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."

"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 misunderstood 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.

One of these men really is off the wall

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.
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.

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 Acklin Chair of Company Law. He will take up his appointment on 3 December.

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.
GPs to be examined on videotape

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 to see what it 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 cut diagnoses," Dr Harris said. "GPs deal with problems which are not defined well or which are still developing, and many psychosocial 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 $108,000.

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 600 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.

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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 underway is a 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.

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.

Chairs of the Victorian Chairs of Anaesthetists Advisory Committee, Mr 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," Mr Lowe said.

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 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.

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 Jean Sharpe and the faculty's Vice-Director, 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.

More than $1.6 million has been pledged to the Victorian Chairs of Anaesthesia Fund. Mr 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."

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

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

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 melt at moderate temperatures.

Modern polymers have solved most of these problems. There are an enormous range that variously offer high 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 (TLPs).

TLPs 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 TLP-based "polymer alloys" is that they can be recycled, even though the disordered, but when they are forced, the molecules pass through a highly oriented product with good mechanical properties.

One way to separate the fibres is to melt the polymer. The only way to separate the fibres is to melt the polymer. In this state its molecules are still in the melted state, the polymer has very low viscosity and flows readily. In this state its molecules are still in the melted state, the polymer has very low viscosity and flows readily.

Mr Turek has been investigating how the design of extrusion dies affects the structure and physical properties of TLPs. In the melted state, the polymer is formed by processing at relatively low temperature in a strong acid solvent such as sulphuric acid. The polymer is then spun into fibres.

Revkars great strength, low ductility and stiffness stem from its highly ordered state of solids. These materials have reasonably low molecular weight in comparison with conventional polymers, which makes them difficult to process without a 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 formed.

"When the molecules pass through the die they tend to align themselves like logs flowing 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 TLPs, and polymer blends based on TLCP; 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."

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 blended with conventional engineering polymers and look at the same sorts of processes and their influence on the development of their properties," Mr Turek said.

Mr Turek says such materials 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).

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 leaving 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," he said.

"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 polyphenylene 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 state, 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 reformulated, 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.

Research Monash
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.

In a world beset by environmental problems, high technology cannot provide all the answers. Monash University water pollution expert Tom Davies is promoting 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 on farms and in 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 (roots and supporting stems) and bacteria to trap and digest biological wastes that remain suspended in the water after conventional 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 submersed 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 on 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 period, during which the specialised bacteria colonise and proliferate on the plant rhizomes, the gravel bed is left partly immersed in natural waterways in carbon combines with dissolved oxygen, forming carbonic acid. 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 weeds-dimming biological deserts, inhabited by anaerobic bacteria.

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

Mr Davies decided to scale up the read 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 read T. domingiensis XITAL, was constructed early in 1988. T. Typha latifolia and T. T. domingiensis XITAL are also suitable reed species.

During the summer of 1988-89, the reed beds were removing up to 96 per cent of suspended solids, with a corresponding decrease in biological oxygen demand at the outfall point. The figures 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 read-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.

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

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 removes 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 solids in reed bed filled up with aluminium sulphate, 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 used to follow up this work at Frankston, using the beds to develop strategies for coping with point-source pollution.

Mr Davies says that householders interested in constructing their own read 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 any coarse material: old bricks, gravel, or even stone. Corked, plastic or metal sheeting could be used, but although materials include crushed bricks, concrete, even plastic, 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 would 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 fed treating 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 added with fish to keep mosquito larvae under control.

The total cost for a domestic wet-land 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.
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 it draws by magnetic attraction, orientating itself like a space-ship 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 interact along the chain's length, caus­ing it to bunch, twist and fold into the 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 in such a way that it can perform a distinct role.

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 interactional behaviour of proteins and has attempted to develop models for predicting their active regions.

Mr Wilce has been exploiting a technique called reversed phase high-performance liquid chromatography (RP-HPLC), 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 be possible to analyse the complex phenomena of the natural interactions by examining the mechanism of separation in the RP-HPLC 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 threedimensional 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 in the active region.

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

The crucial question is whether the technique reliably mimics events occurring in living cells. Does the protein orient 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, proteins and ligands 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 molecule 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 hGH's lactogenic role in its active form.

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. But in its active form, it is so short-lived, even in living tissue.

X-ray crystallography has revealed something of its tertiary and secondary structure, but this time-honoured technique has the disadvantage that it can only work with the isolated form of a molecule that must change shape under natural conditions as a prerequisite to its varied biological activity.

Overseas research suggests that hGH is its unbound state is inactive and breaks down rapidly. In its active form, it is stabilised by a disulphide bond, 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 reversed-phase RP-HPLC technique has now narrowed down the active region and has hinted that one of the active regions may over 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 RP-HPLC to be used as an easy 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 RP-HPLC, it should be possible to recognise active regions that are associated with specific biological activity.
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.

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

"The heating 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 said. He 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.

Mr Johnston's research was directed towards improving the processability of these bulk polymers by blending them and conforming to the shape."

"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. They make the composite materials particularly suitable for injection moulding, because they flow and conform to the mould and conform to its shape.

He says that although the commercial advantages of TLCPs have yet to be demonstrated, "they already have patented a process for making normally unprocessable 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 between 270°C and 370°C. Sech is the heat resistance of these materials that their melting points have been deliber-

Peter Johnston drying coal in a vacuum oven.
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 Tiananmen. She has just released her account of these events.

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 Tiananmen... much bloodshed... crushed by tanks... toppled goddess of democracy... plotted 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.

Sketches of events have been recorded in Waterfront Hinges: Tensions and turmoil in Shanghai, 1988-1989, which was launched last month by former Beijing correspondent for the Sydney Morning Herald.

The book, Dr Grant explained, grew out of a sense of outrage and obligation to her students. It was inspired by reports that appeared in the Australian media shortly after Tiananmen 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 bloodshed and blockades. About 86 cities throughout China experienced similar demonstrations in June.

"It was a moment of extraordinary national upheaval," Dr Grant said. "It felt it was important to humanise the story, to tell people what it was like in China in the months leading up to Tiananmen Square.

"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 waters with one foot while the other foot was planted firmly in conservatism.

"With the establishment of small enterprises across the country, people were getting rich fairly quickly. But teachers, who were not held in high regard in a society that thought that all you needed was two hands and a moneymaking brain, had not been given a pay rise in 16 years."

In fact, teachers were held in such low esteem that students assigned by the Government to teach 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 was so much more insecure."

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

And then there was the repressive 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 people, 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 Tiananmen 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 better democracy. They wanted a better China.

"They were the basic human rights of citizens asserted, the freedom of choice, freedom to travel, to obtain the kind of job they and 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 Tiananmen massacre. "Initially the city was filled with optimism when workers came out in support of the students. But the banner was replaced with a smear that the situation in Beijing became worse. Then there was only outrage and horror."

In the following weeks, Dr Grant lived on a diet of adrenalin and Chinese brandy as she fearlessly 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 devasting.

"Without/brezhnev, the first of a series of publications by the Institute of Contemporary Asian Studies, is published by Hyland House in association with RAM. The cost is $20."

(Stie of the book comes from an old Chinese proverb which says a door hinge, because it is always worn out, is new; worn, eaten. In the words of one of Dr Grant's students: "Our door has been closed for too long.")

ARCHIVIALE PROTESTS CONSIDERED

Academic staff concerned about the style of university management have been considering a special university response.

An ad hoc sub-committee of the Committee of Deans has 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 Logue, Pargette and Porter, the committee is seeking the advice of 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 the 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. This committee would invite submissions from faculty staff and individuals.

Other recommendations included the need for faculty meetings to consider academic issues, appointments processes, the actions of the central administration, the 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 functions.

The meeting of the TRAG, presided over by Mr Malcolm Macmillan, of the Department of Psychology, was attended by 550 members of the triennium academic staff. A series of motions were passed.

The first motion, passed with four votes against, decried "the arbitrary way in which the entrenched structure for managing research was established." It also called for the establishment of a research committee that would replace the current system and receive the best research proposals from the University's five faculties.

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 widesrage of academic opinion across most faculties below the level of departmental level. "The central issue is management style. It's not a problem of communication," he said.

"We are objecting to the notion that elected the Council to a board of directors and the Vice-Chancellor to a chief executive officer. Our view is that the university exists to understand 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 success of recent administrative decisions on teaching and research, and not on efficiency or bureaucratic purposes. These matters warrant the fullest discussion across the university."
Juvenile Diabetes Foundation Australia

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 Saree 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, monitoring, 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 Grants

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

DTFC/GIRD Generic Technology Grants

The Waste and Environment Management Technology Committee of the Industry Research and Development Board invites application for financial support of projects in solid 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. 30 June.

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 the stipend amount is approximately $30,000 in the form of stipend payments, and relocation and thesis allowances will be paid. These payments are tax exempt and indexated 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 equipment, salaries and costs. For further information, contact the Office for Research on extn 75 3197.

Kidney Foundation’s Summer Scholarships

The Australian Kidney Foundation is offering an award of $500 to undergraduates enrolled in medicine or any biological science who wish to undertake a research project studying the kidneys or urinary tract. The project, which will last from six to eight weeks, is tenable in any Australian university or teaching hospital. 15 September.

Water Research Awards

The Australian Water and Wastewater Research and Development Corporation is offering a capital award 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 $10000 per quarter. Excesses towards fees, air fares and thesis production will be covered. Medical students will receive a stipend of $6000 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.

Mitsui Educational Foundation Scholarships

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.

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

The closing date for receipt of applications is Friday 16 August.
Back to the seventies

"Of 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 50 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 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 6 pm. A public lecture by Professor Margaret Plant from the Department of Visual Arts, will be held at 6 pm on 31 July.

On 6 August at 8 pm, a new performance piece, Pill Or: Love Songs, will be presented. Admission is free.

First students past the post

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

Up to 2000 students a day from Caulfield, Clayton and Frankston campuses took part in the college's three-grade stand 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.

Engineering students move in

Distance education students meet with lecturers, industry professionals and other students at 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 Engineering), 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 met at the campus during their visit.

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

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 money was used.

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

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

The field, together with the adjacent turf pitches and the international standard 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.

Press cuttings

1 June, The Age - Professor Ovee Potter, Chemical Engineering: $50m coal plant plan feels tax inquiry.
2 June, Geelong Advertiser - Dr Malcolm Sim, Social and Preventive Medicine: Something's in the air.
3 June, The Sunday Age - Dr Stephen Trumble, Community Medicine: Disabled: new problems for city.
5 June, The Sydney Morning Herald - Desert Professor Michael Abramson, Social and Preventive Medicine: Something's in the air - and it needs urgent control.
6 June, Southern Peninsula Gazette - Mr Phil A'Vard, Alexandra Theatre: Monash proposes a theatre network.
7 June, The Australian - Mr Steven Moen, Faculty of Science: Eye's the limit as camera gets vision.
8 June, The Age - Professor Geoffrey Thorburn, Department of Physiology: Honour for Professor.
9 June, Geelong Advertiser - Mr Peter Warr, computer: Monash day at the races.
10 June, South and Land - Professor John Freibairn, Department of Economics: Follow me: sales tax.
11 June, The Sydney Morning Herald - Professor Geoffrey Thorburn, Department of Physiology: Honour for Professor.
12 June, Geelong Advertiser - Mr Peter Warr, computer: Monash day at the races.
13 June, The Age - Mr Philip Stevens, Electrical and Computer Systems Engineering: Tapping into the host line of things to come.
14 June, The Age - Dr Stephen Trumble, Community Medicine: Discovering the person within. (Down Syndrome).
15 June, The Latrobe Valley Express - Professor Tom Kennedy, MCCG: Churchill College busy tapping into lucrative Asian studies.
16 June, The Age - Professor Bruce Holloway, Genetics and Developmental Biology: Tapping into the host line of things to come.
17 June, The Age - Professor Mark Walsh, Medicine: Wrong dropper causes dangerous vitamin A overdose.
18 June, The Age - Professor Ian Rae, Faculty of Science: $1m greenie injury. (The West Australian).
19 June, The Age - Mr Philip Stevens, Electrical and Computer Systems Engineering: Tapping into the host line of things to come.
20 June, The Age - Professor Peter Slinger, Human Biobehavioural Science: Male boozing, sexual lib president cleared.
21 June, The Age - Professor John Freibairn, Department of Economics: Follow me: sales tax.
22 June, The Sydney Morning Herald - Professor Geoffrey Thorburn, Department of Physiology: Tapping into the host line of things to come.
A SAVANT

 AUSTRALIA'S REPUTATION for original thought is unquestioned. We do not lack the ability to invent, discover or achieve. 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 political system and work practices by copying from the British, Australians and 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 missed the opportunity to learn 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.

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 imported 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 organizing work. Later, these same people went out and set up many of our small businesses. They initiated 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 ways of the Scandinavian 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 limed range of baseless 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 environment. They are preserved against the very nations we originally copied them from.

To compound the problem, we know they are not authentic, have no real Australian cultural integrity and are diminished eyes 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 weekenders 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.

Successful waves of immigrants may have influenced what we eat and work, but we have shown them all how to have a good time. We know 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 same part of our true nature.

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 cling to beneath is scratched or dented to reveal the Aussie brass, something works for us. In our play we are brassy larrkings, frequently knocking everything, including ourselves, with that dry humour that announces we are pre pared to give anything a go. No wonder 'Waltzing Matilda' and the boxing kangaroo are our chosen symbols of national esteem. Not surprisingly, when we set 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. It is time our own work culture just survive. Such times demand new ways, new ideas, a discontinuity with tradition and a readiness to risk failure.

Dr Rosabeth Moss Kanter, one of America's most sought after gurus of the new work paradigm, is urging American corporations to make this change by letting go of the known and inventing a new work culture; one where workers are capable of 'play and success at the same time', prepared to fight for the survival of the fittest.

Across the world, we have copied selectively, however, and have missed the opportunity to learn from others to define it in their own image. We can now move on.

The opportunity exists now, while the rest of the world is redefining its work culture, 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.

by Wendy Bell

DI O I G E N E S

of jobs and relationships and instead invested in a one-way ticket to London, where nothing was guaranteed except the equidistant bedheads and the impertinences 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 an exercise in compression: a squeezing of schedules to fit in as many lightning tours as possible, a tightening of the circalimb muscles to prepare for the next assault of industrial strength cuisine.

Just who is responsible for this? 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 waste of energy, our impatience 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 Dixie.

We go abroad, our gazes fixed, to the cheapest alienates.

We leave the hotel kitchen next to your room. We leave the city of lights as a series of outgrowingly priced hotel rooms. While the other end of the market, kindling nightmar es of drunken brawls outside doorway and the smell of cabbage cooking in the hotel kitchen, is our most expensive accommodation instates, the cheapest alienates.

We are growing old too quickly. We return to the bumbling city with a childlike curiosity, not those for whom a trip is measured by the thickness of their passports.

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

Travel has come a long way since the halcyon years of the working holiday in Britains, when countless young Australians plunged straight through the safety net, daily lives, reflecting the frenzy with