MONTAGE

NEWS FROM THE CAMPUSES OF MONASH UNIVERSITY

Volume 2 Issue 6 July 1991

Crisis looms over salaries in Australian universities: VC

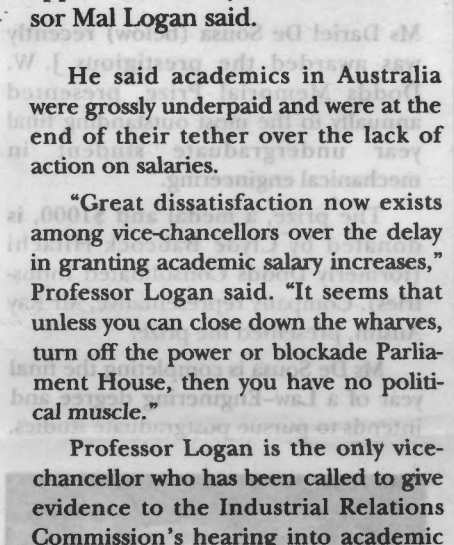
Australia's world-renowned academic community was at risk of becoming an "intellectual backwater" unless significant salary increases were approved soon by the Federal Government, the Vice-Chancellor, Professor Mal Logan said.

He said academics in Australia were grossly underpaid and were at the end of their tether over the lack of action on salaries.

"Great dissatisfaction now exists among vice-chancellors over the delay in granting academic salary increases," Professor Logan said. "It seems that unless you can close down the wharves, turn off the power or blockade Parliament House, then you have no political muscle."

Professor Logan is the only vice-chancellor who has been called to give evidence to the Industrial Relations Commission's hearing into academic salaries by both unions and management.

"Since the mid 1970s, academic salaries have fallen by 30 per cent relative to other professions," he said. "Our lecturers are struggling with over-enrolments and unacceptable student-teacher ratios. No wonder they are being lured overseas and into industry by better pay.



Vice-Chancellor Mal Logan.

"Hypocritically, we continue to ask people to study for at least an extra seven years to become academics only to reward them with a pittance."

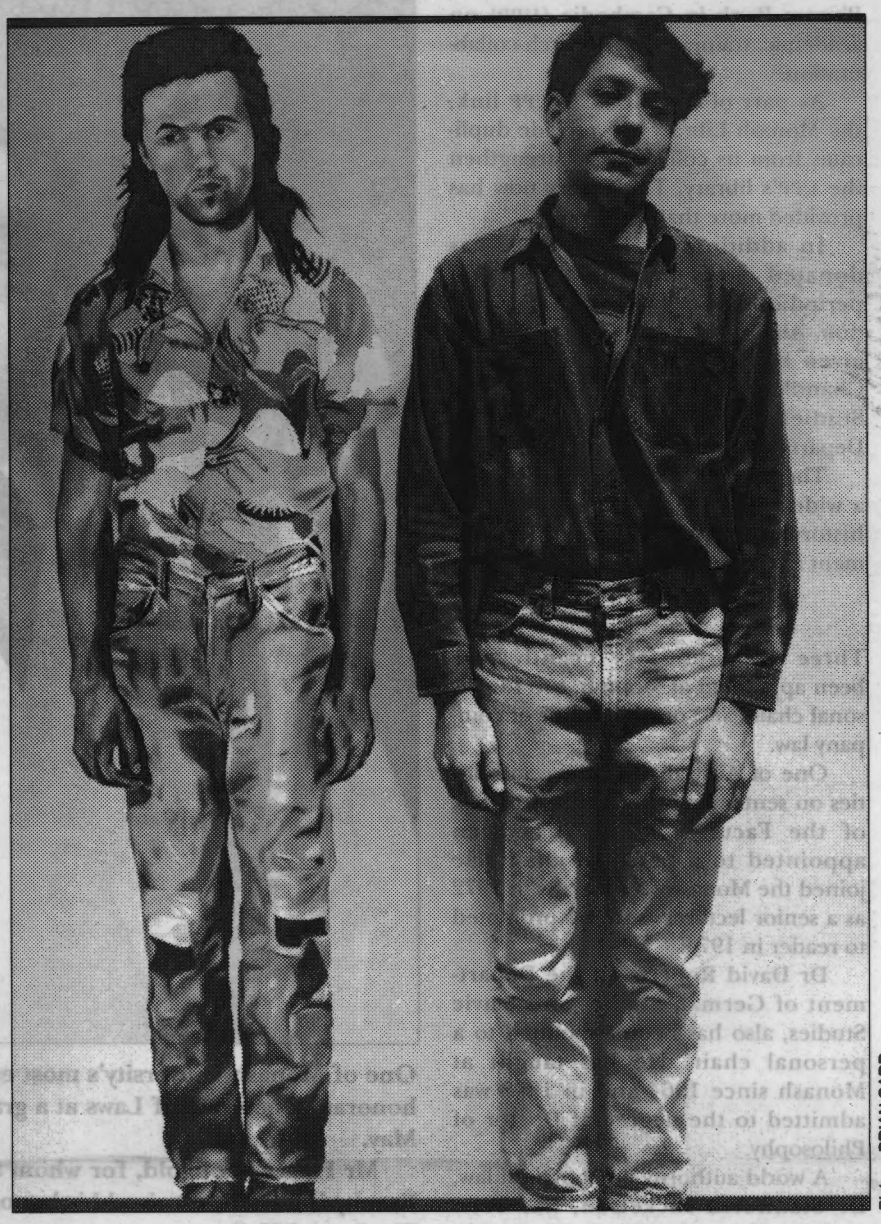
Studies had shown Australia would have a shortfall of 20,000 academics by the year 2000.

"This is the worst crisis ever faced by Australian universities," Professor Logan said. "We have badly misread the international shift to the tertiary sector. For example, most post-graduate engineering students studying in Australia are now from overseas.

"Other countries, who send their best and brightest students to study in our major universities, simply cannot believe that this country is throwing away one of the best systems in the world, particularly when Australia needs it most."

Professor Logan described as "perverse" a system in which a nation clamoured for better education and ideas to wrest it from a recession, while not being prepared to pay for quality universities and academics.

"The challenge to transform Australia into the 'clever country' will founder unless we act urgently to stem the brain drain from our major universities," he said.



Picture: BRIAN CARR

One of these men really is off the wall

Monash graphic designer Mr Peter Bartelt (right), pictured with 'Yellow painting: John' (1974) by Jenny Watson, one of the exhibits in 'Off the wall/In the air: A seventies selection' at the Monash University Gallery. See story on page 7.

Arts, law, economics building gets go-ahead

Monash has been allocated an additional $11 million in Commonwealth capital grants for a major new building on the Clayton campus.

The grants for the 1991–93 triennium were announced last month by the Minister for Higher Education, Mr Peter Baldwin.

Work on the building, which is due to be completed late in 1994, will begin in mid-1993. It is expected that the building will be used by sections of the arts, economics and law faculties, and will be located at the western end of the Forum.

The building will have between six and eight levels and accommodate about 500 people. Its exact location and detailed plans are yet to be finalised.

The building would alleviate much of the present overcrowding in the Menzies Building, a university spokesman said.

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AROUND THE CAMPI

CLAYTON

An agreement has been signed between Monash and the University of Phnom Penh in Cambodia (UPP) on academic, training and research collaboration.

As part of the Monash–UPP link, the Monash Library will provide duplicates from its collection to strengthen the UPP's library. The library now has provided more than 200 books.

In addition, Dr Herb Feith has donated more than 700 books and periodicals from his personal collection. About 300 books also have been given by Associate Professor David Chandler, Centre of Southeast Asian Studies, and Dr Bob Rice of the Department of Economics.

The books fill 27 boxes, and cover a wide range of topics, emphasising history, politics, third world development and economics.

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Three new professors recently have been appointed at Monash: two to personal chairs and one to a chair of company law.

One of Australia's leading authorities on sentencing law, Dr Richard Fox of the Faculty of Law, has been appointed to a personal chair. He joined the Monash Law Faculty in 1972 as a senior lecturer, and was promoted to reader in 1974.

Dr David Roberts, of the Department of German Studies and Slavic Studies, also has been appointed to a personal chair. He has taught at Monash since 1964 and in 1968 was admitted to the degree of Doctor of Philosophy.

A world authority on copyright law, Dr Staniforth Ricketson, has been appointed to the Sir Keith Aickin Chair of Company Law. He will take up his appointment on 1 December.

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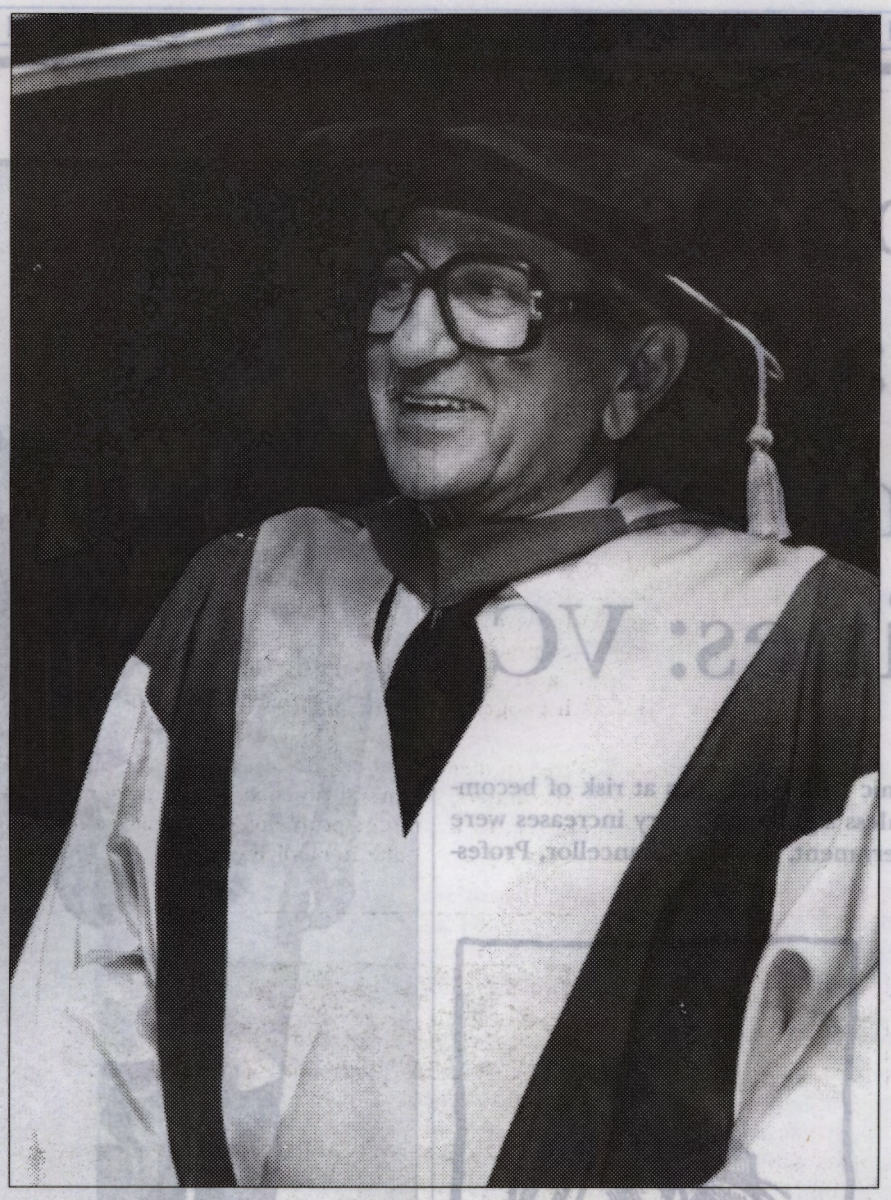

One of Monash University's most enthusiastic supporters was awarded an honorary Doctorate of Laws at a graduation ceremony at the university in May.

Mr Henry Krongold, for whom the Krongold Centre in the Education Faculty is named, received his honorary degree at the ceremony in Robert Blackwood Hall.

Mr Krongold is playing a key role in the establishment of a Centre for Jewish Studies at Monash.

About 200 of Australia's leading academics and research scientists will gather at Monash University for the 38th annual meeting of the Genetics Society of Australia.

Among those presenting papers in the Rotunda from 8 to 10 July on technical advances in plant, animal, human, bacterial and viral genetics will be representatives from Monash.

Speakers on plant developmental genetics include Dr David Smyth and Professor John Hamill, of the Department of Genetics and Developmental Biology. Professor Warren Ewens and Dr Bob Griffiths, of the Department of Mathematics, will speak on modelling in genetics. In the session on population and evolutionary genetics, papers will be presented by mathematician Dr Geoff Watterson and geneticist Dr Steve McKechnie.

For further information, contact Associate Professor Viji Krishnapillai, Department of Genetics and Developmental Biology on extn 75 3853.

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Ms Dariel De Sousa (below) recently was awarded the prestigious J. W. Dodds Memorial Prize, presented annually to the most outstanding final year undergraduate student in mechanical engineering.

The prize, a medal and $1000, is donated by Clyde Babcock Hitachi (formerly Dodds Consolidated Industries). Company representative, Mr Ray Austin, presented the prize.

Ms De Sousa is completing the final year of a Law–Enginering degree and intends to pursue postgraduate studies.

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This group of middle-level administrators (below), including academic and administrative staff, completed a five-day residential program held at Erskine House, Lorne, in May.

The program, Making It Happen, was a joint venture of the Staff Development Unit and the Victorian branch of the Australian Institute of Tertiary Education Administrators.

Participants were drawn mainly from Monash but included some from other Victorian higher education institutions and three administrators from interstate.

Head of Staff Development, Mr John Swinton, said the course went beyond discussion of the external and internal forces influencing policy and decision making in universities. Course members developed projects to put into practice in their workplaces.

Presentations were made by senior Monash management including former adviser to the Vice-Chancellor, Professor Leo West, Comptroller Mr Peter Wade, Registrar Mr Tony Pritchard, Distance Education Manager Mr Gavin Moodie, and the Counselling Service's Mr Robin Coventry.

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The Australian Institute of Steel Construction recently presented the Department of Civil Engineering, Caulfield campus, with a set of steel connection models.

AISC Victorian general manager Paul Allilomou (above, left) presented Mr Geoff Smith (centre) and Mr Bill Wong (right) with the models, built by Senlos Design and Construction Engineers of Wodonga and developed by the Victorian AISC State Committee.

Mr Allilomou said that he welcomed the opportunity of further developing the excellent relationship between the steel industry and Monash.

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GPs to be examined on videotape

Dr Liz Harris.

A groundbreaking videotaped study of general practice in Australia will be conducted jointly by Monash and Melbourne universities with grants totalling more than $350,000.

It is to be the largest direct observational study of general practice ever undertaken in Australia. The study, *150 Days in General Practice*, has been funded under the Department of Community Services and Health's general practice evaluation program.

In the first round of grants announced late last month, Monash and Melbourne attracted about $500,000, half of the national grant total. The collaborative video project involves both universities' community medicine departments and the National Centre for Health Program Evaluation.

The project consists of three studies using actual doctor-patient encounters, videotaped in general practice, as a database. It has been developed by Dr Liz Harris, a senior lecturer in the Monash Department of Community Medicine.

"The title of the project describes exactly what it is," she said. "To have a look at what general practice is and what it does is hard to do, except by direct observation."

The research group will record the daily consultations of 150 selected GPs of both sexes in country and metropolitan areas. The confidentiality of doctors and patients will be protected.

A smaller-scale study in Newcastle in the early 1980s established this method as a useful tool for analysis of general practice, which presented different problems compared with other fields in medicine.

"In general practice you are not always dealing with patients with clear-cut diagnoses," Dr Harris said. "GPs deal with problems which are not defined well or which are still developing, and many psycho-social illnesses."

The project will be linked to the results of other national health surveys.

Community Medicine department staff also attracted several independent project grants. Grants to doctors Peter Schattner, Chris Silagy and Dierdre Lewis totalled $103,000.

Dr Stephen Trumble, the newly appointed senior lecturer in the intellectually disabled unit, was awarded a seeding grant to develop research into the special needs of the intellectually disabled patient in general practice.

A collaborative project between Dr Larry Osborne and Dr Leon Pitterman attracted another seeding grant to develop a project to measure quality assurance for the solo urban GP.

Bridges under the hammer

Months of painstaking design work was demolished in only a few seconds as first year civil engineering students vied for honours in the 1991 Karate Cataclysm Competition.

Sixty-seven teams submitted entries made from steel, aluminium, perspex and wood. But the winning entry was formed from polystyrene, strengthened with a strip of transparent adhesive tape.

The aim was to build the lightest possible structure which did not deflect downwards by more than 120 millimetres after the impact of a 2.3 kilogram steel hammer, dropped through 400 millimetres vertically.

Professor Noel Murray, Deputy Head of the Civil Engineering department, said the competition taught students to apply concepts covered in the mechanics of structures course while working in a team.

The winning team's entry weighed 81.26 grams, closely followed by the second prize winner at 90.62 grams. The members of the winning team were Luke Prendergast, Adam Stanley, Byron Bowman and Nicky Barlow.

Above, Professor Noel Murray raises the steel hammer above one of the entries ... and lets it fall, below. The perspex structure failed the test.

Editor of The Age*, Mr Michael Smith (left) and science writer Peter Pockley consider the academic point of view.*

Picture: BRIAN CARR

Academics meet the press

Mr Luke Slattery, the education writer at *The Age*, has been awarded the inaugural Australian Press Fellowship.

He will spend the second semester at Monash, attached to the National Centre for Australian Studies. While at Monash Mr Slattery will work on a book on higher education.

The aim of the Press Fellowship scheme is to allow journalists to participate and contribute to university life. The scheme, part of the 'Ideas for Australia' program, is funded by the Federal Government, Monash and the Australia Council.

Another two journalists will be seconded to other Australian universities during the second semester.

Announcing the press fellow, the Deputy Vice-Chancellor, Professor John Hay, said Monash would continue to fund the fellowship scheme once the seed money had run out.

He said the aim of the fellowship was to bring working journalists into universities where they did not have the pressure of working to a deadline.

Although the fellows were not expected to undertake specific teaching and research, some would give lectures and seminars.

Professor Hay noted the success of similar schemes in the UK and the US.

The announcement was made during a forum titled 'How can Academics and Journalists talk to Each Other?', another part of the program.

Forum participants included Professor Donald Horne, the former editor of the *Sydney Morning Herald* and *The Herald*, Eric Beecher, the editor of *The Independent Monthly*, Max Suich, and the Director of the National Centre for Australian Studies, Professor Peter Spearritt.

Media representatives said a feeling of mutual distrust pervaded the relationship between academics and journalists.

Mr Suich attributed this distrust to the cultural divide separating universities from the media. He commented on academics' general inability to present their ideas in a manner suitable for the mass media.

Mr Beecher expanded on this view, saying that during his time as editor of *The Sydney Morning Herald* he had tried to expand the editorial and opinion pages of the paper to reflect the best in Australian thought.

However, he said his attempts were largely a failure because there was "not a great deal of original thinking going on in the universities, or in the wider community for that matter."

New centre to promote Korean links

Korea's growing importance as one of Australia's major trading partners has led to the establishment of a National Korean Studies Centre.

The centre, based at Swinburne Institute of Technology, was opened officially last month by the Minister for Employment, Education and Training, Mr John Dawkins.

A joint venture between La Trobe, Monash and Melbourne Universities and Swinburne Institute of Technology, the centre was established in August 1990 with a $900,000 grant over four years from Department of Employment, Education and Training. Each of the four institutions will contribute $250,000.

The centre will act as a national focus for Korean-related teaching and research in Australia, extend the range and scope of academic study and research in Korean studies and promote greater awareness and mutual understanding of the Australia-Korea business relationship.

A textbook writing program already is under way. The program intends to produce and market high quality written and audiovisual texts for Australian institutions. Three volumes of an initial nine volume tertiary course already have been published.

National Korean Studies Centre

According to Monash University's representative, Mr John McKay, the centre is a result of the Garnaut report on Australia's relations with its north-east Asian neighbours.

Mr McKay said that a greater awareness of Korea was important now that the country had passed New Zealand to become Australia's third largest trading partner.

Each of the four institutions is an equal partner in the centre. However, Monash is one of the two members which teaches the Korean language. In addition, Mr McKay said a course in Korean studies would be introduced at Monash next year.

The centre would benefit from the support of Monash's Institute for Contemporary Asian Studies, the faculties of Arts, Education and Economics Commerce and Management, and the Monash-ANZ Centre for International Briefing.

At the signing of the agreement to establish a chair in anaesthesia are (back row, from left) Monash Medical Centre Chief Executive Officer, Dr Just Stoelwinder; Dean of the Faculty of Medicine, Professor Robert Porter; RACS Faculty of Anaesthetists Registrar, Mrs Joan Sheales and the faculty's Vice-Dean, Dr Michael Hodgson; (front row, from left) Monash Medical Centre Board Chairman, Mr Ian Ferris; RACS Faculty of Anaesthetists Dean, Dr Peter Livingstone and the Vice-Chancellor.

State's first anaesthesia chair

The study of anaesthesia in Victoria is to be boosted significantly by the establishment of the state's first chair of anaesthesia at Monash. An appointment to the chair, to be based at Monash Medical Centre, is expected to be made by the end of the year.

Previous attempts to set up a chair of anaesthesia in Victoria have failed, despite the strong support of local anaesthetists. Melbourne is the only city of its size in the English-speaking world without a professor of anaesthesia.

Chairman of the Victorian Chairs of Anaesthesia Advisory Committee, Dr Peter Lowe, welcomed Monash University's offer to provide academic support for the chair.

"Anaesthetists are the third largest specialist medical group, and the terms under which Monash will establish this chair recognises the status appropriate to this position," Dr Lowe said.

More than $1.6 million has been pledged to the Victorian Chairs of Anaesthesia Fund. Dr Lowe said the support of anaesthetists and their colleagues was so strong that they had pledged more than $700,000.

The Dean of the Faculty of Medicine, Professor Robert Porter, was delighted with the Faculty of Anaesthetists' grant to the university and Monash Medical Centre.

"We will now be able to establish a world-class academic department of anaesthesia in Victoria," Professor Porter said.

"It will advance the scientific and medical development of the discipline, engage in undergraduate, postgraduate and continuing education in anaesthetics at the highest international level and also enrich the anaesthetic services available to the Victorian public."

Suburban study probes our recycling attitudes

A metropolitan recycling study, coordinated by staff and students on the Frankston campus, is the first of its kind to be conducted in Australia.

Many households in Camberwell, Frankston and Richmond will be invited over coming weeks to take part in the study, held in conjunction with the Environment Protection Authority, the Litter Research Association and local councils.

Mr Rob Curnow, of the Applied Psychology department at Frankston, said most residents were aware of the recycling bag service operating in their area, but not all were using it.

"The research intends to discover what people know about the service, whether they take part in it, and how it may be improved," he said.

"The study is testing a psychological model that predicts people's participatory behaviour in recycling programs. The purpose is to discriminate between the type of person who uses a recycling system and the type who doesn't."

The research results will form a basis for the development of an EPA education package to improve Victorians' involvement in recycling.

The study, covering a cross-section of metropolitan councils, will continue for about seven weeks. It may be extended, depending on funding.

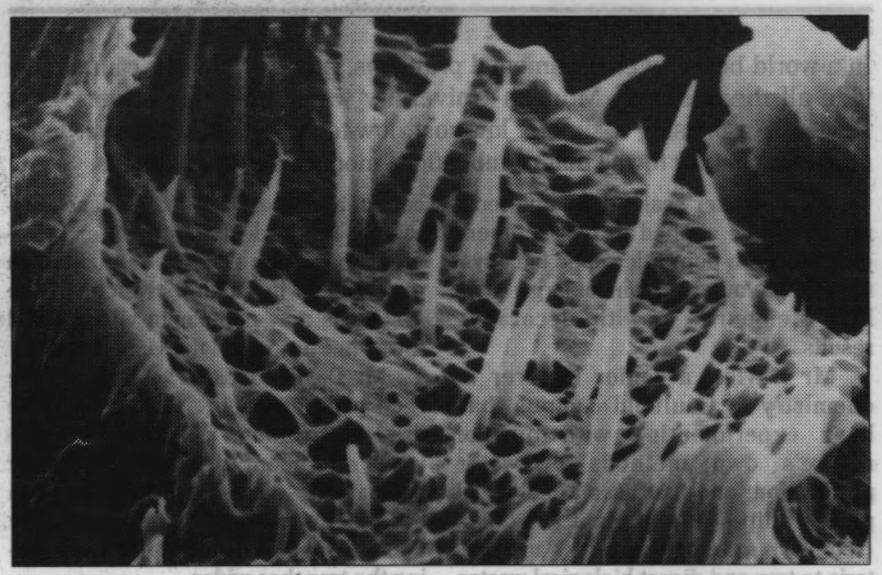
Mr Frank Fisher, of the Graduate School of Environmental Science, and Professor Richard Snedden, of the Professional Studies faculty, may develop the study further in conjunction with the Melbourne City Council's waste minimisation scheme.

The recyling survey team (back row, from left) Ms Justine Stafford, Ms Robyn Parker, Ms Verena Ross, Ms Chris Wilson and Ms Lee Elder; (front row, from left) Ms Mary Marsh, Mr Rob Curnow, Ms Stephanie Deeley, Ms Ange Garaballi and Ms Judy Latta.

RESEARCH MONASH

Tipping the light strong plastic

New generation liquid crystal polymers can be used alone or blended to form "polymer alloys", which promise to be stronger, lighter and even more durable than today's high-tech plastics. PhD student Doug Turek has been examining their potential.



An electron micrograph of a conventional polymer mixed with TLCP.

Polymers – plastics – acquired a poor public image during the 1950s and 1960s, and it has stuck. They were too brittle or too soft, lacked strength and durability, tended to warp and melted at moderate temperatures.

Modern polymers have solved most of these problems. There is an enormous range that variously offer higher strength and stiffness, exceptional resistance to chemical attack and resistance to temperatures of hundreds of degrees. Tomorrow's polymers promise to be even better, and more environmentally benign.

Mr Doug Turek, a PhD student in the Department of Materials Engineering, has been conducting experiments on a new class of super-strong polymers called thermotropic liquid crystalline polymers (TLCPs).

TLCPs can be used alone in hostile environments, or incorporated into other polymers to provide strength and stiffness. Polymer composites already exist that are strengthened by non-polymeric materials such as glass fibres, but these have the disadvantage that they cannot easily be recycled.

The only way to separate the fibres is to burn off the plastic. The advantage of TLCP-based "polymer alloys" is that they can be recycled, even though the TLCP polymer is intimately interwoven in the composite material.

Mr Turek says liquid crystals – now extensively used as display devices in everything from wristwatches to computer screens – represent a novel state of matter, between the random state of liquids and the highly ordered crystalline state of solids. These materials have reasonably low molecular weight and work by orienting themselves when an electrical field is applied.

Thermotropic liquid crystalline polymers have a much higher molecular weight and have highly oriented, linear molecules, in contrast to most conventional polymers whose molecules are randomly oriented and convoluted.

Kevlar was the first liquid crystal polymer. It is a lyotropic liquid crystal polymer, formed by processing at relatively low temperature in a strong acid solvent such as sulphuric acid. The polymer is then spun into fibres.

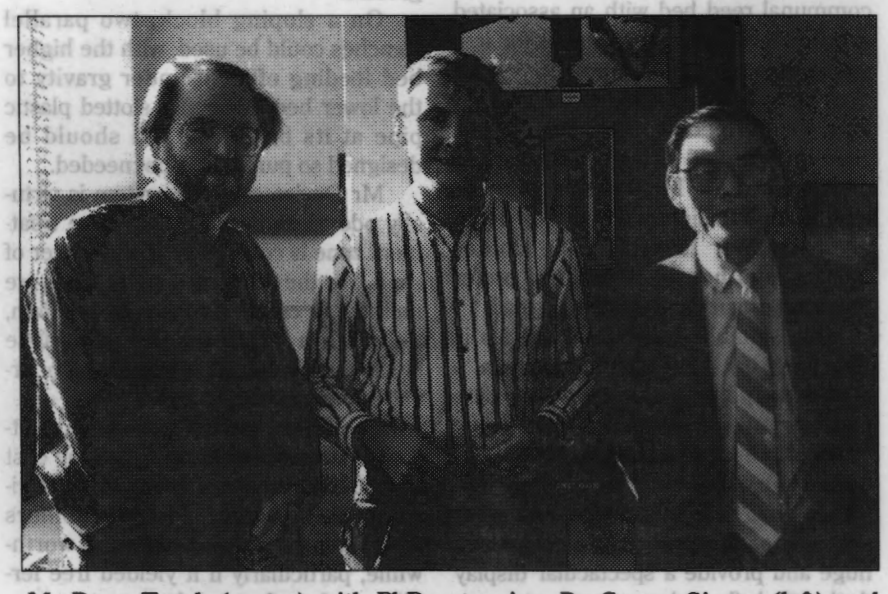
Kevlar's great strength, low ductility and stiffness stem from its highly oriented molecules, and it is used in sails on racing yachts, bullet-proof vests and even as shielding against micrometeorite impacts on the Galileo space probe.

Lyotropic liquid crystal polymers are difficult to process, and thus very expensive. On the other hand, thermotropic liquid crystal polymers, which have similar properties, can be more cheaply produced by extrusion or injection-moulding.

Mr Turek has been investigating how the design of extrusion dies affects the structure and physical properties of TLCPs. In the melted state, the polymer has very low viscosity and flows readily. In this state its molecules are still disordered, but when they are forced through an extrusion die they emerge strongly oriented in one direction. In effect, the polymer that emerges consists of parallel fibres of great strength and stiffness.

They also have a very low thermal expansion coefficient, showing minimal increase in length when heated. This characteristic allows TLCPs to be used in combined plastic-metal components in hot environments such as car engines. Conventional high-temperature polymers consist of molecules based on bulky aromatic chemical groups, which makes them difficult to process and form.

Mr Turek says the properties of TLCPs are very sensitive to their flow history during processing. By carefully controlling flow conditions through modifications to the design of the die, as well as the rate at which the polymer moves through it, a highly oriented product with good mechanical properties can be created.



Mr Doug Turek (centre) with PhD supervisor Dr George Simon (left) and associate supervisor Dr Carlos Tiu (right).

"When the molecules pass through the die they tend to align themselves like logs floating down in a river, and maintain structure and rigidity," he said. Continuing the analogy, the overall behaviour of the logs is sensitive both to the direction and the velocity of travel; conditions that can be changed by modifying the design of the die.

The study is aimed at characterising the fundamental relationships between processing conditions and the properties of TLCPs, and polymer blends based on TLCPs; their microstructure, flow behaviour and mechanical properties.

"One can obtain substantial changes in mechanical properties by changing subtle parameters, but until we know what these relationships are, we can't hope to make polymer blends with optimal properties," Mr Turek said.

"Recently I have been concentrating on how extrusion conditions influence the development of their properties. In a typical injection-moulding process, the flow behaviour and thermal history of the material are quite complex, so the resulting properties of material are complex.

"I have stepped back to a simplified system which involves extruding the material through a die, collecting the extrudate and determining how the flow conditions and flow history influence its mechanical properties and microstructure."

By varying die geometry, Mr Turek has shown that a die with a converging section produces a type of flow that orients the material better than the shearing flow that develops in a tube of uniform diameter. In shear, the flow is highest at the core and lowest at the outer boundary where it interacts with the walls of the tube.

The converging section of the die produces extensional flow, and this stretching greatly improves the orientation of the polymer molecules, producing better mechanical properties than materials produced by shear flow.

For conventional polymers, the geometry of the die is not particularly important because the materials have a short relaxation time: they tend to quickly "forget" the orientation produced after passing through the die. But TLCPs, with their very stiff molecules, respond more slowly, so the orientation is preserved immediately after they have left the die.

"Changing the length of the die changes the balance between shear and extensional flow, and can increase the tensile strength by a factor of four.

"I am hoping now to take TLCPs and blend them with conventional engineering polymers and look at the same sorts of processes and their influence on the development of their properties," Mr Turek said.

He has been doing preliminary experiments with polyphenalyne oxide (PPO), a conventional polymer widely used in automobile dashboards. It is sold in commercial form, already blended with high-impact polystyrene, under the name Noryl.

PPO and TLCP are incompatible in the melted phase, and when they solidify, the TLCP polymer exists as a highly oriented, fibril-like dispersion reinforcing the PPO matrix (see electron micrograph).

The composite material has the advantage of being fully recyclable at the end of its working life. The entire polymer alloy can be remelted and reformed, allowing the material to be reused many times.

The first TLCP was invented by Eastman-Kodak in the late 1970s and several companies now manufacture TLCPs commercially.

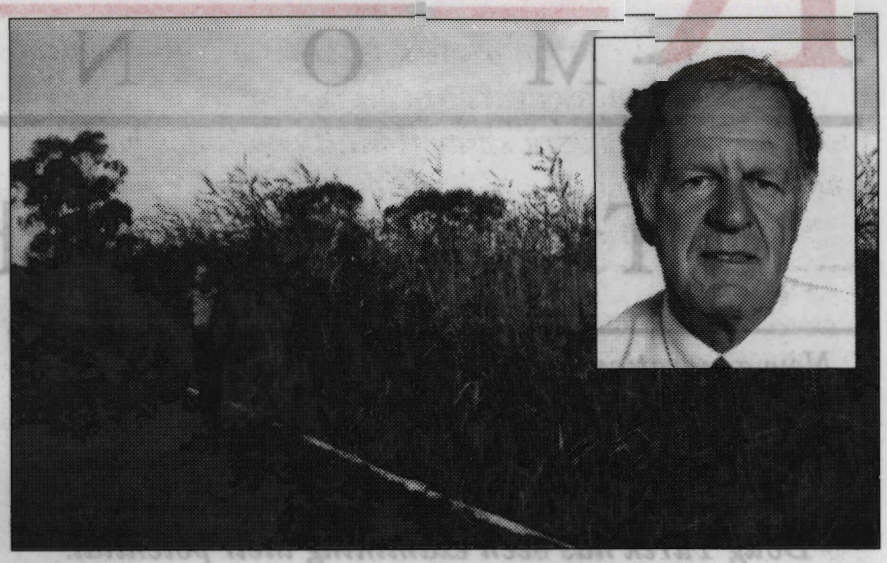
Hoechst-Celanese makes Vectra, Dupont sells one called HX-2000, and the Amoco polymer group makes another called Xydar. ICI and Tennessee Eastman are involved in product development.

Mr Turek says such materials are still very expensive; typically 20 times the price of commodity polymers such as polyethylene. "But they're new, so the cost will come down. They have great potential to be used in polymer blends as the minor partner, to produce a composite polymer with improved properties," he said.

Continued on Research Monash 4

Treating effluent biologically

Water pollution expert Tom Davies has been experimenting with one of nature's own water purification systems – a partnership between plants and bacteria. He believes the system could provide country towns with an effective, low-cost alternative to modern sewage treatment plants.



Mr Tom Davies (also inset) with the Frankston reed bed system.

In a world beset by environmental problems, high technology cannot provide all the answers. Monash University water pollution expert Tom Davies is proposing a simple, low-cost, low-tech sewage treatment technique for country towns that cannot afford modern treatment plants.

On a smaller scale, the same technique can be applied to treat effluent outflows from domestic septic tank systems in the outer regions of large cities like Melbourne – with decorative results.

Mr Davies, a senior lecturer in chemistry at Caulfield campus, has been experimenting with one of nature's own methods of water purification; one that uses a biological partnership between plant rhizomes (rootlike subterranean stems) and bacteria to trap and digest biological wastes that remain suspended in the water after primary settling treatment.

The basic form of this artificial wetland is a long trench, about half a metre deep, filled with coarse gravel. Plant species that normally live partly immersed in water on the fringes of lakes and streams, or which can tolerate having submerged rhizomes, are planted into the gravel bed, which is then topped with a layer of sand.

Three years ago Mr Davies constructed a large experimental system near Frankston for the Mornington Peninsula and District Water Board, which was looking for a cheaper method of sewage treatment to serve one of the fastest-growing population centres in the Melbourne region.

After an initial settling-in period, during which the specialised bacteria colonise and proliferate on the plant rhizomes, the system fulfilled its promise of removing carbon-rich suspended solids cheaply and efficiently from the waste stream.

Carbon compounds are potentially the most damaging pollutant in sewage effluent. If effluent is discharged untreated into natural waterways its carbon combines with dissolved oxygen, forming gaseous carbon dioxide. The reaction robs the water of oxygen, killing fish and other aquatic organisms, including plants.

The capacity of an effluent to deplete water of oxygen is described by a measure called biological oxygen demand (BOD). Large volumes of effluent with a high BOD can turn streams and lakes into foul-smelling biological deserts, inhabited by anaerobic bacteria.

In the early 1970s, German scientist, Dr R. Kickuth, came up with the concept of a low-cost, low-maintenance biological method of waste water treatment, based on reed beds planted in gravel beds in shallow trenches. The system is now popular in villages and towns in Europe and the United States.

Mr Davies decided to scale up the reed bed system to see if it could be used for treatment of much larger volumes of effluent, generated by larger population centres. Larger volumes can be accommodated in two ways: by building multiple trenches, and by making the trenches wider.

The Frankston facility, which is planted with the reed ITAL Phragmites australis XITAL, was constructed early in 1988. ITAL Typha latifolia XITAL and ITAL T. domingiensis XITAL are also suitable reed species.

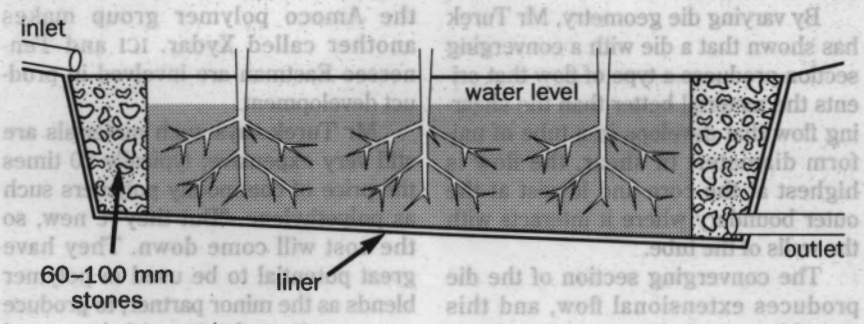
During the summer of 1989–90, the reed beds were removing up to 96 per cent of suspended solids, with a corresponding decrease in biological oxygen demand at the outflow point. The figure remained at more than 90 per cent for two years, even in winter.

Mr Davies says unplanted gravel beds develop their own bacterial populations and will initially approach the performance of planted beds, before falling away as they become completely colonised and oxygen penetration declines, making them more anaerobic. An unplanted gravel bed functions in much the same way as the sand filter at the outflow of a domestic septic tank.

The superior performance of reed-planted gravel beds stems from the fact that the rhizomes conduct oxygen into the bacterial layer, promoting more rapid breakdown of carbon compounds.

The plants also take up small quantities of nitrogen and phosphate, but unless the above-ground parts of the plant are harvested, these nutrients tend to recycle as they are deposited in leaf-litter and reabsorbed into the bed. Significant amounts of nitrogen are removed by nitrification and denitrification.

At the end of the Frankston experiment, the water board considered that levels of nitrogen and phosphorus were still too high to be safely discharged into the sensitive marine environment of Westernport Bay. These nutrients can cause algal blooms that may produce toxins and kill marine life.



Reed bed section.

It is possible to remove phosphorus in its biological available form by adding alum – aluminium sulphate – to the last third of the reed bed's length. The chemical reaction causes aluminium phosphate to be deposited as a solid precipitate that is retained in the reed bed.

Mr Davies says that it would take about 50 years before the voids in reed bed filled up with aluminium phosphate, necessitating removal and replanting.

He believes the technique still has much to offer smaller country centres that do not have conventional sewage-treatment plants. It could also be usefully adopted by property owners concerned about septic tank effluent, with high BOD and nutrient levels, entering ground water or local streams.

In these situations, water containing phosphorus and nitrogen could be usefully regarded as a free liquid fertiliser. The effluent would have a low level of residual microbial activity, and so could not be used on ovals or lawns because of health risks to humans. However, such effluent could safely be used to irrigate and feed pastures, commercial forests or municipal and domestic gardens.

Reed beds would assist in conserving water, often a scarce resource in drier areas of Australia. Surplus effluent could be retained in a pond during winter, and then pumped to where it was needed in the warmer months.

Schemes of this type, using the outflow from primary settler tanks, have been used by small rural communities in the US and Europe for a number of years. They are also popular in camping areas such as national parks.

Mr Davies says a similar arrangement could be used on housing subdivisions in outer suburban areas. Householders would pipe their effluent into a communal reed bed with an associated overflow pond, and then use it for irrigating their gardens in summer.

The individual householder could go a step further by harvesting surplus reed growth and using it as a garden mulch. However, Mr Davies says reeds tend to look unsightly when they begin to shed their leaves in the colder months, and householders may prefer to use an ornamental species instead.

One suitable ornamental species is the canna lily. Mr Peter Cottingham, a master's student in Mr Davies' group, has monitored a system to treat septic tank effluent at a home in nearby Somerville. The cannas, planted in a trench that runs along a fence line at the rear of the property, have grown huge and provide a spectacular display during their flowering season.

Mr Davies has used a collection pond and reed bed to capture and treat effluent draining from the Lysterfield tip, on Melbourne's eastern outskirts. The collection pond is at the base of a hill, and effluent is pumped to two dams on higher ground, before being allowed to trickle through the reed beds.

Preliminary work done in the US has shown that reed beds can even break down many intractable organic pollutants including phenols, benzene and chlorinated hydrocarbons. Mr Davies is planning a collaborative project with Australian chemical manufacturers to follow up this work at Frankston, using the beds to develop strategies for coping with industrial effluents.

Mr Davies says that householders interested in constructing their own reed or canna bed systems to treat septic tank effluent should construct a trench about 20 metres long, one metre wide and about half a metre deep. About 10 cubic metres of earth will need to be excavated, at a cost of around $20 per cubic metre at commercial rates.

The gravel can be of almost any coarse material. Scoria or bluemetal are ideal, while alternative materials include crushed bricks, granite, river pebbles, or even fragmented plastic wastes. The material must combine high hydraulic conductivity with a high surface area for the bacteria to colonise. An average particle diameter of 30–40 millimetres is best.

Effluent should be trickled into the bed across its full width, via slotted pipes placed at the bottom of the bed. The trench should be fully lined with thick builders' plastic sheeting for the first 10 metre section. The second section should be lined for half its length, with the remainder left unlined for the disposal of the treated effluent into the ground.

On a sloping block, two parallel trenches could be used, with the higher bed feeding effluent under gravity to the lower bed through a slotted plastic pipe at its base. The fall should be designed so pumping is not needed.

Mr Davies says the system is virtually odourless because the active treatment zone is covered by the top layer of sand. For the same reason, the beds are unlikely to create a mosquito problem, although a holding pond should be stocked with fish to keep mosquito larvae under control.

The total cost for a domestic wetland system would be less than the cost of installing a normal septic tank. Environmentally-conscious householders might consider the investment worthwhile, particularly if it yielded free fertiliser and garden mulch.

Mapping the molecular landscape

The forces that control protein interactions in their role as genetic messengers are beginning to be better understood. Research student Matthew Wilce has been mapping the role of amino acids, the building blocks of protein, in this complex chain of molecular events.

A protein molecule drifts towards a cell, bearing a biochemical message despatched from another cell. It moves randomly, buffeted by energetic atoms in its watery environment, until Brownian motion finally brings it close to a second protein molecule – a receptor embedded in the oil-like membrane of a cell.

Its motion now seems to acquire purpose. It moves towards its target, gathering pace as if drawn by magnetic attraction, orientating itself like a spaceship preparing for docking.

From a protected recess within the messenger, a loop-like cluster of amino acids suddenly pivots forward to grasp a complimentary structure in the receptor. Transferred chemical energy ripples into the body of the receptor protein and down through the membrane into the cell's interior; ultimately to be conveyed by further protein–protein interactions to the nucleus, where it will switch on a gene.

One of the most important insights to emerge from biology in the past two decades is that when proteins meet to transact the business of life, the outcome is determined as much by their three-dimensional shape as it is by simple chemical interactions.

Another crucial discovery: protein molecules change shape during such encounters. Such shape changes may switch a protein molecule between its active and inactive states, or even alter its function is such a way that it can perform several quite distinct roles.

The promise for medical science is that if such protein–protein actions can be understood in fine detail, it may be possible, among other things, to custom-design new drugs to regulate gene activity, or to modify the activity of proteins to correct metabolic disorders.

Protein–protein interactions are extremely difficult to study at a molecular level. For his PhD studies, Mr Matthew Wilce, a postgraduate student in the Department of Biochemistry, has been evaluating the dynamic interactive behaviour of proteins and then attempting to develop models for predicting their active regions.

Mr Wilce has been exploiting a technique called reversed phase high-performance liquid chromatography (RPHPLC), a technique widely used to purify and separate mixtures of proteins and peptides (combinations of two or more amino acids). It involves passing such mixtures through a bed of tiny silica beads coated with different types of chemical ligands, which act as receptors.

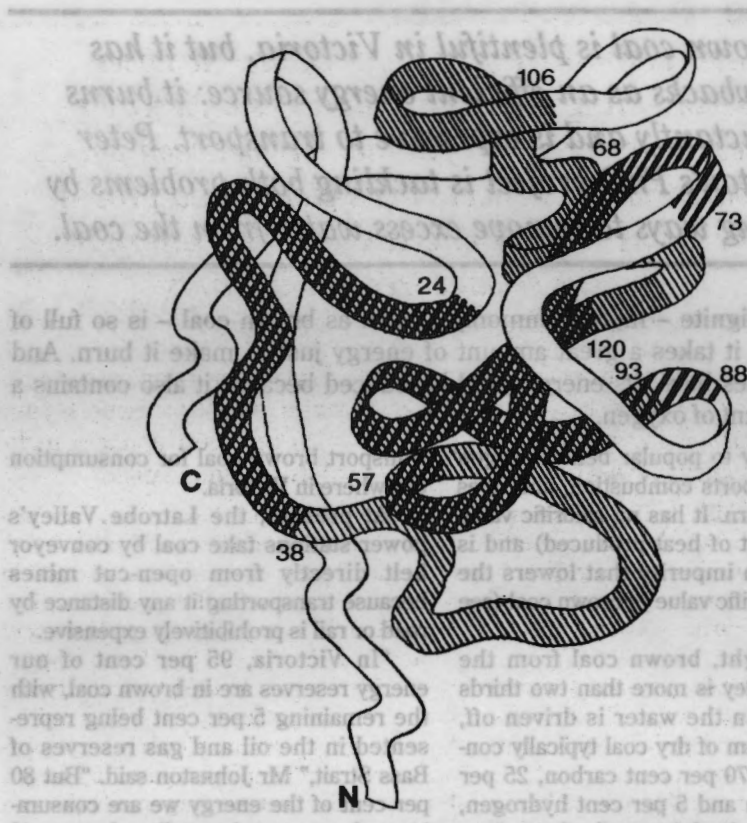
Proteins and peptides will interact with these ligands to varying degrees. It is the differing degree of interaction that gives this technique its exceptionally powerful purification abilities.

If the nature of the interaction between proteins and the ligands is similar to protein–ligand interactions in natural systems, it should have been possible to analyse the complex phenomena of the natural interactions by examining the mechanism of separation in the RPHPLC experiment.

A protein is a sequence of amino acids, the building blocks of all proteins. A typical protein molecule may contain several dozen to several hundred amino acids, arrayed like beads in a long chain. The individual amino acids interact along the chain's length, causing it to bunch, twist and fold into the three-dimensional shape that confers its specific biological activity.

Only certain parts of the molecule – specific amino acids – participate in the protein-ligand interaction. They are intolerant to change; changing a single amino acid may impair the protein's activity, or even abolish it completely. Other regions of the molecule serve only to configure and orientate the active amino acids so that they "mate" correctly with the ligand.

These active regions are believed to bind most strongly to the complementary active regions of the ligand. If Mr Wilce's theory were correct, they should bind in a similar way to synthetic ligands with similar chemical characteristics.



Three dimensional structure of FGF, adapted by J. Jarvis from the stereo templates of X. Zhu, et al, *Science, 251 (1991) 90. The light shading shows the receptor binding regions delineated by A. Baird,* et al, *PNAS 85 (1988) 2324, the dark shading shows the refined regions of Mr Wilce.*

The crucial question is whether the technique reliably mimics events occurring in living cells. Does the protein orientate itself and dock with the synthetic ligand in the same way that it does with its natural protein ligand?

Mr Wilce has produced convincing evidence that it does, and at the same time has provided insights into the behaviour of a protein and its ligand as they approach each other and then lock together.

Initially, protein and ligand are propelled towards each other by hydrophobic ("water-fearing") forces. The two molecules repel water – or are repelled by water – so they tend to be squeezed towards one another in their watery medium.

As they approach more closely, forces that act over progressively smaller distances become important. Attractive and repulsive forces associated with their charged regions force the partners into the correct orientation. Hydrogen-bonds and van der Waals' forces between individual atoms apply the finishing touches.

For his PhD study, Mr Wilce worked with two proteins: human growth hormone (hGH), and fibroblast growth hormone (FGF). Research groups overseas have managed to localise general regions that confer function, but the critical amino acids within these regions are unresolved.

The hGH molcule is interesting because in addition to its role in regulating growth, in humans and other higher primates it has a secondary role in milk production in the female. Exactly which part of the molecule confers this lactogenic activity in humans has been the subject of intensive research.

By comparing the amino acid sequences from hGH and other lower mammals species, Mr Wilce was able to use his technique to predict that the lactogenic region of the hGH molecule occurs very close to one end of the protein, a region called the C-terminus.

He has developed a computer program into which he feeds data about the strength of different protein–ligand interactions. These results are passed through an algorithm that causes the strongest interactions to appear as peaks against a background of weaker, non-significant peaks.

In the case of the hGH molecule, a prominent peak appeared near the C-terminus. No peak was visible for the growth hormones of phylogenetically lower mammals. With help from honours student Ms Helena Ross, he was able to show that there was little doubt that this region underpins human growth hormone's role in milk productions.

Fibroblast growth factor is a more recently discovered protein that is turning out to have many different biological activities. It has proved to be a difficult molecule to study because it is so short-lived, even in living tissue.

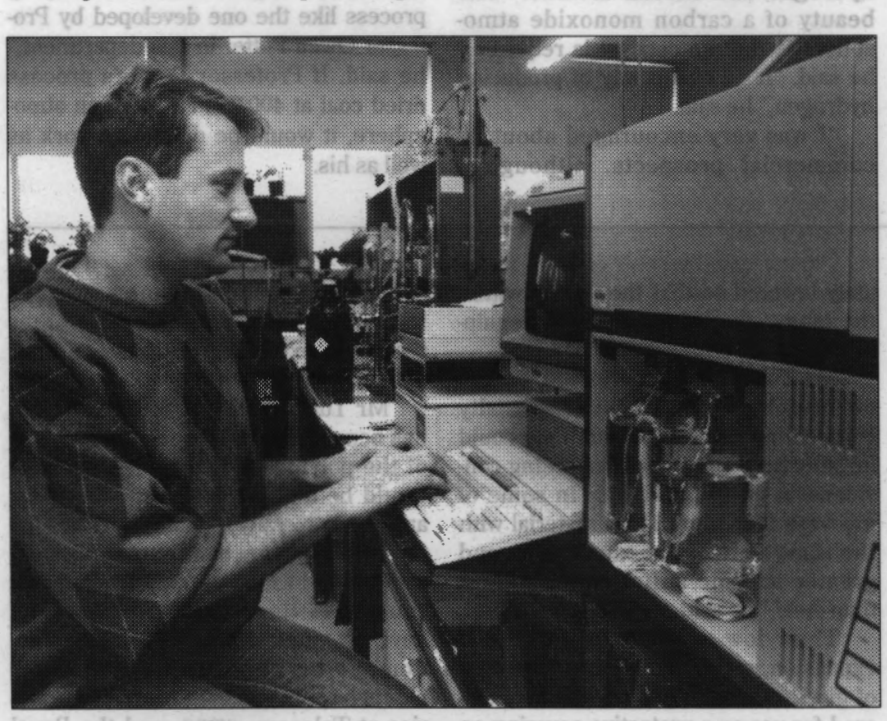
X-ray crystallography has revealed something of its three-dimensional structure, but this time-honoured technique has the disadvantage that it can only offer a still-life snapshot of a molecule that must change shape under natural conditions as a prerequisite to its varied biological activity.

Overseas research suggests that FGF in its unbound state is inactive and breaks down rapidly. In its active form, it is stabilised by heparin, a common protein in the bloodstream, and tends to be much more long-lived.

Other overseas studies have roughly mapped the active regions of the FGF molecule. Mr Wilce's RPHPLC technique has now narrowed down the active region and has hinted that one of the active regions may owe its activity to two shorter active peptides (see diagram above).

His demonstration that the interaction of proteins with synthetic ligands closely mimics real protein–protein interactions should allow RPHPLC to be used as a quick and reliable way of identifying active regions in protein molecules.

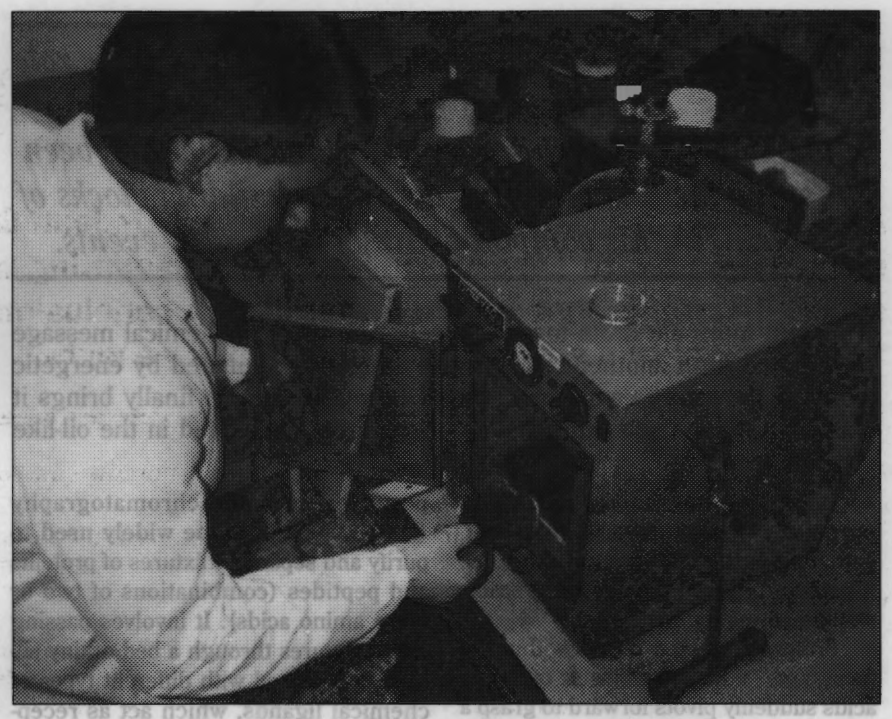
At least a dozen new human genes are being cloned every week. Some of them encode proteins of unknown biological function. With time-saving techniques like RPHPLC, it should eventually be possible to recognise active regions that are associated with specific biological activity.



PhD student Mr Matthew Wilce.

Burning brighter brown coal

Brown coal is plentiful in Victoria, but it has drawbacks as an efficient energy source: it burns reluctantly and is expensive to transport. Peter Johnston's PhD project is tackling both problems by seeking ways to remove excess water from the coal.



Peter Johnston drying coal in a vacuum oven.

Victorian lignite – more commonly known as brown coal – is so full of water that it takes a great amount of energy just to make it burn. And when it does burn, its energy yield is reduced because it also contains a large amount of oxygen.

Contrary to popular belief, oxygen merely supports combustion, and does not itself burn. It has no calorific value (the amount of heat produced) and is basically an impurity that lowers the overall calorific value of brown coal (see *figure 1*).

By weight, brown coal from the Latrobe Valley is more than two thirds water. When the water is driven off, each kilogram of dry coal typically contains about 70 per cent carbon, 25 per cent oxygen and 5 per cent hydrogen, with traces of sulphur and other minor elements. If the oxygen could be removed, the coal would increase in calorific value.

In 1986 Mr Peter Johnston began working as a technical assistant to Associate Professor Joe Mathews, in the Department of Chemical Engineering, on a project funded by the former Australian Research Grants Scheme. The project was to investigate how catalytic methods could be used to remove oxygen from brown coal, increasing its calorific value.

A year into the study, he decided to make it a master's degree project. Two years later he upgraded it to a full PhD study, and is now preparing to submit his thesis. Professor Roy Jackson, of the Department of Chemistry, is his associate supervisor.

The pay-off from any successful technique would be twofold: the coal would burn more readily, and it would finally become economically feasible to transport brown coal for consumption elsewhere in Victoria.

At present, the Latrobe Valley's power stations take coal by conveyor belt directly from open-cut mines because transporting it any distance by road or rail is prohibitively expensive.

"In Victoria, 95 per cent of our energy reserves are in brown coal, with the remaining 5 per cent being represented in the oil and gas reserves of Bass Strait," Mr Johnston said. "But 80 per cent of the energy we are consuming today comes from oil and gas, and the other 20 per cent from brown coal, so there's a large imbalance.

"Coal has become an unpopular fuel because of concern about carbon dioxide emissions and the greenhouse effect. My work has been aimed at making coal burn more efficiently. Upgrading coal to reduce its oxygen content means that it doesn't generate as much carbon dioxide.

"There's an argument that says we should simply bring in black coal from NSW and Queensland, but that ignores the capital investment in infrastructure in the Latrobe Valley, and the momentum of employment in the industry. So if we have to utilise brown coal, we have to do it efficiently."

The studies focused on Loy Yang lignite. Victoria's brown coals vary considerably in their composition and properties, according to their geological history. With old deposits approaching exhaustion, the huge Loy Yang lignite deposits are being exploited and are likely to be Victoria's main source of energy for another 1000 years at current rates of consumption.

To improve the coal's calorific value, Mr Johnston raises its temperature. At temperatures from 150° to 250°C there is only a marginal improvement in calorific value. The rate of increase in energy yield begins to rise sharply at temperatures over 300°C, before tapering off beyond 400°C.

Heating the coal in an inert environment is essential because oxygen would otherwise combine with carbon to form carbon dioxide, and any loss of carbon reduces the coal's ultimate calorific value. Mr Johnston sought to retain 95 per cent of the original energy, a figure that potentially would offer a commercially viable margin after deducting the cost of energy used in heating the coal.

He began his experiments using a nitrogen atmosphere, to establish a baseline against which yields from other reducing environments could be measured. After heating to 400°C, the calorific value of the dry lignite was increased by 30 per cent.

"Using nitrogen for upgrading the brown coal, you are basically driving off carbon dioxide," he said.

"Most of the oxygen is present in the form of unstable carboxyl molecules, which break apart when the coal is heated. Some of the carbon recombines with oxygen to form carbon dioxide and is driven off with the water, but the rest stays in the coal."

Mr Johnston experimented with various combinations of catalysts and reducing atmospheres, obtaining best results with a catalyst consisting of a dilute copper solution in a hydrogen atmosphere. This system yielded a 43 per cent increase in calorific value when heated above 375°C, but would be prohibitively expensive as a commercial process because of the high cost of producing pure hydrogen.

As a compromise, he experimented with an atmosphere of carbon monoxide, which in the presence of water from the coal itself, produces a mixture of hydrogen and carbon dioxide. "The beauty of a carbon monoxide atmosphere is that no catalyst is required," he said. "It's a cheap way of producing hydrogen," he said.

"I was very encouraged about its commercial prospects, although I realised that it would require very high pressures to make it work; about 220 atmospheres. That would make it much too expensive, because to contain such pressures the engineering would have to be very robust, and capital costs would be high.

"The other problem is that when coal is heated in the presence of water and carbon monoxide, there is a high rate of conversion of carbon monoxide to carbon dioxide, and that is unattractive because of the greenhouse effect."

After exploring various options, Mr Johnston came full circle. In the final accounting, the nitrogen atmosphere he had used for his baseline experiments looked most attractive economically. It produced a lower increase in calorific value, but also would cost less, and would yield a product with improved burning characteristics.

Mr Johnston says the ideal product is a coal with a particulate structure that has a high surface to mass ratio, so that it burns more readily. Treated brown coal has a very porous structure for flames to act upon, where black coal tends to be glassy with low porosity.

Even though his research was focused on fundamental aspects of upgrading brown coal, he believes his results could be applied commercially.

"This process could be used as the back end of a coal-dryer, or could be become a component of a coal-drying process like the one developed by Professor Owen Potter in this department," he said. If Professor Potter's process dried coal at 400°C in a nitrogen atmosphere, it would be doing my work as well as his."

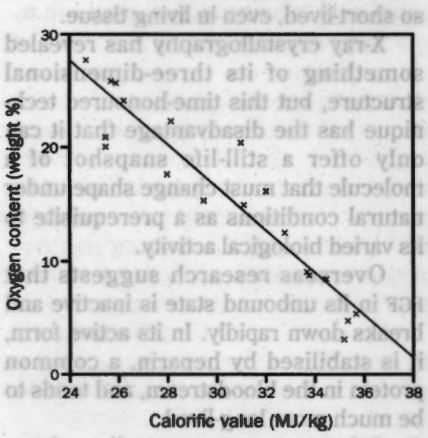


Figure 1.

Polymer process patented

From Research Monash 1

"Because of their low viscosity, they greatly improve the processability of these bulk polymers. At a concentration of 10 per cent, they can improve processability by 50 per cent. This makes the composite materials particularly suitable for injection moulding, because they flow more easily into the mould and conform to its shape."

He says that although the commercial advantages of TLCPs have yet to be demonstrated, ICI already has patented a process for making normally unproduceable polymers by blending them with TLCPs.

One application for TLCPs in the pure state is in plastic cooking containers for dual-function microwave ovens, which also use convective heat to brown foods. The containers must be able to tolerate temperatures of between 270° and 370°C. Such is the heat resistance of these materials that their melting points have been deliberately lowered so that they come within the range of existing processing equipment.

Mr Turek believes there are many opportunities in the field of specialty engineering polymers where they could be substituted for metals, providing considerable weight savings. "In some of my work I have produced material with the same stiffness as aluminium, and greater specific stiffness per weight than steel," he said.

Their low coefficient of thermal expansion, which closely matches that of glass, means they have been considered for use as a protective covering on optical fibres. It also may be possible to tailor the chemical structures in TLCPs to make them compatible with other polymers, extending the range of their potential applications.

Mr Turek says his research project has benefited from the close-knit nature of the polymer industry in Victoria. It would be impracticable and costly for any one university to maintain the range of equipment needed, and equipment also tends to change rapidly. Polymer companies Hoechst, Marplex and ICI have provided access to instrumentation and test equipment, and experiments have been conducted in laboratories at Telecom, CSIRO, and the Royal Melbourne Institute of Technology.

Living on adrenalin and Chinese brandy

As an expatriate teacher in China in 1989, Dr Joan Grant was uniquely placed to observe the pressures mounting within Chinese society – strains that reached their tragic conclusion in Tienanmen. She has just released her account of these events.

Dr Joan Grant at her local post office in Shanghai.

At 6 am on Sunday 4 June 1989, Joan Grant turned on her short-wave radio. In the morning quiet of the small kitchen in her Shanghai flat she heard the news:

"Chinese army stormed Tienanmen ... much bloodshed ... crushed by tanks ... toppled goddess of democracy ... ploughed relentlessly over anything in the way ... about 1000 students trapped ... no one knows the number of casualties ..."

By 11 am, Radio Australia was broadcasting even grimmer reports, suggesting China's new-born "democracy movement" had been suppressed in the most brutal way.

Dr Grant, executive officer of the university's Institute for Contemporary Asian Studies, had arrived in Shanghai in the previous August to take up a 10 month position at Shanghai International Studies University.

Her impressions have been recorded in *Worm-eaten Hinges: Tensions and turmoil in Shanghai, 1988–89*, which was launched last month by former Beijing correspondent for *The Age*, Peter Ellingsen.

The book, Dr Grant explained, grew out of a sense of outrage and of obligation to her students. She was angered by reports that appeared in the Australian media shortly after Tienanmen contending that a massacre did not take place. She also wanted people to understand the desperation that led students to risk their lives.

Although there were no student deaths in Shanghai, the city was still the scene of boycotts and blockades. About 86 cities throughout China experienced similar demonstrations in June.

"By total chance, I was witness to an extraordinary political upheaval," Dr Grant said. "I felt it was important to humanise the story, to tell people what it was like in China in the months leading up to Tienanmen.

"As a teacher you are given an unusual insight. Most other foreigners in China were either business people or diplomats, who had little opportunity to mix with ordinary people.

"Foreign teachers, on the other hand, lived closer to the people and were able to mingle with them."

For most of the 1980s, China had been testing the Western waters with one toe while the other foot was planted firmly in communism.

"With the establishment of small enterprises everywhere, some people in China were getting rich fairly quickly. But teachers, who were not held in high regard in a society which thought that all you needed was two hands and a money-making brain, had not been given a pay rise in 10 years."

In fact, teachers were held in such low esteem that students assigned by the Government to teaching courses tried to fail them in order to go into business.

Many students in China were impoverished, and unrest was high. "Inflation was running at 20 per cent. Some students only had hot water for breakfast and rice for lunch. Fruit was a luxury.

"They wanted the opportunity to choose their own job, rather than be assigned one under the State Unified Plan, which they disliked intensely."

Under the scheme, which required students to return to their home province, an English major could be given the job of translating manuals in a diesel factory.

And then there was the everpresent corruption. "Students often said that no teacher was not corrupt. They were cynical and disillusioned. Their view of the world was that to get anywhere you had to use bribery. Society, they felt, ran on what they called backdoorism."

"They were some of the best, brightest, most dynamic and optimistic students who wanted simply to make China into a better place."

The object of Tienanmen was not to change society, Dr Grant said. "It wasn't a democracy movement in our sense of the word. The students didn't want a multi-party system as such, nor a truly free press. What they wanted were the basic human rights of citizens anywhere, the freedom of choice, freedom to travel, to obtain the kind of job they and not the State wanted.

"They were some of the best, brightest, most dynamic and optimistic students who wanted simply to make China into a better place."

Dr Grant closes the book with a description of events in Shanghai in the days following the Tienanmen massacre. "Initially the city was filled with optimism when workers came out in support of the students. But fervour was replaced with nervous tension as the situation in Beijing became worse. Then there was only outrage and horror."

In the following days, Dr Grant lived on a diet of adrenalin and Chinese brandy as she furiously marked students' final exams so that they could graduate.

She left Shanghai wondering what revenge would be exacted on them. The vengeance, she said, has been arbitrary and devastating.

Worm-eaten Hinges, the first of a series of publications by the Institute of Contemporary Asian Studies, is published by Hyland House in association with ICAS. The cost is $20.

(The title of the book comes from an old Chinese proverb which says a door hinge, because it is continually moving, is never worm-eaten. In the words of one of Dr Grant's students: "Our door has been closed for too long".)

Academic protests considered

Academic staff concerns about the style of university management have been considered by a special university review panel.

An *ad hoc* sub-committee of the Committee of Deans was set up on the recommendation of the Vice-Chancellor, Professor Mal Logan, to consider concerns raised at a protest meeting of academic staff on 3 June.

Consisting of Professors Logan, Pargetter and Porter, the committee made a series of recommendations which the Academic Board adopted on 12 June. The Vice-Chancellor undertook to report to Council after receiving advice from the Committee of Deans.

The major recommendations of the Academic Board were that:

- senior administrators should maximise staff involvement in key academic policy decisions;
- the Comptroller and Registrar should report to Academic Board meetings, which should have the opportunity to comment on academic matters before they become university policy;
- the policy structure and administration of research be reviewed by a committee to be established at the next meeting of the Academic Board. The committee would invite submissions from faculties, groups and individuals.

Other recommendations included the need for faculty meetings to consider academic issues, appointments procedures, equipment funding procedures, changes to the 1992 budgetary process, and devolution of tasks to faculties.

Representatives of the Teaching and Research Action Group (TRAG) say that the Vice-Chancellor's proposals have fulfilled some of the action group's requirements. However, further discussion was expected about their implementation and other issues.

The meeting of the TRAG, chaired by Mr Malcolm Macmillan, of the Department of Psychology, was attended by 350 Clayton campus academic staff. A series of motions were passed.

The first motion, passed with four votes against, deplored the general direction the university was now taking and the erosion of the collegiate approach to university life and management by the actions of the present administration

It condemned the style of management of those senior university officers who made decisions profoundly affecting university life and staff without consultation with or reference to the same staff, who bore responsibility for the quality of teaching and research.

It demanded that the administration publicly renounce these practices and adopt an administrative style which restored a collegiate approach, and consultation with and respect for university staff at all levels of teaching and research.

The second motion, passed with two votes dissenting, deplored "the arbitrary way in which the three-tiered structure for managing research was established." It also called for the establishment of a research committee structure, representative of the university's research community, which allowed for elected delegates at faculty and university levels.

Other motions, passed unanimously, dealt with consultation on devolution of activities; the publishing of a simplified annual budget statement; disclosure of salary packages; and the introduction of regular faculty meetings.

Mr Macmillan said the meeting represented the widest range of academic opinion across most faculties below head of department level. "The central issue is management style. It's not a problem of communication," he said.

"We are objecting to the notion that likened the Council to a board of directors and the Vice-Chancellor to a chief executive officer. Our view is that the university exists to undertake teaching and research, and the administration exists to facilitate these functions.

"We are not opposed to efficiency in the running of the university, but judge the impact of recent administrative decisions on teaching and research as deleterious. These matters warrant the fullest discussion across the university."

Diary

4 July **Southeast Asian Studies Seminar** *Attempts at resistance by Indian workers on a plantation in Malaysia*, by Ms Ramanie Kunanayagam. Room 515, Menzies Building. 11.15 am.

6 July **Member's Social Night** *Rock 'n' Roll Night*, by The Flames. Monash University Club. 7.30 pm – 1 am.

11 July **Mechanical Engineering Seminar** *Investigation of the route to chaos in a differentially heated cavity*, by Dr P. Le Quere, CNRS, Paris. Mechanical Engineering meeting room. Room 203, Building 5. 4 pm.

Southeast Asian Studies Seminar *Women and Buddhism: The impact of war and revolution in Kampuchea*, by Dr Chou Meng Tarr, Curtin University of Technology. Room 515, Menzies Building. 11.15 am.

12 July **Evening Concert** *Stravinsky Concert*, conducted by Warwick Stengards, Richard Green and Russel Davis. Robert Blackwood Hall. 8 pm.

Migrant and Intercultural Studies Seminar *Greek immigrants in Australia: Research Seminar*. R3. 9.30 am – 5.15 pm.

13 July **Evening Concert** *Bagpipes, Brass and Voice*, a Dandenong Mayoral Charity Concert. Robert Blackwood Hall. 8 pm.

16 July **National Centre for Australian Studies** *Biography of W.G. Spence*, by Mr Garry Fabian and *A study of David Malouf*, by Ms Heather Wearne. NCAS meeting room. 10–11.30 am.

17 July **Free Public Address** *The Very Fast Train*, by Mr Alan Castleman, Chief Executive of the VFT Joint Venture Project. Room B2.22, Caulfield campus. 7.30 pm. Presented by the Chisolm Alumni Association. For further information, contact Ms Bev Fryer, extn 73 2731.

18 July **Southeast Asian Studies Seminar** *A question of security in a multi-racial society: Malaysia from WW2 to the Malayan emergency*, by Mr Leon Comber. Room 515, Menzies Building. 11.15 am.

23 July **Staff Development Free Lunchtime Talks** *Industrial Relations*, by Ms Ann Boyle. Gallery Theatrette. 1–2 pm.

27 July **Evening Concert** *The Armenian National Folklore Dance Concert*,, conducted by Assadour Hadjian. Robert Blackwood Hall. 7.30 pm.

28 July **Afternoon Concert** *Eastern youth laureate wind symphony*, conducted by Rowland Yeung. Robert Blackwood Hall. 2.30 pm.

30 July **National Centre for Australian Studies** *Writing a commissioned history, 2: A history of the operative Painters and Decorators Union*, by Mr John Spierings. NCAS meeting room. 10–11.30 am.

Note

Postgraduate Budget Lunch

The Monash Postgraduates Association will cater lunch for postgraduate students on Tuesday 30 July, at 12.45–2 pm in the Arts and Crafts Studios 1 and 2.

For further information, contact the association on extn 75 3197.

Research grants

Juvenile Diabetes Foundation Australia

The Juvenile Diabetes Foundation Australia invites applications from researchers who wish to further their research into diabetes. The awards aim to encourage travel to other research institutions or to scientific meetings.

The awards are open to Australian citizens or permanent residents who are medical graduates, scientists or allied health professionals. 5 July.

Australian National Parks and Wildlife Service

Financial grants are available through the Commonwealth Save the Bush program for the encouragement and support of programs and activities to protect, manage and investigate remnant native vegetation outside national parks and other reserves. Categories of application include on-ground vegetation protection activities, development and implementation of remnant vegetation management strategies, public awareness activities, surveys and data collection. 12 July.

The Myer Foundation

The Myer Foundation and the Sidney Myer Fund support programs in the community, environment, humanities, social development and the arts. 28 June.

Wool Research and Development Council Production Research Grants

The Australian Wool Corporation is calling for preliminary research submissions for new projects to commence in 1992/93 in the area of production research. Priority areas include soil, pests and diseases, farm management and technology, pastures and animal production. 15 July.

DITAC/GIRD Generic Technology Grants: Environmental Technology

The Waste and Environment Management Technology Committee of the Industry Research and Development Board invites application for financial support of projects in solid and liquid waste treatment, waste minimisation, recycling and reprocessing, site remediation and monitoring.

Preference will be given to projects which have the potential to restore or maintain the Australian environment or improve the competitiveness of Australian manufacturing through the adoption of environmentally sensitive manufacturing systems.

The committee will provide grants up to half the cost of a project and has set its minimum grant size at $100,000 for a maximum of three years. 26 July.

ARC Australian Postgraduate Research Awards – Industry

One hundred new ARC APRA (Industry) awards are available in 1992 for projects supported jointly by industry and higher education institutions. The awards provide support for students to undertake the projects and gain a Masters or PhD research degree. For a three year award for a PhD student approximately $53,000 in the form of stipend payments, and relocation and thesis allowances will be paid. These payments are tax exempt and indexed annually. In addition, award holders will be exempt from paying the Higher Education Contribution Scheme.

To be eligible a company must agree to provide a substantial annual commitment to the research including $5000 in cash and a further $5000 in cash or kind. 19 July.

American Foundation for AIDS Research

This Foundation provides support for projects in biomedical, humanistic and social sciences research relevant to AIDS.

Research grants are allocated to support research by postdoctoral investigators working on the psychological, ethical, legal and economic implications of AIDS. Intending applicants must submit a Letter of Intent obtainable from the Office for Research. 20 July.

The Apex Foundation for Research into Intellectual Disability

Applications are invited for grants in support of new or existing research projects. Grants may be awarded to workers in any discipline which is concerned with the causes, diagnosis, prevention or treatment of intellectual disabilities. 19 July.

For further information, contact the Office for Research on extn 75 3085 or 75 5134. Applications must be lodged by the date specified.

Scholarships and fellowships

Mt Stromlo Vacation Scholarship

Undergraduate students, especially those in their final year, are invited to apply for the vacation scholarship offered by the Australian National University. The recipient will spend six to eight weeks at the Mount Stromlo and Siding Spring observatories. 15 August.

Kidney Foundation's Summer Scholarships

The Australian Kidney Foundation is offering an award of $600 to undergraduates enrolled in medicine or any biological sciences who wish to undertake a research project studying the kidneys or urinary tract. The project, which will run from six to eight weeks, is tenable in any Australian university or teaching hospital. 15 September.

Water Research Awards

The Australian Water and Wastewater Association is offering a cash prize of $500 to undergraduates in their final year of a science or engineering degree undertaking a project on a water-related topic. The project must be completed before the end of November.

Sir Robert Menzies Memorial Scholarships

Australian graduates aged between 21 and 35 years who wish to undertake research leading to a higher degree in law or medicine are invited to apply for the Sir Robert Menzies Memorial Scholarship. The award is tenable for two years at a British university.

Law students will be awarded a personal allowance of £1000 per quarter. Expenses towards fees, air fares and thesis production will be covered. Medical students will receive a stipend of £15,000 per year to cover all research and living expenses. Air fares and travel costs will be funded by the Sir Robert Menzies Foundation. 31 August.

For further information, contact the Higher Degrees and Scholarship Section on extn 75 3009.

Mitsui Educational Foundation Student Visit to Japan

28 November – 19 December 1991

Since its establishment in 1972, the Mitsui Educational Foundation has enabled many undergraduates to participate in this cultural exchange program.

Full-time, Australian undergraduate students, aged between 20 and 24 years, preferably in the third or fourth year of their course, are eligible to apply.

Further information and application kits may be obtained from departments or the Higher Degrees and Scholarships Section.

The closing date for receipt of applications is Friday 16 August.

BRIEFS

Back to the seventies

'Off the wall/In the air' is the title of an exhibition of 1970s art, now showing at the Monash University Gallery.

The exhibition, organised by the Monash Gallery in association with the Australian Centre for Contemporary Art, runs until 10 August.

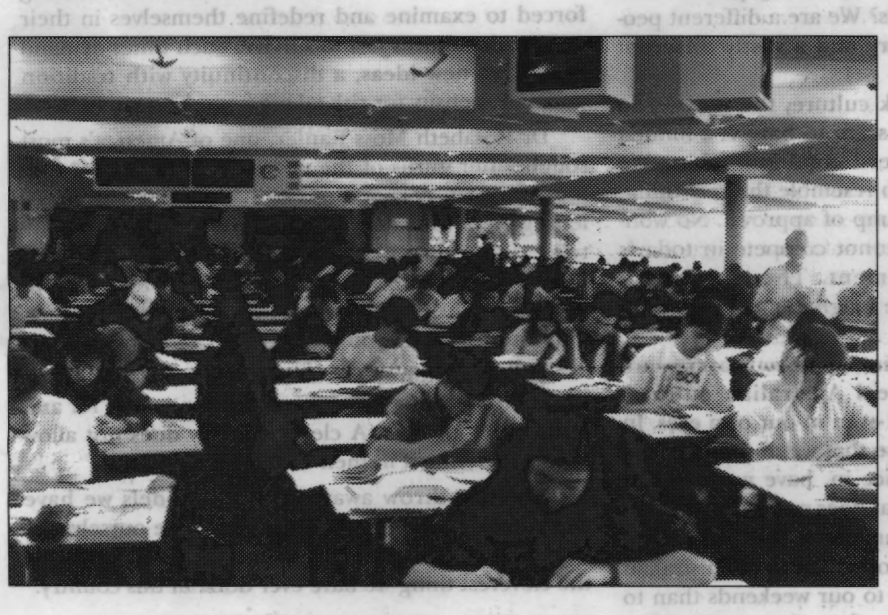
It covers all media, from painting and sculpture to performance and video art. Art in the 1970s was characterised by a strong interest in the environment and an intellectual climate which permitted the use of non-traditional art materials and methods.

More than 30 artists are represented including Robert Rooney, Micky Allen, Dale Hickey and Peter Booth.

The works have been collected from national, state and private collections including the Australian National Gallery, the National Gallery of Victoria, the Art Gallery of New South Wales, the Bendigo Art Gallery, the Geelong Art Gallery, and the Ballarat City Fine Art Gallery.

The gallery has organised a program of related events at the Australian Centre for Contemporary Art. A public forum will be held on 24 July at 8 pm. A public lecture by Professor Margaret Plant from the Department of Visual Arts, will be held at 8 pm on 31 July. On 6 August at 8 pm, a new performance piece, *Jill Orr: Love Songs*, will be presented. Admission is free.

First students past the post



Caulfield Racecourse was the exam venue for thousands of Monash students last month.

Up to 2000 students a day from Caulfield, Clayton and Frankston campuses took exams at the racecourse's three-level grandstand from 12 to 21 June. A special bus loop connected Clayton campus with the racecourse on exam days.

The university is holding mid-semester and final exams at the racecourse, adjacent to Monash's Caulfield campus, on a trial basis. Overall, about 14,000 Monash students took part in mid-semester exams.

The grandstand provided a high level of student comfort, with full carpeting, air conditioning, lifts, escalators and access for disabled students.

International standard lighting makes the new pitch suitable for top-level matches.

Hockey pitch in the black

After two years planning, Monash's long awaited all-weather hockey pitch was opened officially last month.

Monash is the first university in Australia to offer such a facility on campus. The pitch was completed at a cost of $700,000, which was provided from Student Amenities Fees. No government, general university or other public funds were used.

The project will generate enough income from hire to community hockey clubs to meet all recurrent running costs and to replace the synthetic carpet when necessary.

The pitch consists of an asphalt base covered with a shredded, reconstituted rubber-polyurethane mix to provide a shock absorption pad. On top of this a polypropylene tufted fibre pile surface has been laid. The lighting is of international standard.

The field, together with the adjacent turf pitches and the international-sized indoor pitch in the Recreation Hall, provides one of the best hockey facilities in the country.

Both the men's and women's hockey clubs and students who play for clubs other than Monash use the pitch four to five times a week for practice in addition to scheduled matches. The facility has been in use since April and will be used virtually all year round.

Engineering students move in

Distance education students met with lecturers, industry professionals and other students in a residential school organised by Monash University College Gippsland last week.

The School of Engineering runs two residential schools as a compulsory part of the Graduate Diploma of Engineering (Maintenance Management), a two-year part-time course, offered only by distance education.

About 50 participating students from the Solomon Islands, New Zealand, Papua New Guinea and all states and territories of Australia stayed at the campus during their visit.

"A major feature of the residential schools are that they give the students the opportunity to meet fellow students and staff," course coordinator Mr Keith Enders said.

"This allows them to discuss their work and any problems they are having. This has always been a highlight of the visit."

The residential schools also give the students, mainly professional engineers, maintenance engineers and managers, the opportunity to listen to guest lecturers with particular expertise and also the school's own staff. Students also take part in group discussions and workshop sessions.

Last week's school included trips to ESSO Longford Gas Plant and the RAAF base at East Sale.

About 120 students from a wide range of private and public industries have completed the course, which has been running since 1985.

One hundred students are enrolled in the course

Press cuttings

1 June, *The Age* – **Professor Owen Potter**, Chemical Engineering: $30m coal plant plan fuels tax inquiry.

1 June, *Geelong Advertiser* – **Dr Malcolm Sim**, Social and Preventive Medicine: Geelong mums in breast milk study.

2 June, *The Sunday Age* – **Dr Stephen Trumble**, Community Medicine: Disabled pose new problems for GPs.

3 June, *Sunraysia Daily* – **Professor Peter Fensham**, Graduate Studies: Education to fight the greenhouse threat. (*The Bairnsdale Advertiser*, *The Dandenong Examiner*, The *Nunawading Post*, *The Foster Mirror*, *The Shepparton News*).

4 June, *The Sydney Morning Herald* – **Dr Michael Abramson**, Social and Preventive Medicine: Something's in the air – and it needs tighter control.

4 June, *Southern Peninsula Gazette* – **Mr Phil A'Vard**, Alexander Theatre: Monash proposes a theatre network.

4 June, *The Australian* – **Mr Steven Morton**, Faculty of Science: Eye's the limit as camera gets greater vision.

4 June, *Herald-Sun* – **Mr Peter Gourlay**, Social and Preventive Medicine: Try these 4000 reasons to quit (smoking).

5 June, *The Age* – **Dr Ilana Snyder**, Inspiration at the terminal. (*Canberra Times*)

5 June, *Herald-Sun* – **Dr Michael Abramson**, Social and Preventive Medicine: Tidings of an ill wind.

5 June, *Daily Telegraph* – **Dr Ismail Kola and Dr Alan Trounson**, Centre for Early Human Development: Couple's hope from new boost to fertility.

5 June, *Waverley Gazette* – **Professor Geoffrey Thorburn**, Department of Physiology: Honours for Professor.

5 June, *Oakleigh-Springvale Times* – **Mr Peter Wade**, comptroller: Monash day at the races.

6 June, *Stack and Land* – **Professor John Freebairn**, Department of Economics: Follow NZ sales tax: Economist.

8 June, *The Border Mail* – **Professor Roger Short**, Reproductive Biology: Ten years later, the worst is still to come (AIDS).

8 June, *The Age* – **Dr Terry Obrien and Dr Tony Lee**, Koalas, gun trees and myths.

8 June, *The Age* – **Professor Bruce Holloway**, Genetics and Developmental Biology: Subterranean star wars.

9 June, *Sunday Age* – **Mr Phillip Stevens**, Electrical and Computer Systems Engineering: Tapping into the hotline of things to come.

11 June, *The Age* – **Dr Stephen Trumble**, Community Medicine: Discovering the person within (Down Syndrome).

14 June, *The Latrobe Valley Express* – **Professor Tom Kennedy**, MUCG: Churchill College busy tapping into lucrative Asian student market.

15 June, *The Age* – **Professor Bruce Holloway**, Genetics and Developmental Biology: Switching on to genes.

15 June, *The Age* – **Professor Mark Wahlqvist**, Medicine: Wrong dropper poses danger of vitamin A overdose.

15 June, *Herald-Sun* – **Professor Ian Rae**, Faculty of Science: $1.5m greenie injury. (*The West Australian*).

18 June, *The Age* – **Professor Peter Singer**, Human Bioethics: Animal lib president cleared.

18 June, *The Age* – **Professor J. Bruce Jacobs**, Asian Languages: Other sides to the China delegation.

18 June, *Herald-Sun* – **Mr Bryan Barwood**, Courses and Careers: Jobs and how to find them.

Press cuttings can be perused at the Public Affairs Office, first floor, Gallery Building, Clayton campus.

SAVANT

by Wendy Bell

AUSTRALIA'S REPUTATION for original thought is unquestioned. We do not lack the ability to invent, discover or acheive. Yet our Australian work culture has been derived largely from overseas.

History has taught us that the solutions to our problems are usually offshore. We have modelled our organisations and work practices by copying from the British, Canadians, Americans and, to a lesser extent, the Europeans. Now our eyes are straying towards Asia as a source of inspiration, instead of searching in our own back yard.

We have copied selectively, however, and have ended up with several different layers of imported work patterns. For example, just a few minutes viewing of 'Yes Minister' is convincing evidence that we have adopted the British bureaucratic work culture, along with the Westminster political system. Even Telecom, Australia's largest employer, continues to be cast in the image of its British namesake.

The Canadians conveniently provide us with a ready-made version of a society that is similarly western, ex-colonial and living in the shadow of the United States. We often go there seeking solutions. When it comes to non-government, profit-making enterprises, however, we have been more inclined to look towards the Americans.

From the US in the 1950s came General Motors and Ford to kick-start our manufacturing industries. Two decades later, they were followed by McDonald's and Colonel Sanders, to provide us with a model for our service industries.

With them came their foreign management systems and techniques, their organisational structures and aspects of their work culture. Along with the Holden car, we adapted them to Australian conditions, although the original mould still belonged to the General.

A whole generation of unskilled Australian workers and managers were influenced by these derived methods of organising work. Later, these same people went out and set up many of our small businesses. They trained the next generation of our workers, ignoring suggestions from the many immigrants who came to work in our new industries.

The result has been an Australian work culture of derived 'best practice' that stifled originality and innovation, unique only in that it was not our own.

More recently we have, along with the rest of the world, flirted with the participatory and consultative work styles of the Scandinavians and pondered the success of the Japanese. Yoshio Sugimoto, a Japanese social scientist and Dean of Social Sciences at La Trobe University, has told us that we "should not use Japan as a model to copy".

What works for them, the world's most successful copyists, will not work for us. How can Japanese solutions meet our unique needs? We are a different people, have a different history and a vastly different geography.

Then where is our work culture, the way we do things around here? All we seem to have is a limited range of brass copies of others' winning trophies. We have dipped them in gold to resemble the real thing, and then asked for their stamp of approval. No wonder our business models cannot compete in today's global economic environment. They are pitted against the very nations we originally copied them from!

To compound the problem, we know that they are not authentic, have no real Australian cultural integrity and are diminished even in our own eyes. In short, we have a work culture that we do not particularly like, have no confidence in, have not created, and one, not surprisingly, that does not succeed.

Our repressed culture, unable to find expression in our work, has shifted to other areas of Australian life. We are more dedicated to our weekends than to our weeks. We spend more time than most other countries on 'do-it-yourself' activities – our homes, gardens and barbecues are testaments to our weekend productivity.

Successive waves of immigrants may have influenced what we eat and where, but we have shown them all how to have a good weekend. It must mean something that we won the America's Cup to the haunting strains of Men at Work playing 'Downunder'.

There is a tougher side too. On our farms we have battled drought and flood, making mateship and iconoclasm singularly ours. Our diggers in Gallipoli and Vietnam showed the gutsy, diehard side of our true natures.

In sport, adversity and war, Australian men and women behave quite differently from the way they do at work. When our backs are to the wall and there is no-one to copy, we come through.

When that gold veneer we cringe beneath is scratched or dented to reveal the Aussie brass, something works for us. In our play we are brassy larrikins, irreverently knocking everything, including ourselves, with that dry humour that announces we are prepared to give anything a go. No wonder that 'Waltzing Matilda' and the boxing kangaroo are our chosen symbols of national culture. Not surprisingly, when we act like this, we succeed.

We work and play today in a shrinking global environment characterised by tumultuous change. Organisational structures are being literally turned upside down and we are all being thrown about in this wild scenario. Most of the nations we mimic are now being forced to examine and redefine themselves in their own work cultures just to survive. Such times demand new ways, new ideas, a discontinuity with tradition and a propensity for risk taking.

Dr Rosabeth Moss Kanter, one of America's most sought after gurus of the new work paradigm, is urging American corporations to handle this change by letting go of the known and inventing a new work-culture; one where workers are capable of "play and irreverence, where people have fun, have a sense of humour and do silly things". A work culture, in fact, that sounds just like ours.

The opportunity exists now, while the rest of the world is redefining its work cultures, to search for and rediscover our own. A clever country does not allow others to define it in their own image.

Why not throw away the work models we have copied and reveal our intrinsic worth, be ourselves at work and play – even if it is pure brass? It could be the cleverest thing we have ever done in this country.

Wendy Bell is a lecturer in information technology at the Caulfield campus.

DIOGENES

TRAVEL HAS COME a long way since the halcyon years of the working holiday in Britain, when countless young Australians plunged straight through the safety net of jobs and relationships and instead invested in a one-way ticket to London, where nothing was guaranteed except squalid bedsits and the impecuniousness of employers.

A glance at magazines and television programs on the subject shows just how far it has come.

If travel were meant to broaden the mind, why then does it seem more and more like an exercise in compression: a squeezing of schedules to fit in as many lightning tours as possible, a tightening of the stomach muscles to prepare for the next assault of industrial strength cuisine.

Just who is responsible for destroying its magic? Probably all of us. Certainly, the travel industry has a lot to answer for – those people who think they know what we want to see, when we want to see it and at what pace, usually just below mach 1.

As a result, travel now mirrors our daily lives, reflecting the frenzy with which we pursue our livelihoods at home. For travel, read movement.

And we have ruined it too with our expectations. Reality never quite matches our fantasy. We leave London saddened by its overwhelming greyness. We leave Paris feeling more melancholy than romantic. We leave New Orleans still longing to hear some real blues.

We go abroad, our gazes fixed, sticking to the main roads and eschewing the byways. We seek the sanctity of Notre Dame, St Paul's Cathedral; moth-like we are drawn to the brighter lights of Piccadily or Times Square. And the true stories being told down quieter, less public streets remain unheard.

Travel today often amounts to little more than a series of disappointments in foreign places. Visiting another country can be like wandering through an antiseptic art gallery: we are allowed to look but not to touch. We stand in queues, we keep off the grass, we learn to speak in a fractured patois. But we are no closer to the object of our dreams than if we were watching a documentary at home.

Today's emphasis on comfort above experience means that trips overseas often are recalled as a series of outrageously priced hotel rooms. While the other end of the market kindles nightmares of drunken brawls outside doorways and the smell of cabbage cooking in the hotel kitchen next to your room. Expensive accommodation insulates, the cheapest alienates.

We are growing old too quickly. Travel should be the preserve of people with a childlike curiosity, not those for whom a trip is measured by the thickness of a photograph album.

But it was not always thus. Back in the 18th century Samuel Johnson wrote: "All travel has its advantages. If the passenger visits better countries, he may learn to improve his own, and if fortune carries him to worse, he may learn to enjoy it".