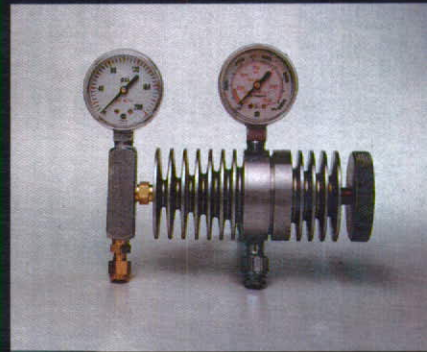
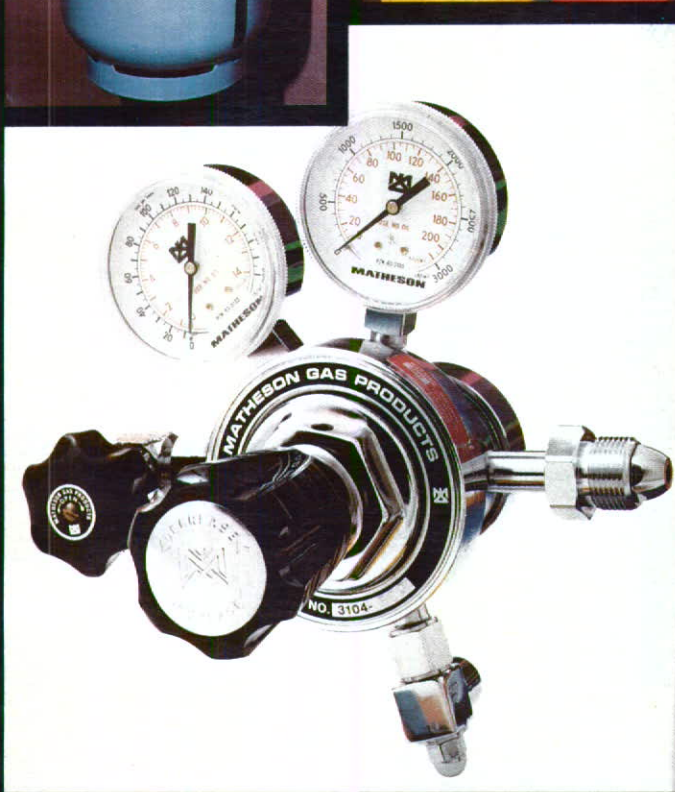




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Vol 52 No 6 October 1988



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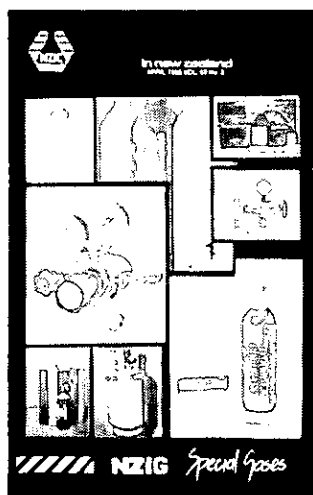
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# chemistry

in new zealand

Vol 52 No 6 October 1988



## FRONT COVER STORY

NZIG Special Gases is setting the standard in high technology gas products and gas control equipment.  
See Page 124.

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## Advertising Features

### October

In this issue we look at laboratory balances, an essential item in most laboratories (not to mention NZ Post). In addition, our cover story looks at the impressive range of products and services now available from NZIG Special Gases.

### December

To conclude the year, we will be featuring mass spectrometry, from simple isotope systems through to the top-of-the-line high resolution models. A directory of instruments currently in use in New Zealand will also be included.

# EDITORIAL

## Denis Hogan Retires

Denis Hogan has retired after 28 years of service as Registrar of the Institute. His dedication and loyalty were previously recognized by the Institute in 1985, when he was awarded an Honorary Fellowship - the first and only time this honour has been afforded a member prior to their retirement. The occasion of his retirement was marked at the Annual Conference by a speech of appreciation from the President and a presentation, during the Conference Dinner. It only remains therefore, for me to record these few words of mainly personal appreciation for the man who has given almost certainly much more than anybody else for the well-being of the Institute.

There are in fact, two Hogans of my acquaintance who are worthy of note. One is the fastest man on wheels in New Zealand. By comparison, I'm sure Denis would not object to being ranked amongst the slowest. Both men have a significant association with chemistry. For Garth Hogan, New Zealand's drag racing champion of many years, the association is with his main sponsor - and indeed the

company that got him started in the "business" - VHT, makers of heat-resistant paint. If that doesn't have a physico-chemical basis I'm not sure what does. For Denis, the association is what we in the institute would recognize as a more conventional one.

Denis Hogan was born at Methven in mid-Canterbury. He is severely handicapped as a result of an attack of infantile paralysis when he was 10 years old. Notwithstanding this, his career history is remarkably normal, for which he must be an inspiration to us all. He attended Christchurch West (now Hagley) High School and the University of Canterbury, where he graduated BSc in chemistry in 1948. The following year he joined the Christchurch Branch, Dominion Laboratory, DSIR, and has been there ever since. He now has the rank of Deputy Government Analyst. He expects to retire from the position in about March of next year.

Denis is married and has two sons. At the time of writing he is on an overseas "jaunt" with his wife Helen, catching up with his sons and pursuing his great love of music.

Denis first took up the position of Registrar in 1960. It is characteristic of the man that one finds very little mention of his activities in the Journal over the last 28 years, other than in relation to his duties of Registrar. At the time of his appointment the move was hailed as a significant step forward - the position was previously held by a variety of accountants and the like (in today's socio-economic environment need I say more?). Denis' record of service from that time on speaks for itself, and he has established a history of service that is unlikely to ever be surpassed.

I think Denis' greatest contribution to the Institute has been the continuity that he has provided in its various affairs. With Presidents in attendance for no more than three years, and Delegates working to roughly the same pattern, the biggest difficulty that Council faces in achieving progress on any issue is in maintaining what we might call a corporate memory. Denis told me once of the frustrations of seeing the same issue raised at Council by successive "batches" of members. In four years of attending such meetings I have

already begun to see the evidence for myself. I would suggest that Council needs to bear this in mind more than any other issue, in its deliberations over future administrative arrangements for the Institute.

While Denis has been modest about his own personal activities, he has been no sluggard in speaking out on matters relating to the Institute, at times with considerable passion. With his record of service no one would begrudge him this right. In characteristic fashion he has prepared a valedictory message for Council which presents quite clearly his concerns for the future - but some positive suggestions as well. This message is reproduced below and I support all that Denis has to say.

Finally I would conclude with a personal note of gratitude. As I'm sure many others have found, Denis has been nothing but helpful and supportive to me in my work as Editor, and as a member of the Institute. I wish him the best of health and an enjoyable, and well deserved, retirement (but please, no attempts to emulate the performance of the "other" Hogan!)

Bruce Graham

## A Message For The Institute

*The following notes were presented by Denis Hogan to the August meeting of Council. They contain a message for all members of the Institute, so at Councils suggestion, they are reproduced here.*

I finish my time as the Institute's Registrar with real concern for the future development of the Institute. I trust my contributions to and concern for its well-being will allow me the status of a tribal elder and that you will consider what follows as both deeply felt and constructive.

My present purpose is to outline broad issues and hence this letter will be fairly terse. The points raised require a great deal of detailed discussion and debate.

### Summary

I believe that the NZIC:

1. is losing sight of its professionalism
2. is failing to involve a sufficient number of vigorous, young chemists in its activities
3. has not established an effective recruitment policy
4. has an opportunity to establish administrative and scientific

links with similar organisations thus providing an economically more sustainable administration and a wide variety of joint chemical activity

5. has not been successful, despite a great deal of effort, in arresting a decline in the importance of chemistry as a secondary school subject or in the public perception of chemistry.

### Professionalism

The Institute purports to be a professional body and frequently has compared itself to doctors, lawyers, dentists, accountants, architects, and particularly, engineers. A clear understanding of what "professionalism" is is therefore essential. On present evidence, I submit that the Institute does not have this clear view and, lacking it, is dismantling our professional safeguards. Examples are:-

- i) The freeing up of entry to Corporate Membership. This will inevitably have the effect of replacing a university degree in chemistry or biochemistry, as the minimum qualification required, with a basic polytechnic certi-

cate. The claim that the latest changes to the membership rules will not result in a lowering of entry standards is demonstrably untrue. Before long an NZCS plus six years experience will be the effective minimum requirement for corporate membership. Council should think about this in relation to our sister organisations, particularly the Royal Society of Chemistry and the Royal Australian Chemical Institute. During our debate on membership rule changes it was reported that RACI were going down the same path. It now transpires that while they have created a non-corporate grade of "Associate" they have carefully subdivided this into:-

"Associate (Graduate)" for those meeting the entry requirements for corporate membership, which are a university degree or an accepted equivalent, and "Associate (Affiliate)" for those "with an interest in Chemistry".

Council should think very carefully about the significance of this distinction in terms of our new membership rules.

- ii) attempts to change the inter-

view system by allowing branches to decide exemptions will destroy it. If this power is granted the assessment of the candidate's professionalism will be gradually eroded and, importantly, differing standards will develop among the branches.

### Involvement

To me the most significant and disturbing indication of the poor state of the Institute is the difficulty in getting vigorous young chemists to become active in Institute affairs. One of the reasons for seeking to change the interview system is the difficulty some branches have in persuading members to serve on an interview panel. The proposed answer to this problem is a short-sighted expedient. Why is it becoming increasingly difficult to involve a new generation of chemists in the running of the Institute either at branch or national level?

### Recruitment

Our recruitment efforts have been directed at students with, I contend, not significant success. A qualitative look at the situation, and the statement that it is a

"good thing", is not enough. We need an analysis of those we have recruited as student members and of their progress in the Institute. An assessment of the market we are courting and of the most appropriate level for recruitment is also needed.

The fundamental question for Council to answer is - why are so many qualified chemists choosing NOT to join NZIC? A good example is Chemistry Division DSIR, where one third of the qualified chemists are not NZIC members. An answer to this question is vital to planning for recruitment. When I became an NZIC member it would have been unthinkable for a DSIR chemist not to join NZIC. Why do so many of them now see NZIC as irrelevant? One factor in the 1980's is the development of other specialist societies (q.v.) but this does not apply to Chemistry Division. Its staff are chemists doing chemistry.

I repeat what I have written before - we recruit best by what we do, not by what we say or write. We must make NZIC a lively organisation that chemists wish to join.

#### Administration

As chemists we feel proud that chemistry is the "central science". It provides the basis for a growing number of special interest groups and societies. The rise of organisations for chemical engineering, food technology, biotechnology, clinical chemistry, biochemistry, geochemistry, forensic science, science teaching, etc., is a significant fact of life for NZIC to come to terms with. The founding members of these organisations were almost always chemists and members of NZIC. As these members retire they are not being replaced by NZIC members and before long

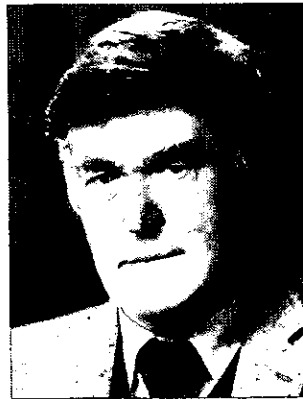
there will be little common membership. These new organisations desired, and obtained, autonomy. There is nothing NZIC can, or should, do about this but without a doubt they have eroded our recruitment base. If we start with the thesis that chemistry is central to these new disciplines it should be possible to develop scientific and organisational co-operation between them and NZIC. I know that the Food Technologists are considering setting up a professional secretariat. NZIC is about to commit large resources to its new permanent, professional secretariat. Why not consider a joint secretariat for a "federation of chemical societies". So long as NZIC is seen as non-threatening, co-operation in administration would benefit all. This should lead not only to administrative economies but also to much improved scientific contact among these chemically related bodies. It is not difficult to envisage special symposia and conferences, joint invitations to distinguished overseas scientists backed by more secure finances, joint publications, etc. The planning and organisation of conferences could become a major function of the secretariat.

#### Chemical Education

Some of the most imaginative work that NZIC has done in the last 30 years has been in the field of chemical education. Despite this chemistry teaching in our secondary schools is not in good shape. Informed members have described the situation as alarming if not disastrous. We have been no more successful in convincing either the politicians or the public of how essential our subject is to the country's welfare. We are of course in competition with every other special

interest group in this. We carry the considerable handicap of the public perception of "chemicals" but that is the situation and we have to organise to meet it - no one will do it for us.

There is a great challenge to the Institute in this. Meeting it requires that points 1-4 above be successfully addressed. Failure to do so will lead inevitably to the decline of the Institute.



#### Positive Initiatives NZIC could take

In conclusion I wish to suggest two positive ideas which Council could action.

1. There is widespread community concern about environmental issues but little balanced reporting or factual information. NZIC membership has a very large proportion of the accumulated wisdom on many of these issues. I receive, either at DSIR or NZIC, many requests for information for school projects on such subjects as "Agent Orange", "The

Nuclear Effect", "Lead in the Environment", "Soaps, Detergents, and their Mode of Action" to quote some recent examples. Dr G F Laws of our Environmental Committee has prepared a commentary "2:4:5T in New Zealand". It is simple, definitive and authoritative - I suggest Council sponsor the production of a number of similar commentaries and make them widely available. The experts are available to prepare them.

2. The American Chemical Society's "Chem Matters" is a brilliant publication costing \$10 p.a. for four issues. I have a subscriptions list of thirty at present but have not attempted to expand this as I cannot cope with the circulation of any more publications than I have been handling. I suggest Council (i) sets out to greatly expand the subscription list for Chem Matters by either or both of a volunteer organiser or the new secretariat and (ii) allocates a publicity budget to purchasing a large number of seed copies. \$1,000 would buy 100 subscriptions of four issues and a seed copy could then be planted during one year in 400 schools.

Mr President, thank you for receiving this submission. I leave the Council with gratitude for the stimulation and comradeship I have experienced and in the hope that Council and branches will consider, debate, and act on the matters raised.

D.J.Hogan

## HONOURS AND AWARDS

Council is pleased to announce the following honours and awards.

**Easterfield Award:** Dr G.W.Rewcastle, Cancer Research Laboratory, University of Auckland.

**ICI Prize:** Dr A.J.Neilson, Chemistry Department, University of Auckland.

**Shell Prize for Industrial and Applied Chemistry:** Dr I.J.Miller, Lower Hutt.

**1989 NZIC/RACI Visiting Speaker Award:** Professor Graham Johnston, Department of Pharmacology, University of Sydney.

**Chemical Education Award:** Mrs May Croucher, Rotorua.

**Student Paper Competition:** Miss Sally Brooker, University of Canterbury.

**Chemical Essay Award:** No award.

**Honorary Fellowship:** The following members have been elected Honorary Fellows of the Institute: Professors R.D.Batt and A.D.Campbell, Dr C.L.Davey, Mr T.A.Mitchell and Mr J.S.Pollard.

## New Zealand Institute of Chemistry

### EXECUTIVE SECRETARY

The Institute is seeking to appoint an Executive Secretary in conjunction with its move to establish a permanent office and headquarters. The person appointed would be expected to manage the Institute office and supervise the work of typing and clerical staff. In addition duties would include attending to routine Institute correspondence, making arrangements for the meetings of Council and its committees, including keeping of the minutes from such meetings, operation of the Institute's accounts, preparation of the annual report and balance sheet, processing of membership applications and subscriptions, maintenance of the list of members, and administrative support for branch committees and specialist groups.

The position will be based in either Auckland or Wellington (This depends on finalisation of the arrangements for the Institute's office). A limited amount of travel will be required to attend meetings of Council and the like. It is envisaged that the appointment will be on the basis of employment for 20 to 30 hours per week, at a salary of \$20 - 30,000 per annum.

For further information and a detailed job description contact the President, Dr D R Llewellyn, Morrinsville Rd, RD 4 Hamilton, or phone (071) 69 172.

# COUNCIL NEWS

Mr T.R.Hitchings presided over the August meeting of the Council, held in Palmerston North on Monday and Tuesday preceding the Annual Conference. He congratulated Dr R.T.Gallagher on his election as a member of the Hamilton City Council. Dr B.Peake attended as delegate for the Otago Branch in place of Dr K.Hunter. Mrs N.E.Wignall was in attendance. Mr Hitchings thanked Dr Waters for arranging with La Mirage Motor Lodge the meeting room and meals for the Council meeting.

## Election of Officers

The following were elected unopposed and take office on 1 September 1988: President, Dr D.R. Llewellyn; 1st Vice President, Dr J.M.Waters; 2nd Vice President, Dr J.Rogers. Mr T.R.Hitchings and Dr D.R.Llewellyn expressed Council's appreciation of the 28 years' service of the Registrar, Mr D.J.Hogan, whose term of office concluded on 31 August. Council appointed Mr D.P.Karf, Scientific and General Consultants,

Auckland, as Registrar, from 1 September 1988 in succession to Mr Hogan. A postal ballot is currently in progress to elect a General Secretary. Dr J.Rogers undertook to continue as acting General Secretary until the result of the ballot is known. Dr Claire Couldwell was appointed Editor for 1989.

Dr R.V.Winchester, Chemistry Division, DSIR, Auckland, was elected to the Membership Committee from 1.1.89 to replace Dr G.J.Wright, University of Canterbury.

## Annual Conference 1989

Planning for the 1989 Annual Conference to be held in Hamilton is now well in hand. Enquiries should be addressed to the 1989 Conference Committee, c/o Department of Chemistry, University of Waikato. The future of Annual Conferences was discussed, it being noted that 1991 would be the Diamond Jubilee of the NZIC as well as the 150th Anniversary of the RSC.

## NZIC Secretariat

The President outlined the

progress of discussions with RSNZ, IPENZ, Chemistry Division, DSIR, Gracefield, and with TELARC, NZ Forest Products Technology Company, and Chemistry Division in Auckland, to whom copies of the tender documents had been sent. This issue contains an advertisement for the position of Executive Officer, to be responsible to Council through the President for the establishment of NZIC's office. Dr Rogers reported that the Heavy Engineering Research Association, Manakau City, proposed to tender and subsequent to the Council meeting a tender was received from the Coal Research Association, Gracefield. The President said he would discuss with the NZ Computer Society their arrangements for secretarial services. Dr Llewellyn and Dr Rogers undertook to visit HERA, with subsequent visits to be made by Dr Llewellyn and Dr Waters to Wellington prior to a decision being made by Council, probably at a telephone meeting. Initially it was hoped to arrange a contract for 2/3 years,

with reviews at regular intervals of costs and the duties of the Executive Officer.

## Branch Grants.

It was resolved to include in the 1988/89 budget a change in the method of calculating branch grants, resulting in an increase in the amount per capita, but with a considerable loading in favour of smaller Branches.

## Chemical Education Trust

Branches reported as follows on the way they planned to spend the initial grant from the CET: Auckland, poster competition; Waikato, sponsoring a branch meeting on the ozone layer; Manawatu, contact with Intermediate Schools (10 to 14 year olds); Canterbury, addresses on i. Superconductors, ii Chemical energy, iii. Contribution to the Science Road Show; Otago, provision of pH meters and chemical kit sets for Intermediate Schools; Wellington, the Branch was still seeking proposals from schools.

Cont on page 116

## Membership Changes: August 1988

### Honorary Fellows:

Professor R D Batt, Professor A D Campbell, Dr C L Davey, Mr T A Mitchell, Mr J S Pollard.

### Fellows

DUNCAN, John Roderick, MSc PhD(Auck). Building Research Assn. of NZ Porirua. (Head, Building Science Section).

REWCASTLE, Gordon William, MSc PhD (Auck). Cancer Research Laboratory, University of Auckland. (Snr. Research Fellow).

TURNER, Allan Arthur, BSc. Liquid Fuels Trust Board, Wellington (Consultant).

VALPY, Graeme Wilfred, MSc(NZ). Central Institute of Technology, Upper Hutt. (Snr. Tutor).

WEATHERBURN, David Charles, MSc PhD(Sydney). Chemistry Dept. Victoria University of Wellington. (Snr. Lecturer).

WILKINS, Brian Joseph, MSc(NZ) PhD(Lond). Central Institute of Technology, Upper Hutt. (Snr. Tutor).

### Member:

WEBSTER, Jenny Gaye, BSc(Hons)(Otago) PhD(W.A.)

Chemistry Divn. DSIR Gracefield.(Scientist).

Member from Graduate: MAGUIRE, Sean Michael, MSc(Well). Mobil Oil (NZ) Ltd. Wellington. (Snr. Special Products Asst.)

MCDONALD, Armando Gabriel, MSc(Otago). Forest Research Institute, Rotorua. (Scientist).

ROBINSON, Nicholas Peter, MSc(Waik). Chemistry Dept. University of Waikato, Hamilton. (PhD Student).

SCHOFIELD, Ms. Linley Rose, MSc(Waik). Chemistry Dept. University of Waikato, Hamilton. (PhD Student).

SIMPSON, Richard William, BSc'Hons PhD(Cant) Division of Chemistry, National Research Council of Canada, Ottawa. (Research Associate).

SIMS, Anthony William, MSc M.Phil(Waik). B V James & Associates, Hamilton. (Patent and Trademark Attorney)

TAN, Johannus Kiem Han, BSc Dip.Tchg. 74 Masters Ave. Hamilton. (Medical Rep. Boehringer Ingelheim).

Re-instated as member: T O R Haggett

### Graduate Member:

GIBSON, Miss Jennifer Joy, MSc(Massey). Dept of Chem/Biochem Massey

University.(Research Technician).

GINLEY, Eamon John, BSc. Chemistry Dept. University of Canterbury. (MSc Student).

KILMARTIN, Paul Andrew, BSc. Chemistry Dept. Victoria University of Wellington. (Hons Student).

MacDONALD, Ms. Melanie Lael, BSc. NZFP Pulp & Paper Co Ltd. Tokoroa. (Analytical Chemist).

NG, Koon Sin, BSc. Expandite Ltd. Petone. (Qual Control Chemist).

PHILLIPS, Anthony Ronald John, BSc. Medical School, Otago University. (Student).

ROLLO, Ms Joanne Rae, BSc(Hons)(Well). Chemistry Dept. Victoria University of Wellington. (PhD Student)

THOMPSON, Miss Carole Elizabeth, BSc Dip.Tchg. Rosehill College Papakura. (Chemistry Teacher).

TIPPETT, Richard James, BSc. Shell Oil(NZ) Ltd. Petone. (Chemist).

WIKAIRA, Jan L. BSc. Chemistry Dept. University of Canterbury. (MSc Student).

### Technician Member:

NAIRN, Ms. Debra Kay, NZCS. Hardie Trading Ltd. Penrose. (Sales Representative).

### Resignations:

M.L.Allen, S N Dawes, C F Denmead, P M Hamilton, J C Hawthorn, B G Lovelock, J C Neilson, I Pamich, A R Raine, T C Reid, T P Smith, B P Stanbury, K A Walsh, (students A C Guptill, J M Manuel, J A Strickett) (Auckland).

D H Andrew (Waikato). T R Burden, P O'Donnell, H E Miller, R E Smidt (Manawatu).

R B Cordner, P K Foster, G P Irwin, D C Lowe, P J Milsom, G Soteros, K F Stevens (Wellington) A M Taylor. P Meredith, R C Rendle, J B Stott, B I Whittington (Canterbury), K J Farnden, G Haaima, A R Hayman, P E Jameson, M A McMillan(Otago)

D A Aston, B P Korner (Overseas). A G Bailey, R W Tribe (Overseas).

### Deaths:

L P Doole (Auckland), H R Bott (Waikato), R B Sankar Rao (Waikato), R H Shepherd (Well), J M Parnell (Otago).

### Life Membership:

T Whilfield (Auck), J M Wood (Manawatu); T Marshall, G Naish (Wellington), A M Forrester, (Canterbury); D G Brown. (Otago).

# NEW DRUGS AND NEW SYNTHETIC METHODS

P.S.Rutledge Department of Chemistry, The University of Auckland

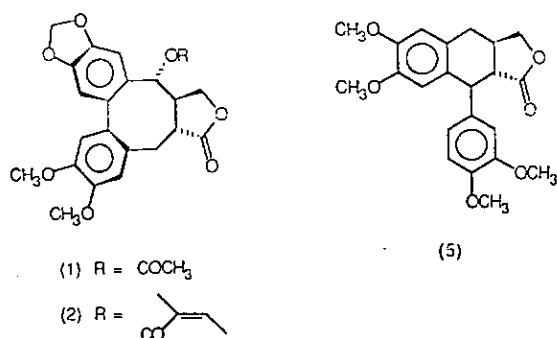
Stewart Rutledge was the 1987 recipient of the Institute's ICI Prize. This paper reviews some of the research for which the award was made.

## Introduction

Synthesis provides one of the most versatile methods for obtaining potentially useful new organic compounds. As the complexity and lability of the target molecules increase, so too does the need for new reagents designed to achieve specific transformations. This interrelationship forms the basis of this article, which outlines some of our recent endeavours to synthesise new chemotherapeutic agents.

## A New Antileukemic Lignan Lactone.

Taking the known antileukemic properties<sup>1</sup> of the naturally occurring dibenzocyclooctadienes steganacin (1) and steganine (2) as our lead, we aimed to develop potentially biomimetic syntheses of analogues from the New Zealand natural product matairesinol (3a). The key requirement for such a synthesis (Scheme 1) was a reagent which would direct the formation of a new carbon to carbon bond between the two aryl rings of (3b) to give (4) rather than the isomeric aryltetralin (5). Earlier<sup>2</sup> we had established that for a non-phenolic substrate, combination of thallium (III) trifluoroacetate with boron trifluoride etherate provided just such a reagent. Now thallium (III) trifluoroacetate is an unstable, expensive, and somewhat capricious reagent, which is certainly not well suited to medium or large scale use.



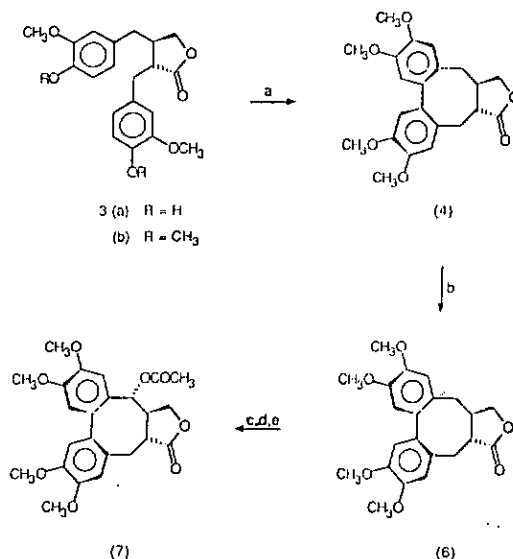
Therefore, we were very pleased to establish that the stable, and readily available, thallium (III) oxide in trifluoroacetic acid provided a reagent which was not only more convenient but also more efficient.

Although this cyclisation gave a dibenzocyclooctadiene (4), its twisted biaryl system was stereoisomeric with that of the target molecule. However, thermally induced isomerisation gave the correct atropisomer (6), which was then readily transformed to compound (7) which we have named 12-demethoxysteganacin. Gratifyingly, this steganacin analogue has exhibited significant *in vitro* antileukemic activity.<sup>3</sup>

## Synthesis of 4-Demethoxy-7,9-dideoxy-daunomycinone (10)

Although the anthracycline antibiotics daunomycin (8) and adriamycin (9) are promising therapeutic agents for a broad spectrum of human cancers, their use in chemotherapy has been hampered by undesirable side-effects including dose-

SCHEME 1

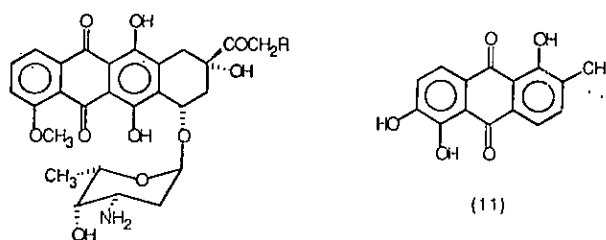


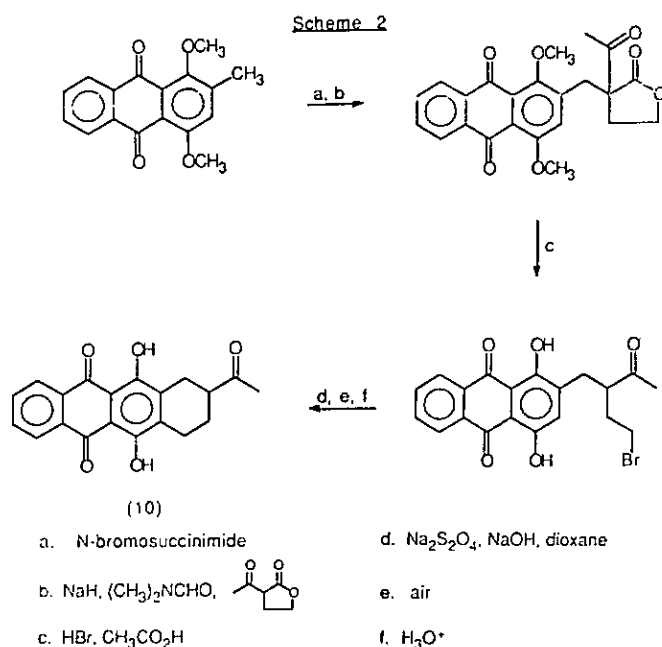
Reagents:

- |  |   |
|--|---|
| a Ti <sub>2</sub> O <sub>3</sub> , CF <sub>3</sub> CO <sub>2</sub> H | d SiO <sub>2</sub>                              |
| b Heat induced atropisomerisation                                    | e (CH <sub>3</sub> CO) <sub>2</sub> O, pyridine |
| c N-bromosuccinimide   |   |

related cardiotoxicity. Structure reactivity studies have revealed that their 4-demethoxy analogues show improved therapeutic properties. Since these latter compounds are not produced naturally, efficient partial or total syntheses are needed. Our aim was to develop such syntheses using readily available 1,4-dihydroxyanthraquinones as starting points.

Our first success<sup>4</sup> was a synthesis of 4-demethoxy-7,9-dideoxy-daunomycinone (10) (Scheme 2) in which the anthracycline A-ring was elaborated from a methyl substituent. A number of readily available naturally occurring hydroxyanthraquinones, e.g. morindone (11) from our own *Coprosma australis*, contain similarly positioned methyl groups, so that this synthesis also aimed to provide a model for syntheses of other anthracyclines with novel substitution patterns.<sup>5</sup>

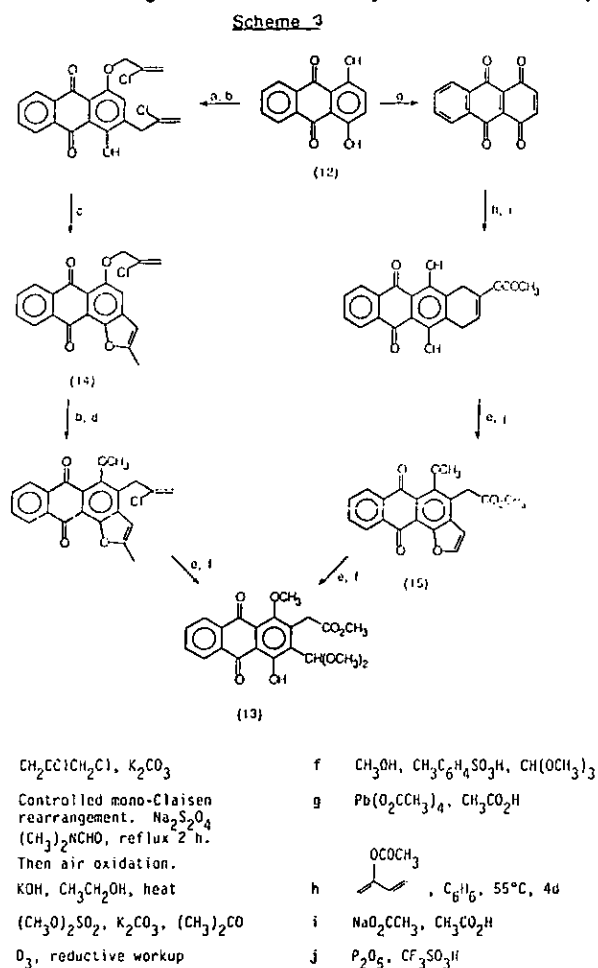




### Syntheses of a Key Intermediate (13)

Although the viability of such sequences had clearly been established, the crucial ring closure was only moderately successful, giving an overall yield of 50% for the last three steps. In general, it has been found that conventional cyclisations involving attack by polar species on even such relatively activated aromatic rings are not efficient for annelations of anthraquinones. Therefore, we turned our attention to syntheses based on reactions with non-polar transition states like Claisen rearrangements and Diels-Alder cycloadditions. Scheme 3 summarises two routes from the commercially available quinizarin (12) to a common key intermediate (13), each of which is based on one of these pericyclic processes.

The Claisen rearrangement route<sup>6</sup> required the controlled step-wise rearrangements of a suitably substituted bis allyl



ether. The thermal rearrangement was not sufficiently selective, so a completely new variant, which we call the reductive Claisen rearrangement, was developed. By first reducing the quinone the necessary control was achieved, and the rearrangement proceeded at an unusually low temperature. Generation of a furan from the unmasked phenol and the resulting side chain laid the foundation for the later differentiation of the original chloropropene chains by ozonolysis.

The Diels-Alder cycloaddition route<sup>7</sup> required use of a relatively electron deficient diene which would add selectively to the external olefinic bond of the quinone system, and lead again to the differentiated side-chains. The only other new synthetic methods in Scheme 3 are reactions c and j which were developed for formation of the furans (14) and (15).

Two alternative syntheses<sup>5,6</sup> of the key intermediate from quinizarin are summarised in Scheme 4. Of note are the forcing conditions which were needed because of the great reluctance of the ester (16) to undergo hydrolysis; and the novel participation of an ester carbonyl group in the intramolecular Wittig-type conversion of (17) to the furan (18).

### Synthesis of 4-Demethoxydaunomycinone (18) from (13)

The completion of our synthesis of 4-demethoxydaunomycinone in 29% yield overall from quinizarin is summarised in Scheme 5.<sup>8</sup> The remaining carbon atoms of the A-ring and the acetyl side chain were introduced by a Lewis acid catalysed directed aldol condensation of the acetal (13) with the mono-silyl enol ether of biacetyl. Base induced intramolecular addition of the ester, decarboxylation, deprotection and adjustment of the stereochemistry of the secondary hydroxyl function at C-7 completed the synthesis.

The only synthesis to date of an anthraiso-benzofuran (19) is summarised in Scheme 6.<sup>9</sup> However, our attempts to use this isobenzofuran as a putative Diels-Alder diene for anthracyclinone syntheses failed when it proved to be unreactive towards a variety of standard dienophiles including methyl vinyl ketone.

### Vineomycin Synthesis

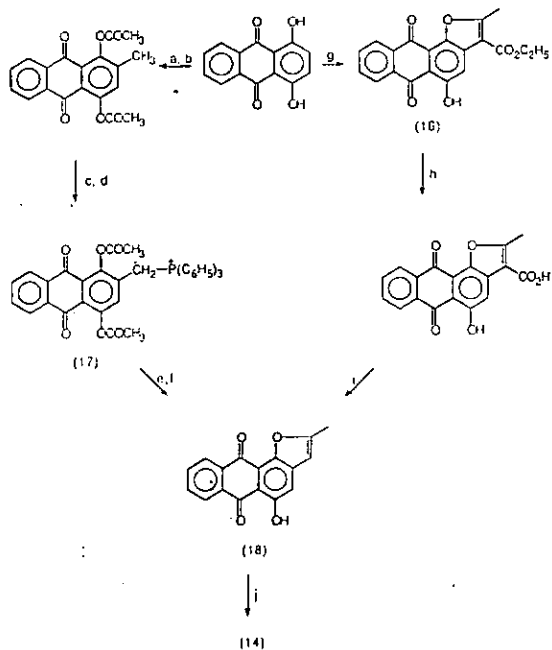
The vineomycins e.g. (23) are a relatively new subgroup of anthracycline antibiotics which all show some activity as antitumour agents in test animals. A notable feature of their structure is the presence of a β-C-glycosidic moiety which should be less vulnerable to deactivating deglycosylation than the equivalent O-glycosyl moieties of adriamycin and daunomycin. Application of a reaction sequence similar to that outlined in Scheme 3 to the commercially available 1,5-dihydroxyanthraquinone (20) has given a very direct entry to the vineomycin system (Scheme 7).<sup>10</sup>

To date, we have completed a high yielding synthesis of the aldehyde (21), and others have elaborated the C-glycosidyl moiety using a closely related substrate.<sup>11</sup> The new methods which we needed were for the conversion of a vinyl chloride to a ketone, which was achieved with mercury (II) trifluoroacetate, and generation of the 3-hydroxy-3-methylbutanoate side chain by addition to the ketone carbonyl group. Additions of the traditional organomagnesium or organolithium reagents to such ketones are usually very inefficient because, with such basic reagents, enolate anion formation competes successfully with the desired addition. Further, in this case, the reactivity of the reagent needed to be carefully modulated to avoid competitive addition to the quinone carbonyl groups. Both problems were overcome<sup>12</sup> by the unprecedented use of less basic but extremely selective reagent which resulted when chloro-tris-isopropoxytitanium was included as a co-reactant.

Our current endeavours aimed at extending this work by developing new syntheses of potentially useful lignan lactones and anthracyclinones with particular emphasis on producing optically active products from homochiral intermediates are proceeding well.

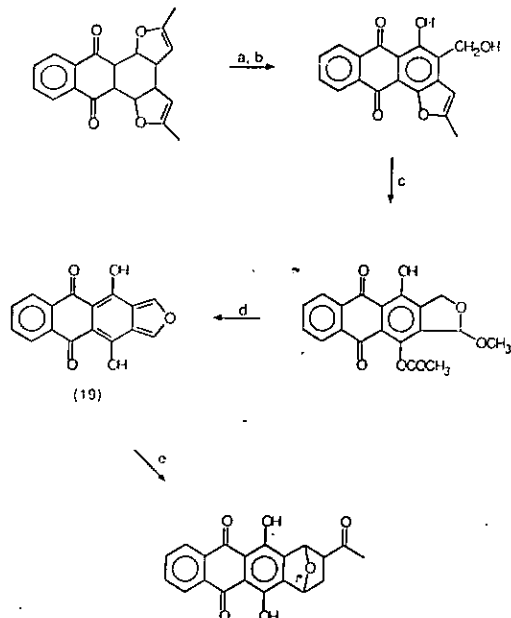
Continued on page 115

**SCHEME 4**



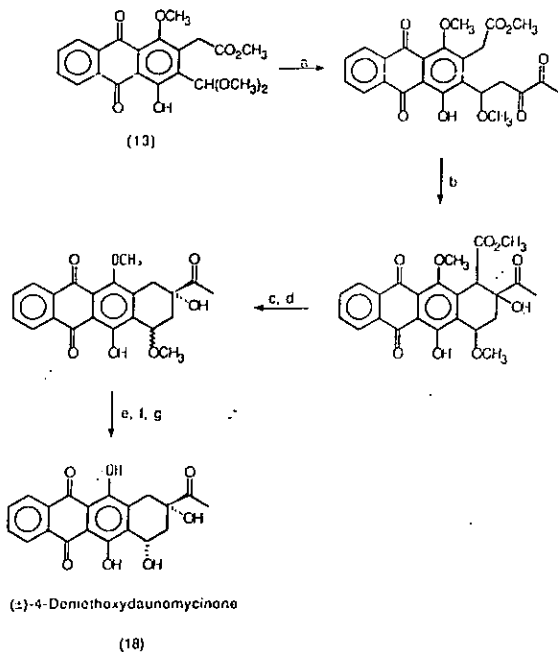
- a  $(\text{CH}_3\text{CO})_2$ , pyridine  
 b  $\text{Na}_2\text{S}_2\text{O}_8$ ,  $\text{CH}_2\text{O}$   
 c *N*-bromosuccinimide  
 d  $(\text{C}_6\text{H}_5)_3\text{P}$ ,  $\text{EtCl}_3$   
 e  $(\text{C}_2\text{H}_5)_3\text{N}$ ,  $\text{C}_6\text{H}_6$   
 f  $\text{H}_2\text{O}$ ,  $\text{H}^+$   
 g  $\text{CH}_3\text{CCH}_2\text{CO}_2\text{C}_2\text{H}_5$ ,  $(\text{C}_2\text{H}_5)_3\text{N}$   
 h  $\text{CH}_3\text{SO}_3\text{H}$ ,  $\text{HCO}_2\text{H}$   
 i Copper chromite, quinoline  
     $\text{H}_2$ ,  $240^\circ\text{C}$ , 25 min  
 j  $\text{CH}_2\text{CClCH}_2\text{Cl}$ ,  $\text{K}_2\text{CO}_3$ ,  $(\text{CH}_3)_2\text{CO}$

**SCHEME 5**



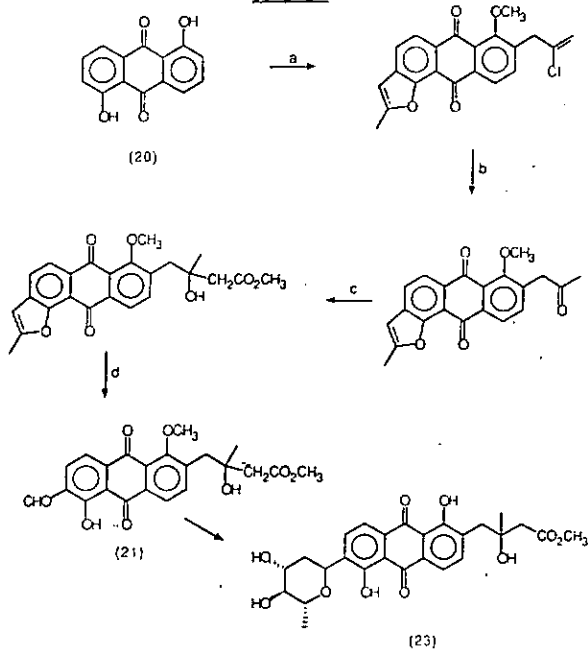
- a  $\text{O}_3$   
 b  $\text{NaBH}_4$   
 c  $\text{O}_3$ ,  $\text{CH}_3\text{OH}$   
 d  $\text{SnCl}_4$ ,  $\text{CH}_3\text{CN}$   
 e . heat

**SCHEME 6**



- a  $(\text{CH}_3)_3\text{SiO}$    
     $\text{SnCl}_4$ ,  $\text{CH}_3\text{CN}$ ,  $-23^\circ$   
 b 1,5-diazabicyclo[4.3.0]non-5-ene, tetrahydrofuran  
 c  $\text{KOH}$ ,  $\text{H}_2\text{O}$   
 d Dry  $(\text{CH}_3)_2\text{NCHO}$   
 e  $\text{BF}_3$ ,  $\text{CH}_2\text{Cl}_2$ ,  $-78^\circ$ ,  
    or  $\text{AlCl}_3$ ,  $\text{CH}_2\text{Cl}_2$ ,  $20^\circ$   
 f  $\text{CF}_3\text{CO}_2\text{H}$ ,  $20^\circ$   
 g  $\text{H}_2$

**SCHEME 7**



- a Similar chloroallylation, sequential Claisen rearrangement, furan formation etc. to Scheme 3  
 b  $\text{Hg}(\text{CF}_3\text{CO}_2)_2$ ,  $\text{CF}_3\text{CO}_2\text{H}$ ,  $\text{HCO}_2\text{H}$   
 c  $\text{CH}_3\text{CO}_2\text{CH}_3$ ,  $\text{C}_4\text{H}_9\text{Li}$ ,  $[(\text{CH}_3)_2\text{CHO}]_3\text{TiCl}$ , tetrahydrofuran,  $-78^\circ\text{C}$   
 d  $\text{O}_3$ , reductive workup

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# Productivity of Research Supported by Different Methods of Funding from a Research Council

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University of Otago Medical School  
Dunedin

## Introduction

In recent years there has been a growing interest in the means of funding academic research, and concerns have been expressed about shortages of funds in the United Kingdom<sup>1-4</sup>, North America<sup>5</sup> and in New Zealand<sup>6-9</sup>

The report of the Beattie Committee<sup>10</sup> recommended the establishment of Science and Technology and Social Science Research Councils in addition to the Medical Research Council of New Zealand (MRC) which, presently, funds research in medicine and the health sciences.

The question of the establishment of these two additional research councils is under investigation by the Science and Technology Advisory Committee. Considering recent interest in the evaluation of research efforts overseas<sup>11-14</sup> and in New Zealand<sup>15-19</sup>, this would seem an appropriate time to evaluate the most cost-effective means of funding academic research through a research council.

Since 1973, the MRC has supported research directly - by funding its own units, and indirectly - by providing grants-in-aid (ie project grants and programme grants). Units were formed originally to introduce research in new fields and investigate problems of national importance<sup>20</sup>. Project grants are meant to provide short-term support, maximum three year, to an individual or small group working on a clearly defined project<sup>20</sup>. On the other hand, programme grants provide support for long-term development of a broad research field by a larger group and have a normal life cycle of 10 years<sup>20-21</sup>.

It has been said that programme grants and the larger MRC grants are most cost-effective but no evidence has been presented on this point. Prior to 1982, MRC-funded workers in Christchurch relied heavily on project grants while those in Wellington, where the cost of MRC-supported publications was much higher, were financed largely by an MRC Unit and by programme grants<sup>18</sup>. This observation could indicate that the smaller MRC grants are, in fact, the most cost effective.

The evaluation of productivity in research is not easy<sup>11-19</sup> but this paper attempts to ascertain, in terms of dollars per publication, the value obtained by the MRC in its support of MRC units, programme grants, and project grants over the period 1973-84.

## Methods

Details of MRC grants and the resulting publications were obtained from the publications Research Review, for the years 1973-84. These were published by the MRC from their office in Dunedin between 1973-8 and from Auckland from 1979-84.

Fair comparison between project grants, programme grants and MRC units, was achieved by considering only those project grants for which directors had received continuing support for research with similar title over periods of three years, starting in 1973. These have been called sustained project grants<sup>15</sup>.

The consumer price index (New Zealand Pocket Digest of Statistics, Department of Statistics, Wellington) was used to adjust the amount of each grant in the year for which it was allocated to its value in 1973.

## Results

### *Cost of grant-funded publications in fiscal dollars.*

The ravages of inflation mean that it is difficult to make comparisons when considering grants in terms of fiscal dollars. From 1973-8, however, the price of publications from sustained project grants rose from about \$5,000 to a little over \$13,000. A steep decline followed to reach \$8,500 in 1980 but, thereafter, there was an increase to \$13,000 in 1983. The price of publications from programme grants declined slightly from \$8,700 in 1974 to \$7,700 in 1976 but, from that time, the cost increased steadily to about \$20,000 in 1983-4.

### *Cost of grant-funded publications in 1973 dollars.*

A better appreciation of the trend in the cost of publications is obtained when the amounts are adjusted so that they can be viewed in terms of constant (1973) dollars. The real cost of publications from sustained project grants has shown some variability but the trend has been downwards and, in 1973 dollars, decreased from about \$7,000 in 1974-5 to \$2,700 in 1984 (Figure 1). The real cost of publications from programme grants also decreased but showed less variability than found for sustained project grants. The price of a publication from this group in 1973 dollars decreased from \$7,400 in 1974 to \$4,900 in 1984. After 1979, the real cost of publications from programme grants was considerably higher than those from project grants

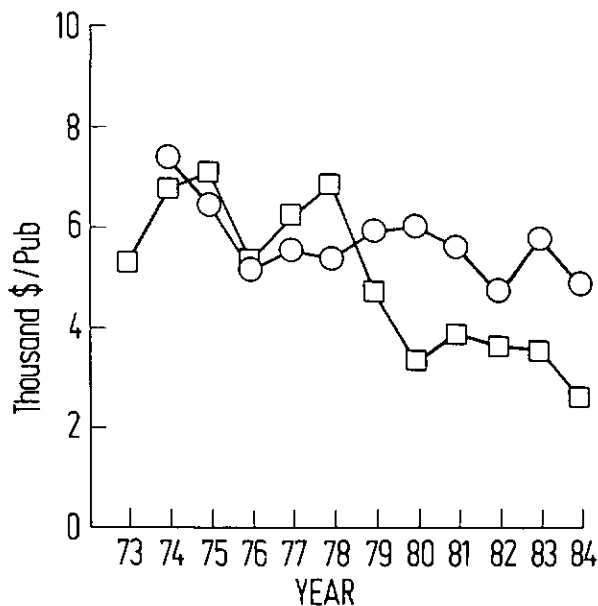


Figure 1. - Real cost (1973\$) of grant-funded publications during the period 1973-84. □, papers from sustained project grants; ○, papers from programme grants.

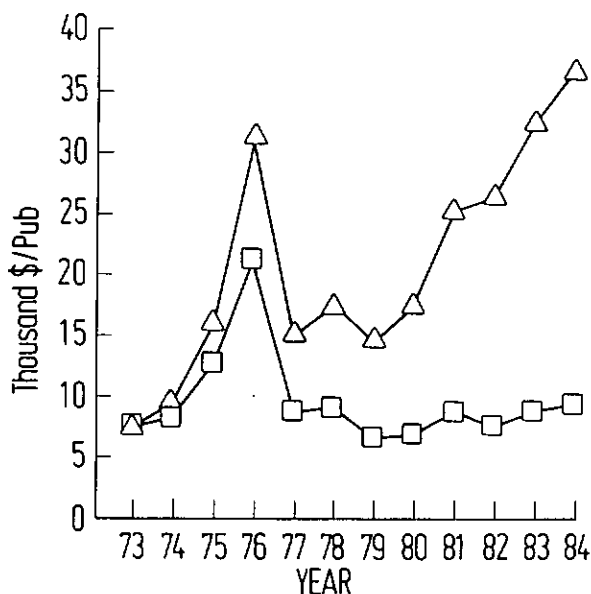


Figure 2. - Cost of publications from MRC units during the period 1973-84.  $\Delta$ , fiscal \$;  $\square$ , 1973 \$.

#### Cost of publications from MRC units.

In fiscal dollars, the price of publications from MRC units increased greatly from \$7,700 in 1973 to \$31,800 in 1976 (Figure 2). From 1976-7 there was a steep drop to about \$15,000 and the cost remained about this level until 1979-80 when there was yet another steep increase to reach \$37,000 in 1984. In real terms, the price of publications from MRC units increased from \$7,700 in 1973 to over \$21,000 in 1976. It dropped to \$8,800 in 1977 and, from then until 1984, remained at about \$8,500 per publication.

The MRC is responsible for all of the costs of running units and some indication of the size of additional expenses arising therefrom might be obtained by considering expenditure on salaries as a percentage of total allocation. Such data has been available only from 1980-4 but it shows that, for units, the average expenditure on salaries during that period was 79.6% of total expenditure. The corresponding figure for programme grants was 77.5% and for project grants 69.3%.

#### Publications and MRC support from 1973-84.

The publications resulting from all the above forms of support in each of the four triennia from 1973-84 were related to the amount of funding in each triennium and scatter diagrams plotted. That for 1982-4 is shown in Figure 3. Correlation coefficients for the four triennia since 1973 were 0.71, 0.61, 0.63 and 0.58 respectively.

#### MRC support and cost of publications.

The price of publications resulting from all the above forms of support were related to funding in each triennium and further scatter diagrams plotted. In the four triennia from 1973 correlation coefficients of 0.02, 0.27, 0.15 and 0.30, respectively, were obtained. Figure 4 shows the scatter diagram for the 1982-4 triennium.

#### Discussion

Although there is a belief that programme grants give better value for money than project grants, the fiscal dollar costs of publications resulting from sustained project grants and from programme grants were fairly similar from 1974-78. From 1979-84, however, the price of publications from programme grants was consistently greater than from project grants and it seems clear that, on this measure of value, programme grants were not the most effective means of supporting research.

When considered in terms of 1973 dollars, the cost of publications from programme grants and sustained project grants has fallen over the period from 1973-84 (Figure 1). The real cost of papers from programme grant support fell fairly steadily from \$7,400 in 1974 to \$4,900 in 1984. The real cost of papers supported by project grants also fell from about \$7,000 in 1974-5 to \$2,700 in 1984, a particularly

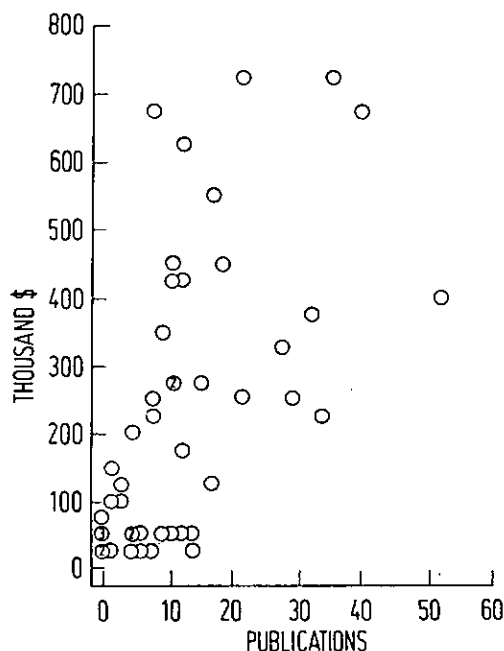
steep fall being noticeable from 1978-80. There is no obvious reason for this sharp decline but it was associated with an increase in the number of papers produced by all grades of academic staff<sup>19</sup> and it was about then that the MRC moved its office from Dunedin to Auckland.

In 1974, the real cost of papers from MRC units was about \$8,700 (Figure 2) and was a little more expensive than those from directors supported by programme grants (\$7,400) or sustained project grants (\$6,800). From that time, however, the cost of publications from MRC units showed a completely different pattern to those found with the other forms of support. From 1974-6 the cost of publications from units increased three-fold in fiscal dollars and, in real terms, increased 2.4 fold. By 1977, however, the cost in real terms had returned to the 1974 level and it is clear that a major influence must have caused such a large increase.

In real terms, financial support for MRC units remained constant from 1973-84<sup>15,16</sup> and the increased costs shown in Figure 2 must have resulted from a decrease in the number of publications produced. The cause of this reduction may have been the recommendation in an MRC working party report that existing units should be phased out and residual research activity incorporated into the work of research teams attached to appropriate university departments<sup>20</sup>. It is surprising that this recommendation could have had such a rapid and dramatic effect, but the real cost of publications returned to normal in 1977 when the MRC produced a response which stated that the concept of units would not be abandoned although the formation of a new unit would be an exceptional circumstance<sup>22</sup>. There was little evidence of an undershoot in the real cost of publications from 1977-84 and it appears that the publications which were lost from 1975-6 were lost permanently.

It is interesting that the real cost of publications from units has not shown the decline found with the other two forms of support. In 1984, the real cost of papers from sustained project grants was \$2,700 while that from programme grants was \$4,900 and from units \$9,500. It must be appreciated, however, that MRC units are mostly autonomous, not associated closely with established institutional departments and are staffed by professional and technical officers whose salaries are funded directly by the MRC<sup>20</sup>. It might be expected, therefore, that the non-salary component of expenditure on units would be higher than for other forms of support. The data for the period 1980-4 showed, however,

Figure 3. - Scatter diagram of MRC support for sustained project grants, programme grants and units during the 1982-4 triennium and the number of publications resulting therefrom.



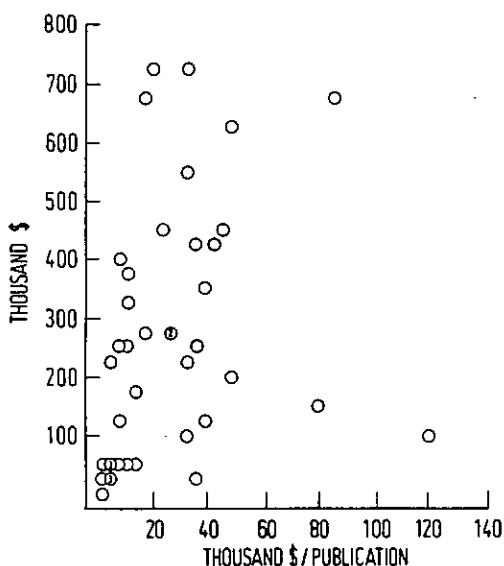


Figure 4. - Scatter diagram of MRC support for sustained project grants, programme grants and units during the 1982-4 triennium and the cost of publications resulting therefrom.

that the non-salary component for units was 20.4% while those for programme and project grants were 22.5% and 30.7%, respectively, and high non-salary expenses cannot be the reason for the higher cost of publications from units.

It might be assumed that a greater number of papers would be produced with an increase in the size of MRC grants. It was found, however, that in the triennia since 1973 the correlation coefficients for such data were 0.71, 0.61, 0.63 and 0.58 respectively. The data for the 1982-4 triennium are shown in Figure 3 where it can be seen that the relationship between the size of an MRC grant and the number of papers produced is not good. Only in the 1973-5 triennium did a positive correlation exist between the size of a grant and the number of publications and it cannot be claimed that, in general, larger grants give better value.

When the size of the MRC grants was related to the cost of publications, correlation coefficients for the triennia since 1973 were 0.02, 0.27, 0.15 and 0.30, respectively. The data for the 1982-4 triennium are shown in Figure 4 and it is obvious that there is no correlation between the size of a grant and the cost of papers which result.

It is clear, therefore, that the larger MRC grants cannot be claimed to give better value on the basis of number of papers produced or on the cost of such publications. From 1979, however, the real cost of publications from sustained project grants was lower than the cost of papers from MRC units or programme grants and it appears that this type of support provides best value for money.

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# GOVERNMENT DEPARTMENTS

## Biotechnology Division Jubilee

Biotechnology Division celebrated its 50th Jubilee on 19 and 20 July. Activities included a one-day seminar, involving presentations by programme leaders, of scientific investigations being undertaken in the Division, an Open Day and a Banquet.

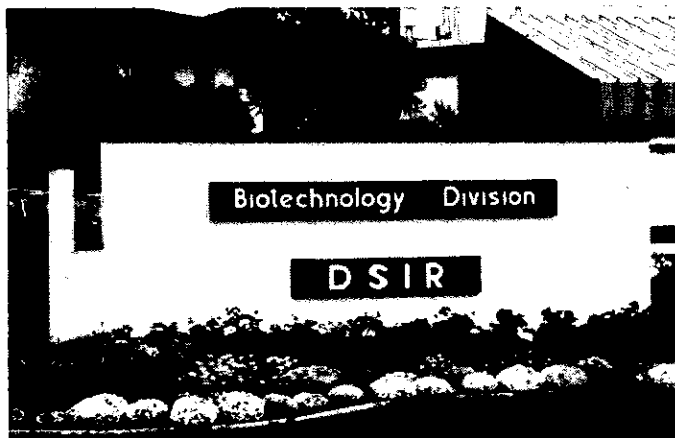
The Division was formed in October, 1969, by the merging of two organisations, the Plant Chemistry and Food Chemistry Divisions, to yield the Applied Biochemistry Division. Another name-change to Biotechnology Division reflecting the current research direction, was made earlier this year.

Plant Chemistry Division was established in 1938, under Dr James Melville, to investigate the cause of facial eczema, a disease resulting in considerable stock losses. The Division's research base was soon extended to include detailed studies of pasture growth and its metabolism in sheep and cattle. Bloat in cattle, a condition causing heavy losses with clover-fed dairy animals at certain times of the year, was intensively investigated from the 1950's. From this work various practical anti-bloating agents were developed to ameliorate this condition.

Plant Chemistry Division became a centre of excellence in microbiology, resulting from the ruminant metabolism studies undertaken. Work involving studies of the symbiotic nitrogen fixation by rhizobia bacteria in clovers and other legumes resulted

in the development of an extensive collection of rhizobial strains, a valuable research resource.

Food Chemistry Division was established, as the Fats Research Laboratory, in 1946 under the leadership of Dr Brian Shorland, to provide information on the composition of butter and meat fats. Extensive detailed analyses were produced on



these fats, particularly of the minor components (*trans*-unsaturated and branched-chain fatty acids). This research combined with that into the hydrogenating action of rumen micro-organisms on dietary polyunsaturated fatty acids, provided the reason for the significant difference in the composition of ruminant and non-ruminant body fats.

When the Fats Research Division was renamed to Food Chemistry in 1966 it started to expand into more general food chemistry. A series of ovine fla-

vor studies were undertaken in parallel with meat keeping quality and lipid studies. The flavour of cooked mutton from animals fed on clover was found to be stronger than that from animals fed on ryegrass. However, reasons for these observations and the exact chemical nature of the characteristic flavour of cooked mutton (objectionable to many people) have not been found.

time, the possibility of increasing the polyunsaturated fat content of ruminant meats by the feeding of "protected" rations was actively pursued, but flavour problems and economics prevented its commercial implementation.

The development of nutritional information services resulted from a long-term interest in both animal and human nutrition. Information from two specialist computer data bases are now available for people requiring information on foods and feeds. These data bases, the New Zealand Food Composition Tables and a Therapeutic Dietetic Database, are currently being expanded.

Application of molecular genetic techniques have resulted in an important shift in research direction for the Division. Another important development was the Biochemical Processing Centre, which is expanding its pilot plant facilities for the application of new technologies to the biological industries.

In-depth studies of the metabolism and physiology of plants, animals and other organisms continued on the formation of Applied Biochemistry Division, under the directorship of Dr Graham Butler. The criteria of pasture quality for ruminants, mineral cycling in the soil-plant-animal system and reasons for the resistance of some plants to insect attack were also studied. Meat flavour work led to the discovery that 4-methylotanoic (hircinoic) acid is a major contributor to the characteristic flavour of cooked mutton. At one

With the re-evaluation of objectives throughout Biotechnology Division, under the directorship of Dr John Robertson, the research emphasis in some programmes is undergoing extensive changes. There is a movement away from the Division being a resource centre of basic data, to the development of multidisciplinary teams for the commercial utilisation of information. This will allow the Division to perform a leading role in biological research and development.

## Chemistry Divn, DSIR, Gracefield

Chemistry Division took delivery of a Bruker AC 300 NMR Spectrometer in July. It will be a shared facility with VUW Chemistry Department.

Richard Furneaux, Peter Tyler and Regina Blattner spent four weeks in the USA and Europe during July visiting various institutions, and attended the IUPAC Conference on Organic Synthesis in Nancy. Tony Woolhouse recently returned from four months at the University of Oklahoma working on organic geochemistry. He and Douglas Crump attended a conference on insect pheromones in Canberra in July and Douglas attended the 3rd North American Chemical Congress in Toronto in June. Yeap Foo returned in August from 12 months at Oregon State University at Corvallis working on the tannins from Douglas Fir.

The Director, Gordon Leary, attended a Gordon Conference on lignin chemistry in Boston and later visited ICI, UK during July/August.

Most of the Gracefield forensic group have attended training courses on DNA fingerprinting over the last few months, both in NZ and overseas.

Dr Dan Perera returned after 19 months post doctoral research at the University of Newcastle Upon Tyne. He was working on a Ministry of Defence (UK) contract on nitrogen glass ceramics. Dr Perera and other members of the Solid State Chemistry section, Drs Ian Brown, Clay Cardile, Ken Mackenzie, Messrs Mark Bowden and Vaughn White attended the Austceram 88 International Ceramics Conference held in Sydney, where they presented five papers/posters on advanced ceramics research.

## COUNCIL NEWS Cont from page 108

### Recruitment

Council is concerned to maintain the existing level of membership and to see it increase more rapidly. Branches reported their current procedures for recruitment. It was agreed there was a need for a recruitment plan which included chemists from outside the university centres. The President, based on his experience of visits to Whangarei, New Plymouth and elsewhere, recommended a Council initiative for visits to smaller centres. This could possibly be linked with an initiative planned by the CET for lectures in these places. The 2nd Vice-President was asked to explore this proposal and report to Council, including suggestions received from members in smaller centres.

### Report on Visit to Australia

Dr Rogers tabled a report on his visit to the 100th ANZAAS meeting held in Sydney in May. During this time contact was made with the President, RACI, and the NSW Branch, in Sydney, as well as with the Executive Secretary, Past President and President-elect, in Melbourne.

At the conclusion of the meeting, Dr Llewellyn expressed the appreciation of the Council of the service of Mr Hitchings during his term as President.

J Rogers  
8 September 1988

### STOP PRESS

Mr Allan Turner was the successful candidate in the recent postal ballot for General Secretary of the NZIC.

# Chemical Spraying: a Public Issue

Nick Robinson reports on some recent events in the Waikato

The New Zealand Institute of Chemistry probably does not see its function as acting as a general educator of the public on popular science matters. The nation's secondary and tertiary institutions are, after all, supposed to do this.

The Waikato Branch of the Institute has, however, moved away from that general wisdom, and is taking a lead on an issue that is both poorly understood by the public and is more than just "general science". The issue, which impinges closely on many chemists within the Institute, is that of agricultural spray control.

Two public meetings on the topic were held recently. The first and smaller meeting on July 5th, was organised by a Koromatua (West of Hamilton) farming group, who recognised the recent alleged loss of four lives as a signal that safety standards needed reviewing. The result was a series of short talks from **Graeme Dale** (Nufarm Chemicals), **Stephen Bryant** and **Janet Shaw** (Wormald Safety), **Anne Berghan** (Waikato Unions Health and Safety Centre) and **Russell Bierre** (Health Dept). The prevailing message, to an audience who were mainly interested spray users, was one of pragmatic caution when in doubt.

The second meeting on August 3rd, organised by NZIC Waikato Branch Chairman, and now Hamilton City Councillor, **Rex Gallagher**, cast the net wider. Included were representatives of the Toxic Action Group (TAG), Ivon Watkins Dow, DSIR, Hamilton City Council, Waikato University, Dept of Health, Waikato Unions Health and Safety Centre and spray contractors. Equally, the audience comprised a wide cross-section of interests, including Institute members, conservationists, horticulturalists, a number of people who had been adversely affected by spraying activities, and even an Agent Orange victim.

Ideological gaps yawned wide, between TAG and the mostly pro-chemical scientific community in particular. Coverage of each point of view will be brief.

The theme of most pro-chemical speakers was educative: the Health Department's **Russell Bierre** recommended common sense and consideration; **Chris Gill** (Ham City Council) explained the necessity of sprays

to the Council's current scrub and weed control programme, and admitted that despite some bad experiences in the past, the council staff had recently adopted new safety practices; and **Anne Berghan** gave the Union's approval to beneficial use of sprays, provided the current problems of lack of training and common sense were overcome. **Dr Peter Molan** (University of Waikato) covered the terminology of poisoning, that is, the clinical symptoms of different types of poisoning and the detailed metabolic/enzymatic effects on human tissue; **Janet Shaw** and **Stephen Bryant** again presented the Wormald Safety gear; **Robert Moffat** (IWD) presented some data on the definition of exposure and the likelihood of the public being truly "exposed" (at least by National Poison Centre standards); finally **Carol Lamb** (TAG) and **Colin Wood** (spray contractors advocate) concluded the formal proceedings. These last three speakers highlighted the different attitudes, and to a degree, the problems, that the Waikato Branch would like to see resolved.

**Carol Lamb** claimed, on behalf of 'ordinary people' that no chemical can be proven completely safe, that the low level of illness that many people experience is attributable to spray poisoning, and that rate-payers are the ones who should be issued with the safety gear, as they are paying to be poisoned. **Carol** claimed that not only are toxin monitoring committees overrun by chemical company representatives, but they overlook evidence which they find harmful to the companies. Selected scientific studies were quoted which were supportive of her argument. The bottom line was: in the long term, a complete ban on all sprays is desirable.

**Carol Lamb's** views perhaps bear much closer scrutiny, because they represent some of the general perceptions and problems of comprehension that are common among concerned lay persons. Some examples:

(i) There are serious misconceptions about the different types of toxicity and their effects on the body. For example, short term versus long term effects, cell damage versus enzymatic disturbance, and so on.

(ii) There is almost no differ-

entiation between different types of sprays, or for that matter, any chemical substance. For example, the cumulative properties of DDT are associated with many currently used, less problematical sprays. Issues like degradation pathways, or structural differences, are difficult for lay persons to appreciate.

(iii) Despite an inherent mistrust of chemists, especially those associated with the spray industry, anti-spray campaigners will refer with complete faith and trust to scientific articles (sometimes only one!) which support their position. Such papers are then taken to 'prove' their case, because they contain 'scientific facts'. Curiosity for the literature is fine, but less selectivity should be strongly encouraged. Problems arise too, if misinterpretation of an article occurs. Nowhere was this more poignantly demonstrated than during the informal discussion, when a member of the audience insisted that according to a Soil and Water article, 50% of a spray application could drift up to 30 km from the spray centre, and that this constituted part of the current regulations, that no people were allowed within 30 km. Panelist **Bob Wilcock** re-

plied "I was the senior author of that article, and that is not what I wrote." The sanctity of the unchallengeable reference had been broken.

(iv) Among lay persons, perceptions of the world may occur from a series of isolated anecdotes. This is almost impossible to combat, as one cannot mock other's personal experiences, and can almost never challenge them. The "I know one bloke who..." or "Forty years ago we never used sprays and our fruit were as good then..." syndrome must be overcome, if any progress towards a more informed public is to be made.

The reasoned manner in which chemists at the meeting conducted themselves, several times providing valuable points of information and clarification, should have enhanced the image of our Institute. It is hoped that the meeting may have helped to reduce the apparent gulf between opposing parties, and to bring the Waikato public a step closer to a better understanding of sprays and their effects. At least this meeting, which began at 7.30pm and was still going at 11pm, was never dull!

Nick Robinson

NZIC Waikato Branch Editor

## INDUSTRIAL NEWS

Two leading industries from the Manawatu and Taranaki Province were the subjects of a recent Bio Search programme on the National Radio Network. **Dr Richard Garland** described the development of New Zealand Pharmaceuticals Ltd., an export-based company located near Palmerston North. This company produces a range of pharmaceuticals and fine chemicals from waste animal products, to fill niche markets in a variety of countries. An example quoted by **Dr Garland** is that of the mucopolysaccharide, heparin, produced by New Zealand Pharmaceuticals from the mucus lining of sheep and lambs. This chemical is produced from pigs in other parts of the World. The product is exported from New Zealand to Middle-East Countries where the ovine product is more readily accepted than the porcine products by the Muslim community. **Wayne King** described in more detail the isolation of a range of bile acid products by the Company. He related problems that arise when products are made to certain

specifications which have to be matched to the requirements of customers.

**Dave Wills**, Chief Analytical Chemist of Ivon Watkins-Dow Ltd., New Plymouth, described the Company's new laboratory for analysing low levels of a range of chemicals on a routine basis. According to **Mr Wills**, most of the cost of the new building went into maintaining the cleanliness of its working environment. This laboratory is unique from an industrial point of view, though there are Government laboratories that specialise in similar low level analyses. **Mr Wills** said that a variety of samples will be analysed in the new laboratory, particularly those for health protection purposes. Some examples are crops for residues of agricultural chemicals, environmental samples (water, soil and air) and body fluids of staff and spray contractors.

This was a most interesting programme from the reporters **Jill Galloway**, **Ian Johnston** and **Sally Smith** of Radio New Zealand, Palmerston North.

# International Conference on Fats

## University of Auckland, 12-17 February, 1989.

An International Conference on oils, fats, and waxes is being organized by the Oils and Fats specialist group of the New Zealand Institute of Chemistry, to be held at Auckland, New Zealand, February 12-17, 1989. The Conference is being supported by the International Union of Pure and Applied Chemistry, the Royal Society of NZ, NZIC, The Royal Society of Chemistry, and by the American Oil Chemists' Society.

The conference has been termed "Fats For the Future II" to focus on the theme of the meeting, which will be opportunity and innovation.

The conference programme will attract and be of interest to business people involved with commercial, economic and marketing aspects of fats and oils, to scientists interested in new developments associated with fats and oils, and to those interested in up-dates in technological advances in processing and formulating. A half day session has been specially included to debate the link between diet, lipids and cancer.

Informal discussions between delegates will be promoted throughout the programme to stimulate the exchange of international ideas.

The programme includes an impressive list of overseas speakers, some of whom are as follows:

**Professor FD Gunstone**, Professor of Chemistry, University of St. Andrews, Scotland.

Professor Gunstone will address the topic of "Oils and Fats - Past, Present and Future" which will cover chemistry, economic, analytical developments and biotechnology, reviewing changes in the past 50 years and trends for the future.

**Professor HK Mangold**, Executive Director and Professor, Federal Center for Fat Research, Institute for Biochemistry and Technology - H.P. Kaufmann Institute, Munster, Germany.

Professor Mangold will present 2 papers titled "Synthesis of Chimeric Ester Lipids" and "Semisynthesis of Pheromone Bouquets".

**Professor C Djerassi**, Professor of Chemistry, Stanford University, California.

He will discuss "Structure and Biosynthesis of Unusual Sponge Phospholipids" and will cover:

(a) structure of the marine and fresh water sponge phospholipid fatty acids.

(b) elucidation of their biosynthesis using specially synthesised radiolabelled precursors.

(c) their behaviour, with sponge sterols, in model membrane.

**Professor C Rattledge**, University of Hull., England.



A leading researcher in biochemical developments involving oils and fats, Professor Rattledge will present "Microbial Oils and Fats: Perspectives and prospects". This paper will consider commercialisation of this new technology for producing edible oils, biosurfactants and low calorie fat.

**Professor T Yamane**, Assoc Professor in Department of Food Science and Technology, Faculty of Agriculture, Nagoya University, Japan.

He will discuss "Conversions of Phospholipids by Phospholipases". Phospholipids are natural surfactants which have many applications in pharmaceutical and food industries. Natural lecithin is a mixture of phospholipids. Four types of bioconversion will be discussed.

**Dr LH Princen**, Centre Director, Northern Regional Research Center, Peoria, Illinois.

Dr Princen's paper "Commercialization of New Industrial Crops" will discuss status and plans for crops such as Crambe, rapeseed, meadowfoam, Jojoba, cuphea, lesquella as feedstock for important industrial raw materials.

**Dr JD Craske**, Consultant, Australia.

He will discuss "The Application of Accurate Analyses to the Control of Edible Oil Production". During recent years, considerable progress has been made in methodology to improve the accuracy of analytical analyses - much less progress in the effective use of the information thereby made available for the control of the quality and cost of edible oil production. Such analyses

should be both reliable and fast. Dr Craske's paper will address the present status in terms of these criteria and discuss application of the concepts as a means of improving cost effective control of edible oil manufacture.

**Dr M O Bagby**, Northern Regional Research Centre, Agricultural Research Service, US Department of Agriculture.

Dr Bagby has researched uses of new crops and new uses for established crops. He will present a paper on "Chemical and Biological Conversion of Soybean Oil for industrial products".

Recently the ARS has expanded efforts to find new non-food uses for agricultural materials including vegetable oils. Program objectives are to investigate and develop economically feasible new industrial products from soybean oil or to develop more competitive technologies for producing commercial materials and chemicals. Efforts focus on chemical and biological techniques to modify soybean oil to introduce new functionalities through isomerization, substitution, addition and cleavage reactions. Progress on microbial hydroxylation and acylation and nonenzymic conversions will be discussed.



Dr Bagby will also present a poster titled "Vegetable Oil Alternative for Diesel Fuel". This poster describes research to overcome problems attributable to inefficient combustion when vegetable oils are used as fuels for compression ignition engines.

**Professor RG Ackman**, Professor, Canadian Institute of Fisheries Technology, Technical University of Nova Scotia, Halifax.

A leading researcher on marine lipids, Professor Ackman will contribute two papers, the first titled "Problems in Fish Oils and Concentrates". With interest in fish oils enriched in respect to

EFA (20:5n-3) and DHA (22:6n-3) content, GLC has become the method of choice for monitoring retail products for their EOA and DHA content. The various modes of presentation of the fish oil omega-3 fatty acids will be reviewed in terms of triglyceride structure, ester absorption and potential effects on body organs and processes.

Professor Ackman will also present "Measurement of Natural Marine Lipids with Commercial Standards for the Iatroscan ILS/FID". Natural lipids of marine origin always include two and usually three basic types of fatty acids, respectively short-chain saturated (14:0-16:0); medium chain monounsaturated (16:1-18:1) and long chain polyunsaturated (20:5-22:6). Their different properties often lead to subfractionation effects on the Chromarods and in extreme cases to possible errors in identification. The problem is largely solved by total hydrogenation of the fatty acids in the sample prior to Chromarod separation, permitting calibration with inexpensive and stable standards and also improves confidence in identifications.

**Dr WW Christie**, Assistant Director (Science), The Hannah Research Institute, Scotland.

Dr Christie's paper "HPLC and GC - Mass Spectrometry in the Analysis of Fatty Acids" discusses uses of picolinyl ester derivatives of fatty acids of natural samples to identify 40 different fatty acid constituents. The methodology has been applied to a wide range of new samples of animal and plant origin and many novel structures have been identified.

**Professor L Hartman**, CTAAB Embrapa, BRAZIL

His paper "Modernization of the Methods of Oils and Fats Analysis" will cover method development to determine saponification number; monoglyceride level in crude oils and fats; phosphorus content of lipids and the hydroxyl value. Simplified methods, developed in the author's laboratory, for Soapstock analysis and determination of unsaponifiable matter will be described.

**Professor FH Mattson**, Adjunct Professor of Medicine, University of California, USA.

Professor Mattson will discuss "Sucrose Polyester: An edible fat with zero calories" Sucrose Polyester, also known as Olestra, is formed by esterification of sucrose with long chain fatty acids.

A petition for use of Olestra in shortening and edible oils has been filed with the US Food and Drug Administration. Properties of this material will be described.

**Dr RE Timms**, Consultant, UK

Dr Timms will present "The possibilities for using modified milk fats in the production of confectionery fats, shortenings and spreads". Four methods of modifying milk fat - blending with other oils and fats, fractionation, hydrogenation and interesterification will be described and illustrated. Some mention will be made of the legal, economic and marketing aspects of modified milk fats.

**Dr DA Rankin**, Scientist, Wool Research Organisation of New Zealand, Inc.

Dr Rankin will discuss "Factors affecting levels of Calcium

Impurities in New Zealand Woolgreases".

Woolgrease is a byproduct of the wool scouring industry and much is exported as a source of wax alcohols and cholesterol for cosmetic and pharmaceutical industries. Calcium soaps in NZ woolgrease have a detrimental effect on separation of wax alcohol. Factors influencing calcium soap levels in woolgrease are discussed.

**Mr KG Berger**, Consultant, UK

Formerly Special Advisor to PORIM and an acknowledged expert on technical aspects of fats and oils, will present "Problems and Opportunities in Market Development of Oils and Fats". This paper will consider current problems in marketing and recent examples of successful market development will be

given. Suggestions for market development of butter will be discussed.

**Dr L Eyres**, NZ Dairy Board.

Chairman of the NZIC Oils and Fats Specialist Group and experienced in industrial and economic aspects of marketing fat based products in New Zealand, Dr Eyres will discuss "Linking Product Development with the Marketplace". Examples of application research which have led to product development in the Dairy industry will be given.

**Dr L Topping**, Division of Human Nutrition, CSIRO, Australia.

Dr Topping is known for his work in nutritional investigation of foodstuffs and he will discuss "Adaptive effects of Fish Oils on Hepatic Lipid and Lipoprotein Metabolism".

Following interest in the dietary effects of fish oils with omega-3 fatty acids, studies of the influence fish oils taken in combination with other foods, particularly dietary fibre such as oat bran, suggest combination food products may be useful in regulating blood lipid levels.

Registrations and abstracts are now being accepted.

Final deadline for abstracts is October 31, 1988.

For further information and registration forms, please contact: Diana Fenton: Fax: NZ(064-9-543-131) or by correspondence to: Jennifer Gray, c/- Chemistry Dept, Unversity of Auckland, Private Bag, Auckland, New Zealand.

## CONFERENCES AND COURSES

**Chromatography Courses, Waikato Polytechnic, Hamilton, 1988/89.** These ever popular courses are to be held again in the Waikato, on the following dates: 22-25 November 1988, Basic GC Course. 29 Nov - 1 December 1988, Capillary GC Course. May 1989, HPLC Course.

For further information contact: Dr P G Robinson (or Science Secretary), Science Department, Waikato Polytechnic, Private Bag, Hamilton. (ph (071)392-500).

**Fermentation Technologies: Industrial Applications, Massey University, Palmerston North, New Zealand, 12-15 February, 1990.**

The Biotechnology Department, Massey University in collaboration with the Biochemical Processing Centre, DSIR (Biotechnology Division), Palmerston North, New Zealand, is organising an international Biotechnology Conference on the theme Fermentation Technologies: Industrial Applications.

The past decades have witnessed remarkable progress in those technologies that service the fermentation industries. There remains a gap between the advancement of scientific knowledge and its industrial application. This conference focuses on the new development of fermentation technologies and the application of them to industrial production of useful products. Topic areas which are being covered include microbial fermentation, yeast fermentation, fermenter technology, downstream processing, process development, product separation and recovery bioindus-

tries, impact of biotechnology etc.

Further information and the registration form can be obtained from the Conference Director, Biotechnology Department, Massey University, Palmerston North, New Zealand.

**10th International Conference of the Clean Air Society of Australia and New Zealand, 25-30 March 1990, University of Auckland.**

This conference will address a full range of topics in the area of air pollution, and atmospheric sciences. Special workshops will also be held on geothermal energy, solid fuel domestic heaters, the ozone layer, and planning. For further information contact the Conference Director (NG Thom), c/- NECAL, Dept of Health, 2 Edenvale Road, Auckland 3. (ph (09)601-747)

**RACI: Chemistry International, 28 August - 1st September 1989, Brisbane, Australia. Incorporating: 3rd Asian Chemical Congress, 10th Australian Symposium on Analytical Chemistry, 1st Environmental Chemistry Divisional Conference.**

For further information contact: Chemistry International Secretariat, UniQuest Limited, University of Queensland, St Lucia, Qld, 4067, Australia.

**Pacificchem '89**

Chemists and chemical engineers in countries bordering the Pacific Ocean as well as in all other countries are invited to submit papers for consideration and to attend The 1989 Interna-

tional Chemical Congress of Pacific Basin Societies. To be held in Honolulu, Hawaii, December 17-22, 1989, it is being cosponsored by The Chemical Society of Japan, The Canadian Society for Chemistry, and the American Chemical Society. In addition, chemical societies in the countries that border the Pacific Ocean plus the Asian and Latin American federations of chemical societies will be Official Participating Organizations.

About 3,000 reports on current research and development are expected to be presented in some 85 symposia and in oral and poster general sessions. The Congress will also feature special scientific events, including plenary lectures on the chemistry, resources, and protection of the Pacific Ocean, an exposition of chemically-related scientific products and services, and tours immediately before the Congress to the volcano area and the observatory on the island of Hawaii.

Scientific topical areas for papers to be presented are:

• **AGROCHEMISTRY**, including pulp and paper, cellulose, carbohydrate, agriculture, and food chemistry.

• **ANALYTICAL CHEMISTRY**, including clinical, electrochemical, environmental, and trace analysis.

• **APPLIED CHEMISTRY**, including C-1 chemistry, catalysis, fossil fuels, biomass, and material science.

• **BIOSCIENCE AND TECHNOLOGY**, including medicinal, pharmaceutical, microbial, and biopolymers.

• **INORGANIC CHEMISTRY**,

including geochemistry and nuclear.

• **INFORMATION TRANSFER**, including computation, economics, education, and management.

• **MACROMOLECULAR CHEMISTRY**

• **ORGANIC CHEMISTRY**  
• **PHYSICAL CHEMISTRY**

Additional information, titles of symposia, and copies of the Congress Abstract Form can be obtained from the Congress co-sponsors.

Contact: Mr. Gordon Bixler, Secretary, Pacificchem '89 Organizing Committee, American Chemical Society, 1155 Sixteenth Street, N.W. Washington, D.C. 20036, U.S.A.

## Letter to The Editor

Dear Bruce

Elswhere in this issue I have expressed some, hopefully constructive, thoughts on the future of the Institute.

As I bow out as Registrar may I through your letters column express my thanks to the many Presidents and Councils, Institute officers and representatives, Editors, branch committees, etc, that I have worked with, for the many happy and rewarding associations I have had. I count it a privilege to have worked with them.

I will keenly follow the Institute's progress and wish it and the membership a very happy and successful future. Thank you all.

Denis Hogan

# BRANCH NEWS

## Visit of Milton Lee

Supercritical Fluid Chromatography (SFC) is a new technology not yet used in this country, so analytical chemists and chromatographers had an excellent opportunity to learn when Professor Milton Lee visited Auckland and Christchurch recently from Brigham Young University, Provo (Utah). He is author of more than 220 publications, many in the area of SFC and actively involved in equipment development. He clearly explained the chemistry of SFC and the relationship to gc and hplc; advantages, applications and the technology involved. His visit was a joint venture between SGE (Australia), Altech (NZ) Ltd, the Overseas Visitors Fund of the Institute and the Auckland and Christchurch branches, and we thank the companies and the Institute for their support.

## Auckland

On 20th June Sci-Med(NZ) Ltd in conjunction with Perkin Elmer sponsored an address by Mr Brian Grigg, Thermal and Elemental Product Specialist from Perkin Elmer, Japan. The topic was "Design Concepts and Applications of Modern Thermal Analysis Instruments" and was very well received with several out-of town visitors making the trip to Auckland especially for the address. Interest in the content of the address was also high as judged by the large numbers who attended the informal refreshment/question session afterwards.

On 22nd July Dr Andy Braithwaite gave a very informative

and timely address to the branch, covering some past and present problems facing fertilizer chemistry. He described the work that won Auckland member Allan Chareston the 1987 Shell Industrial Chemistry Prize, and he gave some interesting comments on the relative merits of reactive phosphate rock versus the traditional superphosphate. He rounded off his talk by describing some of the current work of his research team at Chemistry Division, DSIR, Auckland.

## Presidential Address to Auckland Branch, 19th July.

The President was very thankful that we now have two airlines in NZ. When Mr Hitchings arrived at Christchurch airport to be told by Air New Zealand that they had changed his 737 for a Friendship, he smartly hopped over to the opposition and thus arrived at Auckland in time to join the 50-60 members who had turned out to hear his address. He gave a full and frank talk on the current state of the Institute. His plans for a professional secretariat were well received. Some lively discussion followed, with strong support for the proposed changes. Afterwards the President joined some of the members for dinner which rounded off a very enjoyable evening.

The next day the President and the Branch Treasurer (Rodney Norris) journeyed to Whangarei to meet with our Northland members. A very good 50 percent turnout showed the value of the visit, and a relaxed and informal discussion took place. Ideas were developed for

the Institute to assist members in the smaller centres to hold meetings, and Mrs Jennifer Wright agreed to act as local co-ordinator. This is thought to be the first official visit ever to Northland by the NZIC President.

## Joint Meeting, 30th August

The Auckland Branch together with the NZ Society of Cosmetic Chemists and the Science Teachers Association, co-sponsored a visit to Auckland by Dr Ben Selinger of Canberra, following the Annual Conference. This Dinner meeting at the Sorrento was thoroughly enjoyable and our speaker gave a witty, humorous talk on "Consumer Chemistry". He also gave some interesting demonstrations on his favourite toy (an Apple Macintosh), of income distributions in the populace, and drew some implications from statistics to social policy. It was a stimulating evening and a rare chance to hear a leading chemist who is also a polished after-dinner speaker.

The NZIC (Auckland Branch) Prize at the University of Auckland has been awarded to Mr Michael Mucalo for the second year running. The Auckland Branch has also sponsored six students to attend the NZIC conference in Palmerston North.

The annual schools visit to the University of Auckland was held on the 17th August. This year the visit included the Auckland Technical Institute to show a wider range of tertiary options available to students. Also included in the visit was a chemistry competition for which the

NZIC (Auckland Branch) gave prizes. The winner was Norbet Yee from Auckland Grammar School.

## Manawatu

At the recently-held Manawatu Science Fair, Nicholas Body was awarded a prize from the Branch for his entry entitled, "French Breakfast". This was a study of the growth of radishes under various conditions, which also attracted first prize in the Senior Physical Section of the Fair and the Institute of Agricultural Scientists' Premier Award. Mr Body was given a reserve travel award for his entry being judged third overall in the Fair.

A second prize from the Branch was awarded to Katherine O'Driscoll for her entry, "Melting Moments", a study of the heating effects of microwaves. Miss O'Driscoll's entry also came first in the Secondary Physical Science Section of the Fair and she was awarded an Institute of Food Science Prize.

A highly commended award was given to Jonathon MacDonald for his entry, "Enzyme Inhibition" (a study of the effects of drugs on enzyme activity), both by the Branch and by the Fair (in the Secondary Biological Science Section). The high standard of these entries is indicated by the prizes that they attracted from the various organisations participating in the Fair.

## Otago

The President, Mr Terry Hitchings, addressed the Branch on 14 July on "1988: A Turning Point in the Affairs of the Institute".

## University News

### Victoria

Dr Robin Speedy has returned from Sabbatical Leave which was spent studying diffusion in supercooled water and other liquids at high pressures in Prof. H-D Ludemann's laboratory in the Institut für Biophysik, Universität, Regensburg. While on leave he presented the results of his research in New Zealand and in Germany at conferences and seminars in Germany, Poland, Czechoslovakia, Italy and Israel. Dr. Franz Preilmeier from Professor Ludemann's laboratory will be working with Dr. Speedy as a Post-Doctoral Fellow later this year.

Dr Brian Halton goes on leave in October for five months. He will spend two months visiting laboratories in the U.S. and Europe presenting lectures on

his research work and then will spend three months working with Dr. RFC Brown at Monash University. While in Australia he will give a plenary lecture at the RACI Synthesis meeting in Melbourne entitled "Methylenecyclopropanes - Strained and Polar Aromatics".

Professor Robin Ferrier gave an invited plenary lecture to the Carbohydrate Group of the Royal Society of Chemistry in Oxford and research seminars in the University of Edinburgh and at the ICI Plant Protection Division during a short overseas trip earlier this year. Dr. CK Lee of the National University of Singapore will be visiting the Department later this year to work with Professor Ferrier.

Dr Gary Burns and Dr Jim Johnston have both attended

overseas conferences recently. Dr. Burns attended the Gordon Research Conference on Raman Spectroscopy in New Hampshire and then went on to the XI International Conference on Raman Spectroscopy in London. He also visited research groups at the University of Reading and the National Hellenic Research Foundation in Athens. Dr. Johnston has recently returned from conferences in the U.S. and is currently attending the Second Conference on Petroleum Geochemistry and Exploration in the Afro-Asian region in Beijing.

Closer to home Professor Ferrier, Professor Curtis, Dr. Speedy and Dr Weatherburn together with PhD students Robin Renner, Joanne Rollo, Raj Bhula, Chris Cunningham, Victor Luca, Murray Sim, Dugald McLaughlan, Paul Kilmartin, and Paul Peterson attended and presented papers or

posters at the recent NZIC conference in Palmerston North. Most of these students were assisted by a grant from the Wellington Branch's travel fund. Mr Luca and Mr Sim then went on to attend the Australian Clay Minerals Society Conference held at the University of Queensland.

Neville Tapp, John Patterson and Janet Burns have all recently completed their PhD degrees.

Recent visitors to the Department who have given seminars have included Dr Peter Cribb, York University, Ontario, who spoke on Time Delayed Two Photon Spectroscopy; Dr Martin Banwell, University of Melbourne, *gem*-Dihalocyclopropanes as Building Blocks in Natural Product Synthesis; Professor Karl Wieghardt, Ruhr-Universität, Bochum, The

Cont next page

# 1988 CONFERENCE

A report from Cecil Johnson on the annual get-together of the NZIC and NZBS.

The 1988 Combined Annual Conference of the NZ Institute of Chemistry and NZ Biochemical Society started with the lighting of a match and finished with analyses of radioactive products from atomic explosions. In between, a wealth of current research information was presented at plenary lectures, specialist sessions and poster displays. To bring a proper perspective to this scientific activity, Massey University's orator Mr Robert Neale, convinced delegates at the Conference Dinner that Shakespeare's Hamlet was an extramural university student. After considering the first three questions (1a, 1b and 2a) of an examination paper, according to Mr Neale, Hamlet decided that they were too difficult. He then said to himself, "2b or not 2b? That is the question."

Massey University facilities were not available this year because of extramural student activities and so the Conference was held at the Teachers College. This change of venue and the use of motels instead of student hostels was a particular challenge for Dr David Officer, accommodation and transport organiser. Construction activities at the College hampered planning of the Trades Display by Mr Vern Chettleburg, though the Committee was kept up to date on conditions at the Hokowhitu site by Dr Ken Whittle. Arranging the programme silvered many of Dr Eric Almscough's hairs, although he was ably assisted by Drs Graham Pritchard, Darryl Rowan, Keith Joblin and organisers of the specialist meetings.

Arranging of social events, in particular the meals for these

activities, presented a different set of problems requiring careful negotiations by Dr Charlie (sax) Towler and Geoff Lane. Ms Kathryn Stowell (student paper organiser) emphasised the need for proper vegetarian meal alternatives. Dr Cecil Johnson made sure that the Conference was noted in New Zealand and overseas publications, while Mr John Haylock provided the local media with information. Mr Haylock's knowledge of and contacts within newspapers and radio stations were most valuable, facilitating the publication of Conference information and interviews. The smooth running of all these activities can be attributed to the calm directing of Dr Andrew Brodie (Conference Chairman), along with Drs Mark Pritchard (Secretary) and Barry Old (Treasurer).

## Conference Opening

"The match and its box are so simple - or so it seems. Their history is a story of dangerous devices, human suffering, capitalism versus socialism, penniless students and a princess, a terrible industrial disease and much more ... Chemical demonstrations will add excitement to the lecture." So said the advertising leaflet for the public lecture, the opening activity of the conference, by Dr John Emsley, Department of Chemistry, Kings College, University of London. Dr Emsley's presentation, "The Cost of a Box of Matches," certainly well satisfied the advertising criteria for the audience that filled the large lecture theatre. Apart from discussing the change in chemistry of flame production and construction of matches over the past 300 years, Dr Emsley showed how the ter-

rible working conditions of the original match-producing factories led to the first strike of workers and how the Salvation Army was involved in the industry.

## Plenary Addresses

How many enzymes have evolved over the past 3 billion years to be such efficient catalysts in so many different chemical reactions? Altering the key amino acid constituents in enzymes usually has deleterious effects on their activity. Professor Jeremy Knowles (Department of Chemistry, Harvard University, Cambridge, Massachusetts) showed that the effect of this site-directed mutagenesis may be partially reversed in the enzyme triosephosphate isomerase (catalyses dihydroxy - acetone phosphate to D-glyceraldehyde phosphate) by the replacement of other amino acids near the catalytic site. This work has provided an insight into the structure-function relationships in this enzyme.

The three-dimensional structure of antibody-antigen interactions was discussed by Dr Peter Colman (CSIRO Division of Protein Chemistry Melbourne). Dr Colman described the effects of various modes of binding on the structures of complexes between the influenza virus antigen neuraminidase and its antibody.

Possible chemical remedies for disorders of the mind were described by Professor Raymond Baker of Merck, Sharp and Dohme's Neuroscience Research Centre, Harlow, England. Most drugs that are currently used, show only transient beneficial effects. Professor Baker indicated that improved treatments may be developed from studies of disturbances in pathways within the central nervous system. He indicated that solutions to these problems are urgently required as, by the end of this century over 1% of the population (in the UK) could be affected by some form of senile dementia.

For analytical chemists, Dr Mark Florence (CSIRO Centre for Advanced Analytical Chemistry, Lucas Heights) described recent developments in voltammetry. This method can be used for the analysis of many elements in different redox states, differentiate between various chemical species and labile and inert complexes, in some instances at concentrations to  $10^{-11}M$ .

Many changes have been made in the area of electrode design (from the simple, but difficult to operate, dropping mercury electrode) to produce accurate and reasonably inexpensive, instruments.

Who would consider hoisting a mass spectrometer by crane up three storeys to have it near an industrial process? This was one of the activities described by Dr David Rothman (Analytical Services Laboratory, Dow Chemical Co., Midland, Michigan) in his efforts to take various analytical techniques from the laboratory to the factory floor. He showed how many forms of instrumentation (in explosion-proof containers) can be attached on-line or in-line to chemical processes. This requires close co-operation between the analytical chemists and process engineers. Dr Rothman said that new instrumentation and sampling techniques are being developed for specific applications to allow more direct monitoring of reactions.

The development of computer-optimised high performance liquid chromatography mobile phases containing water, methanol and acetonitrile was described by Professor Paul Haddad of the Department of Analytical Chemistry, University of New South Wales, Kensington. This approach to the development of the best practical mobile phase (within a reasonable time) requires careful consideration of the range of mobile phases to be investigated and criteria to be used to assess the quality of chromatograms thus generated. Some computer programmes are available from commercial sources.

Dr Robert White (Director, The Exploratorium, San Francisco) opened the Education Symposium with a discussion of science museums and science centres. There are about 400 being contemplated in the United States alone. Dr White showed how his organisation caters for the requirements of students, teachers and the general public. With over 500,000 visitors a year, the Exploratorium is rather noisy and gives the appearance of being rather disorganised. Particular difficulties mentioned by Dr White were the development of suitable exhibits for (wet) chemistry and the use of various languages by the visitors.

Cont next page

## UNIVERSITY NEWS Continued

$\mu$ -hydroxy and  $\mu$ -oxo-(bis- $\mu$ -carboxylato) dimetal core in Biology and Inorganic Chemistry, and Dr DC Nonhebel, University of Strathclyde, Glasgow, who spoke on the uses of cyclopropane-containing compounds as probes of reaction mechanism in chemical and enzymatic reactions.

### Otago

Professor Brian Robinson and Associate Professor Jim Simpson attended the 13th International Conference on

Organometallic Chemistry in Turin, 5-9 September, followed by the 4th Eurochem Conference in Freiburg. Associate Professor Simpson also attended the 6th International Symposium on Homogeneous Catalysis, 21-26 August in Vancouver, was guest lecturer at the RSC Dalton divisional meeting on Electrochemistry and Electron Transfer in Inorganic Chemistry, 20-22 September in Birmingham and also spent some time in Melbourne looking at computer modelling, in particular CHEMX programs.

## 1988 Conference Report

Continued from previous page

"Chemists Can't Write", according to Dr John Emsley, or at least that was the title of his presentation. Chemists must make a greater effort, according to Dr Emsley, to convey the benefits of science to the popular press and to quality publications. Hopefully, in time statements produced by non-chemists such as "phosphoric acid explodes in air," "a cloud of ammonium nitrate gas," "the hydrocarbon hydrazine," and "a caustic soda acid spill," will be a phenomenon of the past. Dr Emsley described the various steps that must be taken from the development of a scientific idea to the publication of an article.

This theme was continued by Dr Ben Selinger, Department of Chemistry, Australian National University, Canberra, in describing his publication, "Chemistry in the Marketplace." "Get the first sentence right," said Dr Selinger. Many experiments can be carried out with materials commonly found in the home. The acceptance of some consumer products are reliant on the functioning of important scientific principles, eg the polarisation of light and the ability to match the refractive index of compounds.

During the conference, three competitions were held. Ms Sally Brooker (Department of Chemistry, University of Canterbury) won the Student Paper Prize with her presentation: "Polymanganese Macrocyclic Complexes - Models for the Photosynthetic Oxygen-Evolving Centre." Poster prizes all went to participants from the Department of Chemistry and Biochemistry of Massey University. The student poster prize was divided between a chemistry presentation by Mr Mark Smith. "Pretransitional Behaviour in Micellar Liquid Crystals" and a biochemistry presentation by Ms Johanne Egan. "Enzymes of Lactose Metabolism in *Streptococcus Lactis*." Ms Cathrine Day presented the best overall poster. "A copy DNA Library for Human Lactoferrin." Ms Kathryn Stowell, a co-author of the latter poster won prizes for her presentation at last year's Conference.

This has been but a brief description of the Conference. For more information send \$6.00 to Dr Eric Ainscough, Department of Chemistry and Biochemistry, Massey University, Private Bag Palmerston North, for a copy of the Conference Abstracts book. It's of good value!

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With its range of laboratory balances, Sartorius can provide a balance for every weighing requirement. Six series create a new dimension of unprecedented, performance capabilities, reliability and user convenience, says, Wilton Instruments, New Zealand agent for Sartorius.

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The Sartorius Handy series is designed as a "personal" benchtop balance. Aside from its smaller capacity, it has all the technical features of the "big analyticals". The H51 with its transparent draft shield, has a 51g capacity consisting of a display range of 31g plus a tare allowance of 20.0g and is readable to 0.1mg. For milligram readouts to 121g the H120 compact precision balance is hard to beat. It features a draft chamber made of high grade glass and stainless steel for interference free weighing.

The Universal series, covers advanced balances with all-round capabilities for use in the laboratory, where there are heavier workloads. Made to weigh loads up to 6,100g the Sartorius Universal models are the higher-capacity alternative to the laboratory series. You can select from four different models with 10mg resolution. All four are made for all-round applications covering general weighing and filling, formulation work, check-weighing and animal weighing. Large samples and containers are easy to weigh on a Sartorius universal balance. Its rectangular pan is as large as the toploader itself, so you can utilize the balances wide weighing range.

Sartorius Research balances are designed to solve problems beyond the conventional limits of analytical weighing. A prime example is the R120P, the first fully electronic semi-micro boasting a unique resolution of 10ug over its entire 162g weighing range. Another exemplary model is the R180D: if your sample exceeds the 33g fine range the balance automatically lets you continue weighing up to the 182g macro range. And take the R300S: it enables you to weigh

up to 303g with 0.1mg accuracy - without any compromise. Now you can weigh minute quantities directly into the container you use to process your samples.

Last in this amazing collection of laboratory balances is the Analytical series. It consists of three highly accurate top-loaders in a new low-profile design with an all-glass draft shield. Whether your job in the laboratory involves final weighing, filling or formulation Sartorius' new analyticals will ease your workload with more speed, convenience and reliability.



As well as the models presented here, Sartorius have developed the 'Plus' package for selected models in the laboratory and universal series. This consists of expanded capabilities designed to make your routine work in the lab a lot easier. Data Input Keyboards, program packages for laboratory routines, and a computer interface are all integrated into these balances.

Overall this superb range of laboratory balances let you weigh, faster, easier and more reliably than ever before.

For specific information, please contact the Wilton Instruments Division of Salmond Smith Biolab Ltd, PO Box 31-044 Lower Hutt, Phone 04 (697-099).

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# LABORATORY BALANCES

## Oertling at Foodtech '88 - Auckland

At Foodtech '88, Oertling will be launching the new SC series of top pan balances designed for heavier laboratory and industrial applications.

The SC series can be supplied in a variety of capacities, 8kg and 12kg accurate to 0.1g, 16kg accurate to 1g and 0.1. All balances feature a large rectangular weighpan, a hygienic, wipe-clean fascia and an easy to use, tactile 0-9 keypad. Pre-set tare facilities, fully automatic calibration and an advanced digital filtering system are also incorporated to ensure accuracy is maintained.

This range also offers a variety of integral functions including mean and standard deviation for statistical weight analysis, store weights for recipe formulations and store and recall for checkweighing. Balances are available with one dedicated programme for a single application or with a variety of user selectable programmes capable of carrying out a number of tasks.

The SC balance on display will be linked to the new K502 tallyroll printer to provide hard copy results. The printer is capable of producing simple print-outs, i.e. time, date and weight, or, if the balance is fitted with a user programme, a more comprehensive report with code and a comparison against upper and lower limits. These balances can also be interfaced to a computer for management information.

Also on show will be the new OC61/W which is waterproof (IP65) and therefore suitable for weighing in a wet environment. With a capacity of 6000g x 0.1g, this balance combines fast response time and high capacity with a number of special built-in user selectable functions, including percentage weight change, standard deviation and store and recall of tare and weight.

The new PX4 micro-computer and statistical weight control software package will also be displayed. Designed to reduce giveaway, the micro-computer and programme will perform average weight calculations, incorporates upper and lower warning and action control, and provides histograms, process characteristics and batch and shift reports on up to 500 products.

Oertling will also be exhibiting examples from a complete range of analytical balances. With capacities from 80g up to 500g

and sensitivities from 0.01mg to 1mg, these balances are suitable for all areas of research and pharmaceutical, chemical and process manufacture.

All balances feature a range of integral functions, a 'below the bench' weighing facility, and can be interfaced to printers, calculators and micro-computers for a fully integrated weighing system.

**For further information please circle no. 1 on reader reply card.**

## Mettler AE Analytical Balances: Precision Weighing on a Broader Scale

Further additions have been made to the long-established AE series of Mettler analytical balances. Now there are five models in all, with different weighing ranges and accuracies. Software improvements have reduced sensitivity to vibration, particularly in the case of the higher-capacity models.

The weighing range of the AE240, the successor to the AE163, has been extended to 0 to 205g (readability 0.1mg). This model has a semimicro range of 0-41g, with a readability of 0.01mg. The AE260, which is also new, has a range of 0 to 205g (readability 1mg) and a fine weighing range (Mettler DeltaRange) of 0 to 60g with a readability of 0.1mg.

These two flagships of the AE fleet are accompanied by balances having narrower weighing ranges. They can be used for specific tasks where a limited range is sufficient. The AE offers a wide choice for sharply defined weighing range and readability.



All AE balances can be fitted with a one or two-way data output. They thus have all the facilities needed for integrating any model of the series into a data communication system.

**For further information please circle no. 2 on reader reply card.**

## LabPac-M Lends Variety To Lab Routine

Differential weighing is one of the commonest weighing operations in the lab. It is used for determining moisture and ash, filter analysis, etc. Mettler LabPac-M applications software is particularly suited to this purpose, and others.

LabPac-M is used together with a Mettler analytical or precision balance of the AM/PM series. One of its applications is moisture determination with the aid of an oven. Here with LabPac-M one can store the weights of up to 20 tare containers and their respective initial weights. Drying of the samples is followed by differential weighing. As a result one obtains the weight loss in grams or per cent, as required. The connected printer produces a record of all the necessary data. Other standard applications for LabPac-M include formulating by weight or percentage.

For all applications requiring even greater flexibility with differential weighing and also formulating, Mettler has a selection of software packages for microcomputers which are able to meet the most exacting specifications. Such systems are appropriate where very large batches of samples have to be dealt with, or large numbers of different formulas need to be stored.

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## Adapt to Different Weighing Needs: Mettler's Precision Balances of the PM Series

"The balance should be adaptable to any requirement, any user need." That was the fundamental idea behind development of Mettler's new PM precision balances. By sticking to it and refusing to compromise, the Mettler designers came up with answers that are totally new and exclusive in the field of lab balances.

For instance, PM balances adapt to all sorts of weighing situations. Twelve different adaptor constellations are available for optimizing speed and reliability when ambient conditions or the type of weighing change. Status indicators on the balance display tell the user which status the balance is in at any given moment.

Besides adjusting to different weighing situations, Mettler PM balances also adapt themselves to the characteristics of human perception. A new type of graphic display shows in analog form what the user would otherwise have to figure out from the digital

readout: the Mettler DeltaTrac tells exactly how much of the weighing range is used and how much is still available, and it shows the deviation - with correct sign - from a preset target weight. As a result, the Mettler DeltaTrac makes weighing and checkweighing chores much faster and less tiring than they used to be.



The PM balance even adapts to frequently occurring applications. It houses standard solutions for counting, percent weighing, plus-minus checkweighing, animal weighing and selection of weight units. More sophisticated needs are met by Mettler Pacs and various system solutions, which are connected in no time thanks to the bidirectional CL/RS232C data interface incorporated in every PM balance as standard equipment.

To top off all these advantages, the broad selection - which also includes two DeltaRange models - enables Mettler to meet any and all weighing range and readability requirements.

**For further information please circle no. 4 on reader reply card.**

## Calculating Dry Weights And Moisture Contents Is Now Timesaving And Reliable

The dry weight and moisture content of samples taken from the drying oven can now be determined quickly and easily with Mettler LabWare "Drying". The program is stored on a micro-cassette and is used as application-specific software in combination with a handheld Epson HX-20 computer and a Mettler analytical or precision balance.

Mettler LabWare "Drying" uses a dialog to guide the operator through the determination. And, at his or her option, the instructions appear on the 4-line computer display in English, French or German, or any desired fourth language.

**For further information please circle no. 5 on reader reply card.**

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Gas mixture types available include uncertified mixtures for applications where the exact composition is not critical, such as biological atmospheres, certified mixtures (Beta Standards) for routine calibration purposes and Primary Gravimetric Standards (Alpha Standards). Alpha Standards are prepared by weight on a high accuracy balance and are extremely accurate gas mixtures for applications where the highest degree of accuracy is required.

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ized instrumentation and it's skilled staff can assist in all aspects of gas analysis, and the development of specific analytical procedures.

NZIG Auckland now has an analytical laboratory headed by Rob Slator. Instrumentation includes, GC, FTIR and oxygen meters. The lab now performs tests on both certified and uncertified mixtures, with pools created for those mixtures of high turnover. The net effect is greater client satisfaction through fast and efficient service.

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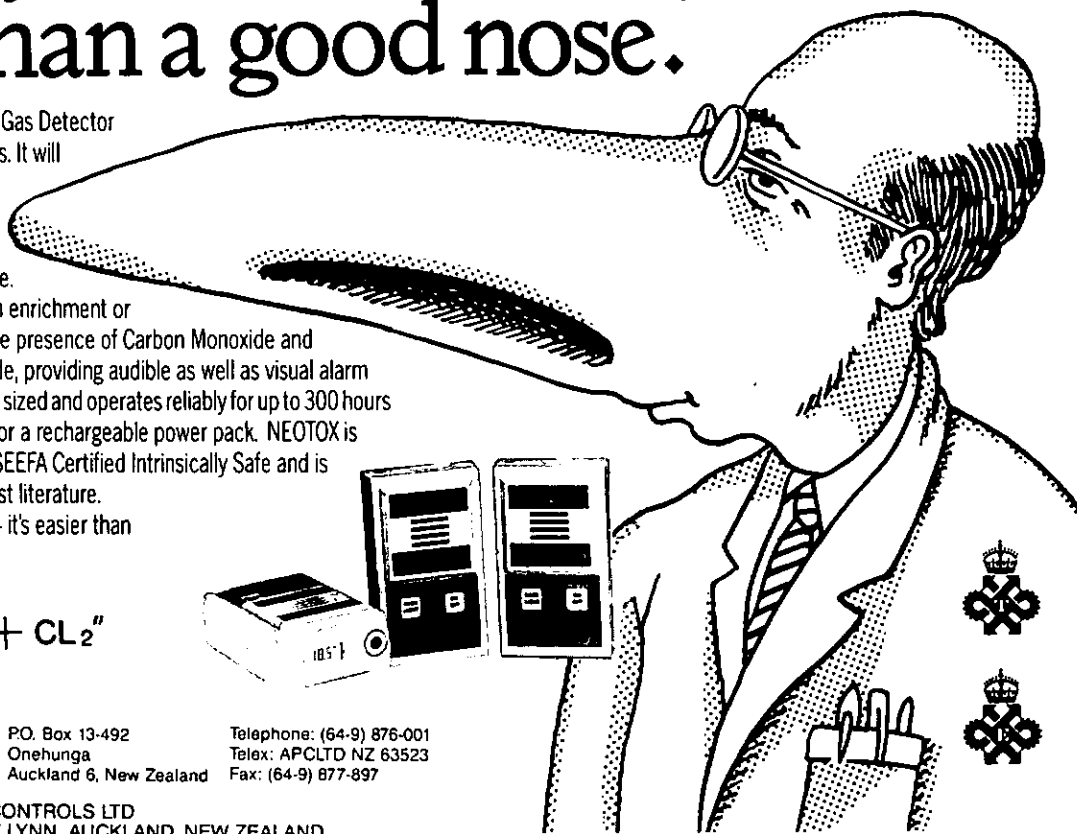
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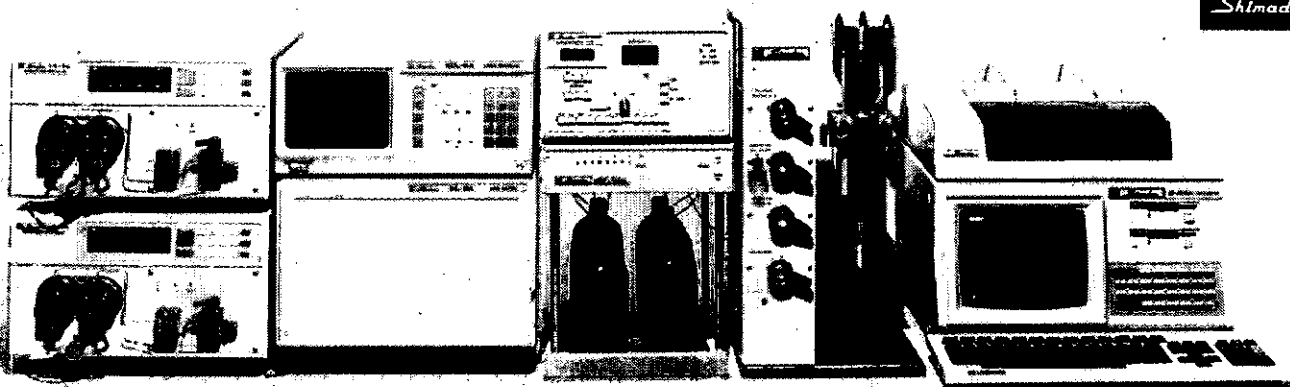
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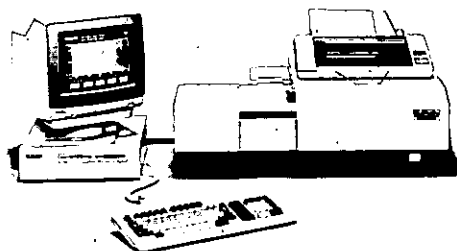
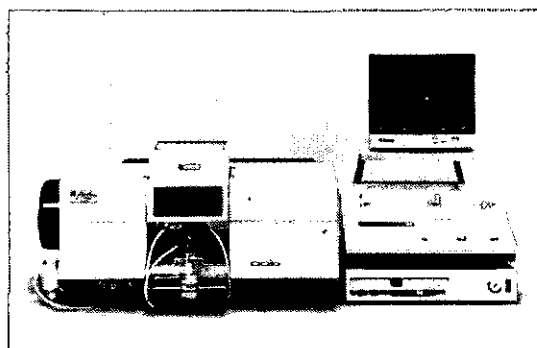
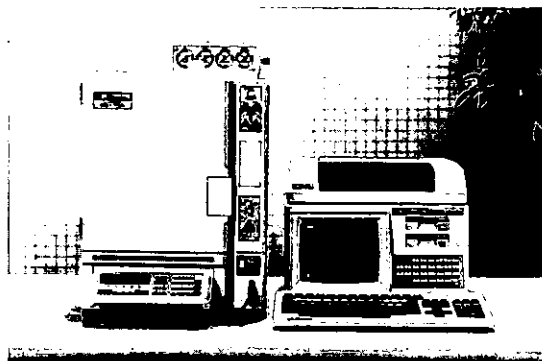
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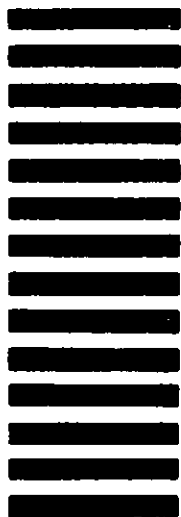
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