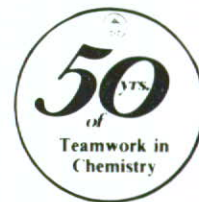


August 1981 Volume 45 No. 4

Chemistry

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Cover: Plasmascan Model 710, Rapid. Scanning Inductively Coupled. Plasma Atomic Emission Spectrometer.

STOP PRESS: The New Zealand Post Office is issuing a special postmark with insignia of the institute for letters posted in the Chemistry Department at the University of Auckland on Monday August 24.

As well, in order to ensure that out of Auckland conference delegates receive their August issue before Conference, copies have been included in their registration packets. Auckland delegates and members not attending Conference will receive the journal through the post in the normal way.

"...An Exciting Period Of Expansion..."

The interwoven histories of our islands, our common language and a shared cultural heritage have forged strong bonds of affection and respect between New Zealand and the United Kingdom. These national links augmented by a mutual concern for the development of chemical science and technology create a feeling of sympathy and understanding between our two organisations. It is therefore with the greatest pleasure that I send from the Society of Chemical Industry the most cordial greetings to the New Zealand Institute of Chemistry on the occasion of its Golden Jubilee. It is wholly felicitous that this year is also the centenary of the Society of Chemical Industry and that we can combine to remember with gratitude the foresight and determination of our founders and to celebrate our histories of success and achievement.

It is pleasing to see that your founding Honorary General Secretary, Bill Joiner, is still actively contributing to your Journal and we would like to extend our congratulations to him. I am sure that it has given him immense satisfaction to participate in the development of the Institute from infancy to vigorous maturity.

It is useful to compare our two organisations which have very much in common but there are interesting differences. The aims of the Society of Chemical Industry are to provide a



William Duncan

forum where major issues affecting the chemical industry can be debated and to facilitate a wide range of formal and informal contacts amongst all those in government, academic institutions and private companies who contribute to the industry's success. It is distinguished from other learned societies by three crucial characteristics.

- ★ It is devoted both to the generation of knowledge and to its practical application.
- ★ It is multi-disciplinary and encompasses all the expertise utilised by the chemical industry, not just chemistry but also physics, engineering, biology and management. Like the Institute it is organised both geographically and by subject groups. These latter range across the whole gamut of topics from fine chemicals, through process engineering and industrial health and safety to biotechnology and management. They provide an extremely flexible way of providing appropriate foci for our activities. It is the interaction of disciplines in these groups which generates much of the dynamism of our activities and stimulates the enthusiasm of members.
- ★ It is international and has members in USA, Canada, the major countries of Western Europe as well as a small number in Australia and New Zealand. It organises regular international meetings both in UK and abroad. For example, the European Section has, since 1975, organised an extremely well attended annual conference. Last year this meeting was held in Switzerland at Zurich and this year it will be held in Germany at Munich. In 1979 we held our Annual General Meeting in North America. The subject groups are also steadily increasing the integration of their activities with those of counterparts in Western Europe and participate in The European Federations for chemical engineering, corrosion and biotechnology.


The Society, like your Institute, promotes an interest in chemical technology by offering prizes at universities for outstanding students and makes awards to those of distinction and eminence in relevant fields. I am delighted in my capacity as Deputy-Chairman of ICI that my company has joined with the Institute to provide two such awards.

The fact that you are 12,000 miles from the location of most of our conferences means, regrettably, that we do not have the opportunity to meet many NZIC members. However, I extend the warmest possible welcome to any of you who travel to Europe to attend our meetings. Your participation would add yet another international dimension to our activities.


New Zealand has embarked on an adventurous and farsighted development programme to exploit its substantial reserves of natural gas. The production of large quantities of methanol, ammonia and possibly later, ethylene and its derivatives will have a tremendous impact on the New Zealand economy. The plans to manufacture gasoline from methanol will not only make you more self-sufficient in transport fuel but will also put you, as the first commercial users of the new Mobil process, in the forefront of chemical technology. You have before you an exciting period of expansion with many opportunities for chemists and chemical engineers to play crucial roles in the construction of a petrochemical industry.

The rapid growth of the petrochemicals industry in New Zealand presages a dynamic decade in the history of the NZIC and I am sure that you will be able to grasp the opportunities offered by a changing world. May I wish you good fortune and a most successful and enjoyable Golden Jubilee year.

Mr Duncan, President of the Society of Chemical Industry, and Vice-Chairman of ICI Ltd., Britain, forecasts a "dynamic" decade in the NZIC's history in this special Golden Jubilee year message. This is the centennial year of the SCI.



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CHEMISTRY IN AUCKLAND

N.G. Thom

Environmental Laboratory, Dept. of Health, Auckland

Auckland, with the largest number of members of the NZIC, has the biggest and most diverse chemical industry. Northland, which extends as far north of Auckland city as Palmerston North is to the south, contains the petroleum refinery and a large cement works, and is an area of great potential.

This article is an attempt to highlight some of the activities of chemists in our area, and is based on responses to letters sent out to various branch members. It makes no claim to be complete. The activities of chemists have been dealt with in 4 categories: teaching and research; industrial processing; public laboratories and research groups; private laboratories and consultancies.

Teaching and Research

The University of Auckland: Apart from the usual courses in inorganic, organic, physical and analytical chemistry, the **Department of Chemistry** offers advanced courses in environmental, structural and radio chemistry. Other departments of the University are also involved in chemistry and biochemistry. In 1980, 45 students graduated with chemistry majors and 16 with biochemistry. At stage III this year there are 87 students enrolled in chemistry and 26 in biochemistry.

Research in the department includes synthesis of diterpenoids; dissolving metal reductions of difunctional ketones; New Zealand natural products — their structure and use as basis for synthesis, e.g. perfumery materials; reactions of diterpenoids and steroids; marine natural products; thallium (I) and electrophilic iodine in organic synthesis; organic reaction mechanisms; new reagents for organic synthesis; synthesis of compounds related to known antibiotics; free radical reactions of benzenediazonium ions; reactions of the trichloro-methylperoxy radical in solution; addition of pseudohalides to unsaturated systems; syntheses of heterocycles; heterocycles in organic synthesis; synthesis and structural studies of organometallic compounds with multiple carbon-metal bonds; studies of complexes and organometallic compounds of the main group metals, especially in low valency states; laser Raman and IR spectroscopy; reaction rates at high pressure of transition metal complexes with oxalate ligands in aqueous media; reaction rates of biological substrates in synthetic and naturally occurring surfactants, particularly bile acids; the corrosion and passivation of metals in aqueous systems; corrosion and surface films on metals in contact with geothermal fluids, with the aim of establishing the

mechanism of corrosion; photo-effects in semi-conductor films; experimental and computer modelling studies of organic reaction mechanisms; x-ray diffraction studies of molecular structure, e.g. organometallic complexes, nature of metal-olefin bonding; interaction of metal ions with ribonucleotides; magnetic and spectroscopic studies of polynuclear and macrocyclic transition metal complexes; ligand field and molecular orbital calculations on such complexes; spectroelectrochemical studies of unusual oxidation states in transition metal complexes; co-ordination chemistry; computational studies of molecular conformation and crystal packing, particularly of proteins and cyclic polypeptides; structures of biologically active molecules; x-ray diffraction of inorganic, and organic and organometallic compounds; complexes of molybdenum with polyhydroxy ligands (including sugars) and compounds of biological interest; labelling of hydrocarbons and lipids in specific molecular sites with tritium; tritium NMR; methods of analysis for trace elements with particular emphasis on speciation; chemistry of arsenic in sediments in Waikato "hydro lakes"; processing of spent nickel catalyst; chemistry of solvent extraction processes.

In the **Department of Cell Biology** chemists are studying: action on DNA of potential anti-cancer agents synthesised at the Cancer Chemotherapy Laboratory, Auckland; mechanism of control of tumour cell growth by cyclic AMP and of plant cell growth by cytokinins; structure and replication of turnip yellow mosaic virus; replication of human rota viruses and reoviruses; genetics of F-plasmid replication; electron microscope studies of the structure of membranes and of junctions between cells; cellular basis of immune response.

Workers in the **Department of Biochemistry** are investigating: tritium labelling of hormonal peptides of high specific activity; haem proteins, particularly haemoglobin; human growth hormone and its structural variants; application of high resolution NMR to biological problems; biosynthesis and degradation of glycogen with emphasis on the role of lysosomes; physicochemical techniques in biology e.g. drug-binding to macromolecules; collagen; biochemistry of cell receptors isolated biological membranes; biosynthesis of hormonal peptides and steroids; enzymatic transformations of steroids in neural tissue; separation methods in steroid and protein

chemistry; electron transfer in anaerobic bacteria; biochemical aspects of cancer in the large bowel; biochemistry of the cell surface in healthy and diseased tissues; chemistry of protease enzymes. The National Hormone Laboratory (see **Chemistry in New Zealand** June 1981) is attached to the Department.

The **Department of Geology** is investigating the following questions of chemical interest: trace elements in New Zealand coals; analysis of geothermal fluids for major and some minor constituents by wet chemistry, flame photometry, AAS and GLC; mineralogical and chemical changes accompanying weathering in the Auckland Province; carbonate rocks in the Pacific; XRF analytical techniques for major and trace elements in silicate rocks and their application to North Island volcanic rocks; chemical stabilisation of roading aggregates and cation exchange capacity of clays in roading materials; major and trace element chemistry of volcanic rocks, particularly North Island rhyolite lavas, andesites and ignimbrites.

Technical Institutes: In the Auckland region, the teaching of chemistry and related subjects are taught for the 5 year part-time NZCS (Chemistry) course at the **Auckland Technical Institute**, **Carrington** and **Manukau Technical Institutes** offer chemistry up to Stage II and Stage III respectively.

Most students enter the course at Stage III level, School Certificate and University Entrance exempting them from Stages I and II respectively. Although ATI has a small full-time intake at Stage III the majority of students are employed in industrial and government laboratories. After this, the controlling authority, the AAVA, requires that all NZCS students must be suitably employed during their Stage IV and V years.

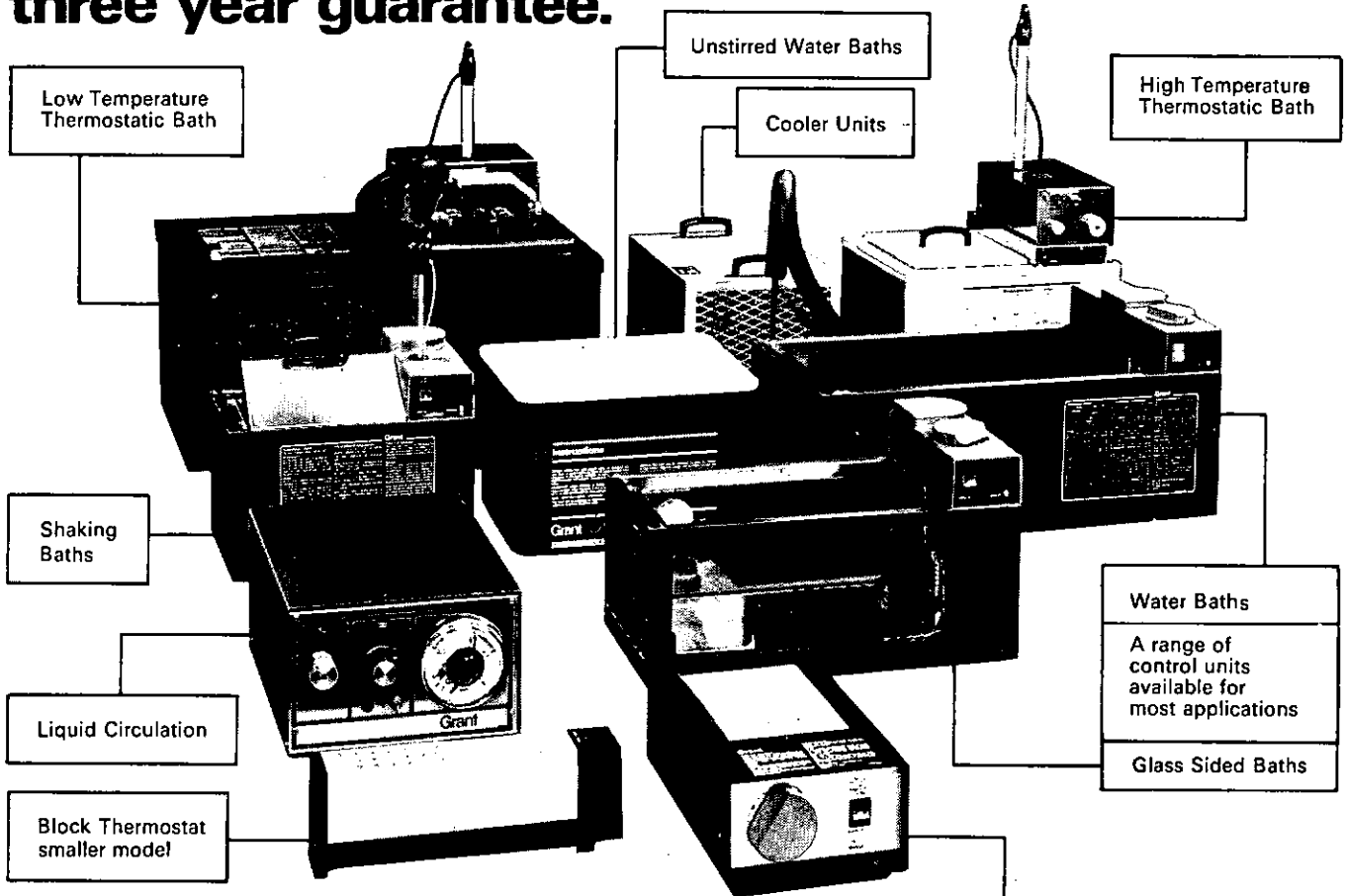
In Chemistry V, as well as the three traditional papers, Physical, Organic and Inorganic Chemistry, students have an option of either Analytical Chemistry or Industrial Technology. The current enrolment at Auckland Technical Institute is approximately 35 students.

Additional courses are provided to extend the NZCS holder's usefulness to his employer and to meet specialised industrial requirements. The post-NZCS Diploma in Science, recently introduced by the AAVA, is based on a supervised project directly related to the student's employment. A 2-year course in Surface Coatings Technology being run in conjunction with OCCA (Oil and Colour Chemists' Association) has enrolled 18 students from the resin and coating industries. Auckland Technical Institute staff and the Australasian Corrosion Association have also been active in running a corrosion technology course.

Auckland Secondary Teachers College and Secondary Schools: A large number of the Branch members are engaged in teaching chemistry and other science subjects at the many secondary schools throughout the area. At the **Secondary Teachers College**, Epsom, there are 20 chemistry graduates enrolled for this year's course. On completion of the 1 year course students can apply for positions anywhere in the country.

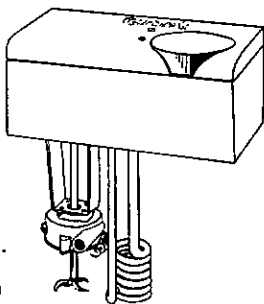
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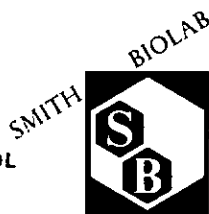
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Industrial Processing

The range of industrial activity in the region is diverse in size, type and complexity. There are several processes that are not operated elsewhere in this country. Examples are the NZ Steel Co's iron and steelworks at Glenbrook, NZ Forest Products hardboard and softboard processes at Penrose, NZ Sugar Co's sugar refinery at Chelsea and NZ Refining Co's petroleum refinery at Marsden Point. Most of the industrial processes rely heavily on chemical services supplied by Branch members.

Food Processing

Food processing and technology is a major activity in the area. Three major meat processing industries are based within the region as are large areas of viticulture and dairy products processing, particularly in the northern regions. The role of chemists in these areas is vital to their success.

With changes to the law (not always on scientific grounds) in recent years, there has been marked increase in the use of margarines and edible oils. **Abels Ltd**, **Aspak Industries Ltd** and **Kaipara Edible Oils Refinery** are three local industries in which chemists are involved. Chemists at Abels are involved in process control, product research and development and quality control. A staff of 10 carries out analyses such as fatty acid analysis by GLC, iodine values and fat consistency using wide-line NMR, as well as the standard wet chemical analyses for acidity, soap content, peroxide value and emulsifier content.

Chelsea Refinery employs chemists and chemical assistants in the laboratory and in the production department, with qualifications ranging from School Certificate to MSc. The main functions of the 6 laboratory staff are raw material analysis, refinery process streams analysis and product quality assurances. The majority of the analyses are of sugars or sugar syrups for sucrose, other constituents, water, colour, pH, crystal size distribution and micro-organisms. Other activities include monitoring boiler water treatment, waste waters and product weight control.

Seven chemists in the production department are responsible for process control and supervision, with emphasis on optimising plant operating parameters while meeting production targets. They are also responsible for the refinery yield, energy consumption and environmental matters, and are involved in development work and the specification of new plant.

Drugs, Pharmaceuticals and Cosmetics

The pharmaceutical industry in Auckland consists of a number of companies manufacturing pharmaceutical products, involving the processing of therapeutic drugs into tablets, capsules and liquids. The minimum requirements for the production of therapeutic drugs to ensure that such drugs are safe, efficacious and of high quality are detailed in "The Code of Good Pharmaceutical Manufacturing Practice" published by the NZ Department of Health.

Graduate chemists and technicians are usually employed in quality control

NZ Oil Refining Company



laboratories. Most of their time is spent in chemical tests on raw materials and finished products to ensure that they comply with the specifications detailed in the Code of GMP. These specifications are normally those of the British Pharmacopoeia (BP), United States Pharmacopoeia (USP) or the European Pharmacopoeia (EP).

Raw materials, comprising the therapeutic drug and excipients, are tested for identity and purity by a variety of chemical means.

Finished product testing varies depending on whether the product is a tablet, capsule or liquid but in all cases the therapeutic drug is identified and its concentration in the product determined by a recognised method.

Specific tests for tablets and capsules to check that they disintegrate when swallowed and release their drug are also conducted. Other tests include appearance, weight, weight variation, moisture, thickness, hardness, and assay checks on individual tablets and capsules to confirm that the drug is evenly distributed throughout the batch. The manufacture of cosmetics is no less exacting than drugs, but the chemist may have more freedom to choose the analytical methods used.

Wood and Forest Products

There are many processes involved in wood, timber and forest products in the Auckland region. Examples are the operations of hardboard processes at Penrose, the particleboard mills at Kumeu and Mt Eden, many veneer processes and the preparation of chemicals for timber preservation by **Hicksons Ltd** at Te Papapa.

At Penrose, chemists employed by **NZ Forest Products** are involved in many activities. The Technical Division maintains a central research and development laboratory to service the research and development needs of all the company activities throughout NZ. The laboratory also houses the main technical reference library.

Some of the chemical work done includes: Wood preservation analysis, organic wood preservatives, foliar soil and water work, water analysis for process use, for boilers, for BOD and contaminants in effluent waters. Directly associated with pulp production comes analysis of cooking liquors, which are

complex mixtures of alkalies, sulphides, sulphites, thiosulphates and sulphonated lignin. A number of other analyses are done on chemical pulps, effluent gases and other facets of this complex operation.

In the manufacture of mineral fibres from rock, many analyses of components containing Na K Ca Mg Fe Ti Mn Al Si are necessary.

Chemically based processes are the subject of continuing work. This includes items such as anthraquinone enhancement of chemical pulping, novel or modified chemical pulping processes, bleaching of pulps using Cl_2 , ClO_2 , H_2O_2 , hypochlorite, O_3 .

Chemicals from biomass are studied, as in the purification of tall oil and turpentine, uses for lignin and lignin compounds and extraction and use of useful chemicals from bark.

Many processes require technical expertise usually provided by chemists: paper, pulp, particleboards, adhesives and pollution control are just a few. Of course quality control, quality assurance, audit testing, development and maintenance of technical specifications for products made and materials purchased all need considerable chemical input in an industry based on chemical processes.

Dominion Oil Refining — Te Papapa:

This company processes about one seventh of all used lubricating oil. It is received from service stations, garages, bus depots and other automotive operations, as well as other types of lubricating oils e.g. from centrifuges. The oils are treated basically with sulphuric acid and bleaching earths to remove carbon, light ends and additives; these last are restored so that the reprocessed oil is equal to or better than the original oil.

At present drastic processes are used to remove additives, etc, but the company is contemplating a scheme by which the oil will be recovered by high vacuum, short-path distillation. This will have a capacity four times that of the present plant.

The laboratory work has the testing of oils for viscosity at various temperatures as a major feature; the oils are also tested for water and other contaminants. Abused oil has a great capacity for holding water — in one

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batch the moisture content fell only from 30% to 28% in one month's settling. Three chemists are employed.

NZ Steel — Glenbrook: The primary activity of company chemists is to check the quality of the feed materials and intermediate products and to maintain final product standards. In iron making the feed materials are coal and primary concentrate and the product is reduced primary concentrate. During steelmaking analyses of the metal bath and final slag are required. Much of the work is done on a 24 hr. basis.

Instruments used include an emission spectrograph, combustion carbon and sulphur analyser, atomic absorption and spectrophotometer, although the classical volumetric and gravimetric methods are still extensively used. Many of the instrumental analyses have been automated.

In addition environmental law requires regular checks on plant waste water and air emission to maintain given quality standards. The other main activity of the chemists is to assist the engineering department in failure analysis and to check that goods supplied meet specifications. As a TELARC registered laboratory, a number of analyses are performed for outside organisations.

Alex Harvey Industries: The diversity of products manufactured by the AHI Group provides both a format for success and a constant challenge to technical staff, who are responsible for product development, quality assurance and troubleshooting. Alex Harvey Industries employs a team of experts in the fields of chemistry, metallurgy, surface coatings technology and materials testing. Chemists are also involved in quality assurance work.

Chemists at the Technical Centre carry out analyses of products such as glass (and its associated raw materials), minerals (including limestone, magnesite, barytes and feldspars), plastics and paper products. Almost all the products manufactured by AHI will, at some time, become the concern of the Technical Centre staff, either as part of a normal quality assurance programme or as a specific problem.

One example of quality assurance work is the testing of PET bottles for the soft drinks market. Polyethylene terephthalate undergoes very slight decomposition during the injection moulding process, one of the products being acetaldehyde. This compound can markedly affect the taste of soft drinks when present in concentrations of more than 4 ppm, and routine tests are carried out by headspace GC to ensure that production is always within specification. As well as straightforward analytical work, the Technical Centre staff are responsible for new product development work and are closely involved with problems which may arise through marketing.

Other Chemical Industries

As indicated earlier there is a very diverse range of chemical activity that industrial members of this Branch are engaged in. Space does not permit detailed description of each of these but possibly one typical example of a

medium sized organisation will suffice. **A.C. Hatrick Ltd** is the largest manufacturer of synthetic resins in NZ. The company has resin producing plants at three locations: Avondale and Otahuhu in Auckland, and at Tawa near Wellington. A continuous process formaldehyde plant is also operated at Avondale. The types of synthetic resins produced in Auckland are, in order of importance: formaldehyde resins, emulsions, alkyds, polyesters, epoxies and urethanes. Speciality surface coating resins, paper chemicals, paint additives and preservatives are also manufactured in Auckland.

Their synthetic resins are mainly used as intermediates in the adhesives, paint, coatings, paper, reinforced plastic and printing ink industries. Approximately half of the resin tonnage produced in Auckland consists of formaldehyde condensation polymers which are primarily used as adhesives in the forest-based industries.

To maintain safe and efficient methods of manufacture, over half the qualified chemists within the company are employed in production-oriented roles as plant managers, supervisors, plant chemists and in quality control.

In common with many NZ chemical companies, A.C. Hatrick undertakes no pure research on synthetic resins, preferring to acquire technical "know-how" and keep abreast of new developments through licensing agreements with large US and European chemical companies. However, to adapt overseas technology in NZ conditions, the company maintains two modern development and technical service laboratories; one for formaldehyde resins and one for surface coating resins, polyesters and emulsions. Emphasis is placed on providing technical service; resin development work being highly customer orientated. Throughout the company there has also been an increasing use of chemists on the sales and marketing side.

Northland Industries

A number of branch members work in industries in Northland. These include the oil refinery at Marsden Point, the glassworks, fertilizer company, meat works and dairy factories in Whangarei and other areas and the cement works at Portland.

The **NZ Refining Co** at Marsden Point operates a large laboratory in which chemists are engaged in quality and process control activities. Chemists are also employed in other aspects of production and research and development.

Wilson's (NZ) Portland Cement Ltd employs chemists concerned with all quality control and chemical aspects of cement manufacture. These include raw material evaluation, plant processes including crushing, grinding, blending, calcining, burning and regrinding of clinker into various cement types. Shift chemists operate 24hrs./day to ensure that NZ and internal company standards are strictly maintained.

Routine laboratory work includes analyses of raw materials such as limestone, clays, iron ore, gypsum, coal and of the final products (clinker and cement) by spectrophotometric methods,

flame photometry, AA and wet chemical methods.

Various research, production and technical investigations are also done to ensure optimum plant performance and productivity. Other work conducted involves energy and pollution control, special products, concrete investigations such as mix design, soil cement, strength and durability testing.

Changing from a "wet" to the more thermally efficient "dry" process at Portland by 1982, will certainly give chemists ample opportunity to test their skills in the chemical engineering and technology fields.

Agricultural Chemicals

Many of the industries providing fertilisers and chemicals for the agricultural industries have groups based in the region. Typical of these is the **NZ Farmers' Fertilizer Co** which is a wholly NZ owned company over 60 years old.

In recent years, the company has recognised the importance of technical participation in management, monitoring of production and checking products. Chemists are an essential part of its staff.

The company regards all qualified technical personnel as potential line managers and junior employees are encouraged to become qualified.

Laboratory technicians must undertake study for the NZCS, holders of which seldom remain in the laboratory; the company employs several as production supervisors in charge of manufacture of chemicals such as fertilisers, aluminium and chromium sulphates. In the fertiliser division, chemists are found at all levels, from works manager to laboratory analysts.

In the company's fertiliser works, the laboratories play an essential role. As well as carrying out analyses of raw materials and partially processed products, they provide the data which confirm that product going out the gate is in accordance with analyses registered under the Fertilizer Act. Several processes concerned with fertiliser manufacture could lead to gross atmospheric or water contamination if not properly controlled, and each works chemist is charged with the responsibility of monitoring effluent streams so that corrective action can be taken.

Other sections of the company deal with manufacture and formulation of products such as herbicides, insecticides, animal remedies and cosmetics. In all these the role of the chemist is important because, in these days of sophisticated, toxic, expensive chemicals for plant and insect control, the professional chemist plays a vital role.

Public Laboratories and Research Groups

Chemical laboratories are operated by the **Department of Scientific and Industrial Research**, **Department of Health**, **Ministry of Agriculture and Fisheries**, **Auckland Hospital Board**, **Auckland Regional Authority** and the joint industry and government-sponsored **Fertiliser Manufacturers' Research Association**.

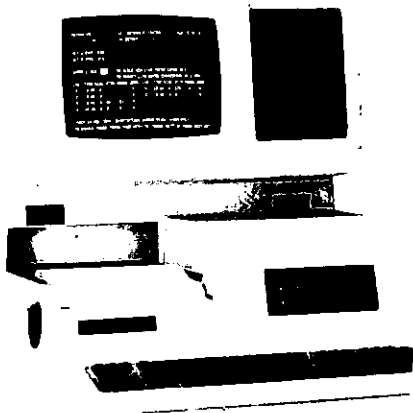
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DSIR, Research Division: An Applied Chemistry Section gives advice to Government Departments and industry on chemical problems especially in fields of plastics, corrosion and hazardous chemicals. Examples of studies arising are plastics packaging (wine packaging), degradation of buried plastics and hazards of using calcium hypochlorite (pool chlorine). Routine chemical testing is done for many client departments including Defence, Works & Development, Fire Service, Post Office, Customs, Health, Railways and Energy.

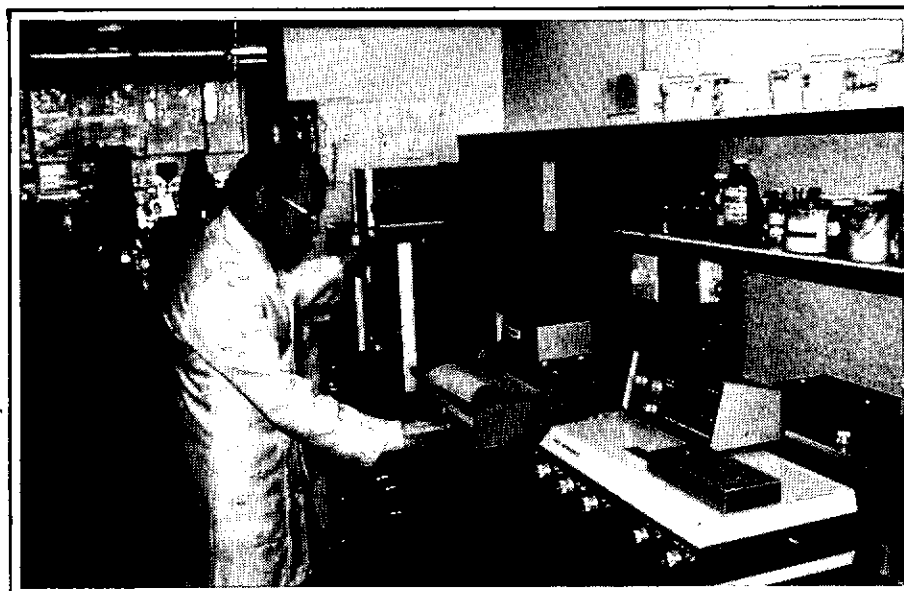
The Food and Water Section acts mainly as chemical consultants for the Departments of Health and Customs. Investigations and analyses of foods include heavy metal and aflatoxin contaminants; colour, preservative, antioxidant and artificial sweetener additives; taste and foreign object complaints; quality and purity assessments for water in wine, fruit juice or milk; fat in cheese, ice cream and butter; meat in sausages and pies; fibre in bread; and vitamin C in fruit and vegetables. Public drinking waters are analysed to World Health Organisation requirements and swimming pool waters are checked. As an analytical reference laboratory, method assessment, advice to industry and collaborative testing originate here. In the Toxicology and Illicit Drugs Section work consists of examination of post mortem samples for drugs or poisons to assist coroner's enquiries, and the analysis of illicit drugs samples for the Police and Customs. Studies arising from this work include immunoassays, chromatographic instrumentation and methodology, and problems associated with the detection of drugs in complex matrices.

By way of contrast, the Criminalistics Section works usually for the Police in extracting information from physical evidence. The work may help in reconstructing a crime, in narrowing the search for evidence, in associating a victim or a suspect with the crime scene or in determining how a crime was committed. Examinations include comparisons of paint flakes, glass, hairs and fibres, tool marks, firearms and body fluids and their stains and analysis of ashes from fires and explosive residues. All results must be presented impartially in court in language that a jury can understand.

DSIR, Division of Horticulture and Processing: The division's Food Processing Section is based at Mt Albert. Its aim is to carry out processing research in an endeavour to increase utilisation of NZ's horticultural produce.

The section draws on a number of scientific disciplines with emphasis being placed on chemistry and biochemistry. Specific areas of research include: aroma components of kiwifruit using GLC/MS; analysis of the extraction and commercial application of actinidin, the proteolytic enzyme of kiwifruit; characterisation of apple juice phenolics using HPLC, and the production of "wine" from kiwifruit.

Chemical methods are developed to evaluate the changes which take place when horticultural produce is processed. There is also a group working on fish,



Abel's laboratory research

particularly on the orange roughie which is found at depths of about 900 metres, and which contains an interesting and potentially valuable liquid wax.

Department Of Health : Environmental Laboratory: The chemical services section of the Environmental Laboratory is particularly involved with the measurement of atmospheric contaminants, either in the ambient air, or within factories. The work involves both routine monitoring and surveys, on-site test work, and methods development. This requires both a well-equipped general chemistry laboratory and also a number of specialist instruments dedicated to the measurement of particular gases in air. Specialist analysers are used for determining CO, NOx, O₃, and sulphur compounds. A portable long path-length infra-red analyser has a wide range of applications for the monitoring of solvent fumes, and the like. Specialist equipment is also available to ensure accurate sample collection, and for calibration of the analysers.

Ministry of Agriculture & Fisheries : Auckland Regional Dairy Laboratory: This laboratory, which has a scientific staff of 4 chemists, 1 microbiologist and 42 technicians, is responsible for the analysis and certification of exported dairy products manufactured in the Northland, Auckland and Waikato regions. The area includes 27 dairy companies manufacturing butter, cheese, milk powders and other dairy products, and 7 milk treatment stations. All scientific staff are appointed analysts and inspectors under the Dairy Industry Act 1952 and the Food and Drug Act 1969.

The analytical work includes traditional wet chemistry techniques as well as instrumental analyses such as GLC, AAS, HPLC and the use of auto analysers.

The laboratory also does research into new analytical techniques and advisory work for the industry on a nation-wide basis. Recent research has included work on sugars, fat-soluble and water-soluble vitamins, manganese, nitrates and nitrites, alkaloids and phosphatase enzyme levels. The Dairy Division has 4 similar laboratories throughout NZ employing a total of 15 chemists.

Auckland Public Hospitals

The work of the chemistry graduate in

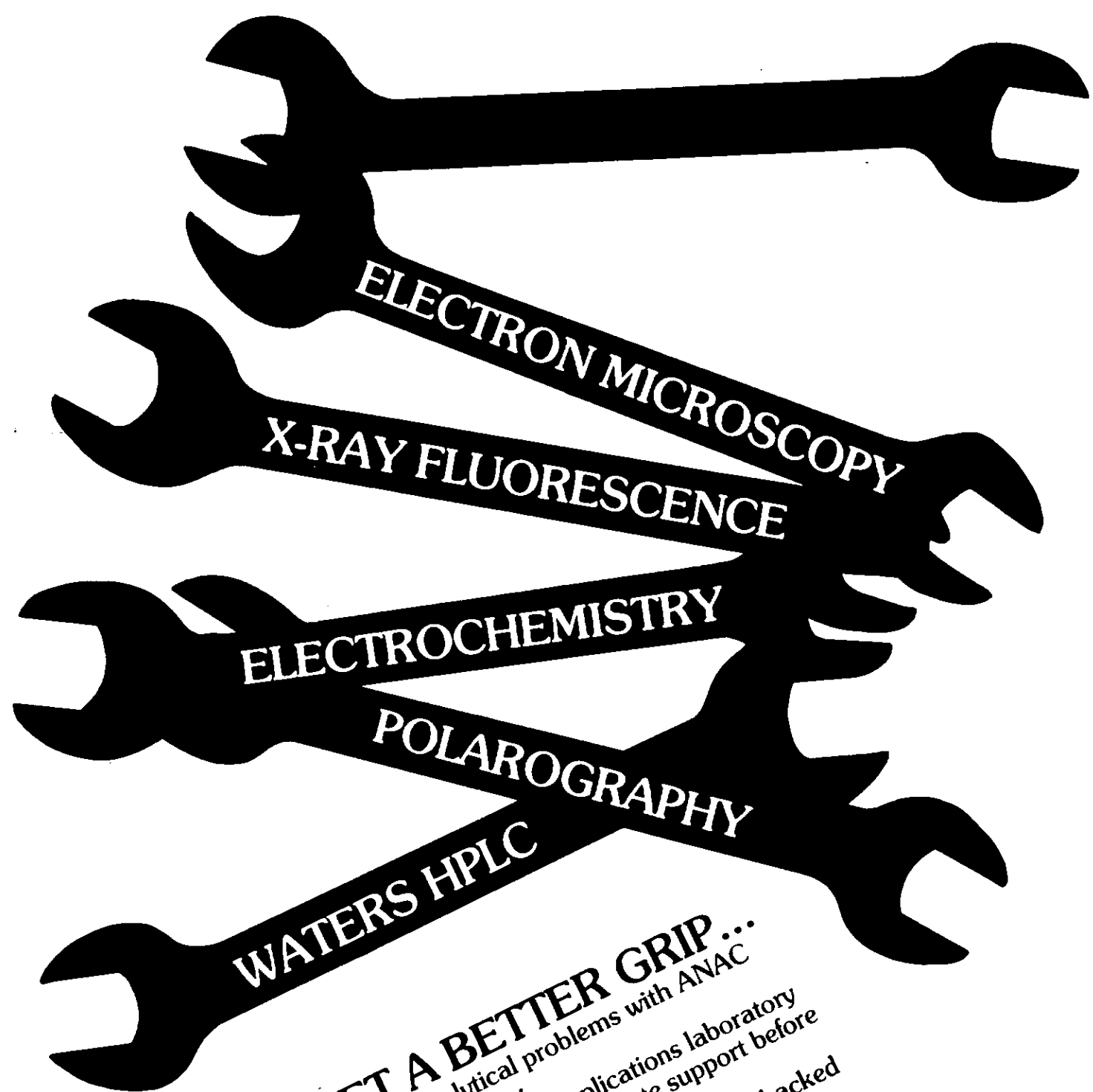
the Auckland Hospital service varies widely. He or she is employed either as a hospital scientist responsible to the chemical pathologist and assessed biannually by a grading committee of representatives from the Department of Health, DSIR and Hospital Boards' Association or as a technologist, after completing 2 years' medical technologist training. Graduates in the Auckland area work in both disciplines, with technologists holding graded positions in clinical chemistry laboratories. Hospital scientists are involved either as general scientists for the laboratory or in specialist work.

As general scientists, the chemists' work involves method troubleshooting and improvement or development and implementation of new methods. Therefore, they must be well acquainted with general methodology and instrumentation for a wide range of techniques.

The chemist who is employed as a specialist has the additional role of consultation with the medical staff and some managerial and administrative duties. Because of the increasing understanding of the quantitative effects of drugs and their metabolites, chemists have been heavily involved in analytical toxicology, such as screening of biological fluids for the presence of drugs or poisons (including heavy metals) and measuring drug levels in blood. A great variety of techniques is necessary, often involving chromatographic separation to obtain the specificity required. Other areas where chemists are involved are in the **Department of Nuclear Medicine** where the work ranges from the preparation of radiopharmaceuticals to the development of radioimmunoassay procedures; in nutrition where trace metals are measured in hair, tissue, blood plasma or urine using atomic absorption or fluorimetric techniques; and in applied research areas on clinically oriented problems especially involving protein and lipid chemistry.

Auckland Regional Authority

The ARA has 3 laboratories, and employs chemists in the two larger facilities that deal with public water supply, the sewage system and environmen-



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tal studies (there are 6 chemistry graduates and several technicians). In addition to their chemical background, the chemists require a working knowledge of biological processes, microbiological techniques, hydrology and chemical engineering.

Techniques regularly used in the laboratories include auto analysis, atomic absorption and a variety of wet chemical methods with either titrimetric or spectrophotometric end points. Analysis of digester gas and engine exhaust emissions is carried out by GLC.

NZ Fertiliser Manufacturers' Research Association (FMRA)

This Research Association was established in 1947 as a joint venture between DSIR and the fertiliser manufacturing industry. Since 1950 it has operated laboratories at the Otago Research Station site near Auckland, currently with a staff of 25 — the majority of whom are engaged in chemical (or chemical engineering) work. Traditionally the industry has been involved almost exclusively with phosphates, but as from 1981 membership will also include the new nitrogen fertiliser industry.

Major research effort is in the field of pure and applied fertiliser chemistry involving the primary plant nutrients (N, P, K, S, Ca), together with minor nutrients (e.g., Mg) and trace elements of agricultural value (e.g., Co, Cu, Mo, Se). The exact chemical and physical characteristics of all raw materials (such as phosphate rock) used, or likely to be used, in NZ must be known, together with the many reactions involved in manufacturing processes. Side reactions are also important as they not only relate to product quality, but may involve environmental problems from the industry's gaseous, liquid and particulate effluents. Fundamental laboratory studies on existing fertiliser systems and those aimed at new product development are extended to the pilot scale and eventually to full scale works experiments. Chemical engineers also perform the usual measurements required for plant operation and design purposes.

Without accurate chemical analysis few of FMRA's activities would be possible. Pride is taken therefore in the quality of all work in this area and in that of physical measurement. Traditional chemical and physical analysis methods, are largely superseded by modern instrumental techniques. Facilities available at Otago include UV/visible and AA spectrophotometry, auto-analysis, X-ray absorption and fluorescence, specific ion electrodes and microscopy.

In addition to the inorganic and physical fertiliser chemistry and engineering involved in the study of manufacturing processes (70% of research effort), soil and plant chemistry is also associated with FMRA's fertiliser use activities to assess the practical value of alternative development products.

Herbage, soil and water analysis for nutrient content is performed to service pot and field scale plant growth experiments so that fertiliser uptake and requirements may be estimated.

The overall aim of FMRA research is to play a role in providing the NZ farmer

with a product of the best possible chemical quality and physical condition at the best possible price.

TELARC

The Testing Laboratory Registration Act of 1972 provided for the establishment of the Testing Laboratory Registration Council (TELARC), the function of which is to promote the development and maintenance of good laboratory practice in NZ. TELARC has its offices in Auckland.

By organising a voluntary nationwide testing programme, TELARC offers the testing community the opportunity to participate in a programme of accreditation based upon the concept of peer review.

Many chemical laboratories in the Auckland area have sought registration with TELARC and have undergone the comprehensive assessment process which precedes registration. The assessment and accompanying technical scrutiny are carried out by people qualified by their personal knowledge and expertise in the field concerned and TELARC has called upon a number of prominent Auckland chemists to act as assessors both in Auckland and elsewhere in the country. Of particular importance in the TELARC programme are the opportunities for exchange of views between those practising in similar fields, through contacts made as a result of participation in TELARC affairs.

For the record there are currently 9 chemical registrations in the Auckland area.

Private Laboratories And Consultants

There are a number of consultants and private laboratories operating in the Auckland area as well as large private pathological laboratories (which will not be discussed here). Several chemists offer consultant services, with very little or nothing in the way of laboratory facilities, but others have very extensive laboratories and even small manufacturing plants. One consultant offers his services as a peak-load worker for laboratories temporarily short of staff.

The largest laboratory, both in area and in equipment and staff available, is **T J Sprott and Associates'** facility. The laboratory has recently been relocated in Newmarket in a new building especially designed and constructed as a laboratory to service the industrial and private analytical and consulting sector. There are few fields of chemical endeavour that are not covered to some extent, the service offered ranging from visiting, discussing, sampling, to analysis, reporting, representing to local bodies or to the courts, to trial manufacturing. Water, effluent, alloys, minerals, timber and wood products, foodstuffs, forensic and microbiological work is undertaken. The value of the equipment available is well over \$250,000 and includes a computer and word processor. For many activities in the analytical and calibration field this laboratory is TELARC registered.

The staff numbers 22 chemists and other technical staff, with up to 6 experienced chemists being available for consultation on specific projects. Supporting office staff number 4.

Flinders Cook (Technical Services) Ltd operates an analytical and consulting laboratory in Auckland city with 4 graduate chemists, and supporting clinical services. Much work is done for importers of bulk parcels of petroleum products, petrochemicals and chemicals, in overseeing quality control during discharge. Staff also act as surveyors to ensure that bill of lading quantities are correct, necessitating going to bulk liquid terminals from Marsden Point to the Bluff.

The laboratory is well equipped to handle quality control of the many chemicals that are surveyed; the group also handles general analyses including pesticides, paints, pharmaceuticals and aerosols. They can be involved at both ends of an industry e.g., providing quality control facilities for the distilleries, particularly in low level impurities of their proof spirit, as well as carrying out second opinion analyses of blood alcohol samples for those charged with drunken driving.

Bioresearches Ltd operates a chemical and microbiological testing laboratory originally established to support the preparation of environmental assessments. The bulk of the work is in the area of natural and potable waters and effluents analysis for which it holds TELARC registration. A staff of around 10 (not all of whom are chemists) also operates extensive sampling equipment, which includes boats, scuba diving gear, underwater cameras and other things not usually associated with a laboratory. Arising from the expertise and laboratory apparatus available, the group has branched out into general public analytical work, and undertakes work in food and beverage analysis (including wines), stack emission testing, quality control, and insurance work, much of this in parallel with a chemical consulting input.

On a somewhat smaller scale **W Grayson** has a laboratory in Onehunga, engaged mainly in servicing the needs of small industries in the surrounding area. These are typically people who operate chemical processes or who make chemical products, but not on such a scale as to need a full time chemist.

Conclusion

Chemistry in Auckland is alive and well, from its source at the schools and tertiary institutions to its end use in industry, government and the general life of our community. The outlines above could have been twice as long, and many more organisations could have been mentioned, but it would have ended up as a small book instead of a journal article. To those people who have not been mentioned, and who feel we have edited their supplied material too rigorously, we apologise, and to those who have supplied material our grateful thanks.

(The author also thanks Mr. L. Stonyer who helped to prepare this Ms.)

Norman Thom is Auckland Branch Editor and a member of the Editorial Committee. He does not feel that there is anything to add to the citation which accompanied his contribution to the Journal in 1979.

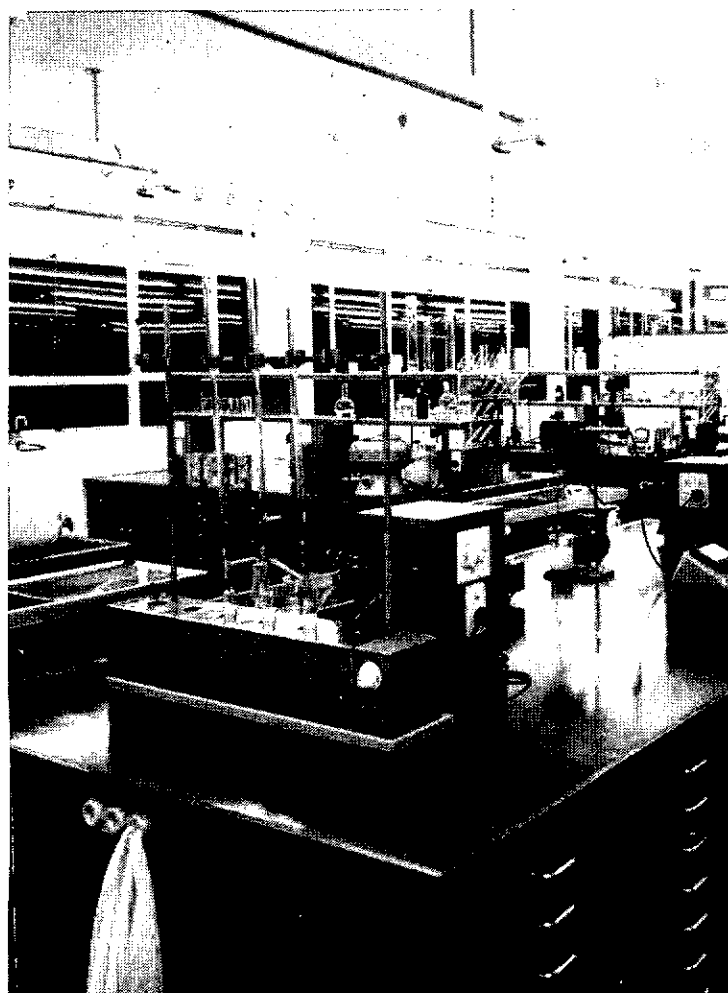
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NZIC ANNUAL REPORT 1980-81

On behalf of the Council we have pleasure in presenting the NZIC Annual Report for 1980-81.

In this our Golden Jubilee year we record appreciation of the great assistance received from branches and individual members in making the many arrangements and creating a wide range of functions and activities. The Institute has always been fortunate in the generous way in which members and their employers have made time available to undertake tasks for the profession. Their assistance and encouragement is gratefully acknowledged.

Honorary General Secretary

Following the resignation of Mr J G Fletcher, Dr J. Rogers who retired as Director, NZ Fertiliser Manufacturers' Research Association in June, 1980, was elected to the position of Acting Honorary General Secretary at the November 1980 Council meeting. Since 1976 Gavin Fletcher has worked enthusiastically and effectively for the Institute as Secretary and members should be extremely grateful to him for his stimulating work in many spheres. Mr Fletcher is now Director, Heavy Engineering Research Association.

Prizes

In 1980 prize winners were: Dr D R Crump, Easterfield Medal; Dr B Halton, ICI Prize; Dr H P Rothbaum, ICI Tasman Ltd Industrial Chemistry Prize; Miss L M Ball, Chemical Essay Prize; Mr P Coman, NZCS (Chemistry) Prize; Mr S J Henderson, VUW, Conference Student Paper Prize.

The Institute is indebted to ICI Tasman Ltd for sponsoring the Industrial Chemistry Prize since 1977 and welcomes the offer of Shell NZ Holding Co. Ltd. to fund the Shell Industrial Chemistry Prize to be first awarded in August 1981. The prize is \$200.

ICI has increased the value of the ICI Prize to \$500. During the year Council also ratified the changes to the ICI Prize rules as suggested at the 1980 AGM.

1980 Conference

The Institute thanks Dr R.D. Reeves (Chairman), Dr M.J. Hardman (Secretary) and the Conference Committee, Manawatu Branch, for the excellent arrangements made for members to meet with the NZ Biochemical Society at Massey University, Palmerston North, in August. Members of the NZ Society for Plant Physiology and of NZ Branch of the Australian and NZ Society for Mass Spectrometry also joined in some sessions. This allowed emphasis of current chemical or biochemical activity on each day.

Professor E. Conn, University of California, USA, Drs J. Edgar and K. Murray, CSIRO, Australia and Dr L. de Galan, Technical University, Delft, Netherlands, were guest lecturers from overseas. A financial surplus from the Conference has been added to the Institute's overseas visitors' travel fund. Council thanks the supply houses who generously supported the Conference with displays.

Jubilee Celebrations

1. **Branch Activities:** Branches have celebrated the Jubilee year in a variety of ways. Most have had jubilee dinners at which other professions and local dignitaries have been represented. Open days at laboratories, and careers programmes for schools have been other common features. In several centres, major feature articles in local newspapers have been arranged in conjunction with industrial advertisement sponsors. Public lectures have been arranged involving both overseas visitors and local chemists. The Waikato Branch organised displays on chemistry in agricultural research and development and a slide/tape show which were well patronised during the field day on June 10 at the Ruakura farmers conference.

2. **Inventors Award:** To mark the Jubilee year, Dr I. Devereux has provided the Institute with an award for the invention of equipment, apparatus, etc. The award will be called the "Rocklabs-Prochem Golden Jubilee Award". A first prize, plus merit awards, are available up to a total of \$2000. Applications for the award will close on October 31, 1981.

3. NZIC — RACI Contacts

a. **Visitors from Australia:** The President issued an open in-

itation to Australian chemists to attend our Jubilee functions in August, through an article in the RACI publication "Chemistry in Australia". Invitations were also sent to the Presidents of sister Institutes in most countries, inviting a representative to attend our Jubilee meeting.

b. **RACI Honorary Fellow:** The President was elected an Honorary Fellow of the RACI during his term of office. This generous gesture by the Executive Council of the RACI is one that could well be reciprocated by the NZIC.

c. **COMO:** A most successful COMO meeting was held in Queenstown in early May jointly with the RACI. Of the approximately 120 participants there was a high proportion of Australians and also visitors from North America and Europe. Professor D A Buckingham and his Dunedin organising group are to be congratulated on such a successful meeting.

d. **Chemeca 81 Conference:** Following discussions with the joint Australia/New Zealand organisers of the chemical engineering conference CHEMECA 81, this was timed for the week following the NZIC Jubilee Conference (August 30 - September 4), which will enable overseas visitors to participate in two major conferences during their visit to NZ).

4. Greetings from Overseas

On the occasion of the 50th Anniversary, the Institute has received many congratulatory letters and a number of illustrated addresses from sister Institutes in many countries. These will be displayed at the Conference.

5. Golden Jubilee Fund

The 1980 AGM decided that a fund should be established during 1981 for the purpose of bringing overseas visitors to NZ. An initial allocation of about \$2000 to this was made by Council from the overseas visitors fund during the year, and there is to be an annual addition by Council.

6. Jubilee Conference Committee

The Institute has been extremely fortunate in an active and effective Jubilee Conference Committee under the chairmanship of Mr A W Mackney. Dr D J McLennan as Secretary has had almost a full-time job over the months immediately preceding the Conference, while the other members of the Committee have all contributed a tremendous amount of work towards setting up the framework for such a major meeting. "Chemistry in the Service of Man" is its theme. Industries employing members of the Institute contributed \$4000 to assist in bringing to NZ the distinguished scientists who are to address plenary sessions. Institute members should let the Committee know just how much their efforts are appreciated.

\$14,000

Publications

1. **Journal:** Despite some difficulties in the production side of the Journal, Mr S G Brooker, Dr A Herd and the editorial team, in co-operation with Mr P Reaves of Tricom, have again done a tremendous job in producing a journal which is of an excellent international standard and contains a good mix of chemistry, information on people, and happenings in various parts of the country. From this August issue publication of "Chemistry in New Zealand" has been taken over by Mr G Le Noel from Tricom. In February issue historical reviews of the Institute's development were featured and the future of chemistry in this country considered.

2. **Book: Chemistry in a Young Country:** As part of the 50th Jubilee celebration Council has published with the support of industry and the Royal Society of NZ, a history of chemistry in NZ. This has been edited by Dr P P Williams and contains contributions from over 30 senior chemists, collated by sub-editors in particular specialist fields. The book traces the development of chemistry in NZ since the mid-1800s, points out the major contribution that chemistry has made in the development of NZ resources, and gives an insight into the problems faced by chemists at different periods. Council decided to make this book available at a rebated pre-publication price until the end of August.

3. Careers in Chemistry

The Canterbury Branch has prepared and published the brochure on Careers in Chemistry, included in this issue, using a financial allocation from Council. Branches have been able to order this brochure for distribution. (Cont on page 126)

ACCOUNT FOR YEAR ENDED 30TH APRIL, 1981.

1980		1980	
\$		\$	
	EXPENDITURE:		INCOME:
	ADMINISTRATIVE EXPENSES:		Subscriptions — Annual 28,680.46
5,688	Honoraria 5,678.33	(20,236)	Sundry — re Use of Mailing List 120.63
2,413	Printing, Stationery, Postages, Tolls etc. 4,368.78		
712	Computing, Address Labels etc. 450.43		INTEREST:
3,357	Travelling Expenses 5,072.04		Bank of New Zealand 1,998.69
1,500	Branch Expense Allowances 1,500.00	615	Local Body Stock 113.76
525	Audit Fee 600.00	144	U.D.C. Finance Debenture Stock 390.51
—	Grant — Fats & Oil Conference 200.00	330	General Finance Debenture Stock —
100	Travel Grant — Chem. Ed. Conference 300.00	294	Marac Finance Debenture Stock 526.07
88	Conference Costs paid by Institute —		
90	Prizes 150.00	(1,383)	
200	Donation — Rutherford Biography —		
	— Asian Chemistry Society 50.00		
40	Subscriptions — Royal Society of N.Z. 70.00		
56	— Common Concern —		
85	— S.A.N.Z. 105.00	<u>\$21,619</u>	<u>\$31,830.12</u>
50	— N.Z.I.E. — Water Research Group —		
109	Depreciation — Office Equipment 118.41		
(15,013)			
			OVERSEAS VISITORS' TRAVELLING ACCOUNT
	PUBLICATIONS:	435	Payments Made 246.57
		1,959	Balance, 30.4.81 2,755.76
		<u>\$2,394</u>	<u>\$3,002.33</u>
4,200	Journal — Publisher 6,418.00		
600	— Honorarium 600.00	649	Balance, 1.5.80 1,959.32
—	Careers Booklet & Sundry Publicity 1,425.00	1,745	Conference Surplus 1,043.01
239	Chem. N.Z. 427.77	<u>\$2,394</u>	<u>\$3,002.33</u>
1,542	Sundry Publications 1,401.01		
(6,581)			
	Less: Revenue from:—		
1,770	Sundry Publication Sales 1,531.20		
(4,811)			
1,795	Excess of Income over Expenditure 4,426.55		
<u>\$21,619</u>			

BALANCE SHEET AS AT 30TH APRIL, 1981.

1980		1980	
\$		\$	
	CURRENT LIABILITIES:		CURRENT ASSETS:
1,246	Sundry Creditors 937.18	149	Cash on Hand 452.00
245	Subscriptions in Advance 536.94	2,808	Bank of New Zealand 5,866.21
	Funds Received in respect of "History of Chemistry" Publication 2,700.00	164	Air N.Z. — Deposit A/c. & Prepaid Travel 464.78
		2,036	Subscriptions in Arrears 2,278.33
(1,491)	TOTAL CURRENT LIABILITIES: 4,174.12	497	Prepayments — Re Conferences 1981 etc. 1,113.54
		551	Sundry Debtors 120.63
1,959	SPECIAL ACCOUNTS:	(6,205)	TOTAL CURRENT ASSETS 10,295.49
567	Overseas Visitors Travelling 2,755.76		INVESTMENTS: (At Cost)
	Easterfield 566.86		North Canterbury Hospital Board
(2,526)	TOTAL SPECIAL ACCOUNTS: 3,322.62	1,000	Stock (5.25%, 1.11.84) 1,000.00
			Lytelton Harbour Board
17,109	ACCUMULATED FUNDS:	1,000	Matured —
	Balance, 1.5.80 18,903.80	500	Lytelton Harbour Board Loan 500.00
1,795	Add: Excess of Income over Expenditure for year 4,426.55		(6.25%, 1.7.98)
(18,904)	Balance, 30th April, 1981 23,330.35	14,000	U.D.C. Group Holdings Ltd. 3,000.00
<u>\$22,921</u>	<u>\$30,827.09</u>		(15%, 19.5.81)
			B.N.Z. Term Deposits —
			Various Terms 12,600.00
			Marac Holdings Ltd. (15%, 19.5.81) 3,000.00
		(16,500)	TOTAL INVESTMENTS: 20,100.00
			FIXED ASSETS: (At Cost)
			Office Equipment 619.41
			Less: Accumulated Depreciation 454.41
			165.00
			Residential Chain 266.60
		(216)	TOTAL FIXED ASSETS: 431.60
		<u>\$22,921</u>	<u>\$30,827.09</u>

We have audited the books of the New Zealand Institute of Chemistry (Inc) for the year ended 30th April 1981, and have received all the information and explanations we have required. In our opinion, according to the best of our information and the explanations given to us as shown by the books of account, the Balance Sheet and Income and Expenditure account are properly drawn up so as to give a true and fair view of the state of the Institute's affairs as at 30th April, 1981.

CHRISTCHURCH: SHANAHAN, WINDER, TOMLIN & CO.
3rd July, 1981, Per: A.J. Tomlin

STATEMENT OF ACCOUNTING POLICIES:

General accounting Principles:
The general accounting principles appropriate for measurement and reporting of profit under the historical cost method are used by the Institute.

Particular Accounting Principles:

1. Depreciation has been charged using the straight line method based on the economic life of the assets.
— Office Equipment and Typewriter 5 years.

NZIC ANNUAL REPORT 1980-81

Elected Officers: President: Dr. A.J. Ellis
 1st Vice-President: Dr. W.S. Simpson
 2nd Vice-President: Dr. D.E. Wright
 Acting General Secretary: Dr. J. Rogers.

Branch Delegates to Council:
 Auckland: Dr. P.D. Boyd
 Waikato: Dr. C.E. Devine
 Manawatu: Dr. E.N. Baker
 Wellington: Dr. B. Halton
 Canterbury: Dr. H.K.J. Powell
 Otago: Prof. P.K. Grant

Officers Appointed by Council:

		date of expiry
Registrar:	D.J. Hogan	31/12/81
Administrative Secretary	Mrs. N.E. Wignall	31/12/81
Journal Editor	S.G. Brooker	31/12/81
Hon. Librarian	S.G. Brooker	31/12/81

Committees Appointed by Council

Membership: Prof. A.D. Campbell (replacing Dr. Rogers) 31/12/81
 Assoc. Prof. D.J. Brasch 31/12/82
 Dr. T.A. Rafter 31/12/83
Publications: S.G. Gray 31/12/81
 Dr. L. Eyres 31/12/83
 Dr. H.K.J. Powell 31/12/83

Energy and Chemical Materials Resources:
 Dr. A. Metcalfe 31/12/81
 Dr. I.D. Watson 31/12/82
 Dr. K.L. Mackie 31/12/83
Public Affairs: Dr. M. Kingsford 31/12/81
 Dr. A.F. Wilson 31/12/82
 Dr. D.M. Bibby 31/12/83

Hazardous Chemicals:
 A.C. Kennett 31/12/81
 R.H. Hopgood
 D.J. Ogilvie

Environment: Prof. R. Lavery 31/12/82
 Dr. G.F. Laws
 Dr. P.W. Larking
 Dr. W.A. Temple
 Prof. A.D. Campbell
Archives: Dr. R.F.C. Claridge
 Administrative Secretary/Registrar.

Representatives to other Bodies:

UNESCO: Dr. G.R. Burns 31/12/81
 RS Member
 Bodies: Dr. D.E. Wright 31/12/82
 SANZ: J.G. Fletcher 31/3/83
 Dr. H.J. Percival 31/3/82
 AAVA C'tee for Science: W. Freitag 31/3/83

Membership:

During the year the following changes in membership have taken place.

Members elected to Fellowship:	19
New Members	25
Re-instated	3
Assoc. elected to Membership	1
Graduates elected to Membership	19
Technician elected to Membership	1
New Associate Members	5
New Graduate Members	25
New Technician Members	6
Technicians elected to Assoc.	5
Resignations	14
Deaths	4
Struck Off	8
Deleted (no address)	4

Consolidated membership figures for the last four years are as follows:

	1978	1979	1980	1981
Auckland	367	345	368	382
Waikato	110	114	113	116
Manawatu	123	126	134	141
Wellington	313	309	319	319
Canterbury	176	183	177	180
Otago	109	110	111	115
Overseas	150	168	182	187
Total	1348	1355	1404	1440

Specialist Groups:

Group	Secretary	NZIC	non-IC	Total
Analytical Chemistry	D.J. Hogan	40	3	43
Biochemical Society	Dr. A.M. Robertson	67	84	151
Chemical Education	D.T. Howarth	154	259	413
Chemical Engineers	E.R. Palmer	no records.		
Chromatography	Dr. J.A. Zabkiewicz	113	73	186
Electrochemistry	Dr. A.J. Easteal	40	27	67
Geochemistry	Dr. J.B. Finlayson	32	95	127* bulk mailings
Organic	Dr. K.E. Richards	86	5	91 not recorded.
Polymer	M.C. Cochrane	54	18	72
Thermodynamics	Dr. D.V. Fenby	no records		
X-Ray Crystallography	Dr. W.T. Robinson	25	2	27
Trace El. & Health	Dr. T.E. Kjellstrom	no records		
Industrial Chemistry	J.R. Yolland	incomplete		19
Inorganic Organo-M	Dr. J. Simpson	no records		

Obituary:

We record with regret the deaths during the year of the following members. D. McClure (Sept. 1979) Dr. C.R. Barnicoat, Dr. B.F. Cain, M.L.H. Stewart.

4. CHEM NZ

Over the last 3 years Council has given financial support to the Education Group of the Institute towards its publication CHEM NZ which has been received enthusiastically by chemistry teachers. Council has re-affirmed its support for this publication by a grant of \$400.

5. Film

In conjunction with DSIR a film has been produced which emphasises the contributions of chemistry to the development of agriculture and agricultural products in NZ. This project has been led by Dr I D Watson and a team from Massey University with Mr J Whalan of DSIR as producer. The title of the film is 'Chemistry for Agriculture' and its running time is about 12-13 minutes. It will be available for loan to Branches from Council and copies may be purchased in either film or video-tape form.

Membership

Branches were encouraged by Council to have a membership drive as a feature of the Jubilee year. In addition, the President is writing a personal letter to this year's chemistry graduates in both universities and polytechnics, pointing out the advantages of membership in their careers and inviting their application for membership.

1. **Student Grade Membership:** Discussion continues in Branches and Council over the conditions for student grade membership. The discussion centres around the extent to which student members should participate in the business of the Institute in addition to their right to attend meetings and receive publications. It is hoped that this matter may be finalised at the August Council meeting.

2. **NZ Diploma in Science:** Council received an approach from the Technical Institutes enquiring whether holders of the recently instituted Diploma in Science would be entitled to full Institute Membership after an appropriate period of professional experience. The membership committee considered this matter and on their recommendation Council has resolved to review the situation after 5 years.

3. **Life Insurance Scheme:** The Council has been able to arrange through the Insurance Brokers Adam & Adam a highly competitive life insurance scheme for Institute members. The scheme is similar to one now in operation for the NZ Institution of Engineers.

Council Committees and Representatives

Council thanks the chairman and members of its Committees and its representatives to other bodies who are listed in Section 1 of this report.

The environmental committee centred on the Otago Branch prepared a submission to the Commission for the Environment on the proposed Petrochemicals plant at Motunui. Their comments centred around the disposal of spent catalyst and lead wastes, and maintenance of local water quality.

Mr W Freitag has been appointed to the AAVA Committee for Science in the place of Dr W E Harvey who has served as an Institute member since 1970. Dr Harvey was elected Deputy Chairman of what is now the Authority for Advanced Vocational Awards in 1972 and made a major contribution to the Authority over an extended period.

Visitors

Dr A. Maehly, Sweden and Dr W. Horowitz, USA were distinguished speakers who visited several Branches during the year in addition to the guest lecturers at the 1980 Conference noted earlier in this report.

Dr I.J. Shearer, Minister of Science and Technology, and Minister of the Environment attended Council's meeting in April.

Fats Conference

Council and the Royal Society of NZ have agreed to sponsor a conference at Auckland in February 1983 on Oils and Fats.

Finance

The income and expenditure account shows excess income at \$4,426.55 which is some \$2,600 higher than in 1979/80. This good result is despite considerable increases in the printing, postal, travel and publications items which were offset by increases from subscriptions and interest. Honoraria were unchanged.

Council when considering the budget in November decided to raise subscriptions for 1981/82 from \$27 reducible to \$25 and \$36 reducible to \$32 if paid by 31/8/81 for Members and Fellows respectively.

The rates are still considerably less than those of sister technical professional bodies.

It is hoped they will allow the Institute's services to members to be maintained despite continuing inflation.

A.J. Ellis (President).

J. Rogers (General Secretary).

NZIC ANNUAL GENERAL MEETING

ANNUAL GENERAL MEETING of the New Zealand Institute of Chemistry 3.45 pm, Monday 24 August 1981 in Room B28, Library Building, University of Auckland.

AGENDA

1. Welcome by the President, Dr A.J. Ellis.
2. Apologies.
3. Presentation of 1980 Easterfield Medal to Dr D.R. Crump.
4. Easterfield Address.
5. Minutes of 1980 AGM to be confirmed.
6. Matters arising:
 - Golden Jubilee Travel Fund
 - Study of vacancies for Chemists and Technicians
 - Company incentives from Government for Chemical Technician Training.
7. Annual Report: See this issue.
8. Finance:
 - 1980/81 Statement of Income and Expenditure
 - 1980/81 Balance Sheet
 - See this issue.
9. Election of Officers:
 - President *from 1/9/81 Dr W.S. Simpson*
 - First Vice-President *Dr D.F. Wright*
 - Second Vice-President *Prof. Ball*
 - General Secretary. *Dr J. Rogers*

10. Awards and Prizes
 - ICI Prize *Dr D.A.D. Parry*
 - Shell Industrial Chemistry Prize *Dr M.S. White (NZFF)*
 - Chemical Essay Prize *B. MacKintosh, Univ. Canterbury*
 - Student Paper Prize.
11. Golden Jubilee Celebrations.
12. Recommendation from Editorial Committee that the inclusion of Conference Abstracts in the June issue of the Journal be adopted as a regular policy.
13. General Business.
14. Presidential Address.

The meeting will be followed by a buffet dinner in the Student Union 6.30 - 7.30 pm where a bar will be open from about 5 pm. Members are reminded of the Joint Meeting with the Auckland Institute and Museum at the Museum's auditorium where professor Max McGlashan, University College, University of London, will speak on "The Role of the Chemist in the Energy Upheaval" at 8 pm. Transport to, and from the Museum after supper, will be provided for delegates at hotels and hostels.

ACCEPTABLE RISKS FROM CHEMICAL MUTAGENS AND PARALLELS WITH RADIATION

P.B. Roberts, Institute of Nuclear Sciences, DSIR, Lower Hutt, New Zealand.

A link between chemical mutagens and cancer-induction is reasonably established. There has been a rapid increase in the number of new chemical products, a significant fraction of which are mutagens, while several familiar chemicals have been shown to be carcinogens. Thus the safety of the work-place and of our general environment has come into question. Although prospective human studies of risk are ethically impossible, recent advances in the detection of mutagens/carcinogens many allow the rapid assessment of chemicals as potential hazards, and a crude ranking of risks may become possible. However, a major problem remains. The existence of a known risk implies a requirement to regulate against that risk. Therefore, a need exists to determine levels of exposure to chemicals that lead to socially acceptable risks. Relatively little has been done to formalise an acceptable risk level for chemicals. In contrast, in radiation-

related industries a general protection philosophy has evolved over 50 years, led by the ICRP. Chemical protection can benefit from experience in the field of radiation protection.

A brief resume of current radiation protection philosophy, the exposure limits and associated risks will be given, and analogies drawn with the chemical situation. The ideas are extended to consider the concept that chemical standards can be based on a radiation equivalence for chemicals. It has been suggested that a given exposure ("dose") to a chemical can be equated to a dose of radiation by comparing the mutations caused. Once a radiation equivalent for a chemical has been established, the principles of radiation protection could be applied to the chemical. The progress, problems and prospects in utilising this concept will be reviewed.

Summary

Radiation protection has had to respond to mutagenic and carcinogenic hazards for many years. The philosophy that has evolved may hold lessons for the setting of standards for the chemical mutagens and carcinogens being revealed in increasing numbers. A common basis for all chemical and radiation risk estimations would be sensible. This article outlines present hopes for the concept of radiation equivalences for chemicals.

About a million chemicals are in use today, a number likely to increase rapidly in the next decade. World trade in chemicals expanded 18% in 1978. Only a small percentage of chemicals are mutagens (i.e., cause alterations to DNA), but this still provides for a vast annual production of potentially hazardous chemicals. The potential hazards to man from any releases to the environment are two-fold. First, when a mutagen affects the reproductive cells of an individual, the DNA alterations produced can be inherited by the off-spring. Such changes can result in an increased risk of spontaneous abortions, serious health defects in the first or second generation or more minor defects that persist for many generations. Second, a link between mutagenicity and cancer induction (carcinogenesis) is likely. About 80% of tested carcinogens are mutagens. It cannot be surprising that the safety of the work-place and our general environment is facing increasingly into question.

Human studies of risk are of limited predictive value because of ethical considerations, poor statistics and exposure to a multiplicity of harmful agents. The recent development of a range of laboratory tests that detect mutagens/carcinogens has been timely. Their cost may be high but they indicate the chemical types which pose a health danger, and a crude ranking of risks from various chemicals may become possible.

However, a major problem will remain. When the existence of a risk is acknowledged, today's society demands that the risk be quantified and regulated. Ideally the use of chemicals should be subjected to risk versus benefit analyses. Risk is, unfortunately, hard to quantify. Some chemicals are already subject to regulations that set allowable exposures at a fraction of a "no-effect level" determined in animal experiments. This approach is adequate protection against gross effects that appear rapidly, and which often require a threshold dose to be exceeded before they occur. It is insufficient for mutagenic and carcinogenic hazards. The reasons include —

- a) the long time that can elapse between exposure and symptoms;

- b) the possibility that there may be no threshold level below which there is zero risk; theoretically, an effect could arise from a single reaction in a single cell;
- c) for many hazards a small individual risk may be run by large numbers of people; and
- d) the impossibility of definitive animal experiments at environmental levels of exposure.

Total safety is unattainable, but the efforts made to formalise a socially acceptable level of risk for such a diverse and widespread hazard as chemicals seem woefully inadequate. In contrast, a comprehensive protection philosophy has evolved over 50 years in radiation-related industries leading to recommendations set by the International Commission on Radiological Protection (ICRP). Protection against chemical hazards can benefit from experience in the field of radiation protection.

Radiation Protection Philosophy

The ICRP was founded in 1928 in response to the obvious harm (burns and tumours) found in early radiation workers. Over the years the causes of concern have changed. In the 1950s thoughts of genetic damage were paramount, only to be outweighed later by the risks of carcinogenesis. At present, genetic and carcinogenic risks are regarded as comparable. Increasing awareness of these risks and the possibility that no absolutely safe threshold may exist has led to the recommended dose limits being lowered over the years ten-fold for radiation workers and three-fold for the public. The latest ICRP recommendations were issued in 1977. There are three 'layers' to current protection philosophy, namely, the justification, the minimisation and the limitation of exposure. To fulfil this philosophy, ICRP states:

- 1) no practice shall be adopted unless its introduction produces a positive net benefit;
- 2) all exposures shall be kept as low as is reasonably achievable, economic and social factors being taken into account; and
- 3) the dose equivalent to individuals shall not exceed the limits recommended.

The chemical analogies for 1- and 2 are obvious. No toxic chemical should be in use unless it produces a worthwhile benefit that cannot be obtained with any less toxic alternative. Where exposures, even if already

low, can be reduced at reasonable cost, then they must be reduced. The complex wording of recommendation 2 allows flexibility to meet the different needs of different countries. For example, developed countries can afford to minimise the use of toxic herbicides, but in undeveloped countries, the benefits in increased food production from the use of a cheap herbicide might be seen as worth a greater risk. Most attention and argument focusses on the recommended dose limits. However, the compliance of any procedure with the recommended limits is inadequate justification for its continuation if to do so flouts recommendations 1 and 2.

The unit of Radiation Absorbed Dose is the rad. One rad deposits 100 ergs/gram. The SI unit of dose is the Gray (Gy) and 1 rad = 0.01 Gy. Dose limits for whole body exposures are set at 5 rad of X- or γ -rays per year for radiation workers. Members of the public are allowed 1/10 of this limit. Provisions are made for the risks to individual body organs and from multiple exposures to be summed so that the total risk does not exceed the risk associated with the whole body limit. Similar procedures would be necessary and possible for chemicals.

ICRP justifies its present limits as follows. When no individual is permitted to exceed the limit, then the average exposure will be considerably below the limit. Experience shows that the average occupational exposure is about 1/10 of the maximum permissible (i.e., 0.5 rad per year). ICRP calculates that the risk associated with the average exposure is an annual mortality rate of 5×10^{-5} for cancer, with a lesser risk of inheritable genetic damage. This rate is comparable to the 10^{-4} mortality rate above which an industry is generally perceived as hazardous. The ICRP risk estimates assume that risk increases in strict proportion to dose received, with no threshold. This implies that any dose, however small, carries a finite risk. The validity, uses and abuses of this assumption, commonly called the linear hypothesis, are contentious issues. However, it permits the risks of low doses (for which information is almost non-existent) to be assessed by direct proportion using the known risks at high doses (e.g., A-bomb and radiotherapy data). ICRP contends that, for all its shortcomings, the linear hypothesis gives a practical, simple approach to the protection problem which does not result in any gross under-estimate of risks.

Historically, chemicals have been regulated by threshold limit values (TLV), a term implying that below the TLV negligible risk is expected. This view is increasingly challenged for mutagens/carcinogens, and more credence is given to a concept of chemical risk along the lines of the linear, no threshold hypothesis used by ICRP.

Radiation Equivalence For Chemicals

The types of DNA damage caused by radiation and chemicals are comparable and often identical. In principle, a radiation dose could be equated to a chemical exposure that produces an equivalent amount of DNA damage. If only the end result is considered, differences in the mechanisms of action are unimportant. Radiation dose is expressed as energy absorbed per gram, and measures the primary damaging events produced per gram of tissue. A fraction of these events leads to the observed biological effects. An equivalent measure of chemical dose is required if radiation and chemical risks are to be put on a common basis. Assuming that chemical damage results from reactions with target molecules, a suitable chemical 'dose' is given by concentration \times time e.g. $\text{mg}\cdot\text{kg}^{-1}\cdot\text{h}$, since this is proportional to the number of damaging events per gram of tissue that results from the exposure. Sometimes the proportionality constant may be simply related to the

rate constant of the damaging reaction, as found for a series of alkylating agents. It has been proposed that chemical 'doses' so defined can be used to assess risk in terms of the exposure that has a biological effect equivalent to 1 rad of X- or γ -radiation. The practical difficulties in assessing equivalence are discussed below. However, if successfully applied, the concept of radiation equivalence has several advantages.

- 1) Chemical exposures could be related to the 5 rad per year occupational dose limitation, a value which has allowed radiation related industries to develop without obviously unacceptable health risks. Suggestions that future knowledge might indicate that lower limits are desirable are not an argument against adopting radiation equivalence now. There is no bar to adopting new limitations as knowledge improves.
- 2) Cancer or genetic illness can be caused by "spontaneous" events or by outside factors including radiation and chemicals. However, individual cancers or illnesses cannot be attributed to a particular cause. A unified approach to radiation and chemical hazards is, therefore, logical and desirable, and a common

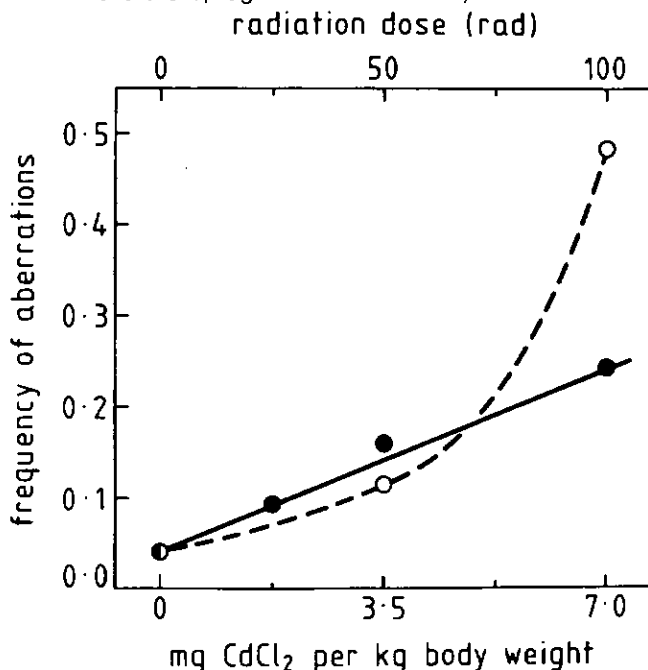


Fig 1. The frequency of chromosome aberrations in mouse bone marrow cells exposed to different doses of, \circ , radiation or, \bullet , CdCl_2 by injection. The figure has been obtained from data given by Muramatsu et al., in Radiobiological Equivalents of Chemical Pollutants, I.A.E.A. (Vienna), 1980, p.61.

unit for the different hazards must follow. Our greater experience with radiation risks makes the rad the obvious basis of a common unit, though in principle a chemical standard is possible.

- 3) Given a common unit for risks, it becomes feasible to sum the risks from exposure to a multiplicity of agents. We are all exposed to a variety of hazards. It makes sense to adopt an approach which can consider overall risk rates rather than the present 'hazard of the month' approach.
- 4) The radiation equivalence concept would aid decisions concerning alternative procedures (e.g., radiation or chemical sterilisation of medical products, chemotherapy or radiotherapy, fossil-fuel or nuclear power stations?)

A Simple Example: Fig 1 shows the the frequency of chromosome aberrations induced in mouse bone mar-

row cells by X-rays or an initial dose of injected CdCl₂. The time factor in the chemical exposures is assumed constant. The response curve is reasonably linear for CdCl₂ but linear only over the low dose region for X-rays. Comparing the two curves in the linear regions suggests that injection of 1.75 mg/kg CdCl₂ is equivalent to about 50 rad or 35 μg/kg is the rad equivalent.

Major Problems In The Concept Of Equivalence

These are discussed more fully in the further reading recommended at the end of the article.

1) **Chemical dosimetry.** Radiation doses can generally be assessed accurately. Unlike radiation, chemicals are subject to permeability barriers and metabolism and no two chemicals behave identically in the body. Frequently a metabolite is the true toxic agent. The common measures of chemical exposure are initial mg per kg body weight or concentration (mol.dm⁻³ or ppm) x time in the surrounding medium or atmosphere. They do not relate simply to the required chemical 'dose', i.e., the time-integrated concentration ($\int c.dt$) of the toxic material in the target cells. Calculation of the true dose requires knowledge of the absorption, retention, metabolism and transport within the body of various classes of inhaled or ingested materials. Such knowledge has been obtained by ICRP to assess the risks of radioactive material taken into the body. However, such considerations must exacerbate species differences and make the extrapolation of experimental data to man tentative.

2) **Mutation spectrum.** DNA damage takes many forms (e.g., strand breaks, chromosome aberrations, base changes or shifts). Although chemicals and radiation produce similar lesions, the proportions of each type produced by different agents (the mutation spectrum) can vary widely. The spectrum is also modified by such parameters as the stage of the cell cycle at the time of exposure and by DNA repair mechanisms. The latter can be influenced by species, and by the direct action of some chemicals. Thus the equivalence obtained may depend heavily on the endpoint and species used, which again makes extrapolation to man tentative.

3) **Extrapolation from experimental to environmental exposures.** Few endpoints of damage are sufficiently sensitive to be detected at the levels of toxic agents found environmentally. The effects of small amounts over long periods (chronic exposure) must be estimated from effects found at high doses given briefly (acute exposure). Extrapolation from high to low doses requires knowledge of the shape of the dose-response curve. If linear response curves can be assumed for the both radiation and a chemical, then an equivalence found at one dose level applies to all dose levels. Unfortunately, the shape of dose-response curves is likely to vary for different hazards and for different endpoints (Fig 2). Frequently the curves to be compared are neither linear nor even similar in shape. Therefore, equivalence can be dose dependent.

Chronic radiation exposure to X- or γ -rays induces damage about three-fold less efficiently than acute exposures. This is due to cell repair mechanisms. The effect of dose rate on chemical damage will be more variable due to differences in mechanism, metabolism and repair capability. At present we must extrapolate from acute to chronic chemical exposures using the assumption that the effects of both are determined only by the product of concentration and time. In other words, 100 μmol.dm⁻³ for 1 hour has the same effect as 0.01 μmol.dm⁻³ for 10,000 hours (about one year). When tested, this assumption is generally valid over only limited ranges of concentration and time.

Problems such as the above lead some people to conclude that the concept of radiation equivalence is unworkable. This attitude forgets that similar problems will attend any assessment of chemical risk. Many of

besides chemical products from our overseas parent and associate companies, we also have speciality products with technical expertise on their usage from the following overseas manufacturers:-

ALOX	<i>Anti-rust products</i>
AMAX	<i>Phosphate and Potash fertilisers</i>
ASAHI	<i>"Avicel," Microcrystalline Cellulose</i>
COMALCO	<i>Aluminium Paste and Powders</i>
CROWN ZELLERBACH	<i>Lignosulphonates</i>
ELCO	<i>Oil and Grease additives</i>
EMULSION AS	<i>Food Emulsifiers</i>
ESCON	<i>Urethane Polyols</i>
HEFTI	<i>Emulsifiers and Surfactants</i>
HODAG	<i>Antifoams and Polyglycols</i>
KUHLMANN	<i>Commodity Chemicals</i>
LONZA	<i>Amines and Amphoterics</i>
NYMA	<i>Carboxy Methyl Cellulose</i>
PYRION CHEMIE	<i>Broad Spectrum Biocides</i>
RAYBO	<i>Paint Additives</i>
SPRAYLAT	<i>Strippable Coatings</i>
SUMITOMO	<i>EVA Copolymer Emulsions</i>
SWAN	<i>Cationic Bitumen Additives</i>
UPJOHN	<i>Urethane Resins</i>
WESTVACO	<i>Tall Oil Derivatives</i>



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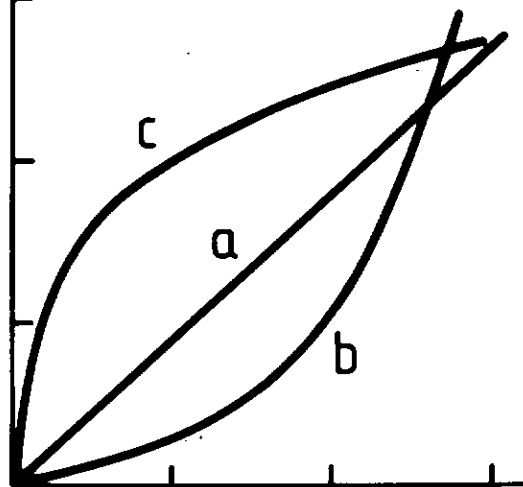
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biological response



dose

Fig 2. A representation of different possible dose-response curves. a, response is proportional to dose (so-called linear response). b, response is proportional to a power function in dose, where n is greater than 1 in the expression $\text{Response} \propto (\text{dose})^n$. c, as b but n is less than 1.

these problems plagued radiation risk assessment but did not prevent the development of protection criteria. Indeed they may have prompted much research and useful discussion. A more tenable argument is that numerical values for equivalent risks may give a false impression of certainty. This must be overcome by open discussion of the uncertainties involved.

The Prospects

Subject to the difficulties mentioned, radiation equivalences have been obtained already for formaldehyde, ethylene, ethylmethanesulphonate, benzo (a)pyrene, vinylchloride, cadmium and several chemotherapeutic drugs. No single value for any chemical is established yet, since values depend upon the species, endpoint and even the dose levels compared. At present a range of tests is necessary from which we can gradually expect to improve our interpretation of the data obtained. In the meantime, the oldest tenet of protection must apply. When in doubt assume the value that emphasises the risk.

The concept of radiation equivalence has several important contributions to make. It can unify assessments of different hazards. Experience from radiation protection should provide guidelines for chemical protection. Findings from one field can be applied to the other, speeding progress in both. Finally, it draws attention to the current empirical nature of standards for chemical carcinogens and mutagens, and suggests one method of improving the situation.

Further Reading

The concepts and data discussed can be found in publications of the ICRP, particularly Annals of the ICRP, Vol. 1, No. 3, 1977, and in two symposia on radiation equivalence. They are First European Symposium on Rad-Equivalence, Commission of the European Communities (EUR 5725e) 1977, and Radiobiological Equivalents of Chemical Pollutants, An Advisory Group Meeting, I.A.E.A. (Vienna) 1980.

Born and educated in N Wales, Peter Roberts took his degrees at University College, Cardiff. After 2 years post-doctoral work in the Chemistry Dept at Cornell University, he spent 4 years at the Institute of Cancer Research, London. He joined INS in 1974, and is interested in the biological effects of radiation and in the influence of chemicals upon the radiation response.

Golden Jubilee Award Is Richest In NZIC History

Chemists who have invented or improved laboratory apparatus, chemical equipment, useful gadgets etc could achieve recognition this year through the **Rocklabs-Prochem Golden Jubilee Award**. It is being sponsored by two Auckland firms, **Rocklabs** and **Process-Ed Chemicals Industries Ltd (Prochem)**, both of which have developed chemical equipment in the last few years for NZ and world wide markets

The Institute has offered awards for many years for academic and industrial research, but may be the first of its kind in the world — to honour those who help make the chemist's life an easier one, with new and better equipment. Entries are sought from anyone working in the chemical sciences anywhere in the world whether NZIC members or not. Inventions could be anything from a bent pin to a computer controlled nuclear powered alarm. Success will be determined by how useful the device is and how novel the idea, not how sophisticated or complicated it might appear.

The sponsors hope the award will stimulate chemists to look at the commercial possibilities of their ideas. "If any entrant would like to consider manufacturing his or her new device, we will be pleased to help in any way we can, but I would emphasise that there is no requirement for entrants to have any association with the sponsors during or after the award", said **Dr. Ian Devereux**, Rocklabs founder and manager. "We have no idea how the award will be received but if there is a good response, we will consider sponsoring it on a regular basis, say every 2 to 5 years".

Details are:

1. The award shall be made for the

development of any novel device, machine, apparatus, etc in any branch of chemistry that has not been put into commercial production. (The sale of prototypes shall not exclude an entry). Entrants shall provide a brief summary of the development of their device and its application to chemistry and all entrants shall provide a signed statement that he/she/they actually developed the device.

2. Where possible, entrants should provide a sample of the device, but entries consisting of drawings and written description are acceptable.
3. The award shall be open to any one working in the chemical sciences whether NZIC member or not.
4. The award shall comprise a suitable certificate plus a cash payment of at least \$NZ1,000. Merit prizes may also be awarded to a total value of up to \$NZ1,000. (The total prize money offered is \$2,000 but the judges may limit the prizes if sufficient entries are received. The judges shall decide on the division of the prize money).
5. The award shall be judged on the usefulness of the device to other chemists.
6. Entries may be the subject of patents.
7. Three judges shall be appointed by the NZIC, to include one nominee of the sponsors who shall be a member of NZIC.
8. While one of the purposes of the award is to publicise inventions, all entries that are to be the subject of future patents applications, will remain confidential to the judges.



The NZIC is very grateful to Dr Ian Devereux, an active member for many years and one who himself has been successful in commercialising some inventions, for offering what is by far the most valuable award in its history.

The officers of the Institute are most grateful that in its Golden Jubilee year, Dr Devereux has shown his confidence in the NZIC in such a generous fashion.

9. Entries may be made by two or more people, jointly and any prize money may be shared as the entrants decide.
10. Entries close at 4 p.m. on October 31, 1981 and the awards will be announced in December 1981.
11. All entries must be forwarded to The Registrar, NZIC, P.O. Box 1926, Christchurch, New Zealand.

The sponsors will be exhibiting their own equipment at the trade exhibition associated with the Golden Jubilee Conference in Auckland and invite all entrants to bring samples or drawings of their entries for display on the sponsors' stand.

NEW PRODUCTS AND SERVICES

WATER HANDBOOK

A comprehensive handbook on water uses and needs and claimed suitable both for specialists and for those dealing generally in water-related problems is available from **Catoleum Pty. Ltd.**, Auckland.

The **Nalco Water Handbook** provides information in the 4 major water conservation and use areas: water chemistry, sources and contaminants; unit operations and treatment; industrial and municipal use of water and its disposal; and special technology in water treatment.

Every aspect is said to be covered in this publication, which sells for \$49.95

CONDUCTIVITY DETECTOR FOR HPLC.

Wescan Instruments has released its model 213A conductivity detector for HPLC. The 213A is a universal detector for ions in solution with high sensitivity and good reproducibility. With this unit and appropriate column virtually any HPLC system can be used to rapidly quantify submicrogram amounts of

specific ions in simple and complex samples. The unit is completely self-contained, has low dead volume, adjustable temperature compensation and advanced electronics. More information is available from the NZ distributors, **Wilton Scientific Ltd.**

NEW PUMP RANGE

Neill, Cropper & Co. Ltd has been appointed NZ representatives for **Peabody Barnes, Ohio, USA**, one of the larger pump manufacturers in that country. It specialises in wastewater, sewage, effluent and sump pump; in addition it manufactures a wide range of deep well pumps and progressing cavity pumps.

Currently sewage pumps are available up to 6" discharge and 48hp along with a full range of accessories including patented slide away couplings. Explosion proof motors are available if required.

Deep well pumps from 4" to 10" diam with motors up to 75hp are also available to handle a wide range of applications from domestic supply to large commercial installations.

CENTRIFUGE ADAPTED FOR BLOOD PROCESSING

Beckman Instruments in California has introduced a version of the J-6B centrifuge, the J-6B/P, designed for blood component laboratories.

The J-6B/P features a lockable control panel. In order to assure uniform preparations, the settings of time, speed and degree of braking cannot be changed without unlocking the control panel cover. To operate the user presses two buttons, one to reset the timer and another to start the run.

A two-step brake decelerates the rotor rapidly until it reaches a predetermined low speed, then switches to the degree of braking established by the operator. This feature cuts the run time while preserving the separation. An audible alarm and a panel light provide signals when its time to unload the rotor.

The J-6B/P incorporates the features of the J-6B, including quiet operation, a choice of four or six place rotors and convenient blood bag cups.

More information, can be obtained from **Beckman Instruments**, in Fullerton, California.

UNIVERSITY NEWS

Victoria

Dr Alan Clarke, Biochemistry Department, has returned from research leave spent at the Courtauld Institute of Biochemistry, London, and North Carolina State University. The US component of the tour was under the auspices of the Fulbright scheme. **Prof. Neil Curtis** (Chemistry) has also returned from leave, this time spent at the Australian National University. **Dr Alan Freeman** has now left for his leave period to be spent at Cambridge University.

Dr Dennis Nelson, a Ph.D student, attended the 59th Annual Meeting of the International Association for Dental Research in Chicago in May. While there he was awarded first equal place in the student papers competition for the Edward Hatton Award. To win this award, Dr Nelson first won the competition sponsored in NZ by Colgate-Palmolive and then the Australasian Colgate research prize.

Dr Brian Halton has been awarded a Fulbright scholarship for his research leave at the University of Utah which commences in October.

Massey

The Vice Chancellor, **Sir Alan Stewart**, became a KBE in the recently announced Queen's Birthday Honours. For Sir Alan, the honour comes after 21 years as academic and administrative head of the University, and is recognition of the

significant role he has played in its growth and development. He was awarded a CBE in 1972.

His association with Massey began firstly as a student studying for a masters degree in agricultural science and later as a lecturer and senior lecturer, prior to taking up his appointment as Principal of Massey Agricultural College in 1959. Sir Alan gained a D.Phil. degree at Oxford University as a Rhodes Scholar and, in the early 1950s left university life to become the Milk Marketing Board's chief consulting officer in England and Wales.

Prof Keith Syers, head of the Department of Soil Science, has been elected Fellow of the Royal Society of NZ for his work on the use of phosphatic fertilisers. He recently received a research grant from Winstone-Dalgety Ltd. to carry out a phosphate rock evaluation study.

Prof Graeme Fraser, professor of sociology, was recently reported to have been appointed by the Minister of Science and Technology, **Dr Ian Shearer**, to head a special inquiry into the forensic services of the DSIR. The inquiry arises from certain judgements by the Thomas Commission, and could have implications for the Kessell case.

Department of Chemistry, Biochemistry and Biophysics

Prof Geof. N. Malcolm and **Drs Ian D. Watson, Trevor Kitson** and **Andrew M.**

Brodie presented lectures and participated in a panel discussion during a recent one day inservice course for chemistry teachers in the Hawkes Bay. The course was held at the Havelock North High School.

Dr David A.D. Parry recently attended the 1st International Conference on the Chemistry and Biology of Mineralised Connective Tissue, held in Chicago. At the Conference Dr Parry presented two papers (co-authored with **Mr Alan Craig** of the Applied Biochemistry Division, DSIR) and chaired a session on the structure of collagen. After the Conference he visited **Dr Brodsky** at Rutgers Medical School, New Jersey and **Prof Larry Smillie** in the Department of Biochemistry, University of Alberta in Edmonton, with whom he is doing collaborative work on collagen and muscle proteins respectively.

In August Dr Parry will attend the Gordon Conference on Keratin, to be held at the Tilton School in New Hampshire, USA. He will then visit various research establishments on the US east coast.

Dr P. Jain from the University of New Delhi, India, is undertaking post-doctoral research with **Dr Roger D. Reeves**. She will be working on aspects of the spectrophotometric determination of precious metals.

Mr S.J. McLauchlan, a recent graduate of the Department, is now at the University of California at Davis studying aspects of NMR spectroscopy for a PhD degree.

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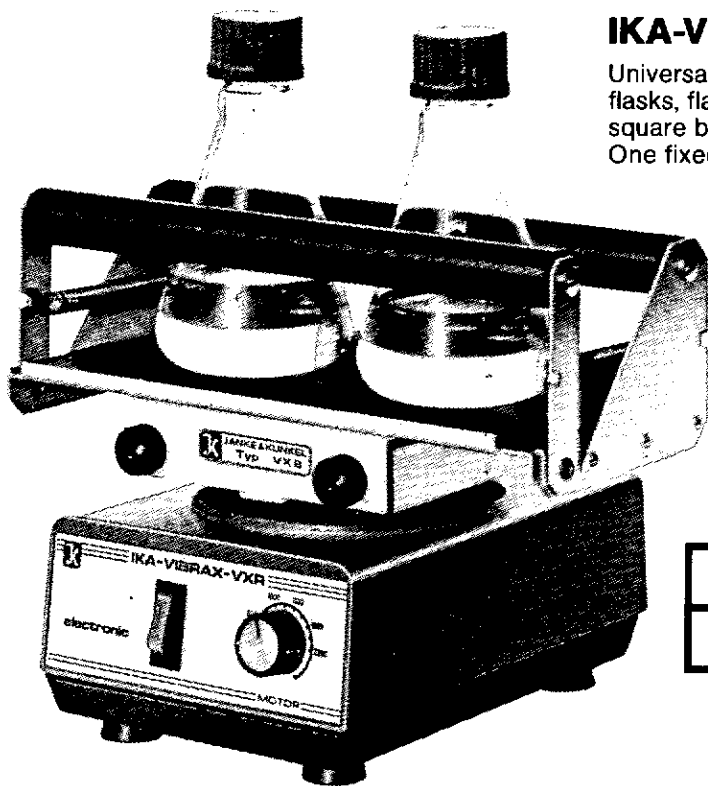
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BRANCH NEWS

Wellington Branch News

The May meeting was a very well attended dinner meeting which included the Presidential address by **Dr A.J. Ellis**, Assistant Director-General, DSIR, on "Resources and Resourcefulness". Because it is the Institute's Jubilee year Dr Ellis thought it appropriate to review some of the ways in which chemistry had helped in defining and utilising NZ resources, both natural and cultivated. He selected particular research and development areas (e.g. meat, dairy, wool, iron, fertilisers and building materials) and commented on the chemistry, the people, and the organisations at different periods of the Institute's history.

Mr A.A. Turner, Technical Manager, Shell Oil (NZ) Ltd addressed the June meeting on "Squeezing the Barrel". He pointed out that in the short and medium term NZ will still be dependent on crude oil imports. He reviewed alternative fuels and described the influence a chemist can exert on the specifications of liquid fuels and the selection of refinery processes which will make our crude oil go further.

The Branch Committee are delighted to announce that the Branch Treasurer, **Mrs Claire Caradus** gave birth to a baby boy, Mark, on Anzac Day.

Jubilee Activities

The Wellington "Evening Post" ran an advertising supplement with the heading "Golden Jubilee celebrated" the evening before the May Presidential address. Aspects of the institute covered by the feature material included outlines of the history of the institute, its objectives, its activities, and its membership categories. Also included was a profile of the President, Dr A.J. Ellis, and

a section on the "active local branch".

During the early part of May Shell Oil (NZ) Ltd screened a film "The Prepared Mind" in their theaterette in Wellington, referring to the NZIC Jubilee in their publicity for the film. This new film described the valuable work of research chemists and scientists in improving standards of living.

A static (board) display covering chemical subjects of general interest and publicising the NZIC has been prepared from DSIR Chemistry Division source material. It has already been mounted for 2 weeks in one local library and will be shown at other venues during the year.

Auckland

Dr George Clark and **Neil Edmonds** report that the Education subcommittee of the Auckland Branch coordinated a successful education mini-symposium "Selected Topics from University Entrance and Bursary Syllabi", held at the Chemistry Department, University of Auckland, on June 24.

The programme included: 1. Demonstrations designed to stimulate student interest in chemistry. 2. The teaching of metallic and ionic crystal structures and demonstrations of model construction. 3. Experiments in inorganic chemistry relevant to UEB syllabi. 4. Pooling of experiments.

The symposium was attended by 89 teachers from 251 Auckland area secondary schools and the Auckland Secondary Teachers College. The enthusiastic response from teachers would suggest that such meetings should become an annual event.

Manawatu

Dr A. Jim Ellis gave his Presidential

Address to the Branch at its Jubilee Dinner on May 26. He reviewed the progress of chemistry in NZ from the 1850s to the present day, with a brief look into the future. Dr Ellis covered a wide range of topics in his address. These included trace element deficiency studies in soils, mineral exploration and exploitation and cement chemistry. Many aspects of processing in the agricultural and horticultural industries were also discussed. In many instances, a long time elapsed between the initial proposals and early research work and the final commercial utilisation of specific processes. This was particularly true for the utilisation of geothermal energy and of iron sands. The work of many famous NZ chemists, whom some members of the audience knew personally, was reviewed by Dr Ellis.

Dr Cecil B. Johnson presented the 1981 Manawatu Branch Chairman's address to Taranaki members, at Ivon Watkins — Dow Ltd., New Plymouth on June 29. He first discussed the possibility of New Plymouth hosting a future Annual Conference of the Institute. His main topic for the evening was "Tallow. Its Composition and Uses — Present and Potential". Dr Johnson indicated that the manufacture of many important industrial chemicals (eg. lubricants, plasticisers, disinfectants, wax esters etc.) by an integrated chemical process could provide NZ with a valuable tallow-based industry. He also described recent collaborative research on the use of monoesters derived from tallow as a diesel extender or diesel substitute for compression combustion engines. At the completion of the address, the appreciative audience provided a lively discussion on many points of interest.

GOVERNMENT DEPARTMENTS

DSIR Chemistry Division

The Director of Chemistry Division, **Dr G.J. Leary** has been to Sweden to attend the 'EKMAN DAYS' International Symposium on Wood and Pulp Chemistry.

Mr W.A.J. Mahon has left the Wairakei laboratory to become DSIR Geothermal Coordinator. **Dr R.W. Henley** takes his place as Officer in Charge of the Wairakei laboratory.

Dr C.D. Stevenson, Water Laboratory, has been appointed Group Leader responsible for the Water and Geothermal Sections at Chemistry Division. **Dr Clair Tunnicliff**, a recent graduate from Otago University, has been appointed to the Water Laboratory.

Dr T.D.R. Manning, Forensic Section, has spent 5 weeks visiting laboratories in USA, Canada, Sweden and UK. During his trip he attended the International Association of Forensic Sciences Conference in Norway.

Dr M. Lawton of this Section has also returned after study leave in Britain.

Miss Y. Van Hoogenhuyze has been appointed to the Toxicology Section where she is assisting with the computer operations.

Dr D.R. Crump, Organic Section, has returned from study leave in USA. Ms

C.M. Sheppard, from the Wellcome Research Laboratories in England, has joined this Section.

Dr C. Vilain, from the University of Liege in Belgium, has a post-doctoral fellowship at the Division for 5 months studying chemotaxonomy.

Two recent seminars organised by the Division were "Protein Crystallography" by **Dr E.N. Baker**, Massey University and "Surface Coatings" by **Mr K.W. Dalzell**, Chemistry Division.

Institute of Nuclear Sciences

The Accelerator Physics Section has now received all the parts required to reassemble a 6 MeV Tandem Van de Graaff accelerator purchased from the Australian National University. When housed and running in its new quarters early next year, the accelerator will be used for research into sensitive new dating methods, principally carbon-14 dating but including Beryllium 10, Chlorine 36, etc. The versatile machine will also be used for elemental analysis and can produce a wide range of short-lived isotopes for use in the agricultural, biological and industrial sciences.

A recent seminar "The Beginning of the Bomb-effect in Atmospheric C-14

CO₂ and the Case of the Travelling Resin" was given by **Mr H.S. Jansen** of the Institute.

Soil Bureau

Dr Kevin Tate has returned from a year spent at Rothamsted Experimental Station, near London. He worked on a method for estimating the ATP (adenosine-5-triphosphate) content of soils as a measure of microbial biomass in soils. He also attempted nucleotide (e.g. ATP, ADP, AMP) fingerprinting for determining the stored metabolic energy in the soil microbial population.

Central Institute of Technology

A seminar "The Co-enzymes and Early Life" was given at CIT by **Dr Geoff King**, of Physics and Engineering Laboratory, DSIR.

BRANZ

Mr R.E. Humphreys has been appointed Contracts Manager. Mr Humphreys was formerly an Appraisal Officer, and in his new position will be responsible for coordinating and administering external research contracts.

Dr R.S. Whitney presented a paper entitled "Roof Paints — Five Year

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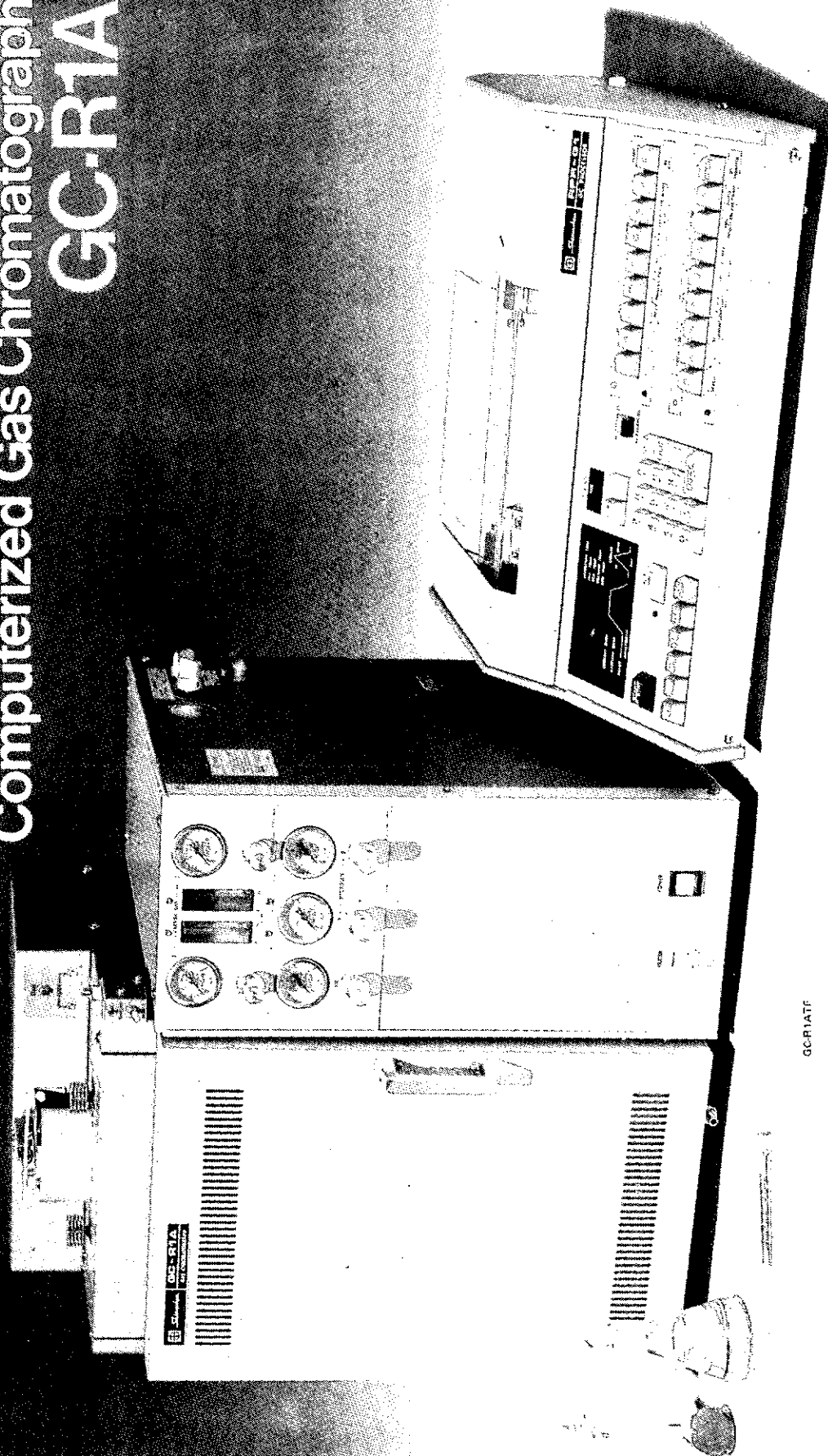
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GOVERNMENT DEPARTMENTS

Weathering Trials" to the Auckland and Wellington sections of the Oil and Colour Chemists Association.

Mr M.J. McCartain has joined BRANZ to assist in projects on coil-coated galvanised steel and polymer concretes.

Dr J.R. Duncan is at present investigating the surface chemistry of chromated galvanised steel at Nottingham University. He attended the Technical Meeting of the European Coil Coaters Association in Stockholm in April.

Dr P.K. Foster, BRANZ Director, has been appointed a Board member of the International Council for Building Research and Documentation (CIB).

AIDD

Mr Les Boulton, formerly Course Supervisor in Chemistry at Auckland Technical Institute, has been appointed as Scientist at the Auckland Industrial Development Division of DSIR. He will work in the Engineering Materials Group headed by Dr Neville Miller, as the group analytical chemist, specialising in problems associated with metallic corrosion and metal finishing.

Dairy Research Institute

Following approval by both the Government and Dairy Board for funding, work has now begun on a 2500 m² extension to the Institute's buildings. In addition to a fullsize basement the new 3-storey extension will provide laboratory and office

space for 7 research sections and the Institute's illustrations unit. The Library will also be re-located on the top floor of the new building together with technology transfer facilities for seminars, short courses and the Dairy Industry Graduate Training Programme. The building is expected to be completed by the end of 1982.

Dr W.J. Harper, who recently retired as Professor of Food Science at Ohio State University, has joined the Whey Products Section of the Institute on a 3-year fellowship. Mr T.R. Bruynel recently joined the Microbiology Section.

DSIR Grasslands Division:

Dr Kamla Pandey, head of the genetics unit, was recently elected Fellow of the Royal Society of NZ. Dr Pandey is well known for his innovative work on hybridising normally incompatible plants.

Applied Biochemistry Division:

Dr Ray W. Bailey and Messrs Peter Vlieg and Keith I. Williamson attended the NZ Society of Food Science and Technology "Resources" Conference in Dunedin in May. Dr Bailey presented a paper "Government Science and Resources Development in Food Processing". Posters were presented by Dr Cecil B. Johnson and Messrs Ralph E.H. Sims (Agronomy Department, Massey University) and Williamson ("Uses of Tallow"), Dennis R. Body ("Wax Esters in

Fish") and Vlieg ("Fish Composition"). Mr Vlieg won the "Best Poster Award" at the Conference.

Dr David R. Greenwood recently presented a seminar to the Division on the topic of "Ecdysone C-20 Hydroxylation in the Desert Locust (*Schistocerca gregaria*)". The seminar was based on recent studies that Dr Greenwood undertook in the Biochemistry Department of the University of Liverpool for a PhD degree.

Dr Noel Dunn of the University of NSW, Sydney presented a seminar on "Cellulose Conversion to Ethanol" to the Division on May 25. Aspects of the enzymatic conversion of cellulose to its component sugars and of the subsequent production of ethanol by alternative fermentative methods were discussed. A major part of this work involved testing the hydrolytic activity of the extra-cellular enzymes released by some 500 naturally occurring bacterial strains. This was followed by mutagenesis of suitable strains to yield new strains of bacteria with improved enzyme production capabilities. New procedures for the isolation of the enzymes were also developed in this study.

Mr Dave Hamilton, Storekeeper at DSIR since 1972, resigned from ABD on June 26. This section has expanded considerably in the past few years and Mr Hamilton was responsible for many innovative developments in stores procedures.

NEWS AND NOTES

We have received from the International Educational Activities Committee of the American Chemical Society a copy of the booklet "Guide to Chemical Education in the US for Foreign Students", which is available free on request. It contains much useful information and even gives specimen questions which graduate students may be required to answer before being accepted for various courses.

★ ★ ★ ★

The National Research Advisory Council, in its annual report to Parliament, has warned that any continuation of the zero growth in scientific manpower that has persisted over the past 3 years could do great harm to the NZ economy, and recommends an actual growth of 1.5% in the coming year.

★ ★ ★ ★

In June, 'Chemistry and Industry', (London) reported that 68 scientists, all members of the Institution of Professional Civil Servants, walked out of a number of Royal Ordnance factories and the Dounreay atomic power station in an effort to push their wage claims.

★ ★ ★ ★

A survey on the status of scientific instruments in various places has been published in "Science" for March 6 last. In a comparison between Universities

and industrial laboratories, half the instruments were 7 years old in the former, but only 3½ in the latter. The average laboratory equipment cost increased 6-fold between 1970 and 1979, but glassware only went up by 60%. The moral is therefore to stick to your beakers and test tubes, boys and girls! The article is required reading for all involved in buying apparatus.

★ ★ ★ ★

Could it happen at our Golden Jubilee Conference? In a subsequent issue of 'Science', giving the programme for the Golden Jubilee Gordon Conference, it says that there will be a place for 'a few posters with astounding (sic) information.'

★ ★ ★ ★

Tax allowance for books: the Member Bodies' Sub-committee of the Royal Society of NZ has been told that while there is no limit on the total amount that may be claimed for books, any chance of getting the paltry allowance of \$20 per volume raised is slender. However, the full price can be claimed if one book is replaced by another.

★ ★ ★ ★

The Research and Development budget was an issue in the recent French Presidential elections. Giscard promised to raise it from the present

figure of 1.8% of the GNP to 2.3%, but Mitterand's bid was 2.5%. Mitterand won! (NZ's figure is 0.9%)

★ ★ ★ ★

The British Government will enforce a reduction of the lead in petrol from the present .40g/l to .15 by 1985, estimated to cost motorists an extra 1p per litre.

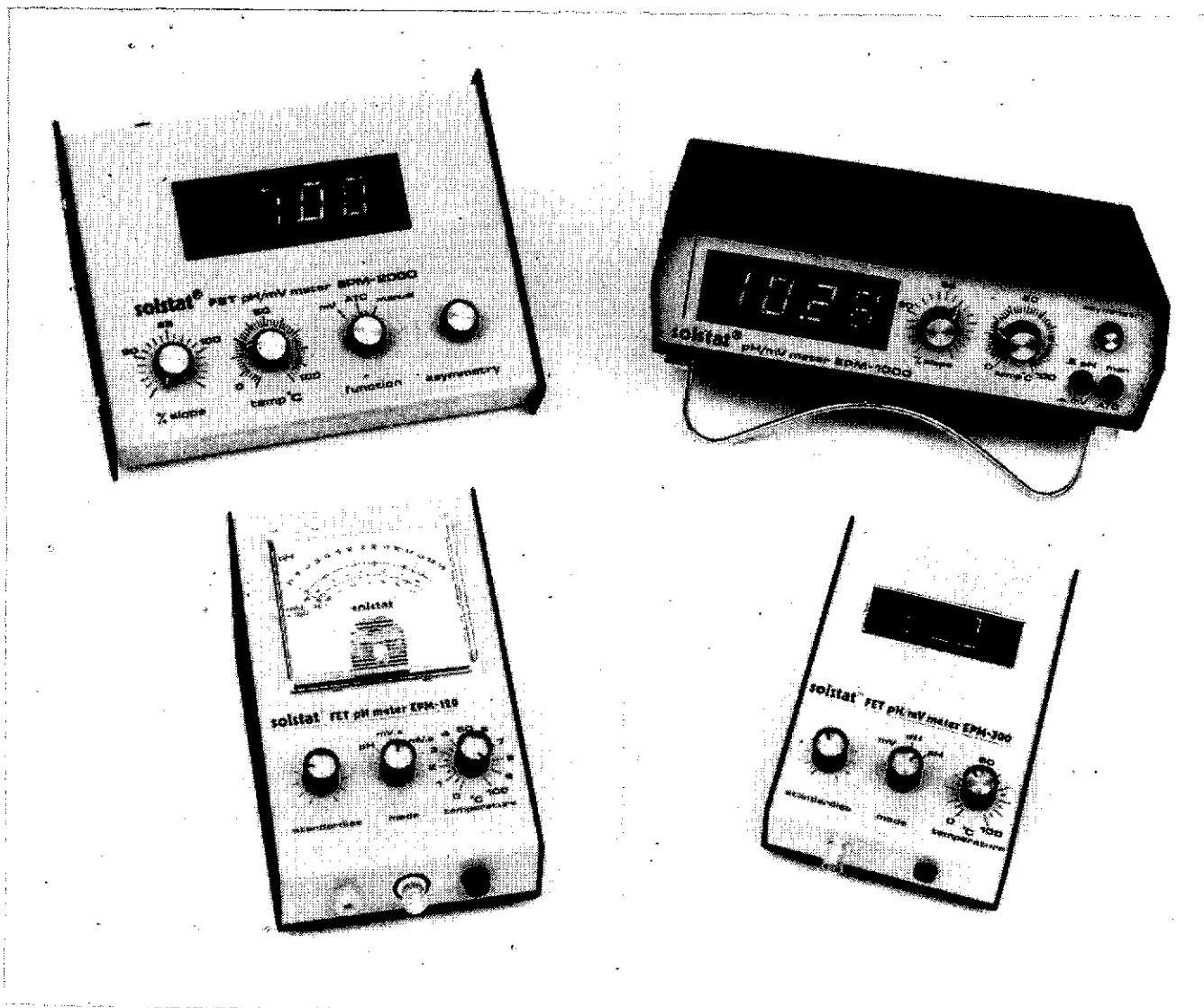
★ ★ ★ ★

Those who use Martindale's "Extra Pharmacopoeia" will be interested to know that the 28th edition, to be issued next year, will be computerised. This will enable the user to retrieve much information not available in the normal index, such as what drugs can be used for a particular disease. The first edition of Martindale was issued in 1883 and contained 313 pages. (We are told that in the days when bookmaking was legal in New Zealand, pharmacists were in some confusion because a leading turf accountant with an office on Lambton Quay had the name Martindale!)

★ ★ ★ ★

The Australasian Corrosion Association is holding a one-day symposium at the University of Auckland on Friday, August 21 (immediately before the NZIC Conference) on "Corrosion Control on Engineering Structures". All enquiries to Dave Christian, Box 5961, Auckland.

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THE ROGERS REPORT

Congratulations on recent recruiting efforts. Council in August will consider about 50 new applications for membership. This is 3 times or more than usual. Keep the Institute before your colleagues who do not yet belong to the NZIC. The President has sent personal invitations to this year's graduates in the Universities and Technical Institutes to join the Institute.

★ ★ ★ ★

In April-May it was a pleasure to meet the chairmen and other officers and members of the Waikato, Manawatu, Wellington, Canterbury and Otago Branches. The opportunity to talk about student membership, a flat rate for Branch subscriptions and other issues before Council as well as to learn of Branch plans for celebrating our Golden Jubilee was rewarding.

★ ★ ★ ★

The focus of the journey when these visits were made was the centennial of the Christchurch Boys High School, May 7-11. Blessed with Indian summer days this was a series of memorable occasions. The background to these was set by "The Years Between", a fascinating volume distributed in March to which **Hugh Parton** contributed a fine chapter on our school's scientific tradition.

★ ★ ★ ★

Our travel, via Hawkes Bay to Christchurch on to Invercargill and back via the lakes, through the Lewis Pass in a blizzard to Nelson and round a shining Mt Egmont were a vivid reminder of what

a remarkable animal farm New Zealand is. 1981 is the centennial of the manufacture in Dunedin of superphosphate which nourishes our clover pastures — now the food of over 100 million stock units.

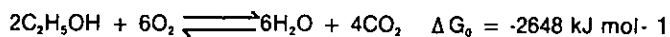
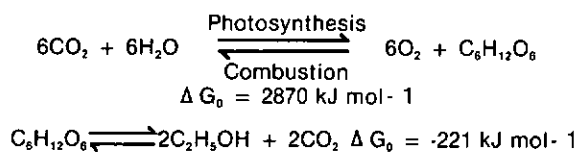
Recently the British Phosphate Commissioners, an organisation set up by the NZ, Australian and British Governments in 1920 to mine and market the phosphate rock on Nauru and Ocean Islands, has been phased out. Nauru is

now independent and deposits on Ocean Island are exhausted.

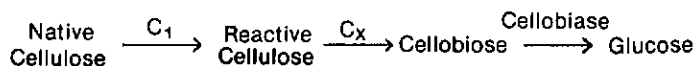
"Chemistry in a Young Country" edited by **Peter Williams** and published by the Institute as part of the Golden Jubilee celebration is awaited with interest for its comments on these and other phases in New Zealand's development. Copies are available to Conference delegates and other members at a pre-publication price of \$9.80 up till August 31.

ERRATA

We regret that in the hassles caused by a change of publisher the gremlins got badly into Prof Max Shepherd's paper in our last issue. Two sections on **Mode of Action, Substrate Specificity and Properties of Cellulases**, and on **Saccharification of Cellulose** which should have followed the words "...several organisms," about the middle of the right hand column on p. 93, were transposed to p. 89 in the article on the National Hormone Laboratory by Drs Chapman and Renwick. In several places there are gaps in the text where the Greek "β" should have been inserted. The equations should read as follows:-



and in the next line "Δ G₀ of -2870 kJ mol⁻¹"



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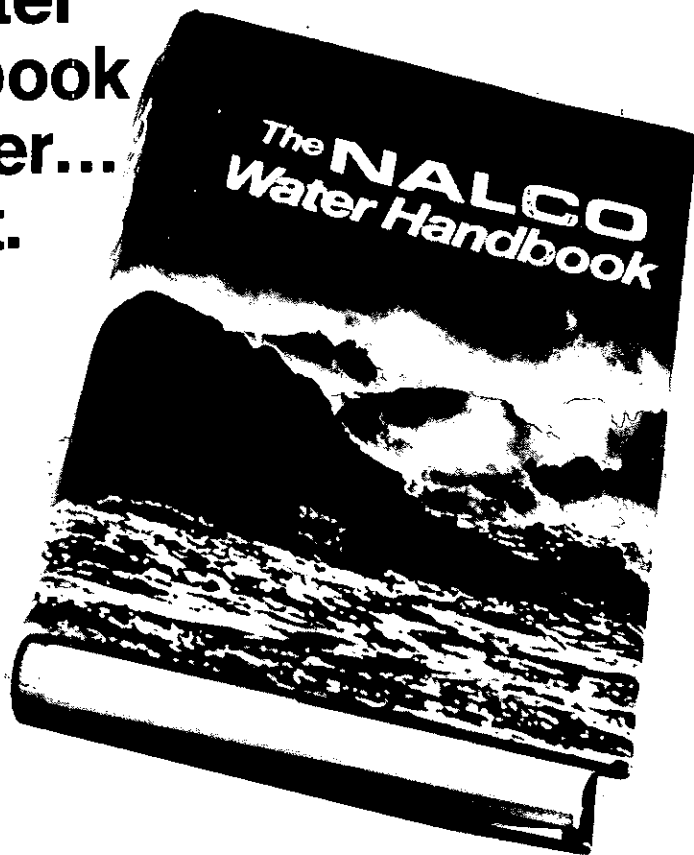
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A Melbourne company, Labtest Equipment Co (SE Asia) Pty. Ltd., represented in NZ by Advanced Electronics Ltd., Auckland, is a major supplier of emission spectrographs in Australia and S E Asia.

By the mid-1970's the technique of ICP - AES was beginning to appear as a useful analytical tool for rapid multi-element analysis. Many pundits considered that the successful development of ICP technology would result in the rebirth of emission spectroscopy; a technique which had taken a retrograde step at the expense of X-ray fluorescence on the one hand and atomic absorption spectrophotometry on the other.

The Australian company was approached to retrofit one of its spectrometers with an ICP generator, nebuliser and torch assembly; a request that was to precipitate it into this new technology at a high speed. It purchased the RF generator from a US communications transmitter manufacturer, while nebuliser and torch both came from "recognised" suppliers to the growing market for ICP components.

Then the Brisbane City Council decided to buy an emission spectrometer complete with an ICP source and computer for data acquisition. Both these early users achieved results which compared favourably with those reported in various scientific publications, but it became apparent that there were several problems with the major ICP components.

These problems — and the need to solve them — motivated the Australian company to "go it alone" in the ICP field. Several major projects were embarked upon simultaneously. These were:

- Development of an ICP RF generator assembly which could provide stable, reproducible operation.
- Development of a data acquisition system in which the hardware could acquire more data very rapidly over

a wide dynamic range and in which the software would enhance the processing of the data, including correction for background and inter-element interference effects.

- Development of a rapid scanning, low cost ICP system, resulting in the design and manufacture of the first "Plasmascan".

A further stage of development became desirable because several users of simultaneous spectrometer systems wanted to analyse for elements not provided for their polychromators. A scanning monochromator was used to view the plasma at the same time as the polychromator; all interfaced to the computer.

Attention was first focused on the RF generator. The result was an almost entirely solid state unit, using the latest technology in switch mode power supplies, making it free from variations caused by AC mains fluctuations. Furthermore, it weighed only half as much as, and used half the power of, other manufacturers' units.

About the same time, Brisbane City Council's laboratory had started to examine new methods of sample introduction, hoping to eliminate the problems of incessant blockages by particulates and reduce the long "memory effect" that prohibited rapid sample throughput. Their second attempt was successful and the GMK nebuliser (as it came to be known) was announced. This remarkable device not only solved the blocking and memory effect problems, but several others as well. The new nebuliser was simply constructed and easily serviced. There were no critical alignments. High salt content samples did not precipitate at the sample tip. Of even more importance was the improvement in analytical precision. For the first time reproducible results were obtained, demonstrating a Residual Standard Deviation of below 1%.

The "Plasmascan" rapid scanning ICP - AES made very early entry to the market. Of equal importance was the company's development of a scanning monochromator to operate in conjunction with a polychromator, resulting in a very flexible system; the polychromator can be equipped to analyse the elements of predominant interest, while simultaneously the monochromator can scan to other wavelengths of interest.

The latest "Plasmascan" has a monochromator with a resolution of .004nm, a reciprocal dispersion of .37nm mm and a computer controlled wavelength scanning mechanism which can step the monochromator in increments of .0001nm. The precision of the wavelength drive is such that a "direct peak top location" technique is used to find the wavelength of each element being measured. Alternatively, successive integrations can be made over the peak, but this is a time consum-

ing method because at least 6 measurements are required for each peak.

The built-in computer is of the Australian company's own design, as is the software which provides flexibility and enables its use in either simultaneous or sequential multi-element systems. Because several microprocessors are used, a number of ancillary functions, such as torch height adjustment and automatic sampler operation, can be controlled simultaneously. This has the effect of reducing the time taken for analysis, thus increasing sample throughput.

There are several other advances incorporated in the latest model, including the use of the highly successful GMK nebuliser assembly, which will not be blocked with particles up to 1mm diameter or by high salts, which can be a major drawback of other nebulisers.

The range of ICP systems now covers:

1. "Plasmascan" Rapid Scanning Multi-element system for sequential analysis of most elements in the Periodic Table.
2. UV-25 Vacuum Polychromator, multi-element system for simultaneous analysis of up to 48 elements.
3. Combination of polychromator and monochromator systems for simultaneous multi-element analysis, using the computer to scan the monochromator for specific elements.

In addition, Labtest has also supplied several dual source systems which can be used for arc/spark or ICP applications, simply selected by a changeover mirror assembly.

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PEOPLE

Mr P R Ambler, previously Scientific Officer, Auckland Hospital Board, has joined Geophysical Energy NZ Ltd., Auckland; **Mr D E Cooper** has been reclassified as Senior Research Chemist at AFFCO., Southdown, Auckland; **Mr P G Farr** is now Head Chemist with Quik Stik International, Manukau City; **Mr J P O'Brien** is now a partner with Applied Geology Associates, Auckland; **Mrs K G Roberts** has transferred from Edgewater College to Epsom Girls' Grammar, both in Auckland; **Mr N C Wansbrough** has gone from Kempthorne Medical Supplies to Red Seal Laboratories, Onehunga; **Dr J S Watt**, previously with Fletcher Holdings is now with Mineral Resources (NZ) Ltd of which company he is now Chairman; **Mr R C Gregg**, Roger C Gregg & Associates, is now with State Coal, Ministry of Energy, Huntly; **Mr Brian Davies**, Manager, Taranaki Co-op Dairy Co., Stratford, is now a consultant in the same town; **Mr L P Chapman** has gone from the Head Office, DSIR, to be Director, Research Institute of Textile Services, Gracefield; **Dr H P Rothbaum** has been made Deputy-Director of the Chemistry Division, Gracefield; **Mr G A Kay**, formerly Head of Mathematics at Mairehau High School, Christchurch, is now with the School Certificate Examination Board in the Head Office of the Dept of Education, Wellington; **Mr J C Bowles** has transferred from Otago Polytechnic, Dunedin to Armidale, NSW; **Miss S M Evans** is now with the Chemistry Dept., University of Otago; **Dr G Woollard** has left MAF Dairy Laboratory to join the Clinical Chemistry Section, Auckland Hospital.

Mr P H Young, Bereg (Micro Batteries) Ltd., Banbury, Oxon., England, has transferred to the firm's Nigerian Branch at Kaduna; **Dr R H Sumner** previously with the Carborundum Company at Niagara Falls, NY, is now with Dresser Industries in the same city; **Mr J T Linzey**, Technical Manager, Ceramco Development Services has retired; **Mr L P Doole** has left Te Awamutu Co-op Dairy to go to Butland Industries, Auckland; **Mr A W Limmer** has been awarded the D.Phil. degree of the University of Waikato, and has joined Analytical Research Laboratories, Napier; **Mr A B Evans** is now Technical Manager with Kodak Ltd., in Wellington; **Mr M J McCartain** of Shell Oil, is now with the Building Research Association at Porirua; **Mr J Viatos** is now with Dulux at Lower Hutt; **Dr A C Arcus**, Laboratory at Christchurch Hospital, has been appointed to the Golden Bay Dairies Co-op, Takaka; **Mr G G Campbell** of Chem Industries, Dunedin has gone to Shell Oil, Petone; **Mr G D Leng-Ward** is now with

the Polytechnic of Wales, Pontypridd.

Mr P A Nash formerly of Mauri Food Ingredients, Papatoetoe, Auckland must be the first member of the NZIC to be appointed a Union Secretary. He holds that position with the NZ Food Processors and Chemicals Union.

Our old friend **Prof Dick Earle** of Massey is the only New Zealander to be appointed a keynote speaker at the IUPAC Congress being held this month in Vancouver, where he will address Section 11b on the Chemistry and Biochemistry of Waste Water Treatment.

Mr Len Spackman, Hon. Fellow, claims to be the only foundation member of the Institute to be still working as a chemist — he is involved with T.J. Sprott & Associates in Auckland, where he specialises in water analysis.

Seen at the social event of the year (centenary of Christchurch Boys' High School) in May: **Prof H N Parton**, **E W Hullett**, **Rob McKeown** (Otago), **John Rogers**, (Secretary NZIC), **Bill Vivian** (Lasra), **Colin Freeman** and **Leon Phillips** (University of Canterbury), **C A Cutten** (Sydney), who with your Editor, lifted the tone of the show.

The DSIR has recently published "A History of Chemistry Division" by two famous NZIC members, **W G M Hughson** and **A J Ellis**.

Honorary Fellows

There were several omissions from the list of Honorary Fellows as published in our February issue. The complete list is:-

R L Andrew*, **H E Annett***, **C R Barnicoat***, **L H Briggs***, **S G Brooker** (Auckland), **Sir Malcolm Burns** (Christchurch), **M S Carrie** (Christchurch), **W. Donovan***, **Sir Thomas Easterfield***, **N L Edson***, **W P Evans***, **T A Glendinning***, **K M Griffin***, **H C Holland** (Taupo), **W G Hughson** (Wellington), **E W Hullett** (Auckland), **A T Johns** (Wellington), **W A Joiner** (Wellington), **O H Keys** (Auckland), **E B Kidson***, **S A Lawrence***, **H L Longbottom A W Mackney** (Auckland), **Sir T H McCombs** (Christchurch), **A D Monro** (Paremata), **J Packer***, **D R Parr***, **H N Parton** (Christchurch), **J A Pond***, **T A Rafter** (Wellington), **H Rands***, **Sir Theodore Rigg***, **F T Seelye***, **F B Shorland** (Wellington), **S N Slater***, **F G Soper** (Dunedin), **L S Spackman** (Auckland), **L P Symes***, **I K Walker** (Wellington) and **F P Worley***.

* Deceased.

Dr C R Barnicoat, President in 1958, and an Honorary Fellow of the Institute, Past Director of Cawthron Institute, Nelson has died.

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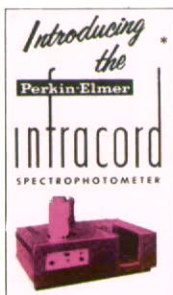
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