VOL 57 NO.3 JULY 1993

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FROM THE EDITORIAL BOARD

This is the second issue of the new look journal and we have been encouraged, to say the least, by the response to the first issue. The focus for this issue is on the pharmaceutical industry and related chemistry, and we trust you will again find a journal with enough variety and substance to sustain your interest.

The difficulty we always have as an editorial group is achieving a balance between the various functions of the Journal. With the current approach, New Zealands industrial chemists have been quite receptive and helpful in providing material and credit for this must go to the Publisher and the Managing Editor. Likewise the news and views - including RACI material for publication are similarly flowing in. However we are confident the balance can be further improved and in particular, more material from the research front could be accommodated. So if you have appropriate material please consider the Journal as a vehicle to disseminate to the scientific community, what you or your research group are working on.

Jim Metson, Roger Whiting
for the Editorial Board.

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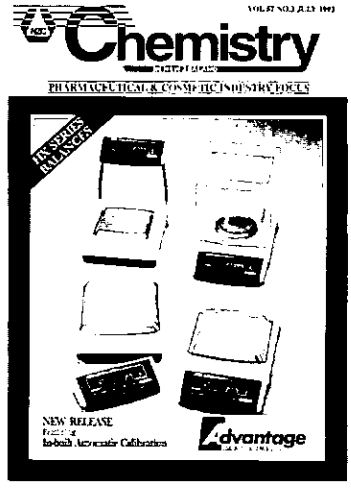
CONTENTS

Chemistry IN NEW ZEALAND

FROM THE EDITORIAL BOARD 1
COVER STORY 2
NZ COMPANY NEWS 2
PEOPLE WATCH 2
NEWS FROM ACROSS THE DITCH 3
THE CHEMISTRY OF PHARMACEUTICAL DEVELOPMENT
by Mark Brimble, Richard Keene & Janet Bridle 4
READER REPLY & PRODUCT INFORMATION REQUEST CARDS 7
ANALYTICAL & SEMI-PREPARATIVE SEPARATION OF ENANTIOMERS USING THE WHELK-O1 CHIRAL STATIONARY PHASE: NAPROXEN & ABSCISIC ACID AS CASE STUDIES
by Christopher Welch 9
ARE YOU COMPLYING WITH OSH REQUIREMENTS? (Part II)
by Douglas Hay 12
THE PHARMACEUTICALS GROUP OF THE INSTITUTE OF ENVIRONMENTAL HEALTH & FORENSIC SCIENCES
by R A Richardson 15
THE TOTAL SYNTHESIS OF NATURAL PRODUCTS: A REVIEW OF THE CHIRON APPROACH
by Christopher Litten 16
DR PEAK'S CHROMATOGRAPHY MADE EASY
"PROBLEMS WITH AIR"
by Roger Whiting 23
RACI 75TH ANNIVERSARY LECTURE: SCIENTISTS AS CITIZENS
by Sir John Cornforth 25
THE INCREASING CHALLENGES TO THE COSMETIC CHEMIST IN THE DEVELOPMENT OF A GLOBAL PRODUCT
by Greg Wanamaker 30
PHARMACEUTICAL PRODUCT FOCUS 31
NEW PRODUCTS & TECHNIQUES 32
NZIC CONFERENCE 41
CONFERENCES & SEMINARS 48
NZIC NEWS 50
NEW LITERATURE & MEDIA 51
BOOK REVIEW 52
ADVERTISERS INDEX 52
SITUATIONS VACANT 29, 52

FRONT COVER



Advantage Data Systems are handling the quality range of A & D scientific and industrial weighing products throughout New Zealand. Precision balances weighing to 0.01mg and offering two years warranty are available from **Advantage Data Systems** network of branches and authorised dealers.

For further information see the **cover story on page 2.**

COVER STORY

NEW DESIGN IN ELECTRONIC BALANCES FROM A & D

Advantage Data Systems has released the new HX Series electronic balance range, featuring A & D's exclusive Quadracorner weighing mechanism, a new advance in balance design that absorbs shocks which could damage most conventional balances. This advanced feature also allows the HX Series to have one of the largest weighing pans available, so that an operator can place a sample anywhere on the pan and obtain quick accurate results.

Intelligent Self Calibration
The HX Series also establishes itself as an industry leader with Intelligent Self Calibration, another A & D technical advance. Built-in intelligent software monitors the daily weighing routine, ambient temperature changes and warm up time - then determines when to automatically calibrate itself for the most accurate weighing using the balance internal motor driven weights.

Calibration can also be carried out at the touch of a button using the automated One Touch Calibration feature, or an operator can calibrate the balance using an external certified weight.

Detachable Remote/Elevated Display and Keyboard Pod
The HX Series comes standard with a detachable keyboard/ display pod which can be positioned alongside the balance, or by opening the integrated arms to make a rear mounted elevated display. This enables an operator to best utilise the balance in both normal weighing and filling applications.

Weighing results are almost instantaneous with the HX Series' new design and electronics. Five levels of filtering cater for almost any weighing environment for improved speed and accuracy. A bright and easy to read capacity indicator assists the operator by clearly showing how much capacity is remaining on the balance.

Comparator Feature
High and Low limits are easily entered by placing known weights on the weighing pan digitally via the optional AD-1652 wireless remote keyboard or computer. Indicator lights come on to show whether the sample is Under, OK, or Over. The comparator can also signal an external device for automated operations.

Communications and Control
Standard on all HX Series models is a bidirectional serial interface for printer or computer communications. Every HX feature can be operated through the RS-232C output for complete and easy computer control and monitoring. Time and date data can also be added to the RS-232C output and the timer can be utilised for interval printing.

Optional Infrared Remote Keyboard
The model AD-1652 infrared keyboard simplifies and expands the balances features - plus allows digital input through a numeric keypad. The AD-1652 allows easy access to the balances many other features, which include counting and percentage weighing as well as the normal weighing mode.

Four Capacities Available
The HX Series are available in four capacities, ranging from 101 to 6100g and with a resolution to 0;1mg; suitable for most laboratory requirements.
Contact: Advantage Data Systems Ltd, P.O. Box 68-281, Auckland. Ph. (09) 360 0916 Fax (09) 360 0074.
For further information circle no.20 on the reader reply card.

NZ Company News

More Glue For Mt Maunganui
ICI has announced that it is undertaking a multimillion dollar expansion of its resin adhesives plant in Mt. Maunganui. The expansion is expected to triple the plant's production capacity.

ISO 9002 For National Starch
National Starch & Chemical NZ Ltd recently became the first adhesive company in New Zealand to achieve ISO 9002 accreditation. The company produces products from two manufacturing sites for a number of industries including food manufacturing and processing, cosmetics, dairy products, packaging and brewing.

A & D and Advantage Data Systems Weigh In
Advantage Data Systems has entered into a business relationship with A & D Mercury, Australia's largest manufacturer of industrial weighing equipment and a wholly owned subsidiary of the A & D Company of Japan.

Advantage Data Systems market the A & D range of industrial scales and electronic balances through a national network of dealers. They will now receive additional support on the A & D product range through their relationship with A & D Mercury.

Mr. Tom Armstrong, A & D Mercury's National Marketing Manager, says that the relationship will ensure an even larger stock of A & D products will be available to New Zealand customers along with enhanced technical and sales support.

The two companies are committed to supplying New Zealand industry with internationally recognised precision weighing equipment and also providing superior after sales service.

Please contact Mr. David Middleton of **Advantage Data Systems** on (09) 360 0916 for more information on A & D products.

People Watch

Jim Turnbull has joined Labsupply Pierce (NZ) Ltd as Marketing Manager. Jim was formerly with Life Technologies Ltd where he held a number of senior marketing and managerial positions with responsibilities for New Zealand, Australia and beyond.

Phillipa Muir has joined Labsupply Pierce (NZ) Ltd in a customer services role for the Wellington office. Phillipa was formerly with Watson Victor and prior to that with Salmond Smith Biolab.

Dr. Peter Robinson, formerly at the Chemistry Department, Waikato Polytechnic, has now joined R.J. Hill Laboratories Ltd as Environmental Section Leader. R.J. Hill Laboratories have recently installed a GC-MS System equipped with a Purge and Trap unit and is now able to offer organic testing to EPA protocols. Peter will continue to be involved with the NZIC Chromatography Group and with the chromatography courses at the Waikato Polytechnic.

Michael O'Donnell has joined Watson Victor Ltd in Wellington as Promotions Officer. Michael is a recent graduate in marketing and management from Queensland University of Technology.

News From Across the Ditch

RACI Appoints Executive Officer

The RACI Council has appointed Dr Susan Cumming to the position of Executive Officer. Dr Cumming commenced work in June after the retirement of Dr Fred Bryant as Executive Secretary. Dr Cumming was educated in New Zealand and was the first woman to graduate (in 1970) with a PhD for research in nuclear magnetic resonance spectroscopy from the University of Otago.

A Letter From Monash University

Chemists in Australian universities are pondering the effects of two national surveys which could affect their working lives. The first is a national report on higher education, with its suggestions of a research elite, and the second is a study of the future of chemistry as a discipline in Australia.

The seven universities which claim to do most of the research in the higher education sector have laid claim to a greater share of government funding than now comes their way in competitive schemes and infrastructure payments. Although the group has not officially adopted a name for itself, it has quickly become known as the 'big seven' although self-appointed spokespersons in Australia's 31 other universities have coined other names.

Prior to 1987, Australia had a two-tier system with about 15 universities and roughly four times that number of institutes of technology and colleges of advanced education, many of which started life as teacher colleges. Only the universities received research infrastructure funding as part of their block grants, but researchers in all institutions were able to apply for competitive research grants.

A few of the institutions in the lower division were striving to become universities, but no formal mechanism existed for this metamorphosis until government initiative set off a round of amalgamations and redesignations. Now there are 38 universities in a 'unified national system' of higher education. Nobody would suggest they are all equal, and in fact five of them collect more than half of the competitive research grants, and adding two more institutions brings the take to 66.5% for the 'big seven'. The system as a whole has seen fairly uniform 64% growth in enrolments during the 1982-92 decade, but growth in graduate schools has been uneven, with the 'big seven' enrolling 80% of the country's postgraduate students.

Research grants in Australia seldom include overheads, but the government has recognised the cost of doing research by creaming money off the top of all university budgets and redistributing it in the form of infrastructure payments. While these payments are mainly determined by grant income, some infrastructure funds are used to help upgrade the former college sector, with the result that the 'big seven' get only 61% of the infrastructure money. This hurts in all sorts of places, but the loudest claims seem to be those that university libraries are falling further and further behind international standards. This is especially marked in science and extra especially in chemistry, where journal costs reach their apogee.

Who are these seven sisters crying out for better finery? The big and the old, of course, with two exceptions which are young but already among the largest institutions in the country. In order of age, Sydney (founded 1850), Melbourne (1853), Adelaide (1876), Queensland (1911), Western Australia (1913), New South Wales (1858, after previous existence as a technical institution), and Monash University (1960).

The debate so far has concentrated on why, or whether, the 'big seven' should be favoured and little attention has been given to just how this could be achieved. Nobody is yet suggesting that researchers outside the group would be debarred from holding major grants, or that PhD enrolments should be restricted to the 'big seven'. Both concepts have been raised as straw men for the opponents to tilt at, but an increase in infrastructure repayments is a more likely way to enhance research concentration and thus better use of scarce resources.

In Britain I understand that the distinction is made on a department basis rather than for a university as a whole. Departments are ranked on a scale of 1 to 5 by a process which is still contentious but now operating in its fifth year. Whether funds supplied by the UK government to their universities on this basis actually find their way to the highly-ranked departments is something I do not know. Australian universities are not bound to distribute infrastructure funds proportionally to their departments, although some bias in this direction is expected by their government paymasters. At Monash we devote 15% to the library, to be spent after consultation with user groups, and the rest is divided up, at least in the Faculty of Science, on the basis of an index derived from grants and publications.

Choosing the right indicators is tricky. The 'big seven' claim legitimacy on the basis of their grant income, but some observers have pointed out that the possession of a large medical school with its associated research is really the determining factor. Others have pointed out that grant dollars divided by total staff would be way of correcting for size effects and if this were done a new elite would be identified including some of the smaller universities. Still others, fearful of the introduction of an index based on 'best' publications or total publications, draw attention to the virtues of a publications-per-staff-member figure which would also see some of the 'big seven' sliding down the list.

It's all good fun, provided your research programme or even your job does not depend on it, and I should be interested to know how this business is handled in New Zealand. In my next letter I will tell you about the national survey of chemistry departments, conducted by the Royal Australian Chemical Institute on behalf of the government.

Best wishes from across the Tasman.

Ian D. Rae
Dean: Faculty of Science
Monash University
Melbourne
Australia

MEDAL FOR WOMAN SCIENTIST

Mrs Margaret Bradshaw, a geologist who has worked for the New Zealand Antarctic Programme for 17 years, has been awarded the Polar Medal. She is the first New Zealand woman to win the medal and only the second woman recipient. The award recognises outstanding contributions by Commonwealth citizens to the exploration and knowledge of the polar regions.

THE CHEMISTRY OF PHARMACEUTICAL DEVELOPMENT

Mark T. Brimble[1], Richard D. Keene[2] and Janet H. Bridle.
Glaxo New Zealand Limited, Private Bag 11018, Palmerston North

[1] Mark Brimble is now Analytical Chemist at WaterCare Services, Mangere, Auckland.
[2] Richard D. Keene is now Production Manager at the Nufarm Ltd facility in Otahuhu, Auckland.

The main roles of the Product Development Department at Glaxo New Zealand Limited are to develop medicinal formulations and technologies and to transfer these to production. Some examples of our activities will be described focussing on the contribution that chemistry plays in development process.

Glaxo is New Zealand's foremost secondary manufacturer of pharmaceuticals with a 18% share of the New Zealand market. A new plant was built in Palmerston North in 1984 and until recently was the newest in Australasia. Product is produced for New Zealand, Australia and the Pacific Islands. Glaxo New Zealand is part of the world-wide Glaxo Group which, headquartered in the United Kingdom, is one of the most successful pharmaceutical companies on the world scene today. Glaxo has its origins in New Zealand and its roots can be traced back to 1856 to Joseph Nathan who was a successful NZ trader. The remains of one of the earliest Glaxo factories can be found in Bunnythorpe just on the outskirts of Palmerston North.

The Product Development Department at Glaxo New Zealand is not involved in researching of new compounds - that sort of work is mainly carried out by Glaxo UK and Glaxo USA. The New Zealand team is small and interdisciplinary consisting of 15 people including chemistry, pharmaceutical and technology graduates.

A project is initiated when a viable product is identified. There may be a formulation available in the form of an in-licensed dossier where the information can be purchased from overseas or it may be developed from scratch in a local formulation. The next step is to develop a process to make the product in the pilot plant while analytical test methods are developed alongside.

Once a product is made supporting data is collated for submission to the Health Department. A stability trial on the product may have to be initiated to prove the shelf-life of the product and in the case of a locally formulated product a bioequivalence trial would need to be conducted to prove the clinical effectiveness of the product. In case of an in-licensed dossier the data to prove clinical effectiveness of the product will have been part of the purchase. As soon as final approval is received from the Health Department the product is launched onto the market.

Returning now to the main theme of the article, what part does chemistry play in the development process? Chemists are required to develop analytical tests for ingredients and finished

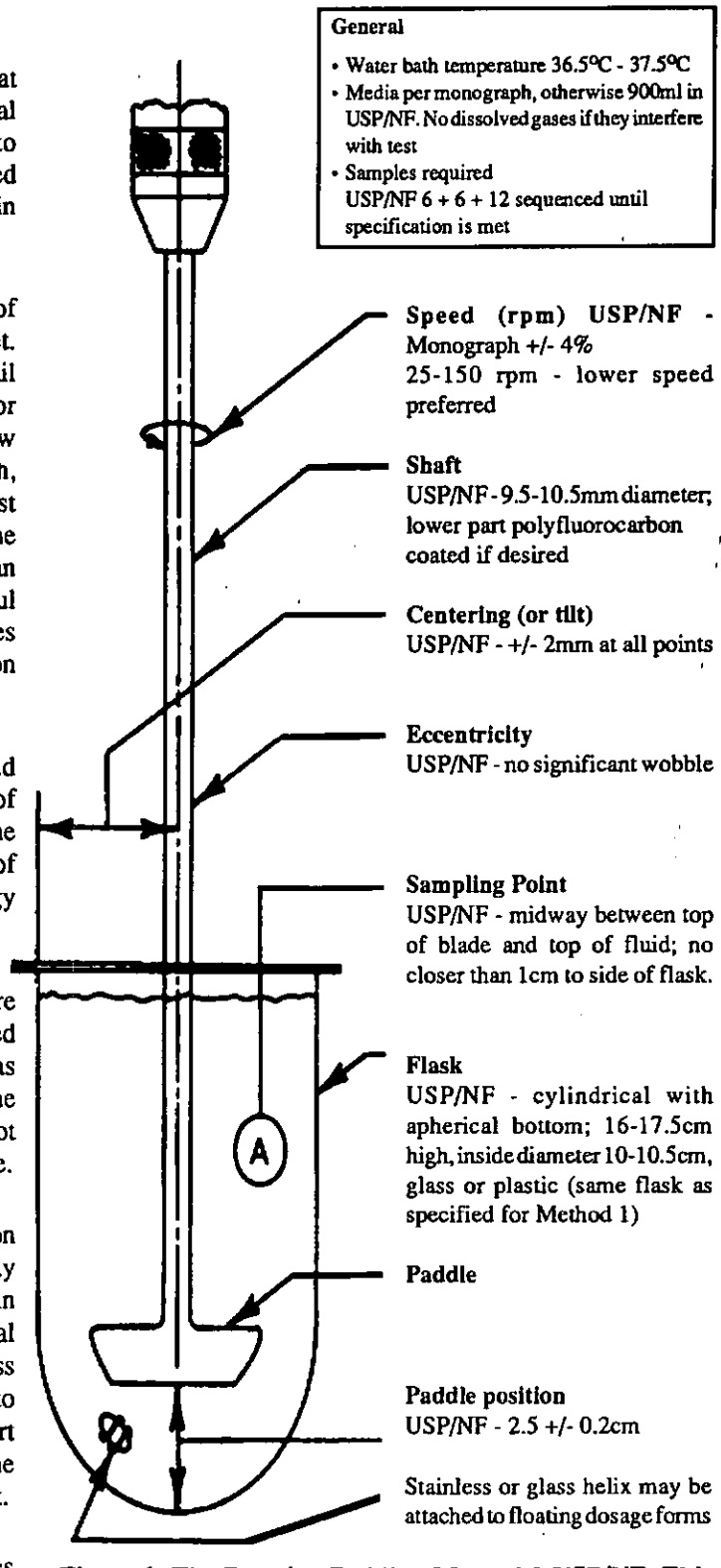


Figure 1 The Rotating Paddle - Method 2 USP/NF. This method is official for USP/NF and is likely to be accepted in the European Pharmacopeia. It is not official for BP.

product. The two areas that require the most attention are:

(i) dissolution of tablet products.

(ii) assay of content that is stability indicating - i.e., it will measure separately the compound in question as well as any degradation products or impurities.

Dissolution[4] is an *in-vitro* test whereby the rate a drug is released from a formulation in an appropriate medium is measured. This is measured by UV absorbance either directly of the solution or more specifically after HPLC. The test apparatus is shown in Figure 1. The tablets are placed in a vessel which is either stirred with a paddle or constrained in a basket. The test is important during:

1. Optimisation of pharmaceutical formulation.

2. A QC control when the active is sparingly soluble in gastric or intestinal juices.

3. A QC control when the tablet has been designed to release over a long period of time e.g., several hours in a controlled release formulation.

One example of optimisation of a formula using dissolution test results is shown below in Figures 2 through 5.

The dissolution rate profile of the tablet formulation in Figure 2, before optimisation had the following undesirable features: the release of the drug is delayed for 30-60 minutes and there is a lot of variation. The formulation was a sugar-coated tablet where the tablet core is coated with several layers of shellac to stop dissolution of the core during subsequent coating with aqueous sugars solutions. These same shellac coats delay the release of the drug in the dissolution test. Figure 3 shows that the uncoated cores release the drug rapidly and that after two coats of shellac the release of the drug is inhibited. We tried to improve the variability of release of the tablets by applying more shellac coats but using a more dilute solution. The resulting tablet dissolution profiles shown in Figures 4 and 5 show that the dissolution is now faster and more uniform as we desired.

[4] *"Handbook of dissolution testing". W.A. Hanson, 1982, Pharmaceutical Technology Publications, Oregon.*

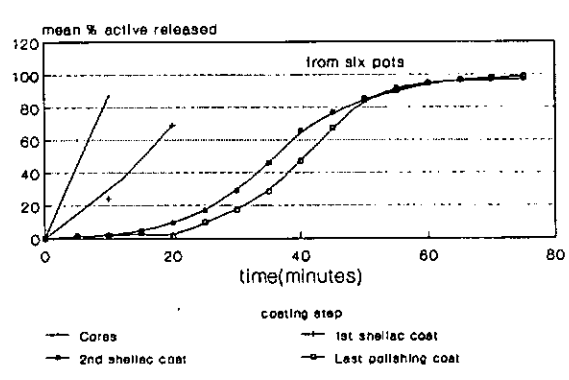


Figure 2

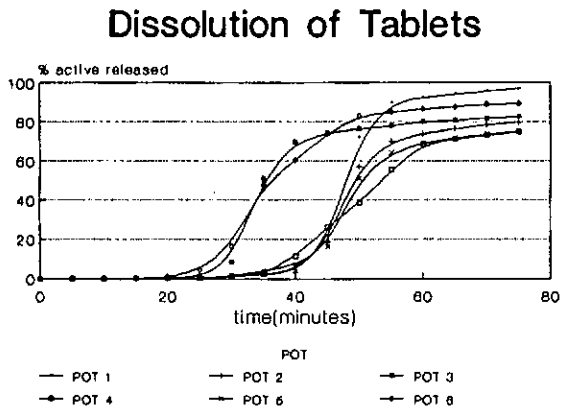


Figure 3

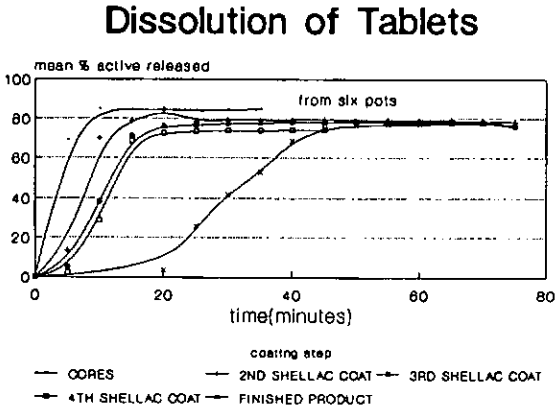


Figure 4

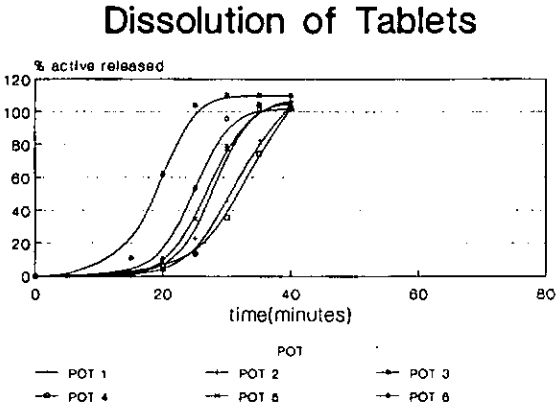


Figure 5

The second area where a chemistry based input is required is in determination of a shelf-life for a new product by measuring the amount of active and impurities with time. An analytical method is designed for this purpose which will resolve all known impurities and degradation productions. We generally use HPLC to separate our active from any degradation products and then a UV detector to quantitate the amounts. The following experiments are generally completed to validate the stability indicating method:

Test	Work to be Performed	Acceptable range/ results
Specificity	(a) Impurities (b) Degradation products (c) Excipient interference	Impurities and degradation products separated from main peak(s) and from each other. Excipients are either not seen or can be eliminated from the chromatogram.
Linearity (assay)	10, 50, 80, 100 and 150% theory should be analysed.	Response is linear (r>0.99) and passes through the origin.
Linearity (related substances)	0.01, 0.05, 0.1, 0.25, 0.5, 0.75 and 1% theory should be analysed.	Response is linear (r>0.99) and passes through the origin.
Limit of detection and quantification (LOD/LOQ)	Use related substances linearity samples.	
Precision (n = no. of samples)	(a) System precision (n = 5) (b) Repeatability (n = 6) (c) Reproducibility	(a) RSD = 1.5% (b) RSD = 1.5% (c) Combined standard(n = 6) deviation (CSD) = 2%
Accuracy from mixture of	Recovery of drug 100% +/- 2.0% excipients plus drug.	Mean recovery = RSD = 2.0%
Stability in analytical solution	Analysis of samples and standard prepared and analysed on day 1 and re-run against fresh standards on e.g., day 2.	Assay results should not differ by by more than 2% Related substances should not have significantly increased over the period.
Essential similarity	Analyse raw materials and/or formulations against competitor formulations.	Related substances test should not be significantly different from competitors.
Ruggedness/ robustness testing.	Transfer to QC analysts.	Not specific - dependent upon test.

In addition to this a system suitability test needs to be designed that can evaluate the suitability and effectiveness of the analytical system prior to analysing the sample. Reliable chromatographic performance, for example, may require specifications for resolution, column efficiency, peak tailing or precision of replicates.

To accomplish all of the above the analyst must perform their method development in a logical, ordered manner. The analyst can derive pleasure from a successfully designed stability-indicating method which can be used routinely without problems by other analysts.

READER REPLY

PRODUCT INFORMATION REQUEST CARDS

Dear Recipient,

These postage paid cards are provided so that you can request further information on the products and services listed in this publication. Please answer all questions on the cards. Alternatively you may wish to contact the supplier(s) directly. Please tell your supplier you saw their product in CHEMISTRY IN NEW ZEALAND.

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CHEM NZ JULY 1993

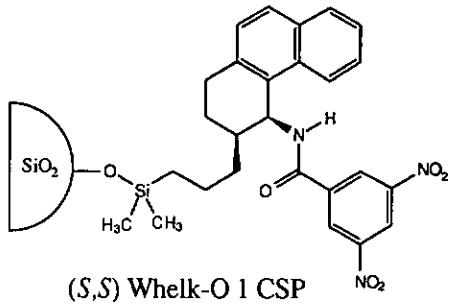
Analytical and Semi-Preparative Separation of Enantiomers Using the Whelk-O 1 Chiral Stationary Phase: Naproxen and Abscisic Acid as Case Studies

Christopher J. Welch, Regis Chemical Company
Morton Grove, IL 60053,USA

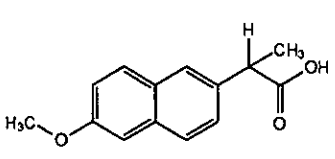
Introduction

The liquid chromatographic separation of enantiomers using chiral stationary phases (CSPs) has become essential to many areas of modern research. This method provides a simple and reliable analytical tool for the rapid and accurate determination of enantiomeric purity, and is routinely used to monitor the production of enantioenriched compounds, especially pharmaceuticals.[1] In addition, the technique is widely used for the study of the enantioselective uptake, pharmacokinetics, and metabolism of chiral drugs.[2]

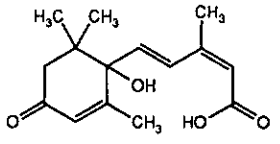
In addition to its widespread utility as an analytical tool, chromatographic enantioseparation provides a very useful and convenient method for the preparative separation of enantiomers.[3] Even using a conventional analytical HPLC column (4.6mm id x 25cm length) small samples (e.g. several mg) of a racemate may sometimes be resolved. In this study the separation of the enantiomers of two racemates, naproxen and abscisic acid, was studied using the recently introduced Whelk-O 1 CSP.



(*S*,*S*) Whelk-O 1 CSP



naproxen



abscisic acid (ABA)

Figure 1

Whelk-O 1 CSP

The Whelk-O 1 is the latest in a series of CSPs developed in the laboratories of Professor William H. Pirkle at the University of Illinois.[4,5] This CSP was designed specifically for resolution of the underivatized enantiomers of naproxen, a commercially important non-steroidal anti-inflammatory drug (NSAID). In addition to providing facile resolution for the enantiomers of naproxen and related NSAIDS such as ibuprofen, ketoprofen, fenoprofen, etc., the Whelk-O 1 CSP resolves the enantiomers of many different classes of racemates, and appears to be the most general CSP developed to date in the Pirkle laboratories.

Combined with the other advantages inherent in "Pirkle-type" CSPs (ruggedness, solvent compatibility, high efficiency, availability in both enantiomeric forms, and enhanced preparative capacity) the generality of this CSP will likely make it the column of choice for a number of applications.

Resolution of Naproxen Enantiomers

Naproxen is the only member of the so called "profen" family of NSAIDs which is sold in enantiomerically pure form, the *(S)* enantiomer possessing the desired therapeutic activity. A number of methods have been developed for the chromatographic separation of naproxen enantiomers.[6] However, many of these methods require derivatisation, while others, particularly those employing protein-derived CSPs, are essentially useless for preparative separations. The semi-preparative resolution of naproxen enantiomers using an analytical (4.6mm id x 25cm length)*(S,S)* Whelk-O 1 column is shown in Figure 1. The baseline resolution of a single injection of more than 12mg of racemate using an analytical column emphasises the superior preparative capacity of this CSP.

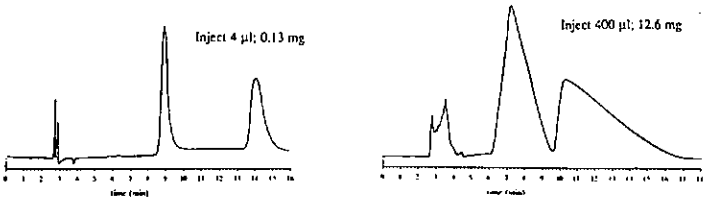


Figure 2: Separation of Naproxen Enantiomers. Conditions: column = *(S,S)* Whelk-O 1 (4.6mm id x 25cm length); mobile phase = 80/20/0.5 hexane/ethanol/ acetic acid; flow rate = 1.00 ml/min; detection = UV 300nm; sample = 31.5mg/ml solution of racemic naproxen in ethanol.

Resolution of Abscisic Acid Enantiomers

Abscisic acid (ABA) is a widely studied plant hormone which exists in nature as the *(S)* enantiomers.[7] The difficulty of obtaining pure *(S)* ABA is reflected in the high price of this material, whereas the synthetically produced racemate is considerably less expensive, and is often used in phytochemical research. Nevertheless, the differential biological activity of the two enantiomers is well established, and a number of techniques have been devised for the resolution of ABA enantiomers.[8] We recently reported a rapid and convenient method for separation of the enantiomers of ABA and several related compounds using the Whelk-O 1 CSP.[8] In addition to providing useful analytical separations, the superior capacity of this CSP permits greater than a thousandfold increase in the amount of ABA which can be resolved in a single injection when compared with previously reported chromatographic methods (Figure 3).

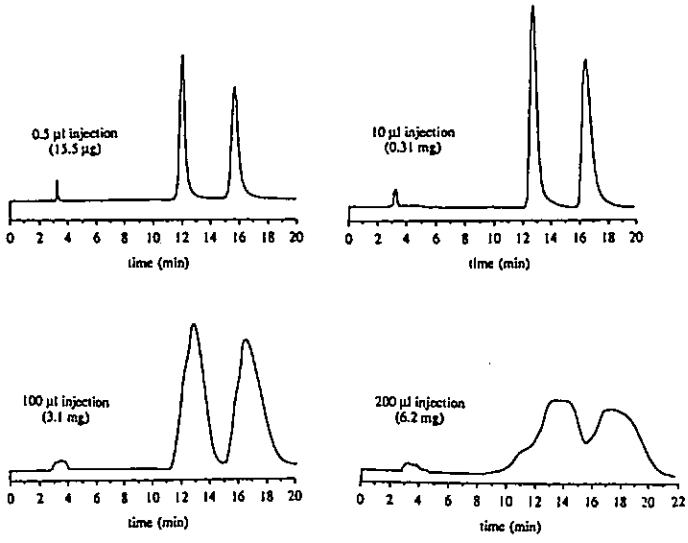


Figure 3: Separation of Abscisic Acid Enantiomers. Conditions: column = *(S,S)* Whelk-O 1 (4.6mm id x 25cm length); mobile phase = 90/10/0.5 hexane/2-propanol/ acetic acid; flow rate = 1.00ml/min; detection = UV 300nm; sample = 31.0mg/ml solution of racemic ABS in 2-propanol.

Summary

These examples are intended to demonstrate that in addition to being useful analytical tools, Pirkle-type CSPs such as the Whelk-O 1 can be used for the small scale purification of enantiomers. The amount of material which can be resolved on a conventional analytical column can be substantial, and sufficient amounts of purified enantiomers for bioactivity or spectroscopic studies can be readily obtained.

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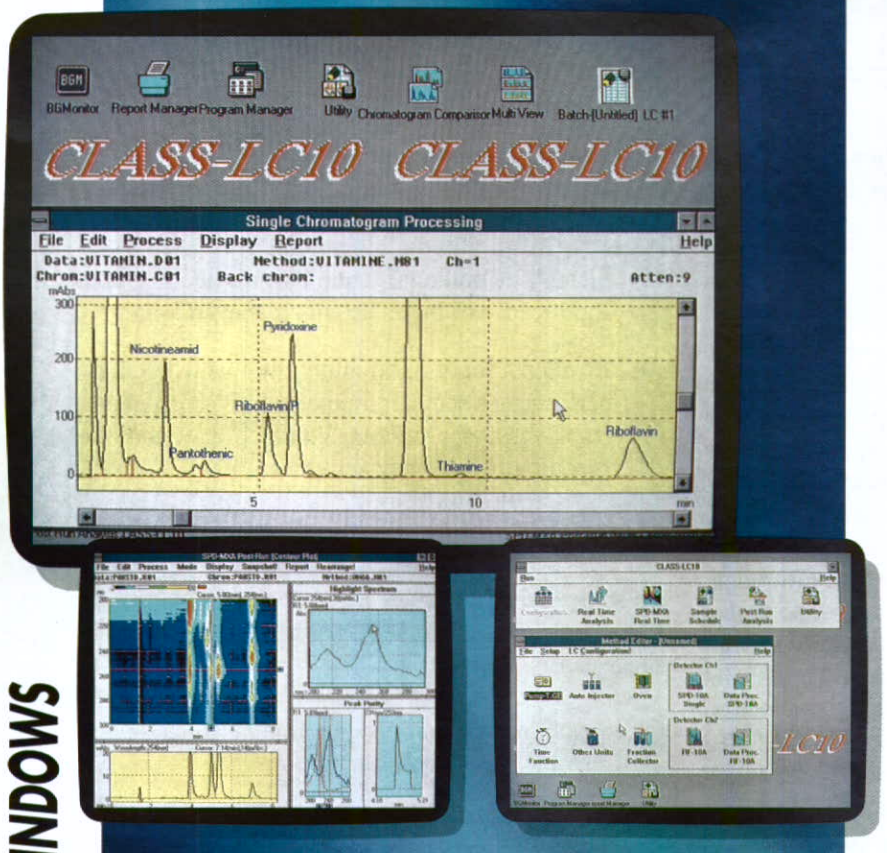

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ARE YOU COMPLYING WITH OSH REQUIREMENTS?

PART II

BY DOUGLAS M HAY, BSc; BE(Chem);
MSc; DIC; MNZIC.

Douglas Hay is a Senior Lecturer in Occupational Safety and Health at Massey University and Principal of UNI-OSH Consultants.

Introduction

In my first article on the Health and Safety in Employment Act (Chemistry in New Zealand Vol 57, No 1, March 1993) I briefly discussed the responsibilities placed on employers and the meanings of key terms in the Act. This paper focuses on how you go about putting in place an effective safety management system for the identification and control of hazards. Accountability for O.S.H. ultimately rests with Board members, however in discharging their duties they (through the C.E.O.) would assign responsibilities throughout the corporate structure. In general the role of the C.E.O. is to ensure (i) that adequate time and financial resources are available so each section head can carry out their OSH duties (ii) that OSH responsibilities are allocated and (iii) that OSH responsibilities are being performed. Section heads must allocate adequate resources (time, financial) to enable OSH functions to be carried out by staff. Supervisors (or equivalent) have the responsibility for implementing Sections 7-10 (Hazard Management), ensuring adequate training (Section 13) and providing relevant information (Section 12) to staff. Responsibility statements need to be written so that all staff understand what is expected of them.

Objectives

Your company will need to prepare a set of objectives to meet the requirements of this Act. Development of these objectives should involve everyone in the company.

These could be:-

(1) Develop a general health and safety policy that will reflect management's positive commitment to health and safety.

(2) Achieve active employee involvement in Safety and Health, including contributions to solutions for improvements.

(3) Develop recording and investigate procedures for occupational accidents and incidents.

(4) Initiate a self-inspection programme for hazard identification, correction and implementation of policy.

(5) Identify training needs in the organisation and ensure that all employers know the hazards and how to deal with them.

(6) Gather material safety data sheets (MSDS) for all products and equipment stored, used and produced by the company and ensure that all staff understand the information contained in them.

(7) Develop an emergency plan.

(8) Identify all potential health hazards and assess the significance of these hazards in the workplace.

(9) Develop a set of basic safety rules which define performance standards expected of management and employees, incorporating common rules and rules specific to higher risk activities.

Sequence of Events

To achieve the objectives listed above a company needs to follow a clearly defined sequence of events. The following is suggested:

(a) A policy statement must be completed as soon as possible.

(b) Define responsibilities at all levels.

(c) Assign responsibilities.

(d) Establish a safety structure within the company.

(e) Provide training on hazard identification and control methods for staff with these responsibilities.

(f) Set guidelines for the safety committee.

(g) Develop relevant documents (contractors questionnaires; accident/incident forms; medical questionnaires etc.)

Getting Started

The OSH section of the Department of Labour is currently giving lectures to companies on the new Act. This service is free and is an excellent way of informing your staff of their requirements under this legislation. Currently the OSH section is developing a number of training manuals covering the more important areas of the Act. The first of these, "How to Identify and Control Hazards" has just been released and Labour Department staff will run this in your company at minimal cost. This is quite a departure from the normal role of the factory inspector which has been enforcement - they are now actively involved in workplace training. There are also a number of consultants specialising in OSH and the Labour Department will provide you with a list.

Assigning Responsibilities

Once your staff have an understanding of the legislation the next thing to do is assign responsibilities and set up a safety system. You will need to write responsibility statements that cover all levels in the company. For new staff members these could be included in their employment contract and for existing staff additional statements would need to be added to their existing contracts.

The safety structure you adopt will depend very much on company size and geographical location of sections. What is important is that information is provided to all levels. The Board will need to know that an effective safety system is in place; managers will need to assess whether hazard identification is being done properly; supervisors need to be trained and informed on how to conduct effective hazard assessments. In addition questionnaires should be developed for contractors so that an assessment on the adequacy of their health and safety systems can be made.

Safety Officer

Whatever structure you adopt you will need to appoint a number of safety officers. These people will be charged with the responsibility of carrying out sections 7-10 of the Act. They will need to be trained and provided with information in the methods of hazard identification and control. The success of your programme will rest with them. In general the company safety committee will be made up of safety officers from the various sections plus possibly one or two specialists (health nurse, consultant etc.) who are there to provide advice. Hazard assessments will be evaluated and collected by this committee who in turn will send copies to managers. Using such a structure, information will be provided to all levels.

Recording and Reporting Accidents

The Act requires the keeping of an accident register in addition to notifying the Department of Labour of accidents and incidents that have, or might have caused "serious harm". Forms have been developed and these can be obtained from your OSH office. Regulations have just been introduced which contain the accident register form.

Section 7(2) also requires that the employer shall take all practicable steps to ensure that the occurrence (accident/ incident) is so investigated as to determine whether it was caused by or arose from a significant hazard.

Conclusion

All Health and Safety legislation is partly **preventative** and partly punitive. The H.S.E. Act is designed to strengthen the **preventative** component by engaging the minds and imaginations of employees at the preventative stage. The Act has well-established, almost ancient, foundation. It may be regarded as an application of the fundamental "duty of care" which every citizen owes to every other citizen. This duty requires every citizen to take all practicable steps to avoid exposing other citizens to hazards which were "reasonably foreseeable". The system you introduce to satisfy the requirements of the Act must be such that if one of your employees suffers "harm" it will be seen to be "in spite of" the fact that you had taken "all practicable steps" to make the "place of work" safe, rather than because you failed to do so.

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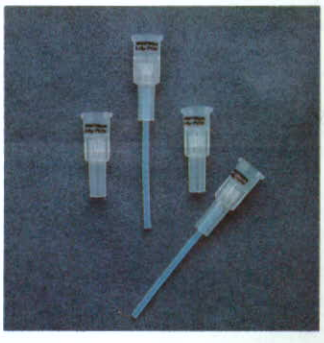

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The 13mm tube tip version is ideal for dispensing samples directly into microvials and other small containers.

THE PHARMACEUTICALS GROUP OF THE INSTITUTE OF ENVIRONMENTAL HEALTH & FORENSIC SCIENCES

By R A Richardson
Group Leader, Pharmaceuticals and Vitamins

The Pharmaceuticals Group of IEHFS (formerly DSIR Chemistry) was formally established in 1970 under the leadership of Dr Michael Kingsford. For eighty years prior to this, pharmaceuticals products had been assessed but in a less formal way.

In 1970 the Drugs Assessment Advisory Committee was set up with Dr Kingsford as an inaugural member. He continued in that role until his untimely death in 1983. Since then a member of the Pharmaceuticals Group has continued to work on the Committee (now the Medicines Assessment Advisory Committee) in the assessment of new medicine applications in the pharmaceutical development and quality control areas (including bioequivalence). This medicine application assessment role has been extended to include generic medicines and some changed medicine applications.

A joint approach is now taken with IEHFS and Department of Health scientists; the Institute evaluator participates in the Departmental evaluation meeting before final acceptance of the application to market is given. Another member of the Group is also a member of the MAAC Generic Subcommittee which performs an audit function of randomly selected applications before the products are finally accepted. This subcommittee is also responsible for development of guidelines for generic medicines and has been involved in the generic substitutions review which has taken place over the last two years.

The primary laboratory function of the Pharmaceuticals Group has been to assess the quality of medicines available on the New Zealand market. This work has been carried out for the Department of Health, generally in the form of surveys defined by a class of pharmaceutical or active ingredient. These surveys are full assessments of the pharmaceutical quality of products, evaluating their chemical and physical properties for compliance with pharmacopoeial or company specifications. The current survey has been carried out on products which were assessed as part of the generic substitution review and were carried out parallel with the paper audit. Since the inception of the medicines testing programme the quality of medicines on the market has improved markedly. It is now very much the exception to find major problems with pharmaceutical products. This medicines testing programme has been extended over the last few years to include medical devices and related products. For example, blood glucose meters were examined in a collaborative approach with Wellington Hospital and a significant part of our continuing work has been put into assessment of condoms. The laboratory is now one of the three approved laboratories in Australasia capable of testing to the British Standard currently used in New Zealand, or the ISO Standard used in Australia. Again, since testing began in 1986, significant improvement has been observed in the quality of the products available in New Zealand.

Other work carried out for the Department of Health includes testing of complaint samples where product failure has been suggested as cause for therapeutic failure, it is contaminated, incorrectly labelled or other aspects of poor quality are suspected.

Although the Group carried out a significant amount of work for the Department of Health, it is part of an independent Institute and does carry out a variety of work for other clients including the Consumers' Institute, pharmaceutical companies and veterinary consultants. Such work has been done in the development of new products, evaluation of products and to provide evidence of products' quality where an independent assessment is required. Such work is often possible because of the wide range of instrumentation and facilities available in the Institute and in the rest of the original DSIR Chemistry, now part of the Industrial Research Institute but still housed on the same site.

The pharmaceutical laboratory is registered with TELARC to assess pharmaceutical and related products and rigorous analytical standards are maintained. TELARC registration has also been obtained for instrumental techniques: HPLC, GC, TLC, Mass Spectrometry, Spectrophotometry, Dissolution, Disintegration, Potentiometric Titration and Karl Fischer water titration. In addition, development work is being carried out on recently purchased Capillary Electrophoresis equipment in anticipation of the requirements of this technique for future products, particularly as pure drug enantiomers are being more commonly developed as new medicines.

The Group has recently extended its areas of work to include the performing of the analytical part of bioequivalence studies in accordance with the New Zealand guidelines. This work is now being done by the Toxicology Group of the Institute which is more accustomed to handling biological materials.

Overall, a wide variety of work is undertaken by the Pharmaceuticals Group. There are many products and projects which provide continuing challenges.

"THE TOTAL SYNTHESIS OF NATURAL PRODUCTS: A REVIEW OF THE CHIRON APPROACH"

By J. Christopher Litten, Department of Chemistry, University of Auckland.

Introduction

The total synthesis of natural products has always been of interest to the organic chemist.

Once the total structure has been elucidated, often in itself a daunting task, a synthetic strategy must be established. In 1969 E.J. Corey formally set down a methodology entitled: "General Methods for the Construction of Complex Molecules". Corey's methodology, which is known as the **Synthon** Retrosynthetic Analysis, is based on the process of breaking down the synthetic target into smaller, readily available starting materials. This is achieved by bond disconnections and functional group interconversions. He termed a Disconnection as the reverse of a synthetic step or synthetic reaction. A functional group interconversion is the action of converting one functionality into another by substitution, elimination, oxidation or reduction.

The synthon is an idealised fragment, usually a carbanion or carbocation which is produced by a logical disconnection during a retrosynthetic analysis. However, Corey's approach doesn't necessarily take into account stereochemical features of the molecule. More recent methodologies for asymmetric synthesis address this aspect to some degree. In spite of these developments, the introduction of functional groups at predetermined sites with stereochemical and regio control remains a crucial problem in the synthesis of natural products.

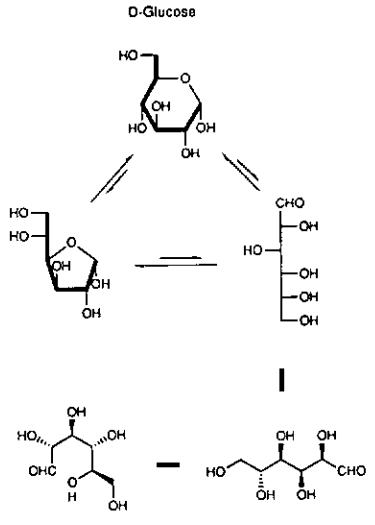
The planning and execution of a synthetic scheme in which optically active starting materials and chiral intermediates are utilised, is an important method for the production of optically pure compounds. Carbohydrates provide a relatively cheap and replenishable source of chiral carbon containing compounds that are available in a variety of ring sizes and chain lengths. On a per-carbon basis, carbohydrates are unequalled in chirality and functionality. In this context, they are ideally suited for chemical manipulations.

A synthetic strategy has been devised to utilise the stereochemical information provided by carbohydrates and other naturally occurring chiral "Natural Products". This methodology has been coined "The Chiron Approach" by Professor Stephen Hanessian of the University of Montreal. The Chiron Approach was extensively reviewed by Professor Hanessian (see further reading), this book is the major source for this review.

The Chiron Approach

A **Chiron** is an enantiomerically pure synthon. Chirons are retrosynthetically generated by minimum perturbation of existing chiral centres in the Target Molecule. This is in contrast to the Synthon approach, which does not take chirality into account. **A Chiral Template** is the term used to describe the optically pure starting material on which the chiron is based. A Chiron must contain the **highest** level of functionalisation and stereochemical overlap with the target, while still maintaining the basic stereochemical information of the starting material.

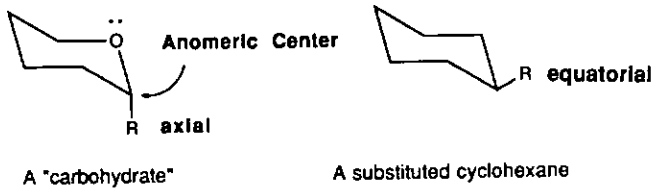
There are many possible chiral starting materials such as: amino acids, hydroxy acids, terpenes and carbohydrates. Carbohydrates are the most versatile, readily available starting materials and hence are the topic of this review. The carbon framework of a carbohydrate is ideal for use as a chiral backbone. A combination of acyclic and cyclic forms (see Scheme I) makes carbohydrates an ideal chiral starting material. The asymmetric centres of a hexose (1-5, or 6 including the anomeric centre) can all be utilised in the Chiron Approach. Carbohydrates also have a variety of sequential functionality: alpha-hydroxy aldehyde, alpha-amino aldehyde, polyol and amino alcohol all of which increase the stereochemical information available to the synthetic chemist. Each of the interconverting forms, shown in Scheme I, can be trapped as the desired species in highly crystalline form.



Scheme I

The Anomeric Carbon and the Anomeric Effect

The lone pair of electrons on the ring oxygen, causes a substituent on the anomeric carbon to adopt the axial position (Scheme II). This position allows for the substituent to be as far removed from the lone pair of electrons as possible. This is termed the Anomeric Effect. In the case of cyclohexane, no lone pair of electrons are present. This means that the more stable equatorial orientation is preferred.



Scheme II

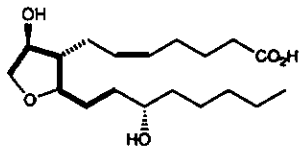
Synthon Retrosynthetic Analysis

In a similar manner to Corey's Synthon Retrosynthetic Analysis, the Chiron Approach can be broken down into six basic steps.

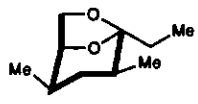
These steps are:

1) Locating the elements of "symmetry"
2) Observation of chirality
3) Observation of functionality
4) Decoding the above information
5) Transposing this information onto the carbon framework of suitable synthetic precursors - the **CHIRON**
6) Obtain the chiral starting material - the **CHIRAL TEMPLATE** - from information obtained from the chiron.

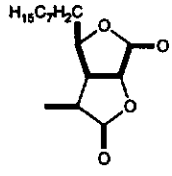
Some examples of Natural Products which have been synthesised by the Chiron Approach are given in Scheme III. The carbohydrate portion is outlined in bold.



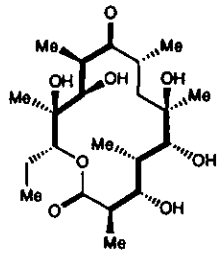
11-Oxaprostaglandin $F_2\beta$



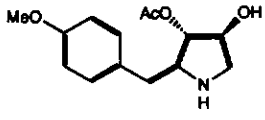
Multistriatin



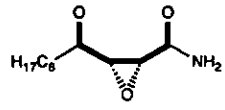
Avenanciolide



Erythronolide A



Anisomycin



Tetrahydroceruleni

Scheme III

Simple Guidelines to Establish a Carbohydrate in a Given Target Molecule.

For a target molecule with tetrahydrofuran, tetrahydropyran or lactone units the 'chiron' and the carbohydrate template is usually easily observed.

The more difficult examples are those with cyclic or acyclic units which are vastly divergent from the obvious carbohydrate-type symmetry. Often the connection between the target molecule and the carbohydrate may seem remote, until certain parameters are considered:

Parameter 1: - Topology

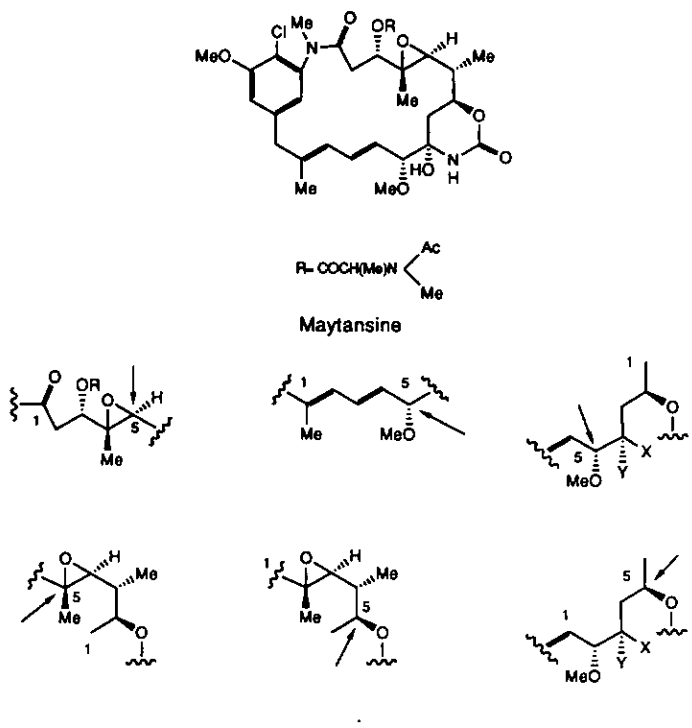
In looking for a carbohydrate unit in a target molecule, we are accustomed to visualising the carbohydrate molecule in terms of a 5 or 6 membered cyclic or acyclic molecule, with what is termed as the natural substitution pattern of hydroxyl groups. This narrow view has often eliminated carbohydrates as a possible starting material. The carbohydrate framework is ideally suited for use as a flexible carbon framework for many carbon-carbon and other bond forming reactions. This allows the carbon skeleton to be used as a template, and made to adopt the topology and "shape" of many synthetic targets.

Parameter 2: - Bond Disconnections - *Strategic Bonds*

The key to retrosynthetic reasoning, is the process of forming a larger component of the target molecule from the smaller chiral template. The process must be a practical and feasible one, which relies on known chemical manipulations. The method of disconnecting the target molecule into smaller, more practical units is the choice of the synthetic chemist and there are no steadfast rules. A guide-line which may make this task simpler is described as the "rule-of-five".

The "rule-of-five"

The most usual 'chiron' is derived from cyclic derivatives. Therefore there is a definite relationship between a heteroatom substituent, especially the ring oxygen atom and the anomeric carbon (the aldehyde or ketone in the acyclic derivative). This allows for a possible functional overlap with part of the carbon framework of the target molecule and a suitable carbohydrate. Any substituents not in the carbohydrate can be introduced by the manipulation of hydroxyl groups (described below). Using Maytansine (Scheme IV) as an example it is possible to generate six carbon segments. Each segment has a formal C5 sugar centre bearing an oxygen, with a predetermined chirality and a potential sp^2 carbon on the anomeric centre five atoms away (labelled 1 in the fragments below the Maytansine molecule). These observations suggest a possible hexose precursor. In the case where the target molecule has no heteroatoms, a carbohydrate may still be used with extensive deoxygenation. In such a case another type of chiral template may well be feasible (a terpene, for example).



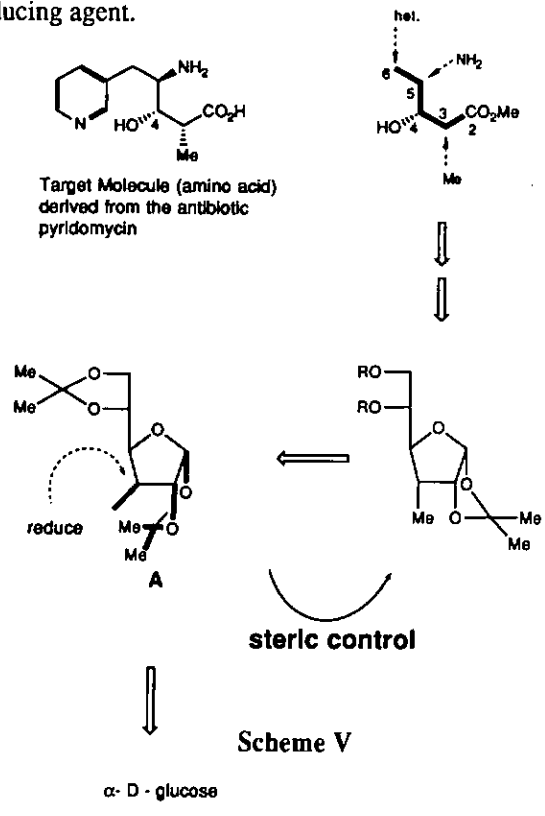
Scheme IV

The Manipulation of Hydroxyl Groups

Functionalisation and the control of stereochemistry of the substituents by the manipulation of hydroxyl groups is also an important tool in the Chiron chemist's arsenal. There are five major methods to manipulate existing hydroxyl groups in order to give either a different isomeric centre or a different functionality.

i) Steric control

The use of steric control requires that some part of the chiral template will cause a preferential attack (for example) at the reactive centre. In this case (Scheme V) the desired alpha-orientation can be achieved by the preferential hydrogenation of the exocyclic methylene in the intermediate compound **A**. The acetal (in bold) causes steric hindrance on any incoming reducing agent.

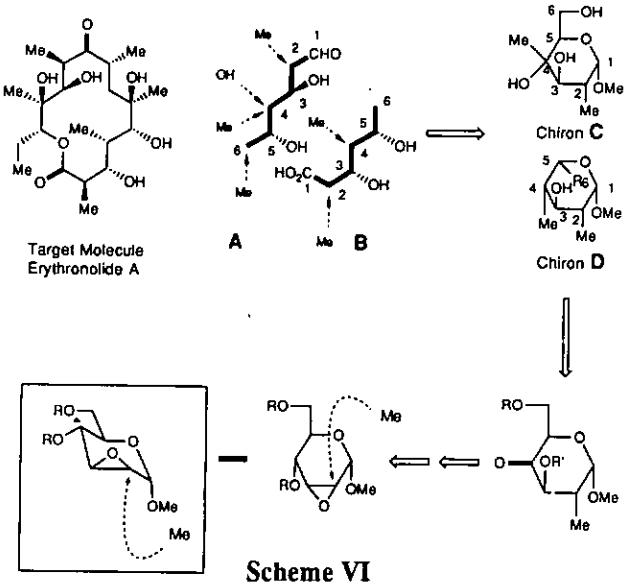


Scheme V

ii) Steric control - *conformational bias and anomeric stereoselection*

This type of steric control warrants its own subsection, since the anomeric effect is predominant in carbohydrate chemistry.

The synthesis of the antibiotic Erythronolide A provides a good example. Two disconnections of Erythronolide A afford the acyclic segments labelled **A** and **B**, (Scheme VI). These two acyclic segments translate into two cyclic hexose chirons, **C** and **D**.



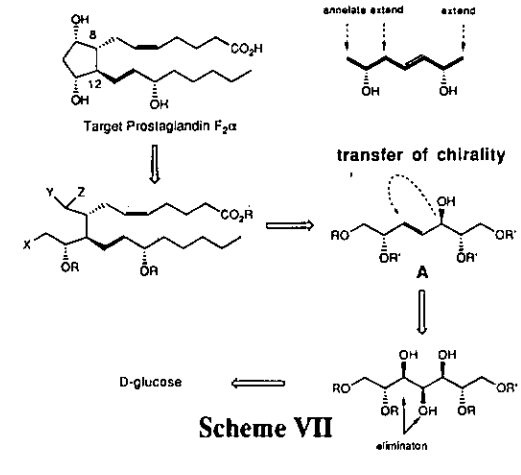
Scheme VI

In this case, the introduction of each substituent is stereocontrolled by the conformational bias caused by the anomeric effect in the carbohydrate used as the chiral template. In Scheme VI, an example of methylation is outlined. The hexose carbohydrate, in the box, has the epoxide ring opened. The rupture of the epoxide ring and the subsequent stereochemistry is a direct consequence of the anomeric effect. The anomeric effect is the basis for the methylation, inversion, oxidation and reduction steps in the formation of Erythronolide A via the Chiron Approach.

Ultimately the two chirons will be converted into the acyclic equivalents, chain extended and linked to provide the carbon skeleton of the target molecule - Erythronolide A.

iii) Transfer of chirality

A unique strategy based on utilisation of the existing stereochemistry has been developed. The existing chirality in a cyclic or acyclic structure is used to create another chiral centre, usually in the beta position, via a Claisen or similar rearrangement.



Scheme VII

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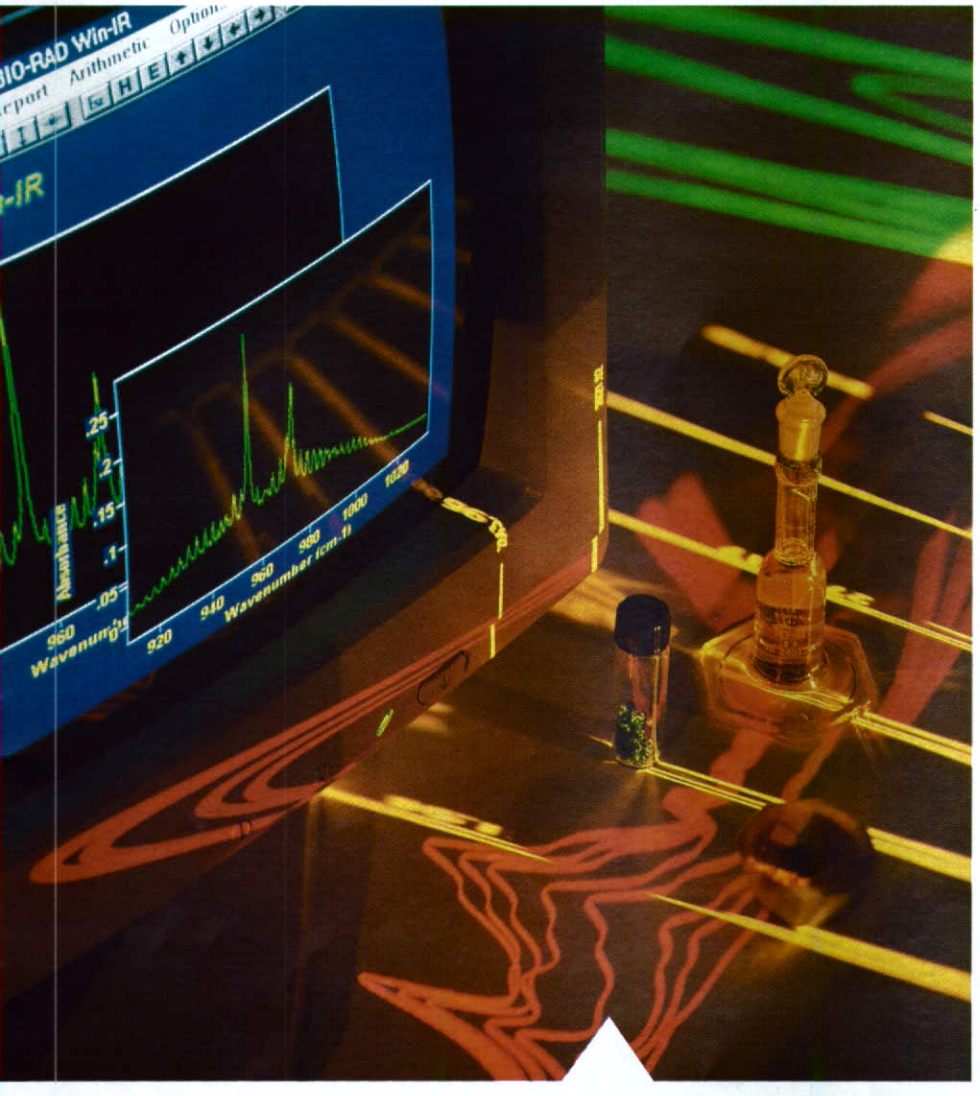

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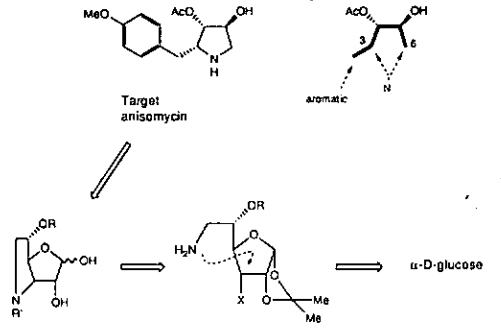
In this case (Scheme VII), the beta-hydroxyl group in compound **A** is used as the anchor point for the stereospecific Claisen rearrangement to form the new C8-C12 bond in the product. This introduces the required stereochemistry at the beta position (C12 in the product).

iv) The "scaffold process"

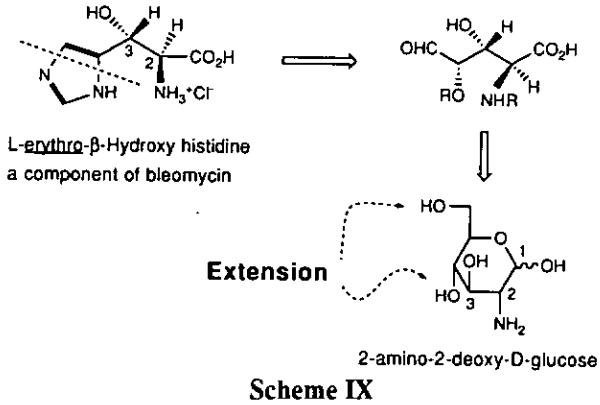
The so-called "scaffold process" is based on the construction of a segment of the target "around" or "on top" of a rigid entity of a ring. Then once the desired level of functionality and chirality is reached, the original carbohydrate portion of the molecule is unfolded to reveal the target or a part of it. Scheme VIII shows a pyrrolidine ring that is formed to introduce the nitrogen entity. When the ring containing the oxygen is opened, the correct stereochemistry is revealed.



Scheme VIII

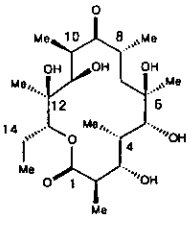
v) Extended and fused structures

A segment of the carbohydrate portion can be utilised to construct a major part of the target molecule. The imidazole ring of the L-erythro-B-Hydroxy histidine has been "extended" from two carbon atoms of the carbohydrate 2-amino-2-deoxy-D-glucose (Scheme IX). The remaining appendage comprising C1-C3 of the original amino sugar is present with its intact functional groups and stereochemistry. Many other heterocycles can be built from segments of carbohydrate in a similar manner.



Scheme IX

Total Synthesis of *Erythronolide A* via the Chiron Approach



Erythronolide A

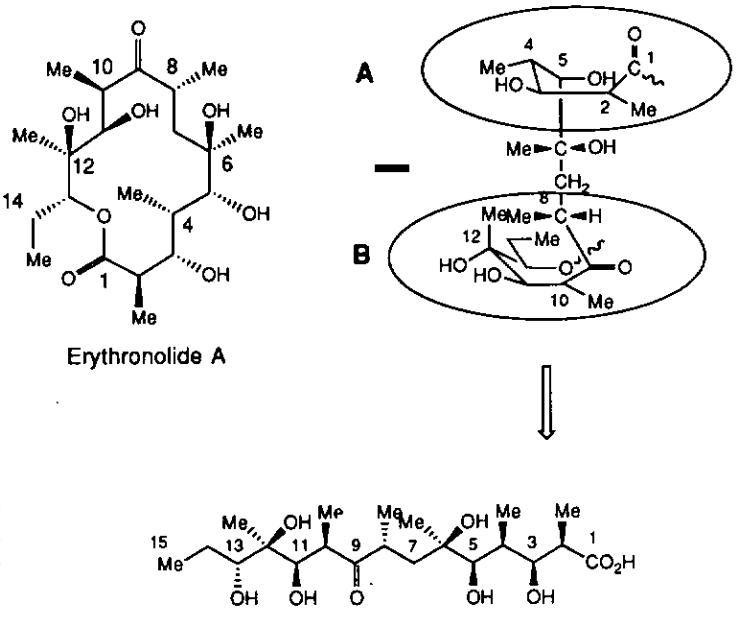
"Erythromycin, with all it's advantages, looks at present quite hopelessly complex, *particularly in view of its plethora of asymmetric centres .....*"

R.B. Woodward (1956)

The formation of the large carbon skeleton with the correct stereochemistry at **all** the asymmetric centres for the Erythronolide A would, in fact, be a nightmare. However, the methodology **outlined** here, has lead to a viable total synthesis of macrolides, and in particular, macrocyclic lactones and lactams.

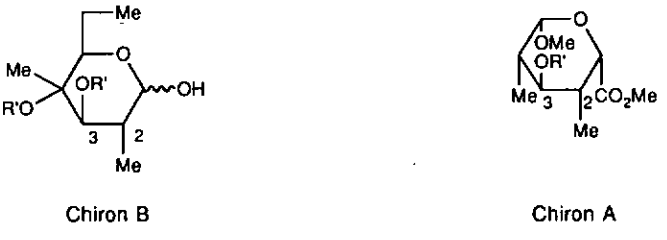
Examination of the structure of the Erythronolide reveals the presence of alternating C-methyl and hydroxyl groups on a fifteen carbon membered backbone, ten asymmetric centres, two tertiary sites and a ketone function in a fourteen membered lactone.

When the two dimensional perspective structure of Erythronolide A is unfolded, there emerges two "carbohydrate" like structures (**A** and **B**, Scheme X). They are contained in C1-C6 and C9-C15 of the target molecule.



Scheme X

These two cyclic type structures relate to two possible chirons (**A** and **B**, Scheme XI), which could be derived from a suitable carbohydrate with appropriate introduction of functional groups.



Scheme XI

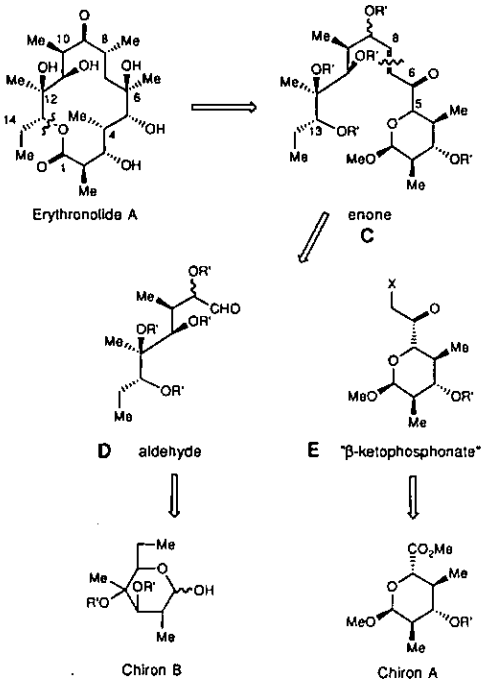
The retrosynthesis affords the two chirons A and B. Each have several important features to note.

The absolute configuration at C2 and C3 in both chirons is the same. This allows for the possibility of utilising a common synthetic intermediate. The anomeric carbon in each corresponds to C1 and C9 respectively in the target. These are

the sp^2 centres. Eight out of ten asymmetric centres of the target are included in the two chirons. The ring oxygen atoms of the Chirons correspond to C5 and C13 hydroxyl groups in the target, hence they are "protected" in the ring until required. The *"rule-of-five"*, as described previously can be utilised in the C1-C6 segment and C9-C15 segment.

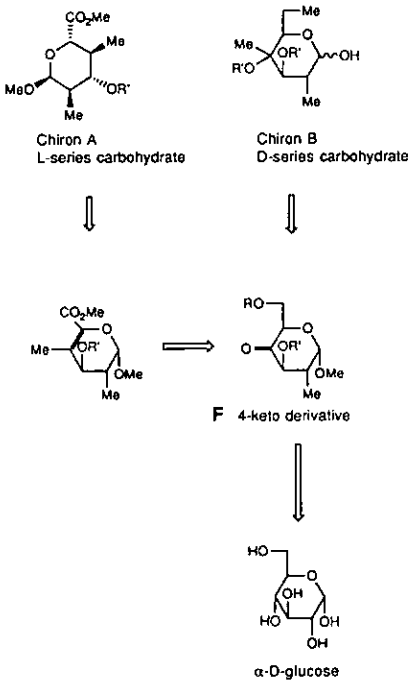
The retrosynthesis shown here (Scheme XII) indicates the required bond breaking and formation operations.

The first disconnection produces an enone, **C** which encompasses the entire carbon framework and therefore, the two chirons. This enone can be envisaged as forming from a nucleophilic component - a beta-keto-phosphonate **E** and an electrophilic component - aldehyde **D**.



Scheme XII

The two chirons A and B arise from a common 4-keto derivative **F**, (derived from D-glucose, Scheme XIII).



Scheme XIII

Chiron A is derived via an ester which undergoes stereoselective catalytic hydrogenation, caused by the alpha-orientation of the anomeric substituent - an example of stereoselection via the anomeric effect. Chiron B requires the stereocontrolled introduction of branching at C4 and chain extension at C5. All the required reactions to produce the correct stereochemistry at all the chiral centres are readily available in this methodology.

The overall synthesis of Erythronolide A proved to be very conclusive in the ability of naturally occurring starting materials to be used as useful starting materials in the total synthesis of Natural Products.

Conclusion

The Chiron Approach methodology described here is gaining momentum. The array of various natural products which have been synthesised, is growing as synthetic chemists realise the potential of the chiron approach.

For Further Reading

S. Hanessian *"Total Synthesis of Natural Products: The 'Chiron' Approach"*
Organic Chemistry Series: Vol 3, Peragamon Press; Oxford, 1983, And references contained within.

S.G. Warren *"Organic Synthesis, the Disconnection Approach"*: Chichester; New York, 1982.

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DR PEAK'S CHROMATOGRAPHY MADE EASY
"PROBLEMS WITH AIR"

by Roger Whiting of Auckland Institute of Technology

One of my earliest recollections of HPLC was being asked to assist a friend in setting up the first HPLC his company had brought into New Zealand. Inadvertently we put so much air through a column that they had to buy a new one. Ever since then keeping air out of the system has been an area of keen interest.

Air in the liquid chromatography system displays itself in several distinct ways. The most common is the irregular chromatographic spike but it can also in manifest itself in the form of problems with the pump or regular pressure spikes. Each of these arise in a variety of ways.

CHROMATOGRAPHIC SPIKES

When air gets into a liquid chromatographic system it usually appears as spikes on the chromatogram. These are usually very sharp and hence they can be differentiated from normal peaks. They often result in baseline shifts however which makes interpretation difficult and occasionally they can be mistaken for normal peaks which also causes difficulties.

Mobile Phase Outgassing

The most common cause of air in the system is poor solvent degassing and attention to this will usually fix the problem. If a single solvent is used then vacuum degassing should be sufficient enough to stop air bubbles forming. In the case of solvents which are mixed in the system there is a strong possibility that the solubility of air in the mixture will be less than that of one of the solvents and so bubbles will form and eventually appear in the detector. Here helium sparging is best as it reduces the amount of air dissolved more than does vacuum degassing. Once this has been attended to, however, there are a number of other possible causes of air problems.

Injectors

The first point for air to enter the system is as a sample is introduced. This can be countered by the attention to injection technique. If a manual injection is being used the syringe should be flushed out with solvent between injections. In the case of autosamplers a check should be made of the level of the liquid in the sample vials to make sure that the sampler does not suck air. Filled loop injectors should be flushed with three loop volumes of sample when they are filled. This improves their reproducibility as well as stopping air problems. Partially filled loop injectors should be checked to ensure that the waste line does not cause the liquid in the loop to siphon out. If this happens the loop is left full of air so that when the sample is introduced there is still air present and this is then introduced into the system.

Fittings

Fittings can be the cause of the air entering the system. The most common problem with fittings is liquid seeping out rather than air seeping in. This is best corrected by tightening the fitting by a quarter turn. As it can be difficult working out which fitting is letting in the air the best approach is to tighten them all by a quarter turn especially this after a column. If a buffered system is being used a check should be made for deposits of buffer around the offending joint. The joint should be cleaned before tightening otherwise the fitting could be damaged.

Columns

Occasionally air can become trapped at the top of a column, normally this does not cause any problems but small bubbles can be swept through and give spikes. To rectify this problem the column can be connected to the liquid chromatography system but with its outlet free. Then the column can be flushed with a thoroughly degassed mixture of methanol and water at a high flow rate. The high pressure required to achieve the high flow rate should shrink the bubbles and allow them to be swept through. After about 25 column volumes have gone through the process should be complete.

Mobile Phase Outgassing Again

As stated earlier this should not be a problem if the solvents are thoroughly degassed but if it persists a restrictor can be installed. A restrictor stops the pressure in the system dropping after the liquid has passed through the column. With the higher pressure the tendency for the solvent to outgas is reduced so bubbles should not form.

The best form of restrictor is a back pressure regulator which will keep the pressure down stream from the column constant at all flow rates. A cheaper device is a portion of narrow diameter tubing after the detector. This will keep the pressure up but the pressure will vary as the flow rate changes.

PUMP STARVATION

The symptom of pump starvation is a lack of liquid coming from the pump outlet when the pump is turned on. It can have two causes either a lack of liquid or an air lock in the pump.

The first thing to check is that there is sufficient mobile phase in the reservoirs to cover the frit. This will not be a problem if you ensure that you do not pump the reservoirs empty. Also check that the vent of the reservoir is not blocked as this can cause a vacuum to form which the pump has to work against.

Next try and get the pump to prime itself by opening the purge valve on the outlet side of the pump and allowing it to run at

a high flow rate (5 - 10mL/min). In most cases this flow rate will flush the air through and prime the pump. If this does not work fill the supply line by disconnecting from the pump and allowing it to siphon. This may need starting off by using a syringe to suck the liquid through. If it will not siphon then the frit may be blocked. This can be solved by fitting a new one. When the liquid is free flowing the pump should be reconnected and primed as before. If it still proves difficult it could be filled with a syringe full of solvent.

Some pumps can be very difficult to purge of trapped air. If this is the case then remove the outlet valve fitting and increase the flow rate and tap the pump head to dislodge the bubbles. This can be helped by raising the reservoir to add some positive inlet pressure. As a last resort the pump can be hand primed by disconnecting the inlet check valve and using a large syringe of solvent to fill the pump.

If these remedies do not work then the pump is probably defective and should be serviced.

PRESSURE SPIKES

A more common problem for pumps is the occurrence of pressure spikes. It is normal for a reciprocating pump to exhibit pressure pulses in the region of 10 - 20 psi when working at the 2000psi level. If the pulses are of the 50 to 100psi level then there is a problem. This can be due either to air trapped in one or more of the pump heads or to one of the check valves not working properly.

If there is air in the pump it can sometimes be removed by running the pump at a high flow rate for several minutes. Often in these cases the air will return after operation for some time. This is because air is getting into the system. To prevent this the solvent should be thoroughly degassed - if necessary use helium sparging. Also the joints on the inlet side of the system should be tightened. Care should be taken in this as overtightening can result in distortion of the fittings which can make them leak more.

If the solvents have been degassed and the joints are tightened but regular spikes continue then the cause is probably the check valves on the pump heads. Which pump head is causing the problem can be discerned by watching the pressure and comparing it to which head is delivering. Replace the check valves one at a time and see whether the problem ceases. Keep track of the valves during this exercise so that the ones that are serviceable can be refitted at the end.

In Conclusion

The procedure outlined here will eliminate nearly all air related problems in most liquid chromatography systems. Occasionally an extraneous peak will occur which can probably be ascribed to air in the system. However, if these are to occur only occasionally then it is probably easier to tolerate them than try to find the cause.

RACI 75TH ANNIVERSARY LECTURE

PRESENTED IN SEPTEMBER 1992

Scientists as Citizens

Sir John Warcup Cornforth, AC, CBE, FRS

School of Chemistry and Molecular Sciences, University of Sussex at Brighton, East Sussex BN1 9QJ, United Kingdom.

Abstract

The full text is printed of a public lecture on the position of scientists in society, and the dilemmas facing scientists as a small minority possessing new information and perspectives which the majority does not yet accept or understand.

Since the Royal Australian Chemical Institute celebrates its 75th anniversary this year, and so do I, it seems appropriate to speak of the changes that these years have seen, and how they affect the present and future role of scientists as part of the communities in which they live and work.

It has been my good luck to spend all my working life in the borderland between physical and biological sciences, and to retain an active interest in them both. But I must begin by limiting my right, or the right of any scientist, to speak for science as a whole. It may once have been possible for one human brain to grasp the essentials of all sciences, but not now, not ever again. Even in my own discipline, organic chemistry, I keep having to make assumptions that I have not tested. I accept, without full belief, the findings of fellow scientists in fields where I have no expertise. They do the same with my findings. Something must tie me to these scientists, and them to me. What is it?

The art of the probable

It is certainly not faith; it is more tentative and incomplete. What one scientist assumes in a statement by another is that evidence about it has been recorded and can be checked, and that facts incompatible with it have been looked for and not found. It is never acceptable as a final statement of truth; it can serve, until upset or absorbed by something better, as a basis for further work that will approach the truth more closely. Science is the art of the probable; and I am using that word not just in its modern sense of "likely", but in its older and more exact meaning: "testable".

Scientists do not believe; they check. And I am not asking you to believe anything I say on a scientific matter; only that there is tested evidence for all of it, and that I know the nature of that evidence and can make a judgment of its worth.

It may seem odd that a system of knowledge based on doubt could have been the driving force in constructing modern civilisation. At its foundation in 1660 the Royal Society of London, for improving natural knowledge, was given by a quaint and still surviving custom a coat of arms and a motto. One motto considered was "Quantum nescimus", which translates as "What a lot we don't know". It is a good motto and I don't know why it was not adopted. Perhaps some much mistaken person thought that it wouldn't be true for long enough. In the end, the one chosen was "Nullius in verba". This means, from its original context, "We take nobody's word for it".

Anyone, of course, can disbelieve anything, but a scientist's unbelief also carries an obligation. You may make interpretations of what has been found out, but you must not believe them to be wholly true or complete; you or your successors must look again, and look beyond. Again, many people find perpetual unbelief a most uncomfortable idea, especially as a basis for action. But once you have accepted, as a scientist, that there are probabilities but no certainties, there is nothing unnatural in acting on your judgment of the odds for and against. That is what we all do most of the time, even if we do not always know it. And when I say "we" in this lecture, I don't mean scientists, I mean the whole human species.

Where and what we are

Here now are some statements about the position of that species in space and time. The evidence for them has been gathered by scientists of many disciplines. In their judgment, and mine, some of the numbers will be modified a little by future observations but the scale is correct.

Our sun is one of about a hundred billion stars - about the same number as the cells in a human brain - assembled in a spiral galaxy, one of innumerable galaxies populating the observable universe. Our galaxy is not an unusually large one, but light takes about one hundred thousand years to cross it. This compares with the four years light takes to reach our sun from its nearest neighbours among the stars, and the eight minutes that the sun's light takes to reach the earth.

Our sun is possibly rather unusual in being surrounded by planets. It was formed nearly five billion years ago. It stays hot by a process that we are trying to imitate on earth: the fusion of hydrogen atoms. In five billion years or so from now, the sun's hydrogen will be spent and the sun will become a red giant star, then a white dwarf, then a black dwarf. The earth as the third planet outward from the sun will be greatly affected by these changes.

This earth condensed from gas and dust around four and a half billion years ago. For much of that time there has been life on earth, and life has greatly modified the earth's climate. The species of life that we call human has been around for less than 0.1% of that time. It has recently examined the other planets in the solar system and has concluded that life is unlikely to exist or to be easily sustainable on any of them.

Nearly all of that information has been acquired in the Institute's lifetime, and mine. For the first time ever, the human species has been able to place itself in space and time. We know how short a time we have been here as a species; we know, barring a cosmic accident that we cannot yet predict or prevent, that we might inhabit the earth for billions of years to come; and we know no other place that we could colonise in large numbers. If we are citizens of anything, we are citizens of the earth.

And at an increasing pace we are finding out *what* we are. I am one of those who were privileged to take part in the revolutionary

development of biological and biochemical science. When the Institute was founded, the structures of the vitamins and hormones, the proteins and nucleic acids, the complex sugars and lipids, the enzymes and coenzymes, the blood and leaf pigments, the transmitters of nervous impulses .... were all unknown. Today all are known, and, by the time this Institute celebrates its centenary, it may well be possible to write full chemical descriptions of many living things.

The studies of function have kept pace with the structural information. And with this knowledge has come the surprise that we, and all living things, cannot be regarded as individual collections of matters with a certain life-span: for the whole of our lives we are incessantly being torn down and built up anew, dying and being reborn at every moment. And in the most revolutionary development of all, the organisers, conductors and controllers of this molecular dance are being identified. The code of instructions stored in the nucleic acids has been cracked; the instructions themselves can be read out. The processes and agents by which harmony is imposed on a dauntingly complex network of simultaneous chemical changes are becoming clearer. The complete functional description of a living organism is a more distant goal than a description of its chemical composition, but that goal too is in sight.

It is a lovely paradox that this flood of new information, this revelation of complexity, has served to emphasise the essential unity of life; and the closer one gets to the chemical and biochemical essentials, the greater is the unity. The family tree of life is being redrawn and extended in the light of much more accurate and intimate knowledge of the differences between species. The evidence gets stronger all the time: the human species is a very recent development in a single process that has been evolving on earth for around three billion years. And once again, the time-scale and the detailed knowledge are almost wholly products of my lifetime.

Scientists and what they do

The people who acquired all this information and much more, and who are testing it and adding to it all the time, have never amounted to 1% of the population of any country. Worldwide, the proportion is more like one in a thousand. They share an intense, usually lifelong, curiosity about everything around them, and with the curiosity they have, or they acquire, sufficient discipline to question their own findings, not just the findings of others. They are impelled to make patterns of what they learn, even while they know that the patterns are imperfect. I have to call them scientists because that is the accepted term for them and they are stuck with it; but the Latin root of the word suggests a system of knowledge, not the real system of increasing probability and residual doubt.

Not many scientists can spend a whole working lifetime satisfying their curiosity. There never have been many ivory towers; and for the past 150 years most of the discoveries have been made by people who earned their living as teachers. Nowadays, the sheer usefulness of science and the multitude of its applications to civilised life have led to the present situation that most scientists spend their careers in applying the results of earlier work, not in extending the frontier. From my own standpoint as a chemist, one gets a particularly broad view of the ways in which science interpenetrates the fabric of modern society, because the business of chemists is matter: the stuff that everything and everyone are made of. Chemists have arrived at a fairly satisfactory understanding of what matter is, and how it behaves. Give them a sample of matter and they can tell you of what elements it is composed, how much of each element there is and how these elements are combined. With increasing facility they also compose new forms of matter from old, and they are becoming cleverer all the time at predicting the properties of compositions before they make them. That seems rather a bald statement of what they do, until you consider its scope. Look first at their power of detecting and identifying and measuring what is there. Many samples of matter can now be analysed without visibly changing them. The 400+ components of the smell of coffee are a different proposition, but they too have been separated and identified. This analytical power means that chemists are employed to monitor the purity and safety of practically every product that civilised people use: the food we eat, the water we drink, the air we breathe, the seas that surround us and the earth we tread .... and not only that, chemical examinations of existing processes and products are continually showing many industries what they must do to maintain and improve quality, and to cut down waste and pollution. And the "natural products" chemists who look at and identify the chemical components of plants have initiated several large industries.

The chemists who create new compositions of matters have transformed, to an even greater extent, the modern world. They began to do this not much more than a century ago, starting with things like dyestuffs and medicines that are valuable but not needed in very large quantity. Sometimes, the things that they learned to produce were already known in nature; now, most products have no natural equivalent, they were created to satisfy the wants of an ever more complex society. New metals, plastics, composites, textiles, adhesives, coatings, rubbers, insulators, conductors, semiconductors, superconductors, optical fibres, detergents, ceramics .... the list is much longer than this, and chemists created the material for them all.

A physicist, a mathematician, a biologist or an earth scientist could tell similar stories. Scientists are embedded in the fabric of modern society and most of them spend their whole careers responding to the demands of the state or the market. They are so useful that the overwhelming majority who are non-scientists assume that that is what they are there for. To an increasing extent this majority is insisting that scientists ought to concentrate more on what society says it wants from them; and as for the teachers of science in schools and universities, their business is to train people who will continue to satisfy these wants. Scientists generally do an admirable job in responding to these demands, but their knowledge is imperfect and the exploitation of their discoveries is usually taken out of their hands. Sometimes, not often, a product or a process does unintended harm to people or to the biosphere; and then the blame is often on the discoverers, not those who recklessly exploited the findings or spread the harm. I do not say that scientists are always free from guilt: I shall be talking of their weaknesses later on. But when scientists are condemned by people who are too lazy to learn anything about science but who have no intention of giving up the comfort, health and enhanced quality of life that science has brought them, I recall Caliban's curse from *The Tempest*.

Thou taught'st me language, and my profit on't
Is, I know how to curse: the red plague rid you
For learning me your language!

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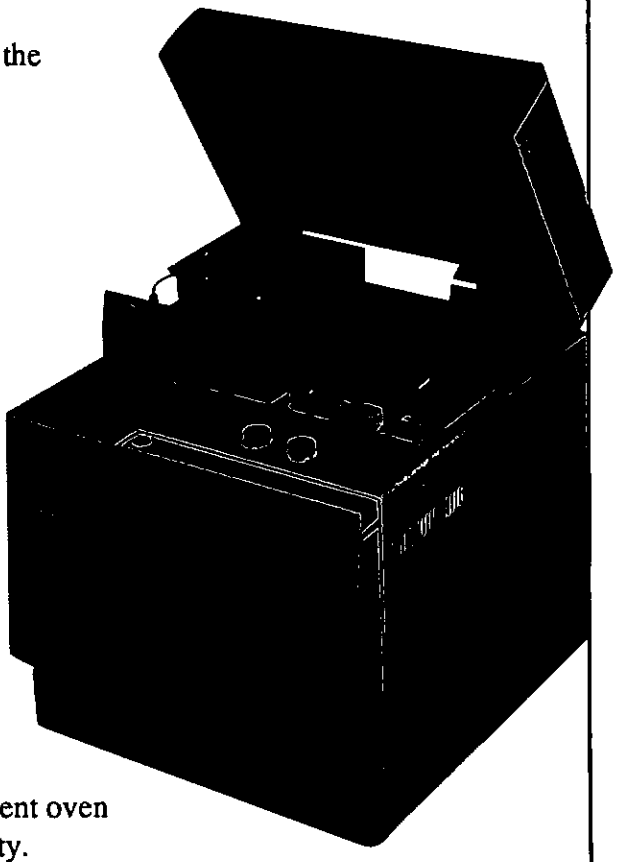

WHAT?

A new state of the art Gas Chromatograph featuring

New Injector Designs

Gold-plated inlet adaptors and septum purge zones contribute inertness to the sample path, enhancing performance.

New Detectors

Up to three of what are widely acknowledged to be the best G.C Detectors (in a market filled with adequate but mediocre performers) can be accommodated in each model 9001 G.C.

PID	HALL	DID	NPD
FID	ELCD	TCD	FPD

New Oven

Accommodates multiple columns in a thermal-efficient oven which easily exceeds US standards for reproducibility.

-Electronic Pressure/Flow control option

WHY?

At last, the best is affordable. The 9001 series G.C.'s have the largest number of features of any commercially available G.C. system, and the smallest footprint. All this plus the back up of SciTech, with branches throughout New Zealand.

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SOXLET? THERE IS A BETTER WAY!!!

If you are interested in how new developments in instrumentation can greatly increase productivity and reduce hazardous solvents in your lab, let SciTech show you how these new techniques can help you.

SOXTEC from TECATOR

Automated Modified Soxhlet Extraction System for fast and safe determination of soluble material in samples ranging from pharmaceuticals to feedstuffs, soil to polymers.

- **Remote heating module removes electrical hazard from solvent area**
- **Automatic solvent recovery**
- **Excellent reproducibility**
- **Faster than Soxhlet**
- **Modular and expandable**

SFE from DIONEX

Supercritical Fluid Extraction employs high-pressure CO_2 to achieve spectacular extraction efficiences in a fraction of the time of soxlet, without the use of solvents!
The Dionex 703 is the only high-throughput, multi-sample SFE available.

- **Eight extractions simultaneously**
- **Fully automatic**
- **Extremely inexpensive to run**
- **Eliminate solvents from extractions**

If one accepts the majority view that scientists are useful servants who must do as they are told "always on tap, never on top", there is no problem. Scientists may legitimately strive for better pay, higher status, more facilities; and they may form Institutes like the RACI to further these aims and to exclude unsuitably qualified people. But during the lifetime of that Institute, new and increasingly extensive and precise information has changed the world outlook of all scientists. And if you are the servant of a master whom you know to be selling the family silver, mortgaging the land, and spending the capital on amusing himself, fighting his neighbours, and producing too many children with similar inclinations, you will probably look for another place before the crash comes.

But there *is* no other place, and scientists cannot opt out of society. So it may be useful to look at the dilemmas confronting a member of society who is also a committed scientist.

The dilemmas of secrecy

The dilemma of nationality is obvious. Science is and always has been international. I still like experimental chemistry and my bench at Sussex University is in a large room where chemists of nine nationalities are working now, and where nine other nationalities have worked recently. We like to compare cultures but it is our discipline that ties us together. Yet all of us were born in nation-states that imposed duties and constraints on us from birth. The wall of my classroom in a primary school at Armidale in New South Wales had a large poster of a flag with the legend "It's our flag. Fight for it. Work for it". This was 1923 or 1924 and even at the age of six I thought it odd that the flag was the Union Jack. Still, the imperatives are the same whatever the flag. In democracies you are allowed, after you grow up, to exercise every few years a choice between representatives whom, as individuals, you normally did not select. In return for this right you are subject to all the requirements that a national government may impose. If you become a scientist, you are often asked to contribute your knowledge and ingenuity to preparations for international war. You are then in hostile competition with scientists of other nations whether you like it or not, and this means keeping scientific findings secret, however valuable they may be to humanity.

The demands of industry present other dilemmas. Multinational companies are our real masters now. Such companies employ scientists to create, improve and monitor their products and processes. Often, original research is required and new findings of general interest may be made. The scientists who do this work are left in no doubt that they are competing with scientists of rival companies and that their findings are secret. Publication, except for patents, is permitted only when the work is of no perceived value to competitors. I can think of several cases - and there must by many, many more - where work remained hidden until it was rediscovered and published by someone else, and of valuable work that remains unpublished to this day. However necessary it is in the short term for companies to make profits the longer-term cost is to the scientists and to science. The pressure of industry to generate short-term profit is always tending to reduce industrial scientists to the level of parasites on the body of scientific knowledge.

Similar pressures are developing on scientists in universities and in government research institutions. Everywhere, governments are telling scientists that their research should become more "relevant" to perceived national requirements and to industries. Well, it does happen sometimes that an important discovery is made at an institute set up for the purpose of making it; but this is infrequent, let alone typical. Here is an actual and far more typical case. Some people decided to examine the effect of an electric field on living cells. They generated this field between two platinum surfaces immersed in the liquid culture medium. The cells died. But the people who did the experiment were real scientists who resisted the obvious conclusion and found that the cells were not being killed by the electric field, but poisoned by tiny traces of dissolved platinum. They mentioned their finding to a colleague, who looked for and found a stronger effect on cancer cells. A search in the chemical literature for soluble compounds of platinum turned up a substance that had been made nearly one hundred years ago by a chemist in another country whose interest was simply to explore platinum chemistry. This compound was even more effective against the cancer cells. In the event, a large number of people are alive today who would be dead but for this constructive but unfocused curiosity of several scientists separated by discipline, nation, and time. The factors combined in this success were curiosity, scepticism, good communication, and publication of results. Together, these produced an outcome that nobody predicted or expected; and that is the essence of research. But it has always been difficult to persuade those who finance research that predictable results are worthless and that the best hope is to employ the team that makes the vital connections between other people's results and, sometimes, their own.

The dilemmas of history

So scientists have these dilemmas, that their role as loyal citizens and employees, and respectable members of society, can be in conflict with their science, based as it is on free exchange and recording of information. Another dilemma facing scientists arises from what you might call their sense of history. As I pointed out earlier, scientists have excellent evidence that the mental powers distinguishing the human species have developed to their present level in a tiny fraction of the time that life has been on earth, and an even smaller fraction of its potential future. The nature of the life we know on earth is to dissipate energy while using part of it to maintain for a short time a particular pattern, and to replicate this pattern with small variations before the original is lost. Very sensibly, practically all present forms of life depend directly or indirectly on sunlight, the most constant energy source of all. The development of complexity that resulted, quite recently, in the evolution of human intellect can be seen as one possible response to the challenge of passing on the pattern of a species before all its individuals die. Death of the individual is unmistakably the driving force.

Scientists have no way of measuring whether any pressure exists *now* on the human species to improve its intellect. But as they discover more about the earth and about our unity with other life, they can see all too clearly some of the origins and consequences of our present behaviour. For most of its existence the human species has occupied its biological niche as a parasite on the ability of green plants to collect solar energy, and as a predator of other animals that do the same. A few hundred years ago - a mere breath of time - a concentrated source of energy was discovered in the fossil fuels: essentially,

the energy of old sunlight trapped by life and buried by the earth. Humanity has exploited this resource with all the restraint of a fox in a chicken house.

The normal response of a species that suddenly discovers an abundant irreplaceable source of food is expansion of population to the limit, followed by mass starvation when the supply runs out. To the extent that we are using fossil fuel as food: making fertilisers to increase crop yields, manufacturing and fuelling machinery to cultivate and irrigate and harvest and transport food, we are following the same pattern. But most of the fossil fuel is spent on uses that are totally frivolous when measured against the basic needs for survival. And as a chemist I just hate to see all that lovely irreplaceable raw material going up in smoke. In one way, an oil refinery epitomises the waste of this precious essence of old sunshine, since most of its product will be burned in engines and under boilers. In another way, though, it resembles the economy of living things: from its many streams, hundreds of useful products will be made, and burning is like excretion: the last resort, when no other use can be found. Perhaps that is one of the few good auguries for the time when our successors will have to manage without fossil fuel.

But the dilemma is this: the historical perspective that I have outlined is peculiar to scientists. But scientists are a small minority, and people conversant with science, let alone scientists, are a small minority in administration, government and (in most countries, including this one) business. The perspective of the politician does not usually extend beyond the next election. The unborn have no vote, whereas the easiest way to get the votes of the majority is to promise them increases in their power to consume. The average citizen's reaction is: "What did posterity ever do for me?" The administrator seldom has a scientific background, or any remit to consider an extended future. The businessman wants to make profits - the quicker the better - for himself or his shareholders. Among all these people there seems to be a general vague expectation, if they think of the matter at all, that the scientists are sure to find some way to rescue future generations from the shit into which the present one is dropping them. And sometimes they would add that the mess is of the scientists' creation, not theirs. So, if you are a scientist and you have this perspective, you realise before long that if the future is in anyone's hands it is in yours; and you can recognise some of your actions, although they might be innocent or even praiseworthy from a civic point of view, as hostile to the future of your species, or at least to a large number of its future members.

How you react to this dilemma depends on what I will call, though in a special sense, your politics. If you judge that overpopulation, poverty and mass starvation are inevitable for the great majority of the species, you may concentrate on the survival of a wealthy minority that can monopolise the world's limited resources. On this view, the future as well as the present depend on competition for survival within the dominant species. That view is widespread, especially in the United States; and a recent British prime minister claimed that there is no such thing as society, only competing individuals and families. The dilemma then vanishes: you best serve the future of your species by depriving and if necessary fighting your weaker neighbours, and if, for instance, you are a scientist employed by a tobacco company, you may see nothing wrong in selling and pushing a lethal addictive drug to the underclass in your own country or to suitably ignorant and gullible people abroad.

If, on the other hand, you judge that widespread human disaster is not inevitable; that the main internal enemies of the human species are ignorance, bigotry and oppression; that the advances of science in understanding and improving the human condition have been made more by co-operation than by competition; and that the chance of further evolution in our species may no longer depend (as it certainly did in the past) on a continued struggle for survival, the horns of your dilemma are sharper. To give the human species its best chance to find out more about what it is, what it can do, and where it can go, you need a sustainable earth that does not exhaust its resources - animal, vegetable, or mineral! That is much more difficult, in the short term anyway.

SITUATIONS VACANT

THE INCREASING CHALLENGES TO THE COSMETIC CHEMIST IN THE DEVELOPMENT OF A GLOBAL PRODUCT

By Greg Wanamaker
Manager Information Services, Elizabeth Arden Co., USA

In the past, the Development Chemist was given prototype direction from a central marketing group, and the challenge was to meet the ship-to-trade date, incorporating marketing enhancements during the process, while still satisfying the basic in-house microbiology, stability, substantiation, and regulatory protocols for the national market. But, in recent years, there have been increasing demands on the cosmetic chemist to develop products to meet all the requirements of a global marketplace.

This process of globalisation of products has limited the cosmetic chemist's choice of acceptable materials which will bear directly on the final product's attributes, efficacy, and claims. In addition, documentation for these product claims, implicit or implied, is increasingly a requirement. This adds a new dimension to the chemist's and the centralised marketing group's understanding of and impact on worldwide marketability of a product.

Raw material selection becomes to the chemist the first critical path in the development process of a successful and worldwide marketable quality product. In the past, raw material selection was completely under the control of the chemist with the help of the raw material supplier. As the marketplace became more demanding, the chemist looked to complementary industries (paint, food, detergents, etc.) for new raw materials that could help him achieve the product profile. The consolidation of the cosmetic industry during the late 1980's and early 1990's allowed the chemist to tap the internal R & D strengths of the parent company which normally encompassed some of these consumer product industries, and finally to raw materials developed specifically for cosmetics or that may have found their way into cosmetics serendipitously from these R & D groups. During the selection process, the chemist must be mindful of any governmental limitations as to the type or level of a specific raw material in a formula.

During the selection of raw materials, quality, cost, and availability may also become an issue. When the raw material selection and successful laboratory development and marketing approval is achieved, then the second critical path to a successful worldwide formulation is where and how the product will be scaled up and manufactured. The use of extended manufacturing sites with varying processing equipment and techniques will directly impact the uniformity and reproducibility of the product and its attributes. Flexibility must be built into the formula to be able to adjust to these manufacturing variances. Companies are typically restricted at this late phase in adding additional ingredients or purchasing replacement equipment if processing problems are encountered due to timing, retesting, or relabelling.

In summary, the development chemist in the 1990's must become increasingly aware of, and knowledgeable about the international environment and be judicious in the selection of raw materials during the development of a product to ensure a smooth and successful launch of a universal product in our global marketplace.

PHARMACEUTICAL PRODUCT FOCUS

LAMBDA 2 AUTOMATIC DISSOLUTION TESTING SYSTEM FROM PERKIN ELMER

Dissolution testing is an analysis technique used in the pharmaceutical industry for formulation testing and as a quality control parameter. USP XXI and related national pharmacopoeias demand this type of testing for a wide range of products, with particular reference to delayed-release drugs. Perkin Elmer offers a PC-controlled automatic system based upon UV-Vis spectrophotometric detection of the active compounds.

The system based on the Perkin Elmer Lambda 2 UV-Visible spectrometer is designed to fulfil this need for reliable, automated routine operation. A number of these automated systems are in operation in pharmaceutical laboratories in New Zealand and there are over 1000 similar installations worldwide. Sampling is performed by parallel, continuous or intermittent sample flow from up to 8 dissolution vessels in closed loops. Cross-contamination is avoided. Measurement cycles are fast and immediate. Set-up is simple. The system is fully automatic, including data analysis and presentation. This offers the laboratory a significant cost and time advantage.

The Perkin Elmer Dissolution Software (PEDS) completely controls the full system, based upon USP and GLP recommendations. Extensive flexibility is retained for the experienced analyst, with reliable implementation for use by trainees. For routine applications, both recording and evaluating options are saved on disk and may be protected from unauthorised modifications.

Contact: **Perkin Elmer - New Zealand**, P.O. Box 22-159, Otahuhu, Auckland. Ph. (09) 276 2230 Fax (09) 276 5602.
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WATSON VICTOR - WE HAVE THE BEST MEDICINE FOR PHARMACEUTICAL WEIGHING PROBLEMS

For producers of pharmaceuticals, cosmetics, or personal care products weighing needs are greater than in other industries.

Compliance with Good Manufacturing Practice is only one of the reasons. The requirements of GMP dictate careful weighing, verification and documentation at virtually every step of production. Materials must be accounted for. Differences between theoretical and actual yields must be reconciled. The second reason is good management practice, it gives an enviably high degree of visibility into the efficiency and the profitability of the manufacturing processes.

The Solution - Statistical Quality Control

Watson Victor can help assure quality from start to finish. From lab analysis of incoming materials to testing the finished product, a range of balances and analytical instruments are available which reliably answer questions on weight density, composition and other parameters. At many plants, for example, statistically selected finished samples are checked to monitor the packaging process. This data helps reconcile output, waste and unused material. Watson Victor also has a range of automatic statistical quality control systems that can weigh an entire batch of capsules or tablets, record the weight of each one and print complete chart and histogram documentation.

It is completely up to the user whether they set up a manual, a semi or fully automatic weighing station and whether they choose one or more weighing stations. Thus the system can be tailored to meet growing demands and needs - a customised solution for the specific situation at hand.

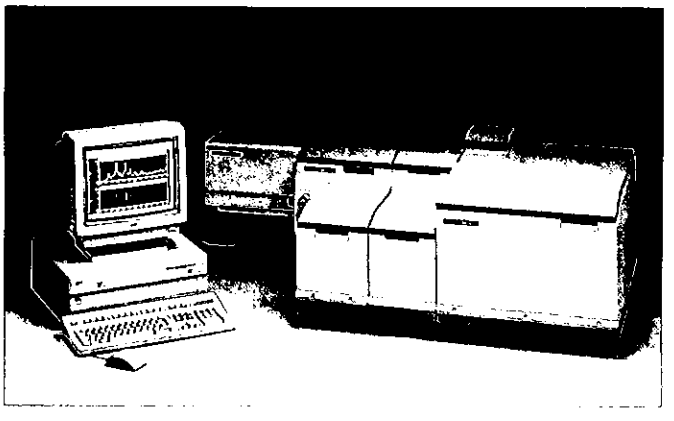
Contact: **Watson Victor Ltd**, P.O. Box 1180, Wellington. Ph. (04) 385 7699 Fax (04) 384 4651.
Or circle no.32 on the reader reply card.

NEW PRODUCTS AND TECHNIQUES

FIRST DIODE PUMP Nd:YAG LASER DESIGNED SPECIFICALLY FOR FT-RAMAN APPLICATIONS FROM PERKIN ELMER

The new Perkin-Elmer Diode Pump Nd:YAG Laser for the System 2000R FT-Raman Spectrometer is an air-cooled laser that uses standard single-phase 120V power, has sealed and desiccated optics, and requires no routine maintenance. The System 2000R with the new Diode Pump Laser integrates complete control of the laser into the data-collection software.

The laser power used in a scan is automatically recorded in the file-header so that it is impossible to have incorrect power levels with a spectrum. Power is set digitally and routine analyses can be automated using predetermined parameters in an OBEY programme. A shutter between the laser and the sample is coordinated with scan and monitor functions so that delicate samples are protected from prolonged exposure to laser radiation.



There are two versions of the laser: 750 milliwatts and 2 watts. Both built to the same high specifications, the 750 milliwatt laser is designed specifically for well-defined routine applications, while the 2 watt laser provides additional flexibility for the wide range of research and analytical applications. It is the only Diode Pump Nd:YAG Laser with a power range continuously variable between 10mw and 2w and better than 0.5cm spectral resolution. Output stability is maintained even at low powers. In addition, both versions comply with the strictest international EMC (electromagnetic compatibility) standards. CLASS 1 laser installation and operation is maintained at all times.

The new laser is designed to provide a reliable, high specification excitation source for FT-Raman measurements. Optimised for the System 2000 FT-Raman Spectrometer, the laser enhances ease of use. The System 2000R combines gold-coated mirrors, f/0.6 collection optics, high-throughout filters, and a proprietary detector design for unmatched sensitivity. Real-time spectral monitoring and pre-aligned sampling devices are combined with digital power settings to enhance repeatability of results. A large sample compartment with remote x-, y-, and z- sample adjustment and 90°/180° excitation over the range 10mw - 2w provides maximum flexibility for research applications.

Contact: **Perkin Elmer - New Zealand**, P.O. Box 22-159, Otahuhu, Auckland. Ph. (09) 276 230 Fax (09) 276 5602.
Or circle no.53 on the reader reply card.

NEW FT-IR SPECTROSCOPY APPLICATIONS FROM PERKIN-ELMER

Two new application notes from Perkin-Elmer illustrate the versatility of the System 2000 FTIR Spectrometer. The first, "Atmospheric Monitoring of Gasoline Vapour by Thermal Desorption - Gas Chromatography - Fourier Transform Infrared Spectroscopy" describes how car exhaust emissions can be collected with an ATD, separated with a GC and identified using FT-IR. The advantage of using FT-IR, as opposed to mass spectrometry, is demonstrated by the identification of different structural isomers.

The second, "The Qualitative Analysis of a Polymer Laminate using FT-IR Microscopy," describes the methodology and application of FT-IR microscopy in the identification of individual layers of a polymer laminate used in a food packaging application.

These and other application notes are available without charge from Perkin-Elmer.

Contact: **Perkin Elmer - New Zealand**, P.O. Box 22-159, Otahuhu, Auckland. Ph. (09) 276 230 Fax (09) 276 5602.
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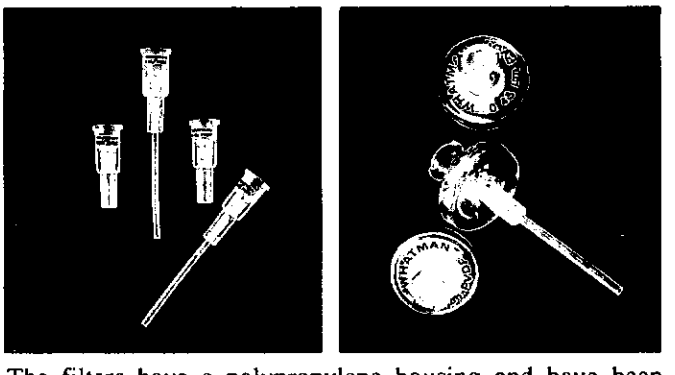
NEW 4MM & 13MM SYRINGE FILTERS FROM WHATMAN

The new Whatman 4mm and 13mm Syringe Filters give maximum sample recovery and reproducibility and are available with special tube tip outlets which provide efficient delivery of samples into microvials.

Both 4mm and 13mm filters are available in a wide variety of media for different HPLC, GC and TLC applications - PVDF for aqueous and/or organic samples, hydrophilic Nylon 66 for aqueous and partially organic samples, hydrophobic PTFE for organic samples, low protein binding polysulfone for aqueous samples, polypropylene for aqueous and mostly organic samples and high loading capacity glass microfibre for more difficult aqueous and/or organic samples.



The filters have a polypropylene housing and have been sterilised by gamma irradiation. They are available with volumes of 2-10ml.

Contact: **Labsupply Pierce NZ Ltd**, P.O. Box 34-234, Auckland. Ph. (09) 443 5867 Fax (09) 444 7314.
Or circle no.55 on the reader reply card.

NEW MICROWAVE MUFFLE FURNACE FROM CEM REDUCES ANALYSIS TIME

CEM Corporation have introduced a new microwave high temperature furnace, the Model MAS-7000. The new 1200°C furnace combines the latest technology in microwave heating with the flexibility of a complete system for weighing samples, calculating results and providing hard copy data.

The MAS-7000 Microwave Muffle Furnace reduces typical analysis of ash and LOI to minutes instead of the usual hours. The system provides real-time product analysis which is critical to producing consistent quality products. The MAS-7000 can be operated anywhere from the production floor to the QC laboratory; it requires no fume hood bench space.

The new Microwave Muffle Furnace has menu-driven software, programme storage, internal calibration software and temperature control for either constant temperature or automatic, programmable ramping stages. RS-232 and parallel ports interface to various types of balances and printers.

Contact: **John Morris Scientific Ltd** Ph. 0800 651 700 Fax: (09) 444 0974.
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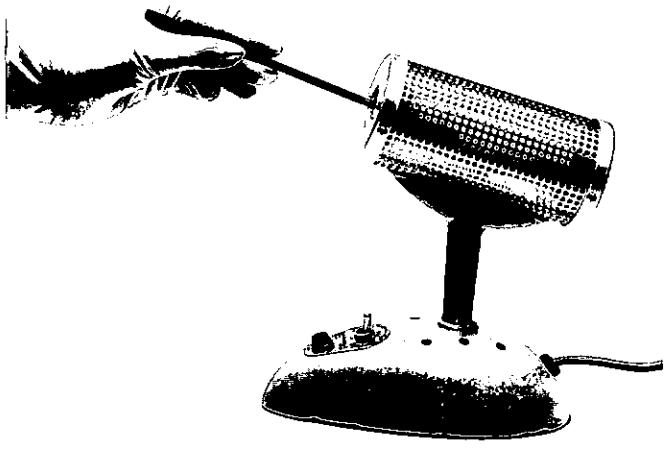
THE CONVENIENT WAY TO STERILISE LOOPS AND NEEDLES

The Lancer Bacticinerator sterilises by infrared heat. Organic material is incinerated deep in a ceramic funnel tube. A loop or needle is inserted into the heating element cavity, complete sterilisation takes only 6-7 seconds at the optimum sterilisation temperature of 871°C. There is no requirement to wait for loops or needles to turn red. The unit does not require oxygen so it can be used in anaerobic chambers. The base is weighted for stability and provides convenient storage for 6 needle holders.



For further information contact **Medic Corporation Limited,** Private Bag, Lower Hutt. Ph. (04) 569 3539 Fax (04) 569 7984.
Or circle no.38 on the reader reply card.

NEW AUTOMATED MICROWAVE DIGESTION SYSTEM FROM CEM

CEM Corporation have introduced SpectroPrep; the new Microwave Digestion System that increases laboratory productivity. The system operates unattended to prepare samples for AAS or ICP analysis. It uses microwave energy and a flow-through system to provide rapid digestion of the samples without the need to handle individual digestion vessels.

The SpectroPrep incorporates all the advantages of rapid microwave digestion into a completely automated system; now using low acid concentrations of only 5-10% for great improvement for laboratory safety. The SpectroPrep offers improved recoveries, leading to lower detection limits and higher sensitivities. The SpectroPrep is self-cleaning between samples, eliminating carry-over. The unique process (patent pending) delivers filtered digestates ready for analysis with no digestion clean-up.

Contact: **John Morris Scientific Ltd.** Ph. 0800 651 700 Fax: (09) 444 0974.
Or circle no.39 on the reader reply card.

PATCH WORK by NIR Analysis

Transdermal patches are becoming an ever-more-popular drug delivery system. Once used primarily for anti-angina medication and estrogen delivery, patches are now finding their way into the OTC market. Producing patches is a high-speed batch operation, but release of the approved product to market can be slowed down by conventional regulatory analysis.

Patch makers have used NIR Systems model 5000's with a spinning sample module for fast, at-line analysis with remarkable success: complete active-concentration measurement takes about 40 seconds, right at the manufacturing point. Now, patch makers have successfully adopted the model OL-5000 for the same purpose. ("OL" means on-line). Now the required analysis can be performed at the production process speed, concurrently, giving rise to the enormous "OL" advantage.

Contact: Glenn Grayston, **SCITECH.** P.O. Box 663, Dunedin. (03) 477 7860 Fax (03) 477 7870.
Or circle no.40 on the reader reply card.

ISCO - DOUGLAS SCIENTIFIC

Douglas Scientific have announced their appointment as exclusive NZ distributor for ISCO's laboratory products. ISCO is a dominant player in the rapidly growing SFE (Supercritical Fluid Extraction) market with products to meet a wide range of extraction and cleaning requirements from manual to highly automated high throughput systems. ISCO is also well known for its fine range of instruments and products for SFC, CE (capillary electrophoresis) and low pressure column chromatography. ISCO has long been recognised for its excellent fraction collectors.

Douglas Scientific see its association with ISCO as significant in its ability to meet clients needs in a number of important and growing areas of separation science and sample pretreatment. Douglas Scientific will naturally fully support existing ISCO equipment in the field.

Contact: **Douglas Scientific,** P.O. Box 45-027, Auckland 8. Ph. (09) 837 5447, Tollfree 0800 735 725 (outside Akld.), Fax (09) 837 5446.
Or circle no.41 on the reader reply card.

NEW SEQUENTIAL TUBE SAMPLER FOR COST-EFFECTIVE, AROUND-THE-CLOCK AIR MONITORING FROM PERKIN ELMER

The new Model STS 25 Sequential Tube Sampler from Perkin-Elmer provides around-the-clock monitoring of the changing concentrations of volatile organic compounds (VOCs) in workplace and ambient atmospheres. The Model STS 25, developed by Perkin-Elmer in collaboration with the U.S. Environmental Protection Agency (US EPA) Atmospheric Research and Exposure Assessment Laboratory, is a cost-effective alternative for an application that normally requires complex on-line air monitoring equipment.

The STS 25 sequentially samples air onto a series of up to 24 sorbent tubes. Once collected, the samples can be transported for thermal desorption - gas chromatography analysis in the laboratory. The system — a small, portable unit housed in a weatherproof box, is operated via a 12 volt battery or mains electricity. When the tubes are not collecting samples, they are effectively sealed with diffusion limiting caps to prevent ingress of atmospheric pollutants.

The unit is compatible with most conventional monitoring pumps which can operate at a flow or flows within the range 10-50mL/min. The STS 25 is designed for pumped air sampling onto Perkin-Elmer thermal desorption tubes.

Contact: **Perkin Elmer - New Zealand**, P.O. Box 22-159 Otahuhu, Auckland Ph. (09) 276 2230 Fax (09) 276 5602
Or circle no.12 on the reader reply card.

REVOLUTIONARY NEW PROSPECT FTIR FROM MIDAC CORPORATION

The Prospect FTIR is designed to overcome many of the historical problems FTIR benches have suffered from e.g. clouding of the beamsplitter and optic windows and sensitivity to vibration. The Midac interferometer began its life designed to operate on helicopter landing gear monitoring chemical warfare at battlefronts. From this evolved the Prospect FTIR for use in Laboratory battlefields. The ruggedness of the Interferometer allows the Prospect to acquire spectra while being moved around - unlikely but indicative of its stability.

The Beamsplitter and sample compartment windows are coated with a proprietary coating which resists moisture up to 80% humidity yet allows full spectral performance from 7500 to 350cm^{-1} at up to .5cm^{-1} resolution. The optical mirrors are diamond turned and gold coated. Gold resists corrosion and also reflects higher intensity IR from the SC source to the sample compartment. The source operates at 1550°K and this is focused to a diameter of 5mm in the sample compartment permitting high energy to be passed into sampling attachments such as ATR etc.

Data is passed to a PC for processing through a high speed parallel bus permitting realtime display of interferograms and spectra. Data processing is done using SpectraCalc for DOS based systems and GRAMS for operating under WINDOWS.

The complete system is fitted into a 15Kg optical bench just a little bigger than a PC CPU cabinet to take up minimal bench space.

Contact: GBC Scientific (NZ), P.O. Box 68-330, Newton, Auckland. Ph. (09) 373 5765 Fax (09) 360 0683.
Or circle no.26 on the reader reply card.

NEW MOISTURE BALANCES FROM A & D

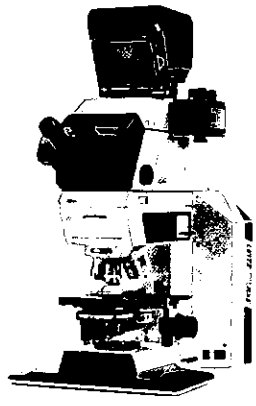
Advantage Data Systems have added to their range of A & D moisture balances with the release of the AD4713 and AD4714 series. The AD4713 is the top of the line moisture balance. Weighing resolution is 0.01%. The infra red lamp minimises measurement error caused by uneven heating or burning of the sample and any temperature between 50 and 200 degrees C may be selected. Sample sizes can be selected from 1 to 300 grams. The AD4713 also has three time setting modes. It is possible to input the minutes to be heated, use the exclusive automatic selection, or continuous measuring process to determine the moisture percentage of your sample. The AD4713 moisture balance comes with a remote cordless keyboard as a standard option to enable remote operation of the balance.

The AD4714 moisture balance has been designed for the price conscious user. It offers fast and easy moisture percentage determination with a weighing resolution of 0.1%. Like the AD4713 the high efficiency infra red heating lamp minimizes measurement error caused by uneven heating or burning of the sample. The AD4714 allows an operator to load any sample from 5 to 70 grams. Heating times can be set up to ninety minutes or set manually.

Contact: David Middleton, **Advantage Data Systems Ltd,** Level 1, 9 Wilkins Street, College Hill. P.O. Box 68-281, Auckland. Phone (09) 360-0916 Fax (09) 360-0074.
For further information circle no.59 on the reader reply card.

ELIMINATE TIRESOME REFOCUSSING WITH THE NEW LEITZ DMR MICROSCOPE

LEITZ recently introduced the DMR microscope which eliminates refocussing after each objective change. The electronic scale overlay automatically adapts itself to the microscope parameters allowing fast and precise classification of object sizes independent of magnification. The new microscope has been fitted with third generation infinity objectives for transmitted and incident light and the elimination of axial chromatic aberrations; and significant reduction or correction of residual lateral chromatic aberrations with the tube lens gives the new system excellent optical performance.



Variability of illumination with four lamp housings and a septuple objective nose piece are two more optical innovations fitted to the new DMR microscope. Ergonomic operation with telescopic stage controls and 110 degrees stage rotation make the DMR system flexible yet very easy to use.

The new Leitz DMR microscope is available in a number of configurations to suit applications in medicine, geology, material sciences, metallography and biological sciences.

Contact: **Labsupply Pierce (NZ) Ltd**, P.O. Box 34-234, Birkenhead, Auckland 10. Ph (09) 443 5867 Fax (09) 444 7314.
Or circle no.42 on the reader reply card.

REVOLUTIONARY DESIGN FOR UV-VISIBLE SPECTROMETRY FROM ATI UNICAM

With over 45 years in spectrometry design and following the 8700 series of UV-Visible spectrometers, ATI Unicam introduces a totally new concept, the UV2 range of scanning spectrometers. By choosing from a range of hardware and software options the instrument can be configured to suit a particular applications environment.

A state of the art, self optimising, high energy double beam optical system has been incorporated into the new range of UV-Visible spectrometers. At the heart of the Unicam UV2 is the revolutionary Hatten Modulator which facilitates rapid signal processing to give the ultimate in photometric accuracy irrespective of scan speed.

The emphasis on the optical design is overall ruggedness, reliability and repeatability for use in the most aggressive environments. The optics are Long Life Quartz Coated Optics which are sealed even further within a separate optics compartment. The grating is a master holographic grating, which helps give UV2 its photometric range, rather than a copy which has difficulty working linearly above 1.5A due to loss of definition of the lines on the grating.

The deuterium and tungsten sources are designed for rapid changeover. Software can monitor their energy profile and how many hours they have been used. This is invaluable in deciding when to replace the lamps. The single photodiode detector is mounted in its own 'shell' to protect from spillages inside the sample compartment.

In addition to the forward thinking optical design is a series of software options. Prism is a software option which can perform scanning, quantitation and rate analysis as standard utilising a minimum key configuration, spill proof keypad and VGA quality liquid crystal display all built into the footprint of the spectrometer. The manipulation and data presentation routines afforded by the software include automatic peak and valley pick, selected wavelength pick, second derivative and emission scanning modes and calibration curve display. A built in, DOS compatible disk drive is included in the Prism option as standard for unlimited data and method storage.

The PC controlled, menu driven Quartz software option offers full colour graphics display, data archiving and full accessory control through icons. Notable features of the software include programmable automatic system switch on/off, Data Processing which records a history of any manipulation or changes which are made to raw data and a rate applications package which can perform automatic linearity search on rate data in seconds.

Contact: **ATI Unicam**, P.O. Box 14-334, Panmure, Auckland. Ph. (09) 527 1745 Fax (09) 527 1743.
Or circle no.43 on the reader reply card.

REGIS CHIRAL STATIONARY PHASES & RESTRICTED ACCESS MEDIA FOR HPLC

Since its inception in 1956, Regis has been involved in the synthesis of a wide range of products primarily oriented toward the pharmaceutical and life science areas. Initially Regis gained experience in the synthesis of a range of biochemical and analytical reagents such as derivatisation and ion-pairing reagents. This led to an interest in the separation sciences.

The company pioneered the use of the Pinkerton ISRP (Internal Surface Reversed Phase) for HPLC analysis of serum and Pirkle chiral packings and columns for the separation of optical isomers.

Continued development has resulted in new Restricted Access Media (RAM) packings for rapid and convenient analysis of analytes in biological matrices; Immobilised Artificial Membrane (IAM) technology in which the chromatographic surface emulates the lipid environment of the cell membrane; the Buckyclutcher for fullerenes analysis; plus a number of other products.

Regis maintains its position as an innovator through its close ties with a number of university research units.

Douglas Scientific is providing full local support for Regis through provision of application support material, product information and supply of the full range of Regis products.

Contact: **Douglas Scientific**, P.O. Box 45-027, Auckland, 8. Ph. (09) 837 5447 Fax (09) 837 5446. Ph. Toll Free 0800 735 725 outside Auckland.
Or circle no.44 on the reader reply card.

NALGENE INTRODUCES SQUARE 2 LITRE PETG MEDIA BOTTLE

Nalge recently extended their range of square PETG media bottles by developing a two litre bottle. This large size has moulded-in hand grips for easier pouring, a wide 53mm mouth to facilitate filling and retrieval of contents and the Nalgene bottle/closure system to guarantee a leak proof seal. The square shape saves space on the shelf, in the refrigerator and freezer, on the lab bench, on racks and under laminar flow hoods. PETG square bottles are available in seven sizes from 30ml to the new 2 litre bottle. The Nalgene PETG square bottle is the first plastic bottle used for long term storage of sensitive cell culture reagents for the biotechnology/pharmaceutical industry. PETG has excellent O_2/CO_2 barrier properties that prevent outgassing and destructive pH shifts in stored media. Both the bottle and the leak proof linerless high density polyethylene closure are non-toxic and non-pyrogenic. The bottles are pre-sterilised and ready to fill. Transparent PETG square bottles economically replace round borosilicate type one glass bottles and have the added advantage that they do not break or shatter like glass. Size for size they are approximately 75% lighter than glass and they are easier to handle. The tamper evident seal, plus individual shrink wrapping of each bottle's closure and neck guarantees sterility. The pouring ring on the neck makes dispensing easy.

Contact: **Medic Corporation Ltd**, Private Bag, Lower Hutt. Ph. (04) 569 3539 Fax (04) 569 7984.
Or circle no.33 on the reader reply card.

PHYSICA RHEOMETER NOW AVAILABLE IN N.Z.

Since being founded in 1985, Physica has become a world leader in the relatively new science of Rheology.

The Mode MC-100 is the only research Rheometer capable of both controlled shear stress (CSS) and controlled shear rate (CSR) in the one single instrument. A huge range of interchangeable modules allows for the easy assembly of the ideal configuration for any application.

All Physica Rheology and Viscometry equipment is run from Windows software and is very competitively priced.

Contact Sci Tech: P.O. Box 12-190, Wellington. Ph. (04) 499 8868, Fax (04) 499 8869.
Or circle no.34 on the reader reply card.

NEW EASY ACCESS ANALYTICAL BALANCES FROM A & D

Advantage Data Systems have added the new A & D HA-M Series of analytical balances to their already comprehensive range of electronic balances.

Featuring a pillarless weighing chamber with three circular doors (and a top access door) the balance provides 200 degree access to the operator. The HA-M also has fully automatic self calibration using two internal calibration masses for better span and linearity.

The balance has been designed to be easily moved by using the two top integrated handles. Once set in position, the HA-M with its advanced software ensures quick stabilization time and the ability to filter out external disturbances.

Options include RS232C serial interface, variable speed vibrating spoon (with automatic shut off from the balance) and a new compact computer.

Contact: David Middleton, **Advantage Data Systems Ltd**, Level 1, 9 Wilkins Street, College Hill. P.O. Box 68-281, Auckland. Phone (09) 360-0916 Fax (09) 360-0074.
For further information circle no.56 on the reader reply card.

NEW RANGE OF DROPPER BOTTLES FROM NALGENE

Nalgene dropper bottles provide accurate, reliable, repeatable dispensing of aqueous reagents. Available in three convenient sizes, 4, 8, or 15ml, they feature a wide 15mm neck finish for easier filling and deliver accurate 50 microlitre drops. One handed flip-top dispensing eliminates cross-contamination. All dropper bottle materials are non-pyrogenic, non-cytotoxic, meet USP class VI and United States Food and Drug Administrative requirements for food contact. Nalgene dropper bottles can be sterilised by gamma radiation or ethylene oxide and are available with white, yellow, orange, green, red or blue caps. These bottles are ideal for use in diagnostic test kits for dispensing reagents, opthalmic solutions, small volume vitamin solutions and a number of other pharmaceutical applications.

Contact: **Medic Corporation Ltd,** Scientific & Industrial Division, Private Bag, Lower Hutt. Ph. (04) 569 3539 Fax (04) 569 7984.
Or circle no.36 on the reader reply card.

TUTORIALS AVAILABLE FOR TEACHING LABORATORIES ON THE PRINCIPLES OF UV-VISIBLE SPECTROSCOPY

ATI Unicam have produced a series of guide notes and practicals which explain the fundamental principles of UV-Visible spectrometry. The notes cover all aspects of this technique including the importance of absorbance accuracy, stray light, the principles of derivative spectroscopy and the use of standard additions to overcome matrix interferences. There are further notes concentrating on scanning spectroscopy including the effect of scan speed, resolution and wavelength accuracy on analytical measurement. These are a valuable aid for any teaching laboratory where students require "hands on" experience of the technique.

Also in the series is a document giving advice on the use and maintenance of cuvettes in UV-Visible spectrometry covering aspects such as cuvette cleaning, the use of microcells, ultra-microcells and nanocells (10-5 microlitres), and a guide to BS codes for different cell types.

Contact: **ATI Unicam,** P.O. Box 14-334, Panmure, Auckland. Ph. (09) 527 1745 Fax (09) 527 1743.
Or circle no.49 on the reader reply card.

THE LATEST IN DIODE ARRAY DETECTON FROM HEWLETT PACKARD

Hewlett-Packard Company recently introduced the HP 1050 series diode-array detector for liquid chromatography. It is available as a stand-alone detection system or as part of an HP 1050 series high-performance liquid chromatography modular system. For automated work, the detection system features a PC-based controller, an HPLC3D ChemStation running under Microsoft Windows. The HP 1050 is for research analysis and for sophisticated routine work using spectral libraries.

The new detector acquires 3-D data continuously during a peak's elution. The third spectral dimension provides the chromatographer with more data per unit time for more reliable results. For example, the HPLC3D ChemStation's software can confirm a peak's purity while quantifying the response against calibration standards.

Now, routine analyses such as environmental monitoring, pharmaceutical quality control or quality assurance testing of other manufactured goods can benefit from the new detectors automated features, including peak-purity calculations — based on comparisons of UV-visible absorbance spectra recorded during elution; positive peak identity — based on spectral comparisons with archived UV-visible absorbance spectra from spectral libraries; and self-validating optics and microprocessors — based on a holmium oxide filter for wavelength calibration.

Contact: **Medtec Products Ltd,** P.O. Box 38-543, Petone, Wellington. Ph. (04) 567 0011 Fax (04) 567 2821.
Or circle no.50 on the reader reply card.

THE NEW GENERATION OF ROTARY EVAPORATORS FROM BUCHI

As the inventor of the rotary evaporator, BUCHI has always been in the forefront of development and innovation.

Four new models are now available in the new generation of BUCHI rotary evaporators: R114 BASIC, R124 STANDARD, R134 OPTIMA, R144 TOP.

The electronic drive head, sealing systems and sets of glassware, are based on modular components and can be exchanged in no time. This enables the user to set together the model they require.

The scientifically tested protective screen, the heating baths with cool-wall protection from accidental contact and seamless plastic coated glassware, combine to offer three times the degree of safety.

For water saving and minimal solvent emissions, there is a vacuum controller in the models Optima R134 and Top R144. These two integrated control units enable a controlled evaporation without unnecessary pollution of the environment.

Contact: **Watson Victor Ltd,** P.O. Box 1180, Wellington. Ph. (04) 385 7699 Fax (04) 384 4651. Or phone one of our offices in Auckland, Christchurch or Dunedin.
Or circle no.51 on the reader reply card.

NALGENE INTRODUCES GRADUATED CARBOYS

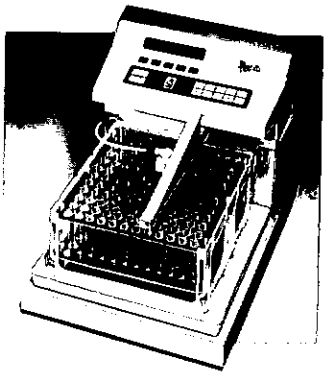
Nalgene are well known for their extensive range of high quality carboys moulded in a number of different resins. Now all Nalgene round carboys from 10 to 50 litres feature moulded-in graduations in litre increments. This saves time calibrating carboys and the mouldings are accurate. Nalgene round carboys with spigots are graduated to deliver, carboys without spigots are graduated to contain. Nalgene round carboys are available in a number of sizes for a variety of applications including shipping and storing distilled water, chemicals and powders. They are shatter proof, light weight and less expensive than glass.

Contact: **Medic Corporation Ltd,** Scientific & Industrial Division, Private Bag, Lower Hutt. Ph. (04) 569 3539 Fax (04) 569 7984.
Or circle no.52 on the reader reply card.

SMART SMALL FRACTION COLLECTOR

Features - built-in peak detection, intuitive programming, space-saving design, wide variety of collection vessels.

Isco's new Foxy® Jr. sizes fractions by time, drop, or pumped volume; locates LC and HPLC peaks; and collects fractions in the most useful way for practically any type of chromatography. By monitoring the slope or level of a UV or other detector signal and combining peak detection with selectable time windows, Foxy Jr. collects only desired peaks and diverts other effluent to waste to minimise glassware handling.



Space-saving design provides an overall footprint of only 27 x 31cm but a capacity of up to 144 tubes. Straightforward parameter entry via a convenient keypad and LCD allows quick, easy setup with no unnecessary keystrokes. Interchangeable racks hold test tubes from 12 to 25mm diameter and up to 150mm tall; full-size or mini scintillation vials; or microcentrifuge tubes. Coldroom-proof electronics and thorough spill protection help assure long-term reliability.

For further information contact: **Douglas Scientific,** P.O. Box 45-027, Auckland 7. Phone (09) 837 5447, Freephone 0800 735 725 (outside Akld.), Fax (09) 837 5446.
Or circle no.45 on the reader reply card.

ANODISC MEMBRANE FILTER DISCS

The Whatman Anodisc filters have superior level of particle removal efficiency because of the narrow pore size distribution of the inorganic membrane and the high porosity of the membranes also give these filters very high flow rate capability. The membrane renders it compatible with a wide range of solvents and aqueous solutions. No monomers, plasticisers, adhesives, surfactants or wetting agents are used in manufacture, so the level of extractables is below detectable limits, avoiding sample contamination. The capillary pore structure of the membrane enables microorganisms and particulate material to be trapped on the surface of the membrane, and not within its structure.

Anodisc is ideal for HPLC mobile phase filtration, bacterial analysis by epifluorescent light microscopy, ultra cleaning of solvents and gravimetric analysis.

The filters are available in 2 diameters - 21mm and 46mm. They are available in pore sizes of 0.02, 0.1 and 0.2um.

Contact: **LabSupply Pierce NZ Ltd,** P.O. Box 34-234, Auckland 10. Ph. (09) 443 5867 Fax (09) 444 7314.
Or circle no.46 on the reader reply card.

NEW ATI MATTSON GENESIS FTIR SYSTEM

The new Genesis Series FTIR spectrometer from ATI Mattson uses new technologies to miniaturise the spectrometer to an unprecedented 0.19m² footprint. This dramatic reduction in size not only saves the user precious lab space but also contributes to the reliability and ruggedness of the instrument. Smaller instruments use fewer components which means that there is less to go wrong. Advanced electronics utilising PAL, DSP and ASIC technology, all on one circuit board, contribute both reliability and low power consumption.

Despite the small footprint Genesis has a full sized sample compartment which accepts all standard FTIR accessories. Genesis uses accessories either in the industry standard 2" x 3" slide mount or on pinned baseplates for rapid and precise switching between sampling techniques. The spectrometer optics are protected from the environment by a sealed and dessicated module inside the instrument.

Genesis and Genesis Advanced software run on an integral notebook PC, giving the user a suite of software routines to match their application and the advantage of floppy disk and hard disk storage on a DOS and Windows 3.1 platform. A variety of output devices including plotters, bubblejet printers and laser printers are compatible with Genesis giving the user complete flexibility of choice.

Contact: **ATI Unicam,** P.O. Box 14-334, Panmure, Auckland. Ph. (09) 527 1745 Fax (09) 527 1743.
Or circle no.47 on the reader reply card.

GENESIS SOFTWARE TAKES THE GUESSWORK OUT OF FTIR SPECTROSCOPY

One of the key reasons why FTIR spectroscopy has largely taken over from conventional dispersive infrared is the improved signal-to-noise performance offered by FT systems and the ability to co-add multiple scans rapidly. However, until now, this advantage has required the instrument user to have acquired a degree of skill and experience in the technique which may not be appropriate where there are a great many different instrument technologies used in one lab. For example, the operator would need to know that ten times as many scans are required to achieve the same quality spectrum from the same sample measured by diffuse reflectance rather than transmission.

Now ATI Mattson have taken the guesswork out of FTIR with the Genesis Series FTIR spectrometer. A simple menu setting allows the spectrometer to be set to acquire data until a pre-selected signal-to-noise ratio is achieved. In a routine environment this guarantees that spectra of consistent quality can be obtained by operators who are untrained or inexperienced in FTIR techniques. Removing operator variability from results improves consistency in QC sampling. For quality control labs checking in-coming raw materials this reduces throughput time. Should a sample fail the QC test then a high quality spectrum is immediately available for further investigation. The improved throughput time for variable samples is also invaluable in the busy teaching lab.

Contact: **ATI Unicam,** P.O. Box 14-334, Panmure, Auckland. Ph. (09) 527 1745 Fax (09) 527 1743.
Or circle no.48 on the reader reply card.

POLAROID RELEASES A NEW, FULLY AUTOMATIC INSTANT CAMERA FOR LIGHT MICROSCOPY

A new fully-automatic, single lens reflex (SLR) instant camera for photographing any specimen through a light microscope has been introduced recently by Polaroid. Called the MicroCam SLR, this new Polaroid microscope camera features a sophisticated exposure and filtration control system, to produce high quality instant colour and black and white hard copy prints, with push button ease. The MicroCam SLR simplifies the microphotographic process in applications ranging from the classroom to advanced research laboratories.

Weighing only 1kg and measuring 20 x 18 x 18cm, the portable MicroCam SLR can be readily moved from microscope to microscope, to serve as the "dedicated" imaging system for an entire laboratory.

The camera attaches to a microscope by sliding the Microcam SLR's 10x magnification lens directly into the microscope's eyepiece tube or phototube, allowing the camera to fit almost all light microscopes. MicroCam's multi-element glass lens produces sharp, clear Polaroid pictures and the bright, single lens reflex viewing system allows the microscopist to focus and frame the specimen easily.

The built-in digital light meter, microprocessor and colour correction filter, combine to produce correct exposure and filtration automatically for high quality colour and black and white prints. The advanced exposure control system adjusts exposure time to compensate for film speed lost in long exposures and controls the colour balance for the final print by adjusting the percentage of the total exposure made through the colour correction filter.

In addition to its automatic functions, MicroCam SLR offers a manual mode that lets the user time exposures precisely up to 10 hours.

MicroCam SLR produces instant 11.4 x 10.8cm Polaroid Type 339 colour or Type 331 black and white professional AutoFilm prints. At the end of each exposure, the camera ejects the film to develop automatically without the need to time or peel the print. Both Polaroid Autofilms are approved for use in class 100 clean rooms.

Contact: **LabSupply Pierce (NZ) Ltd,** P.O. Box 34-234, Birkenhead, Auckland 10. Ph. (09) 443 5867 Fax (09) 444 7314.
Or circle no.28 on the reader reply card.

NEW pH, CONDUCTIVITY & TEMPERATURE METERS FROM HANNA

HANNA Instruments provide a wide range of economically priced equipment for pH, conductivity and temperature measurement as well as dose control of pH and ORP.

A new range of products has recently been released designed specifically for the food industry. These include pocket size, portable and bench-top models as well as waterproof and printing units.

For a complete catalogue or details on individual models contact your local Hanna Distributor or Peter Hassan at **Alphatech Systems** on telephone (09) 377 0392.
Or circle no.29 on the reader reply card.

ELGA OPTIMISES LABORATORY WATER PURIFICATION

Elga have launched a compact laboratory water purification system designed to produce high-grade reagent water from a potable supply at flowrates of 30 or 60L/hr. Called the Elgastat Optima, the system utilises a combination of proven technologies encapsulated in a single unit to provide purified water for applications such as media preparation and reagent make-up.

Superior in quality to single-distilled water, Optima water is purified by reverse osmosis (RO) together with ionic/organic removal, ultra-violet photo oxidation and ultra-microfiltration. The purification media are housed in a special non-drip, high capacity twin cartridge pack, minimising both the running costs and the frequency of cartridge replacement.

A microprocessor-based management system enables the user to select an operating mode that meets particular water quality requirements. In addition, the system status and the water quality - both after the RO module and after final purification - are continuously monitored and displayed.

Easy to operate and maintain, the Optima has low running costs and can be wall or bench mounted. Included in the comprehensive range of accessories is the Elgastat Steritank, which not only incorporates a pre-filter, but acts as a mains water supply break tank and facilitates disinfection of the unit.

For further information contact: **Douglas Scientific,** P.O. Box 45-027, Auckland 8. Ph (09) 837 5447, Freephone 0800 735 725 (outside Akld.), Fax (09) 837 5446.
Or circle no.30 on the reader reply card.

BRINGING ANALYTICAL BALANCE PERFORMANCE TO THE FACTORY FLOOR

Do you need a heavy-duty balance to weigh loads as big as 6kg - 12kg on your factory floor, but one which will give the levels of accuracy and resolution typical of an analytical model?

A & D's FP Series balances have been specifically designed to bring analytical balance performance to the industrial environment. They boast a large, flat weighing pan and a tough, durable construction that can withstand the most hostile of factory production conditions. Despite this ruggedness they still offer a level of resolution as fine as 0.01g.

FP balances are packed with sophisticated weighing functions: 11 different weighing units included as standard (including grams, ounces, carats and pennyweights); the exclusive A & D Counting Function that continuously re-establishes average unit weight; and a HI, LO, GO comparator function for easy and efficient checkweighing.

Everything in an FP balance is designed to make weighing easy. There is a simple, full digital calibration. The large, blue fluorescent display is clearly readable in any light, is on a swing arm, and can be sited anywhere from eye level to bench level.

FP balances are available in three versions. The FP-6000 offers a capacity of 6kg with a resolution of 0.01g, while the FP-12K has a capacity of 12kg and a resolution of 0.1g. The FP-6200 has a dual range with a resolution of 0.01g.

All three models can be used with an optional Remote Control Unit that will calibrate, command and digitally input from up to three metres away. Other popular options are an RS-232C/ Current Loop Interface, for printer or computer hook-up, and a comparator output.

Contact: David Middleton, **Advantage Data Systems Ltd,** Level 1, 9 Wilkins Street, College Hill. P.O. Box 68-281, Auckland. Phone (09) 360-0916 Fax (09) 360-0074.
For further information circle no.57 on the reader reply card.

TIPOS' SYBYL 6.0 OPENS NEW RESEARCH DATA HORIZONS

Researchers worldwide are capitalising on new research information tools in Tripos' SYBYL 6.0 with its *chemactive* Molecular Spreadsheet.

The Molecular Spreadsheet is a new paradigm to handle molecular information management, communication, and discovery from analytical, computational, and database sources for researchers and enterprise-wide teams. The Spreadsheet is *chemactive* in that it provides over 40 molecular measurements, stores 3D structures, and performs calculations such as molecular mechanics energy and dipole moment, within the familiar row and column structure. The Spreadsheet then interactively links computations and statistical and visual analysis display to provide immediate perspectives on the data.

Established in 1979, Tripos now links scientific, spreadsheet and open interface tools to pioneer the field of Molecular Information Analysis Systems. As part of this strategy SYBYL computer-aided molecular design and analysis software is complemented by tools for Analytical Information Processing and Chemical Information Management. Tripos is committed to providing an innovative family of software solutions that dramatically enhance daily productivity in the molecular sciences through proven research strategies while advancing the frontier of knowledge in discovery of new methods.

Contact:- Bruce Meyer of **TRIPOS** Associates Inc. Ph. (800) 323-2960, Fax (314) 647-9241, 1699 South Hanley Rd, Suite 303, St. Louis, Missouri, 63144, U.S.A.
Or circle no.35 on the reader reply card.

NEW RANGE OF PRECISION BALANCES FOR GRAMS-ONLY WEIGHING

Available now from Advantage Data Systems is the A & D FA-Series - a new range of precision balances, introduced as an attractive and cost-effective alternative for those who only require gram units weighing.

FA balances enjoy the same stylish, low profile, compact casing as FX models. Once again, there is a blue fluorescent display which is easy to read in any light. All weighing operations are simply controlled through just four separate sealed keys.

In common with all A & D balances, the FA models offer extremely high weighing accuracy. They also incorporate an in-built counting function, and a percentage function to speed through checkweighing jobs.

A bonus of weighing with an FA balance is that it can be used virtually anywhere, if the optional rechargeable battery pack is installed. Other options include an RS232/Current Loop and glass draft shield.

The FA Series comprises three models: the FA-200 (weighing up to 210g x 0.001g), the FA-2000 (2100g x 0.01g) and the FA-6000 (6100g x 0.1g).

Contact: David Middleton, **Advantage Data Systems Ltd,** Level 1, 9 Wilkins Street, College Hill. P.O. Box 68-281, Auckland. Phone (09) 360-0916 Fax (09) 360-0074.
For further information circle no.58 on the reader reply card.

NZIC Conference

Tuesday 7 - Friday 10 December 1993

The University of Auckland

Chemists are invited to participate in this conference which is being held in conjunction with the **Medicinal and Agricultural Division of RACI**. The conference will cater for those active in most fields of fundamental research, as well as more applied areas. The programme will include invited contributions by prominent New Zealand scientists and by scientists from overseas.

Plenary lectures.

A feature of the conference will be plenary lectures by four distinguished scientists whose research covers a broad span of chemistry:

Prof John Albery, FRS (Oxford University)
Prof Ray Baker (Merck, Sharp & Dohme, UK)
Prof Robert Bergman (University of California, Berkeley)
Prof Ron Prinn (Massachusetts Institute of Technology)

Professor John Albery is Master of University College, Oxford and Professor of Physical Chemistry at that University. He was born in 1936, educated at Winchester College and Balliol College, Oxford, gaining his DPhil with Professor RP Bell. He was then elected to a Fellowship at University College, Oxford, and during his time there also held visiting research positions in Britain and the United States. In 1978 he was appointed Professor of Physical Chemistry at Imperial College, London, where he later held the post of Dean of the Royal College of Science and Head of the Chemistry Department. He was elected to Fellow of the Royal Society in 1985.

John Albery has made major contributions to the fields of electrochemistry, the kinetics of proton and electron transfer, and the development of polymer modified electrodes as sensors. In his early work on ring-disk electrodes he showed how convection-diffusion processes were coupled with electron transfer at electrode surfaces, and in some cases fast homogeneous reactions. These techniques were extended to time resolved electron spin spectroscopy and photochemistry. He is widely known for his pioneering investigations into photo-galvanic cells, which convert solar energy into electricity and stored chemical energy. This research led to the discovery of modified electrodes, which carry films of conducting polymers, and which can be adapted as sensitive sensors for biomedical applications.

Dr. Albery has published several major reviews and monographs, and a large number of seminal papers. His textbook on "Electrode Kinetics" (1975) is a model of an original and lucid introduction to the field. In addition to his scientific contributions, John Albery has a reputation for his humorous and satirical writing of scripts for television and the theatre.

In 1989, he was elected Master of University College, Oxford and in 1992 was President of the Chemistry Section of the British Association. He is the author of 2 monographs and over 200 research papers.

Professor Albery

Professor Ray Baker is Executive Director of Medicinal Chemistry at the Neuroscience Research Centre of Merck Sharp & Dohme, situated just north of London. He was born in Derbyshire and graduated from Leicester University before going on to do postdoctoral studies at the University of California.

He was previously Professor of Organic Chemistry at the University of Southampton, where his work ranged from studies of organometallic chemistry to insect chemistry and organic synthesis. The first eight years of independent research was involved with physical organic chemistry. The culmination of this period was the publication of a standard text on the mechanism of organic chemistry. A major change of emphasis was made into a study of insect pheromones. This involved the determination of the structure and synthesis of a range of insect pheromones and the demonstration of their role in insect behaviour.

The synthetic chemistry involved with the preparation of insect pheromones led, in due course, to the synthesis of more complex natural products. New synthetic procedures were developed for the construction of spiroacetals, a group commonly found in a range of natural products.

Professor Baker joined Merck Sharp & Dohme in 1984 as Director of Medicinal Chemistry at the beginning of the new research centre. The major emphasis of the work is the search

Professor Baker

for new drugs for the treatment of diseases such as Alzheimer's, schizophrenia, depression, neurodegeneration of the brain and the treatment of pain particularly that associated with migraine and inflammation.

He is the author of over 250 scientific publications and has filed over 30 patents since 1985. He was recently awarded the 1991 Royal Society of Chemistry Prize for Medicinal Chemistry and the 1992 Hugo Müller Medal for Chemistry associated with Biology.

Professor Bob Bergman is Professor of Chemistry at the University of California, Berkeley. Born in Chicago in 1942, he received his PhD at the University of Wisconsin with Professor J.A. Berson. After post-doctoral work with Ronald Breslow at Columbia his teaching career began at Caltech, moving to Berkeley ten years later, in 1977.

Professor Bergman

Professor Bergman was trained as an organic chemist and spent the first part of his independent career at Caltech investigating the mechanisms of organic reactions. He also developed methods for the generation and study of unusually reactive molecules, such as 1,3-diradicals and vinyl cations. In 1972 he discovered the thermal cyclization of *cis*-1,5-hexadiyne-3-enes to 1,4- dehydrobenzene diradicals, a transformation that has recently been identified as a crucial DNA-cleaving reaction in several antibiotics that bind to nucleic acids. In the mid-1970's his research broadened to include organometallic chemistry. Since that time he has made contributions to the synthesis and chemistry of several types of organotransition metal complexes and to improving our understanding of the mechanisms of their reactions. In this area he has focused on migratory insertion and oxidative addition reactions, the chemistry of new dinuclear complexes, the investigation of organometallic compounds having metal-oxygen and metal-nitrogen bonds, and the reactions of organotransition metal enolates. He is probably best known for his discovery of the first soluble organometallic complexes that undergo intermolecular insertion of transition metals into the carbon-hydrogen bonds of alkanes, and the use of liquefied noble gas solvents in the study of these reactions.

He is the author of over 200 scientific publications and has received a number of awards and honours. He was elected a member of the National Academy of Sciences and the American Academy of Arts and Sciences in 1984. He has held a large number of visiting lectureships and has given extensive service to the profession of chemistry.

Professor Ron Prinn is TEPCO Professor of Atmospheric Chemistry in the Department of Earth, Atmospheric, and Planetary Sciences at MIT; Director of the MIT Center for Global Change Sciences and Co-Director of the MIT Joint Program on Science and Policy of Global Change.

He was born in Hamilton, New Zealand in 1945 and graduated MSc with first class honours in chemistry, from the University of Auckland in 1968, and ScD from MIT.

Professor Prinn's principal research interests are broad, incorporating the chemistry, dynamics, and physics of the atmospheres of the Earth and other planets and the chemical evolution of atmospheres. He leads the Global Atmospheric Gases Experiment (GAGE) in which the rates of increase of the concentration of the trace gases involved in the greenhouse effect and ozone depletion have been measured continuously over the globe since 1978. In the 1970s he and his colleagues developed the first comprehensive global three-dimensional dynamical-chemical- radiative model of the ozone layer and applied it specifically to elucidating the effects of supersonic aircraft on ozone. He is a Fellow of the American Geophysical Union (AGU), a 1981 recipient of the AGU's Macelwane Medal, and the 1984 V.I. Vernadsky Memorial Lecturer of the USSR Academy of Sciences. He is currently the Chairman of the Steering Committee for the International Global Atmospheric Chemistry Project and he has served as the chairman of the National Research Council Committee on Earth Sciences. Professor Prinn is also very active in planetary science including participation in the Pioneer Venus mission and co-authorship of the Academic Press book, *Planets and their Atmospheres: Origin and Evolution.*

Symposia.

In addition to the plenary lectures, the conference programme will take the form of symposia in the following subject areas:

Medicinal and agricultural chemistry, and natural products (marine and terrestrial). Organic synthesis. Inorganic and organometallic chemistry. Environmental chemistry. Surface science. Chemical education. Reaction mechanisms. Food chemistry. Forensic science. Physical and theoretical chemistry. Polymer chemistry.

Each symposium will include keynote lectures, and shorter oral papers and posters.
Invited speakers who will give keynote lectures include:

- **Prof RA Anderson** (University of British Columbia)
- **Prof Yoshinori Asakawa** (Tokushima Bunri University)
- **Prof David Boykin** (Georgia State University)
- **Dr RJ Capon** (University of Melbourne)
- **Prof JM Cassidy** (Ohio State University)
- **Mr Maurice Churton** (NZ Forensic Odontology Society)
- **Prof Bill Cullen** (University of British Columbia)
- **Prof DJ Faulkner** (Scripps Institution of Oceanography)
- **Prof Lew Mander** (Australian National University)
- **Ms Miranda Mapletoft** (University of York)
- **Prof Stephen Neidle** (Institute for Cancer Research, London)
- **Prof H Ogino** (Tohoku University)
- **Prof Raphael M Ottenbrite** (Virginia Commonwealth University)
- **Dr Ian Patterson** (Cambridge University)

- **Dr Hollis Showalter** (Parke-Davis/Warner-Lambert Company)
- **Prof Geoffrey Sykes** (University of Newcastle upon Tyne)
- **Prof T Don Tilley** (University of California, San Diego)

Easterfield Medal and Lecture.

The Easterfield medal is awarded in alternate years to the New Zealand chemist under the age of 35 who has made the most distinguished contribution to research. The 1993 recipient is:

Dr Margaret Brimble
(Chemistry Department, The University of Auckland)

Dr Margaret Brimble joined the staff of the Department of Chemistry at the University of Auckland at the beginning of 1993, after seven years with Massey University.

Margaret Brimble was born in Auckland in 1961 and topped the Science Faculty at the BSc and MSc level. Her MSc research was undertaken with Professor Brian Davis (Conference Chairman), and her PhD research at Southampton University with Professor Ray Baker (Plenary Lecturer). Her doctoral studies involved work on the polyether antibiotic salinomycin; she has maintained and developed her interest in that area of spiroacetal synthesis. She was then appointed to a lectureship at Massey University and in her research in conjunction with a growing group of research students undertook the total synthesis of a number of natural products. The Easterfield Medal is not the only recognition of her work; she has recently received the Hamilton Award of the Royal Society of New Zealand and spent the 1992 Fall Semester at the University of California, Berkeley with Professor Clayton Heathcock. She is the author of 30 scientific papers.

Posters.

Posters will be displayed throughout the conference period, and poster discussion periods will be scheduled. A prize of $250 will be awarded for the best-presented poster. In addition, prizes of $250, $150 and $100 will be awarded for the three best posters by graduate students who are present at the conference.

CHEMEXPO 93:

Conference Exposition and Display.

This exposition will run conjointly with the conference from Tuesday to Friday. The professionally set out display area will provide an excellent showcase for companies active in the scientific, chemical, analytical and technical publishing industries to demonstrate their latest products and services. Further information including a site map and exhibitor registration form is available from the Conference Secretary.

Social Programme.

There will be an informal mixer on Monday evening preceding the conference, at O'Rorke Hall, which is likely to house the majority of conference delegates. On Tuesday evening a Deans' buffet will be held. On Wednesday there will be an informal women's lunch in the Upstairs Dining Room, Old Government House, 12.30 - 1.30 pm. Female delegates are cordially invited to attend this function. On Wednesday afternoon there will be a picnic tour by coach to West Auckland, taking in scenic spots of the Waitakere ranges, the west coast beaches and gannet colony, and vineyards, culminating in a barbecue meal at twilight. The conference dinner will be barbecue-style, and will be held on Thursday evening in the grounds of Old Government House (the former Governor's mansion built in 1853). Accompanying persons are invited to participate in all of these functions. No specific programme for accompanying persons has been arranged, but a variety of sightseeing and other activities in the Auckland area and further afield are readily available.

New Zealand Institute of Chemistry Conference 1993

Tuesday 7 - Friday 10 December 1993, The University of Auckland, New Zealand

REGISTRATION FORM

Surname _____ Title _____

First names _____ Tel _____

Address _____ Fax _____

_____ Email _____

Presentation (indicate preference) ☐ oral paper ☐ poster

Title _____

Author(s) _____

Preferred symposium:

Registration Fee (all costs given in NZ$, GST inclusive)	Before 30/9/93	After 30/9/93
☐ Standard (RACI/NZIC/ACS/RSC etc member)	240.00	270.00
☐ Graduate student	80.00	80.00
☐ Non-member of NZIC/RACI etc	300.00	350.00
☐ One day - standard	100.00	120.00
- student	30.00	30.00
☐ Chemical Education Symposium only	30.00	30.00

$ _____

Accommodation (daily rates are shown)

☐ O'Rorke Hall (single rooms only) (no. of nights x 46.15) = _____

☐ Hyatt Kingsgate 208.15

☐ Arrival date _____ Departure date _____ $ _____

Social Programme

☐ Conference Dinner (Thursday 9 December)

☐ Vineyard Tour (Wednesday 8 December)

☐ Deans' Buffet (Tuesday 7 December - no charge)

☐ Mixer (Monday 6 December - no charge)

Total payment due

☐ Bank draft in NZ dollars (payable to NZIC Conference 1993)

☐ Credit card Type _____ (VISA, Mastercard, etc)

Number _____ Expiry date _____

Signature _____ Date _____

☐ Post-conference tours information required

CHEM EXPO 93

To be held in conjunction with the New Zealand Institute of Chemistry Conference, 7 - 10 December 1993.

The premier promotional opportunity for companies involved in the scientific and chemical industries in New Zealand.

Current indications lead us to expect more than 300 delegates and the Exposition will be a centrally located and important part of the conference with traffic flow directed through the display area during the refreshment and lunch breaks. It is intended that the posters will also be in the EXPO area, and also one of the evening functions.

Over 100 companies in the following industries have been invited to participate in the EXPO:
Scientific supply, industrial chemicals, CRI's, consulting analysts, technical publishing, polymer and packaging, and food and flavour. Consequently, we expect the EXPO to be oversubscribed and sites will be reserved on a strictly "first come first served" basis.

So that you can derive even greater exposure and benefit from the event we propose to make complimentary EXPO ONLY passes available for exhibitors to give to invited clients.
Numbers of these will be given to exhibitors on request.

To request an Exhibitor information and registration pack simply complete & return the slip below to:

Dr Allan Easteal
Chemistry Department
The University of Auckland
Private Bag 92019, Auckland.

Company: _____ **Phone:** _____

Name: _____ **Fax:** _____

Address for correspondence: _____

_____

Please tick

☐ We intend to exhibit at Chem Expo 1993.
Please rush me an Exhibitor Registration Pack.

☐ Please send me more information on the Conference and Chem Expo.

Venues.

Conference sessions will be held on the university campus in the Chemistry building and in the adjoining Maths/Physics building. The poster display and instrument and equipment exhibition will be in the nearby student union building.

Accommodation.

Low cost accommodation (single rooms only) is available at O'Rorke Hall, a new residence hall with high quality facilities. Breakfast is included in the charge of $46.15 per day (GST inclusive). Advance payment in full is required for O'Rorke Hall accommodation. For those who prefer hotels or motels, the Hyatt hotel is conveniently located adjacent to the campus. Advance payment of one day's tariff ($208.15) will secure a reservation. Reservations at O'Rorke Hall and the Hyatt hotel will be made for delegates on request (see registration form). For those who wish to make their own accommodation arrangements, information on other hotels and motels close to the campus is available from the Conference Secretary.

Registration.

The standard full registration fee is $240 for members of NZIC, RACI and other professional chemical bodies, and $80 for graduate students. The registration fee covers programme book, abstracts, lunches and refreshments each day, the mixer and the Deans' buffet. There is a special fee of $30 for those attending only the Chemical Education symposium. See registration form for further details. Registration forms should be returned to the Conference Secretary by 30 September.

Call for Papers - Abstracts.

Oral presentations (20 minutes) and/or posters are invited in the fields defined by the symposia. Abstracts must be received by the Conference Secretary by 30 September 1993. Abstracts should be printed on one A4 page with 30 mm margins, and should include the full title of the paper, author(s) and address(es). In the case of multi-authored papers, the name of the presenter should be asterisked. The print quality should be such as to allow direct reproduction by photocopying.

Travel.

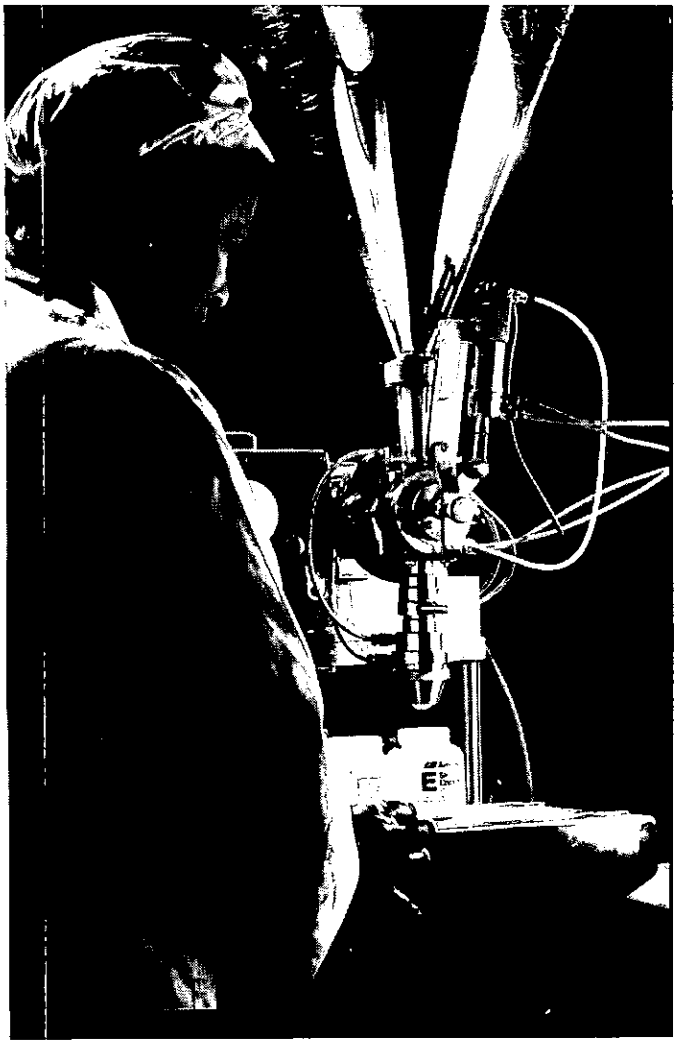
The official carrier for the conference is Air New Zealand whose generous support of the conference is acknowledged with gratitude. A 30% discount is available on Air New Zealand domestic services for travel to and from the conference: the authority DOM 1866/3 should be quoted when making reservations.

Post-conference tours.

Several post-conference tours are available through local tour operators. Information will be sent on request (tick box on registration form).

Conference Secretary:

Dr Allan Easteal
Chemistry Department, The University of Auckland
Private Bag 92019, Auckland
Telephone: 09-3737599 ext. 8963 or 8343
Facsimile: 09-3737422
Email: aj.easteal@auckland.ac.nz



CONFERENCES AND SEMINARS

31 July, 1993. **N.Z. Federation of University Women, Auckland Branch. Seminar on "Demystifying Economics"**

Venue: University of Auckland, Conference Centre, 2.00pm to 5.00pm 22 Symonds Street, Auckland.
For details: Phone Dr. Dormer 09-5246404

4 August, 1993. (1p.m.) **"Optimisers do it best - Sometimes"**
A lecture by Professor David Ryan - Engineering Science, Management Science, and Information Systems, University of Auckland.

Venue: University of Auckland, Conference Centre, 22 Symonds Street, Auckland.

10 August, 1993 (8p.m.) **"Taking New Zealand Seriously"**
A lecture by Professor Tim Hazledine - Economics, University of Auckland.

Venue: University of Auckland, University Hall, Old Arts Building, Princess Street, Auckland.

9-13 August, 1993. **Asianalysis II. Asian Conference on Analytical Chemistry.**

Venue: Changchun, China.
For further information contact:
Professor Erkang Wang,
Changchun Institute of Applied Chemistry,
Chinese Academy of Sciences,
P.O. Box 1022, Changchun,
Jilin 130022
China.

19-21 August, 1993. **Peer Tutoring: Learning by Teaching**

Venue: University of Auckland, Conference Centre, 22 Symonds Street, Auckland, New Zealand.

For further information contact:
Iris Greenland,
Higher Education Research Office,
University of Auckland,
Private Bag 92019, Auckland,
New Zealand.
Ph. 64-9-3737599 (ext 8356) Fax 64-9-3737474

23-27 August, 1993. **AGRI-TECH '93 Science for Industry**

Venue: Auckland, New Zealand.
For further information contact:
Mr. Keith Fuller,
Secretary AGRI-TECH,
251 St. Andrews Road, Epsom,
Auckland, New Zealand.
Ph. 64-9-6258814.

2-4 September, 1993. **W2(SC) - Women's Suffrage Centennial Science Conference.**

Venue: Wellington, New Zealand.
For further information contact:
W2(SC)
P.O. Box 16105, Wellington,
New Zealand.
Ph. 64-4-3892578 Fax 64-4-3892589.

12-18 September, 1993. **7th International Conference on Coal Science.**

Venue: Banff, Alberta, Canada.
For further information contact:
The Coal Research Association of NZ Inc
P.O. Box 31-244, Lower Hutt,
New Zealand.
Ph. 64-4-5662289 Fax 64-4-5667737.

26 September-1 October, 1993. **12th Australian Symposium on Analytical Chemistry (12AC) incorporating the 3rd Environmental Chemistry Conference (3EL).**

Venue: Burswood Convention Centre, Perth, Western Australia.

For further information contact:
Conference Secretariat,
12AC/3EC,
UWA Extension,
Conference and Seminar Management,
The University of Western Australia, Nedlands,
Western Australia 6009.
Ph. 61-9-3803181 Fax 61-9-3801088.

11-15 October, 1993. **VIth International Conference on Superoxide and Superoxide Dismutase.**

Venue: Kyoto, Japan.
For further information contact:
JTB Communications Inc.,
New Kyoto Centre Building 5F,
Shiokoji - Shinmachi, Shimogyo-ku,
Kyoto 600, JAPAN.

17-22 October, 1993. **Twentieth Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies.**

Venue: Cobo Hall, Detroit, Michigan, USA.
For further information contact:
FACSS National Office,
198 Thomas Johnson Drive S-2,
Frederick MD 21702, USA.
Ph. 1-301-8464789 Fax 1-301-6946860.

20-22 October, 1993. **5th NZ Coal Conference.**

Venue: Park Royal Hotel, Wellington, New Zealand.
For further information contact:
The Conference Secretary,
5th NZ Coal Conference,
Coal Research Association NZ Inc,
P.O. Box 31-244,
Lower Hutt, New Zealand.
Ph. 64-4-5662289 Fax 64-4-5667737.

6-10 December, 1993. **Australian Conference on Optics, Lasers and Spectroscopy.**

Venue: University of Melbourne, Melbourne, Australia.
For further information contact:
Dr. R. J. McLean,
ACOLS '93 Conference Secretary,
CSIRO Materials Science and Technology,
Locked Bag 33, CLAYTON,
Victoria 3168, Australia.
Ph. 64-3-5422875 Fax 64-3-5441128.

13-17 December, 1993. **3rd Pacific Polymer Conference, Gold Coast, Australia.**

For further information contact:
PPC-3 Secretariat
Department of Chemistry,
University of Queensland,
Queensland 4072, Australia.
Ph. 61-7-3653511 Fax 61-7-3653628.

10-21 January, 1994. **The 27th General Assembly of the International Association of Seismology and Physics of the Earth's Interior (IASPEI 94)**

Venue: Victoria University, Wellington, New Zealand.
For further information contact:
The Secretary, IASPEI 94,
Institute of Geological & Nuclear Sciences,
P.O. Box 1320, Wellington, New Zealand.
Ph. 64-4-4738208 Fax 64-4-4710977.

3-4 February, 1994. **NZIC Chromatography Group "Supercritical Fluid Extraction, Solid Phase Extraction and other Advances in Chromatographic Analysis"**

Venue: Rotorua, New Zealand.
For further information contact:
Dr. Peter Robinson,
R. J. Hill Laboratories Ltd,
P.O. Box 4048,
Hamilton East,
New Zealand.
Ph. 64-7-8552266 Fax 64-7-8549886

8-9 February, 1994. **Second New Zealand Symposium on Biosensors and Chemical Sensors.**

Venue: Bishop Julius Hall, University of Canterbury, Christchurch, New Zealand.
For further information contact:
Wendy Collier,
AgResearch Grasslands,
Private Bag,
Palmerston North, New Zealand.
Ph. 64-6-3568019 Fax 64-6-3561130.

6 - 10 February 1994. **9th Australasian Electrochemistry Conference.**

Venue: Wollongong, Australia
For further information contact:
Professor Gordon Wallace,
Department of Chemistry,
University of Wollongong,
Locked Bag 8844 South Coast Mail Centre,
NSW 2521, Australia.
Phone 61-42-213127 Fax 61-42-213114

13-18 February, 1994. **8th International Conference on Surface and Colloid Science.**

Venue: Adelaide Convention Centre, Adelaide, South Australia.
For further information contact:
The Secretariat,
Techsearch Incorporated,
GPO Box 2471,
Adelaide, South Australia 5001.
Ph. 61-8-2671755 Fax 61-8-2674031.

18 - 22 April 1994. **6th International Conference on Near Infrared Spectroscopy.**

Venue: Cumberland Conference and Leisure Centre, Lorne, Melbourne, Australia.

For further information contact:
NIR-94, Pastoral and Veterinary Institute,
Private Bag 105, Hamilton,
Victoria 3300, Australia.
Phone 61-55-730915 Fax 61-55-711523

24-29 July, 1994. **30th International Conference on Co-ordination Chemistry.**

Venue: Kyoto International Conference Hall, Kyoto, Japan.
For further information contact:
Professor Koji Taraka,
Secretary of XXX ICCC,
Coordination Chemistry Laboratories,
Institute of Molecular Science,
Myodaiji, Okazaki, 444 Japan.
Ph. 81-564-55-7252, 81-564-54-2254.

17-22 December, 1995. **Pacific Chem '95.**

Venue: Honolulu, Hawaii, U.S.A.
For further information contact:
Pacific Chem '95,
American Chemical Society,
Room 420, 1155 16th Street N.W.,
Washington DC, 20036 U.S.A.
Ph. 1-202-8724396 Fax 1-202-8726128.

NZIC NEWS

NZIC COUNCIL NEWS

PRESIDENTIAL VISITS

The President, Stan Winter has commenced his visits to the NZIC Branches and is looking forward to meeting with the members again. He is giving a talk entitled "Black Cows, Green Grass, White Milk, and other problems for the consulting chemist."

ANNUAL GENERAL MEETING

The NZIC Annual General Meeting will be held in Auckland in December during the 1993 Conference. Formal notice will be given through Chemistry in New Zealand and Branch notices. The annual report and financial statement will be published in the September issue of Chemistry in New Zealand.

WELLINGTON BRANCH

A recent visitor to Victoria University was Dr Stuart Smedley, an ex-staff member of the department and current overseas member of the NZIC now with the Standford Research Institute (SRI), USA. Stuart gave two talks while in the department describing his work at SRI.

The first talk was devoted to the work that he and a large team headed by Dr Michael McKubre (also a Victoria graduate) are doing on the excess heat developed in the palladium/D_2O/Li OD system. Stuart described in considerable detail the development of the instrumentation necessary to make calorimetric measurements in experiments which last for hundreds of hours and he also gave details of the experimental conditions necessary for the reproducible observation of the excess heat developed in these systems.

His second talk was concerned with the development of batteries to power automobiles. He discussed in some detail the various alternative technologies. Stuart is most interested in the development of the zinc air battery which can be recharged in about five minutes simply by pumping out the contents of the battery and replacing with a fresh supply of zinc. The zinc would be regenerated at the local recycling centre.

Other visitors to the department in recent months have included Dr Ray Carman (University of Queensland), Professor Pat Sullivan (Otago), Professor Roger Burns (MIT), Professor Reinhart Keese (Bern), Professor Joachim Thiem (Hamburg), Dr A Downard (Canterbury), Dr C Lensink (Holland) and Professor Hans Bock (Frankfurt).

Dr David Weatherburn
Chairperson - Chemistry, Victoria University

MANAWATU BRANCH

On May 26 Graeme Robertson, Director of the Cawthron Institute, spoke to us about algal toxins. In a relaxed presentation he captured the flavour of the politics involved in this summer's closure of the shellfish beds. I, for one, never realised the important role both mice and the FDA play in our testing programme.

The June meeting of the Dead Chemist's Society was delayed to early July. Stan Winter will present his presidential address and we will find out exactly who is dead chemist.

Mike Boland, branch secretary, has just returned from two weeks at MIT on a summer school course entitled, "Management of Research, Development and Technology-Based Innovation". The course has been taught at MIT for the past 20+ years by Professor Ed Roberts, a world expert in this area. Tradenz are organising the visit to New Zealand of Professor Roberts in November, where he will present a short version of this course.

The Royal Society of New Zealand has just awarded the 1992 Hamilton Award to Dr. Margaret Brimble, until recently Senior Lecturer in Chemistry at Massey, for her work in synthetic organic chemistry. She described some of her work in last month's Chemistry in N.Z. Congratulations Margaret!

Grant Boston.

NEW LITERATURE & MEDIA

(i) Rudolf Hopp, Kenji Mori
Recent Developments in Flavour and Fragrance Chemistry

Comprises the proceedings of the 3rd International Haarman & Reimer Symposium on "Recent Developments in Flavour and Fragrance Chemistry" held in Kyoto, Japan, during April, 1992. Scientists from flavour and fragrance and related industries will find this book a valuable source of up-to-date information.

Published by: VCH Verlagsgesellescaft
P.O. Box 101161, D-6940 Weinheim, Germany.
Further details from the Editor, Chemistry In New Zealand.

(ii) Zhaolun Fang
Flow Injection Separation and Preconcentration

The flow-injection concept has triggered many important break-throughs in instrumental analysis. This new book provides a systematic treatment of basic principles, practical guidelines and useful hints for those who wish to upgrade their analytical methods with flow injection separation and preconcentration techniques. Special emphasis is put on the analysis of difficult samples in environmental, agricultural and clinical chemistry.

Published by: VCH Verlagsgesellescaft
P.O. Box 101161, D-6940 Weinheim, Germany.
Further details from the Editor, Chemistry In New Zealand.

(iii) **New On-line Databases from STN International**

The new **BioBusiness** database offers worldwide coverage of important biological and medical news that has scientific and economic impact. The focus is on topics such as foods and beverages, cosmetics, pharmaceuticals, biotechnology, agriculture, pharmacology, energy and the environment and occupational health. The database is targeted to serve industry executives, marketing professionals, financial analysts, scientists, researchers, legislators and information professionals. The database is updated four times each month.

Information on North American dissertations can be found in the new **DISSABS** database. The searcher will be able to identify research trends in a particular field, access recent research methods, trace development of established and emerging technologies, locate comprehensive subject bibliographies, identify personnel in a specialised field, and trace research at specific institutions. DISSABS is updated monthly.

STN International, the scientific and technical information network is jointly operated by FI2 Karlsruhe, Chemical Abstracts Service (CAS) in Columbus, Ohio, and the Japan Information Centre of Science and Technology (JICST) in Tokyo.

For further information contact STN International in
Karlsruhe, Germany, c/o FI2 Karlsruhe
PB 2465, D-7500 Karlsruhe 1.
Ph 49-7247/808-555
or contact the Editor, Chemistry In New Zealand.

(iv) **Coal Abstracts** is a new information database recently announced by the Coal Research Association NZ Inc. The database is a very comprehensive collection of over 80,000 references on coal literature spanning the last six years, and is available on compact disc.

Further information is available from the Librarian, Coal Research Association NZ Inc. P.O. Box 31-244, Lower Hutt, New Zealand. Ph. 64-4-5662289 Fax 64-4-5667737.

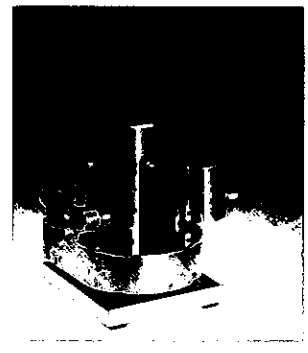
(v) **Kiwinet,** The National Library's on-line information network will soon be able to provide current research information on agriculture, fibres, textiles, skins, wood and paper products, energy production and use, robotics and artificial intelligence, urban and rural planning and climate.

For further information contact The National Library in Wellington.

DATA SHEET NOW AVAILABLE ONTOPO-METRIX NEW SCANNING PROBE MICROSCOPE

TopoMetrix Corporation's new data sheet on their unique scanning probe microscope, Explorer™ is now available. The data sheet describes the capabilities of Explorer, a totally new concept in scanning probe microscope design. Specifications are also included.

Explorer incorporates TopoMetrix' Scanning Tip Technology, a unique feature that permits imaging samples of any diameter, thickness, or mass. Explorer can produce three-dimensional images of conductive and nonconductive samples using a variety of modes, including lateral force microscopy, scanning tunnelling microscopy, and contact and noncontact atomic force microscopy. Samples can be imaged in air or liquid. Also, Explorer can be placed directly on a sample, making it possible to image surfaces that cannot be cut up to place under a microscope. Examples include a space shuttle window, an airplane wing section, and large magnetic media disks.



Explorer's operation is controlled by powerful software, with full 16-bit digital control of the microscope tip. A 66-Mhz computer ensures precise control of the probe and provides rapid feedback. The control electronics are designed with an open architecture, allowing the user to customise experiments. The data acquisition and analysis software also operates with an open architecture. The modular design of both the hardware and software ensures that users can add capabilities as their needs change and new features are developed.

For a free copy of the new data sheet, contact Shirley Keathly, Topometrix, 5403 Betsy Ross Drive, Santa Clara, CA 95054-1162, U.S.A. Ph 1-408-9829700.
Or circle no.27 on the reader reply card.

BOOK REVIEW

NEW ZEALAND'S ECONOMIC NATIVE PLANTS.
BY R.C. COOPER AND R.C. CAMBIE.
published by Oxford University Press 1991,
234 pp. $49.95.

The second edition of this publication is a very professional product with excellent black-and-white and colour illustrations. In fact it is barely recognisable from the first edition (1988). The text has been expanded, in particular the chemistry related section and the references have been reorganised. More importantly structural formulae have been included thus making the book much more meaningful since most commercial prospects use these chemical extractives as their starting point.

The potential botanical and chemical uses of New Zealand's endemic plants, from the earliest days until the present time are reviewed. These uses are wide ranging - fibres, structural, flavours, fragrances, food, pesticides, medicinal and pastoral. As such it will be a key reference work for scientists in these areas. Quite properly the authors warn against commercial exploitation at the expense of the endangered New Zealand flora. It contains a wealth of historical information, especially in the botanical coverage where a relatively high proportion of references are to newspaper articles and DSIR information bulletins. Since these are local and of limited circulation their inclusion prevents them being overlooked with the passage of time.

The botanical section I found to be very detailed, somewhat disjointed and was best read in small portions while the chemistry section read with much greater fluency.

The authors rue the lack of development of a commercial industry using our raw materials. A number of New Zealand synthetic organic chemists have shown that the establishment of a fine chemicals industry is a distinct possibility but further development has been handicapped by two factors - lack of finance to further develop these embryo ideas and the lack of the particular expertise within New Zealand to develop these ideas from the bench to the pilot plant scale. These problems need to be addressed before we can expect further progress in this area. It is worth noting the experiences of DSIR Chemistry Division in their efforts to commercialise a variety of chemical projects (G. Leary, *Chem in NZ*, 1992, **56**, 22).

Although the structural formula of one perfumery compound was incorrect the overall standard of accuracy was very high and I noted very few typographical errors.
As is only to be expected the Auckland (local) influence on the contents was noticeable, possibly at the expense of other areas - extensive work by the Pharmacy Department (University of Otago) on the exploitation of the solanum alkaloids was not mentioned.

Overall I can recommend this to be a very interesting and worthwhile publication.

P.K. Grant
Emeritus Professor of Chemistry
University of Otago.

ADVERTISERS INDEX

ADVANTAGE DATA SYSTEMS	Front Cover
ALLTECH ASSOCIATES INC	24
ALPHATECH SYSTEMS & CO LTD	5
ANCAT HOLDINGS LTD	42
BALDWIN SON & CAREY	50
BIO-RAD LABORATORIES PTY LTD	19
CHEMSPEC	44
DOUGLAS SCIENTIFIC	11, 21, 30
GBC SCIENTIFIC (NZ)	22
HISANZ	42
JOHN MORRIS SCIENTIFIC LTD	44
LABSPEC	42
LABSUPPLY PIERCE NZ LTD	14
M.A.S MARKETING SERVICES	29
MEDIC CORPORATION INC.	Inside Back Cover
MEDSPEC	42
MINISTRY OF AGRICULTURE & FISHERIES — Chemical Residues Lab, Wallaceville	17
PERKIN ELMER PTY LTD	Inside Front Cover
SCI TECH	27
SGS NZ LTD	13
UNICAM NZ LTD	Back Cover
UNI-OSH	12
WATSON VICTOR LTD	9
WEST-WALKER McCABE	29

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