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Chemistry

IN NEW ZEALAND

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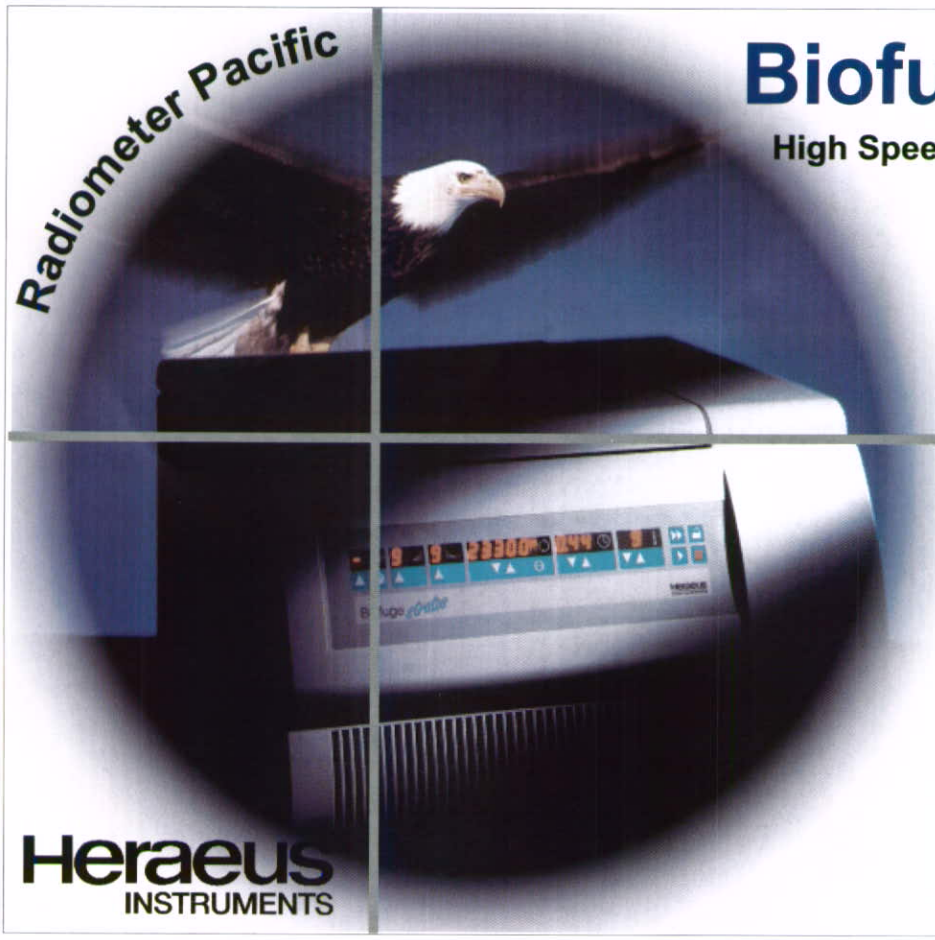
Spotlight on Forensics, Toxicology, Clinical Chemistry
Focus on Centrifuges & Liquid Handling



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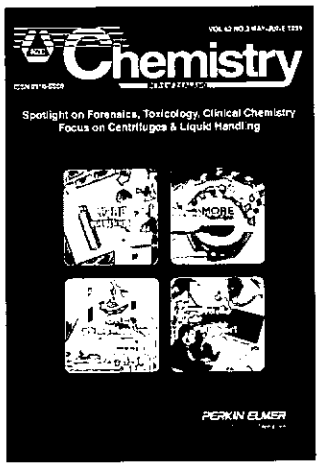
UP FRONT ...

Things are changing at Perkin Elmer Analytical Instruments. "Look to us. And see more", the Analytical Instrument Divisions new theme, is now appearing globally as PE launches it's rejuvenated division.



For further information see the cover story article on page 2

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IN THIS ISSUE ...

COMING UP ...

July 1998 - Mining, Minerals, Steel, Geochemistry
AA, ICP, Particle Characterisation

August 1998 - Dairy Industry
Stirring, Heating, Mixing, NMR

Deadline for material:
5th of the month of publication

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COVER STORY

Perkin-Elmer Analytical Instruments

"Look To Us. And See More"

Things are changing at Perkin-Elmer Analytical Instruments. "Look to us. And see more", the Analytical Instrument Divisions new theme, is now appearing globally as Perkin-Elmer launches it's rejuvenated division.

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20 - 23 July 1998
18th Discussion Conference on Macromolecules: Mechanical Behaviour of Polymeric Materials
Venue: Prague, Czech Republic

2 - 7 August 1998
9th International Symposium on Novel Aromatic Compounds
Venue: Hong Kong

5 - 8 August 1998
8th International Symposium on Solubility Phenomena
Venue: Niigata, Japan

16 - 21 August 1998
14th International Conference on Physical Organic Chemistry
Venue: Florianópolis, Santa Catarina, Brazil

30 August - 4 September 1998
33rd International Conference on Coordination Chemistry
Venue: Florence, Italy

11 - 16 October 1998
21st IUPAC Symposium on Chemistry of Natural Products
Venue: Beijing, China

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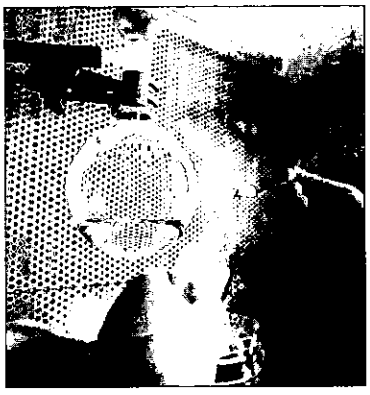
LOCAL NEWS

HIGH VALUE DRUG GROWN FROM SOIL-BORNE ORGANISM



Innovative gene therapy work in the USA is getting a helping hand from New Zealand biotechnologies.

Industrial Research Limited has been contracted to produce large quantities of a small molecule drug, rapamycin, which will be used for clinical trials on human volunteers by US biotech company ARIAD Pharmaceuticals. Rapamycin is a very high value drug with one gram currently worth thousands of US dollars.

Industrial Research's Julian Davies says manufacturing the drug is a long and complex process taking about six weeks with everyone in the process development team putting in some time. "You can't just go out and buy rapamycin off the shelf in the quantities needed for pharmaceutical purposes, which is one reason why it commands such a high price."

There are only one or two other places in the world which make the molecule. Two years ago ARIAD reported that the rapamycin molecule could be used as a switching mechanism in gene therapy trials for treating chronic diseases. For example, if a person is known to have human growth hormone deficiency it is envisaged that a gene cassette containing engineered human cells can be put into their body. The efficient genes will produce the bioactive substance which the patient lacks. Oral doses of a derivative of the rapamycin molecule are given to the patient to switch the appropriate genes on and off as required.

The rapamycin molecule is produced by a soil-borne organism which is grown in Industrial Research's bioprocessing facility. The molecule is then isolated and purified using solvent chromatography with 95% pure material being achieved.

The small amount of pure rapamycin which is extracted from the volume of fermentation medium also helps explain the high cost of the molecule.

"It's a bit like extracting a needle out of a haystack," Julian Davies says. "From 1000 kg of fermenting medium we can extract just 50 grams of rapamycin, or 50 parts per million."

The research team is now trying to improve the strain to increase the yield to 1 kg per batch. Microbiologist Sarah Reader is working on mutating the organism and isolating a better strain which will produce larger amounts of the drug, a process which will take about six months.

It was the unique combination of bioprocessing and chemical processing/solvent extraction facilities under one roof which first prompted ARIAD to approach Industrial Research five years ago. There are no similar contract facilities in the USA.

The initial contract was to produce 5 grams of the rapamycin molecule, for which the whole process had to be developed at Industrial Research. This was followed by two contracts for 30 grams each, with an order in the offing for much larger quantities in preparation for the planned clinical trials later this year.

However, the patients which the rapamycin is destined to help will have to wait quite some time before the new technology is available. At least five years of clinical trials are required to prove its safety and efficacy. In the meantime Industrial Research is weighing up its options as demand for the rapamycin could mean that either a larger facility is built to produce it or the technology is licensed to another fermentation manufacturing company.

Source: Industrial Research Limited, Innovate, Issue 27.

BITE SIZED TECHNOLOGY POPULAR

More New Zealand businesses are taking a conservative approach to the challenge of technology.

"We've had a surge in enquiries and applications for our Technical Feasibility Study funding which shows that taking 'conservative risks' is striking the right note with businesses," says Tony Hadfield from Technology New Zealand.

"Under the Technical Feasibility Study Scheme, a company can work out how to overcome a technological hurdle or find an answer to a key problem, before diving in boots and all and committing people and finances to the whole project," he says. "Research and development has many unknowns and it's sensible, particularly for small businesses, to take a logical, step by step approach to new technology."

Through Technology New Zealand's business-funding Programmes, up to $25,000 per project is available for businesses to test critical technological steps within a larger research and development exercise. Since July more than $1.25 million has been allocated to support more than fifty such projects.

Technology New Zealand has traditionally funded much larger projects. These range from $40,000 to $800,000 under the TBG (Technology for Business Growth) and GRIF (Graduates in Industry) Programmes. However, while funding from the $15.6 million per annum pool is still available for bigger projects, the Technical Feasibility Study option is proving a very attractive option for small companies.

Information about Technology New Zealand funding is available on its website www.technz.co.nz or by free phone 0800 832469.

SCIENCE DATABASES AND COLLECTIONS

The Ministry has just published a scoping study commissioned

from Ian Whitehouse, Landcare Research Limited, on science databases and collections. The report is entitled *Science database and collection issues: Oceans of data, vulnerable collections and terabytes of power.*

The study was broad ranging and considered aspects of the tension between unrestricted access and the commercial imperative of science; changes in the concepts of intellectual property rights; just what science databases are, how to find them, who has access to them; and where to find scientific information. The study also considers the vulnerability of some collections, particularly small collections maintained often without direct funding, by individuals and small teams; and integrating databases across a public sector where agencies have individual mandates and different accountabilities. A future of virtual collections, infoglut and the information have-nots is also briefly considered.

The report is an excellent resource document of current government policies on government held information, with specific sections on the current policy for Crown Research Institute national databases and collections; the recently developed broader policies for government held information, with an example of the Ministry of Fisheries databases.

Excellent web sites are provided that discuss many of the issues in depth. The report will also be made available on our web site at http://www.morst.govt.nz/pubs/publications.htm

Individual reports for personal use are available free of charge from the Ministry. Contact: Emily Sik, Tel: (04) 4726400, Email: esik@morst.govt.nz

INVESTMENT PERFORMANCE PROGRAMME PLAYS KEY ROLE

Government investment in the Public Good Science Fund (PGSF) is now approaching $300 million annually, with the commitment that this will grow substantially over the coming years. Scientists and technologists have argued that more needs to be spent, and while there is a case to say that New Zealand's investment is well below what might be optimal in economic, social and environmental terms, the Ministry needs to back these assertions with facts and rigorously argued analyses. In effect, what is the public getting for its money?

This is the basis of the Ministry's Investment Performance programme. It has a key role in developing the rationale for public investment in research, science and technology, and providing the data necessary to improve the effectiveness of that investment. In this way the Investment Performance programme is one of the main contributors to the work of setting priorities for research, science and technology.

Dr Neville Reeve, Programme Leader for the Investment Performance programme, said that in the coming year the Ministry will be undertaking the major task of completing evaluation studies of all 17 output areas in the Public Good Science Fund (PGSF).

"There are two primary aims. First, to identify, describe, and, where possible, measure the outcomes from PGSF research in terms of the relevant economic, social and environmental goals. Second, to think about the conditions necessary for the delivery of outcomes, including the structure and application of the research strategy and the interactions between research provider and user in the planning performance and exploitation of research."

"Along the way, we have had to think about such issues as what constitutes an outcome, what indicators to use as measures of achievement, particularly in some of the more intangible areas of research, and how to construct an approach that can be applied simultaneously across all of the PGSF output areas – from agriculture to manufacturing to transport to social science."

"All this began in 1997 with detailed planning and extensive stakeholder discussion followed by two evaluations used as trial exercises. We hoped to test the approach that was being developed, learn where we were going wrong and also gain the experience that would be necessary for the much larger exercise to come," Neville said.

The areas selected for the trial evaluations were Output 5 - Forest and Forest Product Industries; and Output 15 - Land and Freshwater Ecosystems. The choice reflected the very different nature of the two areas, one with close links to an industrial sector and with relatively straightforward pathways to commercial impacts, and the other with a strong environmental focus where the measurement of outcomes was likely to be more complex. The reports were completed in September 1997 and are available from Dr Neville Reeve at the Ministry with a covering summary.

Evaluation by the Ministry is a key part of the Foresight Project and priority setting exercises, which will culminate in 1999 in a new statement of priorities for science and technology investment. It is important to note that other information sources and agencies within New Zealand perform separate although relevant roles. The Ministry's evaluation programme is complemented by the work of the Foundation for Research, Science and Technology, including their normal processes of information collection auditing and monitoring of research performance.

SCIENCE AND TECHNOLOGY TO RECEIVE PROMOTIONAL PUSH

As New Zealand enters the 21st century and beyond, we all need to understand the role that science and technology will play in realising national and personal aspirations. A wide range of indicators all show that science and technology and the knowledge it provides us will be critical in assuring New Zealand's future prosperity and well-being. In *RS&T: 2010*, the Government outlined its goal to foster societal values that recognise the critical role of science and technology in achieving future prosperity. To develop attitudes and values supportive of science and technology, the Government has a role in supporting the promotion of science and technology.

The Government is investing almost $3 million in the promotion of science and technology in 1997/98. Much of this money is supporting fellowships such as the Captain James Cook Fellowship, the Science and Technology Teacher Fellowship and Maori Science and Technology Fellowships. Other promotion activities supported include a science and technology section of the Qantas Media Awards, the Future Directors Award, some activities of the Carter Observatory, some of the education-related activities of the Royal Society and a small contestable fund for the promotion of science and technology values to

young people. The value of these activities is well recognised within the science community, but much of the money has gone into supporting the programmes themselves, rather than promoting the value of them to the wider public.

The need to lift the recognition of the value to New Zealand of these science and technology activities was recognised in the 1997/98 Budget with the allocation of new resources for science and technology promotion. Increased funding was provided to existing promotion schemes and for a programme to promote to a wider audience the image of science and technology. Late last year, planning for a science and technology public information programme began. The programme aims to improve the quality and quantity of science and technology information available to decision makers and the public at large. Logos Porter Novelli Limited, a Wellington-based public relations firm have been engaged to assist with the development and implementation of this public information programme.

Market Research

A survey of the attitudes and values of New Zealanders to science and technology was commissioned. The purpose of the research was to gather information on what current views New Zealanders hold on science and technology, and to provide a benchmark by which we can measure the effectiveness of future promotion activities. A telephone survey of 800 people and detailed interviews with 32 people from public, business, education and the science and technology community revealed that:

- over 75 percent of respondents believe both science and technology, as they define it, are important to New Zealand's future. They believe that its importance is greatest (86 percent) for protecting the environment, then for the economy (79 percent) and for society as a whole (76 percent); and

- both science and technology reportedly have a wide appeal as areas to work in when compared with teaching, farming and accounting. Technology rated as most appealing, above management, health and science. Unfortunately, the public draw a "blank" when asked to provide tangible examples of how science and technology are used in the world around them.

Attitudes To Science

The term "science" is most commonly linked to medical areas by New Zealanders, followed by the natural world and farming. Their attitudes to science are often formed by images portrayed in the media, with negative attitudes often gained from parents and teachers. They find scientific inquiry abstract, and only for intelligent people. Science is something that most New Zealanders are not strongly connected to, and is undertaken by "other people".

The strongest metaphor was that science is like a vast "ocean" of knowledge which holds them in awe, but is overwhelming and easy to feel inadequate about.

Attitudes To Technology

Technology has a much higher public profile than science, and respondents regularly hear about technological advances. They feel that technology is all around us, and can be recognised in many of the things we have in our daily lives. While many people embrace it, others feel trepidation about the rapid rate at which it is changing. Technology is like a fast-moving train with an unknown destination.

The research shows that New Zealanders have a relatively low awareness of the benefits of science and technology, particularly its link with the generation of personal and national wealth. While they are interested in the content of science and technology, they struggle to see how it relates to them and how it adds value to society.

Public Information Programme

The strategy adopted for the information programme is based on the market research and other similar public relations programmes aimed at shifting public values and attitudes. The programme will build upon existing promotion activities, binding together the many organisations and individuals already involved in science and technology promotion in New Zealand. We aim to build a science and technology promotion infrastructure for New Zealand, coordinating the key players and their activities, and later jointly developing high-impact activities. The initial focus is on building networks of organisations and individuals who already realise the value of promoting science and technology. The programme will provide them with essential media-related resources that they can use to increase the impact of their own activities and coordinate with related activities and events.

Actions to date within the programme include:

- formation of a promotion coordinating group for government research funding agencies. Convened by the Ministry, this group involves communications professionals from the Foundation for Research, Science and Technology, the Royal Society and the Health Research Council. This group is collectively developing and implementing the information programme;
- face-to-face briefing on the programme for communications staff from Crown Research Institutes, research associations, university research companies, Crown Health Enterprises, regional councils, professional associations and private sector promoters;
- development of an events calendar for science and technology promotion activities;
- development of a list of science and technology promotion "champions";
- development of a database of science communicators;
- increased and coordinated media monitoring;
- media manual for communicators;
- identification of specialist science and technology media and presentation trainers; and
- New Zealand science and technology "fact-file" for wide circulation.

The public information programme is in its low-level development phase where the emphasis is on the building of resources to support increased effectiveness of science and technology promotion over the next 12 to 18 months. The coordinating group are taking the first steps in the process of building an increased positive image for science and technology and raising awareness of its important societal role now and in the future. As activities within this programme gain a higher profile, the groups aims to build momentum for increasing the awareness of the value that science and technology provides all aspects of New Zealand life. This increased awareness must ultimately improve the level of science and technology uptake by all New Zealanders.

The above three articles were reproduced from Sci-Tech, Volume 9, Number 1, March 1998.

Forensic Toxicology In New Zealand

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Forensic Toxicology is the study of toxins both natural and man-made, to meet the needs of the judicial system.

Forensic Toxicology began as a science in the eighteenth century. In 1871 the Colonial Laboratory undertook the first forensic toxicological analyses in New Zealand. Since then the number of chemicals known to, and detectable by mankind has escalated. Nowadays the forensic toxicologist may potentially encounter any of the 2-3 million chemicals known to mankind. In reality, however, only a few thousand are likely to become an issue.

Forensic Toxicology Case Categories

In New Zealand, ESR is responsible for the toxicological work for all coronial and criminal cases. The case types include:

1. Alcohol and drug analyses of blood samples taken from drivers under the Transport Act legislation.

2. Analyses of biological specimens taken from victims and suspects in alleged criminal cases.

3. Analyses of autopsy specimens to establish whether drugs or poisons may have contributed to the death.

Types of Drugs and Poisons

Apart from alcohol, the drug or poison encountered most commonly by the forensic toxicologist is carbon monoxide originating from either car exhausts or fires. Well over 80% of the remaining analyses performed by ESR toxicologists involve either medicinal or illicit drugs. The remaining 20% involve toxic chemicals such as cyanide, pesticides, solvents and even injection of snake venoms.

In deciding on an analytical strategy, the toxicologist must consider the circumstances of the case, as far as they are known. It is important for the toxicologist to keep an open mind, however, since much of the information provided can be incomplete or downright misleading. Important considerations include:

- what medical symptoms did the person display
- what poisons/drugs were available
- what were the occupations of the victim/accused
- what information was obtained at the autopsy.

Even with this information the toxicologist can be looking for a chemical 'needle in a biological haystack'. Levels of drugs in specimens may be as low as sub-parts per billion (e.g. tetrahydrocannabinol, the active ingredient of cannabis, in blood).

Specimens

The specimens available for analyses are clearly dependent on the circumstances of the case, i.e. whether they originate from a living or deceased person. For the former situation blood, urine, saliva, vomit and occasionally hair and nail clippings and sweat samples can yield valuable information. In the latter cases liver, kidney and brain are also valuable specimens.

The information that can be gleaned from hair and nail clippings is particularly important in cases of chronic chemical exposure or of a non-fatal poisoning some days or weeks prior to sampling.

Specimen Treatment

In general, specimens are either extracted directly or following a digestion stage with a protease enzyme.[1] Separation of the compounds of interest can then be accomplished by either solvent or solid phase extraction.[2]

Instrumental Techniques

Routinely specimen extracts are screened for toxins by GC-NPD, GC-ECD and LC-diode array. As circumstances dictate, the specimens may also be subjected to immunoassay screening for selected drug classes e.g. cannabinoids, opiates, amphetamines etc. Any screening "positives" will then be confirmed by GC-MS or LC-MS.

ICP-MS is utilised for metallic poisons and even NMR can be useful for some chemicals.[3]

Once the analyte(s) have been unequivocally identified, the toxicologist needs to quantify the levels in the appropriate specimens. This involves the addition of a suitable internal standard (ideally the isotopically-labelled compound) to the sample matrix. The ratio of analyte to internal standard can then be compared to that for a set of standards extracted from a comparable specimen matrix.

Interpretation of Results

The analytical findings have to be put into context - were the drug levels consistent with therapeutic use or overdosages?

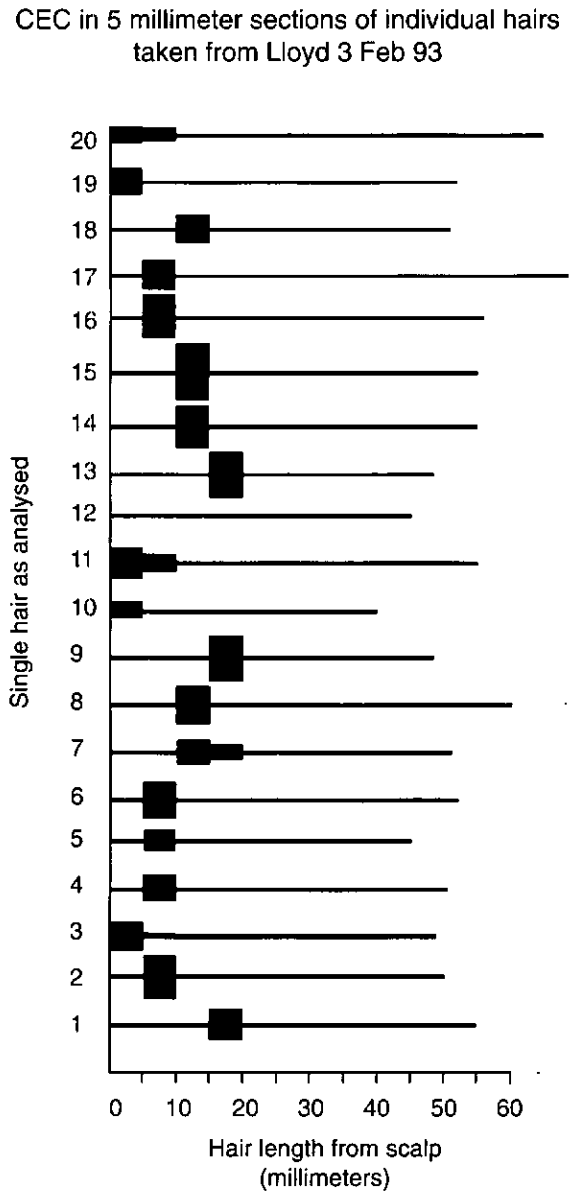
Extensive libraries of data have been built up to answer this question. Nowadays, however, many cases involve multi-drug use and synergistic effects must be considered. Equally important is the drug history of the subject. For example, heroin addicts may be able to tolerate 10 times the dosage of a naive user.

While many forensic scientists have concerns that our legal system does not provide an ideal forum for accessing the

reliability of scientific evidence, the results must nevertheless withstand intense scrutiny in a court of law. Forensic toxicologists are therefore trained as expert witnesses. As an accredited forensic laboratory (American Society of Crime Laboratory Directors), ESR is required to monitor the performance of its forensic staff both in the laboratory and in the courtroom.

Examples of Recent ESR Case Types

1. The so-called "Poisoned Professor Case"[4] which attracted international attention provided an enormous scientific challenge because of the time lapse between the onset of the "illness" and sampling. ESR and Swedish toxicologists analysed blood samples and, in their view, clearly established that Professor Lloyd had been exposed to a toxic dose of acrylamide. The analyses of sections of individual hairs found massive levels of acrylamide adduct (CEC) in a narrow band which was consistent with the ingestion of the chemical around the time of the onset of the "illness". Figure 1 shows the results from single hair analyses for CEC and the combined profile. Participants at the recent International Association of Forensic Toxicologists Conference considered that this work provided an important advance in establishing the value of hair analysis.



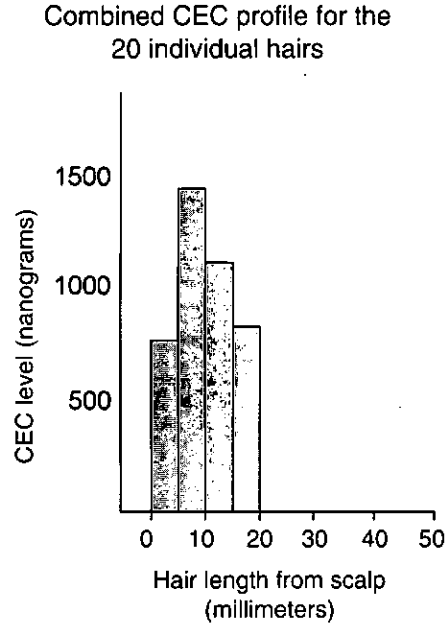


Figure 1.

2. Toxicological analysis of blood and urine taken many hours after alleged rapes have provided crucial corroboration of the victims' stories that they were stupefied prior to the offence being committed. In one case the drug involved was a very short active sleeping tablet which is cleared rapidly from the body. Traces (~1 ppb) of the drug's metabolites were detected in the specimens by high resolution GC-MS.

3. Despite extensive decomposition, analysis of tissue samples from a buried body established the presence of potentially lethal levels of several drugs. The results provided important corroboration of the testimony of a key prosecution witness.

In summary, the forensic toxicologist must have a wide range of microanalytical skills and an intuitive problem-solving mind. In future, newer techniques such as LCMS and CEMS are likely to partially replace some of the more established methodologies.

The development of forensic toxicology has been credited with reducing the number of murders from chemical agents. It is essential that toxicologists develop procedures to meet the challenge presented by the increasingly potent medicinal and illicit drugs.

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Patent Proze

by Jane Calvert and Greg Lynch

THE IMPORTANCE OF KEEPING LABORATORY NOTEBOOKS

In most countries the patentability and ownership of an invention are assessed according to the filing date of the first application for a patent. The assessment is regardless of when the actual invention was first conceived or reduced to practice. This is known as the "first to file" system. However, the United States operates a "first to invent" system. In the United States it is the date of the actual invention rather than the filing date of a patent application which is the important date for determining who has patent rights in the invention.

In the past, New Zealand inventors who filed patent applications in New Zealand, and subsequently sought patent protection in the United States, could only rely on the New Zealand filing date as their date of invention. It was open to a United States inventor to prove an invention date earlier than the New Zealand inventor's filing date, thereby defeating the New Zealander's claim of ownership.

However, changes in United States patent law brought about by GATT agreements, which came into force on 1 January 1996, have removed this United States biased inequity. Patent applicants from outside the United States now have equal rights to rely on an earlier date of invention provided there is support from adequate records.

Activities conducted in New Zealand on or after 1 January 1996 can now be used by New Zealand patent applicants to prove prior invention in the United States. To prove that an invention was made by an alleged date, corroborating evidence in the form of laboratory notes is generally required. Such evidence is required to give an account of the inventor's conception and reduction to practice of the invention. The evidence should not depend solely on the inventor's own account.

A laboratory notebook will suffice as corroborating evidence of the date of invention if it has sufficient guarantees of trustworthiness. In particular, the notebook should be a contemporaneous recording by the inventor while conducting experiments. The manner in which the notes are recorded should be consistent, chronological and complete. In addition, the entries should be corroborated by a reliable third party. Every entry in the notebook should be witnessed by a person unconnected with the invention but capable of understanding the complexities involved.

There have been a number of court decisions in the United States in which inadequate maintenance of laboratory notebooks played a significant role in the court's decision on inventorship. In response to these decisions, a set of guidelines has been developed which provide a detailed account of optimal procedures and requirements. They include guidelines as to how much detail ought to be included, the witnessing of entries, the storage of notebooks, electronic records and a note pertaining to software development. The guidelines are available for viewing on the Baldwin Shelston Waters web site.

It is recommended that science researchers in New Zealand review their current practices in light of the guidelines. One can never know when an important patent dispute might depend on good laboratory notebooks for a favourable resolution.

Please forward any queries to:
Patent Proze, Baldwin Shelston Waters
P O Box 852, Wellington
Email: email@bswip.co.nz, Internet: www.bswip.co.nz

Jane Calvert

Jane Calvert and Greg Lynch are both employed in the patent department of Baldwin Shelston Waters, Patent and Trademark Attorneys and Solicitors, where they specialise in chemistry patents. Jane joined the firm after completing a PhD in chemistry at the University of Canterbury in 1994. Greg also joined the firm in 1994 after three years research at Industrial Research Limited in Wellington. Following completion of a PhD in chemistry at the University of Otago in 1989, he spent a two year period as a post-doctoral researcher at Oxford in the United Kingdom.

Greg Lynch

Forensic Science Education At The University Of Auckland

*Gordon Miskelly**
Department of Chemistry, University of Auckland, Private Bag 92019, Auckland

Forensic science is most generally defined as the application of science to matters of law, although most courses are more narrowly focussed on applications of science to criminal law. This narrowed definition is also referred to as criminalistics. In 1995 representatives of the University of Auckland and the Institute of Environmental Science and Research (ESR) Ltd. realised that there was a need to offer graduate education in forensic science in the South Pacific region. Prior to this forensic scientists in Australia and New Zealand had either been trained at foreign universities, or had received on-the-job training. It was decided to offer a progression of courses - a Certificate of Proficiency targeted at police, lawyers, media, and graduates with a general interest in forensic science, a one-year postgraduate diploma for graduates with a more focussed interest in forensic science, and a two-year masters course. These courses were first offered in 1996, and the first graduates from the MSc programme in forensic science will be graduating in May 1998. The only other forensic science paper offered at a New Zealand University is an undergraduate paper on Environmental, Forensic and Toxicological Chemistry taught by Dr Nick Kim at the University of Waikato. Three Australian universities have also recently started forensic science programmes.

This paper will outline the academic course offered at the University of Auckland, and will also present several of the projects studied by MSc students in 1997 and 1998.

Papers

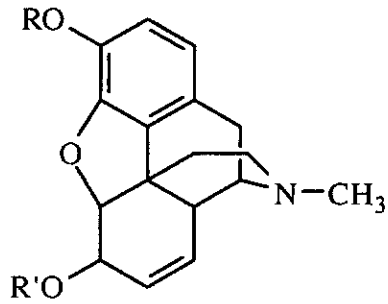
There are six graduate-level papers offered to students. The papers are taught by staff from the Faculties of Law, Medicine, and Science at the University of Auckland, by scientists from the Forensic Division of ESR Limited, and by members of the New Zealand Police. Selected lectures have also been given by external legal experts. Two of the papers give a broad survey of the technical aspects of forensic science, together with lectures on criminal law and providing expert evidence. These papers are appropriate for anyone with a degree in science or appropriate legal or forensic experience. There are three papers which study chemical, biological, and environmental aspects of forensic science in more detail, and the sixth paper is a library research project on a forensic topic. These latter four are restricted entry papers, with a current limit of twenty people. Students who pass the six papers, together with one elective paper are awarded a Postgraduate Diploma in Forensic Science or may continue on to do a one year research project and graduate with an MSc.

Projects

The course was designed to be interdisciplinary, and the student intake has reflected this. The projects selected by the second-year masters students have included such topics as evaluation of a new rapid immunochromatographic analysis for the semen protein P30 (1), analysis of the role of police specialist groups and forensic scientists in the Auckland metropolitan region (2), and a study of the cognitive ability of police recruits (3). Given the target readership this article will focus on three of the more chemistry-oriented projects. All of the students have at least one supervisor at the University of Auckland and at least one at ESR. This ensures that the projects are both pedagogically sound and responsive to the needs of the forensic community. That this latter need is met is shown by the fact that several of the techniques and databases developed by MSc students this year are now in routine use by ESR staff.

1. Homebake Heroin

New Zealand's low population and geographic isolation have meant that attempts to obtain heroin from codeine-containing products are much more prevalent here than in other countries (4). The homebake procedures follow comparatively simple chemistry, often performed in kitchen utensils, to produce an injectable or inhalable heroin solution as the end product. The codeine is first extracted from the medications, then it is demethylated to form morphine which is acetylated to form heroin, with an overall yield of up to 40% for small quantities.



Codeine	: R = CH_3	R' = H
Morphine	: R = H	R' = H
Heroin	: R = $C(O)CH_3$	R' = $C(O)CH_3$
3-Monoacetylmorphine	: R = $C(O)CH_3$	R' = H
6-Monoacetylmorphine	: R = H	R' = $C(O)CH_3$

The recent introduction of morphine analgesic tablets onto the New Zealand market has meant that these provide a second potential source of heroin precursors. When homebake heroin is discovered it is often important to be able to identify the precursors and determine their source. One method used to identify the source is to examine the heroin for markers which either existed in the original medications or would be readily formed during the homebake process. Part of Bronwyn Davies' project was to identify excipients in morphine tablets or capsules

* Gordon Miskelly is the Deputy Director of the Forensic Science Programme.

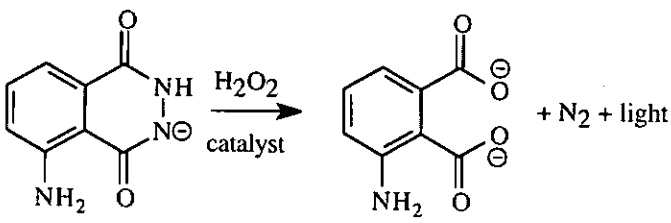
available in New Zealand, and to see whether these were retained in unmodified or modified form in homebake heroin (5). (The word excipient is used as a general term to cover all the components of a pill or capsule apart from the active ingredient, and can include such materials as inert fillers, preservatives, coatings, plasticisers, or sweeteners.) In particular, Bronwyn searched for excipients or their derivatives which could be identified using gas chromatographic analysis coupled with mass spectroscopic detection (GC-MS). Bronwyn's previous degree was a BSc in Biology from the University of Waikato, so the project involved her learning a significant amount of chemistry as well as forensic laboratory procedures.

Bronwyn duplicated the simple conditions used by many homebake manufacturers to ensure that her results would be comparable with preparations obtained by the New Zealand Police. She examined the effect of different acetylation reagents and conditions on the levels and identities of markers detected, and also looked at the degradation of these markers in homebake solids and solutions over a 3 month period. The most readily identifiable excipients (or their derivatives) were stearyl alcohol, cetyl alcohol, stearic acid, palmitic acid, and diethyl phthalate. It was found that the four types of morphine products analysed could usually be differentiated on the basis of their content of these compounds, although two of the tablet types had overlapping distributions of stearic and palmitic acids and so could not always be differentiated. Under the conditions of acetylation used the alcohols were partially converted to acetate esters. In addition, the analytes were usually prepared in ethanol for GC analysis, and under the acidic conditions of homebake preparations the fatty acids were partially converted to ethyl esters. These derivatives were observed to hydrolyse slowly over the three month period of the degradation study. However, the parent excipients were always present.

A further interesting part of Bronwyn's study was her confirmation of an earlier report by Sibley that the homebake procedure using acetyl chloride produces large amounts of 6-monoacetylmorphine (6), whereas the more usual procedures using acetic anhydride produce heroin via the 3-monoacetylmorphine. Prior to these studies it had been assumed that 6-monoacetylmorphine was present as a hydrolysis product from heroin.

2. Modifications to Luminol Sprays Used at Crime Scenes

The use of an alkaline luminol-perborate spray to detect traces of blood is routine in New Zealand. The perborate is used as a stable reagent which generates hydrogen peroxide in solution. This spray gives a visible chemiluminescent reaction in the presence of blood due to the heme prosthetic group of haemoglobin having peroxidase-like catalytic activity (7, 8). The overall reaction can be represented by:



The chemiluminescent oxidation of luminol is subject to some interferences - other oxidants such as hypochlorite can react with the luminol-perborate reagent to give a bright chemiluminescence, while true peroxidases and certain transition metal ions can also catalyse the reaction between luminol and hydrogen peroxide. Of course, hypochlorite is the active component in household bleaches, and so is not infrequently present at crime scenes! Erina Kent is currently pursuing methods for reducing these interferences while maintaining the sensitivity of the test. Erina has a BSc in Zoology from the University of Auckland and is supported by a Ministry of Research, Science and Technology Tuapapa Putaiao Maori Fellowship.

Erina is investigating the effect of adding reagents which react specifically with hypochlorite, without also being oxidised by hydrogen peroxide or oxidised haemoglobin. This latter requirement prevents the use of phenols or tannins, or antioxidants such as ascorbic acid. Preliminary laboratory tests have shown that basic amines react rapidly with hypochlorite to form chloramines under the conditions used in the luminol reaction, and the chloramines then react too slowly to influence the luminol-peroxide-haemoglobin system. Currently Erina is evaluating whether the addition of amines will produce the desired effect in "real life" situations.

3. Effect of Chemicals on DNA Fingerprinting

One of the problems with using reagents such as luminol or other dye systems to detect trace biological evidence is the possibility that the reagents used will interfere with subsequent attempts to analyse any DNA present in the samples. Louisa Boyd and Tony Larkin cooperated on a project to evaluate how easily DNA fingerprinting could be performed following treatment of blood stains with common visualisation reagents. Louisa (BSc in Psychology from the University of Auckland) chose a project focussing on chemical aspects of fingerprint enhancement reagents (9), while Tony (BSc in Biology from the University of Auckland) focused more on the effect of potential degradative processes on the analysis of DNA samples (10). DNA analysis involves extraction of the DNA sample, polymerase chain reaction (PCR) amplification of the DNA, electrophoresis of the DNA, and detection of the DNA fragments. All of these steps could be affected by the reagents, as well as the possibility that the enhancement reagents could degrade the DNA present in the original sample. Therefore it is important to know which reagents affect the overall identification of DNA fragments, and also how and why they are affecting the steps in the analysis. Tony and Louisa have taken a first and important step towards this analysis. They investigated the effect of eight common fingerprint visualisation techniques on both the amount of DNA able to be extracted from a substrate, and also whether PCR amplification followed by gel electrophoresis gave a complete DNA profile. Many of the reagents in common use decreased the amount of DNA extracted. In particular, reagents which involved conditions where haemoglobin is acting as a peroxidase (e.g. luminol and the oxidation of leuco dyes) caused large decreases in DNA yields. The reasons for these decreases will be part of a future study. The general protein stain Amido Black was found to be the best general visualisation method for trace blood stains which still allowed DNA analysis of the blood.

DNA analysis can also be disrupted by something as common as the dye in denim jeans. Tony found that this interference could be removed by a simple extraction procedure (11), and this is now in use in the Auckland laboratories of ESR

In conclusion, this programme has created opportunities for cooperation between staff at the University of Auckland and scientists at ESR Limited. These interactions have lead to new and interesting science and practical improvements in forensic techniques.

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CENTRIFUGES & LIQUID HANDLING FOCUS FEATURE

BECKMAN INTRODUCES ROTOR TECHNOLOGY BREAKTHROUGH

Alphatech Systems is pleased to announce the world's first imbalance-correcting rotor, the high-capacity GC-3.8A with ARIES Smart Balance Technology. This auto-imbalance technology corrects for balance errors, rather than merely compensating for them. Users can easily run different quantities of sample or tubes, eliminating the time-consuming task of balancing. ARIES also incorporates Smart Balance Technology, allowing the rotor to correct itself and complete the run even when an imbalance occurs at high speed, such as when a tube breaks.

The GH-3.8A, the first rotor to feature the new ARIES technology, works with the new Allegra 6 centrifuges from Beckman. The GC-3.8A is a multi-functional horizontal bucket rotor that can handle bottle volumes from 2.5 mL to 750 mL, making it ideal for applications such as milk tests, oil tests, cell cultures, hazardous waste and environmental samples.

For more information,
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NALGENE SAFETY WASTE SYSTEMS REDUCE HAZARDOUS EMISSIONS IN THE LABORATORY

Nalgene Safety Waste Systems make hazardous waste disposal easier, more convenient and safer by reducing volatile emissions from the laboratory atmosphere. Three sizes are available, 2 L, 4 L and 10 L. All Nalgene Safety Waste Systems are made completely from tough, chemical-resistant, high-density polyethylene. A fluorinated HDPE system is available for a larger amount of liquid waste.

Nalgene Safety Waste Systems include a covered Safety Waste Funnel, a standard Nalgene closure and waste container in either bottle or carboy configuration. Funnels screw securely onto the waste containers and are left in place until the container is full. Funnel covers, kept closed except when liquids are disposed, significantly reduce the volume of volatile emissions in the laboratory atmosphere. A built-in funnel vent releases pressure and there is no risk of funnel overflow.

For added security, secondary Nalgene containers are available (sold separately) to contain contents in the event of an accidental spill.

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Sevenoaks, Kent TN14 5XA, United Kingdom
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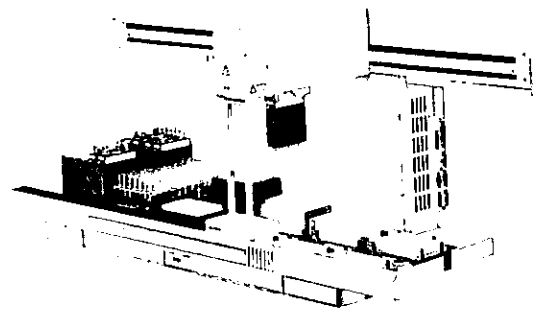
BIOMEK LABORATORY AUTOMATION WORKSTATION



Alphatech offers the widely used Biomek 2000 Liquid Handling Workstation. With the Biomek 2000, liquid handling operations are performed quickly, easily and automatically. Pipetting, diluting, dispensing, plate heating and cooling, plate washing, high density transfers, photometric measurement, and high capacity operation are integrated into a single system. The results are high throughput, reduced operator interaction and increased laboratory productivity.

A range of accessories are available including disposable pipette tips, multi-well plates, labware holders and test tube racks.

To support full laboratory automation, Alphatech offers high level programming services as well as the facility to design and manufacture custom accessories for particular applications.

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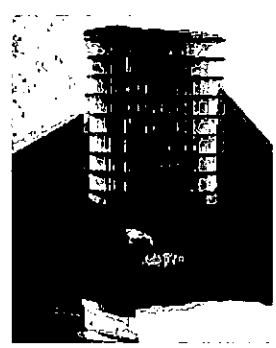
QUICKSHOT AND ECOSTAK PIPETTE TIP SYSTEMS PROVIDE COST AND LABOUR SAVING



Sorenson Bioscience provide their universal fitting 1 to 200 µL pipette tips in two systems designed to eliminate the time consuming, labour intensive task of manually loading pipette tips into racks.

Centrifuges & Liquid Handling Focus Feature

The first is the new QuickShot loading system. This automatically loads pipette tips into reusable hinged racks by placing the SpeedLoader with its attached magazine of 10 x 96 tips over the empty racking. It dispenses one layer of 96 tips that are certified RNase/DNase-free and are non-pyrogenic. The system is sold as a Starter kit with one Loader, one Magazine of 960 tips and ten preloaded racks. It then is only necessary to buy replacement magazines which have the loader attached.

EcoStak is the second system. It eliminates reracking all together as it is a disposable systems of 5 x 96 racks nested in layers with each rack serving as a lid for the rack below. The whole system is autoclavable.

Both systems are available exclusively from sole agents Biolab Scientific.

Contact: Biolab Scientific Ltd
Private Bag 36900, Northcote, Auckland
Free Phone: 0800 807809, Fax: (09) 4803430
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NEW ALLEGRA TRIO OF COMPACT CENTRIFUGES

Alphatech Systems, introduces the new family of versatile, easy-to-use benchtop centrifuges. The three new models are the Allegra 6, the Allegra 21 and the Allegra 64R.

The Allegra 6 high capacity centrifuge features the new ARIES rotor with Smart Balance Technology - the world's first imbalance-correcting rotor. Available in refrigerated and non-refrigerated models, the Allegra 6 reaches forces up to 4,500 x g with swinging bucket rotors and up to 5,710 x g with a high-capacity fixed-angle rotor. This model handles samples from 1.5 to 750 mL and spins tubes, microplates, specialty bottles and blood bags.

The Allegra 21 multi-purpose centrifuge has a maximum force of 21,460 x g with a fixed-angle rotor. Available in refrigerated and non-refrigerated models, it accommodates 1.5 to 100 mL tubes, 180 mL bottles, and microtitre and deep-well plates.

The Allegra 64R is a high-speed refrigerated centrifuge with brushless induction drive with a maximum force of 64,000 x g with a fixed angle rotor. Sample capacity ranges from 250 µL to 85 mL.

With a wide selection of Beckman rotors and adapters, the Allegra centrifuges can be configured to meet the needs of a diverse range of applications. All Allegra centrifuges meet the world's highest standards for quality and operator safety, certified by the CE marking, UL and CSA approvals. They are manufactured in an ISO9001 facility and are completely CFC-free.

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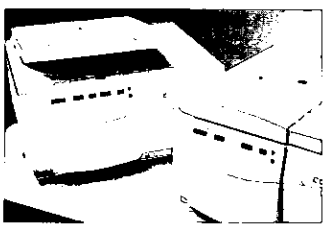
Centrifuges & Liquid Handling Focus Feature

NEW CENTRA-GP8/GP8R CENTRIFUGES FROM IEC



These quiet running centrifuges offer the capacity, separating power and versatility of floor model centrifuges, but cost less and fit conveniently on the lab bench. Their high performance, large capacity and accuracy make them the centrifuges of choice for a variety of clinical, blood bank, industrial and bioresearch applications. Choose from a wide selection of swinging bucket or fixed angle rotors, most of which provide aerosol containment. The GP8 and GP9R also accept many rotors from existing IEC floor model centrifuges.

Easy to clean and "glove-friendly," the membrane control panel makes parameter selection easy. Speed may be set from 500 to 5600 rpm in 10 rpm increments, or set by required g-force directly. Actual values, or at the press of an arrow key, set values, are displayed digitally for instant verification of run conditions. An internal program memory stores 35 of the most frequently used run parameters.

A choice of five acceleration rates, five deceleration rates and a coast position enables runs to be optimised - fast for rapid processing, gentler for delicate samples. Other exclusive features include an "at speed" timer mode to enhance the accuracy of time-sensitive runs.

A fail-safe cover interlock system prevents operation of the centrifuge while the cover is open and releases only at the completion of the run. A variety of self-diagnostic codes and error messages simplify the trouble-shooting and minimise downtime. Large suction feet provide stable, quite operation regardless of sample load.

Contact: Andrew Pearce, Science & Technology (NZ) Ltd
P O Box 663, Dunedin
Phone: (03) 477860, Fax: (03) 477870
Email: scitech@scitech.co.nz
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NEW CENTRA-CL3 LOW PROFILE, GENERAL PURPOSE CENTRIFUGES FROM IEC

- Maintenance-free brushless motor
- Quiet operation, less than 60 dBA (maximum)
- Quick acceleration and deceleration rates
- Low profile, only 12.5" (31.8 cm) from bench
- Aerosol containment using new Aerocarriers sealed carriers

Quality Control Over Sample Preparation
The CL3 series will store and lock up to 99 protocols and has speed and accuracies to the nearest 10 rpm, select temperatures with 1 °C increments, as well as automatic speed calculation of the g-force. Laboratory personnel can be confident that the Centra-CL3/CL3R will provide performance with accurate results.

Run-to-Run Replication
IEC's exclusive "At-Speed" Timer mode is just one more convenience of the Centra-CL3/CL3R series. The time portion of the run being when sample load reaches set operating speed, providing you with the appropriate g-force effect on the sample for the desired time period - run after run.

Most Accommodating
The CL3 series accommodates up to 1 litre of sample (4 x 250 mL), accepting a wide variety of popular tubes including 15 mL, 50 mL, 225 mL conical, Vacutainer® tubes to 15 mL (16 x 125 mm). Microtubes, microplates (standard and deep well), microscope slides, and an assortment of filtration devices.

New Quick Release Rotor
The new IEC 243 Swing Bucket Rotor, utilises convenient sealed Aerocarriers™ which accommodate sample volumes ranging from 0.25 mL to 250 mL. Exchanging rotors is a cinch with a simple, quick release/mounting mechanism (patent pending). Additional savings may be realised because the Centra-CL3/CL3R will accept rotors from various other IEC centrifuges both past and present.

Contact: Andrew Pearce, Science & Technology (NZ) Ltd
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Phone: (03) 477860, Fax: (03) 477870
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International News

EXTERMINATE THE MILLENNIUM BUG!

"Don't panic about the Millennium Bug" is the message being stressed by laboratory equipment company executives in a recent survey published by *Analytical Instrument Industry Report.*

According to managing editor Dr Gordon Wilkinson, "we surveyed leading European, US and Japanese companies, and our conclusion was that manufacturers are working hard to resolve any Year 2000, or Y2K, issues before the end of 1998". He adds, "however, if your work relies on laboratory equipment or PC-based instrument systems having date-dependent functions, and these systems are no longer in production, then most manufacturers will advise you to upgrade ... just like your organisation, they are concentrating the bulk of their Y2K-compliance resources on management information systems (MIS) and have had to focus their efforts on equipment that is currently in production or being supported". He adds, "many suppliers that we spoke to are using the British Standard DISC PD2000-1 as the *de facto* standard, available on the Internet at www.bsi.org.uk/disc/year2000".

Based on the survey results, AII Report has advised laboratory equipment and instrument makers that: "significant effort, possibly even the bulk of the resources that the company has available, should be focused on MIS compliance; companies should not waste effort on obsolete instruments, but instead offer customers a clear upgrade path; in-house tests should be run on supported instruments to ascertain compliance and the results should be made widely available to quell customer uncertainty; service engineers should test for compliance during routine maintenance; and implementation should be completed by year-end to ensure a smooth transition through to 2000".

For a copy of Tackling the Y2K Problem from *AII Report* **14** (24) of 7 April 1998, contact Judy Meek, *AII Report.*
Tel: (+44-1342)-835935, Fax: (+44-1342)-833488
Email: aiireport@compuserve

IUPAC RELEASES STRATEGIC PLAN

The International Union of Pure and Applied Chemistry (IUPAC) announced the completion of its first Strategic Plan. This plan, which is intended to guide development of the Union's programs during the current biennium, 1998-1999, is built around a mission statement and ten long-range goals, each supported by a number of strategic thrusts. In addition to initiating and continuing major thrusts on chemical nomenclature and terminology, atomic weights and many other critically evaluated data in which IUPAC is recognised as the world authority, the Union will represent, when appropriate, the interests of chemistry in international governmental and non-governmental forums. According to IUPAC President Joshua Jortner, goals have also been established for the Union's contributions to the advancement of worldwide research in the chemical sciences, the promotion of the service of chemistry to society, and the facilitation of the development of effective channels of communication in the global chemistry community. "The Union feels it is important to promote the chemical aspects of industry in its contributions to sustainable development, wealth creation and improvement in the quality of life," he added.

Jortner pointed out that the improvement of chemical education is another IUPAC goal. "The Union recognises that the needs of the developed countries and the developing countries in this regard are quite different. Scientific literacy is the major concern in the developed world. IUPAC's role is to act as a clearing house for information about national programs. Less developed countries need help and support at all levels of education and training."

Jortner emphasized that "IUPAC strives towards globalisation of its activities with the participation of the entire world's chemistry community. The broadening of the geographical base will be accomplished by recruiting new National Adhering Organisations. In addition, new mechanisms need to be set up to ensure worldwide dissemination of information about IUPAC's work and the drawing of human capital to its activities. The internet is seen as an opportunity to greatly improve the Union's efforts in both these areas."

The Strategic Plan is available on the World Wide Web at: http://www.iupac.org

VARIAN CELEBRATES 50TH ANNIVERSAY

Varian Associates, Inc., is celebrating its 50th anniversary. The company, which was the first to commercialise devices for chemical analysis-based nuclear magnetic resonance (NMR), today remains a leader in NMR spectroscopy, and offers a broad range of other analytical instrument innovations.

In legendary Silicon Valley style, the company's roots began in a Stanford University laboratory and in a shack-like building on a dirt road. From a start based on microwave tubes and scientific instruments, Varian has become a world leader in analytical instruments, health care systems, vacuum equipment, and semiconductor manufacturing gear.

The founders' initial aim was to create an independent laboratory to advance science, and with NMR instruments as a foundation, Varian has grown into a worldwide developer and manufacturer of a full range of spectroscopy, chromatography, and sample preparation products. In fiscal 1997, Varian Instruments led the company's three core businesses in sales, at $527 million.

Klystron Tubes and Early NMR Efforts
Varian Associates opened for business July 1, 1948, in San Carlos, California, just north of its present Palo Alto world headquarters, with six employees and $22,000 in working capital. Its name came from two brothers, Russell and Sigurd Varian, who, with physics professor William W Hansen, launched the microwave era with their invention of the Klystron tube at Stanford University in 1937.

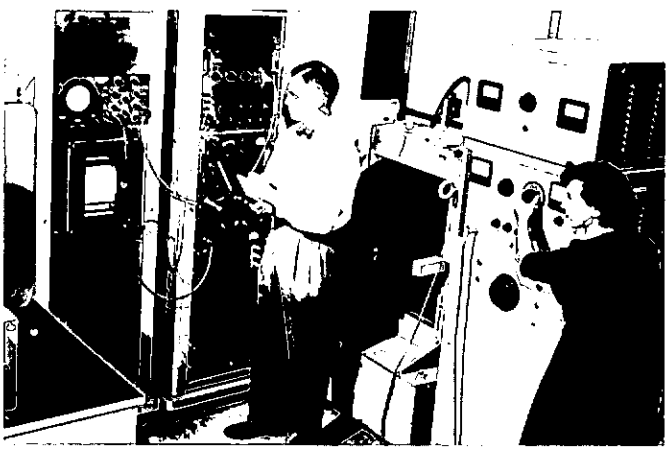
Thinking they could not compete with large Eastern tube companies in manufacturing Klystrons, the founders set out to develop uses of NMR under a patent that Russell Varian obtained

from its Stanford discoverers, Professors Felix Bloch and Hansen. (Bloch shared the 1952 Nobel Prize with Harvard's Edward Purcell, who discovered NMR by a different method).

As it turned out, Varian Klystorn tubes and other microwave devices found a hot market in defense projects and television development by the early 1950s. Earnings from electron devices carried the young company while it built up its NMR capability from scratch.

In 1949, Varian marketed its first instrument, the F-6 nuclear fluxmeter, a technical novelty that won attention but few buyers. Within a few years, however, Varian NMR spectrometers became popular industry standards, aided by trade press advertising designed to teach chemists how NMR could speed up their work dramatically. In succeeding decades, Varian pressed hard for higher resolution in NMR and related spectrometers.

Russell Varian and Martin Packard invented a proton precession magnetometer that proved useful in finding oil and mineral deposits and exploring space. Another of Russell Varian's ideas ultimately led to big advances in imaging. Applying it, Weston Anderson and Richard Ernst mated computers with instruments and, with Fourier transform computations, achieved thousand-fold gains in high-resolution spectrometry.



The first commercial NMR spectrometer, the Varian HR-30, was installed at Humble Oil Company in Baytown, Texas, USA in September of 1952. Jim Shoolery with help from Virginia Royden opened the Varian NMR Applications Laboratory in January of 1953.

Broadening Analytical Instrument Offerings

Acquisitions of several other instrument companies during the 1960s significantly broadened Varian's offerings.

Major additions began in 1965 with Wilkens Instrument and Research, of Walnut Creek, California, a manufacturer of gas chromatographs later called Varian Aerograph. In 1966, Applied Physics Corporation of Monrovia, California, a pioneer in spectrophotometers, joined Varian with its renowned line of Cary Instruments. In 1967, the company began acquisition of Techtron, an Australian maker of atomic absorption spectroscopy instruments invented by a university scientist with Australian government support.

In 1987, Varian acquired Analytichem of Harbor City, California, a manufacturer of automated sample processors. Most recently, the business has grown with targeted acquisitions of businesses and technologies designed to broaden or extend its product lines. The most recent include the high performance liquid chromatography line of Rainin Instruments of Woburn, Massachusetts, and the Chemagnetics product line of Ostsuka Electronics, Fort Collins, Colorado, USA.

Innovate or Perish

Allen J Lauer, a three decade Varian veteran and executive vice president responsible for the Instruments business, attributes much of his operation's success to continuous innovation aimed at refreshing the entire product line every three years. The result has been what Lauer calls "bona fide leaps in instrument performance, productivity, and ease of use - in other words, just what the customer ordered."

He says that the company continues to use trade advertising, seminars, and now the World Wide Web to educate customers on the uses and value of cutting-edge technology. "To achieve significant productivity gains sometimes requires more than a new instrument," explains Lauer. "It often necessitates an entirely new approach to experimentation.

"Just as in the early days of NMR spectrometers," he continues, "we are still educating our customers about product capabilities, and we still learn a great deal from them."

The Next 50 Years

Today, Varian's three major businesses each command a share of world leadership. In addition to Instruments, the businesses are Health Care Systems, the foremost provider of integrated cancer-care systems, based originally on the company's medical linear accelerators and medical X-ray tubes; and Semiconductor Equipment, ranking first globally with 2800 installed ion implanters.

The corporation is led by J Tracy O'Rourke, who took Varian's reins as chairman and chief executive in 1990. He quickly implemented a three-part turnaround strategy to stem years of erratic financial performance. Phase I included exiting under-performing businesses, and Phase II was described as a drive for Operation Excellence. This comprised a commitment to quality; fast, flexible factories; fast time-to-market for new products; customer focus; and organisational excellence. The results are clear: the price of the company's stock has increased six-fold since 1990, and by the mid-90s, it had delivered three consecutive years of record profits.

Now the company has entered the final phase of the turnaround strategy, to continue achieving profitable, consistent growth. O'Rourke says that this growth will come from Varian's often cited chief characteristic: innovation. "Some of that innovation will come from our own R&D laboratories, but much of it will come from outside the company through the relationships we've established with universities, doctors, and start-ups. And, we will be making selective acquisitions that are product-line extenders, market extenders, technology extenders, and geographic extenders."

As Silicon Valley historian, Ward Winslow, points out, "Recapping its first 50 years brings out Varian's unique profile as one of America's and the world's true technology pioneers. The middle '90s have been the most profitable years yet, and they may prove merely a prelude to what is to come - a golden era following a golden anniversary."

US-BASED THERMO, PERKIN-ELMER AND HEWLETT-PACKARD LEAD THE INDUSTRY, BUT JAPAN' S HORIBA MOVES INTO TOP TEN

Three American companies, Thermo Instrument Systems, Perkin-Elmer and Hewlett Packard, topped the global list of analytical instrument and laboratory equipment manufacturers in the "1998 Industry Scoreboard", an annual ranking of companies produced by the newsletter, *Analytical Instrument Industry Report.*

According to managing editor Dr Gordon Wilkinson, who has been producing these rankings for over a decade, "ownership of this industry continued to shift towards the USA in 1997, especially with the cross-border acquisitions made by Thermo Instrument Systems, Perkin-Elmer and Waters in the manufacturing sector. However, in the past year we saw Japan's Horiba move into fifth place in the global rankings as it added $100 million in annual revenues from the acquisition of France's largest instrument maker, Instruments SA". Horiba said that it wanted to be, "the top measuring instrument maker, not only in Japan, but in the world".

Wilkinson's list of over 500 companies shows that the top five held around 40% of the $11.5 billion to $12 billlion market, "compared with just five years ago when the top five accounted for 20% of a market that was then only two-thirds the size". He notes a similar consolidation trend in the global laboratory equipment distribution business, "which is now controlled by Merck, VWR (of which Merck owns 49%) and Fisher Scientific, companies with combined sales of nearly $4.5 billion and a very powerful grip on the market".

For a copy of Industry Scoreboard - 1998, from *All Report* **14** (21) of 18 February 1998, contact: Dr Gordon Wilkinson, Managing Editor, Analytical Instrument Industry Report
Tel: (+44-1342)-835935, Fax: (+44-1342)-833488
Email: aiireport@compuserve.com

PERKIN-ELMER DONATE FIRST PLACE PRIZE IN THE GRADUATE CERTIFICATE OF CHEMICAL INSTRUMENTATION AT GRANVILLE COLLEGE

The Department of Chemical and Environmental Technology at Granville College offers a range of courses for chemical and environmental technicians and technologists, laboratory assistants and operatives, as well as specialised post and graduate certificate courses.

Perkin-Elmer sponsors the Graduate Certificate in Chemical Instrumentation. This course was developed by teachers at Granville TAFE, Department of Chemical and Environmental Technology, which has recently been designated as TAFE Centre of Excellence in Chemical Instrumentation.

This year the prize of $A200 dollars will be shared by Lucilyn Olivar and Fei Xu. Both of these students have degrees in science from their home countries and are seeking to make themselves more employable by gaining an Australian qualification.

The Presentation was held on the 27 May, 1998 in the main hall at Granville College. First prize will be presented by the General Manager of Perkin-Elmer, Stephen Tomisich. Perkin-Elmer would like to warmly congratulate Lucilyn and Fei for their excellence in completing the Graduate Certificate Instrumentation.

LETTER TO THE EDITOR

Tjenderasa and Duxbury must be congratulated for their clear, well-written article on a better analytical method for pholcodine (*Chemistry in New Zealand*, March/April 1998). Their method will be welcomed by many analysts.

However there is a small point concerning methyl paraben, shown in the text as an active ingredient, but not present in Table 1: *Typical Composition of Cough Syrup*. Perhaps the discrepancy between 100 and the total of the Table 1 figures is the paraben?

The high response in the HPLC chromatogram (Figure 2) shows that this component could be a problem, which poses another question: Why does a product containing sugar, ethanol and glycerol need another preservative? Without knowing the strength of the sugar solution, these three will normally be adequate.

C L H Stonyer

SIGMA PSEUDO CANINE TRAINING AIDS

Available from Sigma is a range of forensic products for the training of canines. These include:

• *Sigma Pseudo Narcotic Scents*: which substitute for controlled substances in the training of narcotic detector dogs. Each formulation mimics the odour of controlled substances of abuse. These include cocaine, heroin and marihuana formulations.

• *Sigma Pseudo Corpse Scent:* Canine training aids for the detection of corpses. Formulation 1 is for the early detection or below 0 degrees Celsius and Formulation 2 is for the post-purification detection. Also available is a Drowned Victim Scent Formulation. This is a valuable training aid for water searches. It provides a reliable scent source for 30 to 45 minutes, in still or running water, at depths of 1-12 feet.

• *Sigma Pseudo Distressed Body Scent:* This is a trauma and fear formulation and is a training aid for search-and-rescue dogs. For the detection of live victims of natural disaster or violent crime, as well as missing persons. The formulation is non-specific with respect to age, sex and race.

As part of our Forensic Canine Training Aids, we also offer videotapes and textbooks which cover this area. For further information,

Contact: Anna Civadelic, Sigma-Aldrich Pty Ltd
Free Phone: 0800 936666, Free Fax: 0800 937777
Email: sigmaa@ibm.net
circle number 21 on the reader reply card

J&W SCIENTIFIC RELEASES A NEW GAS PURIFIER FROM R&D SEPARATIONS

J&W and R&D Separations have teamed up to release MegaSorp, a new helium gas purifier. J&W Scientific is the world's largest manufacturer of high resolution capillary GC columns, and R&D Separations specialises in high performance filtration and chromatography products. This new product removes hydrocarbons, moisture and oxygen from a gas stream all with one trap.

R&D Separations designed MegaSorp for trace analyses, high flow rates (3 litres of gas per minute), and optimal bed packing. It reduces oxygen, moisture, hydrocarbons, CO_2 and CO to parts-per-billion levels, from 2000 cubic feet of gas. MegaSorp is available with 1/8" and 1/4" Swagelok stainless steel fittings.

Visit the J&W Web Site at http://www.jandw.com for monthly updated product information.

For more information about MegaSorp,
Contact: J&W Scientific
91 Blue Ravine Road, Folsom, CA 95630, USA
Phone: (+1-916)-9857888, Fax: (+1-916)-9851101
circle number 22 on the reader reply card

THERMO SEPARATION PRODUCTS PUBLISHES NEW 1998 PRODUCT CATALOGUE

TSP's new *1998 Product Catalogue* provides a single, convenient source of information on the company's current products. It includes all the information needed to quickly identify and order systems, instruments and software from TSP, and the former Spectra-Physics Analytical and LDC Analytical. Most of the SpectraSYSTEM, constaMetric, and spectroMonitor products are listed along with instrument accessories, maintenance parts and consumables. All listings show part number and name along with a brief description of the item.

Two catalogue sections address pre-configured HPLC systems and the company's broad selection of instrument modules. Customers can also configure a system for specific application needs. Instruments include a selection of degassing options, isocratic and gradient pumps, autosamplers with several integrated options, and a wide selection of detectors. System control software and chromatography workstations are discussed. The company's well-known family of integrators is also listed.

Accessories, maintenance parts and consumables for HPLC are included. Accessories include the company's extensive selection of interchangeable flowcells. The maintenance parts are categorised by individual instrument for ease of reference. Consumables include the standard items used continually in the laboratory.

Contact: Science & Technology (NZ) Ltd
P O Box 663, Dunedin
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Web Site: http://www.es.co.nz/~scitech/home.html
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HEWLETT PACKARD ADDS THERMOSTATTED AUTOSAMPLER TO HP 1100 SERIES OF LC MODULES

Hewlett Packard (HP) Company announces the HP 1100 Series thermostatted autosampler, which provides Peltier temperature control from 4 °C to 40 °C on as many as 100 samples. The autosampler's ability to cool is a significant benefit to pharmaceutical and biopharmaceutical analysts, who often need to analyse samples containing thermally-labile compounds.

This new addition to the HP 1100 Series of liquid chromatography (LC) modules can be controlled by an HP ChemStation for LC or by the handheld HP 1100 Series control module. The thermostatted autosampler fits neatly in an HP 1100 Series tower and uses the same leak-handling channel for complete system safety.

The autosampler uses Peltier elements for efficient air cooling, and the cooled air is kept dry, eliminating condensation. Specially designed sample trays ensure effective temperature control, regardless of how many vials are in the tray. The

sample trays are removable, providing for easy handling of large numbers of samples, for example, transport from the refrigerator.

Clock-time programming enables the temperature control to be turned on or off for optimised energy consumption. The temperature control can be turned off within a sequence of analyses.

Information about HP analytical products and services can be found on the World Wide Web at http://www.hp.com/go/chem

Contact: Medtec Products Ltd
P O Box 34-241, Auckland
Phone: (09) 4791068, Fax:(09) 4791450
circle number 24 on the reader reply card

HPLC COLUMN FOR DRUGS IN BIOLOGICAL MATRICES

Direct sample injection in HPLC analyses of drugs, drug metabolites, and other substances in biological matrices would eliminate extensive sample clean-up prior to analysis. In earlier methods, direct injection of biological matrices caused problems due to precipitated proteins on the analytical column. Other methods involve the use of micellular mobile phases to solubilise the proteins, or the use of complicated column switching techniques.

The Hisep HPLC column, now available from Sigma-Aldrich, simplifies analysis of drugs from biological fluids. These columns comprise a silica-based material shielded by a thin polymer consisting of hydrophobic regions in a hydrophilic network. This enables small analytes, such as drugs, to penetrate the hydrophilic network and be retained. Proteins are shielded from the silica surface and are not retained.

With Hisep columns, analysts are able to directly inject biological samples, eliminating the need for time-consuming clean-up steps and increasing analytical accuracy.

For more details request Application 145.
Contact: Patrick Wesley, Supelco, Sigma-Aldrich Pty Ltd
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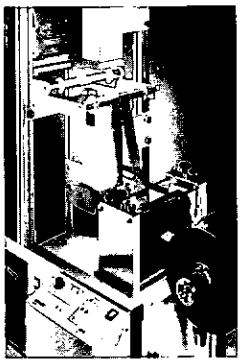
circle number 25 on the reader reply card

IN THE PICTURE! OPTICAL FILM TESTING WITH THE POLYLAB SYSTEM

The Haake PolyLab System, the foremost technology in the field of polymer testing, is used for the laboratory-scale testing of polymer materials under production conditions. Various characteristics for processing, quality control or development are determined using scaled-down processing sensors such as mixers and single- or twin-screw extruders.

Up to now any judgement of the end product after the extrusion process could only be made on the basis of a visual examination. The usage of optical testing systems now automatically provides access to this information at the touch of a button.



A camera system, which is integrated within the HAAKE Postex system, examines the quality of the transported film or tape on-line. Entrapped particles, contamination and other impurities can be qualified and quantified using 20 freely selectable size categories from a size of 20 pm and differentiated between blackspots and fisheyes. This is carried out for the most part independently of the transparency or transparency variation of the film.

The user-friendly, fully menu-oriented software enables evaluation according to fault/m^2, fault/kg or total faults. Statistical functions such as time curves, histograms, alarm limits etc. can be easily linked to company internal testing and production processes.

If you want to know more about OQT (Optical Quality Testing),

Contact: Peter Kilinc, Gebrüder Haake GmbH
Phone: (+49-721)-4094277, Fax: (+49-721)-4094300
circle number 27 on the reader reply card

TSP AND CE INSTRUMENTS EXHIBIT NEW CHROMQUEST CHROMATOGRAPHY SOFTWARE AT PITTCON 98, BOOTH #5845

ChromQuest is a new 32-bit, multi-technique, chromatography software package for LC, GC and CE. With the new ChromQuest software, Thermo Separation Products® and CE Instruments, both subsidiaries of ThermoQuest® Corporation, introduce their Open Lab approach for the chromatography laboratory.

The Open Lab
The Open Lab means that ChromQuest brings together the tools to accommodate existing systems, additional users and new locations for a busy, expanding chromatography laboratory. The software controls multiple LC, GC or CE systems from a single point in the laboratory. No additional complicated software or networking hardware is needed as a network or locations expand. Instrument control includes several separation systems from ThermoQuest, specifically TSP's complete SpectraSYSTEM family of HPLC instruments, CE instruments, TRACE and Ultra-Trace GC 8000 Top GC systems, and the SpectraPHORESIS ULTRA capillary electrophoresis system. ChromQuest will also collect data from PE Nelson's A/D interfaces and control Hewlett Packard GC systems. Operating on the Windows NT 4.0 platform, ChromQuest provides superior reliability, multi-tasking, network scalability, security, and compatibility with most Windows NT based programs, including Microsoft Word and Excel. ChromQuest supplements the existing security features of Windows NT with several additional levels of protection. Laboratory supervisors will control various levels of access,

password protection, instrument restrictions, permission protocols, and records.

Simultaneous Multi-Technique Operation and Analysis
System setup of any combination of LC, GC or CE systems is done simply from one system configuration window. Users can monitor one system in a technique while another system of a comparable technique is running. They can compare data for the same compound run under different techniques, while ChromQuest continues to reprocess data from yet another technique.

Manual integration tools provide even greater reprocessing flexiblity. Any LC or GC chromatogram or CE electropherogram can be integrated easily and quickly. Manual baselines, threshold, peak drops and many other integration tools are available in a separate toolbar. Each integration even can be saved in the Manual Integration or the Integration Events tables, thereby providing chromatographers the choice of integrating other chromatograms with these events, or saving these events with the method.

Customised Reports
ChromQuest software saves time and effort when users generate reports. The software easily replicates an old report or converts it into whatever new form is needed. Operators can import data, graphics, signature lines, structural diagrams, charts or spreadsheets with the software's advanced use of OLE (object linking and embedding) technology. Users then edit text, resize objects, change fonts or colours, and add a photograph or logo - all in the same document. The document can be saved as a template and used over again.

GLP and Validation
GLP compliance is assured with audit trails and validation. Chromatographic methods are saved in the original, non-editable data files and as separate editable files. When the Audit Trail Function is activated, changes are automatically logged without
altering the original data files. If needed, password
protection and privilege levels are available for all systems.

Time-Saving HPLC Analytical Tools
ChromQuest software offers HPLC users several time-saving tools for real-time or post-run analysis. To produce peak purity values, the software automatically correlates multiple spectral scans across a peak in real-time and post-run. ChromQuest then graphically displays the peak purity number above the analysed peak. Additionally, peak purity calculations can be performed off-line with any scan data by simply clicking on the peak of interest.

Library searches are available in real-time or post-run. To identify unknown compounds, HPLC chromatographers will simply highlight a spectrum then choose either to use an existing library or libraries, or to specify different search parameters. Depending on the number of matches, or "hits" requested, the library matches will be displayed. To maximise productivity, there is no limit to the number of specialised libraries that can be established.

A unique LC sequence wizard simplifies the sequence process and saves valuable time. It automatically walks chromatographers through all the sequence possibilities. Calibration vials can be set up easily in any or random order. The sequence table is flexible enough to allow a different LC method to be run with each injection. Error controls and powerful custom programs are available for each sequence line.

The interactive system suitability capabilities built into ChromQuest provide LC suitability testing on a multitude of parameters, including area percent, peak purity, capacity factor, resolution and many others. Various calculation methods are possible, including USP, Exponential Modified Gaussian, Area/ Height and others. Based on system suitability results, operators can customise what action the LC system will next perform. Pause, re-inject, abort or run customised programs are all available choices. System suitability can also be run on any number of sequence items or injections. This automation decreases the time spent monitoring the system manually.

Compatibility with TSP's Former PC1000 Software
The ChromQuest software succeeds the successful PC1000 chromatography software from TSP. Users of PC1000 can convert a single chromatogram or complete spectral scan data safely and easily. All original method and calculation information remains stored with the converted data and accessible for reintegration and printing. This backward compatibility with PC1000 eliminates any concern about a laboratory's ability to recall older data for archiving, retrieval or regulatory compliance.

Powerful GC Capabilities
GC control includes multiple detector channels per system and all the advanced features of CE Instruments' liquid and headspace autosamplers. With a series of check boxes operators automate internal standard addition, solvent flush techniques, the large volume capabilities of the autosampler, and the Multiple Headspace Extraction process.

Methods development and methods transfer have been simplified with embedded audit trails, batch programming and post-run programming for data reprocessing. ChromQuest saves all GC operating parameters, including electronic pneumatic control of carrier and detector gases, in a single file, which makes methods transfer among multiple systems or multiple locations simple and error-free. Once saved, autosampler parameters can be altered later when programming new batches of samples during method development. Batch programming is further simplified by a graphical representation of the autosampler tray that identifies vials, sample identification, injection mode, sample sequence, calibration parameters and current running status. A variety of post-run calibration methods ensure proper quantitation prior to methods transfer.

Control of Capillary Electrophoresis
The ChromQuest software also controls the SpectraPHORESIS ULTRA capillary electrophoresis system, including the system's extensive sample preparation capabilities. The advanced spectral analysis features of ChromQuest greatly simplify

manipulation and evaluation of spectral data generated by the system's UV3000 scanning UV/Vis detector. The library searches and peak purity calculations facilitate comparison of data between existing LC methods and new CE separations. Difficult integration is aided by the Manual Integration functions. Reports are tailored to capillary electrophoresis, including calculation of migration time, mobility and corrected peak areas.

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Web Site: http://www.es.co.nz/~scitech/home.html
circle number 28 on the reader reply card

POWER OF LIGHTPIPE TECHNOLOGY MAXIMISED BY NEW CHROMQUEST SOFTWARE

Thermo Separation Products introduced its revolutionary LightPipe flowcell technology in the first half of 1997 and incorporated it as the cornerstone of its new photodiode array detector, the SpectraSYSTEM UV6000LP. The LightPipe flowcell is 50 mm long, a breakthrough proprietary design that significantly increases sensitivity over that of a conventional 10 mm flowcell. With five times the sensitivity of other detector flowcells, the LightPipe makes the UV6000LP the most sensitive UV/Vis detector for HPLC.

LightPipe Technology One Year Later
Customers who installed the UV6000LP with the LightPipe flowcell are reacting favourably to its superior sensitivity. Where chromatographers are analysing compounds with weak chromophores, the UV6000LP's increased sensitivity allows a reduction in the amount of sample injected. This in turn reduces the risk of column overloading. Smaller samples allow the analyst to use shorter columns for shorter analysis times and greater analytical throughput. Thanks to its chemically-inert construction, the LightPipe flowcell has proven extremely robust with no reports of early life failure.

ChromQuest Software Optimises the Power of the LightPipe and the UV6000LP PDA
The power and flexibility of the new ChromQuest software optimises the spectral data coming from the LightPipe in the UV6000LP. ChromQuest presents absorbance spectra, 3-D plots and contour mapping in real-time. Chromatographers immediately see the superior sensitivity resulting from the UV6000LP's 5 cm LightPipe flowcell. Standard spectral analysis features include spectral library matching, peak purity determination and external event control based on retention time and absorbance level. For greater operator convenience and efficiency, spectral analysis and library matching can be performed for peaks at trace levels on-the-fly.

Summary
No longer must analytical chemists choose between the high sensitivity of a single wavelength detector and the qualitative information of a photodiode array detector. With the LightPipe technology in the UV6000LP analysts have the highest sensitivity available for UV/Vis detection in HPLC and the spectral information of a PDA. By combining the power of LightPipe with ChromQuest's ease of use and networking capabilities, chromatographers master the detector's sensitivity.

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LATEST CATALOGUE FROM J&W FEATURES OVER 1000 NEW PRODUCTS

J&W Scientific has released its latest catalogue for 1998 featuring over 1000 new columns and laboratory supplies for gas chromatography. With over 400 full-colour pages, this free catalogue offers chromatographers a single-source reference guide to supplies, services and technical information for this highly specialised area of separation science.

The catalogue is more than a product guide, it also includes an all-new, 30 page reference and troubleshooting section and displays over 300 chromatograms - both valuable tools for chromatographers. The reference section includes such topics as terms and definitions, selecting columns, method development, and troubleshooting common problems, to name a few. Chromatograms featured include common analyses for environmental, food and flavours, industrial chemicals, life sciences, chiral, NIOSH Methods and petroleum. J&W's corporate personality shines through with the inclusion of tasty recipes ranging from home-canned salsa to chocolate kahlua cake.

For more information about J&W's 1998 catalogue, *Technical Reference and Cookbook*,

Contact: Barbara Bogue, J&W Scientific
91 Blue Ravine Road, Folsom, CA 95630, USA
Phone: (+1-916)-9857888, Fax: (+1-916)-9851101
Web Site: http://www.jandw.com
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WIDE BORE CAPILLARY GC COLUMNS FOR ARSON INVESTIGATIONS

Many forensic specialists use chromatograms from nonpolar gas chromatography columns as reference profiles, or *fingerprints*, for the complex hydrocarbon mixtures arsonists often use to accelerate fires. Traditionally, packed columns, which give high thermal stability, low bleed rates, short analysis times and reproducible results, have been used to analyse accelerant compounds.

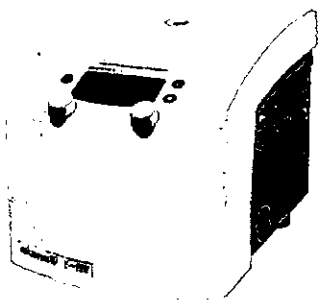
Unfortunately, an accelerant recovered from fire debris often produces a chromatogram markedly different from that produced by fresh material. Partial or indirect heat from fires can selectively reduce the more volatile components, an accelerant can be mixed with, or can resemble pyrolysis products of building materials.

To avoid incorrectly interpreting the chromatogram of a suspected accelerant, it may be neccessary to improve sample resolution. A 30 metre SPB-1 column, from Sigma-Aldrich, provides short analysis times and excellent resolution of hydrocarbons. Many more peaks are resolved than on a packed column with an equivalent phase.

For more details request Application 145.

Contact: Patrick, Sigma Aldrich Pty Ltd
Free Phone: 0800 936666, Free Fax: 0800 937777
Email: sigmaa@ibm.net
circle number 31 on the reader reply card

NEW FULL FEATURED SIGMA CENTRIFUGES



Sigma Centrifuges Germany introduced the world to the first induction drive centrifuge and has continued this policy of refining centrifuge technology to offer customers easier, safer and quieter centrifuge products. The Sigma range includes the new model Sigma 1-15 which features full graphical LCD display, speed and time programmability, and a maintenance free induction drive for smooth, whisper quiet operation. In addition - a full range of rotors and adaptors for every application is available. Other Sigma models include micro-centrifuges, general laboratory centrifuges and large capacity floor standing models.

Biolab Scientific backs the Sigma centrifuge range with a full complement of spares and factory trained service engineers. For further details on the Sigma Centrifuge range,

Contact: Biolab Scientific, Equipment Department
Free Phone: 0800 807 809 or Email: info@biolab.co.nz
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A NEW MEANS OF SAFETY STORAGE

A common problem for many laboratories is the need for safe storage of chemicals and other flammable substances. Often legal regulations specify the need for such storage. To satisfy demand Calibre TecDiv have extended their range of affordable, quality safety products to include Trafalgar flammable liquid storage cabinets. These cabinets comply with the AS1940 Australian standard and the manufacturer is endorsed to ISO9002.

Benefits of Trafalgar storage cabinets include: self-closing doors, a multi-point security locking system to ensure access to particular chemicals is restricted, reinforced shelving for extra strength, compatibility with all standard container sizes, a range of cabinet sizes and capacities to suit your organisation, and easy attachment to external ventilation. Calibre TecDiv offer ventilation systems compatible with these storage cabinets.

The Trafalgar storage cabinet, doors and roof are made from double-skinned steel panels. This provides 40 mm insulating air space for a fire-resistant construction. Ask about custom options also available.

Contact: Sarah Wilson, Calibre Plastics Ltd
13 Patiki Road, Avondale, Auckland
Free Phone: 0800-4-CALIBRE (0800-4225-4273)
Fax: (09) 828-4273, Email: sarah@calibre.co.nz
circle number 33 on the reader reply card

SOPHISTICATED GLASSWARE WASHERS AT REASONABLE PRICES

Have you ever thought it would be nice to have a laboratory glassware washer but the price is beyond your budget. Well now there are Gallay Australia glassware washers available in New Zealand which offer all the sophisticated features of more expensive washers at a very reasonable price.

Calibre TecDiv, who also sell SMEG glassware washers, have recently introduced these glassware washers in New Zealand to fulfill the need for reasonably priced glassware washers. Gallay Australia washers have a high quality European chassis fitted with a superb Australian-made microprocessor control unit which has four standard wash programs. The microprocessor allows the storage of another five custom-wash programs to suit your requirements.

Other features these washers offer include stainless steel construction; hot, cold and distilled water choice; heat and sound installation; the option of fan or convection drying; fault alarms with screen messages, and automatic detergent dispersion. Such features ensure a reliable and consistent cleaning and decontamination process of glassware while preventing unnecessary damage to glassware and the costs associated with replacement.

Contact: Sarah Wilson, Calibre Plastics Ltd
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ORGANOMETALLIC CHEMISTRY IN THE SOUTH PACIFIC – A CELEBRATION

An international organometallic and coordination chemistry conference at the University of Auckland January 24 – 28, 1999

This meeting will be held in honor of Professor Warren Roper's 60th birthday and will feature talks from 40 outstanding chemists from around the world. There will also be the opportunity for registrants to present contributions in poster format. The programme promises a wealth of outstanding chemistry. Social events will include activities for accompanying persons.

Please register expressions of interest either through the conference web site or by contacting the organisers directly (details below). The second circular for this meeting will be forwarded to interested people in June. Poster abstracts and registration will be due in October.

Speakers

T Baker	Los Alamos National Laboratory, USA	M F Lappert	University of Sussex, UK
M A Bennett	Australian National University, Australia	B Marder	University of Durham, UK
J E Bercaw	California Institute of Technology, USA	L McElwee-White	University of Florida, Gainesville, USA
R G Bergman	University of California, Berkeley, USA	B K Nicholson	University of Waikato, New Zealand
D S Bohle	University of Wyoming, USA	H Ogino	Tohoku University, Japan
B Bosnich	University of Chicago, USA	P P Power	University of California, Davis, USA
M I Bruce	University of Adelaide, Australia	C L Raston	Monash University, Australia
A K Burrell	Massey University, New Zealand	C A Reed	University of Southern California, USA
T J Collins	Carnegie Mellon University, USA	B H Robinson	University of Otago, New Zealand
J P Collman	Stanford University, USA	T Saito	University of Tokyo, Japan
O Curnow	University of Canterbury, New Zealand	H Schmidbaur	Technische Universität München, Germany
P H Dixneuf	Université de Rennes, France	U Schubert	Technische Universität Wien, Austria
M A Gallop	Affymax Research Inst., California, USA	B L Shaw	University of Leeds, UK
M Herberhold	Universität Bayreuth, Germany	J L Spencer	Victoria University, New Zealand
A F Hill	Imperial College, UK	F G A Stone	Baylor University, USA
G L Hillhouse	University of Chicago, USA	H Turner	Symyx Technologies, California, USA
G Huttner	Universität Heidelberg, Germany	K Weiss	Universität Bayreuth, Germany
J A Ibers	Northwestern University, USA	H Werner	Universität Würzburg, Germany
H D Kaesz	University of California, Los Angeles, USA	A H Wright	Massey University, New Zealand
R J Lagow	University of Texas at Austin, USA	A Yamamoto	Waseda University, Japan

For further information please contact Dr Penny Brothers or Dr James Wright at the address below, or visit our web site. Updated information will be added to the web site throughout 1998.

http://www.che.auckland.ac.nz/conf.htm

Department of Chemistry
The University of Auckland
Private Bag 92019, Auckland, New Zealand
Telephone: 64-9-3737599, Fax: 64-9-3737422
Email: p.brothers@auckland.ac.nz

HALF-DAY WORKSHOP STAINLESS STEEL IN THE WATER AND WASTE WATER INDUSTRIES

Tuesday 23 June 1998

Suppliers of water equipment, design engineers, construction engineering groups, operators and engineers involved in the handling, treatment and distribution of potable and waste water, can benefit from the use of stainless steels.

To learn how, the Nickel Development Institute, an international non-profit organisation, is conducting a half-day workshop that focuses on the selection, design, fabrication and maintenance of stainless steel for the handling of potable and waste waters. The workshop programme runs from 8.00 am to 12.30 pm and there is no charge for attendance. Topics covered include:

• Corrosion Behaviour of Stainless Steels • Overview of Some Design Considerations • Weld Fabrication of Stainless Steels
• Municipal Water Treatment • Municipal Waste Water Treatment • Building Waters • Water Distribution • Water Industry Case Studies in Australasia

The workshop will be presented by Carol Powell (NiDI Consultant, United Kingdom) Stephen Lamb (NiDI Consultant, USA) and Les Boulton (NiDI Consultant, New Zealand) at the Jean Batten Room, Auckland Airport Travelodge, Kirkbride Road, Mangere, Auckland. The speakers have access to data from a wide range of operating global water industries. For example, part of the Workshop will cover experience gained from 25 years of stainless steel usage in aeration, digester and clarifier piping design, from over 1000 municipal waste water treatment plants in North America. New applications for stainless steels in the water industries continue to be realised and the speakers will highligh these developments and focus on existing applications to ensure that cost-benefits are maximised.

Contact: Les Boulton, Nickel Development Institute
Tel: (09) 3034146, Fax: (09) 3034415

Cooperative Emulsion Polymer Programme
Part 1. Reactor Design

Terence D Lomax[1], Gregory T Russell[2], Christopher J Ferguson[2], Robert G Gilbert[3]
[1]New Zealand Forest Research Institute, Private Bag 3020, Rotorua
[2]Department of Chemistry, University of Canterbury, Private Bag 4800, Christchurch
[3]School of Chemistry, University of Sydney, NSW 2006, Australia

New Zealand has historically lacked a large-scale academic research programme in synthetic polymer science, a technology fundamental to modern society. By researching adhesives for use with New Zealand wood and paper products, new technologies will emerge of fundamental importance to New Zealand industry, and which will provide rapid and on-going benefits. At the New Zealand Forest Research Institute Limited (FRI) a research programme has been initiated in emulsion polymer chemistry, in conjunction with Canterbury University, with an overall objective of improving understanding of fundamentals of structure-property relations of emulsion polymers in adhesives.

The organisation of this research programme is unusual for a Public Good Science Funded Programme. There are two independent Lead Contractors, one being the New Zealand Forest Research Institute, the other a commercial company Protec Industries coordinating both Mr Phil Coveny (Resin Technologies Limited) and University of Auckland involvement. The inclusion of Professor Robert Gilbert, Director of the Sydney University Polymer Centre (SUPC), in this program to act as Science Advisor has allowed access to design information regarding the University of Sydney Polymer Centre reactor. The reactor development described here is part of the FRI component of the research program (which involves synthesis), and further develops that Sydney reactor. To underpin the programme direction, FRI will additionally carry out performance testing of wood adhesives utilising a range of standards to define existing and desired performance criteria for wood adhesives.

The "molecular" design of polymers (i.e. investigation targeting a desired product and/or process through looking at structure-property relations scientifically, for example by control of molecular weight distributions) is one of the exciting fields of modern science. Molecular design can be targeted at the creation of new materials for industry, from micro-electronics and conducting polymers through to structural grade polymers and packaging. The science is interdisciplinary and covers a wide range of required techniques ranging from standard spectroscopic and viscometric characterisation methods, to microscopy techniques employing staining for confocal and electron microscopy examination, to physical performance testing utilising engineering concepts such as measurement of moduli of stress and strain.

For emulsion polymers, performance characteristics are determined by a wide range of factors including copolymer composition, amount of branching, number of particles per litre, particle size distribution, molecular weight distribution, and morphology of the latex particle[1]. Moreover, the complex nature of the emulsion polymerisation process, (Figure 1), and the sensitivity of some of the steps to small variations in reaction conditions, means that it is often difficult to reproduce a given product from day to day, and/or to scale up from laboratory to manufacturing scale. Hence it is important that adequate control of polymerisation conditions be available, a condition in practice not easy to fulfil.

To achieve the necessary research capability, FRI has recently constructed* an emulsion polymer reactor allowing accurate temperature control and sophisticated control of feed rate by proportioning pumps. This has enabled reproducible synthesis

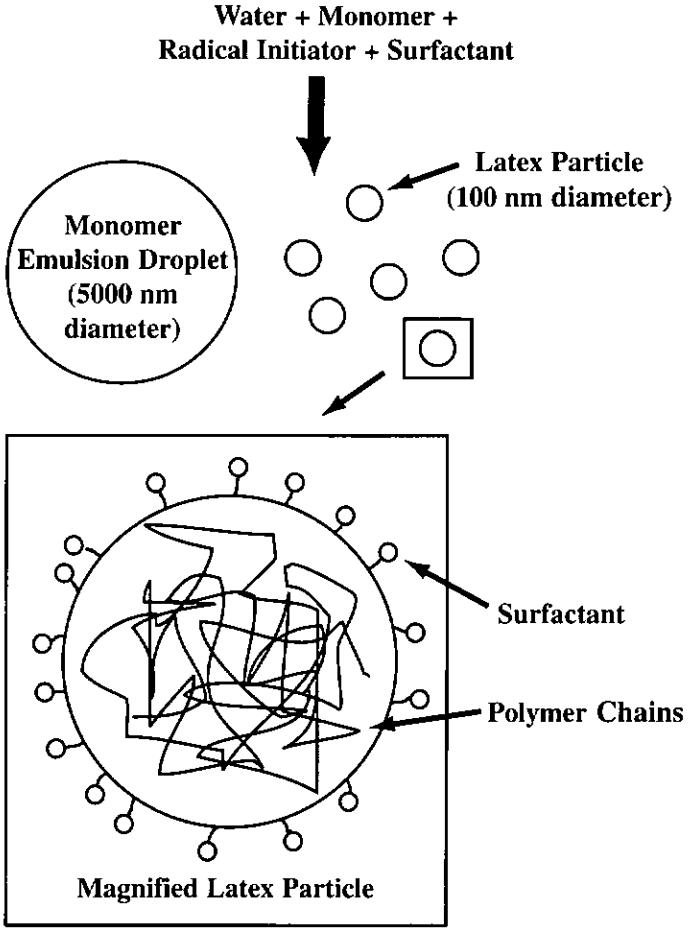

Figure 1. *The basic components of an emulsion polymerisation generally include large emulsion droplets, surfactant stabiliser and initiator at the start of the polymerisation, with subsequent formation of colloidally stable latex particles which contain many polymer chains.*

* We wish to express our gratitude to Josef Wurzer of Jurgen Fiedler Plastics Limited, Sala Street, Rotorua, for the quality of the construction of the reactor.

of emulsion polymers on a small (one litre) scale. For FRI, the essential requirement for the construction of this reactor was that it be sufficiently similar to the reactors of other participating parties to allow the creation of a common database of emulsion recipes whereby similar polymer colloids are obtained by independant researchers.

Experience has shown that agitation and heat flows through the reactor can have major effects on product properties. Therefore it is desirable that the size and shape of the reactor, construction materials and control factors such as stirring rate and geometry be as similar as possible. The resulting reactor, a modification of a Sydney University Polymer Centre design (which includes elements originating from the Eindhoven University of Technology, The Netherlands), is designed to facilitate acquisition of data and control of a wide range of variables such as feed and temperature. The degree of reactor control and data aquisition should facilitate scale-up of production of emulsion polymers to an industrial scale.

Core-Shell Emulsion Polymerisation

Latices made using emulsion polymerisation have a wide range of uses, from adhesives[2] and paints through to rubber (e.g. neoprene). It is common for such latices to have a "core-shell" design[3]: the particle (typically 100-1000 nm in size) contains one sort of polymer as a core and another as a shell. This is illustrated in Figure 2. Usually, the process utilises a latex (that is, the core material) as a seed and performs a second-stage polymer growth to form a shell on the seed particles. The core-shell strategy may be used to create synergy between desirable physical properties of different polymers, e.g. a glassy core for strength and a rubbery shell to give good film formation. New mechanistic knowledge has greatly improved the potential to design such core-shell latices intelligently. It would seem reasonable to attempt to use core-shell polymerisation to design better adhesives. Moreover, through such an attempt it should be possible to answer fundamental mechanistic questions about how exactly an emulsion polymer adhesive functions.

A fundamental part of the emulsion polymer project involves controlled seeded polymerisation to create a series of latices where only a single variable at a time is changed, e.g. amount of branching in the shell while all other variables (particle size distribution, composition, etc.) remain constant. Ultimately, this type of approach should yield answers to questions of commercial importance, such as: What effect does polymer molecular weight distribution have on the durability of a wood/adhesive interface? Can adhesives be tailored to specifically suit various timber species? Can adhesives be designed to make export packaging more robust and durable? Can adhesives be designed with characteristics allowing both performance and compatibility with any post-use recycling processes (such as re-pulping)?

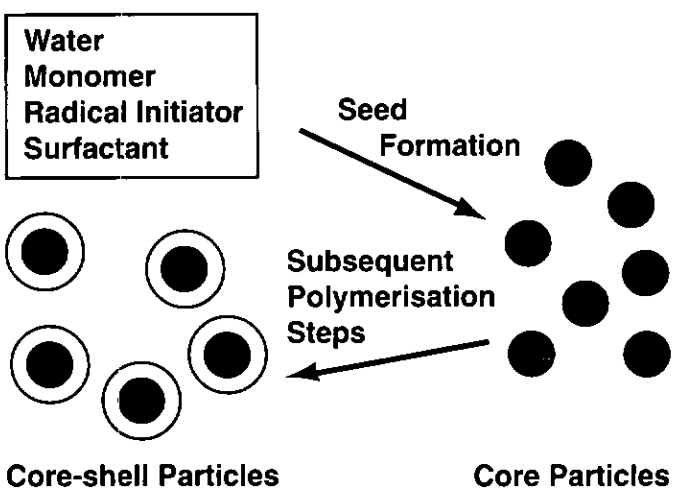

Figure 2. The most common method of producing core-shell latex particles is to pre-form a seed latex, and add the shell layer in a subsequent polymerisation step. Core-shell polymerisation clearly leads to structured latex particles.

Reactor Design

It has been essential to begin the project by focussing on reactor design. The reactor which has been constructed at FRI is shown in Figure 3. Referring to Figure 3, the reactor is constructed from 100 (1) and 130 (2) mm diameter heavy wall borosilicate glass tubes, each of length 180 mm and clamped between two 175 mm diameter stainless steel end plates (3, 4). A Teflon® (5) spacer is used to locate and seal the ends of the glass tubes against the end plates.

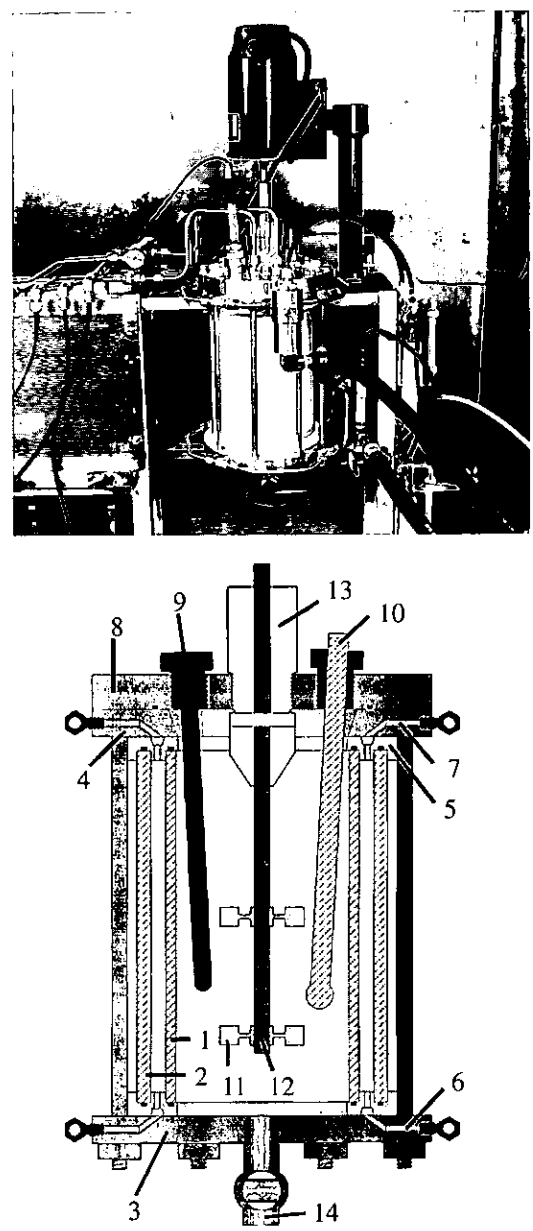

Figure 3. Cutaway diagram of the FRI emulsion polymer reactor. Explanations of the numbered component labels are given in the body of the text.

To enable temperature control, water is circulated between the two tubes, with fluid entry (6) and exit (7) via the end plates. Water flow through the jacket is nominally 20 litres per minute. There is no monomer condensor in the system - the internal glass wall has a nominal pressure rating of 100 psi, and a pressure release safety valve is attached.

The upper end plate is attached to the stainless steel reactor head (8). This contains inlets for nitrogen, monomer and initiator, as well as temperature (9) and pH probes (10), and the stirrer shaft seal. Stirring is provided by 6-bladed impellors (11) mounted on the stirring shaft (12). A magnetic coupling (13) designed for sealed bio-reactor systems is used to overcome the problem of monomer leakage past the stirrer shaft sealing glands. A valve (14) in the lower plate allows the reactor to be emptied.

Control of the reactor is critical to the reproducibility of the experiments. Accurate control of temperature and the rate of monomer and initiator addition is required to enable reproducibility in an emulsion polymer reactor. This is best accomplished by computer control. The Advantech range of interface cards is used, with software control through a programme called Genie, which is a Windows-based control, data analysis and results presentation development program. Monomer and initiator addition is by ProMinent diaphragm dosing pumps, the stroke rates of which are controlled by a 4-20 mA computer interface, and dependant upon the particular model pump used. The pumps currently attached to the reactor are rated at 0.168 litres per hour, 1.080 litres per hour, and 3.180 litres per hour.

A number of experiments have now been now carried out at FRI, with subsequent particle size analysis indicating that adequate control is available from the reactor. As well as the reactors at FRI and Sydney, a third similar reactor utilising slightly different software controls is currently under construction at the University of Canterbury. This will provide two New Zealand institutions with controlled emulsion polymerisation reactors which are as good as any in the world. A coordinated programme of latex synthesis between the institutions will build up a knowledge base in New Zealand for emulsion polymer adhesive latex design.

Research Programme

Size-controlled polystyrene and poly(methyl methacrylate) seed latices can be readily produced. Our reactor design readily enables such monodisperse seed latices to be made reproducibly on a small scale. The research programme at FRI and the University of Canterbury will aim to establish basic techniques for polymerising vinyl acetate shells onto these size-controlled polystryrene and poly(methyl methacrylate) cores.

Appropriate extensions of the core-shell procedure can be used to mimic existing commercial adhesives, some of which are core-shell in structure, but in general these do not originate from a systematic design process. To carry out systematic design, it is necessary to control particle size, particle number, etc. and to achieve this it is important to avoid the formation of new particles – new mechanistic understanding is providing vital guidance in this area. The occurrence of secondary nucleation may be routinely checked for using capillary hydrodynamic fractionation (CHDF) at the SUPC.

An essential part of the project will be to collect physical information about our latices. On the one hand we will characterise our latex polymers by determining microscopic properties such as molecular weight distribution (using size exclusion chromatography), particulate size distribution (using CHDF and other techniques) and morphology (using confocal and electron microscopy). It may even prove possible to determine the extent of branching. On the other hand it is equally important for us to carry out testing of the macroscopic adhesive properties of our latices. A number of protocols for this are being developed at FRI. It should thus be possible to make the vital connection between commerically important macroscopic properties (adhesive performance) and fundamental microscopic properties (polymer properties).

The trans-Tasman collaboration is vital to this project. The advanced analysis techniques made available to this program, and access to leading researchers in emulsion polymerisation will assist New Zealand to a better understanding of the fundamentals of design of industrial emulsion polymers, and hence to the design of better adhesives.

References

1. See, for example, p. 21 of Emulsion Polymerisation: A Mechanistic Approach. Gilbert, R G, Academic Press, London (1995).

2. See, for example, Lomax, T D and Franich, R A, "Analysis and Testing of Thermoplastic (PVAc) Adhesives", Paper No. 19, 5th New Zealand Materials Symposium, Engineering Materials Group of IPENZ (December 1992).

3. See, for example, Chapter 2, Section 8 "Inhomogeneities in Latex Particles" In Emulsion Polymerisation: A Mechanistic Approach. Gilbert, R G, Academic Press, London (1995).

4. Morrison, B R and Gilbert, R G (1995) Conditions for secondary particle formation in emulsion polymerisation systems. *Macromol. Symp.* **92**:13-30.

ABOUT THE AUTHOR

Terence Lomax graduated from the University of Auckland. His PhD thesis involved the effect of surfactants on hydrolysis of phenolic esters in reversed systems. For 4.5 years he was Junior Lecturer at the University of Auckland whilst completing his PhD. He then moved to industry in 1983 to work as a polymer chemist at Peterson Chemicals Limited, designing emulsion polymers and taking over the role of Chief Chemist. Terence moved to research in late 1985 at the Forest Research Institute, working on steam treatment of bark, tannin chemistry and some adhesives work. He was involved with a 50% Secondment from 1994 to 1996 with the Ministry of Research, Science and Technology, to address issues relating to Maori involvement in science. He then returned to the Forest Research Institute full time in July 1996 and was appointed as Member of the new Environmental Risk Management Authority in August 1996. He devised a new polymer program, funded by FRST in March 1997. This paper is the first arising from that program.

CONFERENCES & SEMINARS

24-26 June 1998

Asia-Pacific Society for Neurochemistry: Biennial Conference

Venue: Seoul, Korea

Contact: Peter Dodd, Email: peterD@qimr.edu.au
or full details from:
Professor Yoo-Hun Suh
c/o Organising Secretariat of 4th APSN Meeting
Department of Pharmacology
Seoul National University College of Medicine
28 Yongon-dong, Chongno-gu
Seoul 110-799, Korea

26 June - 2 July 1998

9th Congress of the International Society for Biomedical Research on Alcoholism (ISBRA)

Venue: Copenhagen, Denmark

Contact: Professor Christer Alling
Department of Medical Neurochemistry
Institute of Laboratory Medicine
University Hospital
S-221 85 Lund, Sweden
Fax: (+46-46)-175376

8-10 July 1998

Annual Conference of the New Zealand Biotechnology Association

Venue: Conference Centre, University of Waikato
Hamilton, New Zealand

The theme of the conference will be *Breakthroughs and Technology Transfer*, and the intention is to publicise current research activities in New Zealand.

Contact: Associate Professor Ian Maddox
Institute of Technology and Engineering
Massey University, Palmerston North
New Zealand
Tel: (+64-6)-3505548
Fax: (+64-6)-3505654
Email: I.S.Maddox@massey.ac.nz

1-3 July 1998

"Food At The Centre Of New Zealand"

Joint Conference of the New Zealand Institute of Food Science and Technology and the Nutrition Society of New Zealand

Venue: Nelson, New Zealand

Contact: Conferences and Events
P O Box 1254, Nelson, New Zealand
Tel: (+64-3)-5466022
Fax: (+64-3)-5466020
Email: food@conf.co.nz

Web Site: http://www.nzifst.org.nz/conf98/

12-17 July 1998

MACRO 98 AUSTRALIA

37th IUPAC International Symposium on Macromolecules

Venue: Gold Coast, Queensland, Australia

This forefront conference will bring together polymer-oriented scientists, technologists, educators and students from all areas of the scientific community: academia, industry and government. It will provide an international forum for the communication and discussion of general and specific contemporary topics of interest to the polymer community.

The conference will embrace both the fundamental and applied aspects of polymer chemistry, polymer physics, materials technology and engineering. The program will focus on a number of broad themes which will incorporate a range of symposia, involving plenary and invited lectures, and contributed verbal and poster presentations. Plenary speakers will be Professor J Economy (USA), Professor J Feast (United Kingdom), Professor A Khokhlov (Russia) and Professor Y Tabata (Japan). A special International Symposium will be held in honour of the late Professor Jim O'Donnell.

Contact: MACRO 98 Secretariat
Chemistry Department, University of Queensland
Brisbane, Queensland 4072, Australia
Tel: (+61-7)-33653955
Fax: (+61-7)-33654299
Email: macro98@chem.chemistry.uq.edu.au

Web Site: http://www.uq.edu.au/~cmawhitt/macro98.html

15-16 July 1998

New Drug Targets in Inflammation and Immunomodulation

Venue: Stevenage, England, United Kingdom

Contact: E Wellington
Field End House
Bude Close, Nailsea
Bristol BS48 2FQ, England, United Kingdom
Tel/Fax: (+44-1245)-853311
Email: confsec@dial.pipex.com

22-24 July 1998

Chemistry for Industrial, Agricultural Development and Environmental Protection

Venue: HoChiMimh City, Vietnam

Contact: The NZIC Secretariat
P O Box 39-283, Howick
Auckland, New Zealand
Tel: (+64-9)-5356495
Fax: (+64-9)-5353476
Email: NZICOffice@NZIC.org.nz

23-26 July 1998

18th International Machinery and Materials Exhibition for Asia - Mex 98

Venue: Hong Kong International Trade and Exhibition Centre, Hong Kong

Contact: Business and Industrial Trade Fairs Limited
Unit 1223, 12/F
Hong Kong International Trade and Exhibition Centre
1 Trademart Drive, Kowloon Bay, Hong Kong
Tel: (+852)-28652633
Fax: (+852)-28661770 or (+852)-28662076

2-7 August 1998

The 9th International Symposium on Novel Aromatic Compounds (ISNA-9)

Venue: The Hong Kong Convention and Exhibition

Centre, Hong Kong
Contact: Professor B Halton
Department of Chemistry
Victoria University
P O Box 600, Wellington, New Zealand
Fax: (+64-4)-4955241
Email: brian.halton@vuw.ac.nz

20-26 August 1998
16th World Congress of Soil Science
Venue: Montpellier, France
Contact: A Ruellan
16eme Congres Mondial de Science du Sol
Agropolis
Avenue Agropolis
34394 Montpellier, Cedex 5, France
Fax: (+33-4)-67047549
Email: isss@agropolis.fr
Web Site: http://www.cirad.fr/isss.html

24-26 August 1998
National Agriculture/Horticulture Science Convention "Dimensions of Quality in Food Production"
Venue: Hawkes Bay, New Zealand
Contact: National Science Convention
c/o ENZA
P O Box 1101, Hastings, New Zealand
Tel: (+64-6)-8707621 or (+64-6)-8787318
Fax: (+64-6)-8787318

24-28 August 1998
17th International Cancer Congress
Venue: Rio de Janeiro, Brazil
Contact: Congrex do Brazil
Ruad do Ouvidor, 60 gr 413
20040-030 Rio de Janeiro RG, Brazil
Fax: (+55-21)-2231492

30 August - 4 September 1998
7th European Symposium on Thermal Analysis and Calorimetry
Venue: Balatonfüred, Hungary
Contact: Professor György Liptay
Hungarian Chemical Society
Tel/Fax: (+36-1)-2018056
Email: estac7@ch.bme.hu

31 August - 4 September 1998
SCAR VII International Biology Symposium
Venue: University of Canterbury
Christchurch, New Zealand
Contact: VII SCAR Biology Symposium
Centre for Continuing Education
University of Canterbury
Private Bag 4800, Christchurch
New Zealand
Tel: (+64-3)-3642645
Fax: (+64-3)-3642057
Email: scarbio@cont.canterbury.ac.nz
Web Site: http:www.scar.org/scar-meetings/biology.html

1-4 September 1998
19th International Conference on Polyphenols
Venue: Lille, France
Contact: Scientific Secretariat
Dr Christian Rolando
Université des Sciences et Technologies de Lille
UFR de Chimie, Bâtiment C3
59655 Villeneuve d'Ascq Cedex, France
Fax: (+33-1)-43370051
Email: polyphen@univ-lille1.fr

6-10 September 1998
XVth European Federation of Medicinal Chemistry International Symposium on Medicinal Chemistry
Venue: International Conference Centre
Edinburgh, Scotland, United Kingdom
Contact: Dr John F Gibson
XVth EFMC ISMC
The Royal Society of Chemistry
Burlington House
London W1V 0BN, England, United Kingdom
Tel: (+44-171)-4378656
Fax: (+44-171)-7341227
Email: conferences@rsc.org
(Email subject heading 'ISMC')

9-11 September 1998
Degradation and Stabilisation of Polymers
Venue: University of Salford
Salford, England, United Kingdom
Contact: Dr N C Billingham
Tel: (+44-1273)-678313
Fax: (+44-1273)-677196
Email: N.Billingham@sussex.ac.uk

14-18 September 1998
XXth Congress of the International Federation of the Societies of Cosmetic Chemists
Venue: Cannes, France
Contact: CONVEREGENCES-IFSCC'98
Fax: (+33-1)-40310165
Email: converge@iway.fr
Web Site: www.convergences.fr

16-19 September 1998
First International Conference on Inorganic Materials
Venue: Palais des Congres de Versailles, France
Contact: 4 Manor Farm Barns
Church Lane, Charlton-on-Otmoor
Kidlington, Oxford OX5 2UA, United Kingdom
Tel: (+44-1865)-331040
Fax: (+44-1865)-331125
Email: 101515.2472@compuserve.com
Web Site: http://www.elsevier.nl/locate/materials98

23-25 September 1998
International Symposium on Preparative and Industrial Chromatography and Allied Techniques - SPICA 98
Venue: Strasbourg, France

The subject of SPICA 98 will focus on isolation, purification and fractionation of value-added products, e.g. fine chemicals, natural products, pharmaceuticals, biotechnical products, agrochemicals, aroma and food additives, applying chromatographic techniques, membrane technology and electrophoresis. In conjunction with the Symposium, an exhibition of instruments will be held, giving participants the opportunity to meet most of the world's leading suppliers of preparative and industrial separation products and technologies.

Contact: Secretariat SPICA 98
ENSIC, 1, rue Grandville - B.P. 451
F-54001 Nancy Cedex, France
Tel: (+33-383)-175003
Fax: (+33-383)-350811
Email: brionne@ensic.u-nancy.fr

17-20 September 1998

Polyurethanes Expo 98

Venue: Wyndham Anatole Hotel, Dallas, Texas, USA
Contact: Polyurethane Division
Tel: (+1-212)-3515425
Fax: (+1-202)-2966877

4-9 October 1998

3rd Australian Peptide Conference

Venue: Laguna Quays, The Whitsundays
Queensland, Australia
Contact: Dr A I Smith, Conference Secretary
Baker Medical Research Institute
P O Box 348, Prahran, Victoria, Australia
Tel: (+61-3)-95224333
Fax: (+61-3)-95211362

13-16 October 1998

Preparative High Performance Liquid Chromatography Training Course

Venue: Champigneulles, France
Contact: PROCHROM S.A.
Training Courses
BP. 9, F-54250 Champigneulles, France
Tel: (+33-383)-312244
Fax: (+33-383)-312051
Email: prochrom@millipore.com

18-22 October 1998

14th International Clean Air and Environment Conference

Venue: Melbourne Hilton on the Park
Melbourne, Australia
Contact: PR Conference Consultants Pty Ltd
Tel: (+61-3)-98169111
Fax: (+61-3)-98169287
Email: prcc@labyrinth.net.au
Web Site: http://www.labyrinth.net.au/~prcc

20-22 October 1998

New Zealand Grassland Association Annual Conference

Venue: Nelson, New Zealand
Contact: Alison Graham
Rainbow Station
Private Bag, Nelson, New Zealand
Tel/Fax: (+64-3)-5211838

7-9 December 1998

First Singapore Chemical Conference

Venue: Singapore

This conference will be a major event hosted by the National University of Singapore and will provide a broad forum for researchers to share experiences and exchange ideas in fundamental and industrial chemical research. Emphasis will be made to link chemical research to industrial applications. Another key objective of the conference is to foster better interactions and dialogue among researchers in chemistry or related areas in this region.

Contact: The NZIC Secretariat
P O Box 39-283, Howick
Auckland, New Zealand
Tel: (+64-9)-5356495
Fax: (+64-9)-5353476
Email: NZICOffice@NZIC.org.nz
Web Site: http://www.science.nus.sg/~chem/scc.htm

24-28 January 1999

Organometallic Chemistry in the South Pacific - A Celebration

This conference is being organised to honour Professor Warren Roper of the University of Auckland on the occasion of his 60th birthday. The scope of the conference will include organometallic and coordination chemistry. The meeting will have a strong international flavour with approximately 35 high profile, invited speakers from around the world. Poster presentations contributed by attendees will be welcomed.

Venue: University of Auckland Conference Centre
Auckland, New Zealand
Contact: Dr P J Brothers or Dr L J Wright
Department of Chemistry, University of Auckland
Private Bag 92019, Auckland, New Zealand
Tel: (+64-9)-3737599
Fax: (+64-9)-3737422
Email: P.Brothers@auckland.ac.nz
or LJ.Wright@auckland.ac.nz
Web Site: http://www.che.auckland.ac.nz/conf.htm

31 January - 4 February 1999

IC '99 Joint Meeting of Inorganic Division of the Royal Australian Chemical Institute and Inorganic Specialist Group of the New Zealand Institute of Chemistry

Venue: Wellington, New Zealand
Contact: Rhyl Singleton
School of Chemical and Physical Sciences
Victoria University of Wellington
P O Box 600, Wellington, New Zealand
Tel: (+64-4)-4715335
Fax: (+64-4)-4955241
Email: chemistry@vuw.ac.nz
Web Site: http://www.vuw.ac.nz/chemistry/conf/index.htm

8-12 February 1999

10th International Congress on Marine Corrosion and Fouling Incorporating The 2nd US-Pacific Rim Workshop on Emerging Non-Metallic Materials for the Marine Environment

Venue: University of Melbourne, Melbourne, Australia

The International Congress on Marine Corrosion and Fouling brings together scientists from academia, industry, defence and other government organisations to present and discuss recent scientific developments in understanding and combating the degradation of materials, structures and the performance of vessels in the marine environment. The Tenth Congress will be the first congress held outside the northern hemisphere and the first in the Asia-Pacific region. The inaugural US-Pacific Rim Workshop on Emerging Non-Metallic Materials in the Marine Environment held in Hawaii in 1997 addressed the needs of government, industrial and academia scientists, and engineers interested in reducing the costs of building and operating ships against a background of increasing efforts to reduce or eliminate materials potentially toxic to shipbuilders, ship crews and the environment. The second workshop will permit an assessment of progress and a review of developments.

Contact: Dr Patricia Shaw
DOTSE, New Zealand Defence Force
Private Bag 32901
Auckland Naval Base
Auckland, New Zealand
Tel: (+64-9)-4455844
Fax: (+64-9)-4455890
Email: trishs@dotse.mil.nz

3-7 July 1999

IV Liquid Matter Conference

Venue: University of Granada, Spain

The Conference is sponsored by the European Physical Society and the University of Granada. The scope of the IV Liquid Matter Conference is rather broad and the program is based on the following twelve Symposia, entitled: simple liquids and solutions, classical and quantum; molecular liquids and reaction dynamics; ionic liquids and liquid metals; liquid crystals; polymers, polyelectrolytes and gels; colloids, surfactants, emulsions and foams; membranes and biological liquids; fluids in confined geometries, films and interfacial phenomena; supercooled liquids and glasses; phase transitions and nucleation phenomena; rheological properties of liquids; and powder and other granular matter.

Contact: Professor Dr Roque Hidalgo-Álvarez
Departamento de Física Aplicada
Universidad de Granada
Campus de Fuentenueva
E-18071 Granada, Spain
Tel: (+34-58)-243213
Fax: (+34-58)-243214
Email: liquid99@ugr.es

Web Site: http://www.ugr.es/~liquid99

5-9 July 1999

VIII SCAR International Symposium on Antarctic Earth Sciences

Venue: Wellington, New Zealand

Contact: Dr Fred Davey
IGNS
P O Box 1320, Wellington, New Zealand
Tel: (+64-4)-5701444
Fax: (+64-4)-4710977
Email: ISAES@qns.cri.nz

December 1999

23rd Australian Polymer Symposium

Venue: Geelong, Victoria, Australia

Contact: Dr W D Cook
Department of Materials Engineering
Monash University
Clayton, VIC 3168, Australia
Tel: (+61-3)-99054926
Fax: (+61-3)-99054940
Email: WDCOOK@eng2.monash.edu.au

6-11 February 2000

RACI 11th National Convention

Venue: Canberra, ACT, Australia

Contact: Dr W D Cook
Department of Materials Engineering
Monash University
Clayton, VIC 3168, Australia
Tel: (+61-3)-99054926
Fax: (+61-3)-99054940
Email: WDCOOK@eng2.eng.monash.edu.au

17-25 March 2000

Water 2000 Conference and Expo - "Guarding the Global Resource"

Venue: Auckland, New Zealand

Contact: New Zealand Water and Wastes Association
P O Box 15-974, New Lynn
Auckland, New Zealand
Tel: (+64-9)-8275757
Fax: (+64-9)-8272003

14-18 August 2000

12th International Conference on Thermal Analysis and Calorimetry

Venue: Copenhagen, Denmark

Contact: Dr O Toft Sorensen
Risoe National Laboratory
Fax: (+45)-46351173

14-19 December 2000

Pacifichem 2000

Venue: Waikiki, Honolulu, Hawaii

Contact: Professor B Halton
Department of Chemistry
Victoria University
P O Box 600
Wellington, New Zealand
Fax: (+64-4)-4955241
Email: brian.halton@vuw.ac.nz

26 August - 1 September 2001

XXXIV International Congress of Physiological Sciences "From Molecule to Malody"

Venue: Christchurch, New Zealand

Contact: The Conference Company
P O Box 90-040, Auckland, New Zealand
Tel: (+64-9)-3601240
Fax: (+64-9)-3601242
Email: info@tcc.co.nz

Pacific Oils 2000, A Review

Pacific Oils 2000, an International Conference on Plant Oils and Marine Lipids, was held at the University of Auckland in Auckland on November 25th-28th, 1997. It was organised by the Oils and Fats Specialist Group of the New Zealand Institute of Chemistry, with Con Cambie as Chairman.

The program featured 7 plenary lectures, 15 keynote lectures and 22 other oral presentations as well as 30 posters. Of these, 23 were from New Zealand, 17 from Australia, 9 from the United Kingdom, 7 from the United States, 5 from Japan, 2 from Canada, 2 from Germany and one each from China, France, Israel, Italy, Malaysia, Poland, Portugal, Sweden and Switzerland. There were approximately 130 registrants.

The stated aim of the program was to link primary producers, researchers, processors and marketers in the fields of plant and marine lipids and essential oils. The plenary lecturers and keynote speakers were chosen with this in mind. Their talks covered a wide range of subjects, including analysis and composition, genetic engineering, processing, regulatory aspects and medical applications.

In the opening session, Dr Sefa Koseoglu, Head of the Separation Science Program in the Food Protein Research and Development Center at Texas A and M University, discussed the current status of membrane technology. Although applications of this technology in food processing are developing broadly, it has found little application in the edible oil industry, partly because low profit margins have discouraged processors from looking at more risky but pioneering technologies. Potential applications include degumming, removal of free fatty acids, recovery of catalyst or of solvent and separation of tocopherols, but most of the methodology has only been evaluated on a laboratory scale, with a few reaching pilot plant-testing levels.

This was followed by a discussion of the use of essential oils in the formulation of natural flavours by Dr Daniel Joulian, Corporate Research Director of Robertet SA in Grasse, France. Dr Joulain suggested that the term "essential oils" may have been derived originally from the word "essence". He defined them as products obtained by distillation of plant material either in the presence of water or by dry distillation; by cold pressing; or by concentration of fruit juices.

Three groups of essential oils were distinguished: the citrus oils, having the largest number of applications and variety of flavours. (Included in this group were the mint oils, used for such items as chewing gum and toothpaste.); the seasoning oils, such as cinnamon, garlic, nutmeg and onion, used in lesser quantities with more selected application; and the more costly "exotic" oils, (e.g. rose, Roman camomile), that are used in even lesser amounts for their high impact and specificity. The formulations may range from highly complex to relatively simple mixtures. Important considerations are authenticity, when used in natural flavour formulations and freedom from minor components that may lead to off-flavours.

In the USA, essential oils can be used to formulate a natural flavour provided they are registered on the FEMA/GRAS list. The difficulty of getting a new essential oil registered on this list is so great that current research is mainly devoted to finding new sources of natural isolates.

Further information on essential oils was provided by several other speakers in subsequent sessions of the Conference. In a keynote lecture, Professor Alistair L Wilkins of the University of Waikato, Hamilton described the chemical and compositional analysis of New Zealand manuka and kanuka oils derived from red and white tea trees respectively. The steam-distilled essential oils consist primarily of monoterpenes and sesquiterpenes. They have been used in beverages and medicinal preparations and more recently in perfumes, cosmetics and health care products. New Zealand manuka oil differs markedly in composition and antiseptic properties from the essential oil derived from the Australian *Melaleuca alternifolia,* also referred to as tea tree.

Recent developments in research on Australian tea tree oil were described by Dr David N Leach of Southern Cross University in Lismore, New South Wales, Australia. The Australian Tea Tree Oil Research Institute (ATTORI) was created in 1996 to provide a focal point for research on this commercially important oil; to include plant genetics, propagation, production, extraction, product formulation and efficacy in conditions such as acne, tinea, dandruff and candida. The new research Institute at Southern Cross University is nearing completion. It will provide facilities for a large scientific staff and will offer support for visiting scientists who wish to spend a period of time on related research at the Institute.

Other presentations on the composition of essential oils included those by Paul Moretta of The University of Western Australia in Perth on oils derived from sandal wood species; and by Dr Robert A Franich of the New Zealand Forest Research Institute Limited in Rotorua on oil derived from the large softwood tree species known as hoop pine.

In discussing health products from New Zealand plants, Dr Nigel Perry of the New Zealand Institute for Crop and Food Research in Dunedin noted that the antimicrobial properties of steam distilled oil from the foliage of manuka is due to the presence of several unusual triketones. He also reported that a sesquiterpene dialdehyde isolated from Horopito, a common shrub in New Zealand, is an anti-candida agent. New Zealand's natural vegetation contains approximately 2300 native vascular plants as well as more than 500 liverworts, more than 1000 lichens and many fungi. These provide many opportunities for searching for new bioactive products.

In his keynote lecture, Charles Wells of Essentially Oils Limited, Churchill, United Kingdom, discussed the commercial environment of a variety of natural products derived from plants, focusing on homeopathic remedies, herbal medicines and the use of essential oils in aromatherapy. Although the legal status of complementary medicines is mixed, it continues to be widely used and sales of natural plant products are increasing, despite fears that chemical synthesis would lead to a reduction in demand.

The keynote lecture by Dr Noel G Porter of the New Zealand Institute for Crop and Food Research in Christchurch focused on methods of optimising essential oil composition, with particular reference to the carvone content of oil obtained from dill. These include cutting height, plant density, weed control, irrigation and extraction plant mobility.

E (Tim) Denny of Denny, McKenzie Associates in Lilydale, Tasmania, Australia devoted his keynote lecture to a discussion of the important features of steam distillation of herbaceous oils. Despite centuries of use, significant aspects of this method are still not well understood. Successful recovery of essential oils by this method involves matching the steam's wetness fraction to the absorptive capacity of the herb surfaces to ensure that all herb surfaces remain moist without becoming flooded.

Strategies for bioengineering terpenoid essential oils were discussed by Dr Thomas J Savage of the University of Canterbury, Christchurch. Recent evidence has indicated that in plastids, isoprenoids are synthesised from glyceride 3-phosphate and pyruvate rather than by the classic mevalonate pathway. Isolation of genes involved in terpene biosynthesis offers the possibility of using genetic engineering to improve the quality and yield of terpenoid essential oils.

The third plenary lecture of the opening session was given by Professor John B Ohlrogge of Michigan State University in East Lansing, Michigan, USA, on the use of genetic engineering of plants to produce new products and markets.

Whereas in 1930, at least 30% of industrial organic chemicals were produced from plants, by 1960 this had decreased to about 1%, while about 80% were produced from petroleum and about 20% from coal. With changing costs of new materials, this trend is reversing and can be aided by new products derived through genetic engineering of plants. In some cases, this may involve modification of only one or a few genes. This approach can be used to alter enzymes that control the amounts and composition of oils produced by plants. Examples include the modification of acetyl CoA carboxylase to increase fatty acid production, of thioesterases to alter the chain length of fatty acids and of acyl-ACP desaturases to produce unusual monounsaturated fatty acids. Some of these cis-monoenoic acids have potential uses as low temperature biodegradable lubricants, whereas others might be used to produce margarines with low-saturated and zero trans-fatty acids. One of these acids, petroselenic acid (18:1, n-6), can be oxidatively cleaved to form adipic acid for manufacture of nylon.

The development of alternative crops for production of novel lipids was the topic of the keynote lecture presented by Dr Keith Coupland of Croda Oleochemicals Limited, Hull, United Kingdom. One example is *Lunaria annua* (Honesty) produced for its high content (20%) of nervonic acid (24:1, n-9). This fatty acid is an important constituent of myelin and is of interest in relation to brain development in infants and in demyelinating diseases such as adrenoleukodystrophy and multiple sclerosis.

Another example is *Echium plantagineum* (Purple Vipers Bugloss) produced for its high content (13%) of stearidonic acid (18:4, n-3). This fatty acid is the first product in the metabolism of α-linolenic acid, a reaction catalysed by Δ-6 desaturase. It thus corresponds to γ-linoleic acid in the n-6 series of polyunsaturated fatty acids and is of interest as a competitive inhibitor of the formation of arachidonic acid and as a precursor of the longer-chain, more unsaturated fatty acids of the n-3 series. Recent accessions of Boraginaceae have been identified that contain more than 20% stearidonic acid and their agronomic potential is being examined.

Long-chain polyunsaturated fatty acids were also discussed by Dr David Horrobin of Scotia Research Institute in Stirling, Scotland, in his plenary lecture on medical uses of vegetable oils. The basic idea is that conditions such as diabetes, atopic eczema and premenstrual syndrome are associated with decreased activity of Δ-6 desaturase and that these can be treated with oils that provide δ-linolenic acid, which is formed from linoleic acid by Δ-6 desaturation. Examples of successful treatment of diabetic neuropathy and atopic eczema were presented. One problem with this thesis is that borage oil, which has a higher content of δ-linolenic acid than evening primrose oil, is less effective in treatment of such conditions. Dr Horrobin also discussed the potential use of n-3 polyunsaturated fatty acids in treatment of cancer, based on evidence that these fatty acids can kill cancer cells in culture at concentrations that do not harm normal cells. It was suggested that this difference may be related to the inability of cancer cells to deal with the surge of peroxidation associated with addition of the highly polyunsaturated fatty acids.

This lecture was followed by another plenary lecture by Dr Wai Lin Siew of the Palm Oil Research Institute of Malaysia, Kuala Lumpur, Malaysia, who discussed the analysis, composition and evaluation of various vegetable oils, with emphasis on palm oil. She described various parameters that determine the quality of an oil, most of which are specified by the Codex Alimentarius Commission. She also spoke about some of the minor constituents, including chlorophylls, tocopherols and tocotrienols, and carotenes, with reference to their biological properties and methods of analysis.

Dr Kenneth Carroll of The University of Western Ontario in London, Ontario, Canada noted that palm oil does not promote mammary cancer in rats like many other fats and oils and described evidence to suggest that this may be due to the tocotrienols present in palm oil. Tocotrienols make up about two-thirds of the vitamin E in palm oil, whereas most other oils contain only tocopherols.

Dr Carroll's lecture was sandwiched between two other presentations on polyunsaturated acids. In a witty and entertaining keynote lecture, Dr Julie Miller Jones of the College of St Catherine, St Paul, Minnesota, USA provided a thirty-year retro- and pro-spective review. This dealt with biological properties of both n-3 and n-6 fatty acids and their role in cardiovascular disease. It also touched on effects of saturated and monounsaturated fatty acids. She emphasised the fact that fatty acids of a particular class do not necessarily have the same effects and people also differ in their physiological response to a particular diet. Since the Keys and Hegsted formulae were developed, the situation has become more complicated but Dr Jones was confident that new data will help to resolve some of the present uncertainties.

Dr David C K Roberts of the University of Newcastle, New South Wales, Australia, also spoke on essential fatty acids and health, focusing on the need to balance intakes of n-3 and n-6 polyunsaturated fatty acids. The marked increase in

consumption of n-6 fatty acids following discovery of their cholesterol-lowering properties was not accompanied by a corresponding increase in n-3 fatty acids and this may be contributing to some of today's health problems.

A few papers were devoted to the processing of fats and oils. R Hastert of Hastech Corporation, Omaha, Nebraska, provided an historical survey of the hydrogenation process in his keynote lecture. The feasibility of this process was first demonstrated one hundred years ago by Sabatier, using a nickel catalyst. As vegetable seed oils replaced animal fats, hydrogenation was required to make them suitable for shortening and margarine and many people contributed to the body of knowledge about hydrogenation. Concerns of nutritionists over adverse effects of saturated acids are leading to changes in hydrogenation practices but the process is still the best method of producing functionally acceptable fats and will therefore likely be subject to continuing investigation. This will include catalytic research focused on precious metals, processing developments to include utilisation of the fixed bed modes and use of computer technology for process control and research monitoring.

A mild degumming process for vegetable oils was evaluated in a talk by Professor Jean Pierre Dufour of the University of Otago, Dunedin. This process, based on both the chelating capacity of a specific sequestering agent and improved interfacial exchange properties, was introduced and patented by A Tirtiaux of Fleurus, Belgium. The conclusions were that the degumming technology offers definite benefits and that almost complete degumming can be achieved by the optimised process. In another paper, Peter Bain of Industrial Research Limited, Lower Hutt, described attempts to separate polyunsaturated fatty acid esters, using zeolites as molecular sieves. The selectivity is based on the number of double bonds and offers little hope of separating cis from trans isomers by this process.

The extraction of terpenoids from vegetable sources by supercritical CO_2 in combination with other solvents, such as methanol, ethanol or acetonitriles was described in a keynote lecture by Professor Carlo Bicchi of the University of Turin, Italy. Supercritical CO_2 may also be used for chromatographic separations in a procedure that lies between gas- and liquid-chromatography. Because of the low polarity of supercritical CO_2, these separations usually involve straight-phase chromatography.

B M Smallfield of Crop and Food Research, Mosgiel, reported research on key factors for the production of Dalmatian sage herb and the use of near critical CO_2 for extracting sage oleoresin on a pilot plant scale. This method involves high capital cost but operating costs are low, there are no solvent residues and the quality of extract is closer to that of the fresh herb than those obtained by organic solvent extraction. The CO_2 extract had higher levels of α-thujone, camphor, borneol, and manool but lower levels of ß-pinene, myrcene, bomyl acetate and α-humulene compared to a hexane extract.

The keynote lecture by Geoff Webster of FoodChem Associates Limited, Auckland, focused on small scale processing of vegetable oils for niche markets. These may be produced for their supposed health benefits or their epicurean properties and typically sell for relatively high prices. They are normally produced by batch methods rather than in automated plants and are of interest to small local companies rather than the large multinationals. A number of examples were cited, including "Waihi Bush" Flax Seed Oil, Yandilla brand Indian mustard seed oil, avocado oil and walnut oil.

Dr Selim Z Erhan of the United States Department of Agriculture in Peoria, Illinois, discussed the potential applications of an interesting new starch-oil composite called Fantesk™ (named for the inventors, George Fanta and Kenneth Eskins, who are also at USDA in Peoria). Co-jet cooking of starch, water and oil produces a stable emulsion in the form of a slippery gel, containing up to 50% oil on a starch basis. This gel can be dried to a film, giving a stable, non-oily powder in which the oil is apparently surrounded by starch membranes. This composite has many potential applications, ranging from food to adhesives, coating lubricants and pharmaceuticals.

The stabilisation of essential oils by encapsulation in carbohydrates was discussed by Dr A Blake of Firmenich SA, Geneva, Switzerland. Crystalline sugars form an amorphous, non-crystalline glass when melted and rapidly chilled. Dr Blake expressed the belief that flavone components are entrapped and protected from oxidation because they are distributed as a disperse phase of microscopic droplets rather than as dissolved molecules. This entrapment is effective even in a limited range of temperatures above the transition temperature, when the glass tends to become rubbery, so that storage lives of the encapsulated flavour oils are measured in years rather than months.

Another informative presentation in the middle section of the program was that of Dr Grattan Roughan of Hort-Research in Auckland on the nature of plant fatty acid synthase and the role of CoA metabolites. This included a discussion of observations made at several different levels of organisation, including photosynthetic tissues and whole cells, isolated chloroplasts, permeabilised chloroplasts and cell- and organelle-free extracts.

Industrial applications of fats and oils was the theme of several presentations. Dr Sevim Erhan of the United States Department of Agriculture, Peoria, Illinois, USA described the use of vegetable oils as bases for news, sheet-fed and heat-set inks. Research on vegetable oil-based inks was stimulated by the petroleum shortage in the 1970s, and inks have been formulated that meet or exceed industry standards of physical properties and performance. They are also more readily biodegradable than petroleum-based commercial inks. The vegetable oil-based inks were removed more completely by deinking processes and were found to be superior in evaluation of volatile organic chemical (VOC) emission.

Concerns over the toxicity and environmental impact of hydrocarbons and chlorinated hydrocarbons used as degreasing solvents, paint removers and all-purpose solvents has stimulated a search for suitable replacements. Professor Allan Barton of Murdoch University in Perth, Australia, discussed the use of high-cineole eucalyptus oil for this purpose. Methods of evaluation of the oil for such uses were described and the work has shown that cineole has a strong potential to replace 1,1,1-trichlorethylene as a degreaser. Its biodegradability and ease of recovery from grease-contaminated solvent are also desirable properties in a solvent. Cineole is an unreactive and relatively non-toxic cyclic ether that is currently being used as a degreaser in Australia following successful trials. It has also been reported that cineole blends are better for this purpose and have a less pronounced eucalyptus odour.

The presentation of Dr Ralph Timms of Brittania Food Ingredients, Limited, Goole, United Kingdom, dealt with cocoa butter equivalents developed to emulate the properties of cocoa butter in all respects. These properties result in chocolate with good mouth feel and flavour release together with good contraction and easy moulding. To be equivalent, the replacement fat has to replicate key features for the SOS triglyceride composition of cocoa butter. Milk fat is another ingredient of chocolate that is easier to mimic than cocoa butter. It would be better to replace terms such as cocoa butter equivalents and milk fat equivalents with the more general Cocoa Butter Compatible fat (CBC) where the product is tailored to perform according to the manufacturer's processing and price guidelines.

Dr S Gulati of the CSIRO Division of Animal Production, Blacktown, New South Wales, Australia, reported that butter fats produced by feeding canola/soybean fat protected from hydrogenation in the rumen had lower melting point profiles and improved spreadability than conventional butter fats. Consumption of the modified butter fats reduced LDL cholesterol levels in human nutrition trials.

Another approach to improving the nutritional properties of oils was described by Douglas Lai of the University of Auckland. This involved the use of commercial preparations containing pregastric lipase from tongue tissue of young ruminants. This enzyme preferentially hydrolyses short-chain to mid-chain fatty acids. Lipases have also been used to catalyse the synthesis of a variety of esterified products, particularly short-chain esters. The pregastric lipase has the advantage over microbial lipases that it can be added to food products and its selectivity for short-chain acids makes it suitable for production of low-caloric structural triacylglycerols. The freeze-dried powdered enzyme was found to be stable in non-polar solvents and the use of lipases in non-aqueous systems has been attracting attention as a means of synthesising alkyl esters, sugar esters and fatty amides, as well as mono-, di-, and triacylglyerols by a clean, mild and environmentally-friendly process, with high selectivity. These products are becoming increasingly important in the pharmaceutical, dairy and cosmetic industries.

Bryce Bell of the Australian Oilseeds Federation, Inc, Wilberforce, New South Wales, Australia discussed the commercial environment for new materials and products in his keynote lecture. He referred to two Australian organisations concerned with links between primary producers, researchers, processors, marketers and consumers, as a base for industry and product development. Aspects of the commercial environment were referred to as the six "ions ", namely, specifications, regulation, evaluation, communication, administration and commercialisation.

The first of the organisations was the Essential Oils Producers Association of Australia formed in 1995/96. A strategic plan for 1996-2001 is currently in operation for guiding research directions for the volatile oil plants. The essential oil industry receives funding for research from Rural Industries Research and Development Corporation, but does not have and is not directly involved in research funding through production levels.

The second organisation is the Australian Oilseeds Federation, Inc (AOF), whose membership embraces all sectors of the industry from grower through to consumer products manufacturer. The AOF is currently in the final year of a 5-Year Plan and will shortly embark on a second such plan (1998-1002). An AOF Oilseed Forum is held every two years, the last being in March 1998. The AOF will also be hosting the 1999 International Rapeseed Congress and the 2001 International Association of Oilseed Crushers Congress. The Foundation has operated an Oilseed Development Fund for the past five years, with funds from the post-farmgate sector of the industry, supplemented by funding from the Grains Research and Development Fund. The Fund is essentially for the purpose of supporting commercial development, communication and market research, as opposed to technical/basic research. An Innovation and Technology Group, consisting of one Commercial Executive and four PhDs contributes to the Federation's planning and action base.

A number of papers on marine oils were presented during the latter half of the conference.

In a plenary lecture, Dr John K Volkman of CSIRO in Hobart, Tasmania, emphasised the great diversity of lipids present in a variety of marine organisms, including bacteria, microalgae, macroalgae, seaweeds and marine animals as well as marine sediments. The compounds discussed included fatty acids, long-chain alkyl diols, alcohols and hydroxy acids, long-chain alkenones, alkenoates and alkenes, highly branched isoprenoid diols, as well as other lipids. The aim of much of this work is to discover new bioactive compounds, but another goal is to understand the origins of the complex mixtures of lipids found in marine sediments. Many of these lipids have a rather restricted distribution and can thus be useful as taxonomic markers.

The keynote lecture given by Dr R Jones Henderson of the University of Stirling, Stirling, Scotland, dealt with the production of n-3 polyunsaturated fatty acids by marine organisms. The ability to synthesise n-3 polyunsaturated fatty acids completely *de novo* is limited to microorganisms and photosynthetic algae. The fatty acid patterns produced by a number of these organisms were discussed by Dr Henderson. Some fungi contain very high levels of 22:6, n-3 fatty acid while microalgae produce a wide variety of unusual fatty acids. The cyanobacteria produce only C18 polyunsaturated fatty acids, but have been useful for characterising the desaturases that insert double bonds at various positions in the chain.

Animals cannot synthesise polyunsaturated fatty acids *de novo* and it is well established that the fatty acid composition of fish oils can be influenced by that of their diet. The natural food of freshwater fish contains 18:3, n-3 as the main n-3 fatty acid whereas marine fish receive an adequate supply of the longer chain n-3 fatty acids. However, the lipids of both types of fish contain high levels of 20:5, n-3 and 22:6, n-3, and freshwater fish are thus obviously capable of converting 18:3, n-3 to these longer chain fatty acids, whereas marine fish have only a limited ability to carry out this conversion. Research has shed some light on the control of the desaturation and elongation enzymes in fish.

In a keynote lecture, Dr Colin F Moffat of the Marine Laboratory, Aberdeen, Scotland, discussed the sources, composition, enrichment and fractionation of marine oils. Between 1990 and 1995, approximately 89% of marine oils and fats were body oils from the fatty pelagic species of fish, while an average of

1.6 % were fish liver oils and the remainder were from marine mammals, squid and other species. Although a large number of fatty acids are present in commercial fish oils, the composition of virtually all marine oils can be described in terms of eight fatty acids. The fatty acid composition is influenced by where the fish are caught as well as by the species. The triacylglycerol composition of fish oils has stimulated development of a range of products enriched in the preserved active ingredients. Extracting rapidly frozen droplets of oil with acetone at -40°C has produced oils with a combined concentration of 20:5, n-3 and 22:6, n-3 of close to 60%. Fractions containing even higher concentrations have been obtained by silver-ion chromatography.

In another keynote lecture, Dr Peter Nichols of the CSIRO Division of Marine Research in Hobart, Tasmania, described work on marine oils being carried out there and at the Division of Molecular Science in Clayton, Victoria, Australia. This research is focused on characterisation of marine oils from Australian species, searching for new sources, development of processing methods and transfer of knowledge to industry. Recent research has focused on oils such as wax esters from orange roughy, oreo dories and other species; shark liver oils containing squalene and diglyceryl ethers; and triacylglyceryl oils rich in essential n-3 fatty acids. These oils are used as lubricants, in degreaser and cleaner products, in cosmetics and as neutraceuticals. Studies on the lipids of microorganisms, zooplankton and fish from the Southern Oceans have provided information of use in the taxonomy of new Antarctic bacteria as well as defining food chain interactions.

Dr R G Ackman of the Canadian Institute of Fisheries Technology, Dalhousie University, Halifax, Nova Scotia, described the occurrence of squalene in small sharks caught off the Nova Scotia coast as well as small bony fish from the coast of British Columbia. Squalene was originally isolated from the liver oil of sharks (family Squalidae) and current work has been stimulated by commercial demand. It is the dominant lipid in some shark liver oils and is present in substantial amounts in an oily fish found on the Pacific Coast. This is known as the candlefish because the oil was reputedly solid at room temperature and the dried fish burned readily when fitted with a wick. The role of squalene may be to maintain fluidity of the oil in the marine life phase of the fish in cold ocean water.

Minor lipid constituents of aquatic organisms were described in two other oral presentations. Dr Jose Empis of IST-DEQ in Lisbon, Portugal, described the production of microalgal biomass as a natural purveyor of carotenoids, such as astaxanthin and conthaxanthin, that are effective in colouring the muscle of fish, such as rainbow trout, and contribute to consumer acceptability and market value.

The presence of cholesterol oxidation products in herring lipids and in a sample of refined menhaden oil was described by Professor Paresh C Dutta of the Swedish University of Agricultural Sciences in Uppsala, Sweden. Eight common products were identified, with total amounts ranging from 5 to 10 mg/g of lipids.

Dr Owen Catchpole of Industrial Research Limited, Lower Hutt, described a method for continuous fractionation of shark liver oil to produce fractions rich in squalene and diacylglyceryl ethers (DAGE). The method involved pumping oil at high pressure into the top of a packed column and supercritical carbon dioxide into the bottom. Squalene, fatty acids and pristane dissolved in the carbon dioxide and were collected at the top, whereas the undissolved DAGE was collected from the base of the column. The concentration of squalene was increased from 55% to 99% by weight in a laboratory scale operation, from 50% to 95% in a pilot plant and from 50% to 80% on a demonstration scale. At the concluding session, Dr Catchpole was awarded a $500.00 prize for the best presentation at the Conference by a scientist under the age of 35. This award is given in honour of Stanley G Brooker, a former employee of Abels Limited, of Auckland, who organised the first of this series of conferences, entitled Fats for the Future, in 1983. A second conference, entitled Fats for the Future II, was held in 1989.

Dr Robert Gibson of Flinders Medical Centre in Adelaide, South Australia reviewed the role of long-chain polyunsaturated fatty acids in infant nutrition, in his plenary lecture at the final session of the conference. There is evidence that these fatty acids can have subtle effects on infant development and the evidence is stronger and more consistent for preterm infants than for term infants. Their role in neonatal development may be clarified by large scale clinical trials currently underway in several countries. An important question that is challenging investigators is whether formula-fed infants can synthesise enough long-chain polyunsaturated fatty acids from the essential fatty acids provided by the formula or whether addition of the extra-long-chain polyunsaturated fatty acids to the formula would have beneficial effects.

The final keynote lecture of the conference, given by Dr David Topping of CSIRO Division of Human Nutrition in Adelaide, South Australia, provided a general overview of the health benefits of the long-chain n-3 polyunsaturated fatty acids in fish oils. In addition to their acknowledged benefits in cardiovascular disease, studies have shown remission of Crohn's disease with enteric coated fish oils and there is also some evidence that n-3 fatty acids may reduce the risk of large bowel cancer.

The 30 posters covered a variety of topics related to the themes of the Conference, and these were displayed throughout conference.

The Organising Committee are to be congratulated for arranging such an interesting and informative program of research on lipids and essential oils. Those interested in more details of the Plenary Lectures, Keynote Lectures, additional Oral Presentations and Posters may obtain a copy of the Conference Proceedings from the Oils and Fats Specialist Group of the New Zealand Institute of Chemistry, P O Box 99711, Newmarket, Auckland, New Zealand; Fax: (+64-9)-5755982; Email: eyres@iconz.co.nz The cost of the Proceedings is NZ$45.00, including GST.

In addition to the outstanding scientific program, the Organising Committee arranged a most enjoyable social program, including a Pre-Conference Mixer, a Conference Mixer at the Old Government House, a Conference Dinner at the Sheraton Hotel and a Post-Conference Social. For the Wednesday Half-Day, registrants were offered a choice of a Wine and Scenic Tour, including a visit to the Muriwai Gannet Sanctuary or a Waiwera Hot Pools and Scenic Tour. The groups then combined for an excellent buffet dinner at Settlers Lodge. The Accompanying Persons Programme included a variety of tours to sites of interest in the Auckland area and was extremely well organised.

NEW ZEALAND INSTITUTE OF CHEMISTRY

NZIC BRANCH NEWS

AUCKLAND

Auckland Branch News

The Auckland Branch committee from last year was re-elected almost unchanged, although we welcomed the addition of Ram Sharma from Watercare Limited. Graham Bowmaker remains the Chairman for 1998. The year started with a talk on recent advances in surface science and catalysis by Professor John Yates from the University of Pittsburgh. David Titheridge was awarded the NZIC Auckland Branch Prize in Chemistry at this meeting.

Our second meeting was a tour of the wastewater treatment plant run by Watercare Limited, followed by a talk from Mr Bob Vilker, Project Manager of Project Manukau. This multi-million dollar project will increase the capacity and quality of Auckland's waste water treatment.

We also note with pleasure the admission of Dennis Karl, James Metson, Peter Schwerdtfeger, James Wright, and Malcolm Smith as Fellows of the Institute.

University of Auckland

The big recent news in the Department of Chemistry is the appointment of Professor Margaret Brimble to the Chair in Organic Chemistry. She is expected to join the Department at the start of 1999.

Dr Paul Kilmartin joined the staff as a lecturer with a joint appointment between Chemistry and the new Food Science Programme. His research interests include the application of conducting polymers as sensor devices in medicine and food science and in corrosion prevention, and chromatographic methods of analysis, such as to determine the level of antioxidants in wine. Most recently Dr Kilmartin was a Senior Tutor in Physical Chemistry at the University of Auckland, combined with developing microelectrodes to monitor carbon dioxide in the fruit storage industry. Paul took a BA in Mathematics and Philosophy and a BSc (Hons) in Chemistry at Victoria University and completed an STB and MTh in Theology through Mt St Mary's Seminary in the Hawkes Bay, before teaching at St Bede's College in Christchurch for two years. His leisure interests include basketball and running, piano playing, Russian language, and family history research, being of Ngai Tahu descent.

The past year was a productive one for the Department, with nine PhDs being awarded. The successful candidates were (Supervisors in brackets) Richard Barton (C J O'Connor), Ellen Carter (G A Wright), Russell Clark (P S Rutledge), Alistair Gillespie (J B Metson), Paul Kilmartin (G A Wright), T Lover (G A Bowmaker), Stephen Ohms (P D W Boyd), Helen Palmer (P J Brothers and D C Ware). and Lijun George Qiao (A J Easteal). Richard Barton's thesis entitled "Kinetic and Stereoselective Characterisation of Lamb Pregastric Lipase Catalysed Reactions" was awarded the L H Briggs Memorial Prize as best thesis for the year.

Of course the other "big" news this year was the power cuts in February and March, which disrupted the start of the academic year. Staff were kept out of building except for about half an hour per day for the first week, and then life slowly returned to normal (although major equipment, particularly in the School of Engineering, stayed off until full power was restored). The Department came through fairly unscathed, apart from some unhappy computers. The major inconvenience was to our theoretical chemist, Peter Schwerdtfeger - when he discovered that he could not use his computers he decided to take a few days off in the mountains. Unfortunately his break became way to literal and he remains on crutches!

Gordon Miskelly

WAIKATO

In 1998, Bill Henderson (University of Waikato) has taken over from Peter Robinson (Hill Laboratories) as Chairperson of the branch, and thanks go to Peter for his efforts as Chairperson over the last two years; Peter continues on as a committee member. Shane Burggraaff continues on as Secretary, and Michael Mucalo (University of Waikato) is the newTreasurer.

The year kicked off with the traditional barbeque for current and prospective members, held this year at Hill laboratories. Peter Robinson then gave a guided tour of the facilities there. On May 2nd there was a Branch visit to the Kahikatea Brewery in Hamilton, where a rather small (but select) group learned some tricks of the brewing trade and sampled some excellent ales. Anyone passing through Hamilton is recommended to check the brewery out.

The branch recently gave a number of travel awards to attend overseas conferences: Scott McIndoe, Jane Woodcock, Corry Decker, Trevor Mathieson, Louise McCaffrey and Julian Cook all gave posters at the Inorganic Chemistry conference in Wollongong in February, while Dion Thompson gave a paper at an enzymology conference in Spain.

Congratuations go to Suzanne Faville who has been awarded the J E Allan prize for the top second year student in chemistry at the University.

Bill Henderson

MANAWATU

To start the Branch season in amicable fashion members were invited to a Wine Options Game Evening on Tuesday 7 April in the New Zealand Dairy Research Institute Cafetaria. The aim was to relax and meet members of the branch over a glass or two of wine. A small but enthusiastic group of members formed three teams to participate in the Wine Options Game.

Grant Boston, current chairman of the Branch acted as Master of Ceremonies. The teams tasted (accompanied by cheese and biscuits) a total of four wines and answered four multi-choice questions about each wine (wine type, year of production, country of origin, producer or region of country). Answers were revealed after each question so no team was subsequently handicapped by a wrong answer at each stage. The four wines in order of tasting were: Villa Maria Chardonnay 1997 from New Zealand, Cockatoo Ridge Chardonnay 1995 from South Australia, Domaine Journet Syrah 1996 from the Languedoc region of France, and La Pica Cabernet Sauvignon 1996 from Chile. Everybody agreed that the Cockatoo Ridge Chardonnay was by far the worst of the wines tasted! Competition was fierce with only 1 point between the teams at the end, a maximum of 10 points from 16 being scored. A prize of a large Easter Egg was presented to each team for their participation.

Wine Option Game. Left to Right: Gaile Peddie, Jeremy Dombroski, Tony Wright, Adrian Jull

Congratulations once again to Manawatu Branch Committee member Kath Fletcher, who was reported in the March/April 1998 issue of *Chemistry in New Zealand* as among 20 New Zealand science teachers who received a regional award for Excellence in Teaching. Kath is Head of Science at Central Hawke's Bay College in Waipukurau, Hawkes Bay. This time she has carried off one of the three National awards for the secondary school category after a further selection process among the regional award winners. An award ceremony was held at Central Hawke's Bay College with invited guests and dignitaries. Labour leader Helen Clark travelled to Waipukurau on 9 April 1998 to present the award. NZIC was represented at the ceremony by the National President Alastair MacGibbon (from the Manawatu Branch) and the Manawatu Branch chairman Grant Boston. Branch members Dave Harding and Tony Wright from Massey University, who worked closely with Kath for ChemEd 97, also made the trip to drought stricken Hawke's Bay - on the only day it had rained in months. Two real surprises for Kath occurred. There was a letter of congratulations from an ex-pupil at Marlborough Girls' College, Prime Minister Jenny Shipley, who was unavailable to make the presentation, and a cheque for $5000 to be used for Kath's personal professional development. Kath also received a standing ovation at the award ceremony and the college Maori Club honored Kath with an impromptu Haka. She now intends to travel to the USA to see how the new National Standards in Science are being implemented and assessed. She plans to renew contact with Dwaine and Lucy Eubanks at the ACS Examinations Institute and visit the ACS Education Division in Washington. In addition to the above, Kath has just been made a Fellow of the NZIC (see elsewhere in this issue of *Chemistry in New Zealand*), a Fellowship richly deserved.

We sadly have to report the death of one of our Branch members - Cecil Johnson, a former chairman of the Branch. Cecil died suddenly at his home aged 60 years on Wednesday 29 April 1998. He is survived by his wife Grace and his four children. Our condolences go to his family.

Cecil Johnson received his secondary education at New Plymouth Boys' High School and he attended Victoria University of Wellington. He graduated MSc in 1961 and PhD in 1965, his thesis supervisor being Dr Alex T Wilson. In 1964 he joined the DSIR Fats Research Laboratory. During the mid-1960s, while on post-doctoral study leave, Cecil investigated some aspects of the mass spectra of glycerides with Professor Ralph T Holman at the Hormel Institute in Austin, Minnesota. He then shifted to the Department of Food Science at Michigan State University in East Lansing, Michigan, to gain an appreciation of methodology in flavor research with Professor Albert M Pearson. Soon after his return to New Zealand, the DSIR Food Chemistry Division (formerly the Fats Research Division) was closed on the retirement of Dr F Brian Shorland and Cecil was transferred to the Applied Biochemistry Division of DSIR, Palmerston North. In the early 1970s he was a member of a team which discovered that 4-methyloctanoic acid (hircinoic acid) is an important component of sheep and goat meat flavors. Cecil continued his interest in many aspects of the analysis of ruminant fats for many years. This included the gas and liquid chromatographic separation of medium and long chain fatty esters and the location of double bonds in unsaturated compounds. In 1992, with the disbandment of DSIR and the formation of Crown Research Institutes, Cecil became a staff member of The Horticulture and Food Research Institute of New Zealand Limited (HortResearch), and at the end of April 1996 took early retirement and set up business as Johnson Analyticals for the analysis of lipids, sterols, and related compounds. Cecil was elected to the Manawatu Branch Committee of the NZIC in 1976 and was chairman of the Branch for 1980/81. He was also Branch Editor 1978-1980, 1982-1989 and was on the Branch Committee until 1996.

Harry Percival

WELLINGTON

Wellington Branch News

The March meeting of the Branch was held at Victoria University and provided two of the chemistry PhD students an opportunity to explain their research activities in general terms to a non-specialist audience. Antony Fake, who has gained distinction also from his fencing activities as a national representative, is studying under the direction of Peter Northcote on the isolation and characterisation of marine sponges. He provided an interesting overview of the Wellington activities in marine chemistry and focused the audience to his specific topic. Philip Aichison, working towards a Victoria University degree with Dr Burns but researching in both Wellington and Montpelier on a bilateral government-funded programme summarised his studies on the chemical extraction of lithium from compounds which are used in rechargeable lithium batteries.

In April Lester Stonyer provided a fascinating journey through the information and misinformation generated from the introduction of lead-free petrol. His well attended lecture

followed the discourse presented earlier in *Chemistry in New Zealand* (**61**, No. 6, p. 3-8).

Victoria University News

The University has conferred the title of Emeritus Professor on Robin Ferrier who retired last January after 27 years as the first (and last) Professor of Organic Chemistry that included periods as Head of the Chemistry Department and Dean of Science. A farewell valedictory lecture *Glycobiology - we never knew sugars were so sticky* was delivered to an invited audience in mid-April and was followed by a School farewell dinner.

The past two months have seen a wide range of visitors to the Chemistry Division of the School of Chemical and Physical Sciences that have presented lectures including Professors Brian Heaton (Liverpool, United Kingdom) who spoke on "NMR Studies of Transition Metal Carbonyl Clusters" and Leiv Sydnes (Bergen, Norway) on "Halogenated Cyclopropanes", and Drs Jane Nelson (Belfast) "Accommodating Hosts and Adaptable Guests", Roger Bolton (Surrey, United Kingdom) on "Homolytic Bromination of Arenes", and Richard Hartshorn (Canterbury) on "Photodecarbonylation of Cobalt(III)-chelated Amino Acids".

Brian Halton

OTAGO

Otago Branch Meetings

The March meeting of the Branch involved an address by Professor David Reid, an Associate Dean of the University of California at Davis, on "Physico-chemical factors which affect the quality and stability of frozen foods". Professor Reid, a William Evans Visiting Fellow in the Department of Food Science, University of Otago, and a specialist in freezing and the physical chemistry of food, told the meeting that food preservation is about refrigeration and controlling the activity of water. Freezing is not simply a matter of lowering the temperature since it is highly dependent on the complex process of nucleation which can be manipulated by adding polymers or an organism like *Pseudomonas surengii* (familiar to skiers as just the thing for making artificial snow). He also described how supermarket managers need to know more about glass transition temperatures if they want to ensure the best storage temperatures for their frozen foods. Perhaps they should attend the forthcoming Institute of Food Science Conference in Nelson on July 1-3, 1998.

The April meeting was an opportunity to go "Fishing in the chiral pool" with Professor Richard Stoodley who holds the Chair of Organic Chemistry at the University of Manchester Institute of Science and Technology. Professor Stoodley, a William Evans Visiting Fellow in the Department of Chemistry during April, has research interests in the development of new synthetic methodologies and their application to compounds of therapeutic relevance. After reminding the meeting of enantiomer recognition by receptors, he drew attention to the "good, the bad and the ugly" amongst chiral drugs and the conditions required to make a chiral switch worthwhile. He then went on to illustrate his own work on assymetric induction in Diels-Alder reactions with the use of glucose as the stereo directing unit. In one example of chiral drug synthesis, he showed how to prepare (S)-piperazic acid, with a protected glucosyl residue, for use in a hetero Diels-Alder reaction and the synthesis of the ACE inhibitor cilazapril.

University of Otago News

Chemistry Department

Professor Jane Nelson of Queen's University, Belfast, was a Visiting Professor in the Department from February 16 to May 8, 1998. Professor Nelson, a specialist in cryptand chemistry, made a number of very valuable contributions to the Department's activities and also managed to visit most other chemistry departments in New Zealand during her stay. Along with giving a ten lecture module to the honours class (and postgraduates), a departmental seminar and a talk to the Association of Women in Science, she showed some staff how to use the (old, but sturdy) EPR to best advantage and also found time to "play" very successfully in the laboratory on a joint research initiative with Dr Sally Brooker. The on-line analyses just kept on rolling in and the crystals kept growing, greatly impressing the other occupants of 3n9, the Brooker's Bunch lab!

A number of PhD students have recently successfully defended their theses. Supervised by Professor Jim McQuillan were Paula Brooksby "The Infrared Spectroelectrochemistry of Methanol Solutions", Ali Babaei "A Spectroelectrochemical Investigation of Quinones", Kevin Dobson "Spectroscopic Studies of Adsorption on Metal Oxides" and Paul Connor "Internal Reflection Infrared Spectroscopic Studies of the Aqueous Solution-Metal Oxide Interface"; supervised by Dr Sally Brooker were Bob Kelly "Complexes of Schiff-base Macrocycles Containing the Pyridazine Unit" and Geoff Dunbar "Synthesis and Characterisation of Amide and Thiolate Complexes"; supervised by Dr Keith Gordon were Mark Waterland "Spectoelectrochemistry and Time-Resolved Spectroscopy of Some Copper(I) and Rhenium(I) Complexes in Solution", Sonya Scott "Electrochemistry and Spectroscopy of Some Metal Polypyridyl Complexes" and Tim Simpson "Spectroscopy, Electrochemistry and Spectroelectrochemistry of Some Metal Complexes in Solution". Congratulations to all.

The following postgraduate students have received Student Travel Scholarships donated by the NZIC: Gareth Thomas to attend the RACI Organic Conference in July 1998 in Australia and Thomas Kirchlechner to attend the "Climate Change in the Polar Regions" Conference in August 1998 in Norway.

School of Pharmacy

Dr Rob Ledger is on sabbatical leave for the remainder of the year in Amsterdam and Bath. Dr Paul Fawcett has just returned from attending the American Society of Clinical Pharmacology and Therapeutics meeting in New Orleans. Together with other Pharmacy staff they make up a research group investigating Drug Metabolism and Pharmacokinetics that has recently received recognition by the University as an "Area of Excellence". Part of this research into the metabolism of local anaesthetics involves collaboration with the Medical School at Sheffield University and has recently attracted financial support from Chiroscience Limited a company based in Cambridge, United Kingdom. Similar recognition has gone to our Branch Chairman, Dr Wayne Temple and colleagues in the School of Pharmacy for their research into Toxicovigilance.

Paul Fawcett

NEW FELLOW

Kath Fletcher is Head of Science at Central Hawke's Bay College, Waipukurau - a rural, co-ed school with a reputation for encouraging students to continue their study in the sciences at tertiary level. She has taught there for 23 years but has spent time away from the classroom to carry out other science-based activities.

Kath was the Department of Education Teaching Fellow at Massey University in 1989 and during this time attended the tenth ICCE in Ontario. Since then she has been the 1992 Regional Science Adviser and her involvement with the New Zealand Chemistry Olympiad has included team selection, training and resource writing and being a mentor in Oslo in 1994.

Other "chemistry" activities have included being on the Chemistry Unit Standards writing panel, running training courses for NZQA and the Massey University College of Education, attending the 14 ICCE and national conferences in New Zealand, acting as a Regional Moderator for NZQA and convening ChemED'97. She has been the Hawke's Bay representative on the NZIC Manawatu Branch Committee for a number of years and attends meetings regularly in spite of the 220 km return journey.

Most recently Kath won one of the three National Excellence in Teaching Awards available to secondary teachers across all subject areas. The NeiTA Foundation presented her with their top award - a $5000 cheque for personal professional development. She intends to travel to the USA in September/ October 1998 to look into assessment methods and inquiry learning techniques. Visits to the American Chemical Society Examinations Institute in South Carolina and the ACS Education Division in Washington are to be included.

1998 RSC AUSTRALASIAN LECTURE ITINERARY

This year's lecturer is Professor Michael Paddon-Row of the School of Chemistry, University of New South Wales, Sydney.

The title of his lecture is:
"An Overview Of Recent Insights Gained Into The Most Fundamental And Ubiquitous Of All Chemical Reactions, ElectronTransfer"

His itinerary is given below. The lectures are organised in each city by the local branch of the NZIC, and each branch will notify its members of the time and place.

Monday, 10th August, Auckland
Tuesday, 11th August, Hamilton
Thursday, 13th August, Palmerston North
Friday, 14th August, Wellington
Monday, 17th August, Christchurch
Friday, 21st August, Dunedin

CHEMICAL PROCESSES IN NEW ZEALAND

Second Edition edited by John Packer, John Robertson and Heather Wansbrough

The second edition of *Chemical Processes in New Zealand* will be launched in Auckland on Thursday, 2nd July, 1998.

The new edition will have at least 80 articles written either by professional chemists around the country, or by the editors (mainly Heather Wansbrough) from information supplied by organisations. It is likely to have 800 pages.

In addition to chemistry the articles include much information on technology, biotechnology, and environmental matters.

Articles will be grouped under the headings: Agriculture, Fisheries, Forestry and Paper, Food and Beverages, Dairy Industry, Energy, Metals, Environment, Materials, Household Products, Polymers (including surface coatings), Medicine, Biotechnology, Chemicals, and Water.

To preserve a historical booklet we will also reproduce a 1940 NZIC publication which could probably now be regarded as the first edition of *Chemical Processes in New Zealand.*

This new edition, which partly updates the 1978 and 1988 volumes should be of value to schools (not only chemistry teachers and students), tertiary institutes, and a wide range of scientists and technologists.

As we have nearly used up our financial reserves getting the new edition to the manuscript stage, we are keen to produce a small number of copies of the completed work for inspection. We would like to have a reasonable number of firm orders before a major printing. Thus we are looking at the possibility of having a series of NZIC branch meetings throughout the country in the first two weeks of July (hopefully with the local Science Teacher Associations) to launch the new edition. We would also like to display it at SCICON in Nelson early in July.

Our aim is to keep the cost as low as possible. We plan to sell it at a little higher than cost to build up a fund which will be available for producing a further edition when appropriate. We did not have to seek money for this edition as we had accumulated money from sales from volume 2 (1988). It will probably be produced in two forms, bound or punched for a ring binder to make copying easier.

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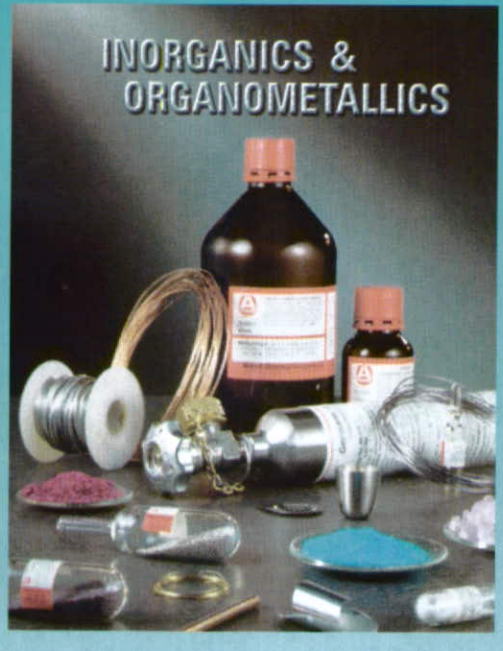

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