Downunder dinosaurs spark debate

A few fossilised dinosaur bones unearthed at two Victorian digs seem set to turn a chapter of the earth's prehistory upside down.

The discoveries at Dinosaur Cove in the Otway Ranges and near Cape Paterson in coastal Gippsland strongly suggest that two dinosaur families common in the northern hemisphere may have evolved on the other side of the world in the supercontinent Gondwana, from which Australia and Antarctica were formed. One of the finds has led to the naming of a new dinosaur species.

A team led by dinosaur hunter Dr Pat Vickers Rich, of the Departments of Earth Sciences and Zoology and Evolutionary Biology, and her husband Dr Tom Rich, of the Museum of Victoria, found a leg bone from what appears to be a pint-sized version of a horned dinosaur of the ceratopsian group, as well as a vertebra and several leg bones from what seems to be an ornithomimosaur, an ostrich-like dinosaur.

Until now palaeontologists thought the ceratopsians, the family that includes the well known rhino-sized herbivore Triceratops, were restricted to younger rocks and had originated in the northern hemisphere. An article, in which the new dinosaur form will be formally announced, is nearly ready for submission to the international journal Science.

The discovery is likely to provoke lively scientific discussion when it is published, probably late this year or early next year. The reason for controversy is that the fossil not only seems to represent the first discovery of a ceratopsian in Australia, but also that its early Cretaceous age appears to predate the radiation of the ceratopsians in the northern hemisphere.

Dr Vickers Rich says this points to the possibility that this dinosaur family originated in the southern hemisphere, while parts of the supercontinent of Gondwana were still intact, and may have reached the north via a tenuous connection between the elongated 'tail' of west Antarctica and southern South America before the two continents drifted apart in the early Cretaceous era.

The bone found in Gippsland is an ulna, one of the major bones of the front leg. While the dig is yet to turn up any more bones of the sheep-sized creature, an extensive comparative search of North American collections found that the bone was very similar to that of a northern hemisphere genus called Leptoceratops, from the late Cretaceous period.

"Some experts we showed it to said it couldn't be a ceratopsian because it was in the wrong place, both geographically and chronologically," Dr Vickers Rich said. But the tentative identification received support when Dr Tom Rich showed the bone to Canadian dinosaur expert Dr Dale Russell, of the National Museum of Canada, who commented excitedly: "We are in violent agreement: it looks like a ceratopsian!"

The ornithomimosaur ('bird mimic') bones found by volunteer excavator Mr Nick van Clavern at Dinosaur Cove lend weight to this account. The creature, which was about the height of a human, is older and more primitive than the ornithomimosaur that was widespread and abundant in the northern hemisphere in the late Cretaceous period. "Only one species - from the late Jurassic deposits in Tendaguru, in Africa - is older, and this is the only other known southern hemisphere form," Dr Pat Rich said.

"We compared ours with ornithomimosaur fossils at the Tyrrell Museum in Drumheller, Alberta, and the American Museum and Yale University, which have good collections. Ours looks extremely primitive and is certainly the second oldest.

Together with the even older material from Africa, this indicates that the ornithomimosaur may have had Gondwanan origins."

Continued on page 13
**A likely story**

Over the years, students have gone to exceptional lengths to explain why their assignments have been late. This is one of the best.

A distance education student rang Ms Sally Joy of the School of Marketing and was unable to explain why his assignment had not arrived. "It was definitely posted," he protested. The reply, a sceptical: "Please send it again." Soon after, the student arrived in person to deliver the goods.

He came bearing a replacement copy of the assignment and the original, which had been returned to him by Australia Post in a mortuary with the document within burnt and in poor repair. Apparently, the student had entrusted his precious parcel to a post box which had been set on fire by vandals.

**Divine intervention?**

The principal of Mazenod College is one Father Kevin Davine.

**Bite the other one**

It wasn’t all swaying palm trees, golden sand and a deep blue sea that greeted School of Marketing head, Professor Gary Harris, as he strolled out for an early morning stroll during a recent Sri Lankan trip.

By 8.30 to soak up some relaxing tropical atmosphere, he swung open his beachside resort apartment’s front door to be confronted by a 1.5 metres alligator with something else in mind. Reptile wrestling not being one of his strong suits, Professor Harris slammed the door on the toothy interloper and retreated to the balcony.

**Sexual arousal**

Retiring Deputy Registrar Mr Jim Leicester will be fondly remembered for many things – although his presentation concerning a sexual assault alarm at a recent Academic Board meeting is not likely to be one of them.

He was waxing lyrical to the board about how students have invented the alarm at a recent Academic Board meeting is not likely to be one of them.

**Numbers up**

The latest enrolment figures for Australian universities have just been released by the Department of Employment Education and Training. The big 10 are:

- **Monash** 35,384
- **Sydney** 30,451
- **Melbourne** 29,700
- **NSW** 26,006
- **Queensland** 24,743
- **Adelaide** 23,543
- **QUT** 23,189
- **SA** 22,776
- **LaTrobe** 20,917
- **Canberra** 20,454

**Fuel cells to generate exports**

Holding fuel cell components are (from left) SEC Chief General Manager Mr George Bates, CFCL Chairman Mr Peter Coats and Pro Vice-Chancellor Professor Tom Kennedy.

A major new hi-tech energy research and development project is soon to be established at the Gippsland campus.

The five-year project to develop ceramic fuel cells on a commercial basis involves a consortium of key players in the Australian energy industry:

Fuel cells have the potential to become a major source of energy by the turn of the century. The consortium believes that $150-200 million industry could be established in Australia by the late 1990s with a potential export market of more than $1 billion annually.

The consortium - Ceramic Fuel Cells Limited (CFCL) - includes the CSIRO, BHP, Pacific Power, the Victorian Government’s Strategic Research Foundation and the Federal Government’s Energy Research and Development Corporation.

A $19 million laboratory and administration complex to house the project will be built at the campus, adjacent to the existing engineering and science laboratories. The campus is providing the site and contributing to the project.

The consortium will begin operations at Monash’s Technology Park, Clayton, in January while the new research facility at Gippsland - due to be completed late next year - is being built.

Fuel cells are devices for producing electricity through chemical processes. They directly convert fuel and an oxidant - in the form of air - into chemical energy without intermediate conversion to heat, as in conventional power plants.

**NOW & THEN**

**25 YEARS AGO**

To cope with an expected shortage of places in the Halls of Residence, the Student Housing Office appealed to members of staff "to ask any of their friends who may have a spare room to offer accommodation to students next year." Guidelines were provided on suitable charges and conditions. Full board - at $13 to $14 per week - would provide a student with breakfast and dinner each weekday and three meals a day at weekends. Personal laundry and/or a cut lunch may or may not be provided.

**15 YEARS AGO**

While universities were going through a time of economic recession, there was no cause for deep pessimism, the Vice-Chancellor, Professor R. L. Martin, said. Noting that Monash was now one of the "big five", he said the university was fortunate to have grown up in the "balmy days of tertiary education" beginning in the 1960s.

**5 YEARS AGO**

The Monash Medical Centre was officially opened by the Victorian Premier, Mr John Cain. The 458-bed hospital cost $132 million to build and was the first new teaching hospital in Victoria since 1963.

The Vice-Chancellor, Professor Mal Logan, announced the Monash plan: a strategy for the future, saying that universities traditionally had been reactive but now needed to embrace "taking risks and marketing ourselves".

**THIS MONTH LAST YEAR**

The university adopted a smoke-free policy, with a total ban on smoking in all university buildings and vehicles, University Council approved the new policy after consulting staff and considering recent court rulings on the effects of passive smoking.

A Monash researcher has produced a radical - perhaps definitive - explanation of the design and purpose of Stonehenge and other prehistoric circles in Europe and Ireland.

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Fuel cells are devices for producing electricity through chemical processes. They directly convert fuel and an oxidant - in the form of air - into chemical energy without intermediate conversion to heat, as in conventional power plants.

They have many advantages over conventional facilities. They have high conversion efficiency, lower nitrogen emissions, high power density and can use fuels including natural gas, coal gas, methanol and hydrocarbons.

CFCL Chairman, Mr Peter Coats, said the project would employ 80 people during the five-year development phase, with 30 of these located at Gippsland campus.

"The Latrobe region, with its extensive brown coal power generation and natural gas operations, has clearly established itself as Australia’s foremost energy centre," Mr Coats said.

"We are absolutely confident that fuel cells have the potential to be a major energy source of the future. The region has the technical expertise and the facilities, along with the community support that would be required for subsequent manufacturing stages of the project."

The Vice-Chancellor, Professor Mal Logan, said the project was a reflection of the increasing level of interaction in hi-tech developments between the nation’s major universities and the private sector.

Scientists at the CFCL research laboratory will be given access to university facilities including laboratories, library and computer resources.

Pro-Vice-Chancellor Professor Tom Kennedy said the project would provide the opportunity for significant collaboration between research scientists of the two institutions, as well as new opportunities for graduates undertaking higher degrees through research.
**Selling up for an amazing Amazon adventure**

A chance meeting has led to a "one in a million" job for a Monash animal keeper establishing an animal rehabilitation centre in the heart of Peru's Amazon Rainforest.

By Christmas, the keeper of Monash's wallaby enclosure, Mr. Antony Taggart, hopes to be tending animals such as jaguars, coucans and monkeys confiscated from poachers or rejected by zoos.

The path that led to his new job began at a Monash lecture where underwater marine naturalist Neville Coleman told Mr. Taggart about the California-based International Society for the Preservation of the Tropical Rainforest (ISPTR).

Inspired by the society's work, Mr. Taggart was determined to become involved. The ISPTR received hundreds of calls daily from volunteers, but he just kept on ringing and eventually his long-distance persistence was rewarded.

In addition to setting up the rehabilitation centre, the society will be sending him to Brazil to work with one of only five species of fresh-water dolphin in the world, the Amazonian pink river dolphin.

Mr. Taggart is selling all his possessions, including a house and car, to finance the trip. "This job is the chance of a lifetime," he said. "I probably won't get paid for the first 12 months, but my highest priority is to be active in what I want most in life — to conserve the world's natural environment and wildlife."

Conservation work is not a new interest for Mr. Taggart, who has studied horticulture and animal technology, and worked at the Healesville Sanctuary, the Melbourne Zoo and the Phillip Island Wildlife Park.

"The work that I have done with animals in the past helped me get the job, but I haven't ever worked with animals native to Peru," he said. "It will be very difficult to begin with, especially as the centre is only accessible with a small private plane."

Mr. Taggart's venture has attracted media interest, but he is still seeking sponsorship.

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**New faculty to be biggest in business**

Monash will create Australia's largest centre for the study of economics and business by merging its Faculty of Economics, Commerce and Management and the David Syme Faculty of Business.

The new faculty — the Faculty of Business and Economics — will have more than 6000 students and 300 academic staff. The merger will formally take place on 1 July next year.

It will be responsible for all undergraduate and graduate teaching in business and economics on four of the university's campuses and by distance education.

It will consist of six schools: David Syme School of Business, School of Economics, Syme School of Business — Gippsland, Syme School of Business — Frankston, David Syme Graduate School of Business, Graduate School of Economics.

The two largest schools — the David Syme School of Business on Caulfield campus and the School of Economics on Clayton campus — will be made up of six cross-campus departments: Accounting, Banking and Finance, Economics, Econometrics, Management, and Marketing.

Some of the graduate teaching will be offered through the faculty's two graduate schools. The David Syme Graduate School of Business will offer a range of graduate courses developed from the present graduate program of the David Syme Faculty of Business.

The Graduate School of Economics will offer a range of graduate courses, including those arising from the present courses of the Graduate School of Management in the Faculty of Economics, Commerce and Management. Both graduate schools will be involved in the faculty's MBA program.

The Syme School of Business — Gippsland will offer business courses on the university's Gippsland campus and by distance education. The Syme School of Business — Frankston will offer business courses on the Frankston campus.

At the undergraduate level, the faculty will offer three generic degrees: the Bachelor of Business (BBus) with various specialisations on Caulfield, Frankston and Gippsland campuses and by distance education; the Bachelor of Commerce (BCom) and the Bachelor of Economics (BEC) on Clayton campus.

The Bachelor of Business is also available in double degree programs with arts, computing and law. The Bachelor of Commerce is offered in double degree programs with arts, law and engineering.

Students enrolling or planning to enroll in courses next year will enter the existing programs of the current faculties.

The Vice-Chancellor, Professor Mal Logan, said the amalgamation would create an environment in which the faculties' separate teaching, research and policy strengths would be reinforced, and in which vigorous interaction between two cultures would promote a new distinction.

The position of foundation dean of the new faculty will soon be advertised worldwide.

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**Christmas Eve will be Deputy Registrar Jim Leicester's last working day at Monash.**

At 65, after 28 years with the university, he says he is now at the age when he 'knew he had to go'.

"People have their life cycles and my time is up," he says. "In my younger years, Monash was smaller, staff knew each other and even knew students," he said. "Since its growth, Monash has become so much larger and wide-ranging."

"My job has changed dramatically and I have watched thousands of students each year graduating. I have known many staff come and go. I have seen the changes in students' attitudes, staff concerns and the progression of Monash from its beginnings until now."

"Monash is at a turning point. I think Monash will be heavily affected by the TV Open Learning program and hope that the program gets the university and the public's support to allow it to develop to its full potential."

"I also believe it would be a shame to let the internationalisation of the university decline. Accepting students on academic merit rather than nationally, making ties with other countries through joint research, staff exchanges, projects, and linking educational institutions is the way of the future."

"I hope that Monash does not become a specialist institution. By encouraging a broad range of studies, research, and academic teaching, the university is always accessible and in demand by students, employers, and the general public." And what of his retirement plans? "I won't be altogether unemployed," he replies.
World focus on funding and teaching

In an area of worldwide concentration on the need for higher education, the Vice-Chancellor, Professor Mal Logan, recently participated in the Sixth International Conference on Higher Education in Washington. It was attended by about 250 presidents, vice-chancellors, and other university leaders from universities in the US and continental Europe. The main theme was the funding of higher education, but discussion extended over many issues. He reports here on the central points of discussion, on which there was broad agreement.

Investment in education

There is debate in US education circles that in a world of mobile capital, governments can best promote higher living standards by focusing on production factors that are relatively fixed.

The two factors that cannot move, at least are people and infrastructure. The argument runs that through all universities are facing major cost increases in a world of mobile capital, governments should be able to constructively participate in the creation of the conditions that in every country, should be able to constructively participate in a mix of instruments aimed at all citizens, students, parents, businesses and philanthropists.

Academic research certainly does suggest that the economic return from extra years of education has steadily increased. And the link between the profitability of private business and the quality of public education is also of major importance. Investment in higher education is now much more in the public debate in all countries. If institutions can demonstrate accountability and quality, they should be able to constructively participate in this debate.

Managing cost increases

All universities are facing major problems in matching their revenues to constantly rising costs. In every country, revenues are being generated by a variety of instruments aimed at all citizens, students, parents, businesses and philanthropists.

The Australian HECS arrangement is being considered with real interest by quite a number of countries. The very real differences faced by universities in the way their costs increase at a higher rate than for most other enterprises.

Physics changes matter

A landmark review of the Department of Physics has recommended broad-ranging changes affecting its structure; teaching practice and curriculum.

Although recognising the department's achievements in its field, comments on the merger between Caulfield and Clayton, the review found that reform was still needed to address the drop in physics enrollments this year and the budget cuts that are likely to result from this.

The majority of the Department of Physics, Professor John Pilbrow, has tabled a response to the recommendations that - while accepting the value of a review and the majority of points put forward - defends the activities already being undertaken to address the situation.

The Physics Review Committee recommended that:

- two new professors, one of theoretical and the other of experimental physics, be appointed to the department as soon as possible;
- the subject matter of courses should reflect the discipline of physics as it is today and not only the research interests of the department or individual academics;
- undergraduate education should be enhanced by increasing the number of lectures taken by students;
- a broad undergraduate curriculum in physics be taught with research concentration in a few areas so as to maximise grants from the Australian Research Council (ARC);
- teaching skills of staff be improved;
- new links be established between the theoretical and experimental work of the department;
- research collaborations with other departments, such as chemistry and materials engineering, be increased;
- future research be linked with grant-funded projects;
- academic and non-academic staff levels be reduced; and
- short, fee-paying courses should be developed.

Professor Pilbrow's response to the recommendations said the department was looking for other funding sources, such as short courses and extended contract work.

"The department has recommended that teaching skills be improved, and collaborative research ventures enhanced. The Department of Physics is aggressively recruiting. In glossy Australian Universities, a world-class physics department is emerging, with a broad and diverse teaching and research programme of the highest quality. In order to be world leading, we must make bold moves.

"But the reality is that, on too many campuses, teaching is not well rewarded, and faculty who spend too much time counselling and advising students may diminish their prospects for tenure and promotion. Thus, the most important obligation now confronting the nation's colleges and universities is to break out of the tired old teaching versus research debate and redefine, in more creative ways, what it means to be a scholar." It is time to recognize that in a world of mobile talent and the great diversity of functions higher education must perform."

Scholarship redefined

Beyer went on to identify the work of the professor-scientist as having several components:

- the scholarship of discovery which comes closest to what is meant when academicians speak of "research."
- the scholarship of application which means the application of knowledge to problems.
- the scholarship of teaching.
- the scholarship of integration which means connecting across the disciplines, placing the specialties in larger context, illuminating data etc.

The search for non-tax revenue, especially for research purposes, is, in danger of creating a conflict of loyalty. Where the university and the source of revenue. This trend has gone much further in in North America and Europe than in Australia, but the Cooperative Research Centres (CRCs) were modelled as a way of bringing the potential to conflict with institutional linkages. Where the research contracts have been large as at Stanford and Yale universities, even better, there have been some major institutional difficulties.

Quality of teaching

The most significant debate occurred around the quality of teaching. It appears that all the American research universities, both public and private, are going to the quality of teaching, despite the fact that they have had student evaluation of teachers for decades.

As Ernest Boyer, director of the Carnegie Foundation, says: "In the current climate, students are all too often the losers. Today, undergraduates are aggressively recruited. If they are not satisfied with the quality of instruction they receive, they will look elsewhere. In particular, there is wide recognition that the professoriate as having four separate, yet overlapping functions:

-...
Spring has heralded a flurry of building activity on all university campuses. Construction of nine major building projects – worth more than $70 million – is now under way.

These large scale building projects at Clayton, Caulfield, Frankston and Gippsland will give Monash a face-lift over the next few years.

The first stage of the $18 million General Teaching and Business School building at Caulfield, jointly funded by the student union and Federal Government, is the first large scale expansion on that campus for 15 years.

The first stage, expected to be completed by July 1993, is being built at a cost of $9.4 million on open space between the campus's library and the Technology tower to the west. The new three-storey building will create seven computer laboratories, 14 classrooms, two lecture theatres and provide the student union with a bistro and book store.

Building project coordinator, Mr Roland Black, said the General Teaching and Business School development would be created in two distinct stages, with each having specific but complementary facilities. The building would form the southern boundary of a large central green space intended to become the heart of future developments.

"The expansion at Caulfield ensures the campus provides suitable university facilities," Mr Black said. "The new construction affects the whole campus and allows for rationalisation of existing buildings on campus; for example, the relocation of the bookshop makes extra room for the library."

The building design also allows for the interconnection of existing buildings and the future creation of other points of access. Stage two is a $9.4 million investment and includes the construction of a five-storey tower to house the David Syme Faculty of Business. It will allow the relocation of the Computing Faculty into other buildings on campus.

The Performing Arts and Information Services buildings on the Clayton campus will create a new look for the south-eastern part of the campus. A feature of the new development (above) will be the formation of a ceremonial courtyard and arts precinct. An artist's impression of the southern aspect is shown at left.

The $5.76 million Information Services Building, which is located to the south of the Main Library, will house the music library, AV microfilm storage, rare books, technical services, administration, postgraduate students and staff. The first-floor building will be connected with a catalogue hall to the Main Library.

The Performing Arts building will accommodate staff of Music, Drama, Australian Studies and Asian Studies, as well as providing performance space, a theatre, offices and teaching, performance and practice areas.

Plans are also under way for the future construction of a restaurant and coffee shop in the courtyard and a verandah and entrance terrace for Robert Blackwood Hall, based on Sir Roy Grounds' original design.

Gippsland will replace the visual arts building at a cost of $1.25 million. The Federal Government capital funding for universities in 1993 and 1994, provided $625,000 for this project, with the university providing the balance of funds.

Current major capital developments

**CLAYTON CAMPUS**

- Engineering ($7.2 million)
  - Now completed and occupied. Landscaping will continue as weather permits.
- Computing & General Teaching ($10.1 million)
  - First stages at both sites will be completed early in December to enable occupation of offices before Christmas. The balance will be completed by commencement of teaching in 1993.
- Law extensions ($3.1 million)
  - Construction is proceeding satisfactorily with completion due in March 1993.
- Performing Arts-Information Services ($13.2 million)
  - Plans have been approved by relevant committees and documentation is proceeding. It is expected tenders will be received in about April 1993 and construction completed late in 1994.

**CAULFIELD CAMPUS**

- General Teaching – Stage 1 ($9.4 million)
  - Construction is proceeding satisfactorily and is expected to be completed for teaching in second semester 1993.
- General Teaching – Stage 2 ($9.4 million approx.)
  - Plans have now been approved by relevant committees and documentation is proceeding. It is expected tenders will be received in about April 1993 and construction completed late in 1994.
- Coffee Shop ($0.4 million)
  - Expected to be completed by April 1993.
- Landscaping
  - A master plan for redevelopment of the landscaping has been approved and significant works are expected to commence from the end of this year.

**FRANKSTON CAMPUS**

- Technology ($6.6 million)
  - Now completed and funded.
- Community Centre – Stage 1 ($1.8 million)
  - Plans have now been approved by relevant committees and documentation is proceeding. It is expected construction will be completed by the end of 1993 (Note: this project is funded by the Student Union).

**GIPPSLAND CAMPUS**

- General Teaching and Distance Education Centre ($7.7 million)
  - Construction will be completed by the end of this year.
- Visual Arts ($1.25 million)
  - Replacement of the dilapidated existing buildings will proceed in three stages during 1993-4.
- Ceramic Fuel Cells Laboratory ($2 million approx.)
  - Architects have been appointed and planning and construction is expected to be completed by the end of 1994.

**PHARMACY COLLEGE**

- Teaching laboratories refurbishment ($0.5 million)
  - Work will be completed for commencement of teaching next year.
Reinventing the mouse

Digital technology students have been up until all hours lately, perfecting ways of running mice through a maze.

They’re not reinventing the behavioural wheel, but redefining the mouse. The third year students in the Robotics and Digital Technology departments are taking part in a project - known as Rodent - to develop and program computer circuits.

The 1992 class in the Bachelor of Computing (Digital Technology) at Caulfield campus are developing electronic mice. The mice must be self-contained, self-powered devices capable of navigating through an intricate maze covering nine square metres. It will be self-powered, self-powered, self-powered.

A comprehensive parking plan endorsed by major staff and student bodies will be put in place on Clayton campus next year.

The plan, proposed by the Computer Working Group on Parking, was approved by Academic Board last month. Its key features include:
- changing gravelled areas, which are currently free, to permit parking,
- reducing the overall number of permits issued, and
- providing 1200 new free spaces on a site adjacent to the campus.

The number of permits issued for each space on campus will be reduced to 1.3. The new free spaces will be provided at the corner of Blackburn and Wellington roads, a former drive-in site, between 7.30 am and 6.30 pm weekdays.

With the increase of cross-campus teaching, the working group recommended that the number of Designated Vehicle Only (DVO) parking spaces be increased from 120 to 210, and that these permits be issued as required by faculty deans.

Up to 2000 people visit Clayton campus daily. In order to keep visitor numbers to a minimum during term, conferences, theatrical performances, graduations and other large functions will now follow - where possible - be scheduled during semester breaks or in the evening.

Fourty spaces are to be reserved for car pooling in the main south car park. The system will be operated by the Monash Association of Students and monitored to see whether it should be extended or discontinued. Alternative forms of transport will continue to be supported and promoted:

The working party said that because future space requirements for parking will only increase, a building reserve fund - receiving revenue from parking fines and ticket machines - will be established to finance the construction of future car parks.

It was agreed that additional on-campus car parking should take the form of above- or underground facilities and that the cost of operating, maintaining and constructing them should be reflected in the price of a permit. Permits for 1993 will cost $45.

Chairman of the group, Mr Brian O’Mara, believes that the new arrangements address most of the issues raised this year and will make life easier for staff and students in 1993.

The Australian Colleges and Universities Staff Association (ACUSA) representative on the working group, Dr Paul Rodan, supports the new system. saying "staff with a permit in 1993 will have a better chance of getting a parking space than this year."

Chairperson of Monash Association of Students (MAS), Ms Kerry Barker, says the changes will also benefit the student group. "MAS is pleased with the recommendations of the group because of the focus on promoting alternative forms of transport," she said.

"Car pooling should be supported by all staff and students."

A parking group, with similar membership to the working group, will meet quarterly to monitor and report on the operation of the new parking system.

A selection of Monash entrants in the OzMouse competition.

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A selection of Monash entrants in the OzMouse competition.
Porter takes on research post

The Dean of Medicine at Monash, Professor Robert Porter, has been appointed Deputy Vice-Chancellor - Research.

Professor Porter (below), dean of medicine since 1989, has been acting in the newly-created position for most of the year. Before joining Monash in 1989, he was director of the John Curtin School of Medical Research at the Australian National University.

His appointment was confirmed by Council last week. The position was one of the main recommendations of the university's Research Review Committee, set up earlier this year in response to academic staff concerns about research management, and departmental and research funding.

Professor Ian Chubb will join Monash in March as senior deputy vice-chancellor. The third deputy VC position - academic projects - has been advertised.

Kennedy retires

The Pro Vice-Chancellor and Chief Executive of the Gippsland campus, Professor Tom Kennedy, is to retire at the end of this year.

Professor Kennedy (below) was appointed director of the Gippsland Institute of Advanced Education in 1984, and played a major role in its amalgamation with Monash.

During his period of office, student numbers on the Gippsland campus grew from about 2500 to more than 6000. In addition, the campus changed from being a regional provider of education to assuming a state, national and international role.

Professor Kennedy is responsible for the university's National Distance Education Centre, which now services about 1000 students offshore.

Before his Monash appointment, Professor Kennedy was deputy director of Chisholm Institute of Technology, and assistant director of the former Western Australian Institute of Technology.

More than talking shop...

When the winners of Monash's new teaching awards got together last week, they had plenty to discuss without resorting to talking shop.

The three academic staff members, each from different faculties on different campuses, already had much in common.

Mr Rob Hagan, of the Faculty of Computing and Information Technology at Caulfield campus, already knew Dr Anne McDougall, of the Faculty of Education at Clayton campus, through a mutual interest in educational computing.

It turns out that Rob and Ms Joycey Tooher, of the Faculty of Law at Clayton campus, had noticed one another at teaching workshops over the years. But in to top that, both Anne and Joycey have children attending the same school.

The Vice-Chancellor's Awards for Distinguished Teaching - each worth $5000 - have been introduced as part of a set of initiatives to improve the quality and status of university teaching.

Each winner will receive a grant to further their teaching interests, a commemorative award presented at the final graduation ceremony this year and a permanent citation in the university Calendar.

Next year, the recipients will conduct workshops on teaching and record an interview of their teaching techniques to be used in future staff development.

The three winners are planning a joint presentation on student assessment and its role in good teaching for a conference later this month. The chairman of the selection committee, Dean of Engineering, Professor Peter Darvall, said the process of choosing only three recipients was not easy, given the high quality of the applications.

"Excellence in teaching is one of Monash's major objectives," The Vice-Chancellor, Professor Mal Logan, said.

"We have instituted evaluations of teaching practices and are looking to change promotion procedures to encourage and reward distinguished teaching."

"We want to enhance distinctive teaching strengths, especially those that emphasise the unique character of Monash graduate and undergraduate courses."

Nominees were required to provide a teaching dossier, which included a statement on their attitude towards teaching responsibilities and their main strengths as a teacher, as well as information about courses and supervision, current teaching practices, student achievements, scholarship in teaching, evidence of student reaction and peer evaluation.

They were judged on their command of the subject, continuing professional development, organisational and communication skills, enthusiasm, ability to arouse curiosity, and concern for the student as a learner.

"It's good to see a public acknowledgement of the work we all put into teaching," Dr McDougall said.

"Hopefully, this recognition will promote development of better teaching skills and contribute to the standing of the profession in tertiary education."

Eureka tells the research story

Eureka, a full colour, glossy magazine about the diversity and significance of research at Monash has just been published.

The magazine aimed primarily at the commercial and industrial world - presents a snapshot of current projects. Copies are distributed free to subscribers of Eureka in the Monash Research Office. It has been produced by the Office for University Development.

Eureka aims to demonstrate to the corporate community the fundamental role of research in today's society and the quality of research at Monash. Articles have been written for the reader with an emphasis on the potential of the projects to change the way we live and work.

In the magazine's foreword, the Vice-Chancellor, Professor Mal Logan, examines the challenges facing the university as a result of rapid change in the economy and society. "The maintenance and enhancement of teaching, as well as research, is the foundation on which the institution must build to meet future challenges," the Vice-Chancellor says. "We believe that the combination of teaching and research will be more important in future assessment of academic staff."

The magazine is available for presentation to visitors, to include in information kits, or for staff to take on overseas trips. Eureka is available from the Public Affairs Office, Gallery building, Clayton campus. Contact the Editor, Greg Williams, on extn 75 2085.
A diverse group of Monash people are proving once again the value of teamwork and persistence.

More than 80 staff from Administration and Management Information Systems (AMIS), Student Administration, the Computer Centre, Finance Branch, the Centre for International Students, and all faculties have been involved in developing the new Monash University Student Information System (MUSIS).

According to manager of AMIS, Mr Max Robinson, this joint effort is the most inspiring instance of teamwork he has encountered in 25 years at Monash.

"Building this system has been a catalyst for change," he said.

"Faculties and central administration units needed to redefine the nature of the service we need to deliver. We haven't always been able to deliver this service, and it hasn't always been easy, but even when there were disagreements everyone involved showed a huge commitment to the project, putting in extra time to get the job done.

"We had people calling for access to the computer system from 8 am to 7 pm weekdays and 10 am to 4 pm on weekends. That's the kind of hours people were putting in. "Although Mr Robinson admits he "wouldn't want to do it again", he believes the process of creating MUSIS has been valuable for the university.

Deputy Head of Student Administration, Mr Philip Irvine, has also been closely involved in the project. He believes that effective application and implementation of computer technology will relieve people of repetitious tasks and enable them to enjoy more challenging and fulfilling work.

His vision for the future is of a paperless office where most administrative tasks will be achieved by scanning a document or keying in decisions as they are made. He believes Monash is well on its way to achieving this kind of administration.

In fact, many of the processes are already in place and he says it will only be a matter of time before the university is employing the latest technology to improve the efficiency of its service to its most important clients: students.

Mr Irvine is well aware that there may be doubters. The introduction of MUSIS has attracted criticism and he is the first to admit the system needs further development and refinement.

"It is not simply a rewrite or a combination of the old systems employed at Monash and Chisholm," he said. "One of the basic tenets was that the system be designed to users whether they be in faculties or the service area. MUSIS represents a significant change in management practice as many tasks shifted and responsibilities changed."

"We have analysed peak activity times, such as re-enrolment, and developed new, more effective methods for coping with demand," Mr Irvine said. "For example, instead of asking all students to come in over an eight day period to enrol in their courses for next year, we are spreading the load over a four week period during October, November and December.

"In October, students register their preferred subjects with their faculty. If they pass their final exams in December, they are automatically re-enrolled in the courses they have nominated. In January, Student Administration will send them an invoice for fees, which they can pay directly into any bank.

"Only students who fail will need to come onto the campus in December to discuss re-enrolment with their faculties.

"With this simple arrangement we have reduced re-enrolment queues by up to 70 per cent."

"Due to the need to update our administration system quickly after the amalgamation, the decision was taken to introduce rapid prototyping technology, but insufficient time allowed for this. We were able to prove only the most basic elements to allow enrolment in 1992. It is a play that they the system had to 'go live' before it was ready.

"MUSIS is much more than an enrolment system. It is an instrument for collecting and disseminating information for many kinds of purposes, from determining quotas to calculating fees. We also use MUSIS to prepare reports for BEET and provide statistical information to Planning and Analysis.

"With MUSIS we can also provide information for collating student requirements and information relating to the university's Equal Opportunity policies. It is not just that MUSIS can enrol 30,000 students in more than 300 courses, it is the flexibility built into the system to cope with the demands of university users that makes MUSIS unique."

"More than 550 people are registered MUSIS users. The system aims to reduce job drudgery and eradicate student queues; a tall order given that Monash's enrolments are now larger than the population of many Australian towns. The first step towards cutting queues is a new pre-enrolment system, effective this year.

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Next year it is planned to further improve the service with the addition of a telephone information system that will enable students to check their results without coming into campus. With the present system the campus is on students to check their exam results when they are displayed on each campus.

However, Mr Irvine believes improvements are already evident. For example, this year's exam timetable took only 20 minutes to create, thanks to a computer program developed by staff from AMIS and the Computer Centre. Previously, it had taken up to 12 weeks to develop an exam timetable for a single campus.

With the new program, once users had keyed their requirements, the task was completed in a matter of minutes with no consecutive subject exams and only three clashes. Other universities have now approached Monash with a view to purchasing the program.

"Phil believes this is an example of the sort of rewards to be gained from thinking laterally and being open to change. Another example is the new digital imaging system for student Centre. This technology allows the image to be stored on computer and transferred for use in faculties.

"Students seeking a replacement card will not be required to wait for a second photograph to be processed as their old image can be used. In the future it is planned to use the imaging for a variety of uses, such as class lists with students' images.

"MUSIS will never be a closed book. Mr Robinson and Mr Irvine agree that the system will be an ongoing task with scope for additions and improvements.

COMPUTERS

Teamwork cuts the queues down to size

Long queues, which have become a familiar part of the campus scenery this time of year, may now be a thing of the past. This year re-enrolment lines are expected to be much shorter, thanks to a computerised student information system.

Educational research has been boosted by the installation of a new computing environment, known as 'Boxer', in the Faculty of Education.

The program was initiated by Professor Andy diSessa, director of the Boxer development project at the University of California.

Boxer is an integrated computing environment with functions including programming, text editing, database design, file manipulation, graphics and animation.

Every part of the system is visible on screen; making changes on screen modifies the system. A text-based environment gives a box of ideas to describe ideas.

In any box, the user may add text or more boxes in arbitrary combinations. The spatial relationships on the screen are interpreted by Boxer in terms of computational ideas.

Boxer was first designed at the Massachusetts Institute of Technology as a successor of the educational computing language Logo. The project moved with Professor diSessa to Berkeley in 1986.

"He anticipates the first commercial release of the program for Sun computers will become available before the end of the year, with a Macintosh version to follow soon after."

"The School of Graduate Studies has ordered two XWindows terminals and, with the support of the Computer Science department, will run the Sun version of Boxer.

"An ABC student, Mr Elizabeth Vincent, whose previous music learning research was done in Logo, will be the first at Monash to use the program on a Macintosh computer. Other projects will examine questions on learning in areas of science, mathematics and computing.

Professor diSessa installed the Macintosh version of Boxer, watched by members of the Monash research group (from left) Mr Elizabeth Vincent, Mr Frederick Sibbald, Mr Paul Nicholson and Dr Anne McDougall.

Boxer enters the educational ring
Fighting for forest survival

Down through the millennia, Victoria's forests have been engaged in a never-ending battle for territory. Rainforest and eucalypt forest have waxed and waned, but the impact of people—particularly logging—now seems to be tipping the scales against the rainforests.

Out in the forests of east Gippsland and the Otways, the planks of two very different communities are playing their own ancient version of the old oriental game of rock-scissors-paper.

Victoria's cool temperate and warm temperate rainforests are constantly contending for territory with the eucalypt-dominated sclerophyll forests.

The eucalypt forests intermittently emit fire to repel the advancing rainforests and to push into rainforest territory. The green, humid rainforests suppress fire and push their own boundaries outwards.

They come to dominate because eucalypts cannot regenerate under a dense rainforest canopy. In the absence of fire, eucalypt forest senesces at around 350 years, rainforest species can live twice as long.

The fronts between the two vegetation types have advanced and receded in response to climate change, with rainforest reaching its greatest extent towards the ends of the warm wet periods between glacials.

Relatively recently, a third force entered this ancient theatre of war: human beings. Aborigines began lighting the forests and, in doing so, helped the eucalypts confine Victoria's rainforests to fire-protected pockets. Lastly, came the Europeans, who logged the eucalypt forests and sought to suppress fire.

Frequent burning soon after the arrival of Europeans reduced the wet rainforest elements and increased the flammability of the forests, perhaps increasing the likelihood of extensive wildfire. The Ash Wednesday firestorms of 1983 destroyed the largest remaining tract of warm temperate rainforest in Victoria—in Coorparooabulla National Park in the Cann River region of east Gippsland.

Concerned for the future of this rare vegetation type, Mr Peter Gell of the Department of Geography and Environmental Science, convened a symposium last November to consider the conservation status of Victoria's remaining rainforest. The scientific papers from the symposium, co-edited by Dr David Mercer, have now been published in a new publication, Victoria's rainforests: perspectives on definition, classification and management.

Mr Gell describes the book as a definitive work on the subject. He says not the least threat to the rainforests is the sort of death by definition. Depending on how broadly or narrowly rainforest is defined, Victoria has either 16,000 or about 35,000 ha of rainforest.

The larger figure applies if mixed eucalypt-rainforest communities are included in the definition of rainforest; the opinion of scientists at the symposium was that they should be. The forestry industry has favoured the exclusion of mixed communities from the definition; this view has held sway in official conservation practice.

Rainforest is characterised by broad-leaved species, which have grown in Victoria for perhaps 80 million years. They are not, as some have suggested, relics hanging on after climate change has passed them by, but communities well adapted to their present circumstances.

Dr John Bush, a researcher with the Australian National Parks and Wildlife Service in Canberra, told the symposium last year that a computer-based projection had shown that Victoria's rainforests occupy only 20 per cent of the area that is environmentally suitable for them.

Antarctic Beech (Nothofagus cunninghamii) and Sassafras dominate in the cool temperate rainforests of the Otways and central Victorian highlands. In East Gippsland, cool temperate rainforest is dominated by Sassafras and olive berry (Elaeocarpus hookeri), while warm-temperate rainforest dominants are another species of olive berry, (Elaeocarpus reticulatus) and Lilly-pilly (Alchemia smithii). Warm temperate rainforest, like its sub-tropical and tropical counterparts, also has fynbos and eucalypts, including orchids.

The rainforests exposed by infiltrating the eucalypt forests with an advance guard of relatively short-lived, fire-suppressing species including fynbos, the tree daisy or blanket-leaf (Buddleja), Banyallie (Pittosporum biseriale), and waratah (Telopea speciosa). There is no sharply defined boundary, but a continuum terminating with eucalypts at one end and rainforest species at the other. In the absence of fire, within its climatic limits, rainforest will eventually invade and shade out the sclerophyll forest.

In the past, mixed communities have been excluded from the narrow definition of rainforest. Logging operations in eucalypt forest have been permitted right up to the boundary of pure rainforest and fires, set to burn off the trash in clear-felled areas to promote regeneration of eucalypts, prevent rainforest expanding and have selected for fire-promoting species and against those that suppress fire.

Mr Gell says that the present area of rainforest of all types in Victoria represents less than one-fifth of one per cent of the State's area. And even that small area is under threat—at a time when climatic conditions actually favour the expansion of rainforest.

Rainforest presents problems for conservation, because it tends to cling to protected gullies and to follow rivers and creeks. It thus forms linear strips that are not easy to protect in reserves or national parks. The way in which rainforest is defined is of crucial importance to the conservation of rainforest communities which lie outside of the national parks.

"Recent government research has shown how, in eucalypt forest, there is a shift from wet or moist sclerophyll towards drier community types after logging," Mr Gell said. "If logging practice favours the regeneration of drier sclerophyll forests immediately adjacent to rainforest, it increases the ability of intense fires to penetrate into the rainforest core areas.

"Logging of moist eucalypt forest containing secondary rainforest elements tends to shift the species balance away from rainforest, particularly where regeneration burns are employed. If the intensity of these regeneration burns is too great, rainforest will not regenerate."

"So there needs to be careful control of regeneration burning, as well as the controlled burns used to reduce fuel loads. The issue of protecting catchments is central to the issue of protecting rainforests.

One pocket of Victoria's remaining rainforest is in the central highlands.
Unravelling a crippling disease

Rheumatoid arthritis causes acute pain and debilitation that can only be controlled with large doses of anti-inflammatory drugs like aspirin. Such treatments are a double-edged sword, but a new study has yielded a potentially crucial insight into the cause of this crippling disease.

In rheumatoid arthritis, the immune system mounts an attack on the tissues that stabilise and cushion the joints: the cartilage and ligaments. This results in painful bouts of inflammation and, in severe cases, crippling erosion of the joints as even the bone itself comes under attack. In the Connective Tissue Group in Biochemistry, research student Ms Elizabeth Gardiner has been examining the biochemistry of rheumatoid arthritis.

Ms Gardiner became interested in biochemistry as a third year undergraduate and, encouraged by Professor Dennis Lowther, undertook an Honours study. Then, in a joint PhD study with Drs Chris Handley and Clem Robinson, she investigated how white blood cells - the front-line troops of the immune system - begin attacking connective tissue when they have somehow been freed of the normal checks and balances operating in the synovial region, the fluid-filled environment of the joints.

The onset of rheumatoid arthritis is marked by an inflammatory response, which brings white blood cells swarming into the synovial region: mast cells, basophils and, particularly, specialised microbe-eating (phagocytic) neutrophils. The initial inflammation may, in fact, be caused by an infection, so the immune system's response in wounding neutrophils is quite normal.

But in some people, what happens next is not normal. "All hell breaks loose," Ms Gardiner said. The neutrophils and other immune-system cells begin releasing cytokines (cell-activating signalling compounds), along with highly reactive free-oxygen radicals and a cocktail of protein-digesting enzymes called proteases. Normally, she says, these compounds work harmlessly within the security of the neutrophil's inner environment.

When the cell encounters a microbe, it engulfs it by folding its cell membrane around it and then pinching it off to form a cavity called a vacuole, into which it releases microbe-busting radicals and proteases. The medium outside the cell contains protease inhibitors and other compounds secreted by the tissues of the joint that neutralise any enzymes or free radicals that might pose a hazard to the joint tissues.

The idea proposed was that in rheumatoid arthritis the neutrophils lose the ability to recognise the connective tissues as 'friendly' and attack themselves to the surfaces of cartilage and ligaments. They flatten out, so that one side of the cell makes such close contact with the connective tissue that the inhibitory substances in the synovial fluid cannot penetrate into the contact region.

In in vitro tests, pieces of cartilage were exposed to neutrophils and, subsequently, a protein-digesting enzyme called elastase was detected on the surface of cartilage, along with fragments of proteoglycan - one of the main structural proteins of the cartilage. Electron micrographs of the samples revealed tiny pits, suggesting that the neutrophils are actively deploying their lethal chemical weapons through their membranes and digesting the proteins of the connective tissues.

Neutrophils also release sulphated proteins into the synovial fluid: Drs Handley and Robinson hoped these might serve as a useful biochemical marker for the early diagnosis of rheumatoid arthritis. Any dramatic increase of a marker like a sulphated protein would indicate that the neutrophils had been activated.

During her Honours year, Ms Gardiner conducted experiments into the dynamics of sulphates in the synovial fluid and obtained some odd results. By incubating neutrophils with a mildly radioactive isotope of sulphur, she was able to track what happened to the sulphur as the neutrophils were activated.

"It seemed that the neutrophils were secreting lots of sulphur as sulphate (SO4), rather than sulphite (SO3)," she said. "Sulphite is much more interesting than sulphate, much more reactive, and it has antibacterial properties. (The food industry commonly uses calcium or sodium metabisulphite as sterilants and antibacterial agents. Interestingly, sulphites are known to trigger asthma attacks; asthma is now considered to be another form of auto-immune disease.)

This new finding will be published in the Biochemistry Journal later this year. Subsequently, Ms Gardiner began looking at the possible consequences of sulphite release by neutrophils into the synovial fluid.

In a collaboration with Dr John Underwood using the mouse as a model, she found that when mouse serum albumin - an abundant protein in blood - was treated with sulphite and then injected into healthy mice, the mice mounted an immune response against the modified protein. The immune system treated the modified protein as 'foreign'. But the more provocative result was that the mice also mounted an immune response against their own, unmodified serum albumin.

Ms Gardiner says that she was so excited by the result that she was "bouncing off the ceiling. It was terrific. My PhD will have this terrific sting in the last chapter. I hope others will pick it up and do further research." So what role might sulphite play in an inappropriate immune response? Another Honours student in the department, Ms Zheng Yang, has shown that sulphite may be incorporated into disulphide bonds on 'friendly' proteins.

One of the most important discoveries in immunology is that the immune system distinguishes between friendly and foreign proteins more on the basis of their tertiary (three-dimensional) structure than their specific chemistry. Proteins consist of linear chains of amino acids that spontaneously fold up into their final, active three-dimensional shape, secured by a system of chemical bonds, including disulphide bonds.

It is possible, she says, that the large quantities of sulphite that neutrophils release into the synovial fluid would react with disulphide bonds on proteins, distorting their normal tertiary structure. Other immune-system cells involved in the crucial process of recognising any alien proteins in the body 'see' the distorted proteins as alien and the immune system mounts episodic attacks on them, resulting in the destruction of cartilage and ligaments.

Ms Gardiner is motivated by the fact that one of her friends suffers from rheumatoid arthritis. Quite apart from the acute pain and debilitation it causes, the disease flares up unpredictably so that sufferers cannot plan their lives more than a day or so ahead and cannot keep regular jobs. The pain and inflammation can be controlled with large doses of anti-inflammatory drugs like aspirin, but aspirin causes other biochemical changes in the liver and the stomach, leading to stomach ulcers.

Ms Gardiner's finding points to the possibility that sulphites, through the disulphide bonding mechanism, may be involved in other auto-immune diseases. It could stimulate a whole new field of research.
Decaying cities of our making

Australia's urban infrastructure — its bridges, roads, buildings, power plants, water and gas-reticulation systems — is decaying. Just repairing the decline will soon consume the entire infrastructure budget of some cities. A Monash engineer believes the causes of this malaise have been built into the system.

The causes of infrastructure decay lie much deeper than the recession or inadequate maintenance, according to Professor Brian Cherry, Associate Dean for Research and Development in the Faculty of Engineering.

"It is a problem that feeds upon itself, with its roots in the public tender system, inadequate training of construction workers, and the inexperience of some supervising engineers. He says by the second decade of next century, some of Australia's cities face the prospect of having to devote their infrastructure budgets to maintenance, leaving no capital funding for new works.

"I believe we are rapidly approaching a state of being the last generation of Australians to enjoy the full amenities of a city," Professor Cherry said. "The development of the public tender system has been bad news for the durability of infrastructure.

He likes to illustrate his argument with an anecdote about an American astronaut, who when asked by a television interviewer whether he was ever scared during a space mission, answered: "Mam, when I thought about that capsule consisting of 14,728 items, each of which had been bought on the basis of lowest possible tender, I was scared."

"Government authorities are normally required to get the lowest possible tender," Professor Cherry said. "Durability and the long term cost of maintaining infrastructure are little place in their calculations. And for our entrepreneurs and developers — the people we are supposed to worship because they get big projects going — the major objective must be to minimise their costs. They have a greater moral obligation to their shareholders to maximise short term profits than they have to maximise durability."

On the rare occasion when an insensitivity does not accept the lowest tender, the engineer must justify his decision to non-engineers. Professor Cherry says he has had personal experience of this situation on a major construction project, in which he recom¬mended one system against another — supposedly cheaper — system because it was inherently more durable.

"In the end, we managed to get the price of the more durable system down to less than the scheme originally proposed," he says. "But I think it was purely because of the way that we fought that the authority eventually allowed two tenders on both schemes, and I recognise that if the less durable scheme had come in cheaper we would probably never have succeeded."

Professor Cherry suggests that sociological considerations have an insidious influence on the quality and durability of infrastructure. "If you take a 22-year-old civil engineering graduate, lacking in experience, and make him a site engineer in charge of a project where there is a 50-year-old shop steward who has been dealing with young subordinates like him for more than 30 years, how likely is it the young engineer will receive the respect he needs to control the quality of construction?" he asks.

"When money is scarce the reality is that if a young, inexperienced engineer costs $20,000, and a senior engineer costs $50,000, the young engineer will get the job. It's a sociological problem, not a technological problem. Inevitably, corners get cut, and it's not primarily a matter of budget."

"In the field of civil engineering we know that 75 mm of cover of a 0.45 water:cement ratio concrete will stand up to seawater for 50 years because this specification was incorporated in our construction standards by the late 1960s. Yet things are still not being built to these standards today.

"The community expects its roads, bridges and hospitals to last. But at the trades level I think there is a profound lack of knowledge about why specifications are written the way they are. It's a training problem; if the builder was aware of the reasons for a specification, then it is much more likely that it would be adhered to. I believe that this is very much a consequence of the 'us and them' attitude."

"The workers can come on site, pour the concrete and go home and forget about it. If the managers were more willing to train the operatives and give them more interest in the job, they would know how what they are doing affects what they are creating and the work would be done much more closely to specification. Even for quite basic jobs you need some fundamental knowledge; the 50-year-old shop steward who is trying to win more from the management on behalf of his workers cuts corners, gives them more interest in the job, they would know how what they are doing affects what they are creating and the work would be done much more closely to specification."

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"Professor Cherry says that durability was much less of a performance has outpaced our knowledge of lifetime performance. When they were building Salisbury Cathedral in England in the 14th century, they were more worried about making it stand up rather than about how long it would last."

Some of Australia's cities may have to devote their infrastructure budgets to maintenance, leaving no capital funding for new works.

Maintaining its urban infrastructure was costing some $750 million a year.

"The causes of Australia's infrastructure decay were institutionalised, but were common to most cities of the world. "In most European cities, if you take a cab from the station to your hotel, you look at the refurbishment taking place en route and think: 'Won't it be nice to come back in 10 years when all the maintenance will have been completed and we can see the city as it was built', But of course it won't — it will probably be worse."

"Part of the problem may be that engineers now understand the behaviour of their materials much better than they did a few decades ago, and were building much closer to the limits of their materials. 'That's good engineering, but the capacity to build closer to the limits means that the margin for error during construction is much less,' Professor Cherry said.

"In the past, we over-engineered to minimise the risk of failure to the extent that durability was much less of a problem. "Today, our knowledge of structural performance has outpaced our knowledge of lifetime performance. When they were building Salisbury Cathedral in England in the 14th century, they were more worried about making it stand up rather than about how long it would last."

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Like many other young scientists working on biology's frontier, Rohan Teasdale dreads the inevitable and hopes that's Dale, a young, cerebral targetor of an enzyme called quiker's eyes to glaze over and to divert attention to a bit of latest night's TV movie. But if this enzyme and others like it did not perform their specialised functions in precisely the right location, a human being might be no more than an amorphous collection of several hundred billion cells.

In a PhD project supervised by Dr Paul Gleeson, Mr Teasdale is studying one of biology's deeper mysteries: how the myriad proteins and enzymes that organise the structure and function of living tissues manage to find their way to the right place in the body. Some form of targeting is involved: a molecule of protein or an enzyme must carry somewhere within its structure a message that directs it to the right site within the cell. Beyond that, it is to perform its specialised task.

Since each individual protein or enzyme is assembled according to the precise instructions of the gene that specifies it, the DNA code of the gene itself must have this information embedded in it. What is the nature of these instructions, and how do they specify the destination of a molecule? Mr Teasdale has been seeking to throw light on these questions, using the Gal-transferase enzyme as a model.

A mammalian cell in cross-section bears some resemblance to a walled medieval city (see figure 1). A series of concentric walls protects the city's residential core; the walls are represented by specialised membranes. The centre of the cell, the nucleus, houses some 100,000 genes and is surrounded by a nuclear membrane. Enzymes within the nucleus synthesise copies of the DNA code of an active gene, and despatch them through the nuclear membrane to a bilayer structure called the endoplasmic reticulum.

Here, tiny structures called ribosomes attach themselves to messenger RNA molecules (or 'mRNA') and transcribe the genetic code. These instructions specify the assembly of a long chain of amino acids that fold spontaneously into the final three-dimensional shape of the protein. Tiny bubble-like structures called vesicles fill up with the protein, and bud off the endoplasmic reticulum, then move to another cellular organelle called the Golgi apparatus. The Golgi apparatus, a series of folded membranes, houses an array of enzymes that modify the newly synthesised protein molecules into their fully functional form.

Not all proteins are modified; some may actually remain in the Golgi apparatus if they are directly involved in the process of modifying other proteins. If not, they may migrate up through the layers of the Golgi apparatus to the outer region of the cell, where they are embedded themselves in the plasma membrane - the 'skin' of the cell.

Some do not even step there: they ghost through the outermost membrane and into the intracellular medium, perhaps to be transported elsewhere in the body where they may help construct new tissues or carry out important biochemical reactions.

Mr Teasdale focused on Gal-transferase because it travels only as far as the Golgi apparatus. The enzyme is involved in a process called glycosylation, in which molecules of a natural sugar called galactose are attached to a range of proteins before they are exported to the plasma membrane.

These sticky sugar-swathe proteins are the body's natural glue, serving to stick cells together into the elaborate specialised tissues. Without them, these tissues might fall apart.

How does Gal-transferase 'know' how to go only as far as its workplace in the Golgi apparatus and not all the way to the plasma membrane? "The current thinking is that plasma membrane proteins end up there by default," Mr Teasdale said. "This implies that proteins that live and function in the Golgi apparatus are actively retained there.

The way we approach the problem is to deliberately mutate the gene. We know that different regions of the gene correspond to different domains of the protein, so if we change the DNA code for the domain that targets the protein in the Golgi apparatus, the protein will no longer be retained and should move out to the plasma membrane."

Various mutant forms of the Gal-transferase gene were introduced into a special line of monkey cells, specially selected for their capacity to over-express introduced genes. Antibodies labelled with fluorescent dye sought out and attached themselves to the enzyme. Under a powerful optical microscope, the dye revealed where the enzyme was concentrated in the cell.

If mutation had knocked out the targeting signal, the cell would fluoresce on its margins, indicating that the enzyme had gone right through to the plasma membrane. If not, it should concentrate in its normal home in the Golgi apparatus, lighting up the region around the nucleus.

Mr Teasdale says molecules of Gal-transferase consist of three domains: a catalytic domain, a transmembrane and a tail. The catalytic domain is in the molecule and floats off into the intra-cellular medium, where it performs its appointed task of attaching galactose molecules to proteins.

The fact that it is cleared off naturally exempts it from containing the targeting information. The transmembrane domain sits within the phospholipid membrane of the Golgi apparatus; while the tail projects from the membrane's underside into the cell's fluid interior, pointing back towards the nucleus.

In scientific parlance, this research field is 'hot': half a dozen other research teams around the world are competing to identify the enzyme's anchor.

In February this year, Mr Teasdale, his supervisor Dr Paul Gleeson and their Italian collaborator Dr Giacomo D'Agostaro, of the Department of Biochemistry and Physiology at the University of Rome, reported that they had found Gal-transferase on the surface of sperm cells. In its normal role in the Golgi apparatus, the enzyme latches onto sugar molecules and then attaches them to proteins.

In its newly discovered role, it latches on to sugar molecules already attached to a protein called ZP3, a component of the translucent, jelly-like layer called the zona pellucida, which protects the ovum, or unfertilised egg. In this novel role, Gal-transferase seems to perform the vital function of linking the ovum with the one successful sperm among hundreds of millions.

In short, Gal-transferase supervises the magic moment of conception. Here, at last, is a discovery that could enliven discussion at the next social gathering that Rohan Teasdale attends.
Bearing up under the strain

Bearing are the most common components in modern machines, and the most critical. The failure of a single bearing in one machine can bring an entire production line grinding to a halt, resulting in significant revenue loss. A PhD project at Monash is taking the guesswork out of bearing maintenance.

A bearing usually gives some warning of its failing health, but in a modern industrial plant there may be few people who can speak its language.

In the past, maintenance staff became familiar with machines through long experience and could judge whether to replace a noisy bearing immediately or let it run until regularly scheduled maintenance was due. However, such seat-of-the-pants experts are dwindling in number.

Efficiency demands some way of monitoring the condition of bearings objectively, so that problems can be anticipated. A bearing must be able to be replaced or repaired with minimal disruption to production.

PhD student Mr Chris Mechefske, of the Department of Mechanical Engineering, has been studying the cryptic language of healthy and ailing bearings and analysing their complaints using advanced mathematical techniques. He has used his findings to develop computer software that will translate the information into a form that can be readily understood.

His PhD project has been supervised by Dr Joseph Mathew, of the Centre for Machine Condition Monitoring, and the research itself has been sponsored by the aluminium company Comalco. The company was interested in finding a more effective way to monitor the condition of low-speed, high-load bearings on conveyor belts used to smelt ore to transport raw materials.

All bearings, even those in mint condition, emit a characteristic pattern of vibrations or 'noise'. Only in the terminal stages does the frequency of these noises spill into the spectrum spanned by human ears. The tell-tale early signs of trouble may be inaudible, and can only be detected by electronic transducers mounted on the bearing.

The pattern of vibration potentially contains valuable information, but it must first be analysed and then interpreted. 'It comes down to a way of automatically classifying a frequency spectrum as normal, or representing some fault condition, or anywhere in between,' Mr Mechefske said.

"It's also important to distinguish between different categories of faults. For example, if you have a flaw on the outer bearing race of a very expensive bearing but the bearing is loaded in such a way that all the load is on the bottom of the race, then the race can be rotated to place the fault at the top where it is not under load. But if the rollers are damaged, it would mean replacing the whole bearing because the position of the race is irrelevant."

A neural network — a computer program trained to learn in a quasi-human way — could be taught how to recognise particular faults. But teaching a neural network to recognise various problems in different bearings under a range of operating conditions would be very time-consuming.

Mr Mechefske has developed a technique based on extracting information from a bearing's frequency spectrum, potentially a shorter route to diagnosing a problem. Against the routine noise of a normal bearing — its normal frequency spectrum — any unusual vibration signals an abnormality, and its characteristic frequency offers clues to its source and nature.

The various components of a bearing (the outer race, inner race and the rollers that separate them) do different jobs, but interact with each other. In a healthy bearing, each component emits vibrations at its own characteristic frequency and energy. The frequency will vary according to how fast the bearing is working as a unit. The rollers, for example, rotate faster than the inner race because of their smaller diameter.

If one of the rollers develops a small flat spot due to wear or overloading, it may 'click' rapidly as it makes contact with both the inner and outer race. If a flaw develops on the outer race, all of the rollers will click as they pass it. In each case, the fault changes the bearing's frequency spectrum.

Mr Mechefske compares the bearing's frequency spectrum against the spectrum of a healthy bearing working at the same speed, using a computer-based mathematical model of the vibration signal generating process. The degree to which the measured spectrum departs from the healthy bearing spectrum is represented as a number from 0 to 100, known as the probability of fault existence, with low numbers indicating normality and high numbers indicating a fault.

The computer program he has developed contains a library of signals of known faults; the software finds the nearest match. Even if the computer cannot identify the fault — it may be of a new type not yet represented in its library — it will still pick it out as an abnormality.

The advantage of his technique is that it can detect a fault within a matter of seconds, whereas other techniques may need to monitor a bearing for 10 minutes or so before the abnormal signal emerges from the background noise. By monitoring the bearing at regular intervals the computer can look at the trend of the fault and predict how long it will be before the bearing fails.

The plant manager can choose a convenient time before the predicted date of failure to repair or replace the bearing.

Bearings are subject to a range of problems as they age: the surfaces of the races may become pitted by fatigue spalling or componentse may corrode. If a large bearing is transported by road in a vertical position, a bumpy ride can cause very high static pressures on one part of the race, causing it to harden. Abnormal patterns of wear can occur when it is put into service.

Mr Mechefske's software can detect these types of faults, but has not yet been extended to detect faults that result from mismatched components or faulty installation of bearings. He has also been experimenting with an analytical technique for identifying different types of faults based on the computer program sNOB, written by Professor Chris Wallace of the Department of Computing Science.

Professor Wallace has developed a technique that estimates the length of computer code needed to describe a group of similar phenomena: in the case of bearings, their frequency spectra. In essence, the computer estimates the minimum amount of code needed to describe a group of spectra; the shorter the code, the greater the similarity, and the greater likelihood that they represent the same type of problem.

Mr Mechefske says the technique does a very good job of matching and classifying various types of frequency spectra data. Written to run on a moderately powerful VAX computer, it is fairly demanding on computer power.

He would like to convert it to run on one of the popular class of PCs with a 386 chip.

"Apart from all the technical work I have done, the thing I am proudest of is that it looks like my software can solve a problem that continues to exist in industry, leading to considerable cost savings," he said. "At the moment, there is no accurate way to predict when low-speed, heavily loaded bearings are going to fail."

The results of the research have been distributed by the Centre for Machine Condition Monitoring to companies that contribute to the centre's running costs and research programs. BHP Steel and Alcoa have both expressed interest and have agreed to sponsor further research aimed at producing a PC-based software package for monitoring low-speed bearing condition.

Mr Mechefske says the software could be installed as part of a permanent monitoring system, in which a PC would be used to monitor a network of transducers mounted on machines throughout a plant. "Companies are now tending to lean towards on-line monitoring of critical equipment so that they can anticipate problems and carry out maintenance before something fails," he said.
Flowing waves of destruction

The eruption of Krakatoa just over a century ago killed people living on islands 45 kilometres from the blast. Behind this destruction was a force known as the pyroclastic flow, a lethal wave of hot volcanic ash and gas that can move across land and sea.

During the Devonian period some 400 million years ago, a massive volcanic eruption projected an enormous column of hot ash and gas into the stratosphere over the ocean.

At a great height — perhaps as much as 50 km — it lost momentum and cooled sufficiently to lose buoyancy in the thin atmosphere. Then it collapsed under its own weight. Gathering speed under gravity, it splashed down on the ocean surface.

But instead of sinking it began spreading radially, like a stream from a high-pressure hose directed downwards onto a bed of vapourised sea water. The 700°C pyroclastic flow raced outwards at speeds of up to 700 km/h before it slowed, cooled, and then began to sink.

Volcanologist Professor Ray Cas, of the Department of Earth Sciences, estimates the volcano erupted some 200 km³ of ash and lava, which impinged on the sea floor over an area of at least several thousand square kilometres. Over time — during mountain building crustal events — the sea floor became dry land, preserving an extensive sedimentary basin in what is today inland New South Wales.

The original volcanic deposit was weathered, dissected and reworked by other geological processes over the past 400 million years, but Professor Cas says it is clear that it formed a confusable sedimentary deposit that can only have been deposited by massive eruptions.

"One of the best well understood phenomena in volcanism is what happens when a gas-rich flow of ash comes in contact with a significant body of water," Professor Cas said. "Some would have it that such a large volume of solids would enter the ocean and continue to flow underwater as a gas-supported flow.

"Others argue that if you look at the flows of debris, it should actually flow over the water. Firstly, the significant temperature differences between the flow and the water mass would set off sustained phreatic explosions, caused by the sudden vaporisation of the water.

"Secondly, pyroclastic flows also carry low-density particles of pumice, so their bulk density is actually less than water, so they should flow over water." It was this type of flow, Professor Cas believes, that could have caused the collapse of the Bronze Age Minoan Civilization when the Santorini volcano on the Aegean island of Thera erupted around 1620 BC.

Research Monash reported earlier this year on a multidisciplinary project involving Professor Cas and Professor Monaghan of the Department of Mathematics, and Dr Peter Bicknell, of the Department of History, to reconstruct the violent events surrounding this eruption, using a combination of historical accounts and mathematical models of the behaviour of the tidal waves and the associated pyroclastic flow.

Professor Cas believes the pyroclastic flow may even have reached the shores of Crete, 140 km away, setting fire to houses inland, beyond the reach of the tidal waves that followed. "There are documented cases of pyroclastic flows over land that travelled more than 160 km," he said. "The deposit from the Lake Taupo pyroclastic eruption in New Zealand in AD 1853 reached the outskirts of the town of Auckland.

"These flows are very mobile. The Taupo pyroclastic flow, to travel such a distance, and to flow over the huge lands of an island has such a height that as it begins to fluidise, its path trajectory, must have been travelling at 600 m/s. The main force driving such flows is gravity, and not as a dispersal of the fallout ash over large distances, the column of ash and gas from the eruption might have been as much as 50 km in height."

Professor Cas says that in a major eruption, the gas and ash column is impelled by the force of the explosion to great heights. When that momentum begins to break off, the column continues to rise from convection as it extrains air from the atmosphere around it, heating up to 600°C.

Finally, it reaches a height where the bulk density of the column is the same as that of the surrounding atmosphere; it spreads laterally and begins to drop its ash, although some of the finer ash at attitudes above 25 km can be transported all the way around the globe. If the column becomes overflowed with solids and is denser than the atmosphere, it collapses, producing pyroclastic flows.

"Once the collapsing column hits the ground it acquires enormous kinetic energy," he said. "It also acquires mobility from the continued expulsion of gas from the ash particles. And, if the landscape has abundant vegetation — as it did in New Zealand — it is instantly volatised and the released steam serves to support the flow as it streams through it."

Pyroclastic flows have caused huge loss of life down through history: some 20,000 died in St Pierre when the Mt Pelee volcano erupted on the Caribbean island of Martinique early this century, and thousands died in the Krakatoa eruption of 1883 when a pyroclastic flow swept over the ocean, burning people on beaches up to 40 km away. The pyroclastic flow from the Kilauea eruption of 1886 in Hawaii also swept over the ocean, burning people on beaches up to 40 km away. The pyroclastic flow from the Kilauea eruption of 1886 in Hawaii also swept over the ocean, burning people on beaches up to 40 km away.

"If one of these large scale eruptions occurred today, there would be enormous loss of life."

Volcanologist Professor Ray Cas: "If one of the very large scale eruptions occurred today, there would be enormous loss of life."
Bridge's ill-starred history, finding fatigue cracks in unexpected places caused some disquiet. Concern, according to Associate Professor Paul Grundy, of the Department of Civil Engineering, who has been investigating the small fatigue cracks since they were first detected about two years ago. "There's nothing remarkable happening," Dr Grundy said. "Fatigue cracking is a recurrent problem with modern cable-stayed box girder bridges. It is the box girders that are part of the problem here, not the cable stays." Dr Grundy describes some of the problems experienced with some box girder bridges in Europe as quite frightening, but says the West Gate Bridge had many good features engineered into it to minimise the fatigue experienced in bridges of this type.

The bridge's specifications included a regular maintenance and inspection program, designed with the expectation that the first fatigue cracking would show up after about 10 years of service. That expectation was fulfilled early with the discovery of some minor cracking in areas where they had been predicted.

The cracks found two years ago, however, were of a different type. They were not found in locations predicted in the manual. Dr Grundy said. "But this is inevitable because all bridges are unique, and have their own idiosyncrasies.

Dr Grundy has considerable experience in studying metal fatigue in large steel structures, particularly railway bridges in Victoria and offshore structures like oil and gas production platforms, where the consequences of metal fatigue and corrosion can be very serious.

The West Gate Bridge is in a coastal environment where salt in the air can rapidly attack and corrode any unprotected metal exposed by cracking. So Victoria's Road Construction Authority engaged Dr Grundy's research group to investigate the nature of the cracks, and the factors that produced them.

"When you're confronted with something like this, you have to conduct a very detailed and thorough investigation of what is going on," Dr Grundy said. "The secret to structural reliability is knowledge; you have to be able to explain what you see, and what it is happening before you can do anything about it.

"The what was easy: the unexpected cracks had occurred around openings cut in steel plate forming the vertical web of the cantilevers that run across below the deck supporting the roadway, at right angles to the direction of traffic flow (see figure-overflow).

The cantilevers, which impart lateral rigidity to the bridge, flex slightly under load. Roughly resembling inverted coat hangers, the cantilevers are bolted to the sides of the box girder, and the steel deck plate is then welded in place. However, at regular intervals there are gaps in the steel cantilever web plate to accommodate a series of parallel, trough-shaped members that run longitudinally under the deck in the direction of traffic, providing stiffening.

Dr Grundy says every passing vehicle puts an independent load on each cantilever; this sets up a load cycle in which the cantilevers are repeatedly stressed. The greater the weight of the passing vehicle, the greater the load. "You need two things to cause fatigue damage," he said. "You need stress to be applied repeatedly, and a notch somewhere in a structure where the stress is focused. Most structures have notches. It costs money to eliminate them from the design, and some are unavoidable."

The West Gate Investigation divided into two phases: the first, a field study in which the stresses applied to the bridge by daily traffic flow were measured and monitored. In the second phase, a research group at Melbourne University, led by Emeritus Professor Len Stevens, confirmed by analysis the behaviour observed by the Monash researchers, using a computer-based mathematical model that employs a technique called the finite element method.

In essence, the model takes real-world data and applies it to the model in an attempt to reproduce the type of damage observed in the real structure. Once the behaviour of the model has been reliably correlated with that of the real structure, it can be used to predict the future behaviour of any cracking, and its effect on the bridge's structural integrity and working life.

Dr Grundy says most modern structures have very large margins for safety designed into them. Safety margins, he says, are normally expressed in terms of loads applied to the structure. For example, an engineer or architect might include a capacity to resist loads much greater than would be encountered in normal service. "But safety margins are a bit old hat," he continued. "Designers know much more about the limits of the materials they are using, so there is more emphasis on reliability."

"All materials respond elastically to stress, meaning that they return to their original shape when the stress is removed. There is a maximum stress, called the yield stress, beyond which elastic recovery does not occur. In the old days when less was known about materials, you might have used a safety factor of 1.5 or 2 from permitted stress to yield stress to ensure the structure reaches the limit of its capacity."

"But safety margins don't have much relevance to fatigue. You are likely to get fatigue cracking in any steel structure; it's not a question of safety, but of knowing how long it will last, because you know that eventually it will fail."

Knowing how a structure will behave under stress, and being able to simulate it using a computer, the engineer can then use the model to simulate the effect of modifying that structure. Dr Grundy says: "You can ask what if type questions of the model: what happens if you add more steel, or even take some away?"

"The interesting thing about the West Gate Bridge, from my viewpoint, was that something was happening that had been overlooked by its designers. The effect of the cantilevers distorting under repeated cycles of load was unlikely to have been taken into account in the original design. It would have taken rare insight to have anticipated this problem.

"The trouble occurred because the web of the cantilever was distorting. All the cracks ran parallel to the direction of the traffic, so they would not compromise the integrity of the bridge for a long time. It now becomes a management problem, as to how we manage the cracks."

"We need to know whether, as they become larger, they grow faster. Cracks tend to grow exponentially, but in the case of the West Gate Bridge, the opposite appears to be happening. Because the cracks result from the distortion of the structure, they are actually relieving the stresses induced by that distortion."

Once the stresses have been relieved by the cracking, the forces involved will find a different path through the structure. The weakness, in effect, redistributes the stresses until the structure reaches a new equilibrium.

Dr Grundy says he was unable to find any description of this type of cracking in the codes relating to the rehabilitation of bridges, and did find one in a code of practice for offshore structures. "The cracks are unlikely to shorten the bridge's life. With the problems clearly identified inspection and maintenance will ensure that the cracks will not get out of hand."

Setting up the instruments to monitor the loads imposed on the bridge by passing vehicles tested the mettle of the Monash team. They had to go over the side to set up on an open grid gantry slung from the underside of the deck, with the water far below.
Cracks redistribute the stresses

"There was a fantastic wind chill factor," Dr Mr Peter Dunbar said, "and we were trying to fix the deck vibrated from passing traffic," Dr Mr Gerard Grundy said. Mr Gerard Grundy's research students, Mr Gerard Grundy said. He says considerable expertise in the field of strain gauges and data-logging equipment. Mr Chitty had developed considerable expertise in previous research on Victorian railway bridges. After four weeks of continuous monitoring, the data obtained by the Monash team was fed into the computer model, which predicted a median life-time for the bridge of between 40 and 80 years; more accurate predictions are made difficult by uncertainties inherent in the design of large structures.

"The research work was done on the Monash team’s success in the field. The electronic systems were developed and tested by technical officer Mr Greg Stroot. Another technical officer, Mr Peter Dunbar assisted two of Dr Gundy’s research students, Mr Gerard Grundy and Dralingam (‘Thiru’) with the installation of the strain gauges and data-logging equipment. Mr Chitty had developed considerable expertise in previous research on Victorian railways. After four weeks of continuous monitoring, the data obtained by the Monash team was fed into the computer model, which predicted a median life-time for the bridge of between 40 and 80 years; more accurate predictions are made difficult by uncertainties inherent in the design of large structures.

After months of continuous monitoring, the data obtained by the Monash team was fed into the computer model, which predicted a median life-time for the bridge of between 40 and 80 years; more accurate predictions are made difficult by uncertainties inherent in the design of large structures.

"The remarkable result that we had before us was a scattering of cracks around the structure, which had appeared at around 11 years, a line with design/impact predictions. Theory and test were in agreement, so we don’t need to investigate any further."

About 100,000 vehicles cross the bridge each day, including about 15,000 trucks. Monitoring of vehicle masses by Vic Roads using a weigh-in-motion device revealed that some of these trucks violated maximum load regulations. The legal limit for trucks is 38 tonnes and, before enforcement by continuous monitoring, about 12 per cent of the trucks were over this limit. Such loads do not necessarily over stress the bridge because with semi-trailers and tankers, the weight is distributed over multiple axles. The bigger problem is short-wheelbase vehicles such as quarry trucks carrying sand or aggregate, many of which are towing trailers with equally heavy loads. These vehicles have only a few axles to spread the weight. Because the heaviest trucks move slowly, most of them use the slow lane on the outside of the deckling, placing higher stresses on the decking and supporting cantilevers.

"Some experts have suggested putting all the heavy traffic in the inner lanes away from the cantilevers, but it’s just not feasible in terms of traffic management, particularly if a truck is trying to get from Williamstown Road up the steep approach to the bridge," Dr Grundy said, "and it would simply transfer the damage problem from the left hand lane to other lanes."

Victoria’s fields ‘active’

"After forest fires there is an incredible burst of regeneration in which the vigorous growth of young eucalypts reduces water yields. It takes a long time to get back to pre-burn yields. In supply catchments, it’s a case of timber economics versus water economics. You don’t want fires in catchment areas. If you can suppress fires for long enough, allowing the rainforest to get fire suppression for nothing, as well as an increase in water yields."

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During this week, the team is working on a halt on logging in mixed rainforests. "Victoria’s fields ‘active’

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"It is a remarkable result that we had before us was a scattering of cracks around the structure, which had appeared at around 11 years, a line with design/impact predictions. Theory and test were in agreement, so we don’t need to investigate any further."

During this week, the team is working on the definition of classification and management of Victoria’s rainforests to preserve rainforest. Cool temperate rainforest has recently been listed as a threatened community; conservationists and scientists have been working to have the definition extended to warm temperate rainforest.

"Former Conservation and Environment Minister Mr Barry Pullen ordered a halt on logging in mixed rainforests earlier this year. He also halted logging in catchments of a number of sites that forest researcher Mr David Cameron had defined as being of special significance; sites containing a core of rainforest. He also halted logging in catchments of a number of sites that forest researcher Mr David Cameron had defined as being of special significance; sites containing a core of rainforest. He also halted logging in catchments of a number of sites that forest researcher Mr David Cameron had defined as being of special significance; sites containing a core of rainforest."

Professor Cas says there is a very small volcanic province in western Victoria that is probably a relic of the mantle activity associated with the break-up of Gondwana. Western Victoria is probably passing over a deep-seated hot spot caused by a rising plume of magma in the mantle. The last eruption was at Mt Gambier some 4500 years ago and others could follow "tomorrow, next year or several thousand years in the future."

The small magmatic volcanoes, which created the basalt plains west of Melbourne, can erupt quite violently at times as molten magma rises through the ground water aquifers, setting off a series of phreatic blasts. They can also produce small pyroclastic flows, called slumps. "If we had another eruption from Tower Hill or nearby, Warrnambool would probably be inundated with ash and the city would be severely affected," Professor Cas said.

Finally, for those who wonder whether physical volcanology should be an important research field for Australia, when active eruptions represent a relatively minor risk factor, Professor Cas points out that much of Australia’s mineral wealth is locked up in ancient volcanic successions. These records cover repeated volcanic activity for the past 4000 million years.

"Professor Cas annually teaches a week-long professional course on volcanology to more than 40 industry, government and research geologists from all over Australia and overseas. As a result, these professionals are better equipped to assess the mineral potential of Australia’s volcanic past."
The problems with Australia’s health system are generally exaggerated. Consider these points:

- compared with the average OECD country, Australia is fairly well provided with medical and hospital services, with an average age of use of doctors and hospitals;
- since 1975, Australia has maintained the same level of expenditure on health, as a percentage of Gross Domestic Product (GDP), indicating a greater degree of cost control than in most other OECD nations;
- Australia’s health costs are almost exactly in line with what would be predicted from our national income — neither too much, nor too little (there is a strong relationship between GDP and personal expenditure on health).

It is not surprising that American commentators repeatedly tell us that we are lucky in addition to its high cost, American insurance leaves 35 million citizens without cover and about the same number with very inadequate coverage of expenses. To qualify for Medicaid, families must generally be well below the poverty line. The near poor have no assistance.

**Dubious distinctions**

Despite having the highest health expenditures in the world, the US also has one of the highest mortality rates among OECD nations and, amongst the lowest life expectancy, Australia ranks near the top on both counts. While we enjoy these dubious distinctions, the figures have been worsening progressively, particularly so when measured with the free market, health and health insurance schemes. In contrast, Australia consistently ranks among the OECD’s most efficient states.

The issues that get the greatest political and media publicity are the small ones. For example, there is the issue of co-payments — the amount patients pay directly out of pocket when they visit the doctor.

Co-payments are almost irrelevant to the costs or the benefits of the health scheme. The evidence is clear that co-payments are quite incapable of explaining increases in health costs and, given the US experience, it is clear in those cases as co-payments increase, the sort of cost pressures that have driven the US system. Their chief function is to give greater control over their incomes.

It is not surprising that when the Federal Government attempted to increase co-payments last year, the chief support came from the medical profession. Many health economists and practitioners maintain that co-payments would explain the differences between US and Australia. The US has tried to use co-payments to control costs; but increasing co-payments have not held down the use of services or the cost of health care. Australia has never had a schedule at the basis for medical fees. Insurance rebates depend on a fee in each area of medical practice ("usual customary and reasonable fees"); as doctors increase their charge, the fee paid by Medicare increases even higher into an inflationary spiral.

The second much-publicised but unimportant issue is whether our health system be publicly or privately owned?

There is no real difference in Australia that private hospitals are more or less efficient than public hospitals. American studies do not show significant differences either. A decade ago private hospitals in Australia were essentially cottage industries with little sophisticated technology.

In the past decade, however, this has changed and there is now reason why private hospitals should not provide services of equal technological sophistication as the public hospitals. They compared with a decade ago have made dramatic changes in their use of medical technology.

One of the really big issues in our health system is what controls costs?

The evidence seems unambiguous that the higher the percentage of the bill paid by government, the lower the national health cost. There have been four studies demonstrating this in the past six years. The OECD’s own analysis shows that for every 10 per cent increase in the share of the bill paid by government, there is about a 42 per cent reduction in the proportion of the GDP spent on health.

This does not specifically reflect the influence of government, but the need for a countervailing influence to the inflationary forces that exist on the providers. It is almost impossible today that there is an incentive to increase costs.

This applies to those who develop the technology, to doctors, to insurance funds and to hospitals. For the medical profession the incentive is financial and professional; the providers of health care are amongst the most influential groups in the community. The individual simply cannot go out of his way to explain the differences between US and Australia. The US has tried to use co-payments to control costs; but increasing co-payments have not held down the use of services or the cost of health care.

Government can only carry this function and, in principle, could other organisations. But the incentive to carry out this difficult task only exists where health costs are funded from a single, concentrated budget.

The US experience shows why the key factor in rising expenditure is the existence of multiple sources of finance; there is no incentive for cost control, only for cost shifting. If the Federal Government is to shift costs to the state, the state can shift it to insurers, insurers can shift it to the employer, and everybody can shift it to the patient through higher co-payments.

The great attraction of co-payments to governments and insurance companies is that they shift the costs and burden of cost control away from them to the individual — but they don’t control costs. The key to controlling costs is to provide an incentive to the government of insurance companies, rather than to the individual.

**Medical ‘uncertainty’**

The second big issue and a longer term problem is the increasing cost of medical practice. The evidence here is startling not only can the consumer not decide what is best practice; the doctors themselves cannot. There is extensive research on the variation in practices carried out by doctors, in treating essentially the same medical conditions.

The differences do not necessarily reflect financial incentives; rather, they reflect the uncertainty of medical outcome and the lack of good information. US doctors perform four times as many tonsillectomies as Swiss doctors, and six times as many hysterectomies as Japanese doctors (twice as many as Australian doctors).

These differences are apparent within small geographic areas. A study of 15 different surgical procedures carried out in 50 US hospitals found that the rate for certain procedures varied from as much as 750 per cent. The implications of such variation is that some patients either receive far too much or far too few services. Either way, it represents a serious reduction in the cost effectiveness of the system.

Medicare, in its various versions under both Labor and Coalition administrations, has been effective in cap-

**FEATURE**

Media reports about long waiting queues for surgery, spiralling health costs and the rising cost of medical insurance suggest that Australia’s health and health-insurance systems are sick and in need of major surgery. But by world standards, we’re not too bad off.

**Just how sick is the health system?**

Professor Jeffrey Richards speaks on the way ahead.

November 1992

Montserrat — 9
Transplant miracles expose moral grey areas

by Lynn Gillam

The same cameras have also shown us hospitals in China admitting foreign, fee-paying patients for heart transplants, using the hearts of prisoners executed in Chinese jails. The prisoners may have been sentenced to death or murder or rape, criticising the government, or stealing a bicycle. The date of their execution is set by the arrival of a patient of the same tissue type and their family receives a bill for the cost of the bullet.

It is not hard to criticise the abuses going on in these instances; the wrongness seems very apparent, even if it cannot readily be put into words. And yet, it seems to me that if patients travel from many parts of the world, including Australia, to receive these 'morally tainted' transplants. The reason is not far to seek, if they stay home, they may very well die waiting. But are there any morally more acceptable ways to help these people without exploiting the poor, the ignorant and the powerless?

One possibility is to look closer to home for more organs. Kidney transplants using organs from live donors do occur in this country with very good results. Those instances; the wrongness seems very apparent, yet it is all too often overlooked that transplantation occupies a morally ambiguous place in our society. And it is because we will quite rightly continue to try to prevent road deaths, accidents, murders and suicides that those involved in transplantation are forced to look for ways of increasing the numbers of available organs, despite the falling road toll.

There is increasing acknowledgment by the medical profession that in the same period there was a very significant shift of patients from the public to the private sector, and partly because private doctors, and partly because private hospitals could return to the easy life, or use the same funds to expand public or all public.

The options are to put a patch on the financial leak - private health insurance deteriorates further.

The options are to put a patch on Medicare so that it subsidises private health insurance and private hospitals. Or use the some funds to expand public hospital capacity so that the public sector grows at the private sector's expense. This is a social judgement politicians must make on our behalf.

Monopolisation

In fact, the reverse has happened; there has been a significant shift of patients from public to private hospitals. The reasons the hospitals have been complaining of financial problems is that in the same period there was a very rapid increase in the number of private hospital beds, resulting in intense competition. Fees have been constrained and hospital occupancy rates have been low despite increased patient numbers.

The shift away from public hospitals has been brought about by the long queues for some surgical procedures, partly because of the influence of private practitioners. Private and public hospitals have made legitimate deals with insurers so that the full cost of private hospitalisation has been met by insurers' rebate. But the long-term scenario is that this trend cannot continue and there almost certainly will be a decline in private hospital use if itfinancial lase - private health insurance deteriorates further.

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Tacked on, out back intellectuals

How a cozy conference was disrupted by a concerted attack on Australia's silent intellectuals. Diana Bagnall reports.

Few among the audience of mostly European specialists seemed to expect the attack, coming as it did at the end of a cozy enough academic conference on "Intellectuals in Europe today". Outside, Victoria was a frenzy, engaging in the intellectual blood sport of the nation - politics. But inside, there was an implicit assumption that matters of the mind would hardly rate a mention on a dull day; let alone the day before the state election.

Maybe the topic of the final panel discussion should have warned them: it was entitled 'Intellectual life in Australia', Barry Jones, president of the Australian Labor Party, began the assault.

"Intellectuals in Australia largely talk to each other," he said. "Why is there this reluctance to engage in public debate? Why are professional political scientists always on sabbatical leave when elections come around?"

Robert Manne, a lecturer in politics at La Trobe University and ousted editor of the right-wing magazine Quadrant who bemoaned to find himself agreed with, rather than against, Jones on this occasion. He pursued Jones's line by citing George Orwell, the exemplary intellectual.

"Orwell, he said, displayed outstanding moral courage, a genuine engagement with the large political questions of his day and the capacity to combine complexity of thought with simplicity of expression. Australian intellectuals, such as the exemplar Jones, are characterised by their conformity, and their virtual abandonment of serious engagement with the public realm.

Most Australian intellectuals hunted in packs, sharing roughly the same world view . . ."

"Most intellectuals maintain the fiction that they are individualists and mavericks," Manne said. The reality was less flattering. Most Australian intellectuals belonged to cliques and caucuses, in general, in "rather unthreatening dialogues with those who agree fundamentally.

"Generally speaking, it is not intellectual magazines or books but newspapers, radio and television which carry public debate forward in Australia," Manne added. "Inevitably what this means is that our public realm is impoverished, for there is a certain level of complexity which is, necessarily, beyond the capacity of the mass media to bear.

"Sane when their own interests were under scrutiny, Australian intellectuals refused to come out and fight, maintained Jones. "It is the age of generalisation and [academic] nerves are vulnerable to generalisations of the big picture," he said. "It is no longer regarded as intellectually respectable . . . ."

"Such nervousness, however, servile, quiescent, reinforces public perceptions of intellectuals being extra to Australian society - 'tacked on like a dummy out the back', to quote Alan Beith.

"Inevitably peripheral countries will seek to avoid being hurt as bystanders in such battles and defensively will seek trade agreements among themselves or with the principals. This would be a bleak scenario for Australia and for other countries which depend on an efficiently trading world economy.

"The Uruguay Round negotiations seem to be back on track after many months of disagreement. Talks resume in Washington this month.

"It is possible that Australia might have been a likely candidate to welcome Australia into their proposed free trade agreement. Any case, the economic benefits for Australia of participating in the ASEAN Free Trade Area would be relatively small because current plans excluded most resource-based exports. Whatever wins in the US, Australia might have of joining the North America Free Trade Agreement would be diminished by the fact that the US would be unwilling to dismantle the main trade barriers that affect Australian exports - meat, sugar and steel.

"From an American perspective, Australia does not offer a large market, does not have serious trade barriers to US exports and does not have a trade surplus with the US. The report notes that so far Australia has not been subjected to harsh direct US harassment, but a failure of Round, or even a slow collapse, may 'remove the brake'.

"If regionalism comes to dominate world trade, the report says that Australia may be forced to seek trade agreements with key trading partners.

"The most likely candidate is Japan, given its prominence as a market for Australian exports (nearly 26 per cent of total exports in 1991) but other possibilities include the Republic of Korea, Taiwan and, with a view to the very long term, China," it says.

"Such agreements may be necessary to protect our market access if these countries were to respond to the collapse of the multilateral system and an increase in aggressive unilateralism by concluding defensive trade agreements with the us. However, an important factor influencing the development of such agreements will be the relative bargaining power of the US and Australia.

"Not only does Australia not have the clout of the US, it also lacks its market size as an attraction to enter into bilateral agreements. And it is access to this market which is likely to drive the Asian countries to seek bilateral agreements with the US.

"The Australian government, written by Professor Snape, Mr Jan Adams and Mr David Morgan, argued that as a relatively small trading nation Australia had far more to gain from a global liberalisation of trade. Other countries had little reason to see free trade agreements benefit Australia, given that it was already opening its own borders.

"If existing developments in North America and Europe did not pose serious problems for Aus-

"November 1992 Montage - 11
Coal drying award

Emeritus Professor Owen Potter from the Department of Chemical Engineering has won an international award for his coal drying process.

The ICI Award for Innovation in Drying, presented at the eighth International Drying Symposium, in Montreal, Canada, recognises Professor Potter's development of steam-fluidised bed drying.

Both electricity costs and greenhouse carbon dioxide emissions from brown coal power stations are expected to be reduced if plant using this process are successful. The first demonstration plant using this process has just begun operation at Loy Yang in the Latrobe Valley.

Pictured at the award ceremony are Mr Stuart Gardiner, of ICI Polymers, Runcorn, England; chairman of the awards committee Professor Jud King, Provost, University of California, Berkeley; and Emeritus Professor Owen Potter.

Bioethics comes of age

The growing awareness of health care ethics in Australia has been marked by the graduation of this country's first bioethics master's students.

Figures above with course coordinator, Dr Justin Oakley (centre back), come from the medical, nursing and legal professions. They are (from left) Surgeon Dr David Macintosh, lawyer Mr John O'Sullivan and nurse Mrs Beverley Tousley. The three graduates received their degrees at a graduation ceremony in Robert Blackwood Hall last month.

According to Dr Oakley, the graduates represent an emerging trend in the way health care professionals, particularly, are dealing with ethical issues.

He said such courses had been running in the US for the past 10 years, with Monash in 1989 becoming the first Australian institution to establish a Master of Bioethics. Now other universities, including the University of Technology Sydney, Newcastle University and Wollongong University, were getting similar courses up and running.

The first graduates represented the three main professional groups of the 50 students undertaking the course. However, the course now seemed to be attracting a wider range of people, including school teachers and philosophy graduates.

International honour

Monash bioethicist Professor Peter Singer has been elected president of the new International Association of Bioethicists.

The association was formed at an inaugural conference of bioethicists held recently in Amsterdam, which attracted more than 310 participants from 34 countries.

Its scientific program included issues such as embryo research, prenatal diagnosis and sex selection, resource allocation, bioethics teaching, and life-and-death decisions at the end of life.

Among those elected to the association's board were Professor Singer and Dr Helga Kuhse, director of the University's Centre for Human Bioethics, who were instrumental in convening the inaugural conference. The centre will also serve as the association's administrative office for at least two years.

The board also appointed Ms Kay Boyle executive officer of the association. Ms Boyle is an administrative officer at the Monash centre.

Glass industry solution

Mr Boon Yuen Yuen, a PhD student in the Department of Econometrics, has solved a problem that has been puzzling the glass industry for the past 20 years.

At the recent student conference of the Australian Society for Operations Research, he won a prize for best paper for his work on 'Sequencing cutting patterns in glass cutting'.

Cutting problems occur when large rectangles of glass stock plates need to be cut into smaller rectangles to comply with customer requirements. The trick, he says, is not only to come up with a cutting pattern that minimises waste, but also to complete one order before moving on to the next.

Mr Yuen built his own computer software to develop optimal, computer driven sequencing patterns. Pilkington (Glass) Limited is now considering how to incorporate the results of Mr Yuen's research, which could save the glass industry hundreds and thousands of dollars.

Banking law prize

Law student Mr David Charles Russell has won the Australian Banking Law Prize.

The award acknowledges excellence for assignments in the Banking Law subject and on his results at the final examination. The head of the National Australia Bank, Mr Don Argus, presented the award at a Monash Law Foundation function held at the Melbourne law firm Minter Ellison.

Computer design winner

Monash Gippalnd design studio staff member Mi Sharon Shaw has won the national Australasian magazine cover competition.

The winning entry, which was produced on a Macintosh II computer using the Aldus Freehand program, appeared on the September issue of Macworld. Ms Shaw received a cash prize and Aldus software worth $2000.

Chinese books

A collection of books specially selected by the government of the People's Republic of China will soon join the collection of the Main Library.

The collection, presented by the Chinese Consul-General, Mr Zou Mingrong, is seen as a significant addition to the Chinese Studies Collection.

"The books will be of great value to Chinese Studies students and interested public," university librarian, Mr Edward Lim said. "We are grateful to the Chinese Government for making such a specialised selection."

The 450 titles range from social sciences, politics, and philosophy, economics, culture and education, language, history, literature, natural sciences and technology, classical works and reference texts.
A sporting pioneer retires

The Director of Sport and Recreation at Monash, Mr Doug Ellis, will retire at the end of this year after 32 years with the university. The driving force behind development of sport at Monash, he played a major role in forming the national tertiary sporting federation and has been labelled the 'Godfather of child care'.

Mr Ellis joined the university as a laboratory manager in the Department of Chemistry in 1962. In response to the Vice-Chancellor's request in 1961 to initiate student activities, he and other staff helped develop the Sports Association and affiliated clubs.

Since 1965, when he was appointed Deputy Warden of the Union (Sports Administrator), the association has grown substantially. It employs 16 full-time and more than 100 part-time staff, and its facilities and services are considered among the best of any Australian university.

"The most exciting thing about my time at Monash is that I have always been involved in new developments," Mr Ellis said. "I have had the pleasure of working with some of the brightest and keenest students from all faculties," he says.

Mr Ellis has also played a key role in the national sporting arena. In 1962 he served as the Monash delegate to the Australian Universities Sports Association. He was assistant manager of the first Australian team to compete in the World University Games in Tokyo in 1967 and also attended the 1983 games in Monash.

More recently, he has been a leader in the move to amalgamate the universities and tertiary colleges sports organisations, which culminated in the formation of the Australian Universities Sports Federations (AUSF) in February this year. He has been elected a foundation director of the federation, which represents about 400,000 tertiary students.

"The existence of a national body combining the two organisations will mean more sporting opportunities for students while increasing the standard of the intramural competition," Mr Ellis said.

Mr Ellis earned the tag 'Godfather of child care' because of his assistance in the development of the Monash Child Minding Centre.

In addition to his sporting achievements, in his time at Monash he has contributed to the amalgamation process, initiated many student and staff support systems, participated in the debate about crime and sexual harassment on campus, and was instrumental in the development of the sports medicine centre in an Australian university. In the 1970s, he earned the tag "Godfather of child care" because of his assistance in the development of the Monash Child Minding Centre.

Mr Doug Ellis.

New Open Learning director appointed

Interim charges have been implemented in the management of the Registrar's Division following Monash's successful bid to manage the national Open Learning initiative.

The Vice-Chancellor, Professor Mal Logan, has appointed Mr Tony Pitchard as Director of the Open Learning Agency of Australia on a full-time basis until the project's management structure becomes formalised and permanent appointments are made.

Mr Pitchard has spearheaded Monash's involvement in open learning and his continued involvement in the program is seen as crucial to its success. He will continue to report directly to the Vice-Chancellor.

Three other senior officers — Mr John Julian, Mr Gavin Moodie, and Mr John Evans — have also been seconded to the Open Learning Agency on a full-time basis to assist Mr Pitchard in getting the new project off the ground.

More dinosaur discoveries

From page 1

"Here we have two dinosaur groups which we assumed were in Australia prior to last year's digs at Dinosaur Cove and in Gippsland. It's intriguing: we now have the barest inkling of a number of groups that may have had Gondwana origins but which then became extinct in Australia in the northern hemisphere. The fossil record is not good enough to tell us what happened to them here yet."

The richest deposits in Gippsland's Strzelecki Ranges also provided other new discoveries last year.

"The Riches' discoveries in Gippsland's Strzelecki Ranges also provided other new discoveries last year."

The Director of the Department of Asian Languages and Studies, Professor Bruce Jacobs said, the introduction of new languages means Monash now offered more Asian Languages at tertiary level than any other Australian institution.

He said the department already offered Chinese, Korean, Indonesian, Thai, Sanskrit and Vietnamese. "We now offer 11 Asian languages, including Japanese," he said.

"The department has strong links to Asia and the new languages are part of Monash's commitment to the region. Monash is also a contact point, linking Melbourne's substantial Asian communities with the wider Australian community."

Asian languages expanded

Monash will offer four new Asian languages next year after receiving a grant from the Monash Development Fund.

The fund has provided more than $500,000 over three years to establish Cambodian (Khmer), Hindi, Malay and Lao language courses.

The courses, offered by the Department of Asian Languages and Studies, will cover many aspects of the languages, including gaining an understanding of the country's culture and society.

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**Australian Centre for Contemporary Art**

An exhibition of photo-based works investigating the idea of place is soon to open at the Australian Centre for Contemporary Art (ACCA).

Titled Location, the exhibition investigates the ways in which Australian artists have turned the photographic medium into an object, rather than a picture of their sense of place or location.

From the majestic black and white, romantic works of Brisbane artist David Stephenson to the airport inspired back-fit transparencies of Anne Zahalka, Location is a journey of discovery in and around the photographic media, the landscape and the city.

Contributing artists include Linda Marie Walker and Paul Hensow, Graeme Hare, Kevin Todd, Ian North, Anna Todd, Annalisa, and Dallas Brooks. The tour, scheduled for early 1993, will further the exchange of art, artists and ideas in the region.

The exhibition opens at ACCA, Dallas Brooks Drive, South Yarra on 12 November and runs until late December. It is open from 11 am to 5 pm Tuesdays to Fridays and from 10 am to 5 pm Saturdays and Sundays.

**Monash University Gallery**

Tracey Moffatt's Untitled (above), bought earlier this year by the Friends of the Monash University Gallery, will be shown next month in an exhibition from the gallery's collection.

The work by the Sydney-based Aboriginal film maker and photographer from her 1989 Selling More series, examines issues of racial integration, Australia's place within its Asian region, and tensions between similar partners.

She ignores the approach of using photography as a tool of accurate and true recording. Rather, she utilises the extent to which the camera can and does lie, alter and transform fact into fiction. The photograph has been shown in New York and also appeared on the cover of the prestigious art journal Art and Text.

The Friends of the University Gallery was launched in 1987 with the opening of the new gallery premises. Other works the Friends have provided for the university's collection include God and Country by Juan Davila, Untitled by Marianne Balibar, Dreaming 1 Landscape at T by Bernhard Sachs, Tree and Wall (Italy) by Roslyn Piggott and Port Melbourne by Jan Senbergs. For more information phone ext 75 4717.

**New student prize**

The first of 60 awards to be presented over the coming year to outstanding Year 11 students was made last month.

The Acting Vice-Chancellor Professor Robert Porter, presented the Monash Prize, a cheque for $500, to Mr Quynh (Peter) Vien, of Westall Secondary College, South Clayton.

Professor Porter said: "It rewards academic achievements and encourages students to continue applying themselves to their studies. It is a great boost for our battle-scarred VCE students." 

**Disabled access ramp**

The opening of a ramp at Robert Blackwood Hall is the most recent of several projects on Monash campuses to improve access for people with disabilities.

The ramp provides access to the stage area of the hall for disabled gradates, musicians and performers. Previously, wheelchair users needed to be lifted up steps to the stage entrance.

The construction of the ramp, at a total cost of $7000, is part of a program to ensure that Monash students with disabilities have ready access to campus facilities, lecture theatres, and administration areas. Projects include the installation of automatic doors and communications equipment on all campuses.

Based on US and UK trends, Monash can expect to have more than 500 students with disabilities studying here within about 5 years. "Our vision for Monash is that access will be no big deal for anyone, including students with disabilities," Disabilities Liaison Officer, Ms Gillian McConnell, said. "We want to make sure that these students have the same access to facilities and systems as everyone else, with the same dignity and independence."

The Disabilities Liaison Office is responsible for the coordination of existing services for people with disabilities and to develop new integrated services and facilities that ensure access and equity for disabled students, members of staff and visitors. An advisory committee reports to the vice-chancellor's on these matters.

The Vice-Chancellor, Professor Paul Logan, said the new ramp was a valuable contribution to the function of Robert Blackwood Hall and the life of the university. The ramp was funded by the Disability Pension Fund and the Vice-Chancellor's private fund on a dollar for dollar basis.

Ms Linda Smith, a fourth year honours student in psychology, tried the ramp for the first time. "We have worked so hard to get changes and facilities established for students with disabilities," she said.

**Information facelift**

The Union inquiry desk at Clayton has undergone a facelift and change of name to provide better service for staff, students and the wider community.

Staff at the new-look Information Desk (above) handle more than 1000 telephone or personal inquiries a day, with requests for assistance ranging from public transport information to car pooling details and directional maps. Other services offered by the desk include thesis and resume typing, book-binding, key cutting, Daily News, Monash, room bookings, faxing, image scanning and lost property.

The refurbishment, the desk's first structural change for 15 years, was the initiative of Acting Union Warden, Mr Joe Curtis, and was planned by his assistant, Ms Jenny Smyth, and supervising draftsman in the Buildings and Development Branch, Mr Koi Foo. "The changes have created more working space as well as given the whole office a boost," Ms Smyth said.

"The Information Desk is the hub of the university. The most commonly requested information is directional. We are also commonly asked to help find someone who is somewhere at Monash - kind of like finding a needle in a haystack."

The Union Information Desk is open from 8.40 am to 10 pm Monday to Thursday and from 10 am to 8 pm Fridays. For inquiries, phone ext 75 3106.

**Community caring**

A community nursing program — the first of its kind in Australia — is encouraging independence and self-esteem in disabled adults and providing caring experience for students.

Last month, 16 developmentally disabled adults were accompanied on a four-day holiday to Brighty, by first year student nurses from the Caroline Chisholm School of Nursing. The trip included visits to the snow fields, tours of horse races, picnic lunches and gold panning.

The program, which was piloted last year, gives developmentally disabled adults the chance to experience different activities. For the 30 student nurses and medical students, it represents practical experience in caring for people on a full-time basis.

"It is important for our students to recognise the developmentally disabled as normal people with needs," head of the School of Nursing, Professor Dot Angell said. "The program goes a long way in helping to break down the social stigma." She said the School of Nursing funded the program through student activities, support from local businesses, and a grant from the Sidney Myer Fund.

Lecturer and program organiser Ms Sue Elsom said students were matched with a developmentally disabled person, and were responsible for caring for them throughout the trip. "We had 70 student volunteers for the 30 positions available, and the whole school has supported the program. We also have people with disabilities waiting for next year's program."
Royalty, treason and murder

The cast and storyline of The Popish Plot makes the tableau marital intrigues of the present day British royal family seem just a little tame.

The blockbusting novel would even find a few echoes of the in-fighting of plotters, rumour-mongers and vil­lains portrayed in the latest exhibition from the university's Rare Book Room.

The exhibition, now on show at the Main Library, Clayton campus, high­lights the substantial resources available in the library for the study of 17th century culture.

The Popish Plot refers to a political crisis that developed in late September 1678 when King Charles II and the Privy Council were informed of a plot by Jesuits to murder the King and install his Catholic brother on the throne. Charles II, with his well-known inclinations to a life of pleasure and no legitimate heir, was in debt and dependent on France to vote funds. The opposition was at the time trying to impeach Charles' Treasurer.

Prions were very apprehensive at the prospect of the re-establishment of a Catholic monarchy; with James on the throne and the possibility of a son to succeed him, Britain could be brought back under papal control.

Into this political cauldron stepped the informers Titus Oates and Israel Tonge. Tonge, a Church of England parishioner, was a well-known anti-Catholic, having lost his church in the Great Fire of London, for which Cath­olics were made scapegoats. Rare Books librarian Mr. Richard Overell.

"Oates was a particularly unavory individual, an Anglican minister who had already encompassed per­jury, sodomy and apostasy. However, there was nothing inherently improba­ble in the plot as such and Charles and his government had to consider the matter seriously."

"But Oates was caught out on vari­ous details in his story and it looked as though any credibility the two men had was over. When on 17 Octo­ber Sir Edmond Barry Godfrey, the Jus­tice before whom Oates had stated, was found dead, impealed on his own accord."

The opposition quickly made this into a hue and cry against the Papists and the "hothead Popish Plot" became a public obsession. About 30 people were eventually executed for their alleged in­volvement in the plot.

Mr. Overell said the other informers were also questionable backgrounds.

"Captain William Bedloe was an experi­enced confidence trickster, who in the course of his avocation had come into contact with many Catholics. Miles Prance was a Catholic who was accused of involvement in the death of Godfrey and to clear himself turned informer."

Stephen Dugdale was the manager on the estate of the Catholic Lord Books librarian and had fallen into financial difficulties. As a means of covering his dishonesty, he decided to inform on his master and his master's Catholic Estate."

The 17th century political pam­phlets that form the basis of the exhibi­tion were just a handful of the many thousands of volumes in the rare books section of the library, Mr. Overell said. "The value of the collection is obvious to historians, but it is also an important resource for students from all disci­plines," he said.

Books, typography, maps and comics are all part of the collection which ranges from a 1476 commentary on the Old Testament to gangster novels of the 1930s, 40s, and 50s. Other subjects in­clude ogres of the 17th century, an 18th century book on divorce and sever­al editions of the Vatican's index of prohibited books.

There is a large collection of 18th and 19th century cookery books includ­ing an early edition of Mrs. Boston's Book of Household Management. "Old cookery books are quite rare," Mr Overell said. "They were general household items which were used and thrown away, not ending up, as many of the more treasured books did, in a gentle­man's library shelf. We have been very lucky to have acquired them. A gener­ous donation by a student at Monash has formed the basis of our collection. We are looking to add to it as opportu­nities arise."

An illustrated catalogue for the cur­rent exhibition, which runs until 4 De­cember, is available free of charge from the Rare Books Room. The Popish Plot's cast of informers.
Modelling the landscapes of the mind

These fanciful constructions, made possible by the latest in computer animation, show the way ahead in the field of product modelling.

Students from the Department of Industrial Design, with the aid of the advanced computer graphics laboratory on Caulfield campus, are producing product models among the most complex ever made by Australian design students.

Senior lecturer in 3-D modelling, Mr Michael Kitson, said the skills students were gaining by using the facilities of the laboratory gave them a distinct advantage in a profession in which computer applications were being constantly updated.

"Because they will have already encountered most of the concepts in computer graphics, students are well placed to move from one specialised computer modelling package to another," he said.

The world-class laboratory comprises twelve networked Silicon Graphics Iris workstations. Each workstation, which outputs to video for animation and to a high-resolution colour printer, runs the professional standard Alias 3.1 software.

The models pictured on this page are single frames from short pieces of animation and were built, lit, coloured and textured using Alias.

The program is capable of 'natural phenomena' procedures. These allow world textures such as wood, varieties of rock, water and clouds to be mapped onto or through objects using fractal mathematics.