

APRIL, 1979 Vol. 43 No. 2

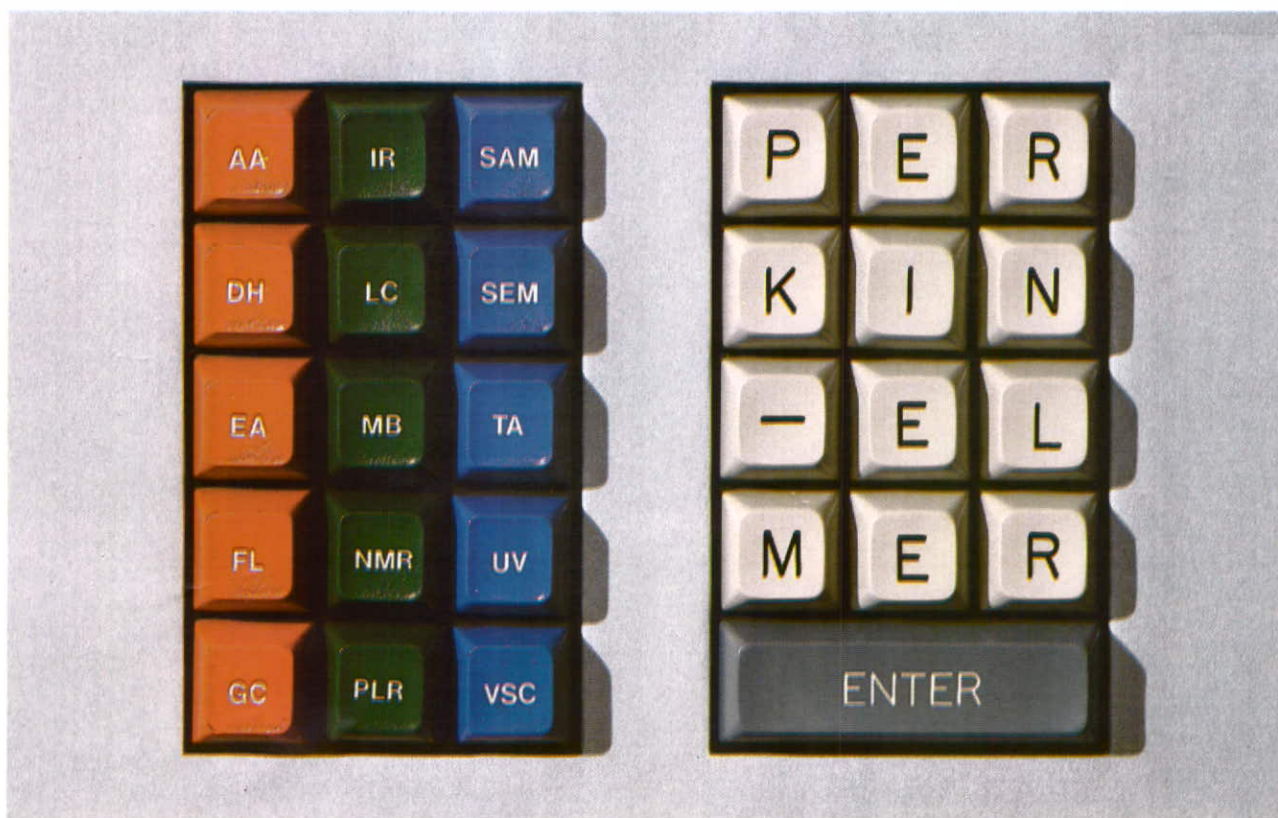
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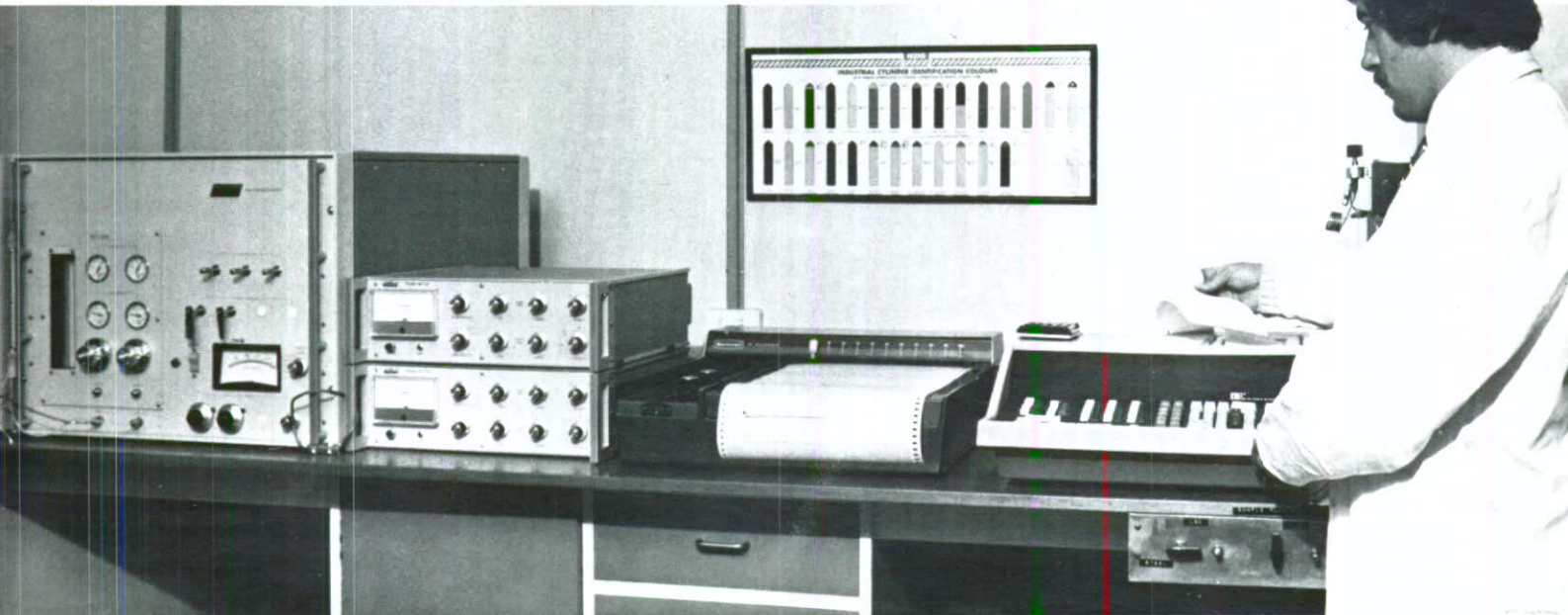
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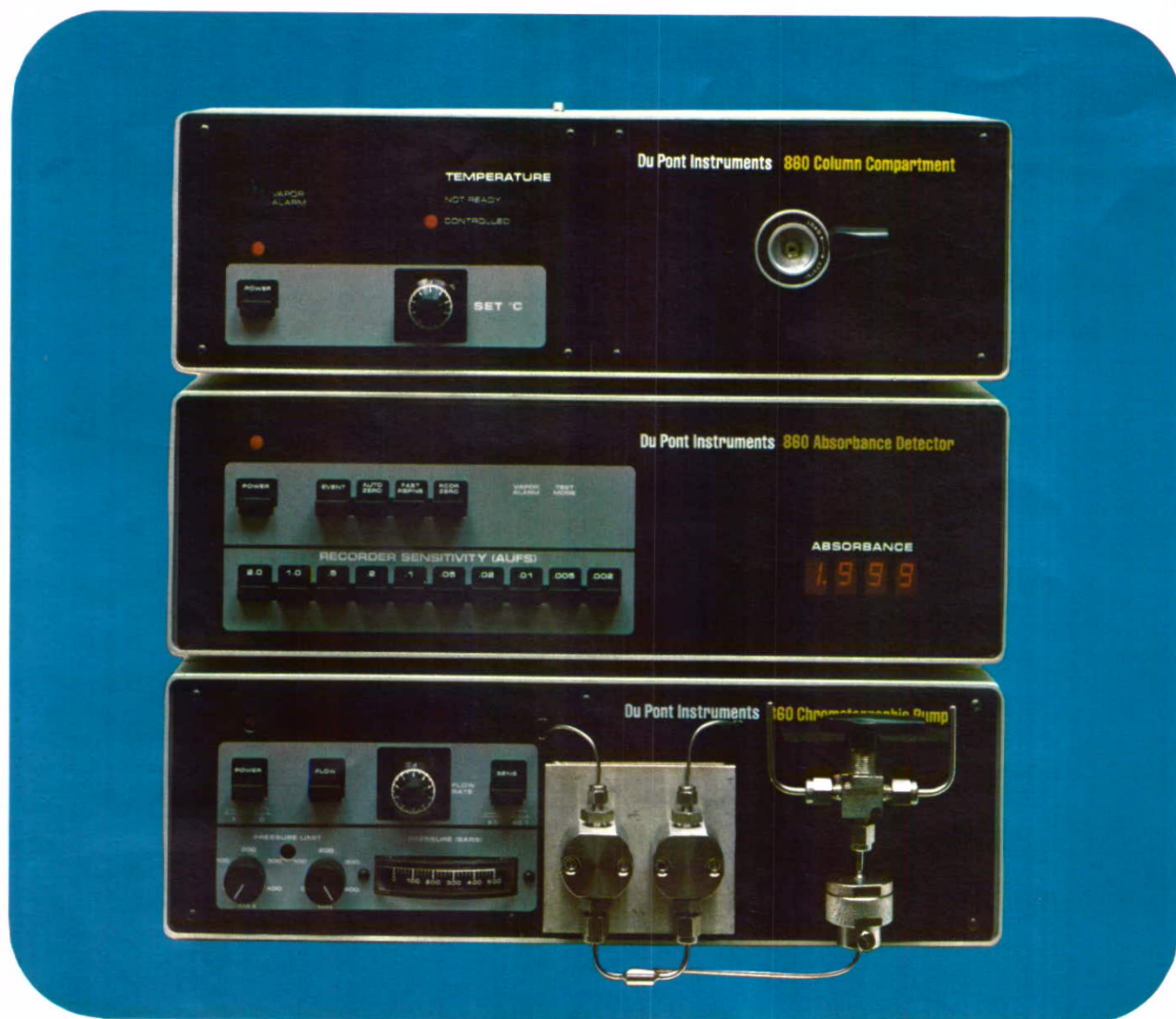
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Cover: Auckland University, venue of the 49th ANZAAS Congress.

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ALSO FEATURED IN THIS ISSUE: 1979 NZIC CONFERENCE REGISTRATION FORM AND PROGRAMME OUTLINE

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This space reserved for late news immediately before press time.

We regret the late publication of this edition, due to the recent industrial dispute involving commercial printers.

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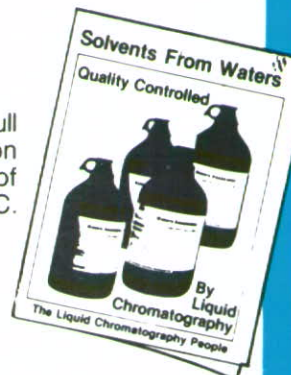
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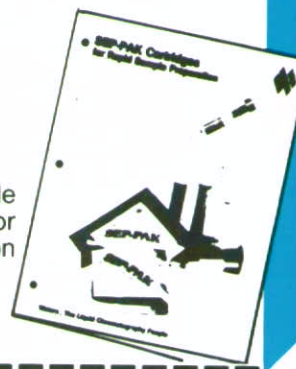
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Comment

ANZAAS In Retrospect

Those who attended the 49th Congress of the Australian and NZ Association for the Advancement of Science will know that it was a very large and very comprehensive gathering — probably the largest of its kind seen in this country. In commenting at this point the editorial writer is spared the need to cajole and exhort readers to lend their support but should face the obvious questions — what now? was it all worthwhile? However, the overwhelming sense of relief experienced by many of us involved in the organisation once the event was safely in the past has tended to leave uncritical recollections from which platitudes readily spring — readers should not expect a too serious post mortem.

The first point to be made — and one of particular concern to the writer who had to make a number of pre-Congress progress reports in Australia — is the international importance of the event to NZ. To have staged a Congress with more than 4,000 delegates (the equivalent meeting in Britain rarely attracts 2,000) and to have presented overseas visitors from 14 countries with an active demonstration of NZ science was an opportunity of some consequence. Our visitors must be left to draw comparisons and conclusions but letters received since the Congress suggest that the very many people who helped in Auckland and elsewhere in the country have cause for real satisfaction.

The second point is also one borne upon the writer by his organising experiences. Should Congresses cater particularly for disciplines and groups or should they be entirely general? Vocal supporters for either contention are not lacking. The writer finds himself in the uncomfortable middle and believes that many chemists would join him there.

We should be concerned to maintain professional and scientific standards and keen to follow the advances in our subject. We should also be concerned about our responsibility to society at large. Congresses of the kind held in Auckland help to remind us of this and also give us the chance to observe the reactions of other disciplines. We also have the chance to question them. Are the activities of social scientists and planners quite so enlightening or benign as they might seem? Human advancement is perhaps not only to be measured by the absence of nuclear power and herbicides.

Chemists, as a group, live easily with a wide spectrum of scientific thought and method — theoreticians or cataloguers, dogmatists or pragmatists, we all belong to the same profession. This wide training should, therefore, make the chemist open-minded and ready to entertain new ideas from a firm base in scientific and professional standards.

A Congress Organising Secretary soon learns that this is not universally so. It also becomes clear to him that people from differing disciplines often react to the same problem in different ways. In writing in the journal of the Institute of Chemistry he can perhaps be excused for stating his belief that chemists, because of their background, have much to offer the community at large in ensuring that balanced views are heard.

An ANZAAS Congress also reminds us that, in the public mind, chemists are part of a much larger professional and academic community. If we wish this community to be seen as acting responsibly and with integrity we should not assume that our own standards are of no importance and that our opinions as a profession do not need to be expressed.

T.N.M. Waters

(Prof. Waters was ANZAAS Congress organising secretary)

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What's Happening

Food Conference: Food scientists and quality assurance people from many parts of NZ are expected to attend "Quo Vadis '79" — a joint venture of the NZ Institute of Food Science and Technology and the NZ Organisation for Quality Assurance.

Being held at North Shore Teachers' College, Auckland, May 14-17, an attendance of 300 is expected to hear, among other featured speakers, **Florian Majarack**, assistant director, quality assurance division, US Food Technology & Drug Administration, **Ralph Blanchfield**, president, UK Institute of Food Science and Technology, and **Dr. M. Probine**, assistant director-general, DSIR. The Prime Minister will open the conference.

Journal Editor, **Stan Brooker**, will chair the seminar session "Quality Assurance — World Wide" at which both Messrs Blanchfield and Majarack will deliver keynote papers.

Full details are available from the conference secretary, Mr T. Sorenson, Box 56-156, Auckland 3.

* * *

Energy Meet: The 4th NZ Energy Conference, entitled "Energy and NZ Society", will be held in Auckland, May 17-19. Full information and registration forms are available from the Dept. of Continuing Education, University of Auckland, Private Bag, Auckland 1.

We hope to keep our readers informed of any developments in the important field of energy which are of particular interest to chemists.

* * *

News: — **Dr Lindsay Main**, School of Science, Waikato University, Private Bag, Hamilton, has been appointed Waikato Branch Editor. His tongue is hanging out for news.

* * *

Thanks: We appreciate the favourable comments we have received on the February issue — and the critical ones. One thing we omitted was to raise our hat to **Ian Scoltock** of Abels Ltd., Newmarket, who organised the symposium on chromatography in November last. Most of the papers in our last issue were derived from that very worthwhile occasion.

1978 Nobel Prize in Chemistry: The committee have this year made a controversial award to **Dr Peter Mitchell**, who in 1961 proposed a new way of thinking about the cellular processes by which energy-releasing reactions such as absorption of sunlight are coupled to the synthesis of adenine triphosphate (ATP), the cell's major fuel which is consumed in energy-requiring reactions. It has always been thought that such changes required undefined (and so far unfound) intermediates, but Mitchell's hypothesis is that these intermediates are unnecessary. He proposed this theory as a young scientist in the Zoology Department in Edinburgh University in 1961, and it was greeted with neglect and scepticism. So Mitchell, who has considerable private means, set up his own private laboratory in a remote part of Cornwall, where with a handful of colleagues he devoted himself to experimental work to support his hypothesis. Since then, according to the *New Scientist*, he has been drawing graphs showing the dates at which different eminent scientists changed sides from opposition to agreement with his hypothesis. But while it has been immensely fruitful, it is still open to much controversy and it is intriguing that the prize has been awarded while the question is still open to doubt, also that it goes to someone outside the established halls of academe.

* * *



Herd (left) and Brittain

Drs A.C. Herd and T. Brittain have joined the Editorial Committee in Auckland. Tony Herd is a past Secretary of the Auckland Branch, who worked for some years in fertiliser research at Otara, Auckland, and is now a tutor in chemistry at the Auckland Technical Institute. Tom Brittain has a Ph.D. in biochemistry from Norwich University in England where he grew up. He came to the biochemistry department at Auckland at the beginning of last year.

* * *

We were delighted to meet **Bob Schoenfeld** during his visit to NZ in February. He was reported in error in Bulletin No 18 as being managing

editor, Royal Australian Chemical Institute; he is in fact managing editor, *Australian Journal of Chemistry*, which is devoted to the publication of original papers, and is funded in part by the CSIRO. He spoke to staff and students at the various Universities about preparing papers for publication and he also gave some tips to the secretaries who have the job of typing these papers. We are hoping that he may contribute a few articles on the lines of the very successful "The Chemist's English" of which over 20 parts were published in our sister journal "Chemistry in Australia".

* * *

ANZAAS: The 50th Jubilee Congress will be held in Adelaide, May 12-16, 1980. Tentatively an especially interesting programme has been arranged by the Health Education Section with social and scientific symposia on: Stress diseases and mental health, Sunshine and skin cancer, Spirits and other drugs, Sloth, exercise and fitness, Smoking, Sex, Sleep, Sustenance, Spirits and other drugs, etc. Anyone interested in these scintillating subjects should write to:- Mr N.R. Wardrop, Secretary, Health Education Section, ANZAAS Congress.

Wattle Park Teachers Centre, 424 Kensington Road, Wattle Park S.A., 5066, Australia.

* * *

Food Standards Any chemists involved with foods will be interested to know that the Food Standards Committee has been carrying out a review of NZ Food Law to align it as far as possible with the Codex Alimentarius International food standards. This is a mammoth task and the Committee would appreciate comments from any chemists interested: information about the standards may be obtained from the Secretary, Food Standards Committee, P.O. Box 5013, Wellington.

* * *

Co-ordination Chemistry: The International Conference on Co-ordination Chemistry will be held in Calcutta on December 10-14, 1979. Any readers interested can obtain copies of the First Information Circular from: Prof. D. Banerjee, Professor of Chemistry Calcutta University, 92 Acharya Prafulla Chandra Road, Calcutta — 700009.

* * *

The following correction should be made to the article on "Cadmium in the Environment" in our November 1978 issue:

Page 91, line 4 l.h. side; "4.5 mg/ha" should be "2.5 Mg/ha"



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What's Happening (Cont)

The Royal Australian Chemical Institute. We have been interested to read the Annual Report of our sister body, which has a membership some 4 times greater than ours, but a small rate of growth of 5% in the year 1977-8. It has Branches in the different States, but differs mainly from the NZIC in having many Sections, which conduct the various Conferences, while no general conference is held. The organic section recently held its meeting in Hobart, and we present a report on this elsewhere. The Institute has a very active employment committee, which has been concerned with unemployment of chemists (1-2%), sources of employment, output of chemists, and conditions relating to the termination of the employment of chemists. There is also an Inter-Institute Committee on Salaries, so the RACI is not working on its own. The financial situation must be a source of envy to officials of the NZIC; it would appear that the total fund and investments in the hands of the headquarters in Melbourne, the State branches and the various Divisions is almost \$500,000.

* * *

In view of the present industrial strife in Britain, in which the UK Government's attempt to hold all pay increases to within 5% is an important factor, it is interesting to note that in November the Association of Professional Scientists and Technologists (APST), which represents many middle managers in the chemical industry, called for a return to free collective bargaining. In this it supports the British Medical Association and the UK Institute of Professional Engineers.

* * *

Zagreb Fair: Being staged simultaneously with the 10th Jubilee International Medicine & Medical Aids Exhibition at Zagreb, Yugoslavia, April 14-May 20, is "Interlabor", the 4th International Laboratory Equipment Fair.

Zagreb has been the venue for a wide variety of international trade and technical fairs for the past 70 years.

* * *

Handy: — We commend to our readers' attention the very handy booklet, "Safety in Laboratories", published by Ciba-Geigy (UK) Ltd. Limited numbers of it are available free of charge from Ciba-Geigy branches in NZ.

* * *

NEW JOURNAL

Pergamon Press has released a new bi-monthly research journal titled ENVIRONMENT INTERNATIONAL. It will be a multi-disciplinary forum for the publication of original environmental literature. Vital data, causes of pollution and methods for protection will be covered. Subscription rate is US\$72.60 p.a. for multiple reader institutions.

TRENDS IN PETROCHEMICAL INDUSTRY DEVELOPMENT

The direction in which the petrochemical industry will develop over the next 2 decades and the location of new production capacities to help accelerate industrialization in the developing countries, was considered at the first consultation meeting on the Petrochemical Industry in Mexico, March 12-16.

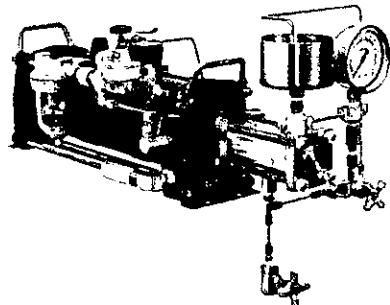
Organized by the UN Industrial Development Organization, the meeting devoted its attention to two main issues: marketing and the transfer of technology. Discussions centred on the action needed to be taken by Governments and industry to remove barriers to international trade in petrochemical products and on the essential principles to be considered in the preparation of a model contract covering the licensing of patents and know-how.

PLANT TISSUE CULTURE SYMPOSIUM

The 3rd NZ Plant Tissue Culture Symposium under the auspices of the International Association for Plant Tissue Culture was held at Plant Physiology Division, DSIR, Palmerston North, February 1-2. The Symposium was opened by Dr. J.P. Kerr, Director, PPD, Dr W.D. (Bill) Sutton (PPD), the organiser of the symposium, then gave a historical account of plant tissue culture in NZ, together with present and possible future activities in this field. Mr Mike Seawright (Plant Propagation Laboratories, Havelock North) gave his impressions of plant tissue culture in USA. In an unusual talk entitled "Ferns in Flasks for Chemists", Dr J.D. (Gus) Ferguson (Applied Biochemistry Division, DSIR, Lincoln) discussed the rapid production of fern material containing insect moulting hormones (the ecdysones) that are required by other researchers in the Division. Dr Ferguson described his work as the study of steroid biosynthesis in a flask.

More than 40 people attended part or all of this Symposium. It included studies into a wide range of plant materials and different techniques. Principal advantages of the procedures described were the more rapid production of genetically superior mature plants than can be obtained by conventional seed or cutting growing methods. The reduction or elimination of disease infections, in particular viruses, is also a very important consideration. The 4th Symposium in this series is scheduled for 1981.

Anyone requiring information about IAPTC., or aspects of plant tissue culture should contact Dr Dan Cohen (Plant Physiology Division, DSIR, Private Bag, Palmerston North), the National Correspondent of the Association.



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Honorary Fellowship For Athol Rafter

Dr T. A. Rafter, OBE, FRSNZ, has been elected to the Honorary Fellowship of the Institute. He was born in Wellington, and educated at St. Patrick's College, Silverstream, to which school he returned as a teacher after gaining his MSc. from Victoria University College, Wellington, in 1936. In 1940, he joined the DSIR as a chemist in the Dominion Laboratory, working as an analyst specialising in procedures for testing uranium minerals. The late Sir Ernest Marsden stimulated his interest in radiochemistry which led to his appointment in 1949 as head of the Isotope Section, which became a separate division of the DSIR in 1957, two years later assuming its present status as the Institute of Nuclear Sciences, currently with a staff of over 60.

Dr Rafter has worked on isotopes in many fields as shown by the publication of some 80 papers; his worldwide reputation has been shown by the holding of an international con-



Athol Rafter: Enthusiasm inspired staff

ference in his honour in 1976 at the Institute of Nuclear Sciences, Wellington on the subject "Stable Isotopes in the Earth Sciences". He was elected a Fellow of the Royal Society of NZ in 1961, and was awarded the DSc by Victoria University in 1968. He was honoured with the OBE in 1959.

This is not the place for a detailed account of his scientific work, but here we can say that his boundless enthusiasm inspired his staff at INS. Despite a crippling and painful condi-

tion of arthritis in the hip, he undertook a great deal of travel in connection with his work and also involved himself in many other activities. He was Chairman of the Wellington Branch in 1955, and President of the NZIC in 1962. He was twice Mellor Lecturer in 1950 and 1965, but his greatest contribution to chemistry outside of the INS has been his chairmanship of the National Committee for Chemistry in which capacity he represented NZ at IUPAC conferences in Washington, Munich, Madrid and Warsaw. Despite his physical handicap he undertook exhausting visits to various company directors in an effort to raise funds to further this country's participation in IUPAC.

Dr Rafter's other activities include membership of the Council of the Central Institute of Technology in Wellington, and he is the present Chairman. He was married in 1939 and has three children. His many friends and admirers will feel that his election to the Honorary Fellowship honours the NZIC as much as it does Dr Rafter.

Having reached the mandatory retiring age of 65 last year Dr Rafter handed over the reins of the INS to Dr B.J. O'Brien and went to London to take up an appointment as Acting Director, International Monitoring and Assessment Research Centre.

People

David Madle, formerly chief chemist, ICI head office laboratory, Wellington, has joined the Technical Correspondence Institute.

Triton Paints (formerly Brolite) now has **John McNaughten** on its staff; previously he was with ICI Resins Division.

Michael Bond, lately chief chemist, ICI-Tasman, has joined Abbott Laboratories as production manager.

Dr G.A. Nicholls, formerly with T.J. Sprott & Associates, has hung out his shingle as a forest utilisation consultant, operating from his home at 469 Riddell Rd, Glendowie, Auckland.

Messrs O.H. Skarsholt and C.F. Denmead have joined Sprott's. Mr Skarsholt was previously with Helena Rubinstein Ltd, while Mr Denmead

retired recently from the Meat Research Institute, Hamilton.

Dr. Ashley Wilson, who in the past has been chairman and a very active member of the Auckland Branch while he was General Manager, Technical Division, N.Z. Forest Products Ltd, has been appointed Wellington Regional Manager for the company. He is now responsible for the marketing of their products in the Wellington area, but his major function is to represent the

Ashley Wilson: Keeping tabs on Government



company in dealings with the various Government departments, trade organisations and other bodies with which NZFP has dealings. This is for the two-fold reason of keeping them

up-to-date with the company's activities and also finding out what decisions are being made in Wellington which have an impact on Forest Products' activities. In this position he reports directly to the Managing Director, which is a reflection on the importance attached to the job.

Mr Ron Hall, previously Wallboard Mill Manager, has been appointed to succeed Ashley as General Manager, Technical Division.

Dr John Featherstone has resigned as Tutor in Pharmacy at the Central Institute of Technology to take up a Medical Research Council Senior Fellowship to further his research into the chemistry of dental decay. The Fellowship will be held jointly at the MRC Dental Research Unit and Victoria University's Chemistry Department.

It is with regret that we announce the death of **Mrs P. Broad**, a Member of the Institute since 1963, who was highly regarded in her profession as a chemistry teacher at Marsden Collegiate School.

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CHEMISTRY 1984: DESIGN OR EVOLUTION

Presidential Address to Section 2 of the 49th ANZAAS Congress.
(Slightly abbreviated for publication.)

A.J. Ellis,
Chemistry Division,
DSIR,

INTRODUCTION

For over 100 years NZ chemists have contributed to the growth of agriculture and industry, and to the well-being of our population.

A major long-term success has been the application of chemistry to improve pasture growth, particularly in developing an efficient phosphatic fertiliser industry and in establishing which trace elements are needed to ensure optimum plant growth in various soils. The superphosphate, legume-produced-nitrogen combination in pastures has been at the heart of NZ farm prosperity.

The now routine export of meat and fruit to the Northern hemisphere first required an understanding of the chemistry of spoilage processes and the development of appropriate temperature and atmosphere storage conditions. Chemists successfully assisted the wool industry to avoid fires in storage and export ships and to scour the wool here economically and without pollution. Other major industries involving brewing, pharmaceuticals, cement, paint and food packing have also benefited greatly from the employment of chemists.

The success of an iron and steel industry in NZ is a tribute to several generations of chemists and chemical engineers who laboured with the difficult problem of handling titaniferous iron ores. Chemists also took a prominent part in the successful establishment at Wairakei of the first geothermal power station in the world to be based on natural high-temperature liquid water. The now widely diversified forest products industry has relied on chemistry to help establish a competitive range of papers, building boards and chemical by-products.

Chemists in government service have controlled the quality of a wide range of materials used by the public: food, pharmaceuticals, water and air.

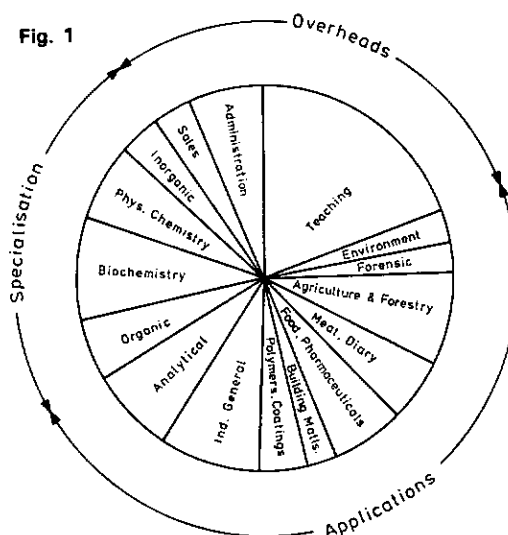
Dr. A.J. Ellis is the Director of Chemistry Division, DSIR. Before being appointed to this position in 1971 he headed the Geochemistry work of the Division and was involved personally with hydrothermal chemistry research both in geothermal development work in several countries and in laboratory investigations of solution and mineral equilibria. He is a member of the executive of several organisations including WRONZ, Building Research Association, and Consumer Institute. He is a Fellow of the Royal



Society of NZ and Second Vice-President, NZIC. He is married with 4 children.

The Present Situation

What constitutes the body of NZ chemists? The NZ Institute of Chemistry recently collected information on the specialisation and work of its members, from which Fig 1 is derived. The high proportion of chemists involved with teaching activities may be noted; also the relatively minor position of inorganic chemistry. Social pressures now have created a significant work segment connected with the environment and with forensic investigations.



Areas of Work
N.Z. Chemists 1977.

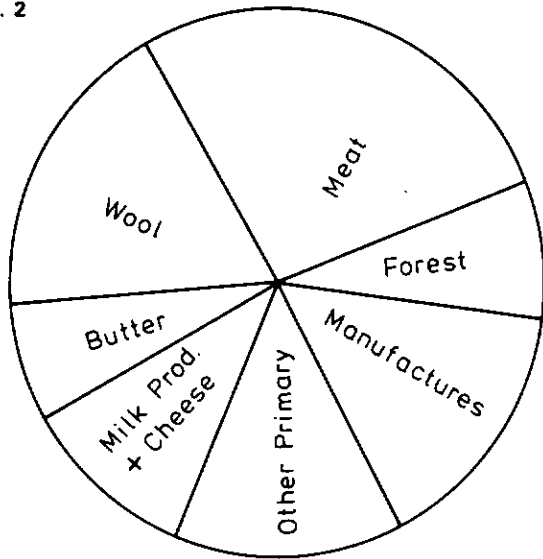
Fig 2, based on recent statistics, shows a breakdown into commodities, of NZ's exports and imports. Over 80% of our exports still arise from products of the land, with which chemists already have a strong involvement (meat, butter, cheese, wool and forest products). It is also apparent that petroleum fuel imports last year took 15% of our export income, approximately equal in magnitude to our exports of either wool, or total dairy products. In comparison, 5 years ago these fuel imports were equal to only 7% of export income.

Although the cost of energy imports (particularly transport fuels) is now creating a financial strain, we have one of the highest per capita indigenous energy resources in the world, in the form of coal, natural gas, hydro-power, geothermal energy and cellulose growth capability. Our number one problem to be solved is the economic transformation of energy into transport fuels.

Fig. 2 also shows that over a half of the goods imported into NZ are associated with chemical-based industries. While there is a reasonable balance between export production and chemical research activity, we have insufficient effort being directed towards the substitution of this type of import.

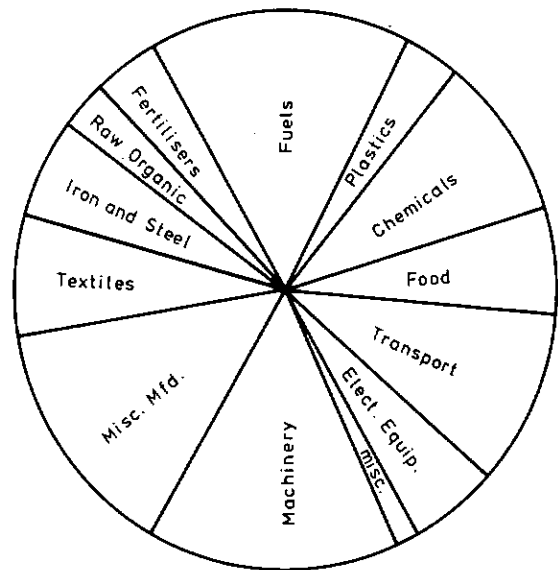
Transport costs are causing pressures for increased processing of materials at their origin. The expense of commuting, along with higher costs of suburban development and buildings, is also likely to create more concentrated

Fig. 2



Export Receipts for
Year at Sept. 1978.

Total \$M 3460.



N.Z. Imports
Year Ending June 1978.

Total \$M 3270.

Chemistry 1984 (Cont)

population centres. Greater health problems related to air and water purity and greater abuse of alcohol and illicit drugs may result.

Some traditional materials are losing their acceptability, or the costs are becoming too high. Concern is expressed about the health hazards of asbestos-based building materials. Wood, our traditional building cladding material, may be priced out of the market. Metal building fittings are being replaced by plastics.

It must be admitted that the public now has rather mixed feelings about the chemist. Regularly, different health messages emerge from the news media, who present as facts, the tentative conclusions from scientific papers. On one hand there are reports of potentially carcinogenic materials being found in bacon or well-grilled hamburgers, while other scientists implore consumers to cook their meat well so as to remove the fat. Apparently one is left with the unfortunate choice of risking cancer of the stomach, or encouraging heart disease through fat intake. Controversy over the destruction of the ozone layer of the atmosphere by fluorocarbons, oil and chemical spillages and air pollution all assist towards public disenchantment.

The changing patterns of agriculture and particularly the rise of new export horticultural crops has created a demand for safe and non-persistent pesticides and herbicides. The effect on human health of chemicals in food, drugs, water and air has been of increasing concern, due to some rare but significant incidents arising overseas from chemical manufacturing industries. A protest against massive environmental degradation has been necessary and worthwhile. On the other hand, there are times when environmental protest groups appear to be needlessly spurred into action by some chemists over-reacting to results obtained from incredibly sensitive microanalytical techniques.

New Zealanders are trying to decide what type of life they want. A new balance is being struck between human demands and environmental protection, e.g., between the desire for comfort and mobility, and the desire to protect our surroundings against change. Particularly in NZ, we need to see man's influence in various areas in proportion to nature's massive processes of destruction such as earthquakes and volcanic activity which occur within a time-scale comparable to man's life-span.

Traditionally we have been slow to become involved in research which is unfashionable internationally. I can recall in the early 1950s that one would receive enquiring looks from many colleagues if one admitted to being involved in geothermal development or ironsands research. Contact between University, Government and industrial chemists has now improved and there is more (but still not enough) money available to allow contracts to be let to Universities for background research on topics relevant to Government or industry. There is a better balance between free-ranging chemical research and mission-orientated research. The young university graduate has a good flexible outlook.

It is encouraging to see more NZ chemists seeking a local basis for their work rather than following a past tradition of importing topics from prior overseas associations. Although this search for relevance is to be commended, partly through budgetary pressures, there is a very recent tendency for everyone to want to work on today's problem, with today's technology. Even in USA this is now of concern, according to a recent study by the Office of Science and Technology Policy which recommended that the balance between short-term and long-term needs in energy research programmes should receive early attention.

We should not be afraid to invest some effort in basic research for the future. There is some truth in the saying that 90% of the value of research comes from the first 10% or so, of effort. Extensive late entries into current "bandwagon" research topics are therefore unlikely to be

profitable. A search is needed for the topics that everyone will be wanting to get into in 5-10 years' time.

Design Or Evolution

The NZ Institute of Chemistry will have its 50th Jubilee Year in 1981. Our chemistry profession is now well into its adult years and should show maturity in the choice of projects. Our future work must be designed to meet local needs and not simply evolved from current interests and programmes. The Institute Working Party on "Contributions to Society" has made a good start, calling on comments from chemists on new legislation, on energy policies and on technical education. In making comments and proposals, chemists must demonstrate good common sense, logical judgement and a feeling for economics. We do not always recognise the large gap in time between demonstrating a process in the laboratory and a major industrial development.

Prof. John Ziman in a recent "New Scientist" article summarized our need concisely in the heading "Research as if Relevance Mattered". He pointed out that by concentrating on a local problem a scientist in a small country may not only assist the economy but he may also become the centre of a scientifically excellent field, with close proximity to his material. Perhaps facial eczema research and geothermal development are established local examples.

I shall concentrate on some particular areas that will require attention in the future, even if in some cases it is only to have an awareness of available technology so as to be effective advisers. Omissions are not to be taken to suggest the unimportance of particular types of work! Not being particularly clairvoyant, I shall concentrate on the near-future over the next 5 years and examine some of the tasks, problems and challenges facing NZ chemists. For the mathematically minded this will be seen to span two parliamentary cycles and end in 1984, surely an auspicious date for concluding any review.

This country can solve its number one problem of transport fuels with known technology and massive capital expenditure. Methanol or gasoline production from natural gas will probably be the first stage, using one of the rapidly-developing catalytic processes. When natural gas runs out, perhaps in 20 years, we are likely to turn to synthetic gasoline from coal, and still later from pyrolysed wood. The tailoring of carbon, hydrogen gas mixtures to useful liquid fuels by a new generation of catalysts is a modern chemical triumph. We should understand the new developments in this direction, and watch carefully that the Government is well advised on the best process at each stage of restructuring transport fuel products.

The production of fuel alcohols by fermentation is being investigated by many groups, but improvements to traditional processes will be required if it is going to seriously compete with chemical synthesis routes. It would also involve increasing our present fermentation capacity by over 100 times. There are already some imaginative approaches, e.g., the use of waste geothermal heat to give conditions suitable for thermophilic bacteria to breakdown waste cellulose; and the search for improved enzymatic processes to attack cellulose.

Coal has never been popular with chemists because of its intractable nature. Yet, since chemists more or less gave up coal 30 years ago, there have been tremendous advances in instrumentation and theory to give an insight into its structure and reactivity. As one of our most important future fuel sources it deserves more attention.

Our clear atmosphere and the high incidence of ultra-violet light in many areas suggest that we should maintain an interest in the long-term possibility of producing

hydrogen as a fuel through the medium of photochemistry. Also the rapid development of cheaper photo-voltaic cells warrants close attention.

Soils, their composition, structure and processes are vital to our economy. Many relationships between plant and animal diseases, and levels of trace elements such as selenium, boron, zinc, and molybdenum have been established. The history of soil utilisation in NZ is still comparatively short. As soils pass through successive cycles of crop or pasture production a better understanding of the factors controlling their structure will become critical. Modern organic chemistry techniques such as Fourier transform NMR are already helping to understand the organo-mineral complexes and their relationships to soil aggregation, biological activity, and plant nutrition.

A recent report by NRAC questions whether we get full value from the 2 million tonnes per year of superphosphate fertilizer applied to our pastoral lands. They recommend further evaluation of the interaction of phosphate with other nutrients such as nitrogen, sulphur, calcium and potassium. The binding of phosphate into soils in a non-available form is an expensive and seemingly inevitable process in certain areas. Hope for an economic solution is remote, but further research is required.

The announced establishment of a nitrogen fertilizer industry based on Kapuni natural gas implies a considerable growth in the use of this nutrient, presumably in new horticultural crops. For pasture production, long-term it seems desirable that chemists obtain a better understanding of enzymatic nitrogen fixation rather than encourage a widespread use of synthetic nitrogen fertilizers based on a depletable raw material. The transference of nitrogen-fixing capabilities into a wider range of plants is currently a hot topic in plant genetics.

Increasingly, barriers are being raised overseas against our agricultural exports, often based on some toxicologically insignificant chemical contaminants. One suspects that these are often of little concern to the overseas consumer, but are brought about through pressures from competitive producers. As we diversify into new crops, new problems arise, as was seen recently with kiwifruit rejection in USA because of pesticide levels. It is certain that with the many new plant diseases appearing in NZ commercial horticulture is not viable without plant therapeutants. Chemical control of bacterial diseases is particularly important. We must be clear about the toxicity and persistence of pesticides, insecticides and herbicides and have an acknowledged ability to provide accurate figures for levels in exported foodstuffs. The high cost in getting an environmental clearance for a new pesticide (up to \$M2.0 for a new chemical, according to ICI) is likely to limit the number in use and make export monitoring for residues possible by automated analysis.

Natural product chemists now have available a wide range of techniques for separation and identification (GLC, HPLC, FT-NMR, GC/MS) and a new generation of synthesis concepts. Those whose interests overlap into biology face interesting challenges in the plant growth and chemical ecology fields. Research is already proceeding on means of protecting crops or pastures from insects and noxious animals, other than by a general blanketing of an area by spray or poisons. In the animal kingdom, scents produce a wide range of reactions, including alarm, sexual attraction or repulsion. Natural or synthetic chemical pheromones may be used to control insects through upsetting their ecology and reproduction. Current NZ research on insect pests includes grass-grub and codlin moth. The pheromones of opossums and rabbits are also being investigated. The examination of plant components for naturally-produced feeding deterrents or toxins to pests is also proceeding. Chemists are also seeking the chemical basis for plant-plant and plant-fungi interaction in crops

and pasture, and investigating the complex organic chemistry of plant growth promoters and inhibitors. This range of work requires a close team effort between biologists and organic chemists with skills in complex analysis.

Absolute safety in food intake is a myth. However, the concern over relationships between particular food constituents and cancer, heart disease and longevity must be of concern to a country that still relies for most of its export income from farm derived products. Chemists will need to keep a close watch on trends in the dietary theories that influence international public opinion.

Our air, waters and surroundings are still of pristine clarity compared with those of many countries. Not only is this aesthetically desirable but it is a selling point in promoting the export of our agricultural products. Monitoring the water quality in lakes, rivers and coastal seas will continue to be an important task along with the allied work of purifying and limiting the discharge of polluting effluents. In undertaking this work colloid and surface chemistry has particular significance. Local bodies and industries ranging from cement manufacture and coal mining, to food processing, wool scouring and tanneries are involved with a wide variety of colloidal effluents.

Chemists in NZ should keep a careful watch on the possibility of importing hazardous industries. Examples of this type of export from western nations to third world countries are the growth of the benzidine dye industry in India and the shift in asbestos textile production from USA to Latin and South America. Although we are not in the third world country category we are small and will often have to rely on the good sense and persistence of one or two knowledgeable people in particular fields to avoid unwanted situations.

The production of refined by-products from our primary industries will be a profitable area for chemical investigation. There is the current example of bile acids production from meat industry waste. Currently profitable by-products may not always have an assured market and may need alternative processing. For example, the meat-meal market may face competition from single-cell protein products derived from waste oils. Already, the tallow industry, which is in competition with palm oils, is looking into the manufacture of finer products through distillation and chemical modifications.

Enzyme chemistry has traditionally been important in treating farm products, for example in cheese manufacture and leather production. Further use of enzymatic processes could give liquid protein concentrates from waste fish or meat. An alternative sugar industry based on the enzymatic treatment of corn starch is already under consideration.

The wine industry has a bright future now that the manufacturers have realised the necessity for a careful control of raw materials and processing. Chemistry has an important part to play in maintaining the quality and purity of our wines.

In spite of our oceanic setting we have much to learn about developing an economic large-scale fishing industry. The fish-packing and meat-packing industries must face some similar problems in terms of muscle chemistry, spoilage mechanisms and conditions of storage, yet one sees little technical collaboration between them. Natural products chemists could investigate further the extractants from marine organisms, particularly algae (seaweeds) and invertebrates. Further development of the alginate and carageenin industries in NZ could be promoted.

Although many chemists here deal with polymeric materials, these receive little attention in the universities. There is a need for more teaching of the theory and techniques appropriate to materials such as plastics, wool, synthetic fibres, coal, rubbers, paints and inorganic polymers such as glass and cement pastes. Their non-stoichiometric nature and ill-defined form has made them traditionally undesirable for research topics, but their importance economically suggests that we allocate a greater proportion of resources to them. The Wool Research Organisation has made excellent progress in this direction with their work on wool modifications to increase wear life, to eliminate electrostatic charge, to fire-proof fabrics, and to eliminate shrinkages in washing and yellowing and loss of strength in light.

As a result of fundamental research by the ceramics industry and PACRA we now produce a fine range of products from clays with properties quite different from the traditional European supplies. Developments in the industry are likely to include raw materials processing for better consistency and an extension of products into higher temperature ceramics and the manufacture of basic bricks for furnaces. As yet there is no ceramics course offered by NZ Universities.

Although there have been many past successes in materials research in NZ there are still many major and under-utilized mineral resources that are a challenge to the chemist; e.g., pure silica, coal, titanium ores, geothermal brines. As a result of increasing fuel costs, traditional manufacturing processes will change, e.g., cement manufacture.

We have a careless disregard for materials. The cost to the country of avoidable corrosion and failure of metals is likely to be over \$M50 per year*. As examples, many car and household fittings corrode away within a short period; in the manufacture of some pre-coated steel building materials there was insufficient collaboration initially between metal-forming and cladding industries to ensure a product of optimum design. The call for improved hygiene in food packing plants has given an immediate incentive for better knowledge and protection against corrosion. It is within the metallurgists' and chemists' ability to protect the individual and industry from poor choices of materials and coatings in buildings, vehicles and equipment, and we must be more effective advisers in this direction.

Although we have decided to postpone the use of nuclear power at least until the 1990s we should not discard by association the numerous stable and radioactive isotope techniques available for research in industry, medicine, hydrology and agriculture. Our present capabilities in this field must be maintained and developed, for in proportion to the effort invested they will continue to make a great impact.

In being faced with problems, chemists must learn to ask sufficient questions to get to the heart of the matter, and not just be used by other professions. An example from corrosion work can be used. In my organisation, an initial approach is often a blunt request for an analysis, in this case a steam condensate. On asking why it was needed, the existence of a corrosion problem was established. Where was the corrosion problem? In a steam-heated stainless-steel reaction vessel. What does it contain — and so on. It emerged that the corrosion arose from internal reaction through an inappropriate choice of stainless steel to contain the product. An analysis of steam would have achieved nothing.

Although NZ is a small country it is a relatively affluent one in comparison with many Pacific neighbours. There is

*Footnote: Making a parallel with other countries mentioned in NBS Special Publication 511-1, May 1978.

Radio-Gas-Liquid Chromotography Of Tritium Labelled Compounds

A.L. Odell, Urey Radiochemical Laboratory, University of Auckland.

Tritium, ^3H , rivals ^{14}C as a useful tracer in chemical and biochemical studies. It has one great strategic advantage over ^{14}C , namely that it can, in many instances, be introduced into a molecule by an exchange reaction between carbon-bound hydrogen and tritium gas or $^3\text{H}_2\text{O}$, thus avoiding a synthesis which would be required to introduce ^{14}C into the skeleton. This is especially important if the molecule is complex or of unknown constitution.

An early method of direct tritium labelling is due to Wilzbach[1]. A sample of the compound to be labelled is confined in a bulb with, say, 5 curies of Tritium gas at room temperature for, say, 10 days. The intense beta-bombardment of the substrate and of the tritium gas itself produces many ions and radicals and gives rise typically to some 10mCi of labelled products but only about 5% of this incorporated activity is found in the parent molecule, the remaining 95% being distributed amongst a variety of radiation-damage products. The mass of the labelled products can be shown by a simple calculation to be about 70 μgm (assuming a molecular weight of 200). Of this 66 μg

Chemistry 1984 (Cont)

an increasing call for chemists, along with other technologists, to help develop new industry in the Pacific. Our abilities in food handling, ceramics, iron sands technology, geothermal chemistry, soil chemistry, and animal nutrition will be in particular demand in the Pacific and possibly in China.

It may be heresy, but it seems to me that chemistry thrives best in cooperation with other fields. Future chemistry graduates will be in particular demand if they have strong training also in other fields such as biology, geology, biochemistry, computers, electronics, or metallurgy. Although the interaction between academic institutes and industry has now improved, few graduates make industrial chemistry their immediate choice. A senior industrial colleague has suggested that we copy 'Chairman Mao' and insist that all Government and University research workers be required to spend a period in industry or in the field. When considering Ph.D projects, university staff must examine the national needs against their personal objectives.

Finally, to have a long-term effectiveness, chemists must maintain a good knowledge of chemicals, chemical principles and chemical processes. The useful careers of those who rely entirely on today's black boxes to do their work will be short.

Discussions with senior chemists in many fields greatly aided in the preparation of this lecture and are acknowledged with thanks.

Prof. Odell was educated at Scots College, Wellington, and Auckland University College where he graduated MSc. in 1942. He has served on the teaching staff of the Chemistry Department at Auckland continuously, except for a period of leave, from 1943 until the present.

He took his Ph.D. degree at University College, London in 1956 where he worked under the direction of Dr D.R. Llewellyn on separation and use of stable isotopes of carbon and nitrogen. He was appointed an Associate Professor in 1960 and to a Personal Chair in 1970. He has directed the Urey Radiochemical Laboratory since it was established in 1960.

In his leisure time Prof. Odell sails his veteran keel yacht "Aramoana" on the Northland coast with prolonged stops at the Bay of Islands where he is constructing a retirement cottage.

His wife Aileen teaches chemistry at Westlake Girls High School and his daughter Annette (17) hopes to enter the School of Engineering next year.



is impurity. When 1 gm of material is used initially then impurity level is 0.0066%. But this impurity contains 95% of the incorporated activity! Thus any attempt to use the radioactivity to follow the movement of the parent in a tracer experiment must give highly misleading results. To make the preparation usable, the labelled impurity must be removed to such a level that its activity is, say, less than 1% of that of the parent, i.e. to a level of $3 \times 10^{-6}\%$!! This is beyond the capability of orthodox chemical purification procedures but can be achieved by Radio GLC.

In Radio GLC the effluent from the column is split and part is sent to an ion chamber coupled to an electrometer and pen recorder, while the other part goes to a mass detector such as a flame ionisation detector.

Fig. 1 shows activity and mass plots for a sample of cyclohexane labelled by a Wilzbach procedure and it can be seen that although there is much activity associated with the mass peak of the parent, there is more associated with other products (damage products). Furthermore these damage products are seen to be present in "weightless" amounts.

The trace on the left hand side of Fig 1 shows in contrast the activity and mass traces for cyclohexane labelled by a modern catalytic procedure, in which tracer amounts of tritium gas sorbed on a hydrogenation catalyst (rhodium black in this experiment) are allowed to exchange with cyclohexane.

In Fig. 2 we see how toluene, labelled by a Wilzbach procedure and showing the usual "damage" peaks, has been purified by GLC methods.

Another use to which the high sensitivity and good separating power of Radio GLC can be put is the study of reactions which do not proceed, or rather which proceed only to a microscopic extent, e.g. reactions induced by discharge of colour centres produced by gamma irradiation of solids. Silica gel has long been used as a cracking catalyst in petroleum refining and much effort has been expended to find ways of improving its catalytic activity. One method tried was to irradiate it with Co-60 gamma radiation. This imparts to the colourless gel (after degassing) a deep magenta colour. ESR spin counting show some 10^{18} unpaired electron spins per gm of solid at saturation. This colour and the ESR signal are, however, rapidly bleached on admission of hydrocarbon and no permanent catalytic

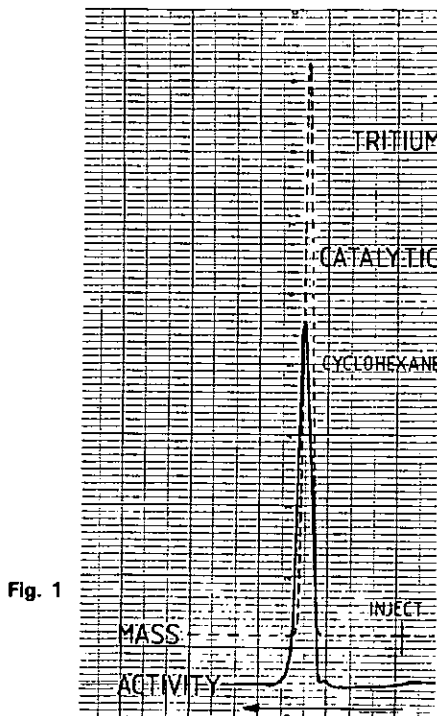


Fig. 1

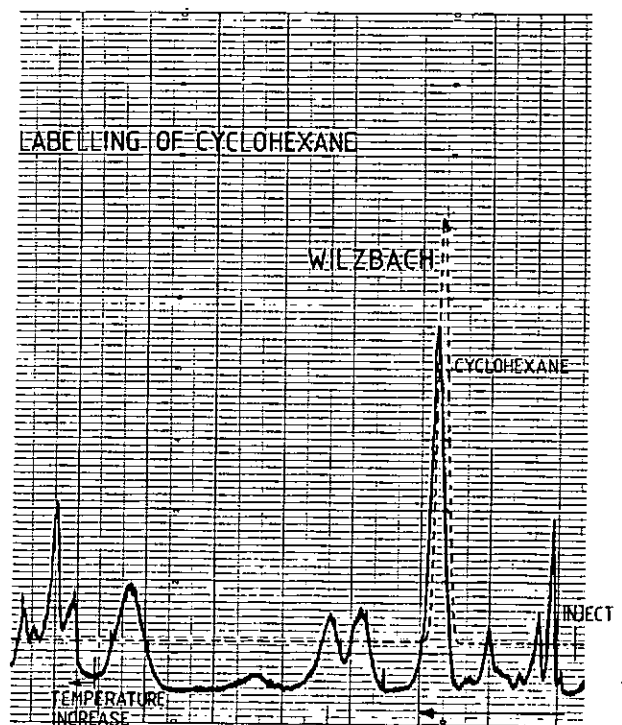


Fig. 2

Radio GLC (Cont)

effect due to the colour centres remains. Hydrogen-gas also bleaches the colour centres.

For some years my students and I have been bleaching this colour with tritium gas and then adding hydrocarbon [2,3,4,]. We find that the tritium is activated during the bleaching and then rapidly labels the hydrocarbon when it is admitted. Yields are small and it appears that each colour centre activates only one molecule of $^3\text{H}_2$. Assuming one ^3H atom per molecule of $^3\text{H}_2$ can be incorporated, this gives a maximum yield of about 48 mCi from 2 gm of SiO_2 . In an actual experiment using 1 gm of 2-methyl-butane we obtained the yields shown in Table 1.

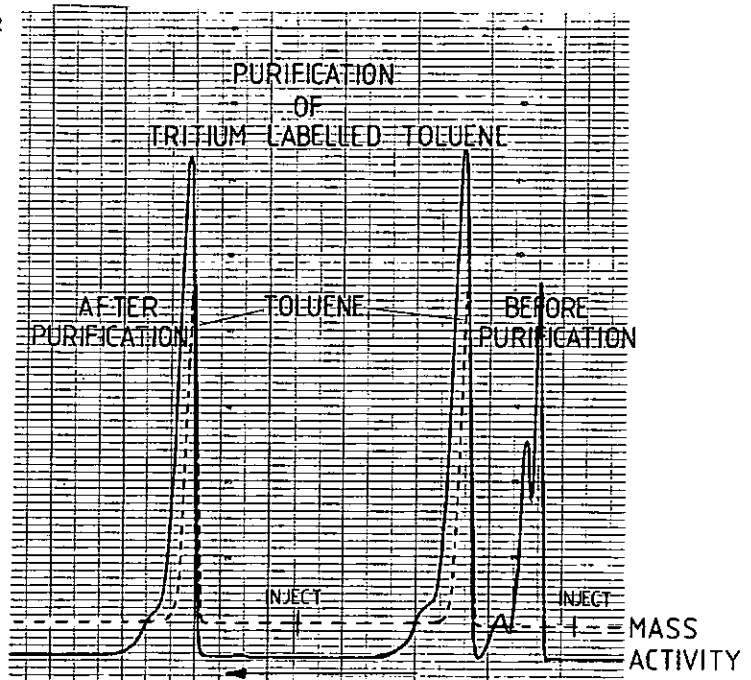
The actual mass of labelled 2-methyl butane is a $18 \mu\text{gm}$, i.e. yield is $1.8 \times 10^{-3}\%$! Nevertheless, the 7.10 mCi is a very useful level of labelling. Note that 96% of the incorporated tritium is in the parent 2-methyl butane and that other labelled products are present in very small activities. This is thus an excellent labelling method for this compound. A useful feature of the method is that irradiated silica gel, bleached by tritium gas, can be stored indefinitely without losing its activity and labelling can be achieved simply by adding the hydrocarbon when required.

TABLE 1

Reaction products from labelling 2-methyl butane on $\text{SiO}_2/\gamma\text{-}^3\text{H}_2$

Product	Yield (m Ci)	% of Total Incorporated Tritium
Methane	0.03	0.4
Ethane	0.02	0.25
Ethylene	0.005	0.06
Propane	0.01	0.13
2 me-propane	0.01	1.56
n-butane	0.005	0.06
2 me-butane	7.1	96.0
2 me but-1-ene	0.02	0.30
2 me but-2-ene	0.08	0.90
trans me pent-2-ene	0.01	0.20
3 me pent-1-ene	0.01	0.13

% of total tritium incorporated 16%.



More detailed studies have shown that hydrocarbons with a tertiary carbon are efficiently labelled and that the activity is incorporated mainly into the methyl group adjacent to this carbon atom. Aromatic hydrocarbons are also efficiently labelled mainly in the aromatic ring. Radio GLC was most useful in developing the study of this reaction of nearly zero yield.

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SELECTION CRITERIA FOR AN HPLC

Mathew Meerkin, Ralph Richardson
Department of Clinical Chemistry, Auckland Hospital

High performance liquid chromatography is one of the most rapidly growing methods of investigation in separatory analysis. With the more recent development of better detectors and improvements in column packings, this technique has become of increasing interest to the clinical biochemist.

The choice of manufactured product with respect to continuous flow and discrete analysis has until recently been rather limiting and has therefore we believe reduced our capacity to deal with a product available from a large number of manufacturers.

You will be aware that until recently HPLC instrumentation was largely supplied by one manufacturer. However, with its rapid growth in popularity there has almost been an explosion in the number of manufacturers presently producing sophisticated HPLC instrumentation. We recently went to tender for such instrumentation and were faced with at least 10 detailed tenders. The literature was rather sparse in relation to evaluations of such instruments and so we had the difficult task of sorting out the most appropriate tender with having had very little experience in the general day-to-day running of an HPLC.

Our strategy was designed to provide a positive result at the end of our extensive evaluation.

We decided that we should exclude the analyte from our variables because once the decision was made that HPLC was the most appropriate separatory procedure, then the

Although the title of this paper refers specifically to High Performance (or Pressure) Liquid Chromatography (HPLC), the paper is of very general interest since it gives criteria which can be used in considering the purchase of any laboratory instrument. — Ed.

choice of which HPLC for measuring a particular analyte was irrelevant. In other words, it is mandatory that the objectives for such a purchase or purpose be clearly stated.

Therefore the variables chosen (Table I) were intended to provide a total rational approach to the problem. In addition, it was possible to cross check these variables against (i) accuracy, (ii) versatility, (iii) maintenance/fault diagnosis/accessibility, (iv) ease of use/general convenience and (v) general features.

TABLE I

VARIABLE CHOSEN	MAXIMUM SCORE (100)
Company background	5
Gradient capability	2.5
Pump system	20
Column & injection system	15
Pressure monitoring	2.5
Detector	15
Options	10
Laboratory evaluation	10
Service and references	10
Financial evaluation	10

As many of these variables carry a greater or lesser value, it was decided that to obtain a very positive result, a weighting procedure might be useful. However, it must be remembered that any weighting procedure is purely arbitrary and dependent on one's prior knowledge of such instrumentation and above all one's subjective feeling concerning a particular variable. So the objectivity of such a weighting procedure is open to question. Nevertheless, provided that one is aware of these shortcomings, the procedure does provide some useful information. In this instance the weighting procedure was applied in retrospect.

Because 6 of the 10 tenders did not provide us with an instrument to evaluate in our laboratory, or access to one in operation elsewhere, variable No. 8 eliminated a great proportion of the tenders.

We have only referred indirectly to the remaining 4 tenders, as a different weighting procedure and/or variables by a different group could conceivably come up with a different answer, and would also be unfair on the manufacturers concerned. The scientific platform is not the place to argue which instrumentation may or may not be the most superior.

To illustrate some of these variables, (excluding the company name), we have company background (Fig. 1), in which information was sought with respect to their annual report and financial statements. Information pertaining to the company's age and as to whether it was the parent company or a subsidiary was then ascertained. In addition, the financial stability was noted having regard for the capital assets, liabilities and revenue growth. The number of employees was accounted for having in mind whether they belonged to the parent or subsidiary and their growth rate in terms of past performance and future potential. Finally, the reputation of the company both locally and overseas was sought by the various means available.

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Ralph Richardson obtained his honours degree in Chemistry at the University of Auckland in 1968 and his PhD in 1972. He subsequently joined the Department of Clinical Chemistry at Auckland Hospital as toxicologist. His major interests are in the application of chromatographic techniques to the determination of drugs and their metabolites in biological fluids.



Selection Criteria (Cont)

Fig. I

	Company			
	A	B	C	D
Variable 1				
Company background (5 total points)	4.5	3.	3.5	2.5
<ul style="list-style-type: none"> • Age • Financial stability 		<ul style="list-style-type: none"> • Employees • Reputation 		

The maximum score in the assessment of company background was 5 points out of a grand total of 100 points. The score for each of the four companies is illustrated in Fig. I.

The second variable chosen was that of gradient capability, (Fig. II) for which the maximum score obtainable was 2.5 points. The features of concern to us were the number of pumps, gradient variation, the mixing chamber volume and whether there was a dynamic mixing chamber within the design of the instrument. For a gradient system most instruments employ a two-pump system, but some use only one, which in this instance was downgraded because it was a constant pressure type. However, there are some very recent gradient systems now available that use only one pump but are of the dual reciprocating piston type. Gradient variation was not a feature of all systems but most were capable of generating a linear gradient. In addition, it is to be noted that system B had a dynamic mixing chamber whereas system A did not contain such a mechanism.

Fig. II

	Company			
	A	B	C	D
Variable 2				
Gradient capability (2.5 total points)	1.5	2	2	1.5
<ul style="list-style-type: none"> • Number of pumps • Gradient variation 		<ul style="list-style-type: none"> • Mixing chamber volume • Dynamic mixing chamber 		

Variable 3 scored heavily (maximum score 20) as we considered the pump system the heart of the instrument (Fig. III). Many features were examined and included — whether the basic design was of the constant volume or constant pressure type, whether the constant volume pumps were of the syringe type, or a reciprocating diaphragm type. The screw-driven syringe pump is pulse free but unfortunately is not precise. It also requires large volumes of solvent and is therefore wasteful of solvent, slow and inconvenient. The reciprocating diaphragm pump has pressure limitations; it is not pulse free and therefore requires pulse dampening but allows for continuous solvent delivery. The third constant volume pump is the reciprocating dual piston pump which features a closed loop flow control to eliminate both flow irregularities and pump pulsations. It was noted that in one pump it was possible to continuously monitor flow. With respect to head volume, points were scored if the head volume was greater as this was felt to induce less wear. In addition, the

pumps with a flush valve in the pump line scored additionally as it meant that the solvent could be completely flushed through the pump. With respect to the overall pump system design, an unlimited solvent capacity added positively to our method of scoring.

Fig. III

	Company			
	A	B	C	D
Variable 3				
Pump System (20 total points)	15	18	11	10
<ul style="list-style-type: none"> • Constant volume/pressure • Syringe type • Reciprocating diaphragm/piston • Dual reciprocating piston 		<ul style="list-style-type: none"> • Head volume • Priming • Flow feedback control • Solvent capacity 		

Variable 4 consisted of an analysis of the column and injector system (Fig. IV). The maximum score possible was 15 points. We gave consideration to the various injector systems available — namely the valco valve, the Rheodyne, the U6K valve and the stop flow valve. Company A scored in relation to its quality and range of columns over the other companies concerned.

Other features analysed, such as position of the column, presence of a valve switch/event marker, type of seals, etc., require no explanation.

Fig. IV

	Company			
	A	B	C	D
Variable 4				
Column and injector system (15 total points)	11	13	9	8
<ul style="list-style-type: none"> • Type • Volume • Seals • Syringe inject • Ease of use 		<ul style="list-style-type: none"> • Quality • Range of column packings • Position of column • Valve switch/event marker 		

Pressure monitoring was the fifth variable analysed and scored a total of 2.5 points (Fig. V). Some instruments had digital displays for monitoring pressure which may or may not have been taken from the column head. This last feature was considered to be an asset. In addition, the maximum pressure could in some instances be set by the operator; others were not so accurate.

Fig. V

	Company			
	A	B	C	D
Variable 5				
Pressure Monitoring (2.5 total points)	2	2.5	2.5	2
<ul style="list-style-type: none"> • Digital • Maximum pressure 		<ul style="list-style-type: none"> • Site of pressure monitor 		

The UV detector quality was variable 6 for which a total of 15 points could be scored. A number of companies or agents were found to market the same detector. The variables for both fixed and/or variable are illustrated in Fig. VI.

(Continued on Page 63)



New Zealand Institute of Chemistry

1979
ANNUAL CONFERENCE

Victoria University,
Wellington
August 20-23

The New Zealand Chemical Industry: Pro- spects And Perspec- tives.

The Scientific Programme will commence at 2 p.m. on Monday, August 20 and conclude at 5.30 p.m. on Thursday, August 23.

PROGRAMME OUTLINE

**MONDAY, AUG. 20:
THE NEW ZEALAND CHEMICAL INDUSTRY**

An overview — M. Probine (DSIR)

CARBONACEOUS RESOURCES

(i) Renewable Resources — A. Wilson (N.Z. Forest Products Ltd.)

(ii) Non-renewable Resources — B.V. Walker (Liquid Fuels Trust)

**TUESDAY, AUG. 21:
PROSPECTS FOR THE CHEMICAL IN-
DUSTRY**

Inorganic Based Industry — W. Russell (N.Z. Fertiliser Co.)

Organic Based Industry — Speaker to be arranged.

Agriculture Based Industry — D. Andrews (Fletcher Holdings)

**WEDNESDAY, AUG. 22:
HEALTH-BASED INDUSTRY**

The Pharmaceuticals Industry — D. Jull (Glaxo Laboratories Ltd.)

Biomaterials — R.P. Garland (N.Z. Pharmaceuticals)

**THURSDAY, AUG. 23:
PROSPECTS FOR BIOCHEMICAL IN-
DUSTRIES**

Detailed programme unavailable at time of going to press.

(See over for further details and registration form)



Conference '79

In addition to the daily conference themes detailed above the programme will include:

The 1979 Easterfield Address — R.E. Mitchell (Plant Diseases, DSIR).

The Littleton Lecture.

The Presidential Address.

The various Specialist Groups will hold their own sessions during the late morning and each afternoon except for the first day. Furthermore, contributed papers from industrialists and others compatible with the various industrial themes are especially called for. The traditional Student Papers Competition will be incorporated into these concurrent sessions.

The NZIC Annual General Meeting is scheduled for 7.30 p.m. on Tuesday, August 21.

A full social programme has been arranged and the meeting will conclude with the Conference Dinner on Thursday, August 23. However, a one — day seminar on "Problems Encountered in Collecting Forensic Exhibits" is planned for Friday, August 24. Those interested are asked to contact: **Dr. P. Cropp, Chemistry Division, DSIR, Private Bag, Petone.**

CONTRIBUTED PAPERS

This is the only call for contributed papers to the Industry-based daily themes and the more traditional Specialist Groups. Papers are invited on any aspect of chemistry. They may be presented in lecture or poster form and the author's preference will be followed where possible. If more papers are submitted for lecture presentation than time allows, authors may be asked to reconsider their mode of presentation.

15 minutes will be allowed for each lecture session plus 5 minutes for discussion. Overhead and 35mm projectors will be available.

Posters will be displayed on bulletin boards. Authors are to be in attendance throughout their relevant poster session for discussion of their contribution and answering of questions. At the end of each session posters will be removed to a general display area for the duration of the Conference. Contributors will be provided with appropriate facilities and more detailed instructions will be provided after the receipt of the abstract.

Authors will be notified of the acceptance of otherwise of their paper(s) by the end of June.

Each contribution will be allocated to one of the following groups and authors must specify which one their contributions is for:

Analytical, Biochemical, Chemical Education, Chromatography,
Crystallography, Electrochemistry, Industrial, Inorganic,
Mass Spectrometry, Organic, Thermodynamics.

ABSTRACTS

Contributors to both lecture and poster sessions should submit a short abstract typed (preferably with one and one-half spacing) on A4 paper in a form suitable for photocopying. The line width should not exceed 15.5 cm and the depth (including title etc.) not more than 10.5 cm. The heading should include the title (capitalised), author(s') name(s) and affiliation. The name of the person presenting the paper should be underlined. The abstract must be sent to and received by

**Dr. J.T. Craig, Conference Secretary, Chemistry Department,
Victoria University, Private Bag, Wellington.**

NO LATER THAN MAY 30, 1979.

Please indicate clearly whether it is for poster or lecture presentation and which specialist session the contribution is to be considered for. Late arrival will prejudice acceptance.

REGISTRATION AND ACCOMMODATION INFORMATION

The registration form below should be completed and returned **before July 4**; A late fee of \$10 (\$2.50 per day for daily registrants) will apply after this date. Only the persons attending the scientific programme are required to pay a registration fee.

Accommodation is available from Sunday, August 19, at Weir House and Victoria House, both of which are within 5 minutes' walking distance of the Conference venue, and a number of twin rooms are available. If you wish to share a twin room with a specific partner please indicate this on the form. Participants may elect for FULL BOARD at a cost of \$16 per day or DINNER, BED and BREAKFAST at \$14 per day (for twin accommodation deduct \$3 per day from each of the rates). For those not requiring lunch in College, a light lunch will be available in the University Union on a "pay-as-you-go" basis. Should motel accommodation be preferred advise the Conference Secretary and give full details of your requirements at your earliest opportunity. Precise accommodation costs will be forwarded to registrants with deposit receipts.

Tear Across

REGISTRATION FORM Please complete and return this form together with your remittance **BEFORE JULY 14** to:
Dr. J.T. CRAIG, CONFERENCE SECRETARY, CHEMISTRY DEPT., VICTORIA UNIVERSITY, PRIVATE BAG, WELLINGTON.

BLOCK LETTERS PLEASE

Surname Title
 Preferred first name
 Address for
 Correspondence
 Business Phone No.
 I will be accompanied by the following person(s)

 who is/is not interested in a social programme.

I/We require **FULL BOARD** in Hall for days
DINNER, B&B

commencing on August

I/We prefer single accommodation
 twin (name of partner

I/We prefer motel accommodation (provide details)

I/We will arrive* in Wellington at a.m. on August
 p.m.

by AIR . RAIL . CAR

*Discount travel vouchers will be issued as appropriate.

REGISTRATION FEES

	Full	Daily	
NZIC/NZBS Member	\$20	\$7.50	\$
Non-member	\$40	\$10	\$
Student	\$7.50	N/A	\$
Late Fee after July 4	\$10	\$2.50	\$
If daily circle days		M Tu W Th	\$
ACCOMMODATION DEPOSIT	\$10		\$
CONFERENCE DINNER			\$
(\$12 per person)			\$

REMITTANCE ENCLOSED

(payable to: NZIC Conference) \$

The following flights will be met:
 Auckland Flt. 451 arr. 11.00
 Hamilton Flt. 591 Arr. 12.10
 Christchurch Flt 448 Arr. 10.30
 Dunedin Flt 480 Arr. 9.25

Book Review

Toxicological Significance of Laevorotatory Ice Crystals. H.A. Stiff, Jnr. (Bull., Bureau Chemical Investigation, New York State Police, Dec. 1943, 8, 6-8)— The author, who is Director of the Oregon State Police Laboratory, has studied the characteristics of acute ice poisoning. Moussewitz (Arch. Pchy. u. Norm., 1933, 199, 276) bombarded snow crystals with the isoclonic cyclotron, using wavelengths in the mega spectral region, and noticed irregularities in the extinction angles of ice crystals when their tips were irradiated with therma particles. Illidsen (Swenska, Norska and Finska Hellegund, 1939, 27, 645) noticed similar effects when the crystals were infiltrated with methyl chloro-fluoride vapour and expressed his results in a mathematical formula, but the great forensic importance of these findings has so far escaped notice. In the author's expts. tap water was analysed with a mass spectrometer to fix rigidly the concns. of beryllium at not more than $0.0067\mu\text{g}$ per litre, since otherwise therma particles are absorbed and irregular results are obtained. The tap water was run into aluminium alloy trays to form 2.5-cm cubes and frozen for 6 hr. in a commercial refrigerator. The trays had the following composition: Al, 65.4; Mg, 18.7; Ca, 0.0029; Fe, 5.67; Ga, 12.6%. The resulting crystals were a mixture in equal parts of slowly melting monoclinic rhombs and hexagonal plates. Examination of the mixed crystals (n_D 1.333) in polarised light showed that the monoclinic needle-like crystals were laevorotatory and the hexagonal plates dextrorotatory. They could be separated by treatment with ethyl alcohol, which dissolved only the laevorotatory crystals and, on evaporating the soln. 99.8% pure crystals were obtained. The acicular laevorotatory ice crystal is a bi-axial positive rhomb with an extinction angle of 46° ; n_D 1.345; m.p. -3°C .; hardness + 6; sp.gr., 0.9996. In alcoholic soln. (10 to 50%) the

laevorotatory ice forms an alcohol-crystal complex, whilst the dextrorotatory ice melts innocuously.

Quantitative toxicity studies showed that laevorotatory ice had a toxic index of +3.45 and the dextrorotatory ice an index of -3.45 ; ordinary ice, when melted, is thus a racemic mixture of the two in equal proportions, and the two compounds completely neutralise each other. Animals given parenteral injections of the laevorotatory crystals (10mg/kilo) developed gastritis, diarrhoea, foul breath, rapid pulse and bulging eyes and were extremely irritable. At autopsy, the tissues appeared normal, but microscopical examination showed numerous sharp-pointed laevorotatory ice crystals sticking out of the cerebral cortex, making contact with the calcarium.

In human expts. 1 litre of commercial brandy was ingested in 3 hr. in 60-ml doses with a 2.5-cm cube of ice prepared and treated as described above. In addition to the usual alcoholic intoxication (in some cases extreme) the symptoms observed in the animal expts. were also noted after ca. 10 hr.; besides frequent eructation, conjunctivitis, sensations of heaviness in the cranial cavity and jabbing pains in the frontal region. Nervous irritation, not relieved by thiamin, was extreme, loss of memory was noted and psychic functions were atypical. In the acutely poisoned subject, the sight and odour of an alcoholic beverage produced reflex nausea; in some cases the subject developed a split personality; the average duration of this type of malady was 12hr. to 7 days. The acute symptoms spontaneously disappeared within 24 hr., apparently owing to the melting of the laevo crystals. Relief was afforded by cold milk and by aspirin (0.3 g every 30 min.). In a control group of subjects 1 litre of water was given in 60-ml doses with the same amount of ordinary ice as before. No symptoms developed.

(Reprinted from "The Analyst")

Selection Criteria (Cont)

Fig. VI

	Company			
	A	B	C	D
Variable 6 UV Detector Quality (15 total points)	12	13	11	10
<ul style="list-style-type: none"> • Fixed <ul style="list-style-type: none"> • Number of wave lengths • Back pressure on flow cell • Variable <ul style="list-style-type: none"> • Noise/wavelength 	<ul style="list-style-type: none"> • Band Pass • Cell volume • Back pressure on flow cell • Attenuation ranges • Solvent degassing recommended 			

An over-view of all the various options available by each instrument maker comprised variable 7. As is seen in Fig. VII this variable scored a total of 10 points. It was regarded as a significant section so as to allow for the purchase of the least sophisticated instrument but with the flexibility for appropriate expansion or for the purchase of the most sophisticated instrument available.

Fig. VII

	Company			
	A	B	C	D
Variable 7 Options available (10 total points)	7	9	6	6
<ul style="list-style-type: none"> • Programmable integrator • Temperature control • Fraction Collector valve • Degassing facility 	<ul style="list-style-type: none"> • Automation by microprocessor • Facility for three solvent systems • Automatic sample device 			

Our intralaboratory evaluation, variable 8, scored a total of 10 points. The features checked during the evaluation are listed in Fig. VIII. One small but significant point that should be given a special mention was the adequacy of the instruction manuals provided with the instrument.

Fig. VIII

	Company			
	A	B	C	D
Variable 8 Intralaboratory evaluation (10 total points)	6	9	5	6
<ul style="list-style-type: none"> • Electrical and mechanical safety • Accuracy • Precision • Correlation 	<ul style="list-style-type: none"> • Linearity • Machine performance • Subjective assessment • Instruction manuals 			

Variable 9 was concerned with service availability and references. A total of 10 points was awarded to this variable. The features that were of concern to us (Fig. IX) included the reliability of the agency or the parent company subsidiary, whether support was offered by trained personnel, what their response time and guarantees were to instrument failure, whether they had a list of available spare parts, whether they offered training courses and whether such training officers were dedicated or part-time, what preventative maintenance programmes were available and finally what their normal lead time was with delivery versus their actual delivery schedule.

Fig. IX

	Company			
	A	B	C	D
Variable 9 Service availability and references (10 total points)	7	7	5	6
<ul style="list-style-type: none"> • Reliability • Support • Training 	<ul style="list-style-type: none"> • Spare parts • Preventative maintenance • Delivery 	The purpose of the vendor reference checks was to gain additional information from the viewpoint of other users.		

The last variable — variable 10 — consisted of a stringent financial evaluation for which a total of 10 points could be scored. The points scored are seen in Fig. X. The request for information (an HPLC for preparative and analytical work including a programmable gradient dilution system, a sample injection valve, one syringe injection kit, a pressure monitor, one UV or UV — visible or variable detector, a programmable integrator with recorder and three columns) was weighed against potential discounts, maintenance costs and above all, value for money.

Fig. X

	Company			
	A	B	C	D
Variable 10 Financial evaluation (10 total points)	7	9	7	5

The financial evaluation of the vendor proposals were based upon the specific considerations of the request for information; including discounts; maintenance costs and value for money.

In Table II it will be observed that Company B is ahead by a clear margin. When this weighting procedure was compared to our overall impression of these points, it was felt that we had placed the companies in their appropriate and correct positions.

It was therefore recommended that we should purchase the instrument supplied by Company B.

If we were to repeat this performance, a similar scheme would be adopted except that some features of the instrument e.g. the detector system, may have been purchased from a different company. Nevertheless, for the uninitiated it is probably wiser to purchase a complete system from the one manufacturer.

TABLE II

VARIABLE	TOTAL POINTS				COMPANY			
	A	B	C	D	A	B	C	D
Company background	5	4.5	3	3.5	2.5	1.5	2	1.5
Gradient capability	20	15	18	11	10	10	8	8
Pump system	15	11	13	9	2.5	2.5	2.5	2
Column & injection system	15	12	13	11	10	10	6	6
Pressure monitoring	10	7	9	6	10	6	9	5
Detector	10	7	7	5	10	7	5	6
Options	10	7	9	7	10	7	9	7
Laboratory evaluation	10	7	9	7	10	7	9	7
Service and references	10	7	9	7	10	7	9	7
Financial evaluation	10	7	9	7	10	7	9	7
TOTAL SCORE	100	73	85	62	57			

In May 1978 the Minister of Energy issued "Goals and Guidelines — An Energy Strategy for NZ", a publication of some 110 pages available from the Government Printer at \$3 per copy, which is recommended reading for all chemists. Council of the NZIC referred the publication to the Committee on Materials and Energy, consisting of Dr I.D. Watson (Massey), Prof. A.G. Williamson and Dr. G.J. Wright (Canterbury) who prepared this commentary, which is now published with the authority of Council.

Energy Strategy For NZ — Institute's Response To "Goals & Guidelines"

Prepared by
The Committee on Materials & Energy
of
The New Zealand Institute of Chemistry.

I.D. Watson

Dept. of Chemistry,
Biochemistry and
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Dept. of Chemical Engineer-
ing,
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G.J. Wright

Dept. of Chemistry,
University of Canterbury

1. Introduction
- 1.1 We firstly wish to congratulate the Minister and his Department on the production and publication of "Goals and Guidelines". We found the factual material to be accurate and ourselves in broad agreement with the points made and opinions expressed. We do, however, feel that the problems are more urgent than is implied in Goals and Guidelines and, while we recognise the sensitivity of the Minister to the effect that emphasis on this might have on the larger audience for whom it is intended, we believe that the imminence of the problems must not be played down.
- 1.2 We also wish to say that, as a learned body, we appreciate the opportunity to contribute to a discussion on the Energy Policy for NZ. Energy is clearly an area in which many disciplines are involved. Economics is one and an important one at that. However, there are also sociological, environmental, technological and energetic considerations which may individually or collectively override the purely economic considerations. It is tempting to attempt a synthesis of all aspects, and present this to Government, and we have no doubt that some will do this. We shall, however, attempt to resist such temptation, and confine ourselves mainly to technological and energetic considerations. We have nevertheless in mind these other factors when making our remarks.
- 1.3 We are sufficiently concerned about the crises to wish to make positive assertions for immediate action.
2. Nature Of The Problem.
- 2.1 **Dependence on Oil** — The world in general and NZ in particular, have developed ways of life and technologies which are highly dependent on oil imported from a few suppliers as their energy source (60% or more).
- 2.2 **Increase in Oil Prices** — The immediate cause for concern is the effect of the five-fold increase in oil prices since 1973.
- 2.3 **Limited Life of Oil** — The longer term (and in the long run more important concern) is the recognition that oil is a source whose lifetime may be as short as 30-40 more years.
3. **Basis For A Policy**
As a basis for a policy we must have a philosophy (or Goal) which will condition our approach. We believe that the overall goal of an energy policy should be to use the technology which is available and to encourage the development of new technology to provide the materials and energy desired by society with side effects which are at best negligible and at worst acceptable to all members of society. The side effects (in terms of materials depletion) of our activities should as far as possible be sufficiently trivial that they do not close off options for future generations.

"START NOW" SAYS COMMITTEE

An immediate start should be made to implement means of extending current energy resources and to seek alternative energy resources, says the Committee in its response to recent Government announcements on Maui gas utilisation, the full text of which follows.

Emphasising the fact that both oil and gas will become scarcer and more expensive, it says that an alternative technology will be needed — and the sooner the better. "The prospect of an energy hiatus towards the end of the oil era is something with economic and political overtones of the worst possible kind."

Energy Strategy (Cont)

4. General Approach To The Problem

4.1 There is no doubt that we can ultimately reach a long term solution to the problem of providing the energy needs of the world. Two known sources of energy, nuclear fusion of earthly resources and solar energy (which is really nuclear fusion at long range) are both capable of providing much more than our present needs for periods of time beyond those for which any presently imaginable technology would exist. Nuclear fusion has not yet been achieved in a manner appropriate to this use. On the other hand, the technology to use solar energy, while it exists, has not yet been developed into actual use.

We believe that in terms of our own stated goal, the long term aim should be to develop the existing technology to use solar energy as our major continuing energy source. This decision then crystallises our shorter term aim to that of ensuring that the present resources and technology carry us through until the solar technology is implemented.

5. Specific Approach To The Problem

5.1 The attack on the problem should be a three-fold one. In the short term we must cut back our growth of energy consumption and in particular we must cut back our use of oil. In the long term we must aim to create a technology which uses renewable energy resources. At present the best sources of renewable energy are solar energy and biomass. In the medium term, (i.e. over the next 30 years) until this new technology becomes available, we must utilise existing technologies and materials which will help us stretch, complement and replace oil. This will include using LPG, Condensate and Methanol made from natural gas as transport fuels and the improvement of technologies to obtain such fuels from coal and biomass.

5.2 Oil as a resource is utilised in four ways. Firstly as a transport fuel. At present this accounts for 75% of its usage. The conservation and replacement of oil in this area is clearly of paramount importance. Secondly and thirdly, oil is used in the generation of electricity and in the production of industrial steam. We must consider ways of eliminating oil from such processes. Finally oil is used as a source of chemicals. Of the various resources available, only natural gas, oil and biomass are alternatives in this area.

6. Conservation Of Oil Resources

6.1 **Reduction of Oil Consumption** — The two ways by which we can meet the requirements of 5.1 are by conservation of oil resources and by its substitution. In the short term, the most effective method is a decrease in the consumption of hydrocarbon fuel. Though it is possible that improvements in (overseas) technology may lead to an increase in efficiency in the use of transport fuel, the major savings in fuel will arise with less — and more efficient — use of existing transport modes. This is really an economic and sociological problem. We are aware of studies by Dr. P.H. Phillips and Beca Carter Hollings & Ferner in this regard and appreciate the problems raised. We would like to see the identification and minimisation of the inefficient and trivial use of fuel though bearing in mind that one man's trivium is another man's succour.

Where oil is used as a source of industrial heat, further savings might be possible through further and more effective insulation and through process modification.

6.2 **Optimisation of Energy Produced by Oil** — A second way of conserving oil resources is to minimise wastage. Where, for instance, oil is being used to produce process steam, consideration should be given to co-generation of electricity. Where this is produced in excess, it could be sold to the NZED or local authority at a realistic figure.

6.3 **Optimisation of Use of All Energy Resources** — At present 20% of our total energy supply comes from electricity generation. This is a large percentage, even by western standards.

So long as this energy is being provided from renewable resources (e.g. hydro and geothermal), or is being used for high grade energy (lighting, electric motors), there are few problems. Wastage can occur, however, wherever thermal plants are used to produce electricity, or whenever electricity is used to provide low grade energy (space and water heating and cooking).

In thermal power stations wastage can be minimised by combined cycle operations, (gratifyingly present in plans for Auckland No. 1) and also in co-generation. Gas turbine equipment, for instance, which already exists, is capable of producing electricity from gas at efficiencies at least as great as any thermal plant and, when used in conjunction with process heat production, the efficiency of the use of that part of the fuel which goes to electricity is extremely high.

The use of electricity as a low grade energy source is some cause for concern. There are, of course, situations at which such production is acceptable, but we believe that alternative sources such as solar energy, or better utilisation of coal in industrial heating merits further investigation.

To illustrate the importance of the conservation measures outlined in 6.1, we are aware of a sizable industrial plant which reduced its energy consumption by 40% by adopting simple conservation habits such as the turning off of steam valves and electrical appliances when not in use. We also know of another which, by careful analysis of its steam generating facilities, was able to harness sufficient electrical energy to meet all its needs and also to feed excess into the national grid. We are also aware of studies aimed at conserving energy in the food, freezing, and glass manufacturing industries and hope that results of these studies will be widely publicized.

6.4 **Efficient Utilisation of Natural Gas** — There are three ways in which gas may be utilised:

- (a) as a fuel in a thermal power station,
- (b) as a premium grade fuel to provide low grade heat,
- (c) as a material resource, particularly for manufacture of methanol.

The least effective use of gas is (a) and, while we appreciate the economic arguments for the use of gas in electrical generation, we have considerable reservations about using it in too many future thermal power stations, believing that for this purpose coal is the preferred fuel. The appropriate way to use gas is as a premium fuel (b), and we would wish to see it used as such, particularly as a replacement for oil in steam plants.

We are even more firmly convinced, however, that a sizeable amount should be used in the manufacture of alcohol which would provide a valuable supplement to hydrocarbon fuel. At present we obtain 200 PJ p.a. of energy from oil, of which 125 PJ are used in transport. Utilising current technology we could, by 1980, manufacture (from 20 PJ of gas) about 12 PJ of methanol. This would replace 20 PJ of our fuel,

Energy Strategy (Cont)

since up to 15% of methanol may be included in petrol without any change in vehicle tuning or performance. If in addition we utilised the 25 PJ available from condensate from Maui and Kapuni, and the 10 PJ from LPG, we could get an immediate net savings of 30-35% of current imported oil usage. This would still leave more than sufficient Maui gas to provide 20 PJ p.a. to replace the non-transport sector of oil, making possible in total a 45-50% substitution of our present oil needs **within less than 5 years.**

We should, however, be aware that, like oil, gas will eventually run out. It is a limited resource and best viewed as a commodity to help us through the hiatus from an oilbased technology to one based on renewable resources.

7. Substitution Of Oil

- 7.1 Ultimately we must move away from an oilbased technology. Listed below are possible energy sources. We have included wind, tidal and other alternative forms under solar. Also included are estimates of the life time of these fuels, of the environmental hazards (lowest 1, highest 5), the estimated lead time to implement the technology, and the kinds of uses the resources can be put to in terms of existing technology, (T=transport fuel, E=electricity generation, H=heat source, M=material source).

Energy Source	Lifetime/Yr	Environmental Hazard	Lead Time to Implement Technology/yrs.	Uses
Oil	20-40	3	0	TEHM
Natural Gas	30	3	0	T+EHM
Coal	50-500	4	20	T+EHM
Biomass	Renewable	4	10	T+EHM
Nuclear Fission	30-50	5	0-10	E
Nuclear Breeder	1000-2000	3	50	E
Nuclear Fusion	Renewable	3	50	E
Solar	Renewable	1	5-50	EH

+ means that the fuel must be obtained by processing.

- 7.2 **Coal** — Though the above table contains many subjective elements, and much conjecture, it is of assistance in assessing options. The relative abundance of coal in NZ makes it an attractive alternative, particularly for steam plants, low grade heating and thermal power plants. However, there is considerable pollution, particularly in the production of oxides of nitrogen and sulphur and also in the production of carbon dioxide. As a commodity to help us through the hiatus, however, it clearly has a place. There is also the possibility of the manufacture of petroleum from coal and also the production of chemicals. Squires in the special Energy issue of the Canterbury Engineering Journal May 1975 has sounded a pessimistic note on the latter, arguing that at present natural gas is the preferred raw material and that this is in considerable abundance in the world (estimated resource 150 years). However, we believe that research should be done into this, beginning initially with a feasibility study. The production of petroleum from coal is thought at present overseas to be too costly. But this economic factor could change over the next 10 years and again we believe that, as a country, we should be investigating the efficient production of petroleum from coal and that research at both the Coal Research Association and elsewhere should begin to be directed in that area. This is unlikely to have immediate spinoff, but should begin to make progress within 10-15 years.
- 7.3 **Biomass** — Based on our present knowledge, biomass offers the most feasible renewable system. That is not to say there are no problems. To produce

100 PJ of methanol from say fodder beet (using fermentation processes) would require about 5×10^9 ha of land. To replace all the energy used from oil in the non-transport sector with biomass would require a further landmass of similar size. That is, we require two other land masses the size of the present indigenous forests. The utilisation of biomass would also give rise to considerable environmental problems and the risk of fire makes it somewhat less secure than other options. Nevertheless the technology of the utilisation of biomass is already underway and is sufficiently inexpensive to be able to be undertaken in NZ where already there is considerable expertise. We believe it most important that high priority be given to such research and development.

- 7.4 **Nuclear Power** — Of the various types of nuclear power, the only option we have at present is nuclear fission. This would be used to produce electricity only, (from an imported fuel furthermore) and, as we are aware, it poses some environmental problems. It also involves expensive imported technology. Thus it has something of the nature of a last resort about it. The other types of nuclear technology, breeder reactors and nuclear fusion are some distance from practical implementation and depend on development work which cannot be done in NZ.

- 7.5. **Solar Energy** — The abundance of solar energy and its extremely low adverse environmental side effects make it the most desirable source of energy and it has already proved to be of some use as a low grade source of energy. We have already advocated its use via biomass. The other methods of fixing solar energy are to use it to manufacture electricity, by photovoltaic effects, thermal effects (concentration of the sun's rays), or by using wind power. Expertise is already available in all these areas in NZ and again we believe research in all these areas should be encouraged and funded in NZ.

- 7.6 **Transport Fuels** — While long term substitution for oil in non-transport use appears feasible even today, it is difficult to see how an alternative transport fuel will ever be devised. The high energy/mass ratio and higher energy/volume ratio are what makes oil so indispensable, particularly for aviation. Biomass offers one possibility, but manufacture of petroleum from this and other sources will require a further energy input. Our hydrocarbon material will become the transducer of solar energy to mechanical energy. Another possibility — but one for which the detailed technology is not yet implementable — is to use electricity to decompose water by electrolysis, then to use hydrogen as the combustion fuel in transport. We should keep an interest in this and other alternatives as they arise, and where unconventional approaches arise in NZ, we should not dismiss them out of hand but give due thought and, where appropriate, encouragement to them.

8. Oil Exploration

While exploration for further supplies of oil is a worthwhile activity and discoveries of oil would be of great value to NZ, we are perturbed that such a large fraction of the total amount spent on energy research is going into this activity and so little is going into other areas where success, though less dramatic in its effects, is much more certain.

9. Maui Gas Conservation

The development of the Maui field was originally undertaken with a view to its major use being for electricity generation. The present fall-off in electricity usage and the fact that future thermal energy — based electricity

Energy Strategy (Cont)

generation will be at a higher efficiency than were originally envisaged mean that the Maui gas may need to be used at a slower rate than was originally planned.

We realise that the Government has a "take or pay" agreement with respect of Maui gas. However, as we understand it, gas paid for but not taken is held in reserve for future use. We urge that the temptation to use the gas merely because it has been paid for should be resisted, both with respect to its combustion and with respect to its export via the use of gas for petrochemical production.

10.1 Conclusion and Recommendations

10.2 It is important to realise that both oil and gas will become scarcer and more expensive, and that sooner or later we shall need an alternative technology. It would be wise to assume this is likely to be sooner. We should immediately begin to implement means of extending current energy resources and to seek alternative energy resources. The prospect of an energy hiatus towards the end of the oil era is something with economic and political overtones of the worst possible kind. There is another incentive — if that is necessary — and that is a dependence on transport for our economic survival.

10.2 In order to implement the outlined strategy, we recommend the following be adopted:

- (1) The immediate construction of a methanol plant using natural gas as feed-stock to produce 10 PJ per annum of fuel grade methanol. The plant should be programmed to go on stream in 1980.

- (2) The immediate development of the distribution system to handle the methanol for a 15% methanol/petrol fuel.
- (3) The encouragement of the use of LPG as a fuel, initially for fleet owners, but also extending to private individuals.
- (4) The confirmation of our commitment to indigenous fuels by restricting refinery capacity to its present size.
- (5) The establishment of a continuing research and development programme to develop high energy fuel from biomass and coal.
- (6) The establishment of a continuing research and development programme to examine the production of biomass non-transport fuel.
- (7) The establishment of a continuing research and development programme of solar energy, paying particular attention to the biochemistry and organic chemistry related to the possibilities for "cultured" solar energy conversion and to the electrochemistry and surface chemistry related to the improvement of storage battery chemistry, the development of wind power and the harnessing of the photovoltaic effect.
- (8) The immediate establishment and wide dissemination of energy consumption norms for process industries.
- (9) The continuation and intensification of the conservation campaign.
- (10) The establishment of a group to study the use of all forms of energy in NZ, with a view to formulating an energy policy based primarily on optimum utilisation of resources and of research and development effort.

Book Reviews

THE DOUBLE HELIX REVISITED—BY G. A. RODLEY AND D. C. REANNEY

Published for the University of Canterbury by Whitcoulls Ltd., Christchurch, 1977, 56pp.

The recent proposal of an alternative, double-helical structure for DNA has inspired the production of this little book. The authors point out that many of the finer points of the double-helical structure as proposed by Watson and Crick in 1953 remain poorly understood and appreciated and they aim to "bring together this background information from a variety of sources in what we hope is a reasonably concise and elementary manner." At the same time, in the light of the proposed new structure they consider it timely to review the present status of the theory of DNA structure and "hope to convey something of the interplay of ideas, the attitudes and even rivalry which accompany scientific endeavour."

I found the realisation of these aims to be somewhat patchy, and I could not help wondering just how clear a picture a layman would obtain from a reading of this book.

The first three chapters of the book are devoted to a summary of the molecular structure of polynucleotide chains and the Watson-Crick structure for double-stranded DNA. I would wonder whether they present a picture that is any more complete or understandable to the uninitiated than that to be found in any elementary textbook of biochemistry. Indeed, I suspect that it would have the opposite effect. The authors have adopted a curious mixture of what someone has called the "gee whizz" approach

(complete with irritating exclamation marks) with inevitable oversimplification and some quite unnecessary complexities.

For example, a half-page Figure (Fig. 1) is devoted to a meaningless oversimplified representation of "separation of strands during cell division (replication)", while Figure 3 shows the four possible conformations of a pentapyranose ring which would be equally uninformative to the layman. In other places the authors have succeeded in oversimplifying to the point of absurdity. The situation in a living cell is summarised as "something like having a tape recorder whose information is tightly packed on the reel in such a way that the tape recorder is able to reproduce itself! (SIC)" while, after a perfectly adequate definition of the terms 'hydrophilic' and 'hydrophobic', the DNA molecule "can be described in a simple way as having an oily core and a water-loving exterior." It is hard to imagine what sort of a picture of the molecule is conjured up in the mind of a layman by woolly statements like these.

These lapses in the first chapters are, however, more than redeemed by the remainder of the book, in which the major deficiencies of the Watson-Crick model are summarised and features of the alternative, side-by-side, model are lucidly expounded in a way that should certainly be intelligible to the interested reader. The account of the alternative structure is illustrated with excellent stereoscopic diagrams and photographs of the model (although I suspect that the value of these to many readers would have been enhanced by some brief instructions on how to view these stereoscopically without a stereoscope). The reader is left with a feeling that the Watson-Crick struc-

ture, beautiful though it might seem, does raise some difficulties. Whether the side-by-side model successfully overcomes these criticisms is of course another question that time alone will answer. I cannot recommend this book to someone who wants to learn about the molecular biology of DNA, but I can certainly recommend it to a reader who is interested to find out what all the fuss is about.

G. B. Petersen

STRUCTURE DETERMINATION BY X-RAY CRYSTALLOGRAPHY.

M.F.C. Ladd & R.A. Palmer, Plenum Press, New York, 1977, Pp 393. Price \$35.40

Published in 1977 this book aims to introduce crystallography to final-year undergraduate and first-year graduate students. The early chapters deal with symmetry, preliminary crystal examination by optical and photographic methods and space group determination. Later chapters cover methods of structure solution which include the Patterson function, heavy atom method, isomorphous replacement and direct methods. Mathematical detail has been kept to a minimum. Numerous examples have been included in the text to illustrate the concepts discussed. The final chapter presents details of the structural analysis process for two different molecules, the first a bromine containing organic compound, the second a relatively small "all light atom" molecule.

J.M. Waters

Lawrie Creamer, reporting on the International Conference on Fibrous Proteins, Massey University, February 12-16, describes it as . . .

Bridging The "Culture" Gap

The aim of this conference was to bring together a number of eminent scientists and technologists so that there could be a transfer of knowledge across an often impermeable barrier, namely that between the academic protein chemist with his preoccupation with sequence studies, fluorescence emission curves and how to fund the work to be done next year on one hand and the applied protein chemist whether he be a gelatin manufacturer, a tanner, a plastic surgeon, a meat chemist or a wool scientist on the other.

By and large the pious hopes of most conference organisers are not fulfilled because of the natural instinct of the participants to stay with their own kind and not to mix with those from the "other side". This particular conference was successful in that there was a mixing of the various "cultures", if that is the right term, and consequently many participants went away with a realisation that there was more than one way of tackling any particular problem. If one tries to analyse just why the conference succeeded, this is rather more difficult, although several factors clearly emerge. First, the organisation of the conference was excellent, with almost all delegates being met, the registration desk manned (femalely) at all times, adequate sign-posting in readable lettering etc. etc. (Incidentally, I don't think the leather satchels will meet the usual fate of conference paraphernalia). Secondly, Palmerston North in its usual way had threatening skies and a few drops of rain every day, discouraging a leisurely stroll in the Massey grounds or even further afield. This coupled with the 30min tea breaks and 70min. lunch breaks meant that most delegates attended most sessions. Thirdly, and probably most important, several of the delegates were able to span the gap between fundamental and applied in a very able way. Allen Bailey, whose speciality is cross-linking in collagen, was able to discuss many of the related disease conditions and the problems of ageing. Milos Chvapil who has developed a number of very saleable products was an active contributor to many of the discussions on the fundamental papers.

All the plenary lectures were excellent and, because a high proportion were from young, active scientists, they were well prepared and included a large amount of previously unpublished work. The book of proceedings, which the organisers, somewhat optimistically one feels, hope to publish in July, should be a useful addition to the library of any fibrous protein chemist with some interest in applied aspects of the subject.

Considering the interest that NZ should be putting into fibrous proteins, it was a little surprising at first sight that there were so few New Zealanders at the conference (60 registrants and many of these were only able to attend for one day). One quickly realised, however, that despite the fact that 50% of our export receipts come from fibrous proteins, NZ does not have very many fibrous protein scientists. A glance at the efforts of other countries shows that they are continuing to decrease the effort put into fundamental science related to wood, meat, dairy products and wool. However, their exports tend to contain transistors rather than amino acids and we should not use their behaviour as our model.

To return to the conference, it was opened by Mr L.A. Cameron, Head of the NRAC. The opening address, an historic review of the importance of farming and protein exports to the NZ economy, was given by Dr A. Stewart, Vice-Chancellor of Massey University. The plenary speakers (and affiliations) were: C.L. Davey (MIRINZ, Hamilton), E. Hedimann (Technische Hochschule, Darmstadt), M. Chvapil (University of Arizona, Tucson), H. Bacemann (Westfälischen Technische Hochschule, Aachen), D.A.D. Parry (Massey University, Palmerston North), N.M. Tooney (Polytechnic Institute of New York), R.W. Gianville (Max Planck Institut für Biochemie, Munich), A.J. Bailey (Meat Research Institute, Bristol), R.D.B. Fraser (CSIRO Division of Protein Chemistry, Melbourne), R.D. Harkness (University College, London), S. Lowey (Brandeis University, Waltham, Mass.), J.M. Squire (Imperial College, London), H.E. Huxley (Laboratory of Molecular Biology, Cambridge) and D.F.G. Orwin (WRONZ, Christchurch). There were 51 research papers, 5 research poster papers and a 12min film of collagen fibril formation presented during the week. Registrations came from NZ (60), Australia (31), UK (8), USA (6), Germany (3), India (2), Japan (1) and Israel (1).

Organic Chemistry of Sulfur

Edited by S. Oae, Plenum Press, New York-London, 1977, 713 + ix pp., \$48.00.

Sulphur is present in a wide array of natural and synthetic organic compounds. These include malodorous short chain thiols of both vegetable and animal origin, biochemically important proteins and sulphate esters. Many organic sulphur compounds are of industrial importance, e.g. sulphoxides and sulphones as solvents and salts of sulphonic acids in detergents, while in petroleum refining the removal of sulphur compounds from crude oil can be a major problem. Thus, a knowledge of the properties of these compounds could be of interest to many scientists.

This book is a survey (textbook style) by an international group of authors, of the basic chemistry of organosulphur compounds. The opening chapter gives a very brief account, in orbital theory, of sulphur bonding and reasons for the similarities and differences between related oxygen — and sulphur — containing compounds. A discussion leads to the widely known industrial process of vulcanization of rubber. The following chapters describe the preparation and properties of thiols, thiones, sulphides, disulphides and polysulphides, sulphoxides and sulphilimines, sulphonium salts, sulphones and sulfoximes, sulphinic acids and sulphinic esters. The final chapter discusses reactions of sulphonate and sulphate esters.

As this is a textbook of a very wide field, it tends to be a review of previous reviews. Fortunately, an extensive list of references follows each chapter, from which one can obtain the original publications. From these lists, it is obvious that the manuscripts for the book were prepared in 1972 although the publication date is 1977. Thus, many relatively recent publications, e.g. those on sulphur-containing ring compounds of potential importance in the flavour chemistry of meat, could not be considered for inclusion in this book. As with many other publications, the time lag between manuscript preparation and publication does a serious disservice to science, especially in rapidly developing and changing fields.

Material in the book is well presented and all subjects are comprehensively treated. Overlap between chapters is minimal and where it occurs the comments are complementary. Inclusion of more spectral data would have been desirable. The index, which is barely adequate, contains some annoying incorrect page numbers and there is no author index. Thus, material of interest may be difficult to locate readily.

This book is written for both students and research workers in many fields. It is a valuable review of its subject and can be recommended to research laboratory and university libraries. It could be of value to practising synthetic and analytical organic chemists and it is not excessively priced for its size.

C.B. Johnson

High Standard Evident At RACI Meet

Prof. R.C. Cambie (Auckland), Dr. B. Halton and Mr. D.L. Officer (Wellington) attended the RACI Organic Division meeting in Hobart, January 14-19. Dr Halton has provided this review.

The meeting was characterised by an exceptionally high standard of Chemistry and the 250 participants owe much to Prof. Polya and his committee for organising and managing the proceedings in a way which could not be faulted.

The scientific content of the meeting consisted of 8 plenary lectures, 35 research papers and 64 poster displays. Of the plenary lecturers four were from overseas. Prof. K.B. Sharpless (Stanford University, USA) surveyed his work in the area of metal catalysed selective olefin oxygenations employing t-butyl hydroperoxide while Prof. K. Nakanishi (Columbia University, USA) discussed his intricate studies on visual pigments and retinoids which have a direct bearing on vision and colour recognition. In addition he outlined the use of retinoic acid and related compounds in the regression of precancerous tissue cells to normal cells. Prof. G.S.R. Subba Row (Indian Institute of Science, Bangalore) outlined his recent investigations on the structure-activity relationships of a variety of natural products extracted from Indian medicinal plants, some of which have led to the development of new drugs. Prof. R.C. Cambie (Auckland University) elaborated the

OBITUARY

J.J.S. Cornes, BA, BSc, FNZIC.

Mr J.J.S. (Steve) Cornes who died on December 11, 1977, had a most varied and interesting career. Born in Thames of a Cornish mining family, he graduated BA and BSc from Auckland University College. In 1916, he enlisted and because biology was his main subject in his studies he was placed in the Medical Corps, serving in NZ and in Europe. Later he took various teaching positions, leading to an appointment at the Christchurch

recent developments in the addition of iodine azide to olefins, an area which will be the subject of further discussion at the Institute conference in Wellington next August.

The Australian plenary lecturers, R.W. Rickards, (ANU), J.H. Bowie (Adelaide), L. Radom (ANU), and A.A. Baklion (ICI Australia) matched their overseas counterparts on their topics of glutarimide antibiotics, hydrogen rearrangements in mass spectrometry, molecular orbitals in organic chemistry, and heterocyclic anthelmintics, respectively.

The research lectures and posters were divided into sessions covering natural products, reagents and mechanism, synthesis, heterocycles, and theoretical and physical methods. Lectures and posters were run concurrently and the poster displays were subsequently retained for perusal by those who had attended the lecture session. The success of this latter format was obvious to all participants and 'posters' are to be commended to Institute Conference Committees for more frequent use here.

Teachers' Training College. When this was closed as a depression measure, Steve Cornes made some money by touring NZ with films for schools, from which he developed a life-long interest, being at one time Secretary of the Wellington Film Society.

In 1935, he joined the inorganic section of the Dominion Laboratory, where he soon became well known for his enthusiasm and his discoveries of new minerals and new analytical methods. His major work was the use of dunite and later serpentine as a reverting material for superphosphate, which became very significant in making limited super supplies go further during the war. Although he briefly mentioned it during a meeting of the Wellington Branch of the Institute, which was reported in the Journal of the NZIC for December 1938, he did not get proper credit for this work until 1972.

Steve Cornes' enthusiasm extended to other plant nutrients. He had a sandy section at Titahi Bay which he fertilised with sea weed, and challenged any member of the Lab. staff to grow larger potatoes. R.L. Andrew, then acting Dominion Analyst, and a keen gardener, took up the challenge, but Cornes won easily.



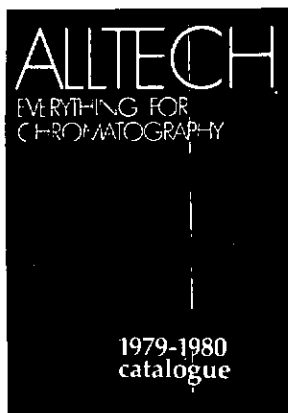
Steve Cornes: His work with minerals profited NZ

Another unfortunate issue in Cornes' career arose from his analytical work on the discovery of uranium in the Buller Gorge. An article in "Truth" brought pressure on politicians to order that people with rather radical views like Steve should not work on uranium, and although he protested even to the Minister, this work was taken away from him. This concerned him long after he retired and was one of the reasons why he did not continue in the Dominion Laboratory after reaching the official retiring age, which affected him financially as he was not covered by the civil service superannuation. He worked in various positions subsequently, the main one being Chemist to the Waitomo Cement Co. at Te Kuiti.

Cornes is survived by his second wife, Marion, 4 children and 10 grandchildren. All his colleagues will regret the passing of this colourful personality.

(Based on notes supplied by Dr S.H. Wilson and G.S. Lambert.)

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ANZAAS: An Assessment

By Dr Magnus Pyke, OBE, FRSE

Since the British Association for the Advancement of Science was founded in 1831 it has grown and developed through a number of phases. At the beginning, it served as a forum where the newly discovered facts of science could be brought to public notice. The new discoveries were often new to scientists other than those who were describing them.

The meetings of the BA, and the printed accounts of their proceedings thus served in those early days in the way in which the specialised learned societies now do as a platform by which new knowledge gained currency.

At the same time, however, the educated section of the public also took note of the advancement of science and sometimes made use of the knowledge to do practical things like lighting the streets or substituting guncotton for gunpowder. In those days, an educated man — few women were then involved — could, if he took the trouble, make himself conversant with the discoveries of science and understand what scientists were saying.

The scientists themselves, who today would be considered deprived of the professionalism of the specialised societies which did not then exist, were members of that same community of educated men.

Things are different now. Professional scientists know what their fellow citizens do not. It thus follows that at meetings of the BA — but not necessarily to the same degree at ANZAAS conferences — the scientists are primarily attempting to tell the outside community what is new in science. Sometimes they also feel themselves qualified to tell these same fellow citizens what the community should do with the new knowledge.

The fact that more than 4000 people attended the ANZAAS meeting at Auckland out of a population of, say, 15 million, whereas fewer than 3000 attend BA meetings from a population of 55 million implies that ANZAAS serves a wider purpose than does the BA. A glance at the ANZAAS proceedings shows that its conferences still serve in part as a central meeting place where scientists of the same and of different disciplines exchange new information with each other. ANZAAS members also comprise those who, while they work within the

scientific ambience — as technical salesmen, technicians in laboratories of various sorts, as dietitians, agriculturalists and teachers — would not claim themselves to be scientists extending the horizons of new knowledge.



Scientists are laity in every field but their own — Magnus Pike

Members of the general community also attend ANZAAS meetings and many more take notice of what goes on by reading about it in the newspapers or seeing it on television. What do they see and read? What is it that scientists in general and chemists in particular tell them and what are their qualifications for doing so? Those involved with food and nutrition, for example, can legitimately describe the new analytical techniques by which the presence of selenium — more poisonous than

arsenic — can be detected in foods and in living tissues. They can review what knowledge is available about the chemistry of that ambiguous entity, fibre — the "humus" of nutrition, as it would seem. They can discuss the molar concentration of sodium in the diverse diets of NZ citizens. These are hard facts that scientists know but the listening citizens do not.

But when it comes to deciding what — if anything — should be done about the state of affairs illustrated by the various chemical analyses, the scientists are — or ought to be — more circumspect. Nor are their credentials unequivocal. Do New Zealanders suffer from eating as much or as little selenium as they do? Or as much of whatever chemically composed fibre as they eat? Could some of the current preoccupation with saltiness and health be a scientific red herring (and were they salty!)?

Whereas, at the ANZAAS meetings — but not so much as at the conferences of today's BA — scientists speaking as experts to the laity are also involved in discussions of their experimental results with their peers — and how puzzling it can be to discover the truth — they may be better able to remember that they, too, are members of the laity in every field but their own. Remembering this, they may be less ready to propose statutory changes aimed, let us say, to change the chemical composition of the national diet and more prepared to discuss with the generality of the community — more concisely, perhaps, than themselves of the diversity of factors capable of influencing public wellbeing — whether such change is likely to be practically beneficial.

It would be of little virtue to raise the level of fibre with the intention of benefiting the digestion of the old if, by so doing, the growth of the young were thereby stunted due to a consequential shortage of available zinc.

(Overleaf we feature briefs from the ANZAAS Congress)

Among those enjoying Editor Stan Brooker's hospitality during ANZAAS were Drs Keith Farrar OBE, chief scientist, Kraft Foods, Melbourne (left) and Garth Wallace, Massey University.



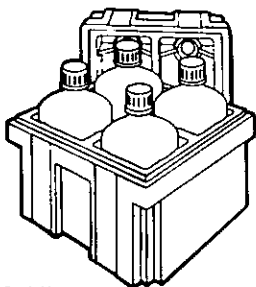


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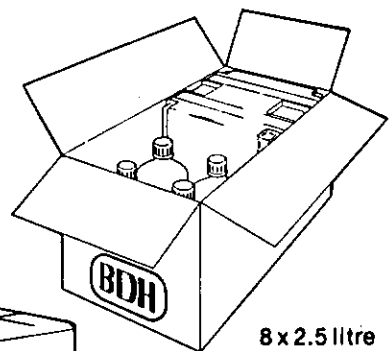
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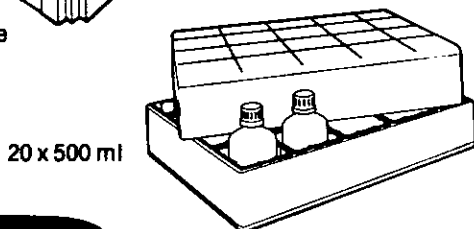
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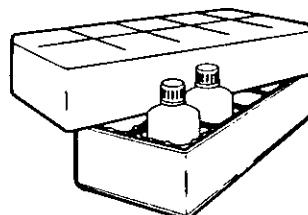


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The ANZAAS Congress must surely be rated as the greatest scientific occasion in the history of NZ and, as readers will note from Dr Magnus Pyke's comments on another page, compared favourably with congresses held by sister organisations overseas. As chemists we can take some pride that Prof. Neil Waters, a chemist who contributes our guest editorial this month, was Hon. Organising Secretary for the whole Congress, and can take much credit for its outstanding success.

A notable feature of the Congress was the amount of coverage in the media, about 100 reporters and assistants, so that ANZAAS did something in the way of getting science across to the public, which historically at least was the main aim of the British Association. The NZ Herald of Saturday, January 27, the day after the Congress finished, tried to sum it up, relying mainly on the comments of Dr Georg Borgstrom, an expatriate Swede now at Michigan State, and Dr Pyke.

In line with most of Dr Borgstrom's utterances during the Congress, he was pessimistic, as witness the Herald quote "It is unlikely that they (the scientific papers) would have any useful result." Dr Pyke, who as a past Secretary of the British Association may be biased, said that the Congress fulfilled a twofold function — professionals had exchanged knowledge of the "cutting edge" of research, and the Conference had succeeded as an exposition of the work in science to the lay public.

The Listener's staff writer, who paid most attention to a controversial paper on eyestrain, summed the whole affair as "a week of impenetrability", which may shed more light on Helen Paske than on ANZAAS.

Big gatherings have problems as well as pleasures, the chief being the multiplicity of areas covered by the various sections, which besides the classic disciplines, included criminology, industrial relations, sports science, social responsibility in science, communications, oenology, musicology and student ANZAAS. In addition, there were a large range of symposia, social events and concerts, so that those who attended were constantly faced with making decisions as to what they should attend. For chemists, this problem was compounded by concurrent sessions in Section 2, and a siphoning off of many good chemists into a special Section on trace elements. Dr Keith Bedford, Secretary for Section 2, notes that with a total of only 166 delegates

ANZAAS 49TH CONGRESS

registered for the Section, attendances were spread pretty thinly over three concurrent sessions and the same applied to several other Sections. We feel this could sacrifice quality for quantity.

Section 2 had Dr Jim Ellis, Director, Chemistry Division, DSIR, and 2nd Vice-President of the NZIC, as its President, and we publish his address in this issue. The Section Committee made a very good choice in their guest speaker, Prof. Bryce-Smith, University of Reading, UK; his address to the Section on the Photochemistry of Benzene did not have the public at large rolling in the aisles, but his campaign about the evil effects of lead in petrol (and its inefficiency as a fuel additive) really hit the media. We also found his lecture of the effects, non-effects, and interactions of trace elements in the body of absorbing interest, and hope to publish something from him in a later issue. Other featured addresses were by Prof. H. Bloom, University of Tasmania (ex Auckland) on Mercury and Cadmium in the Marine Environment, Prof. J.P. Collman, Stanford University, USA, on Synthetic Analogues of the Hemoproteins, D.F. Sangster, Australian Atomic Energy Commission on Radiation in Science and Industry, and the Liversedge Memorial Lecture by Prof. D.A. Buckingham, Otago, on the Future of Co-ordination Chemistry in Biology.

The Congress confirmed our view of chemistry as a basic science, for there were few sections where it was not involved in some way or other. Space does not permit us to mention them all, but we were intrigued by the use of sodium hexafluoride as an inert tracer in studies of air currents and ventilation by T.S. Clarkson, NZ Meteorological Service. With gas chromatography, this compound can be detected at a concentration of 1 part in 10^{12} in a 1 ml sample.

An important inter disciplinary session with Section 33 — Communication — heard a lecture by Dr G.A. Sklovsky, President of that Section, on information for chemists in Australia and NZ. This is very appropriate when we find that the ninth

collective index to Chemical Abstracts for the 5 years 1972 — 1976 will fill 62 volumes and cost about \$8000, and the system now used is difficult even for academics, let alone rank and file chemists.

Following our thought above about the widespread interest of chemistry, we picked out the session in Section 20 on the role of the expert witness, which directly affects some of our members. Lloyd Brown, Q.C., rejected the commonly advanced alternative of an expert appointed by the Court to assist and supplement the legal process. He felt that a good part of the problem was due to inadequate liaison between the scientific witness and counsel, for which he blamed the latter rather than the former. He also referred to the new rules of the English Supreme Court Practice, 1976, which restrict the right of parties to adduce expert evidence in civil proceedings as a matter of course and provide machinery for pretrial disclosure by each party of expert evidence to the other.

Mr Justice Mahon felt that the special power of expert opinion was such that if the tribunal accepted it, this opinion in fact and not the tribunal decided the issue. He also criticised counsel who went from one expert to another until they found one who would support their case. In one example quoted, 68 experts were approached before one was found who would say what counsel wanted. He was likewise unhappy with court appointed experts who speak to the judge alone, and are in fact used in NZ in land valuation cases. His Honour considered the average jury was not competent to reach an informed verdict upon a scientific dispute of any complexity and quoted legal authorities in support. In protracted cases members of the jury could have forgotten a good deal before they came to consider the verdict.

He suggested, therefore, that the presiding judge should prepare for the jury a memorandum setting out the salient facts relied on by each of the experts, their conclusions and the reasons for these conclusions. We discussed these papers with Dr. Jim Sprott, who has probably had as much court experience as any of our members. He agrees with both authors in their criticisms, and feels that Mr Justice Mahon's suggestion would help, but neither paper gets to the nub of the matter. In Dr. Sprott's view, the place to sort our scientific differences is in the laboratory and not in the court: he cites occasions when

magistrates have adjourned proceedings and sent scientific witnesses away to resolve their differences, and these experts, freed from the constraints of evidence by question and answer, have always been able to agree. This should work in the Supreme Court also. It is interesting to note that while the judge can make any notes he wishes, the jury cannot, and have to rely on their memories in cases which may last weeks. It seems reasonable that the jury should even be encouraged to make notes, which would have the additional advantage of preventing jurors falling asleep, as happened recently in New Plymouth.

* * *

The Congress had some notable visitors, whose expenses were in many cases assisted by generous help from industry and Government. We pick out a few without prejudice. When the impending energy crisis prevented the NZ Minister of Science from attending a function for overseas delegates at the Auckland Museum on the Wednesday evening, Senator P. Baume of the Australian Federal Parliament spoke in his place. The Senator also contributed a paper to the symposium on Human Resources in Health Care on the political and medical realities of GNP. The fact that he was so involved indicated the importance placed on the Congress by our Australian friends.

Prof. Jon Appleton from Dartmouth College, New Hampshire (described in the "Listener" as "an earnest American in a vivid striped suit") caught our attention with the "synclavier" which he described in a paper to the Musicology Section. This is a digital performance instrument, a computer driven synthesiser which can reproduce music sounds ranging from the harpsicord to the human voice; it can also memorise and play back recorded music — and all for \$15,000 which will probably be reduced when the orders flow in. There was a concert with the instrument whose output was accepted as real music by the NZ Herald's discerning critic. Like many other musical events this was one which we could not attend because we were involved with the activities of another section. Which brings us to the dilemma mentioned before — a little event brings little people, but a big event brings so many big people that we have little time to meet and hear them.

* * *

Our Associate, Dr Bill Denny, attended the Pharmaceutical Sciences Section (section 6) which provided an

opportunity for a group of people of quite diverse interests from the pharmaceutical industry, retail and hospital pharmacies, and university departments of pharmacy and pharmacology to come together to discuss their mutual interests.

Total enrolment for this section was 116, about the same number which attended at the last Congress in Melbourne. The specialist scientific sessions were held at the Medical School and attracted average audiences of 60-90, despite the relatively remote venue. Highlights of the specialist sessions were the Presidential Address by Dr. J.T. Baker, Director, Roche Institute for Marine Pharmacology, NSW, on the chemistry of marine extractives of pharmaceutical interest, together with the symposia on Carcinogenesis and Environmental Mutagens, Indigenous Sources of Pharmaceuticals in Australia and NZ, the Pharmacology of Neural Transmitters, DNA as a Target for Therapeutic Drugs, and The Impact of Immunology on the Pharmaceutical Sciences.

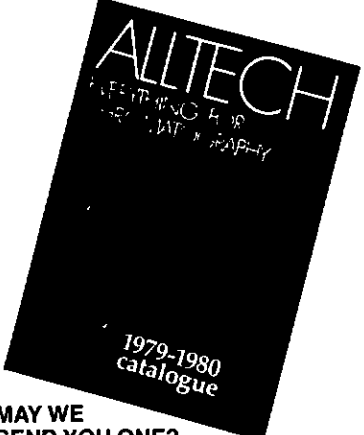
In the afternoons, delegates had the option of attending general symposium 13, Modern Drug Treatment — Benefits, Risks and Costs, organized jointly by section 6 and the Pharmaceutical Manufacturer's Association of NZ. Although attendances were modest compared to some of the other general symposia, the 100 or so delegates at each session were given an interesting and comprehensive view of the vital role which pharmaceuticals have in modern health care in NZ.

The President of the PMA, Ken Vincent, told the meeting that while it cost the Government \$110 per day to keep a patient in hospital, the average prescription cost just over \$4; he felt that some effort should be made to compare the relative effectiveness of \$572M spent annually on hospital care with the \$98M spent on medicines. He also pleaded for more incentives for the development of pharmaceuticals in NZ, utilising our own raw materials such as sheep glands and Solanum.

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Little Urgency Over Energy Problem Seen In USA

Little sense of urgency in USA over "The Energy Problem" was noted by Prof. A. G. Williamson, Department of Chemical Engineering, Canterbury University, when he attended a solar energy symposium in Miami in December.

In fact, he found this conference rather disappointing. However, he gained much from attending a UNESCO conference in Toronto a few days earlier and in visiting various universities and energy companies during his North American trip, undertaken partly with the assistance of the NZIC.

His report follows:

This visit was triggered by the fortunate conjunction of two conferences viz. the UNESCO International Symposium on "University—Industry interactions in Chemistry" at Toronto, December 4-7, and the Clean Energy Institute's Symposium on "Solar Energy and Conservation" in Miami, December 11-13. In addition to these conferences I visited the Chemistry Department at Wright State University, Dayton, Ohio, the Chemistry and Chemical Engineering Departments and the Thermodynamics Research Centre at Texas A & M University, College Station, Texas, Solar Gas Turbines Ltd, San Diego, the Chemistry Department UCLA, Associated Power Systems Ltd, Palo Alto and the Boiler House at University of California, Davis.

My attendance at the UNESCO symposium arose from my submission, in response to an earlier UNESCO query, to the symposium of a brief national resume of University—Industry interactions in NZ and a specific case study based on my own involvement with industry through the approved professional practice requirement of the University of Canterbury degree in Chemical Engineering.

Briefly this practical work requirement involved students in supervised projects representative of the kind of work they will be required to do as professional chemical engineers. A number of NZ industries have appropriate projects but insufficient staff to supervise the work. In order to take advantage of these opportunities staff

members of the Chemical Engineering Department at Canterbury have, over the past 10 years, provided supplementary supervision of these student projects by spending some time with the students in the plants in which they were employed. We believe that this has provided benefits for the industry, for the students and for the staff concerned and that this form of interaction could be a valuable form of interaction in the so called underdeveloped countries. It might also be applied to Chemistry degrees.

The Toronto symposium was one of UNESCO's most successful, being attended by some 200 representatives from 61 countries. National reviews were presented by 27 countries. The submissions indicated that practically every conceivable form of interaction had taken place in one form or another in one place or another. Sandwich courses, Academic Staff — Industrial Staff exchanges, and consultation seemed to be the most common forms of interaction.

Some of the more interesting forms of sandwich course were those operated at Waterloo University and at the University of Surrey. As with the Canterbury Chemical Engineering Department approach, the Surrey scheme depended largely for its success on informal personal relations between Industrial and Academic Staff. The reappraisal of objectives recently carried out at Delft University was described in some detail with particular reference to the curricular objectives and the differences between the chemist's and chemical engineer's approaches to chemistry in industry was particularly interesting.

The institutional barriers to interchange were discussed at some length, especially the concern among academics that devoting time to industrial activity would detract from their more academic pursuits and reduce their chances of promotion. In general it was felt that this was an unfounded concern and that industrial activity of academics in the long run promoted academic activity rather than restrained it.

The sharing of University facilities with Industry was widely discussed

and was of special concern in the developing countries. It appeared that at present there is insufficient cooperation of this kind.

Indeed much of the general discussion at the Symposium involved comparisons between the "underdeveloped" countries and "developed" countries. The general consensus appeared to be that the "developed" countries were capable of achieving a wide range of forms and degrees of interaction and that the development of increased interaction was largely a matter of individuals getting to work and making the appropriate contacts.

On the other hand the underdeveloped countries appeared to have real problems related to the fact that many of their industries are branches of large multinational companies whose policies are set and whose research is done in headquarters in the developed countries. This leads to a lack of opportunities for indigenous interactions in the underdeveloped countries and, in the view of some contributors, to the imposition in these countries of standards of activity and even of products, derived from the developed countries, which are inappropriate to the underdeveloped countries. In this respect it became clear that even such countries as NZ and Canada were often aligned with the underdeveloped countries.

As with many conferences much of the benefit of attendance came from informal discussions and I certainly made a number of new friends particularly among the delegates from the African countries which were well represented. The full account of the proceedings of the Conference is being prepared by UNESCO and will be available later this year.

The Solar Energy Symposium in Miami was rather disappointing. The advertised manufacturers' displays failed to eventuate. The conference was attended by some 450 delegates many of whom seemed to be there to press their cases for research grants with the representative of the Department of Energy. Many of the papers listed in the programme were not presented. Many were trivial and many were ill prepared and presented. There appeared to be little sense of urgency in USA with regard to "The Energy Problem", and many of the papers were speculative rather than oriented to immediate problems.

A fair part of the concern of many of the participants at the conference was with the present supply and demand problems rather than with "resource" problems. This last attitude was less prevalent in California where I visited

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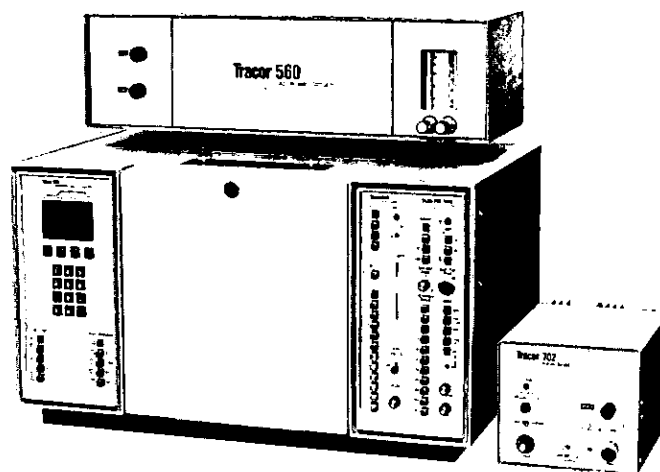
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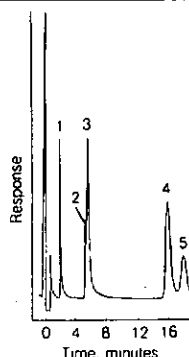
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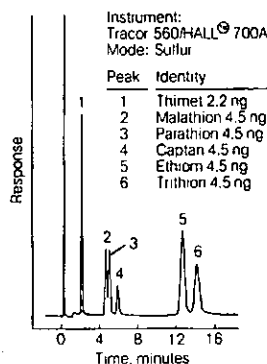
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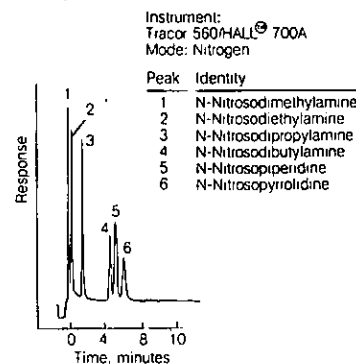


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The Mackney Formula

HARD WORK BREEDS SUCCESS

Presenting what could be described as a personal case history — it was certainly appropriate to the occasion — recently — retired managing director, NZ Forest Products Ltd., Alan Mackney, was the guest speaker at the inaugural meeting of the Industrial Specialist Group in Auckland, March 1.

Mr Mackney, an honorary Fellow of the Institute, entitled his address "The Industrial Chemist in Industry". His

basic message: hard work breeds its own success.

And his career is personal proof. He began his professional work in Australia in the 1930's and first visited NZ in 1937 when he addressed the ANZAAS Congress.

Shortly after he joined the team that built up NZFP into the enterprise it has become — an involvement he described as stimulating and demanding.

Apart from indicating that success results from hard work, he noted that the major factor in success derives from being in the right place at the right time and being lucky enough to be involved in a developing industry.

Mr Mackney holds several views on NZ's industrial future, including the

Being in the right place at the right time also helps — Alan Mackney



development of mineral exploitation (perlite, bentonite, clay, salt and silica). He speculated, too, on the future of the pulp and paper industry, commenting that new plant is very capital-intensive and that perhaps new methods should be investigated. Like others, he believes that NZ is energy-rich and suggested that new technology applied to CNG, LNG, coal and exotic forestry could be our saviour and, in the long term, result in our becoming a net exporter of energy.

His final advice to his audience was not to become too involved in their own fields, to be able to grasp the profit motives of business and not to suffer "paralysis by analysis". He also paid tribute to an understanding wife.

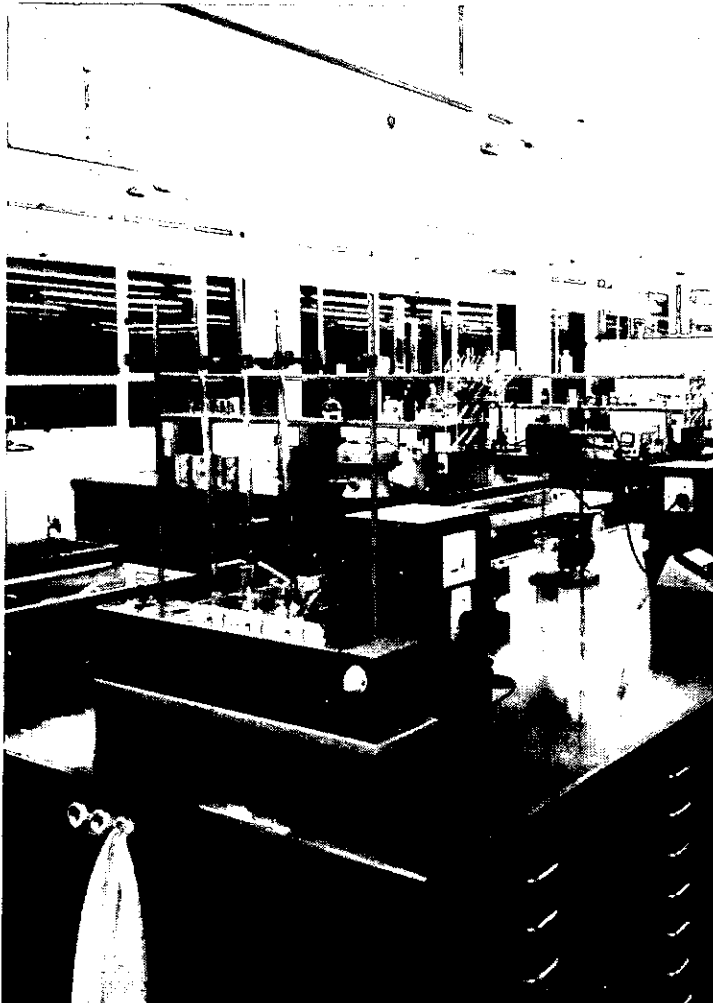
While the organisers were disappointed with the attendance of 18 at the meeting, they hope the Group will attract more continuing support.

Energy (Cont)

two recently installed co-generation projects, one at the University of California, Davis, and one in industry at San Diego. Both were designed around gas turbine generating sets and both were in the size range relevant to NZ industry. There is a considerable interest in co-generation of electricity in process and commercial heat systems in California, which arises from the Public Utilities Com-

mission's directive to the utility companies to increase the amount of such generation. It was pleasing to end my visit on the high point of a visit to Davis Campus in the company of an enthusiast as dedicated to the subject as Mr Carl Martineau of Associated Power Systems Ltd.

The support of the NZ Institute of Chemistry, UNESCO, the NZ Energy Research & Development Committee and the University of Canterbury towards this visit is gratefully acknowledged.



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WELLINGTON

A recent survey of the Branch membership concerning the monthly meetings will assist the Committee greatly in organising future meetings; the number of excellent suggestions for lecture topics could fill the programme until 1982! Most significant was the preference for lectures aimed at educating the chemists in a field other than his own speciality. In keeping with the survey, the programme for 1979 has an overall theme of 'Chemistry in the Wellington Region' and the response to its announcement has (thus far) been enthusiastic — no doubt meeting attendances will reflect this.

*Bob Schoenfeld —
delighted his audiences*



Recent visitors include **Bob Schoenfeld** (Managing Editor, Australian Journal of Chemistry) who delighted his audiences at both the University and DSIR with "The Grammar of Graphs and the Theology of Tables" and "How to Write a Good Paper".

Plans for the Institute Conference are well advanced and readers are reminded not only to check the Conference information elsewhere in this issue, but to return their registration form which is also included, as soon as possible.

CANTERBURY

The September meeting of the branch was addressed by **Prof. F.S. Rowland**, University of California, Irvine, who discussed "Man's Threats To Stratospheric Ozone". This talk reviewed the situation regarding the depletion of the earth's zone layer by photochemical dissociation products of chlorofluoromethane compounds. The final meeting in 1978 was addressed by **Prof. Cuth. Wilkins** (Canterbury) who spoke on mineral deposits in Westland beach sands. The 1979 programme commenced in February with an address by **Mr Bob Schoenfeld**, Managing Editor, Australian Journal of Chemistry. The talk on "How to write the Good Paper" was enjoyed by all of the 60 members present and the evening concluded with a wine and cheese social function.



The March meeting was addressed by **Dr Alan Missen**, Chemistry Division, DSIR, who spoke on "Drugs, Driving and Death". A teetotal supper followed.

MANAWATU

Mr Russell G. Mathews, Freyberg High School, has been co-opted as an advisor to the Branch Committee.

Present members of the Branch Membership Committee are **Dr Wayne B. Sanderson**, (NZ Dairy Research Institute), **Dr Ian D. Watson** (Department of Chemistry, Biochemistry and Biophysics, Massey University), and **Dr Ken R. Whittle** (Palmerston North Technical Institute). **Drs Geof A. Lane** (Applied Biochemistry Division, DSIR) and **David F. Newstead** (NZ Dairy Research Institute) were nominated as Manawatu Branch Corresponding Members of the Hazardous Chemicals Committee.

The Branch was well represented at the 49th ANZAAS Congress held at Auckland University, January 21 - 26. Papers were presented from members of both Massey University and the DSIR departments in the fields of flavour chemistry, plant and ruminant biochemistry, mass spectrometry and mineral studies. These papers were included in many different sections of the Congress.

Dr Roger D. Reeves, Department of Chemistry, Biochemistry and Biophysics, Massey University has been appointed chairman of the 1980 NZIC Conference.

Meetings: The first Branch meeting for 1979 was addressed by **Prof. R.D. Harkness** on the subject of "Connective Tissue". Prof Harkness discussed the mechanical and physiological properties of connective tissues and related these properties to the content of various constituents found in these tissues.

In this wide-ranging lecture, topics included the treatment of rat-tail skin to give a product that "creeps" under load similar to that of the uterus tissue during pregnancy, components of the tapetum (a light reflecting material in sheep's eyes) and the structure of camels' feet. The latter has two

unusual features, a pad containing a more highly unsaturated fat than that in the hump (the former approaches the composition of olive oil and is used to counteract intense cold periods) and the epidermis contracts on drying, i.e. its mechanical properties change with varying water content.

The next meeting, on May 22, will be a Symposium on Energy. We will be given addresses by **Dr J.H. Troughton** (Ministry of Agriculture and Fisheries), **Dr P.A. Toynbee** (Coal Research Association of NZ) and a speaker from Shell Oil Ltd. Further information may be obtained from the Branch secretary, **Dr. David R. Husbands** (Department of Chemistry, Biochemistry and Biophysics, Massey University).

UNIVERSITY NEWS

Auckland

A distinguished visitor to Chemistry Dept. in the days immediately following the ANZAAS Congress was **Dr. Alan Jones**, Head of the National NMR Centre, Australian National University, Canberra. Dr. Jones was in Auckland at the request of the Auckland High-Field NMR Committee, headed by **Prof. A.L. Odell**. The committee is studying the possibility of obtaining a high-field NMR spectrometer in the immediate future. Dr. Jones gave two very interesting and well-attended lectures, one on physical aspects of the operation of high-field instruments, and a second on application of the techniques to problems in biochemistry and medical chemistry.

Canterbury

Recent visitors to the department have included: **Dr Sally Page**, Department of Biophysics, University College, London; **Mr Bob Schoenfeld**, CSIRO, Melbourne and **Prof. Alan Barton**, Murdoch University, Western Australia.

The visiting lecturers in Chemistry for 1979 are **Dr John Cretney**, Christchurch Technical Institute, and **Dr Ken Emerson**, Montana State University. Dr Emerson's research interests are principally in synthetic inorganic chemistry.

Massey

An International Conference on Fibrous Proteins: Scientific, Industrial and Medical Aspects was held in the Department of Chemistry, Biochemistry and Biophysics, February 12-16 (see report). After the Conference, **Prof. and Dr R.D. Harkness** went to work with **Dr E.G. Bassett** in the Department of Oral Biology, Den-

tal School, University of Otago and will return to the Department of Physiology, University College, London in May. **Dr Allen J. Bailey**, a leading authority on the characterisation of covalent crosslinks in connective tissue, visited the Meat Industry Research Institute of NZ, Ruakura, before going to Australia and then returning to the Meat Research Institute, Bristol, England.

Drs Andrew M. Brodie and Eric W. Ainscough, Department of Chemistry, Biochemistry and Biophysics, recently took delivery of an electron paramagnetic resonance spectrometer as part of a University Grants Committee grant. At present they are using the instrument to study the interaction of iron with lactoferrin, a protein in human milk. This will allow them to determine the way in which metal ions interact with a protein without the small amount of protein used being destroyed.

Dr. Brodie will present a paper at the combined American Chemical Society - Japan Chemical Society Congress in Hawaii on "The Metal Complex of Human Lactoferrin". **Dr W.S. (Bill) Hancock** will also present a paper at the Congress on "The Use of HPLC for the Analysis of Amino Acids, Peptides and Proteins". Dr Hancock will then spend his sabbatical leave working with **Dr A. Gotto**, Baylor College of Medicine, Houston, Texas, to study further aspects of the chemical synthesis of lepoproteins.

Mr John Woodhead recently returned to the Department of Chemistry, Biochemistry and Biophysics from USA to sit his oral examination for a PhD degree. His subject was the self association of detergents and beta-casein.

Dr W. (Bill) Edwardson recently resigned as lecturer with the Biotechnology Department to take up a position as Advisor to the Development Projects on India and SE Asia with the International Research and Development Centre, Edmonton, Canada.

Mr R. Selwyn Jebson has been appointed senior lecturer in the Department of Food Technology. Mr Jebson was formerly Head of the Milk Fat and Butter Section, Dairy Research Institute.

Victoria

The winners of the 1978 NZIC student prizes are: Chemistry (1st year) **Mrs R. Ainsworth and Mr. I.G. Angus** (Joint Award) and Chemistry (3rd year) **Messrs. D. Macfarlane and B. Williamson** (Joint Award). The second-year prizes must, by regula-

News From Govt. Departments

DSIR - CHEMISTRY DIVISION WELLINGTON

Recent visitors to the Division include **Mr. C. Norris** (Australian Government Chemist), the equivalent of our Dominion Analyst, **Dr. A. Jones** (Director, National NMR Centre, Canberra) who lectured on 'Recent Developments of High Field NMR' and **Prof. A.F.M. Barton** (Murdoch University, W. Australia who spoke on 'Resource Recovery and Recycling.'

Dr. R.J. Weston (Natural Products Section) has returned from a year at Imperial College, London, and **Dr. Ian Brown**, a New Zealander who has been working for Pilkingtons Research in UK, has joined the Physical Chemistry Section. **Mr. A. Mahon**, of the Geothermal Section at Wairakei will shortly be visiting the Philippines and Sabah to assess geothermal resources.

DSIR - CHEMISTRY DIVISION CHRISTCHURCH

Mr Gordon Scott has recently returned from leave during which he visited a number of forensic laboratories in Britain and Europe.

DSIR - APPLIED BIOCHEMISTRY DIVISION PALMESTON NORTH

The Division was saddened by the death of **Mr John R. Williams** in a climbing tragedy on Mt. Cook on January 2. Mr Williams, an electronics technician, joined the Physics and Engineering Laboratory in January 1966 as a trainee and moved to this Division in March 1968. He assisted in the development of measuring equipment and recording facilities for the animal nutrition research and also contributed substantially to the design, construction and development of new equipment for biological use in the Division. He was also involved in many outdoor activities.

tion, be awarded to a continuing student and the recipient has yet to be announced.

Prof. Derek Bryce-Smith visited the Department and his lecture 'Environmental Heavy Metals and Behavioural Problems' attracted a large and wideranging audience.

Prof. Neil Curtis and **Drs. David Weatherburn and Gary Burns** attended the recent ANZAAS congress in Auckland.

Dr Eddie Wong was recently transferred to Plant Diseases Division and is temporarily located in the Plant Physiology Division building.

Dr Ed. L. Hove, a well-known nutrition chemist, retired on December 24 last.

Dr Jim M. Gooden, Nutrition Group, resigned in January to take up a lectureship at the Dairy Husbandry Unit of Sydney University.

Miss Rita Beeler, Organic Chemistry Group, resigned in February to start her intermediate year, at Massey University, for a medical course. Miss Beeler worked with **Dr Geof A. Lane** on insect feeding deterrents in plants.

Dr A.R. (Tony) Cashmore left in early January to take up a 15-month study award at the Rockefeller University, New York. Dr Cashmore will be working in **Dr Nam Chua's** laboratory, one of the leading plant molecular biology laboratories in USA.

Dr John B. Robertson, Biochemistry and Microbiology Group, returned after 15 months' study leave at the Charles F. Kettering Research Laboratory in Yellow Springs, Ohio, USA. Dr Robertson's research objective was to determine whether lectins were synthesised in the roots of plants.

Dr John Shaw joined the Organic Chemistry Group to supervise the running and development of the gas chromatograph mass spectrometer system. He is a graduate of Massey University and from 1975 was involved in biomedical applications of mass spectrometry in USA.

Prof. James Sutcliffe, University of Sussex, visited the DSIR Centre in February. Prof. Sutcliffe gave a seminar on the topic "Ion Transport in Plants - Some Recent Trends."

Dr Tom Bauchop has been invited to be the keynote speaker for the session on microbe/animal interactions at the 2nd International Symposium on Microbial Ecology at the University of Warwick, Coventry, in September, 1980.

An electron microscope is to be purchased for use by research personnel in the Manawatu. The instrument, a Phillips EM 201C transmission microscope will be located at ABD. Work with this instrument will largely replace that done on the present Phillips EM200 microscope that was installed over 13 years ago. The cost of the basic instrument will be shared between DSIR and Massey University

and an application has been made to the Golden Kiwi Grants Committee for a grant for a goniometer stage.

Other instruments recently acquired by the Division include a stopped-flow spectrophotometer and an Aminco SPF500 corrected spectra spectrofluorometer (Dr M.J. Boland) and a solvent programmer for the high pressure liquid chromatograph (Dr. G.B. Russell).

Health Dept. Auckland

Mr. R.B. Hoyle has left the Health Dept. Environmental Laboratory in Mt. Eden, and transferred to the central Pacific; his new address is c/o CPO, Funafuti, Tuvalu.

Dairy Research Institute, Palmerston North

The Board of the NZ Dairy Research Institute at its last meeting appointed Dr Peter S. Robertson as its Director Designate and Dr. W.A. McGillivray as its Director Emeritus.

Dr R.C. (Bob) Lawrence is visiting UK where he will present a lecture to the Microbiology Society on "Milk Fermentation". He will then visit Egypt on behalf of the NZ Dairy Board.

Recent appointments to the Institute include Messrs Brian Robinson, Brett Ennis (Whey Products Section) and Russell Richardson (Analytical Chemistry)

CENTRAL INSTITUTE OF TECHNOLOGY, PETONE

Five of the Pharmacy School tutors presented papers at the recent ANZAAS congress: Dr J.D.B. Featherstone, 'The Hydrogen Bond and Opiate Analgesic Activity'; Mr. D. Hancox, 'Hospital Pharmacy in NZ — Now and in the Future'; Dr. R. Ledger, 'Kinetic Analysis of Progress Curves — NADH — Cytochrome Reductase'; Dr. J.P. Shaw, 'Lithium and Brain-5-hydroxy-tryptamine Activity'; and Dr. B.J. Wilkins, 'Lipophilic Character and Drug Action'.

Dr. N.D. Harris (Department of Pharmacy, Chelsea College, University of London) is spending part of his sabbatical leave at CIT.

Dr Tony Herd, tutor in chemistry, Auckland Technical Institute, spent March on a special training course in Wellington. Tony is a member of our Editorial Committee.

"Act now to nip this evil . . . in the bud" — Jim Sprott

SHOULD CHEMISTS TENDER FOR WORK?

Should chemists offering a public analytical service allow themselves to become embroiled in the tender system?

Auckland analyst Jim Sprott, who heads T.J. Sprott & Associates, thinks not and he explains his reasons in this letter to the Editor:

"I wish to draw the attention of members of the Institute to a practice which has developed recently whereby chemists who are offering a public analytical service are being given the opportunity to tender for certain work. This practice seems to have developed in certain local bodies. The tender system is well established in many fields of industry such as the building and contracting fields, various trades such as painting, plumbing, electrical services and so on, particularly where these services are required by a Government department or a local body.

"In general I think it would be agreed that the tender system has been developed in those areas of business which are normally referred to as "trades".

"At the risk of being called a snob (which I probably am) I feel that the provision of public analytical services should not be placed in the same category as trades of the type mentioned above. Members of the NZ Institute of Chemistry belong to that body in the knowledge that it is a professional group and should command the same respect as other honoured professions such as those of the professional engineer, the accountant, the lawyer, the medical profession, the architect and the other professions which come to mind and which are no less honourable for my failing to mention them by name.

"I have yet to see an advertisement calling for tenders for consulting engineers to provide their professional services, nor for the provision of accounting, nor legal, nor medical, nor architectural assistance.

"Why is it therefore that industrial chemists, no less skilled than these other professions and providing a service no less professional should allow a tendering system to develop for their services?

"The purpose of the tendering system is quite clear, it is a means whereby the buyer seeks to purchase the services for the lowest possible cost. It is a system which leads to price cutting which is anathema as far as I am concerned. I think the Institute and its members should act now to nip this evil of tendering in the bud before it

becomes any more firmly established. There appear to be two means whereby the tendering system can be broken:

a) By "ring" tendering whereby all those who are tendering agree to tender at the same price. This is illegal in some countries and may well be illegal in NZ, but it is nonetheless very effective.

b) By all those in the industry who provide the services declining to tender.

"I advocate the latter course as ring tendering has an unpleasant note about it and is certainly not in keeping with the ethics of a professional organisation.

"If all members decline to tender — and if this were to be made the avowed policy of the Institute — it would be a very real stand for professionalism by the Institute and its members.

"Concurrently with this it would be desirable to establish standardised prices for various services and a move along these lines is being considered by a committee of the Institute. I would like to see standardised prices, which truly reflect the costs involved and a proper margin for development and profit and which reflects the value of services provided to any client, but over the years we have seen many instances of price cutting and unprofessional behaviour.

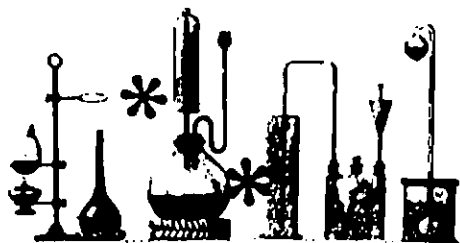
"It is necessary first of all for all members of the Institute to turn their backs on practices of this nature. There is no point in establishing a set of prices until there is complete agreement that these prices will be observed and we have not reached this stage yet. If now we allow tendering to become part of the industrial chemical scene it will be a very real backward step, and lead to circumstances quite incompatible with the normal practices of other professional organisations.

"The question of price cutting and unprofessional activities raises very much wider issues and I am aware that there will be other members whose views are not parallel with mine in this regard.

"I would think however that most, if not all, members of the Institute would join me in this endeavour to stamp out the evils of a tendering system within our chosen profession."

We'd be interested to hear from others offering the same service.

What do you think?



New Products, Services

PRESERVATIVE

A new \$12 million plant will double ICI's "Proxel" biocide production capacity when completed at Huddersfield, England. The plant will use a new ICI continuous process for the manufacture of the active chemical. This latest computer process-control technology will further improve the consistency and economy of manufacture. "Proxel" biocides are based on formulations of 1,2-benzisothiazolin-3-one (BIT), and are effective against a wide range of micro-organisms which can cause extensive and costly damage to many products and processes.

They are used widely to preserve the storage life of emulsions, binders, paints, latices, adhesives and polishes; and to control slime in industrial water systems and in the paper industry.

"Proxel" biocides are rapidly replacing traditional products (such as mercurial, phenolic and formaldehyde compounds) because of their non-persistence in the environment, overall effectiveness and low toxicity.

"Proxel" biocides are marketed in NZ by Chemicals Group, ICI NZ Ltd.

C007 For further details, use Reader Service Card.

PHOTO CONDUCTIVITY DETECTOR

From work carried out to date in USA, it appears there is a promising future for the Tracor LC detector model 965.

It responds to Halogen compounds (F, Cl, Br and I), which contain nitrogen and compounds which contain sulphur. Some of the work of interest is as follows.

Nitrosoamine Analysis: The unit has a detection limit for diethanolnitrosamine of 750 pg.

Environmental Analysis: It can be used for analysis of most pesticides containing halogens, nitrogens and sulphur when a separation is achieved.

Pesticide Analysis: Direct injection of diluted formulations of pesticides have been done with the detector. It is said to give good sensitivity to triazine and urea herbicides, both of which contain nitrogen and chlorine. Sensitivity is also good on insecticides which contain sulphur which is Dy Syston, which has only sulphur and phosphorous in the molecule.

Drugs: This is an area which looks very interesting but more work needs to be done. It is felt that the response will be comparable for most drugs which contain halogens, nitrogen and sulphur.

C008 For further details, use Reader Service Card.

SINGLE-USE LABORATORY PRODUCTS

Single-use plastic products for medical laboratories, food and pharmaceutical industries, education and research are made by an Australian company.

Petridishes are moulded from a special grade of crystal polystyrene. They are suitable for all bacteriological examinations.

Many types and sizes are available and most can be supplied fully vented, making them suitable for anaerobic work and for culturing organisms in an atmosphere of carbon dioxide.

The 90mm x 15mm single and triple vent dishes can be used with automatic plate pouring machines. The 100mm x 18mm square dish is for antibiotic assays and sensitivity testing.

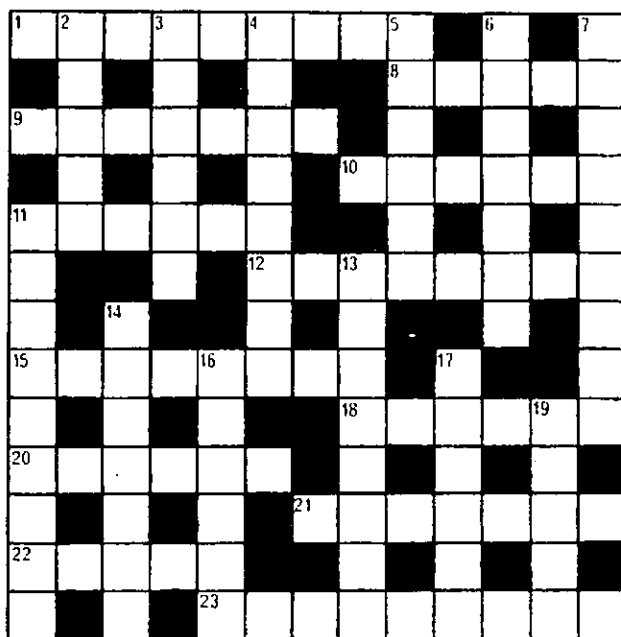
Specimen containers have been designed with operator safety in mind. They have a screw cap to eliminate leakage in transit and spontaneous discharge during laboratory use.

The low cost makes the containers an attractive alternative to reusable bottles and their strength and light weight are an advantage in transporting specimens, say the manufacturers.

C009 For further details, use Reader Service Card.

Chemical Crossword

— by
Mike



CLUES

Across

1. Small 5 unit (9)
8. Type of molecule, like a Biblical heroine, we hear (5)
9. R.N. Stoic carries a genetic message (7)
10. Confusedly go over the track (6)
11. There's a lot of it about! (3,3)
12. A fish that's not a fish but resembles a mini medieval weapon (8)
15. Cute Toni has a German relation (8)
18. Full of pluck? (6)
20. To go for a skate? It would make your hair curl! (6)
21. Possibly the reason why he stole Arnold's textbook (2,5)
22. Treat it reasonably carefully and the burette will give this result (5)

23. Pointless pudding and a charged particle cause rat action (9)

Down

2. Shaw's stew? (5)
3. Allowed to go scot free (3,3)
4. Protein containing droplet, it seems (8)
5. Measuring system (6)
6. Walks and takes a tumble in the streets (7)
7. Clerical sounding chemical pioneer (9)
11. Mash up (9)
13. Hot wire? (8)
14. "The — of mercy is not strained." — The Bard (7)
16. Unscrewed, unlocked, and made an incision (6)
17. Most recent formula tested in the lab. (6)
19. A treeless trunk? (5)

NEW

MSE

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Chilspin, like all MSE centrifuges, is backed by our second-to-none after sales service — a — a most important consideration when choosing a centrifuge.



FEATURES

- **Safety** Complies with the latest published international safety standards. Positive lid lock ensures that access to the rotor chamber is possible only when the rotor is stationary. High grade steel guard ring for the maximum protection.

- **Gas Lid Stay** Smooth action, self-locking — supports the lid when in the open position.

- **Refrigeration** ¼ HP hermetic cooling unit providing temperature control over the range + 5°C to + 15°C.

- **Speed Control** Electronic controls provide stepless speed regulation, and an indicator shows actual rotor speed.

- **Automatic Timer** The centrifuge will switch itself off automatically at any predetermined time from 1 — 26 minutes. Optional manual position for longer runs.

- **Electric Brake** For smooth deceleration.

- **Trolley** Chilspin can be converted to floor standing model by using the purpose-built trolley available.

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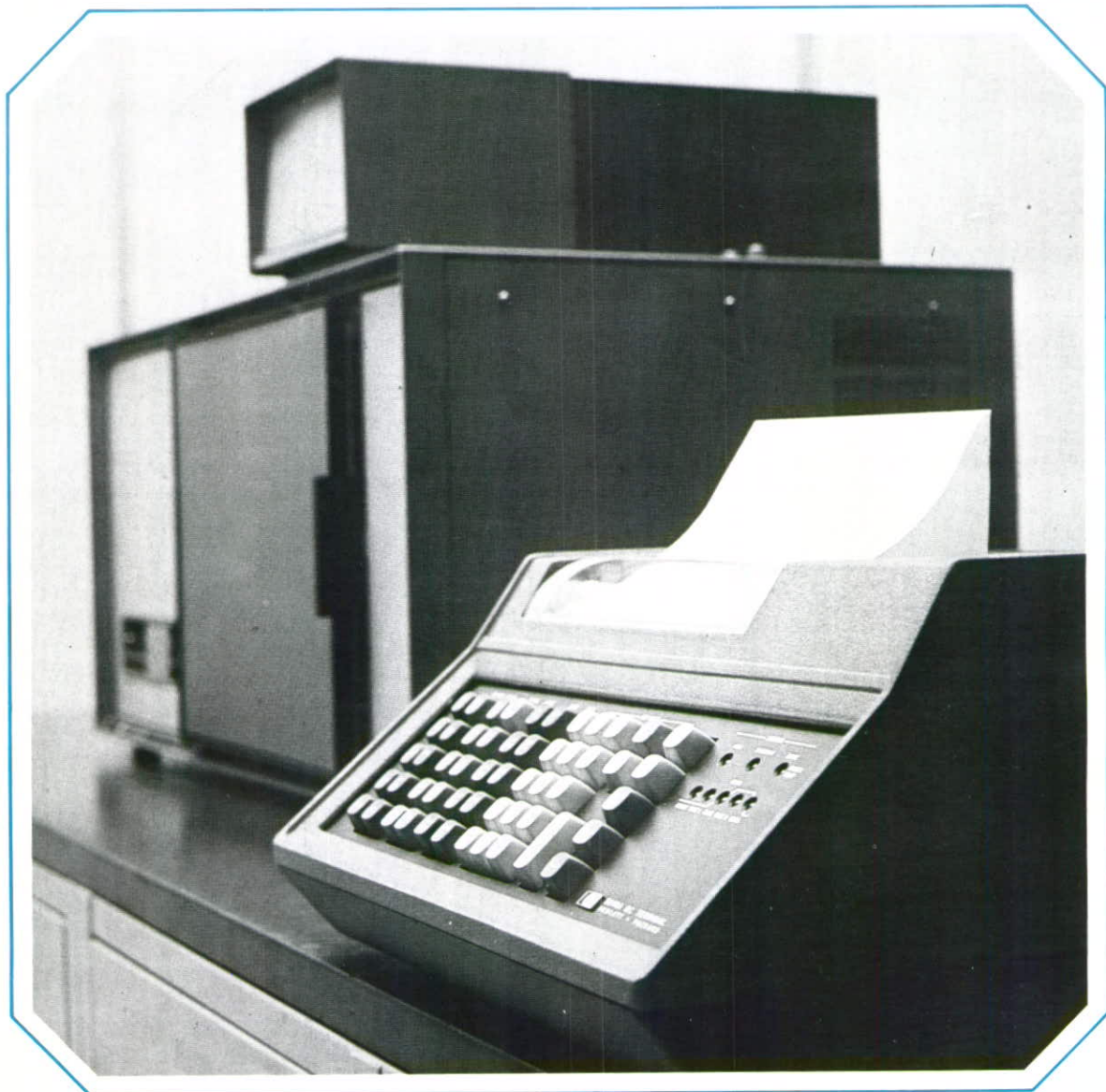
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