VOL 64 NO.1 July/August 2000

NZIC Chemistry IN NEW ZEALAND

ISSN 0110-5566

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Chemistry
IN NEW ZEALAND

Published on behalf of the New Zealand Institute of Chemistry in January, March, May, July, September and November each year.

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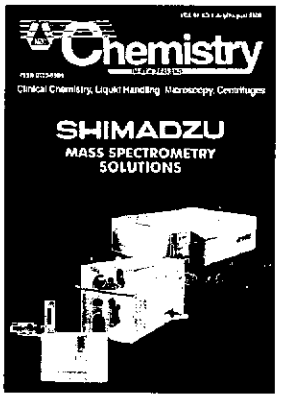

Coming Up ...

September/October 2000 Polymers, Plastics, Petrochemicals, FTIR, Thermal Analysis, Viscosity, UV Spectroscopy

Deadline for material *5th of the month of publication*

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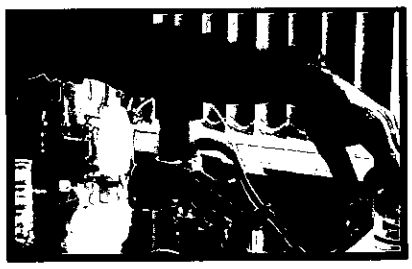
CLINICAL CHEMISTRY APPLICATIONS

NEEDLE-FREE BLOOD SAMPLING

Blood sampling offers the most comprehensive information about how well an athlete is responding to training, or a patient is responding to a treatment. However, repeated sampling from a blood vessel can be both invasive and awkward.

A team at HortResearch led by Dr Christian Cook is seeking to overcome the limitations of repeated blood sampling. They are developing two different technologies that allow a non-invasive sample to be obtained from the surface of the skin quickly and painlessly.



An adapted ultrasound devise collecting cells from the skin surface. The device contains an internal cell with microdetectors.

One combines variations on low frequency ultrasound with, in a world first, the successful collection of hormones that are reflective of blood levels at the skin's surface.The method potentially allows repeated, painless sampling without the need for blood removal. It can obtain repeated measurements from an athlete during training sessions without the need for invasive equipment. By obtaining such information, they hope to design software that can predict and offer optimal training regimes for any individual. On the clinical side, they hope this new technology will allow on-line, rapid and frequent monitoring of patients at risk from sepsis (a type of blood poisoning) so that early predictors can be found.

To improve speed of use, a second stage is being developed where Dr Cook's team hope to incorporate biosensor-based measurement directly within the sampling device.This will allow rapid feedback to the clinician or athlete/coach. Monitoring and finding new biological information on human performance indicators, such as response to sport training or to therapeutic treatments, offers a frontier of science that has the potential to extend both healthcare and sporting performance. It is also likely to generate leading edge, New Zealand-produced technologies that could open up new markets in healthcare and professional sport monitoring.

NZ SCIENCE SCENE

Ai SCIENTIFIC LAUNCHES WEBSITE

Ai Scientific is proud to announce the launch of it's website <aiscientific.com>. Aiscientific.com covers both Ai Scientific divisions, the Australian/New Zealand instrumentation supply division and the International pre-analysis automation division. In addition to a full product catalogue the website lists the latest product and application news and details of available training courses. "Regular updating of the website information will ensure it remains current," said Ralph Donaldson, Ai Scientific's Sales and Marketing Manager. "Service calls can be logged on-line for instant transmittal to the Service Team." The user-friendly design also makes it easy to find the contact details for Ai Scientific offices around Australia, the USA and New Zealand. Mr Donaldson went on to say, "We see the website as a valuable adjunct to the services we provide to laboratories, providing the information they need - when they need it."

DADE BEHRING APPOINT NEW TERRITORY MANAGER

Della Smith recently joined Dade Behring Diagnostics Ltd as North Island Territory Manager.

Della qualified NDMLS in 1993 majoring in microbiology and haematology.

Before joining Dade Behring Diagnostics she worked in the Microbiology Department at Greenlane Hospital, Auckland as Senior Technologist.

ROYAL SOCIETY OF NEW ZEALAND ELECTS NEW PRESIDENT

Recently the Royal Society of New Zealand Council elected SirGil Simpson KNZM QSM as its new President. He succeeds Professor Sir John Scott KBE FRSNZ. Sir Gil Simpson is Founder and Chief Executive Officer of New Zealand's largest software company, Aoraki Corporation Ltd, and its divisions - JADE, Cardinal and JADE Direct.

In 1999 Sir Gil was made a Knight Companion (KNZM) for services to information technology, commerce and the community. He is a director of Television New Zealand, a non-executive director of the Reserve Bank of New Zealand and a member of the New Zealand Business Round Table. A Fellow of the New Zealand Computer Society, the New Zealand Institute of Management and the New Zealand Institute of Directors, Sir Gil was awarded a QSM in 1986 in recognition of his services to new technology. Among a number of other community roles, Sir Gil is Chairman of the Christchurch City Mission Foundation.

NEW ZEALAND UNIVERSITY FUNDING OVER THE LAST TWO DECADES

The following is the abstract from "New Zealand University funding over the last two decades" by W Guy Scott and Helen M Scott. Working Paper Series 2/2000 ISSN 1175-2254; ISBN 0-908719-31-0 The full report is available from http://www.aus.ac.nz

The aims of the study were to investigate trends in university funding per equivalent full time student (EFTS) over the last two decades (1980 to 1999) and to compare New Zealand university funding from public sources with OECD countries for which data were available. A university price index was developed and used to deflate nominal data on expenditure per EFTS. Between 1980 and 1999 real Ministry of Education funding in 1999 dollars per EFTS fell at an annual average rate of 2.3% or by $3,821 (36%). The EFTS to staff ratio increased from 12.5 in 1980 to 18.4 in 1998, an increase of 6.0 students per academic staff member or 48%. Over the period 1980 to 1998, for every $1,000 reduction in Ministry of Education funding per EFTS the EFTS/staff ratio deteriorated by 1.7. In 1995 New Zealand spent US$3,192 less per EFTS than did Australia. The findings of this study highlight a number of concerns for New Zealand. If present trends continue, New Zealand universities may experience difficulty in matching academic salaries with those in other countries, student/ staff ratios will continue to rise, and the quality of teaching and research could decline. Rising student fees may result in a reduction in the number of students from lower socio-economic groups able to access university education. Failure to build on the nation's stock of human capital will reduce New Zealand's ability to compete internationally.

ROYAL SOCIETY OF NEW ZEALAND SCIENCE AND TECHNOLOGY AWARDS

Please note that applications for these awards which have previously been offered twice a year, will now close once a year on 1 October. PhD students wishing to attend an overseas conference in 2001 must make an application by 1 October 2000. To be eligible students must be undertaking full-time PhD study in science and/or technology and must be New Zealand citizens or have permanent residency status. Because of limited funding, preference will be given to applicants who have received their secondary schooling and the majority of their tertiary qualifications in New Zealand. Preference will also be given to those students at an advanced stage of their PhD studies.

Full information and an application form are available on the website:
http://www.rsnz.govt.nz/awards/rsnz_awards/index.php

AUSTRALIAN WORLD HERITAGE ENVIRONMENTAL SITE OPENS NEW ZEALAND-MADE WASTE-TO-COMPOST UNIT

A plant designed and built by a New Zealand company to turn solid waste into compost has been opened on Australia's environmentally sensitive Lord Howe Island.

The small mid-Tasman Australian territory, a World Heritage listed environment, previously disposed of its waste by incineration and landfill, causing harmful air emissions and groundwater contamination.

Vertical Composting Unit (VCU) technology developed by Auckland company Wilson Brown Associates Ltd won a tender against international competition in an 18-month evaluation by seven Australian state and federal agencies.

Wilson Brown executive director Paul Brown said the installation was an important milestone in the company's drive for local and export sales.

"Landfill is becoming increasingly unacceptable for waste disposal for environmental, health and cultural reasons. Our solution enables the waste stream to be converted into a valuable product without gas or odour emissions. In dollar terms, our technology is more than competitive with the cost of setting up, operating, closing and managing a rubbish tip" Mr Brown said.

Mr Brown said the company had five installations in operation internationally and was talking with local bodies and industrial waste producers overseas and in New Zealand about the benefits of its system.

A key advantage is the small land area needed. On Lord Howe Island a single three metre square, five metre high vertical composting unit processes all organic waste from a resident and visitor population of 800 people.

Installations for a larger population centre would site units close to the waste source, eliminating trucking to a central point.

The VCU copes with material which cannot be treated safely by conventional composting methods, including meat, dairy products, food scraps, green waste, cardboard, paper and sewage sludge.

Because microbial processes take place inside an insulated column, there is complete conversion of waste, even including methane and other gases usually given off by open-air windrow composting.

Waste is processed continually by the unit and typically takes 14 days to produce odourless, pathogen-free compost or mulch ready for bagging or direct application as a soil conditioner.

NEW ZEALAND UNIVERSITIES TOLD TO LOOK FOR STRENGTHS

New Zealand universities would be asked to clearly define their areas of specialisation under the Government's tertiary reforms, Associate Education Minister Hon. Steve Maharey said last month.

In a speech to tertiary managers, Mr Maharey said the Government wanted institutions to spell out their role in the tertiary education system.

Last month, the Government introduced legislation limiting the number of universities to eight, signalling it wanted tighter quality control measures over tertiary studies.

When introducing the legislation, Mr Maharey said the Government wanted each of the country's universities to "play to its strengths" according to an agreed national plan.

In his speech this week, Mr Maharey said he had received his first report from the newly established Tertiary Education Advisory Commission, which he expected to release later this month.

The report gave an indication of the approach the commission intended following in developing an "in-depth strategic direction" for the tertiary sector.

Over the next 18 months, the commission would look at ways of funding institutions so they worked together more closely; funding research in a way that avoided duplication and advanced excellence and establishing a system where institutions specialised at what they did best.

Mr Maharey believed the last decade of competition between universities, polytechnics, colleges of education, wananga and over 800 private providers had not served the nation's interests. It had also left many tertiary institutions in a "financially marginal" position, contributing in part to rising student fees.

FORMER MARSDEN FELLOW WINS FULBRIGHT AWARD

Former Marsden Fellow and Lincoln University research scientist, Dr Timothy Clough has won a Fulbright Fellowship to the United States.

Dr Clough will spend 4 months at the University of California, Davis, researching the production and movement of greenhouse gases, such as nitrous oxide in the soil. "We know that both nitrogen fertilisers and nitrogen from urine patches of grazing animals produce nitrous oxide but there is still a lot we need to learn if we are to develop environmentally sustainable farming systems," said Dr Clough. He will also look at how rainfall and irrigation affects the release of nitrous oxide from soils.

Dr Clough will have the opportunity to work with leading soil scientist Professor Dennis Rolston, head of the University's renowned Department of Land, Air and Water Resources. Having studied previously in the United

Kingdom at the Institute of Grassland and Environmental Research in Devon and at The Queen's University of Belfast, Dr Clough's work has already gained international exposure. He is a leading player in efforts to identify and control greenhouse gas emissions in New Zealand.

Dr Clough's recent work in New Zealand was undertaken during a postdoctoral Marsden Fellowship, spent at Lincoln University's Centre for Soil and Environmental Quality.

Fulbright Fellowships are offered annually to people who have shown academic, artistic or professional achievement.

NEW ZEALAND'S FIRST GENOME RESEARCH FACILITY OPENED

The Minister of Research, Science and Technology Hon. Pete Hodgson officially opened New Zealand's first genome research facility at the University of Otago in Dunedin early in July.

The $1.8 million Otago Genomic Facility will accelerate research into human, animal, and plant genes and places the university at the leading edge of international genomic research.

Mr Hodgson said: "The initial sequencing of the human genome recently achieved by researchers in the United States and Britain, will produce an explosion in genomic research.

"The University of Otago, with its new research capability and its record of successful genetic research, is positioned to become a key player in expanding the genomic frontiers."

"The new facility is a visionary investment that builds on the University of Otago's existing strengths and ensures that New Zealand scientists will be in the forefront of genomic research into human animal, plant and microbial systems."

Director of the University of Otago's Functional Genomics, Gene Expression and Proteomics Theme, Professor Warren Tate FRSNZ, said " The new facility incorporates the most advanced technology from the USA and Canada. The facility was planned only after an extensive review by Professor Tony Reeve of leading overseas research facilities, particularly at the National Institute of Health in the USA."

Central to the Otago Genomic Facility is the micro array unit - a robot - which allows high speed print spotting of human genes for analysis. The micro array unit will allow Otago researchers to analyse 64,000 genes at one time, a huge advance on the pace of previous research which was limited to analysis of one gene a time.

Other key equipment includes a laser scanner, robotics equipment and equipment for processing the DNA chips.

$4 MILLION IN GOVERNMENT TEACHING SCHOLARSHIPS

Education Minister Hon Trevor Mallard this week released details of a $4 million plus programme to attract high-quality people into the teaching profession. The programme makes 405 scholarships of $10,000 each available to selected teacher trainees.

"This major investment by the Government aims to get new people into secondary teaching in particular.

"It has been developed in co-operation with schools and teachers. They are part of the campaign itself, demonstrating yet again that in the profession there are talented, creative teachers who are making a fantastic contribution to the development of young New Zealanders," Mr Mallard said.

"Real teachers will be featured right throughout the Government's recruitment programme this year which will help to direct interested people to understand the rewards that teaching now offers."

Mr Mallard said a focus of this year's scholarship programme was to increase the number of secondary teachers in the key shortage areas of physics, maths, and information and communications technology. There is an international shortage of secondary teachers of maths. Teachers of physics, computing and physical education are anticipated to be in short supply over the next few years.

Trevor Mallard announced the following categories and numbers of teacher scholarships available:

- 100 scholarships for Maori graduates
- 50 for Maori non-graduates
- 55 for people to train as Maori-medium teachers
- 50 for people to train as Maori language teachers
- 50 for Pacific graduates
- 25 for Pacific non-graduates
- 30 for graduates to train as secondary maths teachers
- 10 for graduates to train as secondary ICT teachers
- 10 for graduates to train as secondary physical education teachers
- 10 for graduates to train as secondary physics teachers
- 15 for people to train and then teach in rural areas where teacher shortages exist.

Applicants may apply for more than one scholarship. These will be promoted by the TeachNZ (www.TeachNZ.govt.nz) unit of the Ministry of Education. Applications for the scholarships close on 4 September 2000.

RESEARCH FELLOWS HONOURED

New Zealand's brightest young research scientists were honoured at the FIRST Awards in early May. Sponsored by the Foundation for Research, Science and Technology, the FIRST Awards recognise the top research fellow within each of the Foundation's three Fellowship assistance

programmes, Graduates in Industry, NZ Science and Technology Post-Doctoral, and Tuapapa Putaiao Maori Fellowship schemes.

"One of the Foundation's principal aims is to invest in the types of research which underpin New Zealand's economic growth and improves the country's social and environmental well being; celebrating and recognising the contributions made by young researchers is pivotal to halting the science and technology exodus from New Zealand." said Foundation Chief Executive, Dr Steve Thompson.

The Minister for Research, Science and Technology, Hon. Pete Hodgson presented the awards at two ceremonies, one in Christchurch and the other in Auckland in mid-May. This year's Awards were enhanced with daytime workshops for up to 150 fellows.

The winners were:

FIONA CARSWELL Post-Doctoral Fellow, South Island Winner
RACHEL FOREST Tuapapa Putaiao Maori Fellowship, South Island Winner
MEGAN McKENNA Post-Doctoral Fellow, North Island Winner
CATHERINE MORROW Post-Doctoral Fellow, North Island - Highly Commended
GINA MOHI Tuapapa Putaiao Maori Fellowship, North Island Winner
DAVID TEIRNEY Graduate In Industry Fellow, North Island Winner
NISHA D'SOUZA Graduate In Industry Fellow, North Island Highly Commended.

ENZTECH APPOINT NEW REPRESENTATIVE

Enztech Pty Ltd are pleased to announce the appointment of Trevor Lowe as their New Zealand Regional Manager. Enztech are the representatives for Applikon Bioreactors and sensors. A full range of small scale laboratory bioreactors and pilot plant fermentors are available.

The quality and range of the Applikon equipment has seen the company grow over the last fifteen years to become a global supplier of laboratory fermentation equipment. The acceptance of their products in Australia and New Zealand has been very rapid, and there are many installations in the laboratories of leading companies, research organisations and universities.

The equipment is supplied in modular form, and a wide number of configurations are possible. The flexibility of the Applikon equipment means that it is possible to purchase a basic unit initially, which can be added to as required at a later date. In addition the bioreactors can be supplied with fittings which allow configuration either for growing bacterial/yeast cultures or animal or plant cell cultures.

Enztech offers full technical advice on bioreactor systems, and provides installation, service and spares for all systems sold.

International News

PLANTS GET SUNBURN TOO

People and animals aren't alone in suffering the ill effects of too much sun. Plants get sunburn too, researchers at the Friedrich Miescher Institute in Basel Switzerland said last month.

Excessive ultraviolet radiation (UV-B) from the sun's rays damages DNA in plants and stunts their growth. The damaging effects of UV-B for humans are well known but until now there was little evidence the sun's damage to plants was more than leaf-deep.

"As far as we know this is the first time it has been shown that UV-B has an effect on the stability of the genome (all the genes in the plant)," molecular biologist Dr Barbara Hohn said. She and her colleagues discovered that in plants exposed to UVB light their DNA was rearranged or changed. Higher levels of exposure led to the biggest changes.

"This particular kind of rearrangement in DNA is increased under UV-B. Whether that is positive or negative for a plant, we cannot tell," she added.

In humans exposure to sunlight and resulting genetic damage can lead to skin cancer. Hohn and her team have found similar changes in plants but plants do not develop tumours. They also noted that the effect on the plant's genome increased with each generation so the plant somehow remembers earlier DNA damage.

"The DNA rearrangements in skin cells can lead to cancer. Such DNA rearrangement has now also been found in plants. Whether this is any danger for humans we do not know. The research only shows that the effects are more general than we knew," she added.

In a commentary on the research, Dr Anne Britt, of the Section of Plant Biology at the University of California at Davis, said the research suggests the depletion of the ozone layer could have a measurable impact on the mutation rate of some plants.

"But further work to determine the mutation rate and the spectrum of mutations caused by UV-B exposure are required before we can fully assess the significance of these observations," she added.

LETTER TO THE EDITOR

Dear Editor

So, the constructivist debate is on again[1]. Before taking sides, perhaps it might be useful to reflect on a comment by Malcolm Carr - one of the founders of applying constructivism to science education in New Zealand. In a contribution to a recent book on developing the science curriculum in New Zealand[2] he says:

> "If students come to lessons with ideas about their world which already make sense to them, then teaching needs to interact with these ideas, first by encouraging their declaration and then by promoting consideration of whether other ideas make better sense."

Surely nobody could doubt the wisdom of finding out what knowledge or understandings students already have, and in fostering a climate in the classroom that encourages them to *declare* it. The problem arises if the teacher goes that little bit further in providing a supportive and encouraging environment for self-expression and, by so doing, gives the student the notion that such declaration provides *affirmation* that the understanding was by virtue of its utterance valid or appropriate.

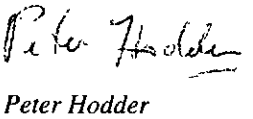
The "promoting consideration of ... other ideas" that Carr advocates is, I believe, what was once called "teaching". Recognising that the student's knowledge may be incomplete or incorrect, the teacher guides, cajoles and instils that knowledge or concept, which as a result of years or centuries of investigation might now be considered as "act" or "best practice", into the student's mind. Only by that process can the student's understanding of the world be enhanced beyond simply sharing embryonic ideas as undeveloped as his or her own.

Many teachers subscribe to the notion that they are "facilitators" - that their role is more to guide than to teach[3]. But to be effective, guidance needs to made from a strong background of knowledge. It is widely recognised that many teachers have a weak and in some instances, non-existent background in science and technology. These teachers might find it difficult to "teach" science, although as Carr[2] also notes: "Teachers who are themselves insecure in their knowledge of science can find the uncomplicated transmission of knowledge attractive". Given that science is not a major interest or concern to many teachers, retention of a simple teaching model might have meant more science was made available to students than occurs with the less prescriptive and constructivist science curriculum[4] now in vogue.

Research into teacher knowledge in one of the "learning strands" of the curriculum - "Planet Earth and Beyond" (which was not included in previous curricula)[5] - suggested that teachers, even experienced teachers, often do not have the knowledge to impart, either by teaching or facilitation, the content required for this strand. Lest it be thought that other "strands" in the science curriculum will be covered, it is sobering to reflect on the exposure of students to science knowledge in teacher training programmes is typically about 5% of their curriculum studies component, a component which is itself just a third of their training (Table 1). It seems that those who aspire to be teachers acquire very little science in their professional programme. Thus, science knowledge is either acquired before enrolment in teacher education, or it is acquired as part of subsequent professional development, or it is never acquired at all.

There has been recent grudging admission from within the education profession that implementation of the science curriculum is difficult for teachers with little scientific knowledge[7]. Rather than another debate about constructivism versus traditional teaching [8], professional scientists might be better to advocate greater emphasis on *content* not only of science, but of other learning areas too, in the education of those aspiring to be teachers. If teachers knew more, perhaps they could better enhance the learning of their students, by whatever teaching paradigm is currently in favour.

[1] Vincent Gray, "Educational cancer", *Chemistry in New Zealand*, **64**:3 (2000), p.20; in response to Coll and Taylor's article in *Chemistry in New Zealand*, **64**:2 (2000), pp. 17-24.
[2] Carr, M; Barker, M; Bell, B; Biddulph, F; Jones, A; Kirkwood, V; Pearson, J; & Symington, D. (1997). The constructivist paradigm and some implications for science content and pedagogy. pp. 161-174 in "Developing the science curriculum in Aotearoa New Zealand". Addison Wesley Longman, Auckland. Bell, B; Baker, R. (eds.).
[3] Benson, B. (1997). Teaching strategies. pp. 91-100 in "Developing the science curriculum in Aotearoa New Zealand". Addison Wesley Longman, Auckland. Bell, B; Baker, R. (eds.).
[4] Ministry of Education. (1993). "Science in the New Zealand curriculum". Learning Media. Wellington.
[5] Hodder, A P W and Otrel-Cass, K. (1998). Teacher attitudes and knowledge of geoscience in New Zealand: a small-scale survey and some implications. *Waikato Journal of Education*, **4**, pp. 134-140.
[6] Ramsay, P D K and Hodder, C. (1997). The provision of pre-service primary and secondary education in New Zealand. A report to the Ministry of Education, University of Waikato. 64 pages.
[7] "In Time for the Future": a report prepared by the Education Review Office [cited in Cassie, F, Primary teachers key. *New Zealand Education Review*, 5:9, pp. 1-2, June 30, 2000].
[8] The constructivist paradigm championed by Carr and others has been contested in Matthews, M P. (1995). "Challenging NZ science education". Dunmore Press, Palmerston North.



Peter Hodder
The Waikato Polytechnic, Hamilton

Table 1. Knowledge and teaching skill components in teacher education programmes*

Programme	Year or level	Component			
		Education Studies	Practicum	Curriculum Studies	Science and Technology
BEd	1	12 [a]	12	12	
	2	12	12	12	2
	3	12 [b]	12	12	0-12
	total	36	36	36	2-14
% of total programme		**33%**	**33%**	**33%**	**2-14**
Primary diploma	100	3 [c]	3		
	200		4	10	
	300		5	10	1.7
	400	3			
	total	6	12	20	1.7
of total programme		**16%**	**32 %**	**53 %**	**4.5%**

* compiled from information supplied by Wellington College of Education. Most teacher education programmes have a similar balance between components [6].
[a] number of credits in the programme on this component.
[b] these may be from degrees and subject areas outside education, so, in principle, university science courses could be included here.
[c] number of weeks in the programme on this component.

With comparatively few people with science backgrounds on the staff of colleges of education (Table 2), this poor representation of science in teacher education is unlikely to change from within the teacher education "industry".

Table 2. Lecturing staff with a science background in selected teacher education establishments

Institute	Number of teaching staff		Proportion of teaching staff with science degree
	total	with science degree	
University of Waikato School of Education [a b]			
Primary and secondary	98	15	15%
Massey University Department of Educational Studies and Community Support [b]			
Primary and secondary	42	5	12%
Christchurch College of Education			
Primary	83	5.5	7%
Secondary	36	8.5	24%
Overall	**110**	**14**	**12%**
Advanced [c]	40	3	8%

*compiled from the calendars of the institutes.
[a] including Leisure Studies, but excluding Early Childhood Studies.
[b] This unit formed by the incorporation of a former college of education within the university.
[c] "provides courses for teachers in all sectors from early childhood to tertiary education".

Chemistry In New Zealand July/August 2000 Page 11

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Patent Proze

by Jane Calvert and Greg Lynch

COPYRIGHT

Copyright law in New Zealand is governed by the Copyright Act 1994. At first glance, the principles of copyright law can seem relatively straightforward. However, copyright is a complex area. The Copyright Act sets out several basic principles including ownership of copyright and what constitutes copyright infringement. It also outlines a myriad of exceptions to, or variations of those principles. The Copyright Act additionally includes other aspects such as the moral rights of authors, measures for protecting New Zealand's borders and the licensing of copyright. It is the purpose of this *Patent Proze* to inform readers of some of the basic principles. Particular aspects of copyright law will be the subject of future *Patent Proze* articles.

Unlike patents, designs and trade marks, there is no registration system for copyright. Copyright resides in a copyright work simply by virtue of its creation. For example, as soon as pen is put to paper and an article written, there is copyright in that article. There is no requirement to apply for copyright registration.

Copyright works include original literary, dramatic, musical or artistic works, sound recordings, films, broadcasts, cable programmes and typographical arrangements of published editions. It is worth noting that an artistic work is defined as a graphic work, photograph, sculpture, collage, or model, irrespective of its artistic quality. The definition also includes other works, such as works of architecture and works of artistic craftsmanship not already covered by the definition. Literary works include tables or compilations and computer programmes. Compilations include multi-media products and databases.

The duration of copyright is, in most circumstances, the life of the author plus 50 years. However, for copyright works that have been "industrially applied" the term of copyright is 16 years from when the work was first industrially applied. For most copyright works of this type, industrial application means the making of more than 50 of the articles in which the copyright resides. So, for example, copyright resides in an originally designed and made desk lamp. However, once more than 50 of the desk lamps are made, the duration of copyright reduces to 16 years instead of the life of the creator of the desk lamp plus 50 years. The primary rationale behind this difference is to ensure some consistency with the term of protection afforded by a design registration.

Copyright is peculiar to most other forms of intellectual property in that it protects only against actual copying. In contrast, a patent, for example, is used to protect an invention against another person using that same invention irrespective of whether the person copied the invention or arrived at the invention independently. A patent is therefore considered to be a stronger form of intellectual property protection, although there are often a number of aspects of a patented invention to which copyright can give additional and complementary protection.

The broad range of activities that can constitute infringement of copyright in New Zealand include copying, issuing copies to the public, performing, playing or showing the work in public, broadcasting the work, and making an adaptation of the work. However, the Copyright Act does specify a number of situations where the copying of a copyright work does not amount to infringement. For example, the photocopying of documents for various research or educational purposes may not be a copyright infringement.

For any copyright work in which you believe copyright exists, we recommend marking the work with the copyright symbol, the year date of its creation, and the name of the copyright owner. For example, the bottom of each page of an important company document prepared this year could include the line:

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Any reference to copyright as shown above serves as a warning to others that copyright exists in the work and that the work should not be copied. It can also be important for the award of a full account of damages in the event that a copyright infringement action is taken. Any important document should also include in its introductory passages a statement explicitly referring to the ownership of copyright in the document, and also aspects of confidentiality if appropriate.

Copyright law is riddled with intricacies. We therefore recommend seeking professional advice for an assessment of your commercial activities and any associated copyright law implications. With a full understanding of those activities it can be relatively straightforward to prepare practical protocols which help maximise protection of your intellectual property and minimise the likelihood of your infringement of copyright owned by others.

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

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Improving Chemistry Teaching Through The Study Of Classroom Learning Environments

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Introduction

Science educators talk about the classroom climate, environment, atmosphere and so forth and consider it to be influential on teaching and learning. The educational environment present in a classroom, be it at school or tertiary level is a subtle and complex mixture of such diverse factors as the nature of the physical environment, personalities, technologies and so on. Because of its influence on teaching and learning, educators have attempted to characterise the classroom-learning environment in a number of ways.

The study of learning environments has been of particular interest to science education researchers (e.g., Fraser, Giddings, & McRobbie, 1992; Huffman, Lawrenz, & Minger, 1997; Orion, Hofstein, Tamir, & Giddings, 1997), with much research focus being on the development of survey instruments for measuring a variety of learning environments. The origins of instrument development can be traced to the work of Moos (1979). In his research on human environments, Moos found that three general categories can be used in characterising diverse learning environments. This finding emerged from Moos' work in a variety of environments including hospital wards, school classrooms, prisons, military companies, university residences and work milieus. The three dimensions are: *relationship dimensions* which identify the nature and intensity of personal relationships within the environment and assess the extent to which people are involved in the environment and support and help each other; *personal development* dimensions which assess personal growth and self-enhancement; and *system maintenance and system change* dimensions which involve the extent to which the environment is orderly, clear in expectations, maintains control, and is responsive to change. For nearly 30 years, Moos' work has influenced the development and use of instruments to assess the qualities of the classroom-learning environment from the perspective of the student (Fraser, 1998; Fraser & Walberg, 1991), and the association between learning environment variables and student outcomes has provided a particular focus for the use of these instruments. Instruments have now been developed to cover a wide variety of learning environments; elementary schools using the *My Class Inventory* (MCI) (Fisher & Fraser, 1981), secondary schools using the *Learning Environment Inventory* (LEI) (Fraser, Anderson, & Walberg, 1982), the *Classroom Environment Scale* (CES) (Moos & Trickett, 1974), and the *Individualised Classroom Environment Questionnaire* (ICEQ) (Rentoul & Fraser, 1979), tertiary institutions, using the *College and University Classroom Environment Inventory* (CUCEI) (Fraser, Treagust, & Dennis 1986), and laboratory classes using *Science Laboratory Environment Inventory* (SLEI) (Fraser *et al.*, 1992). Other instruments focus on constructivist classroom environments (Taylor, Fraser, & Fisher, 1997), computer-assisted instruction classrooms (Teh & Fraser, 1994) and teacher interpersonal behaviour in the classroom (Wubbels & Levy, 1993; Fisher & Kent, 1997). Consequently, there is now a variety of well tested and validated survey instruments available to teachers and researchers.

Research into learning environments, has provided strong evidence that improvements in students' learning environments can lead to improved performance in the classroom (Doran, Fraser, & Giddings, 1995; Fraser, 1991, 1994, 1995; Fraser & Fisher, 1983a, 1983b; Fraser, Giddings & McRobbie, 1992). In a meta-analysis which examined 823 classes in eight subject areas and representing the perceptions of 17,805 students in four nations, Haertel, Walberg, and Haertel (1981) found enhanced student achievement in classes which students felt had greater cohesiveness, satisfaction, and goal direction and less disorganisation and friction. Other literature reviews since then have supported the existence of associations between classroom environment variables and student outcomes (Fraser, 1998).

The use of instruments such as questionnaires to investigate learning environments has a number of advantages (Fraser, 1995). The relatively simple data gathering process involved is economical for studies involving a large number of participants. Data gathering using questionnaires requires less expertise and training on the part of the investigator compared with interviewing or classroom observation. In qualitative studies classroom observation is usually carried out over a quite limited time. In contrast, using a questionnaire means that students' perceptions of their learning environments take into account previous experiences as well as their current situation. Quantitative studies also allow for the pooling of data from a large number of students.

Students' perceptions of their learning environments are believed to influence their classroom behaviour and their learning. Hence, knowledge of students' perceptions from questionnaires may prove more informative in determining behaviour than investigations based solely on classroom observation. In addition, the data from questionnaires offers more scope for explaining the variation seen in students' learning than observation.

Learning environment instruments are typically produced in two forms - *actual* and *preferred*. Whereas the actual form asks students to describe their *actual* classroom-learning environment, in the preferred form students are asked to describe their *preferred* or *ideal* learning environment. Research has revealed that there are often differences between students' perceptions of their preferred and actual learning environments. Differences have also been observed between students' and teachers' perceptions of the same learning environment (Fraser, 1995). The wealth of information obtained from a variety of studies suggests that if chemistry educators have a clear understanding of students' preferred learning environments; they can implement changes to achieve more positive environments and thus foster better learning. In this paper, we describe the application of two classroom learning environment instruments, the College and University Environment Inventory (CUCEI) and the Questionnaire on Teacher Interaction (QTI). We describe their use in a second-year chemical technology class along with some work in a cross-cultural setting, and reflect upon the value learning environment instruments have for chemistry teachers.

Learning Environment Instruments Used In Our Classrooms

We have applied two learning environment instruments in our classrooms, the CUCEI and the QTI.

The CUCEI was developed at Curtin University in Western Australia (Fraser *et al.*, 1986; Fraser, Treagust, Williamson, & Tobin, 1987), and the instrument comprises seven scales, Personalisation, Task Orientation, Satisfaction, Involvement, Student Cohesiveness, and Innovation - each scale containing seven questions.

As with other classroom learning environment questionnaires, two forms of the CUCEI, the Student Actual and Student Preferred, have been developed to gather students' perceptions of tertiary classrooms. Although item wording is almost identical in the actual and preferred forms, words such as "The class would" are included in the preferred form to remind students that they are rating their preferred, or ideal classroom, rather than the actual classroom environment. For example, the statement, "New ideas are seldom carried out in this class" in the actual form of the CUCEI is changed in the preferred form to, "New ideas seldom would be carried out in this class".

The Questionnaire on Teacher Interaction (QTI) instrument was based on work by Wubbels, Créton, and Hooymayers (1985) who investigated teacher behaviour in classrooms from a systems perspective. Within the systems perspective on communication, it is assumed that the behaviours of participants mutually influence each other. The behaviour of the teacher is influenced by the behaviour of the students and in turn influences student behaviour. Circular communication processes develop which not only consist of behaviour, but determine behaviour as well. With the systems perspective in mind, Wubbels *et al.* (1985) developed a model to map interpersonal teacher behaviour. This model has been used in The Netherlands to gather student and teacher perceptions of interpersonal teacher behaviour (Wubbels, Brekelmans, & Hooymayers, 1991; Wubbels & Levy, 1993). This model maps interpersonal behaviour with the aid of an *influence* dimension (Dominance, D – Submission, S) and a *proximity* dimension (Cooperation, C – Opposition, O). These dimensions are represented in a coordinate system divided into eight equal sectors and every instance of interactional teacher behaviour can be placed within this system.

Table 1. *Description of Scales and a Sample Item for Each Scale of the CUCEI*

Scale Name	Description of Scale	Sample Item
Student Cohesiveness	Extent to which students know, help and are supportive of one another.	I work well with other class members. (+)
Personalisation	Emphasis on opportunities for individual students to interact with the instructor and on concern for students' welfare.	The instructor goes out of his/her way to help students. (+)
Involvement	Extent to which students participate actively and attentively in class discussions and activities.	The instructor dominates class discussions. (-)
Individualisation	Extent to which students are allowed to make decisions and are treated differently according to ability, interests and rate of working.	Students are allowed to choose activities and how they will work. (+)
Task Orientation	Extent to which class activities are clear and well organised.	Students know exactly what has to be done in our class. (+)
Satisfaction	Extent of enjoyment of class.	Classes are boring. (-)
Innovation	Extent to which the instructor plans new, unusual class activities, teaching techniques and assignments.	New and different ways of teaching are seldom used in this class. (-)

Items designated (+) are scored by allocating 5, 4, 3, 2, 1, respectively, for the responses Almost Always, Often, Sometimes, Seldom, Almost Never. Items designated (-) are scored in the reverse manner. Omitted or invalid responses are given a score of 3.

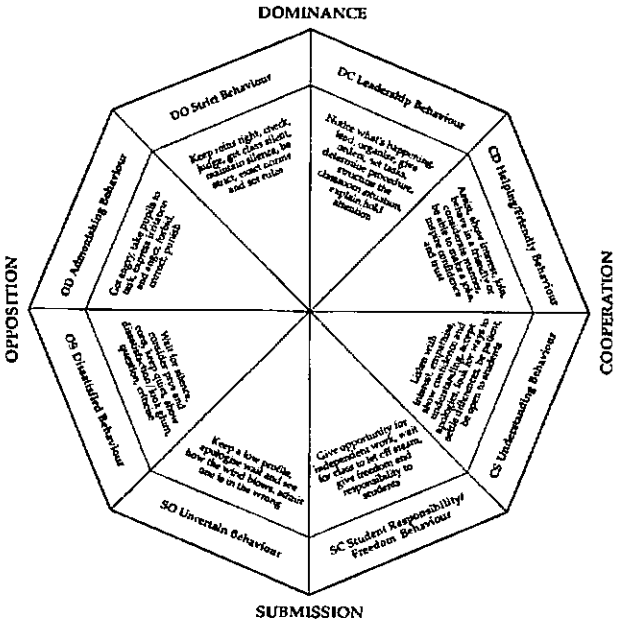

Figure 1. *The model for interpersonal teacher behaviour (After Wubbels, T. (1993). Teacher-student relationships in science and mathematics classes. (What research says to the science and mathematics teacher. No. 11). Perth: Curtin University of Technology).*

The original QTI instrument contained 77 items, however, a shorter 48-item version was developed more recently (Wubbels, 1993; Fisher, Rickards, & Fraser, 1996), and this was the version employed in our classroom studies. This version of the QTI contains eight scales with 6 items per scale. The scales are named Leadership Behaviour, Helping/Friendly Behaviour, Understanding Behaviour, Student Responsibility/Freedom Behaviour, Uncertain Behaviour, Admonishing Behaviour, Dissatisfied Behaviour and Strict Behaviour. Table 2 provides a description of each of these scales and an example item from each scale.

The information obtained by means of the questionnaire includes perceptions of the behaviour of the teacher towards the students as a class, and reflects relatively stable patterns of behaviour over a considerable period. The students' perceptions of their teacher's interpersonal behaviour has been reported to influence learning (Fisher, & Rickards, 1998; Wubbels, 1993). Generally, leadership, understanding, helping/friendly and strict behaviours are positively correlated with student achievement.

One advantage of the QTI is that it can be used to obtain the perceptions of interpersonal behaviour of either students or teachers. When the QTI is administered to both teachers and their students, information is provided about the perceptions of teachers, and the perceptions of their students, of the interpersonal behaviour of that teacher. The wording of the questionnaire is varied slightly when used to obtain teachers' self-perceptions. For example, the question "This teacher talks enthusiastically about his/her subject" in the student version becomes "I talk enthusiastically about my subject" in the teacher self-perception version.

Results from use of the QTI are often depicted graphically on sector profile diagrams based on the model by Wubbels *et al.* (1991); the greater the shading in any sector the more often the teacher behaves that way.

Using the Instruments in the Classroom

We used the CUCEI and QTI instruments in a second-year chemical technology class and the teacher also

Table 2. Description of Scales and Sample Item for Each Scale of the QTI (Adapted from Wubbels, 1993).

Scale Name	Description of Scale (The extent to which the teacher...)	Sample Item
Leadership	...leads, organises, gives orders, determines procedure and structures the classroom situation.	This teacher talks enthusiastically about his/her subject.
Helping/Friendly	...shows interest, behaves in a friendly or considerate manner and inspires confidence and trust.	This teacher helps us with our work.
Understanding	...listens with interest, emphasises, shows confidence and understanding and is open with students.	This teacher trusts us.
Student Responsibility/ Freedom	...gives opportunity for independent work, gives freedom and responsibility to students.	We can decide some things in this teachers class.
Uncertain	...behaves in an uncertain manner and keeps a low profile.	This teacher seems uncertain.
Dissatisfied	...expresses dissatisfaction, looks unhappy, criticises and waits for silence.	This teacher thinks that we cheat.
Admonishing	...gets angry, express irritation and anger, forbids and punishes.	This teacher gets angry unexpectedly.
Strict	...checks, maintains silence and strictly enforces the rules.	This teacher is strict.

Responses are indicated on a five point scale where '0' represents lack of agreement with the proposition, and '4' represents agreement: the higher the score, the more prominent the behaviour.

completed the questionnaire. The Department involved offers two chemical technology courses; one at the second-year level, and one at third year. These courses are taught in a less traditional manner than other courses in the Department with the instruction following a more learner-centred approach, consistent with the features of the *new learning* described in the science education literature (Watts & Gilbert, 1988). The courses combine lectures, tutorial/ workshops, visiting lectures from industry experts and a number of off-site activities. A given module, for example, chemical health and safety, or catalysis, may utilise all of the above teaching strategies.

An intact class completed the actual and preferred versions of the CUCEI instrument and the two versions of the instrument took about 35 minutes to complete. The same students responded to the QTI two weeks after administration of the CUCEI. Students took about 20 minutes to complete this questionnaire. The teacher also responded to the QTI describing his self-perceptions of his interpersonal teaching behaviour. In a second study Fiji in-service chemistry teachers' perceptions of their own teaching style were evaluated using the QTI instrument.

Some Findings From the Use of the CUCEI and QTI Instruments

The results for the CUCEI questionnaire for the second-year chemical technology students are illustrated graphically in Figure 2 where it can be seen that there is least difference between the actual and preferred environments for the two scales Personalisation and Task Orientation. The biggest differences between actual and preferred environments occur for Involvement, Student Cohesiveness, Satisfaction, Innovation, and Individualisation. This course is one that is more varied in teaching style than other courses offered by the Department, and hence these results are somewhat surprising. The results appear to indicate that the students in this class do not see the course as especially innovative, nor do they see the environment as cohesive, or affording them the opportunity for individual learning. It is important to bear in mind that the comparison here, is with the students' perceptions of their preferred learning environment, rather than in comparison with other courses.

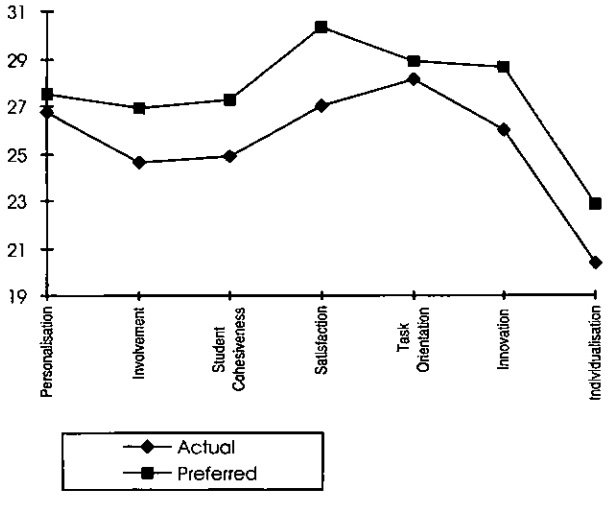

Figure 2. *Differences between students' perceptions of the actual and preferred learning environments for second-year chemical technology students.*

There are a number of factors that may have influenced these results. First, it is important to remember that this is a second-year course, hence, students may not have got to know each other even though they may have done the same first year chemistry courses — class sizes in first-year chemistry are typically large (*ca.* 200). This may mean that student cohesiveness is not as yet fully developed. A similar situation exists for Innovation, Involvement and Individualisation. Students have not yet been fully exposed to all of the teaching strategies. For example, the off-site activities, group-based cases studies, and class presentations of their case studies, were all at a relatively early stage — that is, students had been on one site visit and had not completed, their group-based case study. Hence, it is possible that the difference in actual and preferred environments may be rated differently later in the year after greater exposure to these activities. Fraser *et al.* (1987) stated that the CUCEI instrument "measures distinct but somewhat overlapping aspects of classroom environment" (p. 20). Thus, it is possible that the different instructional approaches that will occur during the year will affect several of the instrument scales as described above, albeit to a different degree, and in the same way may impact upon Satisfaction also.

The differences between the teacher's perceptions and students' perceptions of the actual teaching style in the second-year chemical technology course are illustrated graphically in Figure 3. Fisher *et al.* (1996) point out that for the QTI instrument, the higher the score for a given scale, the more prominent is the behaviour. As mentioned before, generally research has shown that students prefer "stronger leaders, more friendly, and understanding and less uncertain, dissatisfied and admonishing" (Wubbels, 1993, p. 5). A comparison of the teacher's perception of the learning environment achieved in this course with students' perceptions, suggests that they have similar views about most scales with the exception of Strict and Dissatisfied, both of which are perceived more favourably by students. It is possible that a factor in the difference in perceptions is that relatively little assessment had taken place at the time of the survey.

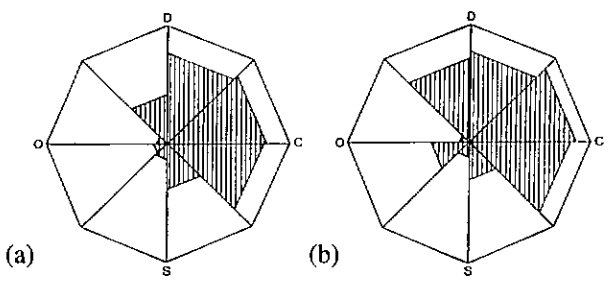

Figure 3. *Graphical representation of perceptions of teaching style for second-year chemical technology students as measured using the QTI instrument.*
(a) teacher's perceptions (b) students' perceptions.

Examination of questions for the QTI instrument suggests that there is some relationship between the scales of this

instrument and the CUCEI instrument. For example, the Helping/Friendly Behaviour, Understanding Behaviour, Admonishing Behaviour and Dissatisfied Behaviour categories are related to Personalisation scale of the CUCEI instrument. The Personalisation scale of the CUCEI instrument is one which shows least variation between students' actual and preferred environments, and this is consistent with the students positive views of the scales in the QTI instrument. The Task Orientation scale of the CUCEI instrument seems related to the Leadership Behaviour scale of the QTI instrument, and again there is a relatively high level of satisfaction for Leadership Behaviour corresponding to a low difference in actual and preferred values for Task Orientation. The low value for Student Responsibility is consistent with the large difference between preferred and actual values of Individualisation and Involvement. There are no obvious grounds for comparison of the remaining scales of the two instruments. Nevertheless, overall the results of the QTI instrument are consistent with those obtained from the CUCEI instrument.

Teachers' perceptions of their own teaching style for secondary school in-service science teachers at a tertiary institution in Fiji are illustrated in Figure 4.

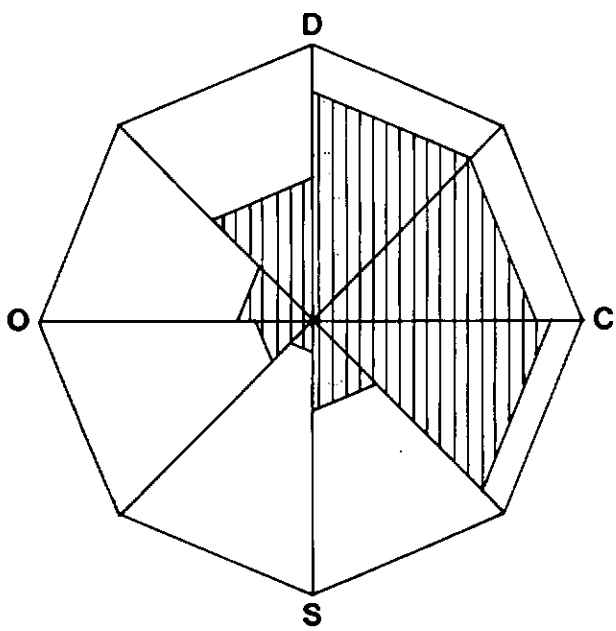

Figure 4. *Sector profile diagram for Fiji in-service secondary school teachers' perceptions of teaching style as measured using the QTI instrument.*

The higher the value for a given scale in the sector profile diagram, the more prominent the behaviour. Wubbels *et al.* (1991) developed eight *typologies of teacher behaviour style* based on data gathered from a large-scale study (Figure 5).

It is interesting to compare the results of the Fiji teachers and New Zealand chemical technology students and their teacher with this typology; interestingly according to Wubbels's *et al.* (1991) typology, all parties considered the teaching style to be *tolerant and authoritative*. That is the teachers that are not critical or admonishing, are friendly and helpful and show understanding, but at the same time show strong leadership.

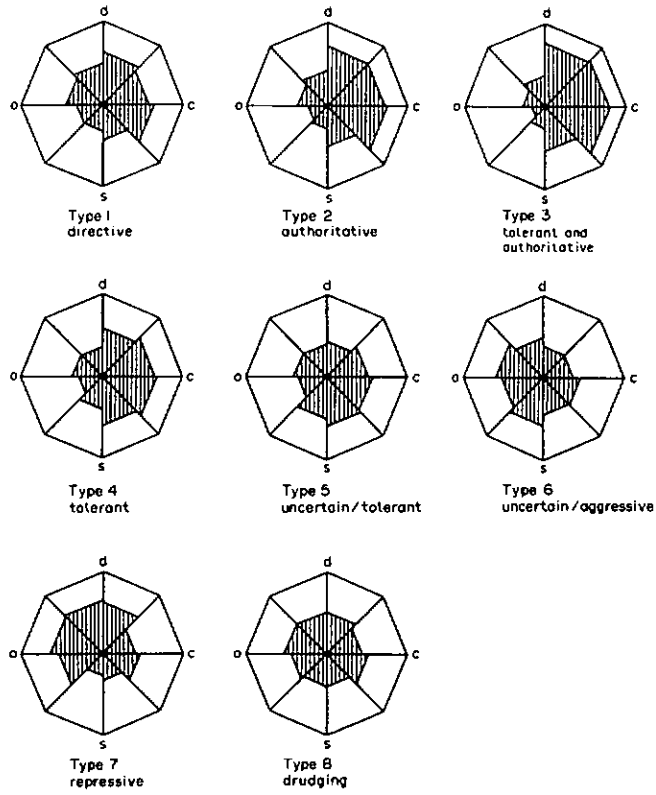

Figure 5. *Typology of teaching styles in the classroom. (After Wubbels, T, Brekelmans, M, and Hooymayers, H. (1991). Interpersonal teacher behaviour in the classroom. In B J Fraser and H Walberg (Eds.). Educational environments: evaluation antecedents and consequences (pp. 141-160). London: Pergamon Press).*

Whilst it would be inappropriate to generalise the findings based on the small sample used here, it is interesting to note that the results are in general agreement with a number of previous naturalistic studies involving classroom observation. For example, Murahlidhar (1989) observed that science teachers' teaching style in Fiji was characterised by a formalistic didatic approach in which the teacher maintained strict control of the classroom and allowed students little freedom. Similar results have been reported for other developing countries (e.g., Vulliamy, 1988).

Some Reflection On the Use of the CUCEI and QTI Instruments

With the increasing scrutiny of teaching practice in universities and other tertiary institutions (Ramsden, 1992; Richardson, 1994), many courses and academic staff are regularly surveyed by Teaching and Learning Development Units (TLDU) or their equivalent. Ostensibly, such evaluations are used to improve teaching, and in theory are used when staff are being considered for promotion. However, although teaching is taken into consideration, in reality staff are mostly promoted on the basis of their research output and ability to secure external funding, particularly for senior level appointments. Hence, there may be relatively little incentive to actually improve teaching.

In light of the above, what place do learning environment instruments have for University teaching staff? We believe they have much to contribute. The most common means of measuring teaching quality in tertiary institutions is via surveys such as course and staff-evaluation questionnaires (Ramsden, 1991, 1992). However, such instruments fail to take into account the complexity of the learning environment. Clarke, Chant, and Dart (1989) point out "that classroom behaviour is complex and perhaps not realistically explicable by strongly parameterised statistical models" (p.1). Hence, learning environment questionnaires like those employed in this study may prove more informative for teachers. For example, the stark differences between students' actual and preferred environments seen in the graphical representations of survey results (see, e.g., Figure 2) may be more effective in reducing complacency about curriculum design, teaching style and appropriateness of teaching strategies. Furthermore, the results obtained from learning environment surveys afford ready identification of areas of greatest student concern, and mean that intervention strategies can be clearly focused. The instruments are simple to administer and data analysis is possible using readily available software.

One factor that may impinge upon the widespread use of learning environment questionnaires is that, as in the case for the tertiary institution involved in this study, Teaching and Learning Development Unit (TLDU) questionnaires are often quite short — typically taking about 10-15 minutes to complete. Students are commonly surveyed for their courses annually with questionnaires administered at the end of the semesters; since the CUCEI & QTI instruments take longer to complete it would be important to overcome student resistance if it is envisaged that the instrument replace the TLDU survey. Perhaps the best approach is to convince the students that this research represents a genuine effort to improve their learning environment. It maybe that it is not necessary to survey students annually, and the use of learning environment instruments administered biennially may in fact be more informative.

It is our belief that chemistry educators should consider the use of learning environment instruments as a possible alternative or addition to teacher and course-evaluation instruments. The learning environment instruments have been validated in a variety of teaching situations, are simple to administer and analyse, and perhaps most importantly, provide detailed, valuable, information about the learning environment achieved. Past research has indicated that frequently there is surprising discrepancy between teachers' and students' perceptions of the learning environment, and students' actual and preferred environments—and this is again borne out by our application of these instruments. Research has also indicated that students' academic performance is enhanced in a favourable learning environment. The use of learning environment instruments enables chemistry teachers to gain understanding of their learning environment and affords them the opportunity of modifying the learning environment to foster more effective learning.

References

Clarke, J A; Chant, D and Dart, B C. (1989, Dec.). *The influence of learning environment on the satisfaction of pre-service teacher education students.* Paper presented at the Annual Conference of the Australian Association for Research in Education, Adelaide, Australia.

Doran, R L; Fraser, B J and Giddings, G J. (1995). Science laboratory skills among grade 9 students in Western Australia. *International Journal of Science Education,* **17** (1), 27-44.

Fisher, D and Fraser, B. (1981). Validity and use of My Class Inventory, *Science Education*, **65**, 145–156.

Fisher, D and Kent, H. (1997, March). *Associations between teacher personality and classroom environment.* Paper presented at the annual meeting of the American Educational Research Association. Chicago, IL, USA.

Fisher, D and Rickards, T. (1998). Associations between teacher-student interpersonal behaviour and student achievement and attitudes in mathematics, *Mathematics Education Research Journal,* **10** (1), 3-15.

Fisher, D; Rickards, T; and Fraser, B. (1996). Assessing teacher-student interpersonal relationships in science classes. *Australian Science Teachers Journal,* **42** (3), 28-33.

Fraser, B J. (1991). Two decades of classroom environment research. In B J Fraser and H Walberg (Eds.). *Educational environments: evaluation antecedents and consequences* (pp. 3-28). London: Pergamon Press.

Fraser, B J. (1994). Research on classroom and school climate. In D. Gabel (Ed.), *Handbook of research on science teaching and learning*, New York: Macmillan.

Fraser, B J. (1995). The learning environment in science classrooms and its effects on learning. In A Hofstein, B-S Eylon and G Giddings (Eds.) *Science education: from theory to practice.* (pp. 331-346). Rheovot: Weizmann Institute of Science.

Fraser, B J. (1998). Science learning environments: Assessment, effects and determinants. In B J Fraser & K Tobin (Eds.), *International handbook of science education* (pp. 527-564). Dordrecht, The Netherlands: Kluwer.

Fraser, B J; Anderson, G J and Walberg, H J. (1982). *Assessment of learning environments: Manual for Learning Environment Inventory (LEI) and My Class Inventory (MCI).* Perth: Western Australian Institute of Technology.
Fraser, B J, and Fisher, D L. (1983a). Student achievement as a function of person-environment fit: a regression surface analysis. *British Journal of Educational Psychology,* **53**, 89-99.

Fraser, B J and Fisher, D L. (1983b). Use of actual and preferred classroom environment scales in person-environment fit research. *Journal of Education Psychology,* **75**, 303-313.

Fraser, B J; Giddings, G J and McRobbie, C J. (1992, March). *Science laboratory classroom environments: a cross-national study.* Paper presented at the annual meeting of the National Association for Research in Science Teaching, Boston.

Fraser, B J; Treagust, D F and Dennis, N C. (1986). Development of an instrument for assessing classroom psychosocial environment in universities and colleges. *Studies in Higher Education,* **11**, 43-54.

Fraser, B J; Treagust, D F; Williamson, J C; and Tobin, K G. (1987). Validation and application of College and University Classroom Environment Inventory (CUCEI). In B J Fraser (Ed.), *The study of learning environments,* **2**, (pp. 17-30). Perth: Curtin University of Technology.

Fraser, B J and Walberg, H J. (Eds.). (1991). *Educational environments: Evaluation, antecedents and consequences.* Oxford, England: Pergamon Press.

Haertel, G D; Walberg, H J and Haertel, E H. (1981). Socio-psychological environments and learning: A quantitative synthesis. *British Educational Research Journal,* **7** (1), 27-36.

Huffman, D; Lawrenz, F and Minger, M. (1997). Within-class analysis of ninth-grade science students' perceptions of the learning environment. *Journal of Research in Science Teaching,* **34** (8), 791-804.

Moos, R H. (1979). *Evaluating educational environments.* London: Jossey-Bass Publishers.

Moos, R H; and Trickett, E J. (1974). *Classroom environment scale manual.* Palo Alto,California, USA: Consulting Psychologists Press.

Muralidhar, S. (1989). An exploratory study of a science curriculum in action: Basic Science in Fiji. Unpublished PhD thesis, Monash University, Melbourne, Australia.

Orion, N; Hofstein, A; Tamir, P and Giddings, G J. (1997). Development and validation of an instrument for assessing the learning environment of outdoor science activities. *Science Education,* **81**, 161-171.

Ramsden, P. (1991). A performance indicator of teaching quality in higher education: the course experience questionnaire. *Studies in Higher Education,* **16** (2), 129-150.

Ramsden, P. (1992). *Learning to teach in higher education.* London: Routledge.

Rentoul, A J and Fraser, B J. (1979). Conceptualisation of enquiry-based or open classroom learning environments. *Journal of Curriculum Studies,* **11** (3), 233-245.

Richardson, J T E. (1994). A British evaluation of the course experience questionnaire. *Studies in Higher Education,* **19** (1), 59-68.

Taylor, P C; Fraser, B J and Fisher, D L. (1997). Monitoring constructivist classroom learning environments. *International Journal of Educational Research,* **27** (4), 293-301.

Teh, G and Fraser, B J. (1994). An evaluation of computer-assisted learning in terms of achievement, attitudes and classroom environment. *Evaluation and Research in Education,* **8**, 147-161.

Vulliamy, G. (1988). Third world schools. In S Briceno and D C Pit (Eds.), New ideas in environmental education (pp. 143-157). London, UK: Croom Helm.

Watts, D M and Gilbert, J K. (1988). The 'new learning': Research, development and reform of school science education. *Studies in Science Education,* **16**, 75-121.

Waltzlawick, P; Beavin, J and Jackson, D. (1967). *The pragmatics of human communication.* New York: Norton.
Wubbels, T. (1993). *Teacher-student relationships in science and mathematics classes.* (What research says to the science and mathematics teacher. No. 11). Perth: Curtin University of Technology.

Wubbels, T; Brekelmans, M and Hooymayers, H. (1991). Interpersonal teacher behaviour in the classroom. In B J Fraser & H Walberg (Eds.). *Educational environments: Evaluation antecedents and consequences* (pp. 141-160). London: Pergamon Press.

Wubbels, T; Créton, H A and Hooymayers, H P. (1985, April). Discipline problems of beginning teachers, interactional teacher behavior mapped out. Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, IL, USA.

Wubbels, T and Levy, J (Eds.). (1993). *Do You Know What You Look Like? Interpersonal Relationships in Education* (1st edition). London, England: The Falmer Press.

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Venue: Boston, USA
Contact: Website: http://www.drugdisc.com

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17th Annual Meeting of the International Society of Chemical Ecology
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1 September 2000
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Email: laura@ilsieurope.be

19-22 November 2000
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Venue: Hyatt Hotel, Auckland, New Zealand
Contact: Corrosion Prevention Centre
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Website: http://mape.waikato.ac.nz/conferences/icamp.shtml

3-8 December 2000
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9-13 December 2000
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Venue: Hilton Waikoloa Village, Waikoloa, Hawaii
Contact: William H Daly, Department of Chemistry
Louisiana State University, USA
Email: bill.daly@chem.lsu.edu

14-19 December 2000
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Venue: Waikiki, Honolulu, Hawaii
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19-20 January 2001
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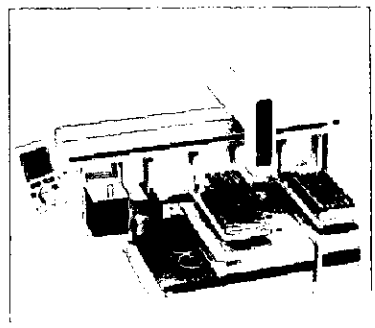

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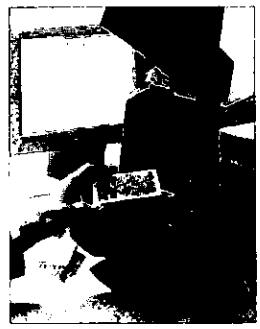

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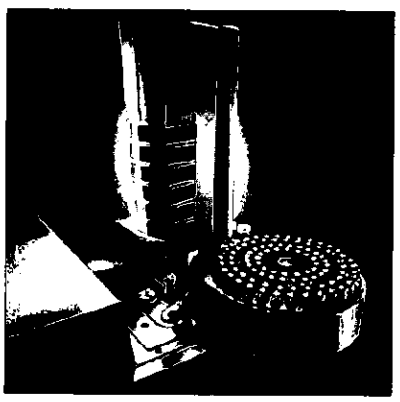
Ai Scientific introduces the Varian CP-8400 AutoSampler, which uses dual and duplicate injection technologies to achieve improved conformational analysis and dramatically improved sample throughput. The new, 100-sample CP-8400 AutoSampler can be used in any application requiring liquid injections into a GC injector and is designed to satisfy the needs of technicians in environmental, toxicology, and petrochemical laboratories or any other high-throughput facilities requiring round-the-clock operation. Users can inject two identical samples or two different samples in two injectors by simply

assigning injector function from a Star Workstation or GC keypad. The automatic positioning of injectors also improves reliability - eliminating downtime associated with manual adjustment of injectors and maintenance necessitated by faulty injector positioning.



The CP-8400 AutoSampler uses 100 x 2 mL vials to further improve throughput, and gives users the option to add an internal standard to individual injections without adding directly to the sample vial, reducing the risk of contamination from dirty samples over numerous sample analyses. The CP-8400 can also be configured with the Saturn 2000 Ion Trap GC/MS with Rapid-MS technology for the ultimate in GC/MS productivity and unattended operation.

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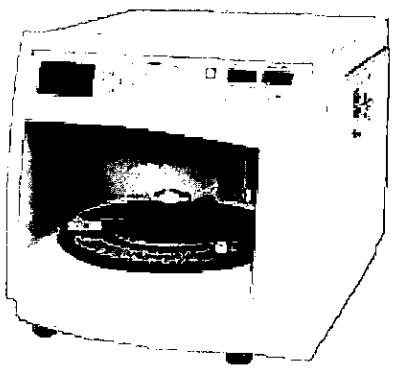
NEW AUTOSAMPLER PROVIDES STRONG AUTOMATION SUPPORT FOR HPLC LABORATORIES



Ai Scientific is pleased to introduce the Dionex ASI-100T Automated Sample Injector to its Summit HPLC product line. Like the ASI-100, the ASI-100T is a highly flexible autosampler for automating HPLC methods. The ASI-100T provides Peltier sample tray heating and cooling for temperature control from 4 to 45 °C with a maximum cooling capacity of -18 °C from ambient. The stainless steel flow path makes the ASI-100T compatible with normal phase and reverse phase solvents. The ASI-100T incorporates an in-line split-loop injection system where the needle is an integral part of the sample loop, providing variable injection volumes with the precision of conventional fixed-loop autosamplers. With integrated safety features such as automatic vial recognition and electronic needle resistance shut down, the ASI-100T is ideally suited for unattended operation. The ASI-100T can accommodate a wide variety of sample vial types and can hold sixty-three (63) 4-mL vials, one hundred seventeen (117) 2-mL vials or one hundred ninety two (192) 1.2-mL vials. The ASI-100T can be programmed either through its front panel or through CHROMELEON 6.1 Chromatography Data Management Software. In addition to injecting samples, the ASI-100T can also perform sample preparation functions such as sample dilution, standards preparation and reagent addition(s).

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POWERFUL DATA HANDLING FOR CHROMATOGRAPHY

The Dionex CHROMELEON Chromatography Information Management System from Ai Scientific provides data acquisition and instrument control in both stand-alone workstation and Client/Server implementations. CHROMELEON lets users quickly collate data based on test results as well as sample entries, and automatically generates custom reports. Sophisticated queries of the integrated relational database can be composed using any of 150 result variables; users need

not decide in advance which data to store. Queries can even include user-defined variables, as well as events automatically recorded in audit trails. Queries can be created *ad hoc*, or saved and re-run whenever needed. Reports can include custom calculations, result charts, and statistical analyses, in addition to chromatographic tables and plots. Together, the search and reporting capabilities are powerful tools for analysing data trends and assessing system performance. For example, a pharmaceutical quality control analyst can retrieve all validation samples from the "last three weeks" or the "last two years" in just a few seconds, and compare the results in a control chart. CHROMELEON offers a broad range of other capabilities, including multi-vendor instrument support, customisable user interfaces, and electronic signature support.

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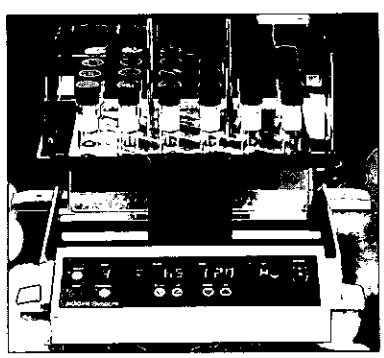

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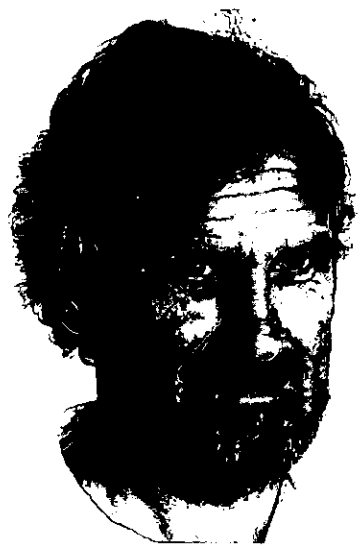
OBITUARY

GORDON ALLEN RODLEY

1937 - 2000

Gordon Rodley was a consummate scientist with a deep social conscience, and his death this year is a great loss to the scientific community. Those who knew and worked with Gordon have had their lives greatly enriched by their relationship with him.

Gordon was born in Nelson in 1937, went to Hampden Street Primary School, followed by secondary education at Nelson College. In 1955 Gordon enrolled at Canterbury University College, and graduated BSc in 1957 and MSc (First Class) in chemistry in 1959, with a thesis on phosphorus sulfides. In the first half of 1960 Gordon was a Temporary Lecturer and before going to London to University College, London as a New Zealand Ramsay Fellow and a Commonwealth Scholar he and his wife Margaret married. He worked under Professor Sir Ronald Nyholm for his PhD particularly on the infra-red spectra of transition metal complexes. Gordon graduated PhD in 1963 and returned to a lectureship in the Chemistry Department of the now University of Canterbury. Margaret and Gordon had three children, Gillian, Philip and Clare. Gordon was a keen sportsman and tennis player and played as often as time would allow. Gordon retired early in 1987 after 23 years. Gordon was a Fellow of the New Zealand Institute of Chemistry. He reached the rank of Reader, and during his University life was Dean of Science 1976-78, and a University representative on the Board of Governors of Avonside Girls' High School, where he was chairperson for a period. Gordon, among others, was instrumental in initiating a series of University Lunch Time Lectures, and study groups. He was also a member of a University committee on the role of the professoriate. Around this time Gordon chose to drop back to Senior Lecturer as a personal protest against a rigid hierarchical system. Gordon loved mixing within the University and frequently visited other departments at coffee times. Gordon left the University in 1987, not to retire from science, but to be more free to expand his wide interests in science and humanitarian issues. From 1987 until his death this year Gordon continued to work voluntarily in science and social issues based at times at the University of Sydney, the University of Hyderabad, and at home in the Marlborough Sounds, where he and two other retired academics set up a study group called The Sounding Board. Gordon died on February 7, 2000, after a very painful battle with cancer over four months.



These are the facts of Gordon Rodley, but there was also a great deal of substance to Gordon; the person, the scientist, the teacher, and the humanitarian. Gordon was a gentle, unassuming man, but yet determined. He was an exciting thinker, and yet a private person, deflecting from himself. On the other hand he would be prominent in working and putting the case for others, especially those who felt powerless in a particular situation.

Though Gordon was an academic chemist, he is better described as a scientist, who ranged widely over interdisciplinary boundaries, embracing chemistry, physics, biology, mathematics, history, engineering, environmental science, social policy, theology and economics. He was able to work in a number of disciplines at the same time and enthuse and pull other scientists into his work, as evidenced by the wide number of collaborators/joint authors on his publications. Even during his PhD he worked and published with others at Imperial College. He was not only a research scientist but also a distinguished scholar. Gordon worked carefully, with attention to detail, and with very high standards of scholarship. He published over 80 papers, reviews and books and his work can be grouped under the headings: general inorganic coordination chemistry and structure involving metal porphyrin, phosphine and arsine and their oxide and sulfide complexes; the structure of DNA; the nature of the bonding of dioxygen to heme; chemical oscillation reactions and their applications to the concept of order; and infra-red and Raman spectra of coordination compounds. Gordon also published on radiochemical dating of the Dead Sea scrolls, science and Christianity, nuclear disarmament, origins of life, and the marketplace and its impact on people. Just before his death he had submitted papers on quantum theory and nuclear particles.

The Chemistry Department at the University of Canterbury has had its fair share of exciting discoveries, two of which can be attributed to Gordon. The first, in the 1970s, was associated with his and colleagues' work on the nature of the bonding of dioxygen to the heme nucleus in myoglobin and haemoglobin, and even more exciting was his work,

again with colleagues, on the structure of DNA in the late 1970s and early 1980s. The interest in dioxygen bonding was whether the Fe-O-O bond system was linear or bent. Gordon himself produced the first crystals that enabled the X-ray structural analysis to be carried out [1] and this led to development of models for the heme component of oxymyoglobin [2]. The results indicated that the Fe-O-O angle was less than 180°. Gordon's work on the structure of DNA was extensive and involved a number of colleagues and disciplines. The work started with questioning the established structure's ability to explain certain facts, for example the rapidity with which the two strands separated. A new model was developed where the two strands lay side by side (SBS model) rather than entwined. Gordon spent many hours building a three-dimensional model to demonstrate it was possible and could be used to explain many of the facts of DNA [3,4]. He demonstrated that the SBS model would also explain the famous X-ray structural photograph of DNA with the characteristic "cross" diffraction pattern. The Chemistry Department at the time experienced an excitement that could have been akin to the excitement when Watson and Crick built their original entwined model in 1953. The work led to an unfortunate conflict with proponents of the established model, and Gordon experienced some disillusionment over the closed minds of some scientists. In *"The Double Helix Revisited"* Gordon and D C Reanney[5] wrote:

> If science is to remain healthy then it is essential that all theories remain open to honest scrutiny. ... The more deeply embedded a theory is in the thinking of scientists, the more necessary it is that the concept be constantly re-examined to see that it still fits the available facts. This is a major reason why the SBS model has been put forward. In a sense it does not matter whether it is right or wrong. To most scientists the double helix has become a conditioned reflex, and all good biologists know that conditioned reflexes can be dangerously unadaptive in a changing world.

Concurrently with Gordon's work on DNA another group in India, independently, was looking at a similar SBS model, and this led Gordon to his collaborative work with the Indian group. A further significant area of research for Gordon was on chemical oscillation reactions, work that he also began in the 1970s, and again this led to collaboration work with Indians and across interdisciplinary boundaries [6]. A recent paper on order in biology displays the breadth of Gordon's interest, and his ability to interrelate different aspects of science [7].

The bulk of Gordon's research in pure chemistry was on the coordination chemistry of ligandssuch as R_3P, R_3As, R_3PO, R_3AsO, R_3PS, and R_3AsS [8] and porphyrins [9]. This work consisted of careful preparative and structural studies.

Gordon's scientific research displayed courage in taking risks in new ventures that did not keep to the usual research avenues. His research could never be called mundane, and much of his work has challenged accepted concepts. It is sad that Gordon felt he had to leave his University tenure in order to find the freedom he wanted to pursue his interests in the widest possible way.

As the complete university person Gordon took a full part in the teaching of chemistry in the Department. His teaching and lectures were liked by the students, undergraduate, graduate and research. He used a careful but challenging lecturing style. He was ready to explore different ways of teaching, and was always happy to receive assessment of his endeavours. Gordon felt passionately that chemistry was a unified subject, and for example advocated that one lecturer could better deliver an integrated first year university chemistry course rather than three or four. As well as supervising a number of BSc (Hons) research projects, and MSc and PhD students, Gordon was also particularly helpful to students struggling with chemistry, and also in making chemistry accessible to the public. He took part in continuing education classes.

Finally there is Gordon the committed humanitarian, in which he became especially deeply involved after his retirement. Gordon's humanity was grounded in a strong spirituality, based on Christianity. He had been very involved in the Church, as a Crusader member as a student, an active church member, a bible class leader, and a member of the Vestry. Gordon was very interested in the interface of science and Christianity and wrote on the subject. Gordon was concerned over the impact of powerful organisations on people, especially the effect of commercialism and competitiveness on freedom, something which he deeply regretted was happening within the Universities. At the University of Sydney, over 8 years, Gordon was involved in a number of Departments including the Centre for Peace and Conflict Studies, and he was editor and co-editor of three books, on nuclear disarmament [10], and the human cost of economic and management policies and practices [11-12]. At the same time he was a both a scientific expert, and hands-on support person, for a group of citizens in Sydney who were combating the building of an exhaust stack in their locality. In this effort Gordon reached out to colleagues in Manchester, Arizona, and New Zealand for help, in his usual way of involving others. Just before Gordon died the group achieved a significant victory in their battle. My guess is this gave him great satisfaction.

It is hardly possible to present a complete and satisfying picture of Gordon Rodley, but to the many people; family, friends, colleagues, students, and numerous others, Gordon has left a lasting pleasant and challenging impression. New Zealand and the scientific community have lost a true scientist, an eminent scholar and an exciting inquiring intellect. The days of walking down the corridor to talk with Gordon are gone but the memory and effect remain.

References

1. Rodley, G A and Robinson, W T. (1972). Structure of a monomeric oxygen-carrying complex; *Nature,* **235**, 438-9.

2. Collman, J P; Gagne, R R; Reed, C A; Robinson, W T and Rodley, G A. (1974). Structure of an iron(II) dioxygen complex: model for oxygen carrying hemeproteins; *Proc. Nat. Acad. Sci. USA*, **71**, 1326-9.

3. Rodley, G A; Scobie, R S; Bates, R H T and Lewitt, R M. (1976). A possible conformation for double-stranded polynucleotides; *Proc. Nat. Acad. Sci. USA*, **73**, 2959-63.

4. Bates, R H T; Lewitt, R M; Rowe, C H; Day, J P and Rodley, G A. (1977). On the structure of DNA; *J. Royal Soc. N. Z.*, **7**, 273-301.

5. Rodley, G A & Reanney, D C. (1977). *The Double Helix Revisited;* Univ. Canterbury, Christchurch.

6. Balasubramanian, D and Rodley, G A. (1991). Incorporation of a chemical oscillator into a liquid-crystal system; *J. Phys. Chem.*, **95**, 5147-9, and 9614.

7. Rodley, G A. (1997). The development of order in biology, in *The Web of Life,* G Padmanaban, M Biswas, M S Shada & S Vishveshwara, Harwood Academic Publishers, Amsterdam, 54-81.

8. Brodie, A M; Hunter, S H; Rodley, G A and Wilkins, C J. (1968). Cobalt(II) complexes with trimethylphosphine oxide and trimethylphosphine sulfide; *J. Chem. Soc. A.* , 2039-42.

9. Ong Chin, Choon; McKee, V and Rodley, G A. (1988). The crystal and molecular structure of magnesium tetraphenylphorphyrin complexes involving water and methanol coordination. *Inorg. Chim. Acta*, **151**, 233-6.

10. G A odley, G A and Rees, S. (Eds.) *Beyond Deterrence,* Centre for Peace and Conflict Studies, Sydney, 1989.

11. Rees, S; Rodley, G A and Stilwell, F. (Eds.) *Beyond The Market.* Centre for Peace and Conflict Studies, Sydney, 1993.

12. Rees, S and Rodley, G A. (Eds.) *The Human Cost of Materialism;* Centre for Peace and Conflict Studies, Sydney, 1995.

Jack Fergusson
Chemistry Department
University of Canterbury

OBITUARY

ARTHUR PLEASANT OLIVER

1920-2000

Arthur was born in Wellington in 1920, the oldest of the three children of Percy and Ruby Oliver.

He went to Northland School, then to Wellington College and Victoria University. In the mid-1930s he had joined the Department of Agriculture as a clerical cadet, but not too long afterwards transfered to the Chemistry Division of the DSIR. He "matriculated", meaning that the University of New Zealand recognised him as a suitable person to admit, in 1917. At that time Victoria was a College, and had only part-time courses.

Following his graduation as a BSc in 1941 he served in the Royal New Zealand Navy from 1940 to 1944 in the development of ship and shore-based radar. This included sailing the Pacific Ocean in HMNZS Achilles. His later habit of always having polished shoes, even when employed at the brewery was attributed by his colleagues to his navy training. He attained the rank of Petty Officer, but was discharged early so that he could work for Greemvell and Son Ltd, Auckland (after John Offensoerger left).

This firm made a vitamin concentrate from fish oil which was desperately wanted by the U.K. government. From there he moved to the Fats Research Laboratory, and around 1946/47 to the toxicology section of the DSIR Chemistry Laboratory. While there Arthur resumed his studies, graduating MSc with Honours in 1949.

By 1954 his reputation was such that he was head-hunted by the General Manager of New Zealand Breweries, Bernard O'Connell (Later Sir Bernard) to devise a system to manage the technical aspects of production throughout the company. He accepted the task of converting the front of the Red Band Brewery in Wellington into a modern laboratory; he employed staff and devised the quality control systems that were so badly needed. Branch breweries of the company also benefited from this work. The Central Laboratory was heavily involved in the development of continuous fermentation techniques, and the installation of modern equipment to use these methods. Achievements like this at the age of 34 were not common among chemists.

He took a particular interest in many brewing fields, such as the agronomy, chemistry, and grading of hops; the vitamin requirements of yeasts, the stability of packaging beers; and improvements in water filtration.

While with New Zealand Breweries, Arthur read extensively, and had an international reputation for his knowledge of brewing technology among his contacts in the USA, Canada, Germany, Belgium, Ireland, Australia and the United Kingdom. His interests were not confined to chemistry and he had a wide knowledge of New Zealand flora, especially ferns and of the geology of the country.

He used this knowledge and his management abilities in many other activities. He helped to develop food technology courses at Massey University, and represented the NZ Manufacturers' Federation on the Technician Certification Authority in aspects of science and geology.

As a "people person" he took to heart any personal problems his staff had, and he and his wife Marie did what they could to solve them. Many will remember this aspect of his character with gratitude.

As a member of the New Zealand Institute of Chemistry I know he was active in the affairs of the Wellington Branch, and must have held offices from time to time, but records have been scattered. The Institute honoured him with a Fellowship in 1977. The year after this he retired.

He is survived by his wife Marie, five children, fourteen grandchildren and two great-grandchildren.

C Lester H Stonyer

(Much of the above information was contributed by his friend and co-worker Bob Brightwell,and his son Peter.)

NEW ZEALAND INSTITUTE OF CHEMISTRY

BRANCH NEWS

AUCKLAND

On the evening of 29th June the Auckland Branch held a joint meeting with four other societies, The Auckland Museum Institute (Auckland Branch of RSNZ), Auckland Science Teachers' Association, Society of Chemical Engineers, and Engineers for Social Responsibility. The speaker was Professor Terry Collins of Carnegie Mellon University, Pittsburg, USA, and his title "Green Chemistry, Sustaining a High Technology Civilisation". The topic was one of interest to a much wider audience than just chemists with its environmental implications. The audience was considerably larger than for just an NZIC meeting. Terry was on his way to SCICON 2000 and we took advantage of his visit to Auckland.

WAIKATO

The annual NZIC Waikato Analytical Chemistry Competition was held at the University of Waikato Wednesday 21 June. This activity was sponsored by Hill Laboratories who provided prizes, and the Department of Chemistry at Waikato who provided staff and facilities. The Waikato Branch of NZIC provided financial support to provide lunch for entrants and staff. There was high interest with 23 schools and a total of 92 students entered. The task was to analyse a sample of $ZnSO_4.xH_2O$ for sulfate by gravimetric means and for zinc by EDTA titration Results for x varied, from negative values to 111, but over half the entrants were close to the nominal value of 7 (actually 6.7 in the sample provided). Given the limited time for analysis and unfamiliarity with the techniques the results were impressive; comparable to that expected of first-year university students making judging difficult. Nonetheless, the following prizes were awarded. First prize went to Hamilton Girls High Schoool (Sonya Gratton, Leh Wei Ning, Michelle Walker and Crystal Pennell. Second went to Matamata College (Michelle Davy, Niaomi Bluett, Daniel Joe and Justin Earl). Third went to Hillcrest High School (Sarah Devoy, Megan Vant, Ritwik Kejriwal and Tim Hodgson). Fourth went to St Johns' College (Liam McCaffrey, Adam Nooyen, David Scurmann and Matthew Stephens. In addition the judges highly commended the teams from Te Awamutu College, Forest View High School and Tauranga Boys Collge. Overall the competition enables keen budding 7th form chemists to spend a day at the University laboratories and to mix with peers from schools in the region. It also provided chemistry teachers a chance to meet other local teachers and University staff.

Upcoming events include a talk and dramatic fireworks display by Dr Martin Van Tiel and a seminar by Len Lindoy the RSC Lecturer for 2000. Other planned events include a talk by Tony Sims a Patent Attorney from James & Wells Patent Attorneys and later in the year we will be putting on our Chem-Quiz chemistry mastermind contest

Richard Coll
Branch President

MANAWATU

Snippets

* Dr Richard Haverkamp of Massey University visited SINTEF (The Foundation for Scientific and Industrial Research at the Norwegian Institute of Technology) in Norway from 25 June - 25 July. He is collaborating with a group there on research into molten salt electrolysis reactions in the aluminium smelting industry. He also be visited the research divisions of a company in Germany and another in Switzerland for a week after his time in Norway.

* The NZIC (in association with BIOTENZ, NZSBMB and NZBA) Conference 2001" Molecules for Life" now has a website kindly sponsored by HortResearch.Visit online and preregister your interest at: www.hort.cri.nz/nzic

Massey University News

The redevelopment of the chemistry laboratories in Tower A at Massey University is going well. Stage 1 (the ground floor) is complete and the other three floors have been vacated and everything totally stripped out. For Semester 2 our first year laboratory classes will be located in the biochemistry teaching complex and advanced laboratories in the Ag/Hort Building. This will be a little inconvenient but the pain should be worthwhile. The new teaching and research laboratories will be ready for the start of Semester 1 next year. Chemistry staff have been very busy over the mid-year break with various activites such as The Siemens Science Experience. This was a programme which allowed students (mainly fifth formers) from a range of schools including South Island ones to spend some days at Massey University participating in various activities. In chemistry out an experiment making a copper/mercury/iodide thermochromic material (i.e. one that changes colour when you heat it) in the laboratory. Josine van Melsem, Andrew Brodie and Jo Hislop were kept very busy making sure the students did not burn or otherwise damage themselves over a couple of hours. Patricia Sheilds, with advice from Graham Freeman, had put the experiment together so that everything worked well. We had prizes for the the students who most accurately determined the temperature at which the material changed colour and the group that was the tidiest. The transition temperature was determined by laminating a small sample of the copper/mercury/iodide compound bewteen two plastic sheets and heating it in water. There was also a prize for the person who made the most artistic design from the thermochromic compound when it was laminated in this fashion. All the students enjoyed themselves and hopefully took away the message that science is fun as well as challenging.

Visit of Waiopehu College

Around 30 students from the sixth form at Waiopehu College came to visit Chemistry on 29 June. We split them into three groups so they could move around and visit the NMR Laboratory with Pat Edwards, the X-ray Crystallography Laboratory with Geoff Jameson and a Synthetic Chemistry Laboratory with Steven Kennedy. It was good to see one of our graduates Craig Steed, now a teacher, enthusing this group and maybe we will see some of them here majoring in chemistry in 2002.

SCICON Conference

Tony Wright was heavily involved with the organisation and the following people organised workshops or gave lectures: Carol Taylor, Slavica Pavlinic, Judy Edwards, Indira Chandrasen, David Officer, Eric Ainscough, Simon Hall, Michael Liu. All these activities were very well received and help to raise the profile of chemistry in the community.

Conference 2001 News

The NZIC Conference for 2001 (being organised by the Manawatu branch in association with BIOTENZ, NZSBMB and NZBA) now has a number themes finalised and a dedicated organising committee. It has been decided to hold the conference in Hawkes Bay at Napier's War Memorial Centre commencing with a mixer on the evening of the Tuesday 4 December and finishing on Friday 7 December. There will be an opportunity to "taste the fruits" of the region during the conference, as well as specialist meetings, poster sessions and the traditional NZIC student paper competition. Visit the conference website for further information (website updated as details are finalised by the organising committee): www.hort.cri.nz/nzic

Jeremy Dombroski

WELLINGTON

The failure to collect and forward the news from the Wellington Branch during the first half of 2000 has been a cause for concern and it is hoped that the present summary will correct the previous omissions. The attendance at Branch meetings seems to have increased this year and the monthly gatherings from March onwards have been particularly appreciated - a thank you to the Branch Committee for providing the interesting programme.

In March the activities for the year were started in good chemical vein by way of a pilgrimage to clarify the finer points of one of the world's oldest chemical processes, that of beer brewing. The meeting was held at the new Copperhead Bar and Cafe on the corner of Willis and Dixon Streets, Wellington. Rodney Burke, the head brewer of Copperhead (formerly of the Loaded Hog), gave a 30 minute discourse on the different aspects of brewing. For example, the importance of water hardness in brewing ale rather than a lager and the selection of a brew temperature to match the strains of yeast were addressed. The talk culminated with the 35+ members in attendance tasting four of the different beers brewed by Copperhead. A fine evening was had by all, especially by those student members who stayed on to carry out their own research into the field! April saw the Presidential address to the Branch, and Professor Keith Hunter's visit and lecture on "Ocean Disposal of Liquid Carbon Dioxide" was appreciated by a good attendance and a lengthy question period afterwards; the only dismaying feature was the non-appearance of a particular committee member at the ensuing dinner; he got lost!

The Wellington Branch retains its annual Mellor Lecture and this year it was given by Dr Sally Brooker (University of Otago) for the May meeting. Despite the question mark in her title "Macrocycles, ladders and grids: potential nanocomponents?" there was no ambiguity in the enthusiastic way in which she led her audience through the exciting possibilities offered by modern coordination chemistry in the information age. In particular, she demonstrated how the coupled magnetic properties of metal atoms in some rather sophisticated complexes could be harnessed to provide logic gates in the ultra-small computing devices of the future. Following the lecture we travelled rapidly in time from the frontiers of the 21st century to the Dark Ages with a celebratory dinner at the Ghengis Khan Restaurant. In June Dr Barry Dent of Dent

Global Ltd provided what proved to be a particularly worthwhile evening for the large number of members in attendance by way of a discourse on his experiences and successes in establishing a new chemical company in Wellington. Whether the answer to the lecture title "How To Make Money Out Of Chemistry" was satisfied quantitatively remains unclear at least to this member!

The year has not been without its difficulties and while Dr Ted Harvey (past Hon. General Secretary - but a now revitalised Branch committee member) was hospitalised in March and after the necessary surgery is back (almost) to his traditional self. The writer, too, was hospitalised in January and was treated in Wellington Public Hospital no differently than was the Hon. Mrs Shipley more recently.

Victoria University

The beginning of the millennium saw much change in Chemistry at Victoria University. A review and repositioning of the School of Chemical and Physical Sciences concluded that the cost savings required in meeting allocated targets could only be met with the loss of staff. Dr Garry Burns is in the process of reducing his time to zero although he will continue to work here on externally funded research programmes. Dr Rod Tilbury took early retirement, continued for trimester 1 on a specific teaching contract but left Wellington for his native Western Australia towards the end of June. In the physics area, Drs Warwick Darcey and Peter Johnston have accepted the early retirement package. In addition, the technical staff suffered major job reorganisation; those providing computing support have left, but are to be replaced at least in part, while in Chemistry Mrs Izabela Pommer leaves in October and Mr Rhys Batchelor has taken a half-time post and registered for conjoint part-time PhD study with Dr John Hoberg.

Industrial Research Ltd, Gracefield Campus

Dr Neil Milestone now leads the renamed Applied Inorganic Chemistry Team which is a part of the Advanced Manufacturing Division. Moreover, Neil has just been re-elected to the Royal Society Council (NZIC nomination) and was awarded a DSc by VUW in April for his research in silicate science in the fields of cement chemistry and zeolites. He recently attended the farewell workshop at the University of Illinois honouring Professor Francis Young, a New Zealander who has been leading the Centre for Advanced Building Materials in the USA for the last 11 years and is retiring to New Zealand.

Dr Reiner Goguel who brought his analytical skills honed in geochemistry to cement chemistry and answered many of the problems of aggregate pore solution interactions is retired at the end of June. Reiner presented some of this work at a conference in Quebec in June. Chris Harris, a young chemical engineer, has joined the Team from Britain to carry on with the work of Steve Jones on the hydrogenation of tallow. Dr Graeme Gainsford is part of a PGSF team looking at added value products based on terpenes and also supports an IRL project utilising X-ray crystallography. He has also been keeping the local travel agents happy with trips to the Advanced Photon Source, Argonne (near Chicago), as part of teams lead by Professor Veronica James studying the low angle scattering of hair samples. He is also a consultant in studies on the basis of the "strength" of cellulose-based fibres, a Marsden funded project lead by Dr Roger Newman with postdoctoral Tony Davidson from Otago.

Dr Cees Lensink is always on the go with FoRST work — homogeneous catalysis with early transition metal complexes, alpha-pinene conversion in collaboration, metal complex behaviour, and catalysis in supercritical carbon dioxide with David Grant-Taylor. NSOF work involves collaborations with Dr Andrew Falshaw and Joanne Hart of the Carbohydrate team at IRL (Asymmetric catalysis with carbohydrate-based ligands). This study also involves collaboration with Dr John Hoberg at Victoria University. Gabriel Ossenkamp, a PhD student with Drs Tim Kemmitt (IRL) and Jim Johnston (VUW) presented a poster entitled "Hydrophobic Functionalisation of Silica Surfaces" at the NZIC conference for which he was awarded a student prize.

The functional materials group lead by Dr Tim Kemmitt continues to make progress in developing new technology targeted at industrial partners. Photocatalysis and titanium dioxide remains a major research theme. Exchange visits with Drs Hicham Idriss (University of Auckland), and Jim McQuillan (University of Otago) by himself and Najeh Al-Salim have laid the basis for collaborations within New Zealand. New initiatives in photocatalytic hydrogen production will occupy the group's interest in the coming years. Formation of volatile complexes for MOCVD applications has also shown exciting progress. Fruitful collaborations with research partners in Moscow have followed Tim's month-long visit last September. Ann Mills continues the 'chemicals from minerals' theme with the development of some new routes to manganese compounds. This extends the silicon and titanium chemistry which laid the initial foundations for the functional materials projects.

On the electroceramics front, collaborations with Dr Marc Daglish and Freddie Lecarpentier of the ceramics team have pinpointed the most effective system for making PZT thin films, and continuing collaborations with MTEC in Bangkok is advancing the thick film technology. A new collaboration within IRL is with Dr Tony Bittar in the area of solar and daylight resources. It involves the formation of some specialist thin film materials.

Dr Steve Bagshaw continues his collaboration with Dr Alan Hayman at the University of Otago. They have managed to use some bi-functional surfactants to template difficult-to-prepare microporous silicates. Steve is away on a Japanese STA fellowship working at NIMC, Tsukuba, from June 1. Dr Colin Downes continues to run catalyst reactors containing zeolites at pressures up to 40 MPa for the synthesis of organic chemicals from methanol and other feedstocks. The use of high pressure improves the yields of desired products and removes "coke" which would otherwise cause catalyst deactivation. Colin still also works with Crop & Food Research scientists, utilising his microcalorimetry skills to measure the responses of various bugs to different atmospheres and temperatures;

the objective is to find benign alternatives to methyl bromide fumigation. With Dr Gavin Hedwig (Massey University) he has been looking at peptides and amino acids in solution at high temperatures, which is of interest to those studying the origins of life.

Brian Halton

OTAGO

Congratulations to Dr Sally Brooker (Chemistry Department, University of Otago) who has been awarded the prestigious Easterfield medal in recognition of the quality and originality of her research work. Sally has just left for a sabbatical visit to USA and Europe.

The Branch July visit to Speight's brewery in Dunedin proved very successful. A group of about a dozen members toured the facility and imbibed in the products at the end of the evening.

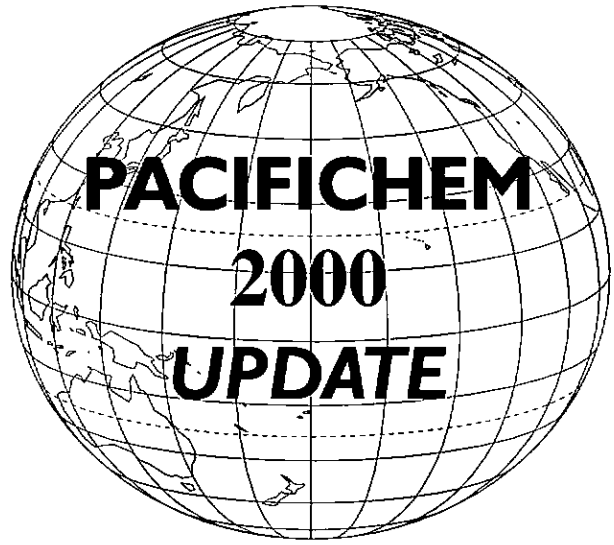
The International Science Festival, running the first two weeks of July in Dunedin, has proved very popular. The Sustainable Energy Forum (8-9 July) discussed renewable energy resources and more efficient use of energy. The forum was well attended and a number of NZIC scientists presented material, Dr Jim McQuillan gave an overview of photovoltaic cells and Dr Keith Gordon discussed the use of light-emitting polymers as efficient back lighting sources.

The chemistry magic show (5 July) did what few chemistry lectures do nowadays. Firstly it had a 360 seat lecture theatre packed to capacity, with 100 people still trying to get in and secondly, when volunteers were requested almost 100 hands went up. Lisa Bucke and Keith Gordon conducted the show ably assisted by Russell Frew. After many bangs, several colour changes and a floor covered in fragments of liquid nitrogen-frozen banana and savaloy, about 50 - 60 members of the audience went on to tour the Chemistry Department.

Congratulations to two of the postgraduate student members of the Branch who received Travel Awards. Joy Kerr will be attending the International Conference in Coordination Chemistry in Edinburgh and Zimei Rong is to attend the The 16th International Conference on High Resolution Spectroscopy in Prague.

Coming up in August is the Analytical Competition which is open to 7th form college students in the Otago region. This contest; a test of a students analytical, numerate, and writing skills, will consist of the accurate calibration of an acid solution and the identification and quantification of an unknown carbonate salt. The students will be judged on a submitted laboratory report analysing and discussing their experimental data.

Dr Keith Gordon
Secretary, Otago Branch



5 MONTHS TO GO,
5,500 SUBMITTED ABSTRACTS,
5.5 DAYS OF FASCINATION AND FUN!

Pacifichem 2000 will open on Thursday, December 14 with a traditional Hawaiian chant. The opening ceremony will also include welcoming remarks by the officers of the sponsoring societies, the Govenor of Hawaii and the Mayor of Honolulu.

The Congress, which runs to noon on Tuesday, December 19, has a full scientific program with 180 symposia and contributed papers in 10 thematic areas, and an exposition; student posters will be presented within the symposia and also at two special judging sessions (5-7 and 8-10) on Friday evening. The scientific programme will take place in Sheraton, Hyatt, Illaki and Hilton properties in Waikiki. This congress, the fourth in the series, will feature the first Pacifichem Lecture, the Glenn T Seaborg Lecture, to be delivered by Professor Ronald Breslow (Columbia University — one of the 1999 NZIC Conference plenary lecturers). It honours the late Nobel Laureate Seaborg who was inspirational in establishing Pacifichem.

The social programme includes a pre-conference Volcano Tour, a Millennium Mixer and a fireworks display. A variety of day tours on Oahu and to the neighbouring islands of Hawaii and Maui have been arranged for registrants and accompanying persons.

With some 5,500 submitted abstracts Pacifichem 2000 promises to be the best yet. The programme is essentially finalised and is published below though venues and times are subject to minor change *(NOTE: Copy date in New Zealand preceded the final programme deadline. Finalised information will be provided at the web site from July 17).* At the time of writing some 50 abstracts from New Zealand scientists had been identified as accepted for the Congress. The Pacifichem web site has full details of the programme, registration, accommodation and the pre- and post-congress tours and is:

http://www.acs.org/meetings/pacific2000/

REGISTRATION:

Advance registration deadline - Friday November 10. After July 17 full details of the registration and accommodation procedures are available at the web site. The Congress Organising Committee encourages delegates to register and pay fees by credit card using these Internet facilities. However, should you prefer the traditional paper and air-mail approach please request forms from the undersigned or the Congress Office (address below). Fees (unchanged from those indicated previously with late on-site registration in parenthesis) must be paid by credit card or $US bank cheque; purchase orders will not be accepted:

NZIC Member	$US 340	(410)
Non-member	$US 420	(505)
Full-time student	$US 75	(90)
Guest of Registrant	$US 50	(50)
Book of Abstracts	$US 45	(55)

The registration fee includes the opening ceremony, the Pacifichem Lecture, the Millennium Mixer and all technical sessions. Use of the hospitality centre, entry to the exposition, and participation in tours prearranged by the Congress is available to registrants only. All refund requests *must be in writing* to the Secretariat Office (address below).

Accommodation: The scientific programme will take place in Sheraton, Hyatt, Illaki and Hilton properties in Waikiki. Pacifichem 2000 has special arrangements and rates at these hotels as well as a limited number of *non-participating* condominiums as detailed separately. Accommodation reservations for the participating hotels *cannot* be made directly with the hotels. It must be done using the web site (with one night's deposit by credit card) or via hard copy with forms available as detailed above for registration. The special rates apply from December 11 to 19 only. If you intend to arrive before the 11th or depart after the 19th you will need to make reservations for the additional nights directly with the assigned hotel. Condominium reservations must be made individually with the property and the Pacifichem 2000 rate requested. If you subsequently find that you cannot attend cancel your requests (to November 10 to housing@acs.org, thereafter directly with the hotel).

Tours: The Pacifichem Organising Committee has made special arrangement for a number of conference tours including a scientific Hawaii Volcano field trip from Tuesday December 12 through Thursday December 14. Tours of Oahu and its major attractions, including Pearl Harbor and the Punch Bowl Cemetery, have been arranged. Day trips to other islands in the Hawaiian chain have also been arranged - full details of all tours including costs are available at the web site. Advance purchase of tickets is recommended and pre-registration mandatory for the Volcano tour.

A full programme for accompanying persons is in place and includes a range of local activities but you should note that the registration fee does not include the cost of tours for these participants.

Travel: As the number of airlines servicing Honolulu from New Zealand is not great [Air New Zealand (direct service), Air Pacific (via Fiji) and Qantas (via Sydney)] registrants are encouraged to make their travel arrangements early. Please remember that the Congress commences on Thursday, December 14 and concludes in the afternoon of Tuesday, December 19. The direct service from Auckland to Honolulu on Thursday December 14 arrives a little before midnight on Wednesday, December 13; direct departure to Auckland during the evening of December 19 (or shortly after midnight) will have a Thursday morning arrival in Auckland in good time for Christmas!

POLY Millennial 2000 Congress: This ACS Division of Polymer Chemistry Inc. meeting will be held from Saturday December 13 on the island of Hawaii at the Hilton Waikoloa Village. Fees for this meeting are fully inclusive. Conjoint registration with Pacifichem 2000 is available to participants but only to October 15 – full details are available at the web site.

Exposition: The Congress will include an exposition featuring more than 40 companies displaying the latest instrumentation, laboratory equipment and supplies, software, publications, and other relevant products in the Coral Foyer of the Hilton Hawaiian Village.

Special Event: Gaussian Inc. will host a workshop on Wednesday December 13.

Car Rental: Special rates have been negotiated with selected rental agencies – see the web site for details.

Facilities for People with Disabilities: The organisers are committed to making the Congress accessible to all attendees. We realise that some people have special requirements and we will do our best to accommodate the needs of all. Registrants requiring assistance or seeking information are asked to contact the secretariat office (details below) by fax or email or may submit their requirements on the registration form.

Local Arrangements: Entry to the USA with a New Zealand passport is usually by the visa waiver programme. Details are available with your travel agent. Taxi (~$US 27) and shuttle buses (~$US 12) to Waikiki are available directly outside the Honolulu arrivals terminal.

Speaker & Poster Information: OHP and 35 mm slide projectors and projectionist, lapel microphone and lighted reading desk will be available in all meeting rooms. For posters each presenting author will be provided with a 4' high x 6' wide (1.3 m x 1.8 m) board identified by a card showing the paper number, and a bag of push pins. Posters must be erected and removed as indicated by the organisers, as there is much pressure on the meeting rooms. .

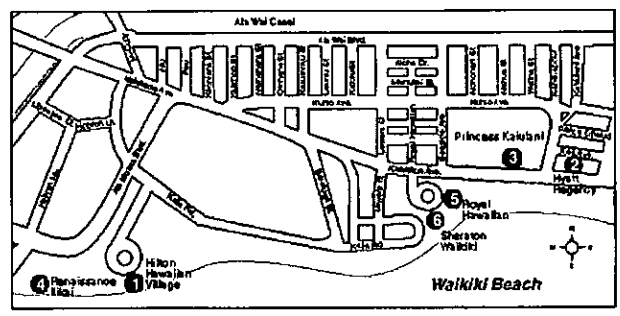
Further Pacifichem details are available from the web site listed above, from Professor B Halton, School of Chemical & Physical Sciences, Victoria University, P O Box 600, Wellington (Ph: (04)-4635954; Fax: (04)-4635241; email: brian.halton@vuw.ac.nz), or Pacifichem Secretariat, American Chemical Society, 1155 Sixteenth St., N.W., Washington, DC 20036, USA (Fax: 1-202-872-6182; Email: pacifichem@acs.org).

Official Pacifichem 2000 Hotels in Honolulu, Hawaii

	Single	Double	Addit. Person[a]	Max. Occupancy
1 Hilton Hawaiian Village				
Rainbow Tower, ocean view	$220	$220	$30	4
Tapa Tower, ocean view	$205	$205	$30	4
Tapa Tower, partial ocean view	$185	$185	$30	4
Run of House, garden view	$177	$177	$30	4
2 Hyatt Regency				
Run of house	$130	$130	$35	4
3 Princess Kaiulani				
Run of ocean view	$130	$130	$45	4
Run of city view	$115	$115	$45	4
4 Renaissance Ilikai				
Ilikai Tower, ocean view w/kitchen[b]	$155	$155	$30	4
Ilikai Tower, city view w/kitchen[b]	$145	$145	$30	4
Ilikai Tower, deluxe ocean view	$135	$135	$30	4
Yacht Harbor Tower, ocean view	$125	$125	$30	4
5 Royal Hawaiian				
Main Building, garden view	$225	$225	$45	3
6 Sheraton Waikiki				
Run of ocean view	$205	$205	$45	4
Run of mountain/city view	$165	$165	$45	4
Manor (no view)	$125	$125	$45	2

Children below 18 yrs (17 for Ilikai) are free in parent's room.
Note: The rates listed above are in US dollars and do not include the current 11.42% room and occupancy tax per room per night, which is subject to change.

[a]Add the additional person charge to the double rate for each guest over two persons.
[b]Double/double rooms have two twin beds and a pull-out queen-size sofa bed.



Non-participating Condominiums

Reservations for the condominiums listed below must be made directly with the condominium, but you should ask for the Pacifichem 2000 Congress rate.

	Dates Applicable	Studio	One Bedrm.	Two Bedrm.
Aston Pacific Monarch				
	Dec. 12-20	$86	$104	na
	Dec. 21-31	112	121	na

2727 Kuhio Ave, Honolulu, HI 96815, Phone: 1-808-923-9805, Fax: 1-808-324-3220, Email: lia.tauelangi@aston-hotels.com

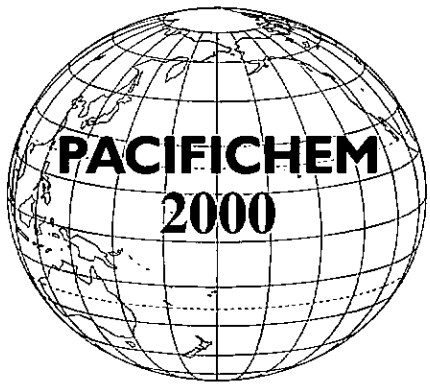
Aston Waikiki Banyan				
	Dec. 12-20	na	105	na
	Dec. 21-31	na	154	na

201 Ohua Ave., Ste 406-2, Honolulu, HI 96815, Phone: 1-808-922-0555, Fax: 1-808-922-0906, Email: res.ban@aston-hotels.com

Aston Waikiki Sunset				
	Dec. 12-20	na	111	231
	Dec. 21-31	na	161	na

229 Paoakalani St., Honolulu, HI 96815, Phone: 1-808-922-0511, Fax: 1-808-924-7114, Email: res.sun@aston-hotels.com;
Website for all three Astons: www.aston-hotels.com

Note: These hotels are not part of the official congress housing block. Reservations must be made directly with these hotels, and the Pacifichem Congress group rate requested. These hotels are not on the congress shuttle route, but are within walking distance of one of the official hotels. Studios offer kitchenettes, and one- to two-bedroom units offer fully equipped kitchens.



The 2000 International Chemical Congress of Pacific Basin Societies

Honolulu, Hawaii, USA ♦ December 14-19, 2000

SYMPOSIUM ORAL SESSION PROGRAMME

The program detailed below was subject to minor change until July 17, later than the copy date for Chemistry in New Zealand. The final schedule was published at that time on the web site and contributed oral and poster sessions added.

Key Code:			**Hotel**:	
Thu=Thursday	Sun=Sunday	AM = morning	HHV=Hilton Hawaiian Village	RI=Renaissance Ilikai
Fri=Friday	Mon=Monday	PM = afternoon	SMS=Sheraton Moana Surfrider	HR=Hyatt Regency
Sat=Saturday	Tue=Tuesday	Eve = evening	RH=Royal Hawaiian	SW=Sheraton Waikiki

AREA 1: Agrochemistry – including agriculture, cellulose, carbohydrate, pulp, and paper chemistry HHV

005, Immunochemical Biomonitoring for Environment Chemicals; Hideo Ohkawa; Sun AM, PM, Eve
006, Molecular Designs of Food Proteins for Industrial Applications; Akio Kato; Mon AM, PM; Tue AM
111, Functional Food Ingredients: Trends and Prospects; Feriedoon Shahidi; Thu AM, PM; Fri AM, Eve
134, Utilisation of Biomass for the Production of Chemicals in the Twenty First Century; Jon Meister; Thu AM, PM; Fri AM, PM
139, Quality of Fresh and Processed Food; Arthur Spanier; Fri PM; Sat AM, PM
145, Industrial Enzymes; Srinivasan Damodaran; Fri PM; Sat AM, PM
152, Chemical Modification, Properties and Usage of Lignin; Thomas Hu; Sat AM, PM
153, Lignocellulosics Science and Technology: From Laboratory to Market; David Hon; Sun PM; Mon AM, PM
165, Chemical Ecology and Biochemistry of Plant Resistance to Diseases and Nematodes; Robert Stipanovic; Thu AM, PM; Fri AM
192, Bioconversion of Lignocellulosics to Ethanol and Co-Products; John Saddler; Mon Eve; Tue AM
202, Food and Beverage Antioxidants in Health and Disease; Joe Vinson; Sun AM, PM

AREA 2: Analytical Chemistry – including clinical, electrochemical, and trace analysis RI

021, Electrochemical Sciences; Koichi Aoki; Mon AM, PM
026, Liquid-Liquid Interfaces in Analytical Sciences; Hitoshi Watarai; Thu AM, PM; Fri AM
031, Soft X-Ray Spectroscopy: New Evaluation of Chemical Composition of Functional Materials; Hisanobu Wakita; Sun AM, PM
074, New Wave of Analytical Reagents for Symbiotic Human Life with Nature; Mizuo Maeda; Sat AM, PM
075, Frontiers of Spectroscopic Analysis of the Brain; Hideaki Koizumi; Thu AM, PM; Fri AM, PM
076, New Optical Probes for Chemical and Biochemical Analyses; Koji Suzuki; Mon PM
113, Ultrasensitive Chemical Measurement and Characterisation; Edward Yeung; Thu AM, PM; Fri AM, PM
117, Separation Science: Trends for the New Century; Robin Rogers; Fri PM, Eve; Sat AM, PM; Sun AM
121, Novel Measurements of Gas Phase Ions; John Traeger; Sat AM, PM; Sun AM
124, Elemental Mass Spectrometry for a New Millennium; Naoki Furuta; Sun PM; Mon AM, PM; Tue AM
137, Microbioanalytical Chemistry: Separations and Manipulations of Micron Size Domains; J. Michael Ramsey; Sat AM, PM; Sun AM, PM; Mon AM
154, Chemical and Biochemical Sensors; Raoul Kopelman; Thu AM, PM; Fri AM, PM, Eve; Sun Eve
159, Recent Developments in Field Analysis; Janusz Pawliszyn; Mon AM, PM
171, Raman Spectroscopy: Coming of Age in the New Millennium; Robin Turner; Fri AM, PM; Sat AM, PM
204, Chemical Sensors Based on Chemical Recognition; Eric Bakker; Sun AM, PM, Eve
214, Recombinant Proteins in Analytical Chemistry; Sylvia Daunert; Mon AM, PM

AREA 3: Bioscience and Technology – including microbial and pharmaceutical chemistry HHV

038, Pyridoxal Biocatalysis: Fine Catalytic Mechanism and Application; Kenji Soda; Mon AM
040, Chemical Regulation of Bioreactions and Biorecognitions; Makota Komiyama; Thu AM, PM
046, Peptide Chemistry as Life Molecular Science; Hisakazu Mihara; Sat AM
047, Biomineralisation: Controlled Bio-Architecture by Inorganic and Organic Molecules; Tadashi Matsuhaga; Sat AM, PM
061, Advances in Solid State NMR of Biomolecules and Materials; Akira Naito; Sun AM, PM, Eve; Mon Eve

063, Bioengineering of Extremophiles and Extremozymes; Ichiro Okura; Fri AM, PM
073, Astrobiochemistry and Origins of Life; Kensei Kobayashi; Mon AM, PM; Tue AM
129, Medical Applications of Nucleic Acid Molecules; Siew Ping Ho; Sun AM, PM
158, Biomolecular Structure and NMR; Raymond Norton;Sun PM; Mon AM, PM, Eve; Tue AM
170, Biosynthesis of Natural Products; Craig Townsend; Thu AM, PM; Fri AM, PM
185, Evolution of Enzyme Function; John Gerlt; Sat PM; Sun AM
186, Xenobiotic Enzymology; Richard Armstrong; Thu AM, PM
187, Multiple Solutions to the Same Chemical Problems; Rowena Matthews; Fri AM, PM
188, Nucleic Acid-Protein Complexes as Drug Receptors; Laurence Hurley; Sat AM, PM
194, Metal Thiolate Clusters in Biological Systems: The Biochemistry and Chemistry of Group 11 and 13 Metals and Their Reactions with Metallothioneins, Phytochelatins, Gamma-EC Peptides and Related Metal Complexes; Martin Stillman; Fri AM, PM
196, Environmental Biotechnology: Bioremediation and Bioprevention; Murray Moo-Young; Sat AM, PM
205, Glycobiology; Curtis Brewer; Mon AM, PM, Eve
220, Advances in Biochemical Production Technologies; Mark Marten; Sun AM, PM, Eve; Mon Eve

AREA 4: Chemistry and the Community – including chemical education, chemical economics and business, and public education and outreach **HR**

041, Environmentally Benign Chemistry Including Microscale and Smallscale Laboratory; Kazuko Ogino; Fri AM, PM; Sat AM
051, Changing Chemical Scene in the Pacific Basin; Naoya Yoda; Mon AM, PM; Tue AM
059, International Relationships in Chemical Education;Yoshito Takeuchi; Sat AM, PM
120, Testing with Technology; Charles Atwood; Mon AM
143, Teaching Aspects in Chemistry: Curriculum Developments in Analytical Chemistry; Gary Christian; Thu AM, PM; Fri AM
150, Chemistry for Elementary Schools; Sue Ann Berger; Sun AM, PM, Eve
184, International Perspectives of Graduate Education; P. Wyn Jennings; Fri Eve
190, Metrology, Standards, Testing, Quality (MSTQ): Keys to the Future for the Chemical Enterprise; Nina McClelland; Sun AM, PM, Eve
195, Catalysis and Catalytic Processes for Efficient Chemical Synthesis; Harold Kung; Fri AM, PM; Sat AM
206, Research Supported Teaching/Learning Innovations; Diane Bunce; Mon AM, PM
207, Laboratory Education in the 21st Century; Thomas Wildeman; Sun PM
216, Multimedia and Visualisation in Chemistry for the Major and the Non-Science Major; Zafra Lerman; Sun AM

AREA 5: Environmental Chemistry **RI**

112, Environmental Chemistry of Main Group Organo-Metallics; Rorbert Pellenbarg; Sat AM, PM
115, Photochemistry of Freshwater and Marine Environments and its Impact on Biogeochemical Cycles; David Kieber; Thu AM, PM; Fri AM, PM
116, Environmental Applications of Ionising Radiation; William Cooper; Sun AM, PM, Eve; Mon AM, PM, Eve; Tue AM
118, Sampling and Analysis for Verification with the Chemical Weapons Convention; Lawrence Keith; Sat AM, PM
142, Characterisation, Performance and Fouling of Water Treatment Membranes; Amy Childress; Mon AM, PM; Tue AM
155, Chemical and Biochemical Technology for Improving the Environment; Kiran Kadam; Sun AM, PM
211, Plasma Chemistry and Technology for Green Manufacturing, Pollution Control, and Processing Applications; Andrzej Miziolek; Thu PM; Fri PM

AREA 6: Inorganic Chemistry – including geochemistry and nuclear chemistry **SW & SMS**

002, Selective Chemical Transformation on Late Transition Metal Complexes; Sanshiro Komiya; Sat AM, PM; Sun AM, PM
009, Selective Catalysis for Environmental Applications; Yasuhiro Iwasawa; Thu AM, PM; Fri AM, PM
013, Multifunctionality of Inorganics, Organics, and Their Hybrid Solids, Part 1. Electric Conductivity and Related Properties; Susumu Kitagawa; Sun PM; Mon AM
014, Multifunctionality of Inorganics, Organics, and Their Hybrid Solids, Part 2. Molecular Magnetism and Related Properties; Toshiaki Enoki; Sat AM, PM; Sun AM
015, Recent Progress in Rare Earth Chemistry; Gin-ya Adachi; Thu AM, PM
017, Polyoxometalate Chemistry for Nano-Composite Design; Toshihoro Yamase; Fri PM; Sat AM, PM
018, Advances in Inorganic Fluorine Chemistry: New Synthetic Methods, Applications in Industries and Material Sciences, and Computational Aspects; Tsuyoshi Nakajima; Sun AM, PM, Mon Eve
019, Inorganometallic Chemistry of Group 13-16 Elements; Hiroshi Ogino; Sat AM, PM; Sun AM
023, New Trends in Biofunctional Metal Complexes; Shigenobu Yano; Thu AM, PM; Fri AM
027, Nuclear Hyperfine and Exotic Particle Techniques for Studying Chemical States; Masuo Takeda; Mon PM, Eve; Tue AM
028, Metal Complexation in Colloid and Polymer Systems; Tohru Miyajima; Sat AM, PM
032, Fundamental Studies on Coal for the New Century; Masahi Iino; Fri AM, PM, Eve
034, Main Group Chemistry I: Advances in Synthesis, Theory and Applications; Kin-ya Akiba; Fri PM; Sat AM, PM
037, Structure and Dynamics of Solute-Solvent Interactions; Hitoshi Ohtaki; Thu AM, PM
043, Oxygen Activation by Metalloproteins and Their Models; ; Masatatsu Suzuki; Fri AM, PM; Sat AM, PM
049, Inorganic Organometallic and Biological Chemistry of Metal Sulfides; Kazuko Matsumoto; Sun PM; Mon AM, PM
067, Environmental Chemistry and Microbiology of Actinides; Zenko Yoshida; Sat AM, PM
070, Organometallic Chemistry of Early Transition Metals and Lanthanides; Tamotsu Takahashi; Mon AM, PM; Tue AM
072, Bio-inspired Molecular Design of Multinuclear Metal Centers; Mitsuhiko Shionoya; Sun AM, PM
101, Metal-Mediated Nucleophilic Cleavage of Nucleic Acids; James Bashkin; Mon PM; Tue AM

105, Main Group Chemistry II: Low Valent, Low Coordination Number and Cluster Compounds; Penelope Brothers; Sun AM, PM, Eve; Mon AM
106, Reservoir Geochemistry; R J Hwang; Sun AM, PM, Eve
107, Chemistry and Application of Metal Complexes of Mixed-Donor Multidentate Ligands; Craig Jensen; Sun AM, PM, Eve; Mon AM
109, Twenty Years of Organic Superconductors: New Materials - New Insights; Urs Geiser; Mon PM; Tue AM
130, New Developments and Directions in Inorganic Charge Transfer Complexes; Clifford Kubiak; Thu AM, PM; Fri AM
135, Radioisotope Production and Applications in the New Century; Dennis Phillips; Sun AM, PM
148, Fundamental and Technological Advances in Actinide Chemistry; R.G. Haire; Fri AM, PM
151, Electron and Atom Transfer Chemistry of the Late Transition Metals; Gregory Hillhouse; Thu PM; Fri AM, PM
166, Chemistry of Inorganic Thin Film Formation; Martin Zinke-Allmang; Mon AM, PM, Eve; Tue AM
169, Science with Radioactive Beams; ManYee Tsang; Sun Eve; Mon AM, PM, Eve
180, New Materials from Organometallic and Coordination Chemistry; M David Curtis; Thu AM, PM; Fri AM, PM
212, Molecular Recognition of Anions and Cations; Anthony Baker; Mon AM, PM; Tue AM
213, Chemical Effects of Ultrasound; Kenneth Suslick; Mon AM, PM; Tue AM

AREA 7: Macromolecular Chemistry RHV & SMS

003, Advanced NMR Characterisation of Polymers: Precise Structural Analyses and Molecular Interpretation of Macroscopic Properties; Fumitaka Horii; Thu AM, PM; Fri AM, PM, Eve
044, Polymer Thin Film Interfaces; Tisato Kajiyama; Fri PM, Sat AM, PM
050, High Performance Polymers; Masa-aki Kakimoto; Sun PM; Mon AM, PM
054, Photonic Processes in Polymers and Self-Organised Materials; Tomiki Ikeda; Thu AM, PM; Fri AM, PM
055, Structures and Properties of Polymer Alloys; Hirokazu Hasegawa; Sat AM, PM; Sun AM, PM
056, Self-Ordering Phenomena in Polymeric Systems: From Microscopic to Mesoscopic Scales; Kenichi Yoshikawa; Sat PM; Sun AM, PM; Mon AM
057, Precision Polymerisations and Controlled Supramolecular Architectures; Mitsuo Sawamoto; Thu AM, PM; Fri AM, PM, Sat AM
058, Liquid Crystalline Polymers: Self-Organisation of Macromolecules with Well-Controlled Orientation and Polarity in the Liquid Crystalline Field; Junji Watanabe; Thu AM, PM; Fri AM
068, Photophysics and Photochemistry of Polymeric Materials; Kazuyuki Sugita; Mon AM, PM, Eve
102, Reactive Polymer Processing; Warren Baker; Mon PM, Tue AM
127, Pi-Conjugated Polymers; Steven Holdcroft; Thu AM, PM; Fri AM, PM
149, New Methodologies in Polymer Synthesis; Bing Hsieh; Sat PM; Sun AM, PM; Mon AM
157, Aromatic Azo Materials and Applications; Almeria Natansohn; Sat AM
177, Self-Assembly in Water-Soluble Polymers; Francoise Winnik; Fri PM; Sat AM, PM
193, Dendrimers and Hyperbranched Polymers - Synthesis, Structure, and Properties; Jung-Il Jin; Sat AM, PM; Sun AM
197, Characterisation and Modeling of Membrane and Barrier Polymers; Benny Freeman; Thu AM, PM; Fri AM
203, Associations in Solutions: Amphiphiles, Macromolecules and Colloids; Saad Khan; Mon PM; Tue AM
209, Radiation Chemistry of Polymers; David Hill; Sun AM, PM, Eve; Mon AM

AREA 8: Medicinal Chemistry HHV

011, Chemistry and Signal Transduction; Mikiko Sodeoka; Mon AM, PM, Tue AM
036, Neurochemistry of Excitatory Amino Acids; Yasufumi Ohfune; Sun AM, PM
045, Molecular Recognition Using Nucleic Acids and Their Related Substances; Akira Matsuda; Thu AM, PM; Fri AM, PM
132, Recent Advances in Protease Inhibitor Design; Patrick Lam; Thu AM, PM
140, Mathematical and Computational Aspects of Molecular Design; Dave Winkler; Fri Eve; Sat AM, PM
156, Viral Serine Proteases; Dennis Liotta; Fr PM, Eve
160, Cysteine Proteases; Peppi Prasit; Fri AM
172, Advances in Radiopharmaceutical Chemistry; Henry VanBrocklin; Fri AM, PM
173, Alzheimer's Disease: Receptors and Small Molecule Therapies; Donald Weaver; Mon AM, PM
174, Radionuclides for Therapeutic Oncology; Suresh Srivastava; Sun Eve; Mon AM, PM, Eve
181, Frontiers in Antibiotics: Synthesis, Design and Mode of Action; Robert Williams; Sat AM, PM; Sun AM, PM
189, Next Generation Therapeutics; John Kozarich; Sun AM, PM
199, Chemical Perspectives on Human Cancer; Lisa Peterson; Sat AM, PM; Sun AM, PM
217, MMP Inhibitors; Biswaneth De; Sat AM, PM
218, Combinatorial and Parallel Synthesis: Applications to Medicinal Chemistry; Andrew Combs; Mon AM, PM; Tue AM
219, Novel Mechanisms for the Treatment of Pain; Ed Roberts; Thu AM, PM

AREA 9: Organic Chemistry HHV

001, Reactive Intermediates and Unusual Molecules; Hideo Tomioka; Sat AM, PM; Sun AM, Eve
007, Chemistry of the Organic Solid State: Synthesis, Structure and Reactivity; Fumio Toda; Mon AM, PM, Eve; Tue AM
010, Pi-Electronic Systems with Novel Structure; Yoshito Tobe; Thu AM, PM; Fri AM, PM
012, Strategy for Molecular and Supramolecular Photochemistry; Haruo Inoue; Thu AM, PM; Fri AM, PM, Eve
020, New Synthetic Methods in Organofluorine Chemistry; Takeo Taguchi; Thu AM, PM; Fri AM
024, New Strategies to Transition Metal Catalysed or Mediated Organic Synthesis; Hideo Kurosawa; Fri PM; Sat AM, PM; Sun AM, PM; Mon AM
029, New Developments in Organic Radical Chemistry; Ilhyong Ryu; Thu AM, PM; Fri AM
030, Prospects for Automated Solution-Phase Synthesis in the 21st Century; Jun-ichi Yoshida; Mon PM; Tue AM

035, Photoremoveable Protecting Groups and Caged Compounds: Principles and Applications; Richard Givens; Sun Eve; Mon AM, PM, Eve; Tue AM
042, Natural Products Chemistry: Biological Activity and Synthesis; Daisuke Uemura; Fri Eve; Sat AM, PM; Sun AM, PM, Eve
052, Organic and Combinatorial Chemistry on Solid Supports; Takeshi Takahashi; Fri PM; Sat AM, PM
060, Phase-Transfer Catalysis; Tadatomi Nishikubo; Thu AM, PM; Fri AM
065, Discovery and Development of Asymmetric Synthesis and Chiral Technology; Ichiro Shinkai; Thu AM, PM; Fri AM, PM, Eve; Sat AM, PM; Sun AM, PM, Eve
066, New Developments in Heterocylic Chemistry; Mitsuo Komatsu; Sat AM, PM; Sun AM, PM, Eve
110, Marine Natural Products Chemistry; Roy Okuda; Mon AM, PM, Eve; Tue AM
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123, Organic Reactions in Aqueous Media; T H Chan; Thu AM, PM; Fri AM, PM
128, Free Radicals: From Molecules to Materials; Robin Hicks; Sun PM; Mon AM, PM; Tue AM
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208, Boundary Between Long Bond and Short Non-Bonds; Jay Siegel; Sun AM, PM

AREA 10: Physical and Theoretical SW

004, Solvated Molecules and Ions: from Clusters to Condensed Phases; Dennis Salahub; Sat AM; Sun AM, PM; Mon AM, PM; Tue AM
016, Recent Progress in the Science and Technology of Fullerenes and Nanotubes; Yohji Achiba; Thu AM, PM; Sat AM; Sun AM; Mon AM
022, Chemical Applications of Synchrotron Radiation; Toshiaki Ohta; Thu AM, PM; Fri AM
025, Nonlinear Dynamics in Chemistry; Kenneth Showalter; Fri Eve; Sun AM, PM, Eve; Mon Eve
033, Electrochemical Surface Science at Molecular/Atomic Resolution; Kohei Uosaki; Thu AM; Fri AM, Eve; Sat PM
069, Solvation Structure and Reactivity in Supercritical Fluids; Okitsugu Kajimoto; Fri AM, PM; Sat AM, PM
071, Mathematical Characterisation of Structure and Properties of Molecules; Haruo Hosoya; Sun PM; Moin AM
077, Ordered Molecular Films for Nano Electronics and Photonics; Atsushi Koma; Fri AM, PM, Eve; Sat PM
078, New Frontiers in Chemical Reaction Dynamics; Hiroki Nakamura; Sat AM, PM; Mon AM, PM; Tue AM
103, Laser Control and Manipulation of Molecules; Andre' Bandrauk; Thu AM, PM; Sat AM; Sun AM, PM
108, Materials Chemistry on Oxide and Carbide Surfaces; Charles Campbell; Sun PM; Mon AM, PM; Tue AM
114, Fluids at Interfaces; Douglas Henderson; Thu AM, PM; Fri Eve; Sun AM, Eve
125, Computational Quantum Chemistry: Theoretical and Experimental Perspectives; John Goddard; Thu AM, PM; Fri AM, PM, Eve; Sat AM, PM; Sun AM
136, Advances in Quantum Monte Carlo; Stuart Rothstein; Mon AM, PM, Eve; Tue AM
146, Science and Technology of $Ti0_2$ Photocatalysis; Abhaya Datye; Fri PM Sat AM, PM
147, Structure and Dynamics of Photogenerated Intermediates in Solution: Vibrational and Electronic Studies; Terry Gustafson; Thu AM, PM; Fri AM, PM
167, Nanomaterials: Synthesis, Characterisation and Catalysis; G A Somorjai; Sun PM, Eve; Mon PM, Eve
168, Surfactant Science and Technology; John Scamehorn; Sun AM, PM; Mon PM
179, Physical Chemistry/Chemical Physics of Ion Channels; P C Jordan; Sun PM; Mon AM, PM, Eve
191, Structure, Dynamics, and Reactions of Small Clusters; Elliot Bernstein; Thu AM, PM; Fri AM, PM
198, Photon and Electron Induced Processes on Surfaces;Hai-Lung Dai; Thu PM; Fri PM; Sat PM; Sun AM
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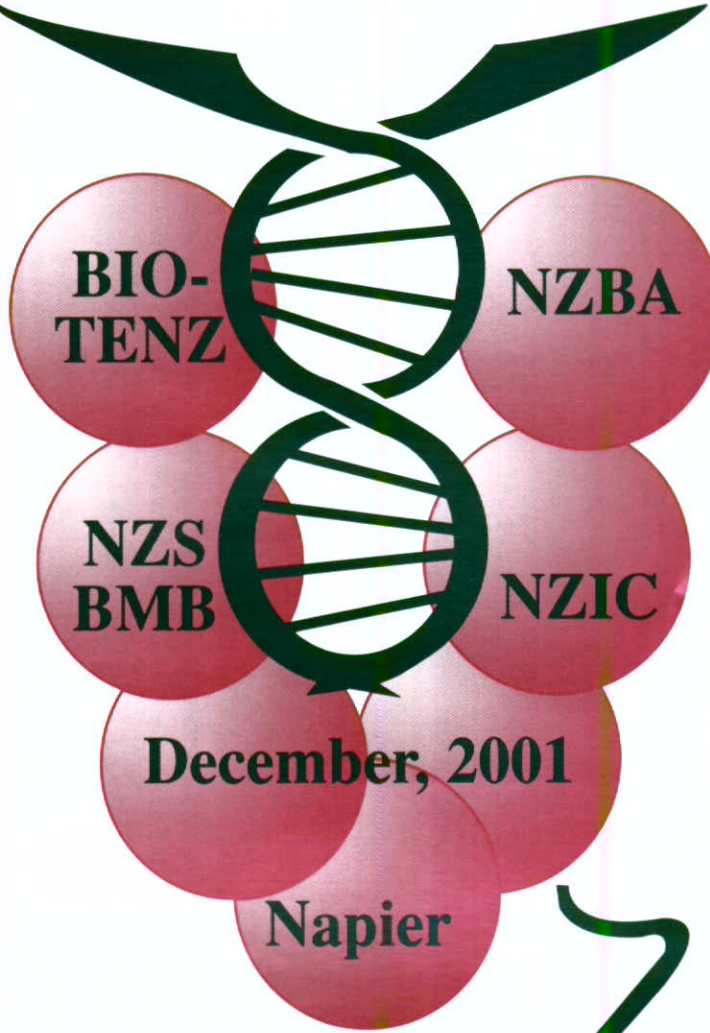

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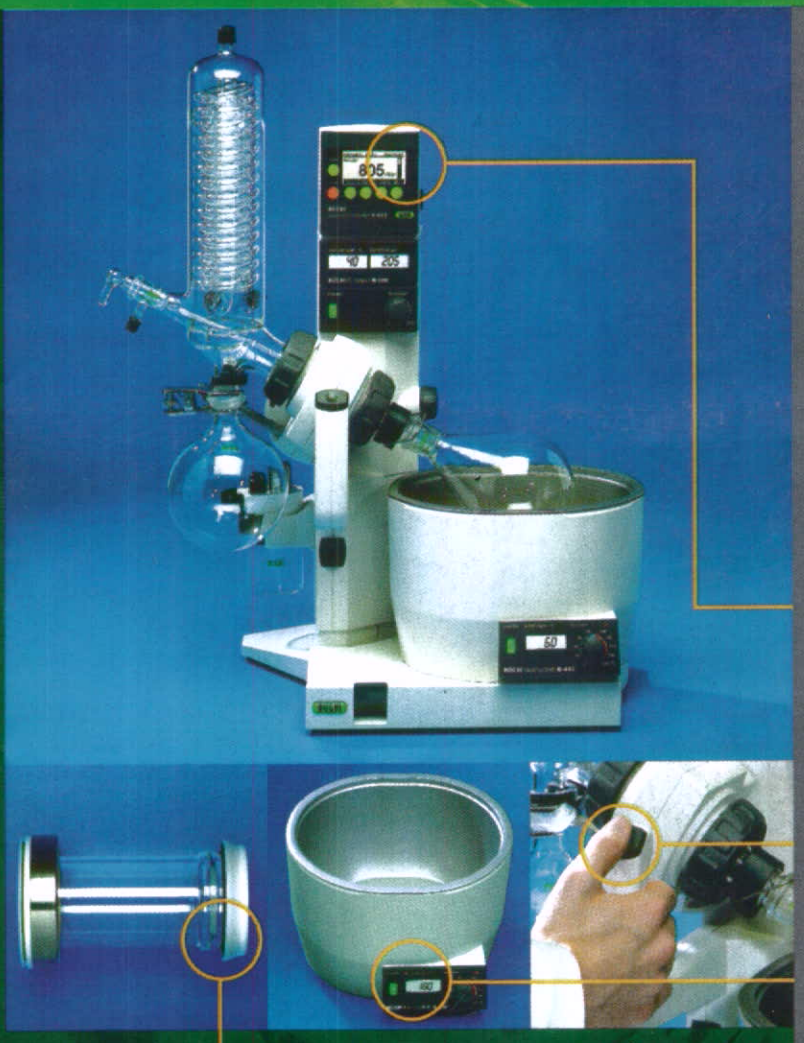

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