MONTAGE

NEWS FROM THE CAMPUSES OF MONASH UNIVERSITY

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September 1992

SAVANT

Elections: crisis or confusion

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PLANNING

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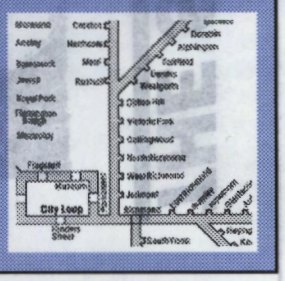


Birth control plan for feral pests

Feral animal populations in Australia could be significantly reduced – even eliminated – by a radical new approach to population control.

Two Monash researchers believe that antifertility compounds, developed for human use, could rapidly cut down the numbers of introduced pest species such as foxes, mice, rats and cats.

Professor Roger Short and Dr Yan Gao, of the Department of Physiology, are proposing that compounds such as methyl testosterone and antigestagens like mifepristone (RU486) could be used to limit or even eliminate feral animals, particularly on islands, by blocking their reproduction.

Australia has more problems with introduced feral animals than almost any other continent. Mammals that evolved in other parts of the world have flourished in the absence of their natural predators and diseases, displacing or destroying native animals and endangering native plants.

Professor Short said the population control idea was inspired by the success of sterile-male techniques in controlling certain insect pests. "It made us wonder why we have been so slow to develop contraceptives for animals," he said.

"There is no chemosterilant that will permanently sterilise male or female mammals, but we have plenty of fairly long-acting, reversible contraceptives that have come out of human family-planning research and development.

"RU486 will abort rats, mice, rabbits, and dogs (and hence presumably dingoes) but it has no effect on marsupials or birds. To have a drug that will abort introduced pests but which does not affect native species would be quite a staggering breakthrough."

RU486 is an antigestagen, which binds to specialised receptors in the endometrium, the lining of the uterus to which the placenta attaches. By competing for the receptor for the natural hormone progesterone, RU486 prevents the hormone from doing its normal job of maintaining the uterus in the pregnant state. Within a day or two, the uterus contracts, expelling any implanted embryo.

The androgen methyl testosterone can be used as a unisex contraceptive. An orally active form of the male hormone, it blocks ovulation when administered to females, and above a certain dose, suppresses sperm production in males.

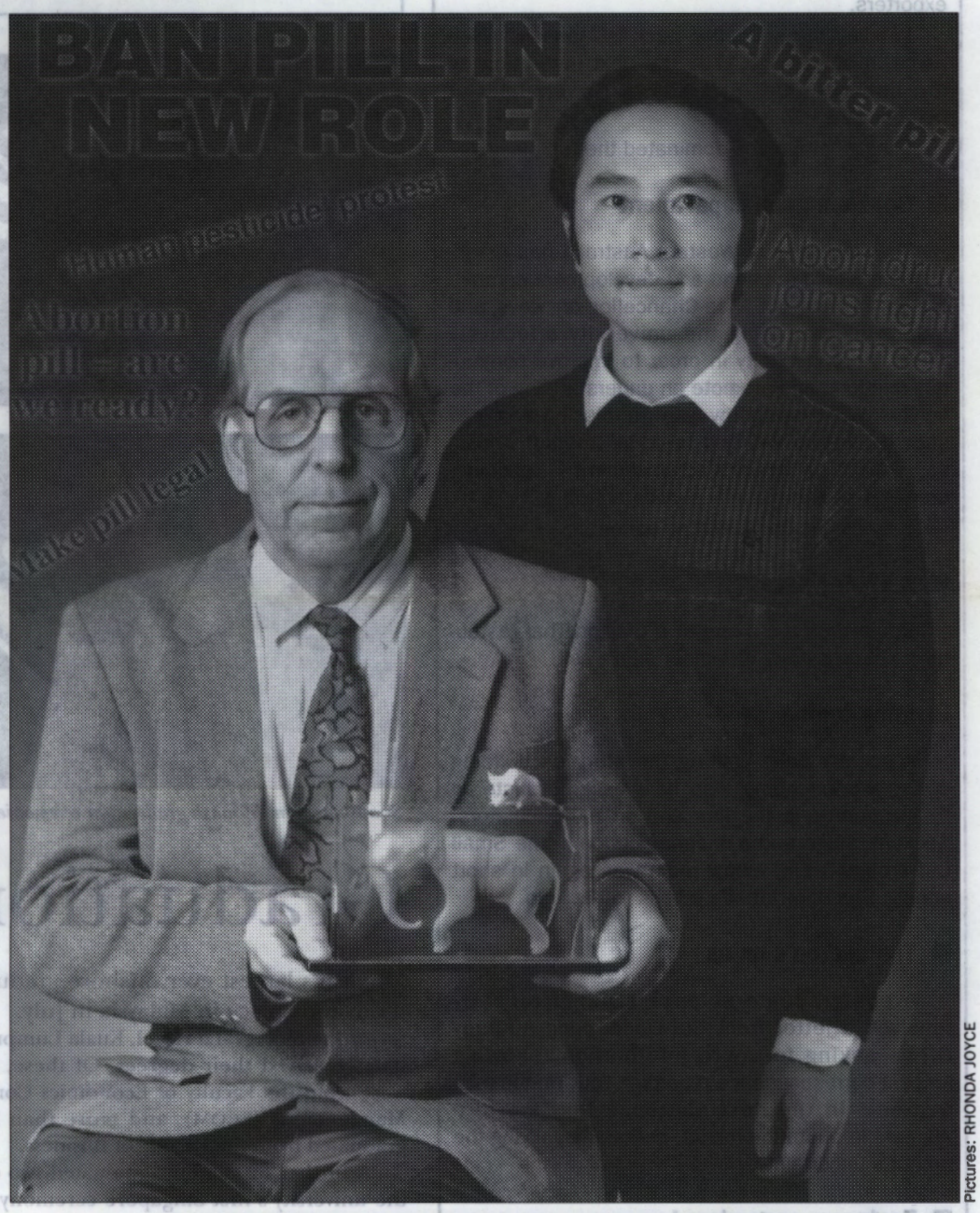
Professor Short recently returned from a conference in Kenya on the fertility of the world's largest terrestrial mammal, the African elephant. Ivory poachers have devastated wild elephant populations, but animals brought into the relative sanctuary of specialised game reserves have bred prolifically, destroying large areas of woodland by browsing and so ruining the habitat for other species.

In parks that cull their animals by shooting, elephants avoid human contact; in parks where there is no culling, they move freely among human visitors. Professor Short believes that drugs like RU486, which induce abortion, could be used to humanely manage populations in the reserves (see story page 6 for more details).

The timing and method of administration of fertility control drugs would need to be carefully keyed to the reproductive biology of each species. "The ideal way to tackle something like the mouse or rat would be to use a poison first, to get the population down to the lowest number, and then to use chemosterilants when the population was at its lowest ebb, to make sure it couldn't rebound," Professor Short said.

Laboratory work by Dr Gao, a Chinese-born postdoctoral researcher, has shown that a very low dose of methyl testosterone effectively suppresses breeding in rats and mice through its impact on female infertility. If these results were to be duplicated in the field, the exponential population growth that leads to plagues could be prevented. Mouse plagues occur once every four years on average and cost Australian farmers about $100 million in lost production.

He said that foxes, because of their breeding behaviour, would be highly vulnerable to antigestagen baits. "Vixens come into season only once a year, around July or August, so if you put down baits in August or September you could abort all the pregnant vixens and totally eliminate that year's recruitment to the population," he said.



Pictures: RHONDA JOYCE

Professor Roger Short and Dr Yan Gao: proposing a radical method to control feral animal populations.

Melbourne was thought to have one of the largest urban fox populations in the world, but animals could not be trapped, poisoned or shot in the city because of the risk to humans. "Put down antigestagen baits on just one day in the year for two or three years, and the population would disappear," he said.

One of Professor Short's research students, Ms Michelle Nijk, is looking at the effects of antigestagens in cats. An antigestagen treatment would need to be given only three to four times a year to prevent all breeding.

Professor Short said research funding for controlling feral animals was being "monopolised" by the CSIRO, whose experimental techniques would not be ready for a number of years.

"We've got something right now that could control rats and mice, and we hope to have something soon for foxes and cats, if only we could get some research funding," he said.

Professor Short said a fox control program using antigestagens could begin as early as next year, and he would like to conduct a field trial on an incipient mouse plague to see if it could be halted.

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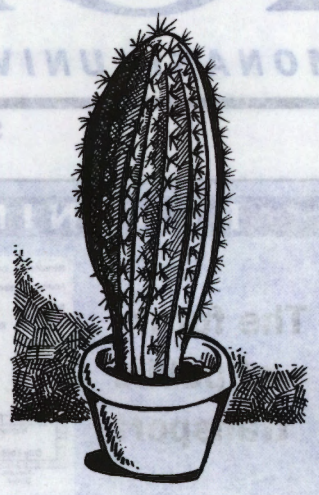

■ Educated exports

A survey by Austrade published in *The Australian Business Monthly* has included a number of universities among the nation's top 500 exporters.

Leading the education pack is Monash, which came in at number 175. The next institution on the list was the University of Queensland at number 322.

Mining companies dominated the top placings.

■ Gobbledegook department

The University of Western Australia has established a public relations and development committee to "advise the Vice-Chancellor on ways and means of promoting the university effectively within the community in order to improve community relations and promote an understanding of the university and sympathy with its mission so as to secure the goodwill and material support necessary for the university's advancement in teaching, research and community service activities".

Sounds like they need an editor too.

■ A seated satay?

Spotted on the menu at a Clayton Thai restaurant: "Stule satay". The diner didn't ask.

■ Ming throng

A society belle visiting the Menzies building during the lunchtime rush hour became flustered by the hoards in the lifts and on the escalators. Seeking refuge and a cheering cuppa in the Small Caf around 1 pm, elbow room was again in short supply. She barely made it back to her limo.

■ The degree's on us

A postgraduate science student recently received a letter from the Dandenong Austudy Office asking for more information following "recent correspondence regarding your Honus (sic) degree." In the next sentence the 'H' word appears in quotation marks, perhaps signifying the author's uncertainty.

■ Engineers engendered

An invitation to attend an engineering oration at that university in Parkville has put some recipients offside. Addressed to "Dr", the invitation is extended "to you and your good lady".

This seems to imply that all engineers with doctorates are male, or else, makes an assumption about the preferred companions of engineers.

MONTAGE
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NOW & THEN

25 YEARS AGO

A letter from H. P. Shoenheimer in the Faculty of Education draws attention to the "misnomer" of Departmental News of General Interest. He writes: "I have just waded through scores of items informing me that innumerable people whose names I have never heard of gave (no doubt intensely interesting) lectures on extraordinarily esoteric aspects of sub-disciplines that I did not know existed."

15 YEARS AGO

Senior law lecturer Dr W. Weerasooria has resigned to take up an appointment as a permanent head in the Prime Minister's Department in Sri Lanka.

Only seven months before, he was arrested in Colombo, his passport confiscated and placed under virtual house arrest for alleged participation in the publication of a satiric cartoon booklet attacking the former Sri Lankan Prime Minister.

5 YEARS AGO

The Monash workforce includes a higher percentage of women than the workforce as a whole but women still hold less than 20 per cent of full-time academic posts, according to the university's Equal Opportunities Coordinator, Dr Margaret James.

A new Centre for Women's Studies was launched to foster research into "issues which have affected women since antiquity".

THIS MONTH LAST YEAR

A classroom study by Faculty of Education lecturer, Dr Ilana Snyer, has found that students using computers write more effectively than those using pen and paper.

Monash is to lead an international research effort to uncover the causes of sudden infant death syndrome (SIDS). Australia's first full-time SIDS research facility was established at Monash Medical Centre.

Snapshots from Monash graduation ceremonies in Kuala Lumpur and Singapore.

Graduations go to students

Monash's largest ever offshore graduation ceremony took place in Malaysia in July.

At the Shangri-La Hotel, Kuala Lumpur, 163 graduates received their degrees. Of these, 37 per cent were from the Faculty of Economics Commerce and Management (ECOM), and more than 20 per cent graduated from the Faculty of Business.

A further 62 students graduated two days later in the university's first Singapore ceremony. The Singapore graduation, held at the Mandarin Hotel, also reflected the popularity to Asian students of an ECOM degree. More than half of those graduating wore the faculty's peacock blue hood.

The Malaysian Minister for Education, Datuk Dr Sulaiman Daud, gave the occasional address at the ceremony in Kuala Lumpur, which was attended by more than 500 parents, relatives and friends of graduating students, and media representatives.

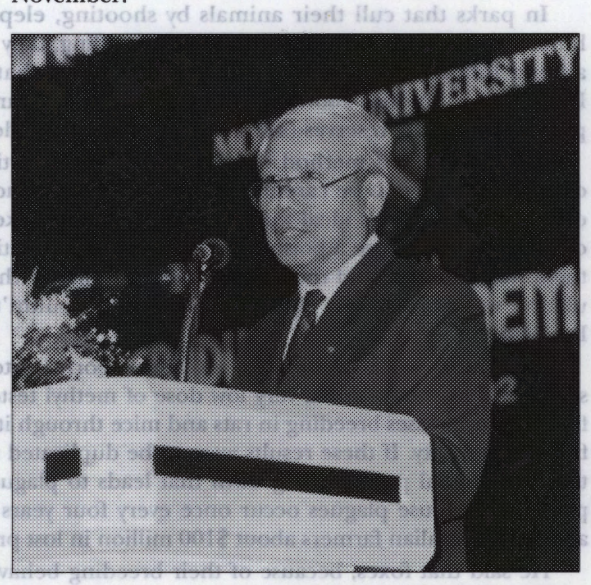
In his address, Dr Daud, who visited Monash earlier this year, said that Malaysia was fortunate to have such a close relationship with Australia's top tertiary institution.

"It is well acknowledged that Monash University has reached the pinnacle ... in Australia," he said. "Amongst the world's universities, Monash has for many years enjoyed an unmatched relationship with Malaysia."

He said as well as producing a great number of scholars, researchers and graduates in varied fields and disciplines of knowledge, a more significant feature of Monash's international contribution was the thousands of graduates in Malaysia who had passed through its doors.

Offshore graduation ceremonies are now a common occurrence for many Australian universities, because overseas students who finish a degree in November are generally unable to return to Australia in June or July to graduate.

Holding the ceremonies in the students' home country means that their families can participate in the tradition of a graduation. Monash's next off-shore graduation ceremony is to be held in Hong Kong in November.



Presenting the occasional address in Kuala Lumpur: Malaysian Minister for Education, Datuk Dr Sulaiman Daud.

Uni first in work scheme for the disabled

Mr Shane Russo at work with Ms Judith Clarke of Human Resources.

Monash has taken the lead in a new work experience program for disabled people.

The university is the first Victorian employer to take part in a Department of Employment Education and Training (DEET) initiative that offers people with disabilities the chance to gain experience in a normal work environment.

Although the program was established in March, no employers had come forward until Monash's Equal Opportunity Office responded to a request from the Disability Employment Action Centre to provide work experience for Mr Shane Russo, who has spina bifida. As a result, the university is looking to establish an ongoing program.

Ms Jean McCulloch of the Equal Opportunity Office says that taking on disabled people should be looked on as a positive experience. "The program benefits all those involved", she said. "It is designed to improve and develop the work skills and capacity of people with disabilities and to promote their competitiveness in gaining access to further employment and training opportunities. At the same time, the employer gains an extra staff member, funded by the Federal Government."

Mr Russo, 23, who has difficulty walking long distances, standing for lengthy periods of time and understanding new work concepts, will be working for the university's human resources and student administration sections for eight weeks.

Mr Russo, who has been educated in specialist schools, has the equivalent of a Year 9 qualification. He has also completed a computer course at the Western Metropolitan College of TAFE, and worked for the CES, Safeway supermarkets, and as a cleaner.

He says he is capable of offering as much to the positions as a fully able person. "It's difficult to find work, and when I do it is usually for a short time only" he said. "I hope that after the program is finished I will be able to gain some full-time work with the skills I have learned here."

Offshore business degree opens in '93

Singapore-based students soon will be able to study for a Monash business degree without ever setting foot in Australia.

The School of Accounting and the Singapore Institute of Management (SIM) recently signed an agreement allowing students living in Singapore to undertake a Monash Master of Business (Accounting).

The course – to commence in January next year – will be developed, taught and assessed by Monash staff, with the SIM responsible for providing facilities, administration, and advertising. Professor Janek Ratnatunga and Associate Professor Claudio Romano, of the School of Accounting, were instrumental in negotiating the joint venture and will continue to coordinate the course.

Professor Ratnatunga believes the School of Accounting is offering a product unique in the Singapore education market; one that is well in keeping with the university's move into the international education arena.

"Over the last couple of years Singapore has been flooded with numerous foreign universities offering masters degrees," he said. "We have chosen to offer a specialisation masters degree through an independent, not-for-profit organisation."

The SIM has a reputation as the country's leading management organisation. "SIM approached the School of Accounting as it has both a successful postgraduate program, and one of the highest concentrations of PhD academics within any accounting department in Australia," he said.

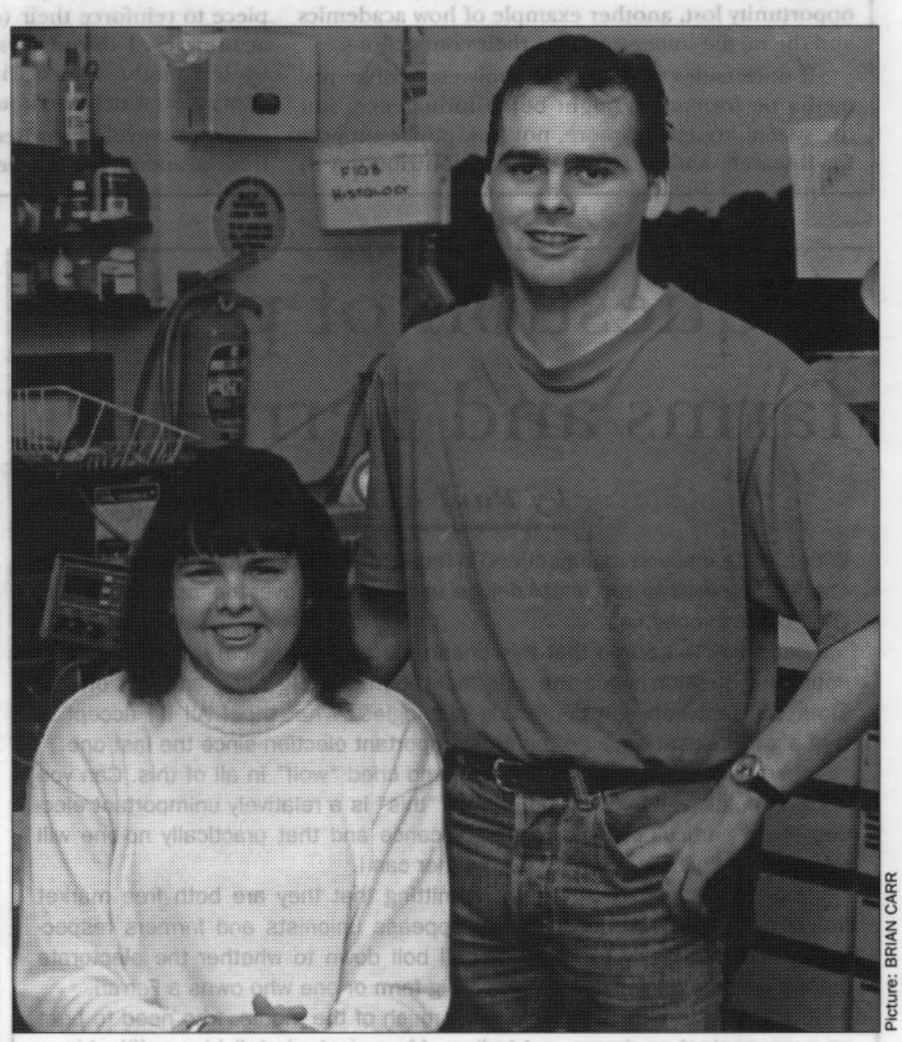
Speaking at the signing ceremony, Pro Vice-Chancellor Professor Leo West said that the agreement was a major initiative for both the university and the SIM. "It reflects Monash's dedication to expanding educational programs in South-East Asia, and indicates the high esteem with which Monash courses are regarded," he said.

Monash has 20 other twinning arrangements with institutions in Asia. This course will be taught mostly on a structured learning basis, with Monash academics flying to Singapore twice in each unit for intensive teaching.

As part of the agreement, Monash will also design, teach and assess the first year of the SIM's postgraduate diploma. Students with this diploma may advance into the Monash Master of Business (Accounting) program.

Dr Romano, the program's course director, believes that many masters students will also come from the 6000 accountants registered in Singapore. "The course has such a flexible entry and exit point that it will attract individuals who hold Bachelor degrees and professional accounting qualifications," he said.

The Chancellor, Mr Bill Rogers, shakes hands with the SIM executive director Professor You Poh Seng, while Pro Vice-Chancellor Professor Leo West and SIM deputy executive director Mr Tan Ging Hee offer congratulations.



Picture: BRIAN CARR

Brother and sister researchers Carol and Peter Delaney.

Research is in the blood

Brother and sister Peter and Carol Delaney have much more in common than their family ties.

Blood unites them in more ways than one because the Delaneys, who are both undertaking their PhD studies at Monash, are bonded by diabetes.

Ms Delaney has been taking insulin for Type 1 diabetes since she was 11. Her brother Peter developed the disease when he was only five. Their form of diabetes results from an absence of insulin, in which the immune system mounts an attack on the body's own insulin-secreting cells.

For her PhD in physiology, Carol is studying the lesser-known Type 2 diabetes which afflicts thousands of Australians without them even being aware of it. In this form of diabetes, the body is unable to respond to insulin – even though it may be producing higher levels than normal. Its effects on the human nervous system are being investigated with the help of a species of Israeli desert rat. *Psammomys obesus* may prove to be a model for how the disease – slower in onset and more difficult to diagnose than Type 1 diabetes – develops in humans (see story in *Research Monash*).

Peter's PhD project to develop a new type of laser confocal microscope was featured in *Montage* last year. The first commercial microscopes – worth about $50,000 each – have just been sold to Imperial College, London, and Stanford University, California.

Developed by the small Dandenong company HBH Industries, in association with Monash and ROK Pty Ltd, this miniaturised and more flexible version of the confocal microscope has attracted worldwide attention and looks set to establish a major export industry.

An uneasy marriage: academia and the media

OPINION

by Helen Trinca

A couple of weeks ago the executive producer of Radio National's Late Night Live, Janne Ryan, rang a Sydney academic and organised an appearance for him on the program. He was enthusiastic.

So she was surprised when he phoned the next day and started backing away – fast. News of his forthcoming interview had spread like "wildfire" around the department and he was anxious about going ahead. A senior member of his school, it seems, had advised him to spend more time on his research and his students rather than on radio.

Was it a lack of recognition of the power of the media, or an absolute recognition of the power of the media which led to this particular piece of career counselling? Was it jealousy about a relatively junior member of the department appearing on a program which attracts the intellectual high-fliers on a nightly basis? Or was it a genuine case of believing that the time involved in preparing for a radio interview was, in fact, a waste of time?

When I phoned the academic involved – the junior one – he insisted it was not jealousy which had prompted the advice but seemed unable to really explain the motivation. Either way, it was an opportunity lost, another example of how academics and the media sometimes miss their connections.

If universities were teaching-only establishments, media performances might be an indulgence. But the system argues for more, not less, public support for research, and in return offers a contribution to society. It's a fair exchange but the trouble is that sometimes the deal isn't consummated.

The reasons why this should be so have been argued endlessly. Academics can't write. They can't write short. They can't write on time. They can't explain their ideas. Journalists are superficial. They lack the expertise to judge our work. They write bad headlines. They trivialised my project last time and I'm damned if I'm going back for more.

We fall back on the image we have of our own work and feel reassured we are on the right track. The more subtle barriers, like the conservatism of each profession, are often ignored. Academics resist simplifying their work; journalists resist complicating theirs, and if both sides can rely on trite analysis of the problems, so much the better.

When I wrote recently about obscure language used in an academic paper, I was horrified by the reaction from some journalists who leapt upon the piece to reinforce their (often negative) views about academics. I found myself trying to explain that while I might want clarity I didn't want a form of expression which corrupted complex ideas.

I was equally surprised by the defensive reaction from academics, who seemed happy to dismiss the criticism as some sort of far-Right assault on academic freedom. Dealing with both sides every day, it was still a shock to be reminded about how entrenched these attitudes are.

One of the arguments most commonly used by both sides to urge better exchange is responsibility – the responsibility of academics to society to transmit their views or the responsibility of journalists to be a conduit for information and ideas. But beyond the public duty there's a great deal to be gained from the interaction. It can be fun, and it can be illuminating.

As a journalist, I'm increasingly struck by the riches available in the academy: not just the breakthroughs which will lead to economic strength but the work done in assessing and challenging assumptions, the scholarship in various disciplines. It's all there for the taking, just as the power of the press is all there for the academic taking.

From this side, the trick seems to be to develop ways of talking about what has always been seen as "non-news" in a way that makes it accessible without destroying it. We need to keep stretching the agenda, with journalists becoming co-workers in the ideas business. For academics the trick might be to become a little more savvy about the value of the media so that a late-night radio appearance is not so easy to knock back – whatever the reason.

Helen Trinca is editor of The Australian *Higher Education Supplement. Article reprinted with permission.*

A question of pig farms and Ferraris

by Paul Rodan

With a state election imminent and a federal election not long afterwards, we can look forward to the usual deluge of hyperbole, over-the-top rhetoric and good old-fashioned lies.

Get ready to be told that this (insert election of choice) will be the most important election since the war/federation/the big bang and will offer a stark contrast between conflicting ideologies. What tripe! All I'll accept is that a given election will be the most important election since the last one.

There is just too much of the boy who cried "wolf" in all of this. Can you imagine politicians ever admitting that "this" is a relatively unimportant election of no particular ideological significance and that practically no-one will ever write a PhD thesis on it? No, neither can I.

Imagine Keating and Hewson admitting that they are both free market freaks (with a few modifications to appease unionists and farmers respectively) and that really the election will boil down to whether the electorate prefers a Prime Minister who owns a pig farm or one who owns a Ferrari.

Conspiring in election silliness are much of the media, who need to beat up every contest as drama, not tedium. My cynical mind divides political journalists into three broad types. The first have been around for ages and are part of the political furniture, but still swallow the conventional non-wisdom of the day (such as free market economics).

The second are wet behind the ears and think that politics began the day they started covering it; they have no sense of political history and will usually swallow anything. (I would make a course in Australian political history compulsory for these young hacks.) The third group are half decent and generally know what they are talking about, but I won't embarrass any of their number by naming them.

Lest I be assailed by Labor zealots that forthcoming elections are really (truly ruly) ideologically significant (whereas the last 10 weren't), let me offer my defence. They may be right, and maybe the new right wolf is at the door, but I am of the view that the wolf seems to have got into the house anyway without the election of a coalition government.

Much of what previous ALP propaganda told us would be Liberal "vandalism" has been delivered by Labor in any event: higher education charges, sales of government assets, deregulation, enterprise bargaining etc. I leave to one side the question as to whether such policies are good, bad or indifferent.

The conclusion is clear: the re-election of a federal Labor government does not guard against any coalition policies, although it may delay their introduction. Pardon my cynicism, but on past form expect a re-elected Keating government to be embracing a GST in about 18 months time.

Dr Paul Rodan is President of the Australian Colleges and Universities Staff Association.

Tranquilliser addicts in first health study

The first comprehensive study of the long-term health effects of addiction to certain tranquillisers is soon to begin at Monash.

Research student Ms Helen Jarvis, supervised by Dr Jenny Redman in the Department of Psychology, will examine whether addiction to the benzodiazepine (BZD) group of tranquillisers – including Valium, Serapax, Mogadon and Normison – also affects the body's immune system and its internal timekeeping mechanism.

The PhD research project urgently needs non-addicted volunteers to act as control subjects. The subjects will be used to establish a 'normal' basis for comparison with BZD users who are attempting withdrawal.

BZDs are widely used in the community despite the fact that long-term use can lead to addiction. Withdrawal causes both physiological and psychological problems for such users.

"We hope the study will help clarify whether BZDs are appropriate for widespread long-term use," Ms Jarvis said. "The suggestion has been made that BZDs in this way may affect both the circadian (daily timing) and immune systems. Changes in the immune system may lead to an increase in the risk of getting various diseases, and disorders of the circadian system are associated with sleep and mood disorders."

The use of BZDs in Australia has increased rapidly since the 1970s. In 1990 alone, 10.6 million prescriptions of the drugs were issued to 750,000 Australians. "I expect that people will be motivated to take part in the study because they know someone who has had a problem with BZDs," Ms Jarvis said.

She stressed that she was not seeking volunteers who were addicted to BZDs. She said anyone who believed they had a problem with prescribed tranquillisers should contact the self-help group TRANX on 899 6078. To take part as a control subject, contact Ms Jarvis on extn 75 3957.

'Land and water' CRC launched

Australia's valuable land and water resources came under the spotlight last month with the launch at Monash of a new national research centre.

The Cooperative Research Centre for Catchment Hydrology, which will have its headquarters at Monash, has been set up to coordinate research efforts into preserving and improving land and water resources in line with ecologically sustainable productivity.

The centre is an affiliation of federal and state bodies and universities, including the CSIRO Division of Water Resources, Monash and Melbourne universities, the Rural Water Corporation of Victoria, the Department of Conservation and Environment, Melbourne Water, the Murray-Darling Basin Commission, and the Bureau of Meteorology.

Speaking at the launch, CRC director Dr Emmett O'Loughlin, of the CSIRO, said the centre would conduct important research, especially into salinity, soil erosion, sedimentation and pollution, water supply and flooding.

"These issues are growing in significance, as actions taken in the past have led to a serious decline in resources. The CRC will make sure that the solutions to today's problems will not encumber future generations," Dr O'Loughlin said.

RESEARCH MONASH

Ratting on insidious diabetes

A species of Israeli desert rat is providing important clues about the causes of an insidious form of diabetes. Research student Ms Carol Delaney, a diabetic herself, is trying to determine if these rats can be used to show how the disease develops in humans.

Thousands of Australians suffer an insidious form of diabetes without even being aware of it. Victims of non insulin-dependent diabetes mellitus (NIDDM) are at risk of suffering irreversible damage to their health because some doctors may not be alert to its early symptoms.

People with NIDDM, otherwise known as Type 2 diabetes, may suffer complications including the formation of cataracts in the eyes, problems with small blood vessels of the retina and kidney, impaired resistance to infection and healing of wounds, and problems with nervous and circulatory systems.

Ms Delaney who has been studying NIDDM for her PhD project, has been taking insulin for Type 1 diabetes since she was 11. She has been alternating her work between the Department of Physiology and the International Diabetes Institute in Caulfield.

NIDDM has proved difficult to study because of the lack of a suitable animal model for the disease in humans. But in the 1960s scientists discovered such an animal by chance. The Israeli sand rats (*Psammomys obesus*) have turned out to be most engaging subjects for the study of NIDDM, the insulin-resistant form of the disease. In their natural desert habitat, the Israeli rats eat a low-calorie, high-salt diet.

If fed on standard rat chow under laboratory conditions, some of the rats rapidly develop the classic symptoms of non-insulin-dependent diabetes in humans: their serum insulin levels soar and they become obese. As they lose their ability to respond normally to insulin, they develop progressively higher blood-sugar levels that begin to cause tissue damage.

There are several forms of diabetes, but the disease is broadly defined as a condition in which blood glucose content is elevated, in the presence of inadequate production or impaired action of insulin. In NIDDM, the action of insulin is impaired: the body's is unable to respond to insulin, even though it may be producing higher levels than normal.

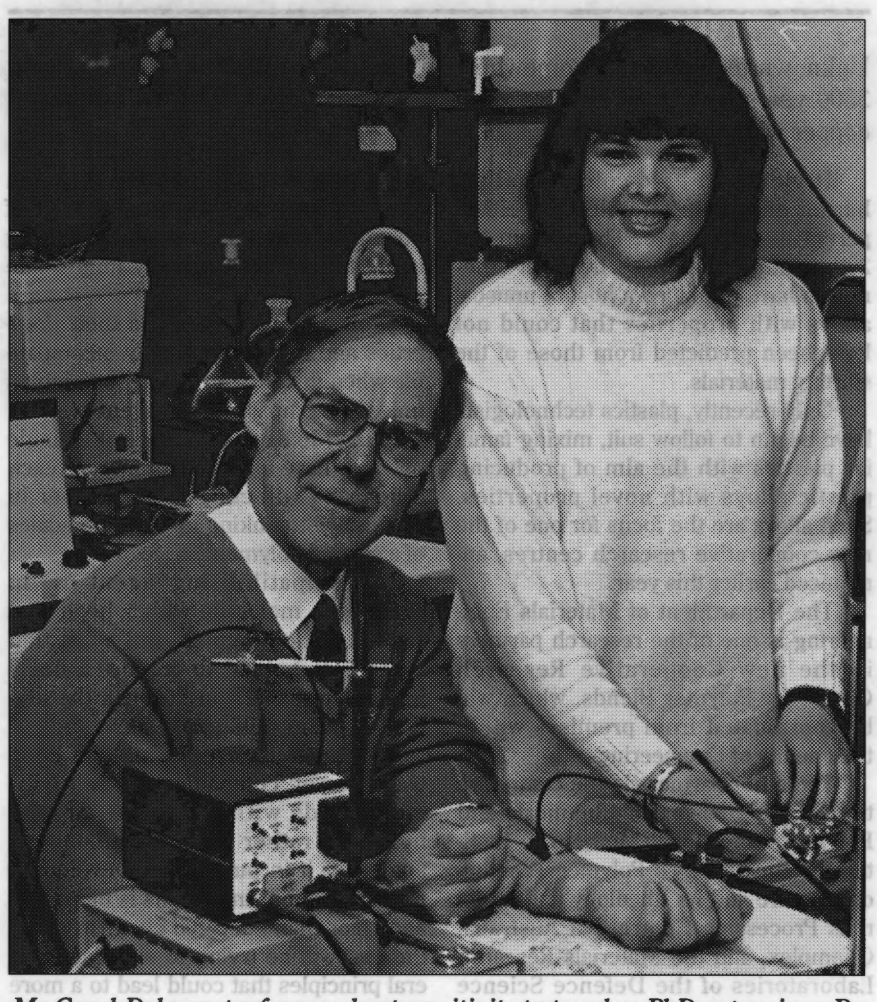
Type 1 diabetes in humans is thought to be caused by an autoimmune reaction, resulting from an interplay of genetic and environmental factors. Ms Delaney's brother Peter, whose own PhD project on the development of a new type of laser confocal microscope featured in *Montage* last year, developed Type 1 diabetes when he was only five.

Their form of diabetes results from an absence of insulin. The immune system mounts an attack on the body's own insulin-secreting cells in the endocrine part of the pancreas, called the islets of Langerhans.

Type 1 diabetes can be mimicked in laboratory rodents by chemically ablating the beta cells of the islets of Langerhans. However, duplicating non insulin-dependent diabetes is more complicated because the underlying cause is not the failure of insulin production, but the progressive failure of insulin receptors throughout the body to respond to insulin.

Feedback mechanisms cause the body to over-compensate by progressively secreting much higher levels of insulin, in an attempt to force the failing receptors to respond. Because insulin mediates the cellular uptake of blood glucose, the cells are starved of glucose, and it can accumulate in the blood, reaching toxic levels that cause tissue damage.

Ms Delaney is particularly interested in nerve dysfunction resulting from NIDDM: victims suffer impaired sensitivity to heat and cold, and to vibration. Nerve transmission slows down, with the peripheral nervous system being most affected. Patients suffer sensations like tingling in the fingers and toes, numbness and pain.



Ms Carol Delaney performs a heat-sensitivity test on her PhD supervisor, Dr Rod Westerman. The test detects early signs of small-nerve fibre dysfunction, an indicator of NIDDM diabetes.

"The thing about Type 2 diabetes is that a lot of people have the condition without realising it," Ms Delaney said. "Its onset is slow and insidious, whereas the symptoms of Type 1 diabetes smack you in the face.

"A person can have Type 2 diabetes for years without knowing it. Its effects are reversible to some extent if they are detected and treated early, but the longer somebody goes on without knowing they have it, the more lasting damage it can do to the body. Diabetes generally starts off with reversible, short-term nerve dysfunction, which can later result in structural damage."

The problem develops in all types of nerve fibres. Myelinated nerves are covered with an insulating sheath of the protein myelin that ensures that the current carrying the nerve impulse does not leak out of the nerve body.

In diabetes, the myelin sheath can break down or even peel away from the body of the nerve, preventing the transmission of impulses. The thinner, unmyelinated fibres do not show much obvious structural change – even under electron microscopy – but their chemistry is altered and function impaired.

The ability of peripheral nerves to sense heat is one of the first functions to change. Ms Delaney performs a heat-sensitivity test on humans, aimed at detecting the early signs of small-nerve fibre dysfunction due to NIDDM.

Her supervisor, Dr Rod Westerman, says critical biochemical reactions mediated by the nerves also begin to fail. When a person suffers any injury or infection which would normally cause pain, the nerve releases neurotransmitters that relay the information back to the brain.

At the same time, the sensory end of the nerve releases neuropeptide factors that bring cells from the immune system swarming to the site. The cells secrete growth factors which stimulate other specialised cells to grow and divide, healing any injury.

Thus, slow healing and poor resistance to infection in diabetes patients are ultimately a consequence of their impaired nerve function. However, nerves damaged by diabetes can repair themselves. Dr Westerman says diabetes patients exhibit a mix of damaged and regenerating nerves. If the damage is detected early, it can be reversed.

"The proof lies in operations in which patients with insulin-dependent diabetes received a kidney-pancreas transplant," Dr Westerman said. "When their diabetes was cured, all their complications were reversed."

But what causes Type 2 diabetes? Ms Delaney says the cumulative effects of stress, poor diet and deranged fat metabolism all are important factors.

Stress alters the body's hormonal balances, which can in turn alter eating behaviour and the body's balance of fat to lean tissue, perhaps because their ability to respond to insulin is declining. Many people with NIDDM are overweight or obese, particularly in the abdominal region.

Israeli sand rats develop symptoms of the insulin-resistant form of diabetes when their diet is changed.

Continued on Research Monash 4

Blending polymer alloys

Since ancient times, metals have been blended to produce alloys of greater strength and durability. In our era, this alchemy has been applied to plastics. A new Monash research centre is adding momentum to the search for these materials of the future.

Unknown technologists somewhere in the Middle East or in China some 3500 years ago made a happy discovery when they mixed the soft metal copper with small quantities of tin.

It yielded a gold-coloured alloy, harder and more durable than either parent metal: bronze. Throughout the 20th century, marriages between other metals have produced a host of unusual alloys with properties that could not have been predicted from those of the starting materials.

Only recently, plastics technologists have begun to follow suit, mixing familiar plastics with the aim of producing plastic alloys with novel properties. Such alloys are the focus for one of the new cooperative research centres, announced earlier this year.

The Department of Materials Engineering is one of the research partners in the new Cooperative Research Centre for Polymer Blends, which will be coordinated from premises within the Faculty of Engineering.

The other partners in the centre are the CSIRO Division of Chemicals and Polymers, the Royal Melbourne Institute of Technology's Polymer Technology Centre and its Rheology and Materials Processing Centre, ICI Australia, Chemplex, and the Materials Research Laboratories of the Defence Science and Technology Organisation. The Plastics Industries Association and the supercomputer company, Cray Research, are affiliates.

The Director of the Polymer Blends CRC, Dr Ezio Rizzardo, says the centre's work will cover five areas:

- design and production of polymer blend components;
- processing and properties of polymer blends;
- computer-aided technologies in polymer blend technology;
- recycling and environmental control; and
- education through higher degree programs, mainly by research, but perhaps by course work as well.

The centre will study polymer blends and polymer alloys. Dr Rizzardo says there is no clear divide between the two types of material, but a blend is generally a mix of two or more polymers with useful properties, while an alloy is a more highly engineered mix of polymers, which uses a compatibilising agent to join two normally immiscible polymers.

Polymers vary widely in their properties and tend to be highly incompatible when mixed, segregating into lumps unless a compatibilising agent is used. Dr Rizzardo says molecules of a single polymer have a natural affinity for each other, and will cling to each other in preference to linking up with molecules of a second polymer.

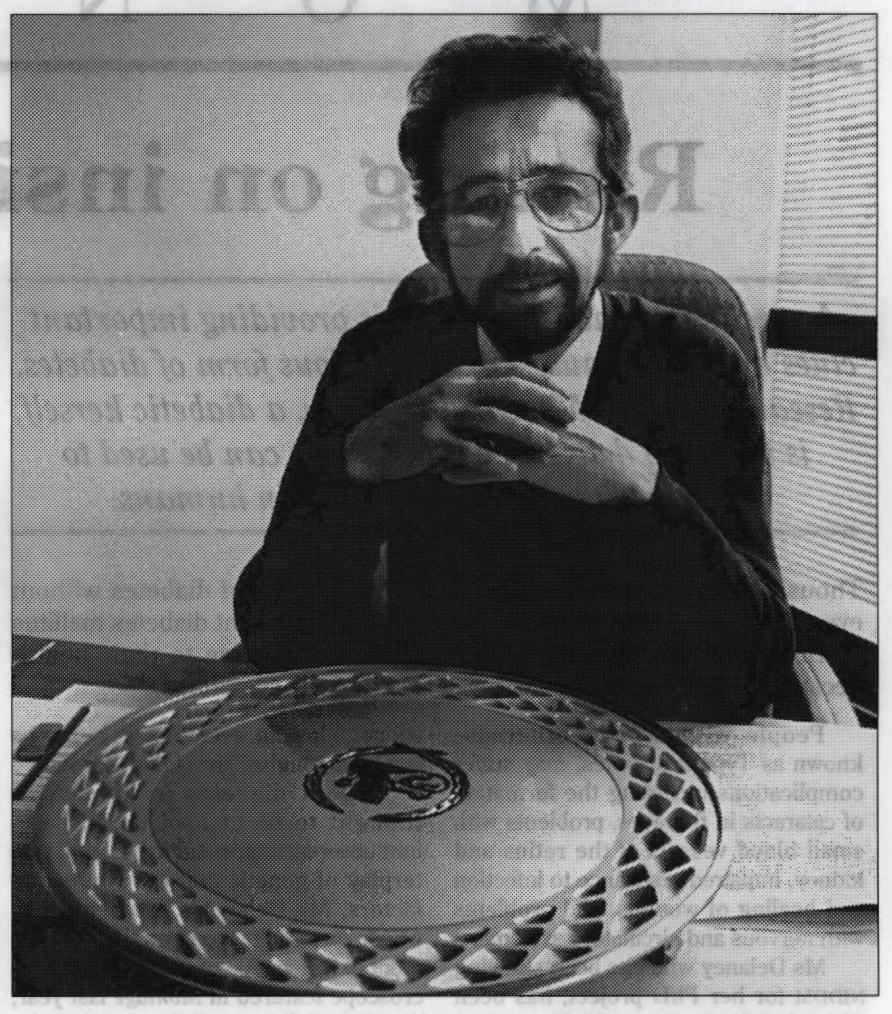
A compatibilising agent is, in essence, a molecule with a head that binds to one polymer, and a tail that binds to the other, to produce a finely integrated dispersion between the otherwise incompatible partners.

Such agents are normally a deep trade secret; companies will sell polymer blends with the agent already mixed in, rather than risk somebody analysing it in pure form. Developing new compatibilising agents is more trial and error than educated chemistry, and the CRC will be trying to elucidate general principles that could lead to a more rational approach to the design of new compatibilising agents.

"One aim in generating new polymer blends is to upgrade the properties of commodity polymers like polyvinyl chloride (PVC) or polypropylene, so that they can be used in new applications," Dr Rizzardo said.

"Another is to make very expensive, high-performance polymers cheaper by adding low-cost polymers as extenders. Some high-performance polymers have properties that exceed requirements; they don't need to be so strong or so tough in certain applications."

Developing new polymer blends or alloys from existing polymers is usually much cheaper than developing a new, pure polymer – a homopolymer – for specialised applications, Dr Rizzardo said. A company might need to invest tens of millions of dollars in new plant to produce a new polymer, whereas it can use existing plant to produce a blend with the required properties.



Director of the Polymer Blends CRC, Dr Ezio Rizzardo: identifying market trends and commercial opportunities that can be pursued by research.

The explosion in interest in polymer blends is only a decade old, and progress has been slow because mixing polymers has proven far more difficult than expected. Dr Rizzardo says the CRC is relying on the expertise of its commercial partners, ICI and Chemplex, to identify market trends or opportunities that can be pursued by research programs.

ICI has already identified opportunities in the market for polyolefins like polyethylene and polypropylene. One idea is to recycle the polypropylene bumper bars on many modern vehicles. The material used in the bumper bars is already a blend of polypropylene mixed with about 5 per cent of a rubbery toughening agent, which imparts flexibility to the normally brittle plastic.

"One of the key issues is that if you recycle used bumper bars, you lose some of the properties of the original material so that it no longer meets the specifications for re-use in bumper bars," Dr Rizzardo said. "It would be very desirable to re-use the material, and the motor industry is now looking at employing it in less critical components inside and outside the vehicle.

"However, an alternative might be to generate a new blend with the right properties for a bumper bar, but which doesn't degrade when it is recycled. This is an important concept, looking at the whole life-cycle of polymers.

"It is attracting a lot of attention in the Plastics Industry Association, both from an economic and environmental viewpoint. Recyclable plastics are becoming increasingly important, but after the fiasco with bio- and photo-degradable plastic bags, nobody wants to go down that path without knowing precisely what they're doing.

Another application for polymer blends in motor vehicles is for internal components like the dashboard and fascia. These components are formed from a mix of three polymers called ABS (acrylonitrile, butadiene and styrene), which has less than ideal resistance to distortion at high temperature.

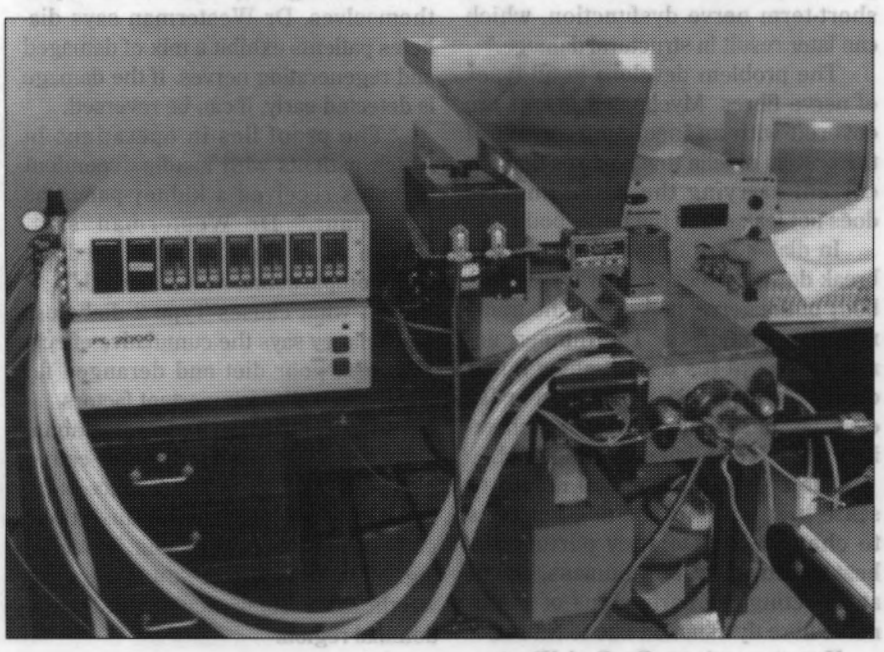
Dr Rizzardo says the solution may be to blend ABS with a fourth polymer with very high heat-distortion resistance. Australian car manufacturers are also exploring the use of an ABS-polycarbonate for hub caps. The material has very high impact and abrasion resistance, and good resistance to distortion.

Some cars have their polymer bumpers painted with polymer paints, which is difficult to remove when the bumper is recycled. One solution may be to develop a new polymer paint that would blend in with the recycled material of the bumper, without compromising its properties.

Dr Rizzardo says more and more plastics today are being designed for recycling. In fact, the desire to do so is still running ahead of the community's ability to establish viable recirculation programs; there are still problems with segregating and collecting recyclable plastics.

Polymer blends could be used to improve the performance of quite mundane materials. Margarine containers can be made from polystyrene, which is easily formed into tubs. But polystyrene is very brittle, and tends to soften by absorbing fats from the margarine. Using a rubbery polyolefin, such as polyethylene or polypropylene, could prevent cracking and also prevent softening.

Similarly, the polymer insulation around electrical cables sometimes comprises a PVC layer around the copper core, with an outer nylon coating for abrasion resistance. Rats often chew through the insulation, and although PVC and nylon are not flammable individually, they form an explosive combination when used in close proximity. Dr Rizzardo says new polymer blends could solve both problems.



Extrusion of a polymer blend.

Continued on Research Monash 4

Transporting the future

Melbourne's much-maligned public transport system actually does quite a good job of moving commuters in straight lines between the city and suburbs. But getting around away from these tracks is a different story, and funding is not being spent where it is most needed.

The demise of the horse as Melbourne's main mode of transport was hailed at the time as an environmental breakthrough.

The several thousand horses plying Melbourne's streets in the 1880s each produced an average of 16 kilograms of solid waste and 8.5 kilograms of liquid waste per day.

By 1890 Melbourne already had in place the greater part of what is today one of the most extensive train and tram networks of any city in the world; not as a result of enlightened planning for the commuters of the new century, but to provide a profit to land speculators on the urban fringe.

Professor Ken Ogden, professorial fellow in the Department of Civil Engineering, says it was this rail and tram network that set the city's growth and land-use patterns fully 60 years before the motor car began to cause serious traffic congestion.

"It is a myth that the motor car produced the urban sprawl," Professor Ogden said. "The rail network did that. We had a strongly radial transport system with a highly centralised city. The two were, and still are, compatible and mutually reinforcing.

"One feature of such an extensive public transport system was that it went out a very long way. This meant that there were very large wedges of open space between the radiating rail lines."

With the rise of the motor car in the 1950s, manufacturing industry's need for increasingly large sites, and the evolution in the outer suburbs of suburban retailing, office development, and education and research facilities, it was inevitable that the wedges of open country would be filled in by development.

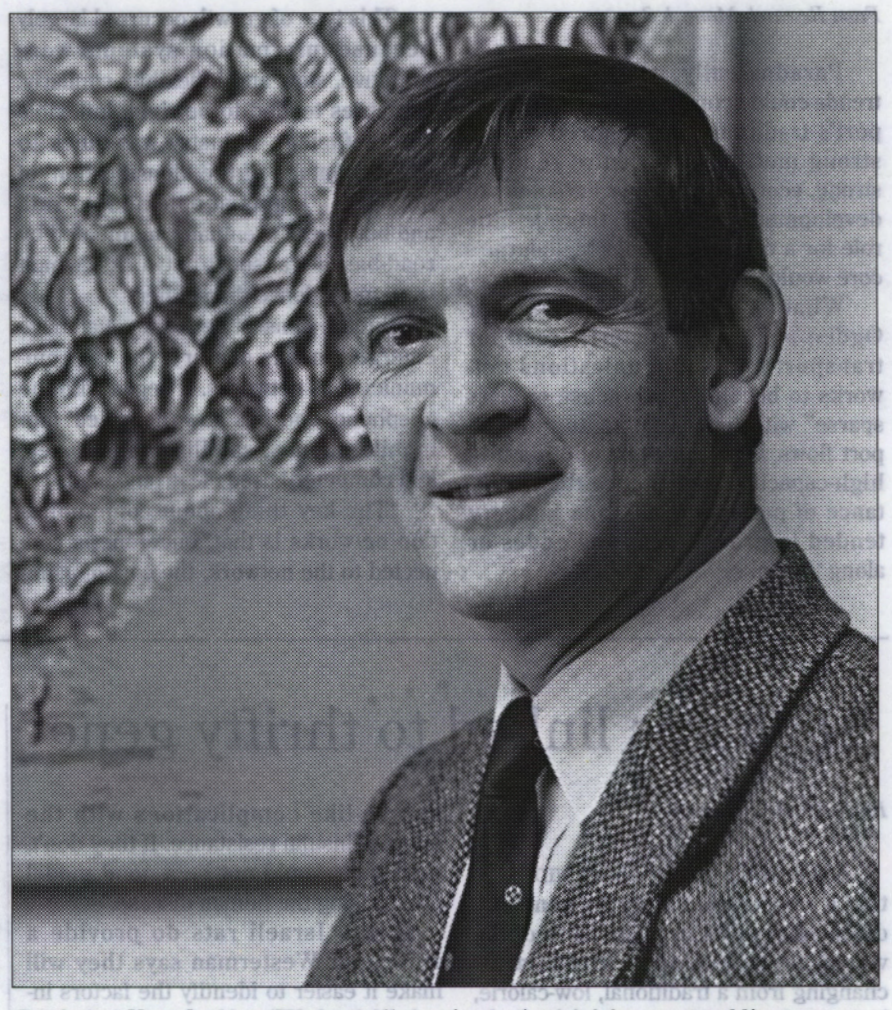
Professor Ogden makes these observations in a Civil Engineering working paper titled 'Has public transport a future?', which he presented earlier this year to a forum on the future of public transport, organised by the Conservation Council of Victoria.

His paper makes it clear just how much the past has influenced, even dictated, the present and the future of Melbourne's public transport system, and the city's design and patterns of economic activity.

Despite the increasing criticism levelled at the public transport system, he says, "We are all too fond of criticising our public transport system in this town, but we really must acknowledge its strengths, and certainly the vast extent of the tram and rail network is one of them."

Public transport dominates the central city commuter market, providing over half the daily commuter trips into the central business district; by world standards, a very high percentage for a low-density city. Public transport is built around radial travel into the central city, particularly for work trips. Because it is so successful, it is obviously competitive and will continue to be so while Melbourne has a large central-city workforce.

But Professor Ogden says planners need to consider what public transport can do for non-centrally oriented travel, dominated by private motor vehicles making random point-to-point trips. It is this pattern of travel that produces Melbourne's increasing road congestion.



Professor Ken Ogden: "We are all too fond of criticising our public transport system in this town, but we really must acknowledge its strengths ..."

The key to improving Melbourne's public transport system, he believes, is to encourage it to develop market-responsive entrepreneurial activity. The financial climate surrounding public transport works against this aim.

Public transport expenditure, via both capital investment and operating subsidy, absorbs a significant proportion of the State budget. Most of the benefit of the subsidy goes to upper and middle income groups, which raises equity issues. The practice of directing the subsidy at the operator, rather than the traveller (particularly the low-income traveller) only perpetuates the status quo.

Another significant aspect of public transport is that while the radial, city-centred network was designed to serve the inner-city worker, work trips account for only 30 per cent of all travel. The city centre accounts for only 12 per cent of Melbourne's jobs, and only 50 per cent of inner-city workers commute by public transport.

Multiplying these figures together, it turns out that the radially designed public transport network today caters for a mere 2 per cent of all the trips undertaken by Melburnians each day!

Professor Ogden says the number of people using public transport is much higher than this statistic might suggest, because the network also carries large numbers of people who are not going to work, and whose destination is not the city. Buses cater for the much larger market for cross-suburban travel (trains and trams provide some, where the routes are convenient) but overall, public transport provides only 11 per cent of all suburban trips.

While demand for cross-suburban public transport is much greater than for city-centred public transport, there is a very large imbalance in the allocation of the public transport budget. The buses that provide most of the trips account for only 22 per cent of the public transport budget: the other 78 per cent goes on trains and trams.

Professor Ogden poses the question: can public transport gain a larger share of the suburban travel market? The answer depends on what sort of trips are likely to be made in future, and what proportion of those trips could be provided by public transport. In the short term, the abundance of inner-city office space is likely to generate more trips to the city.

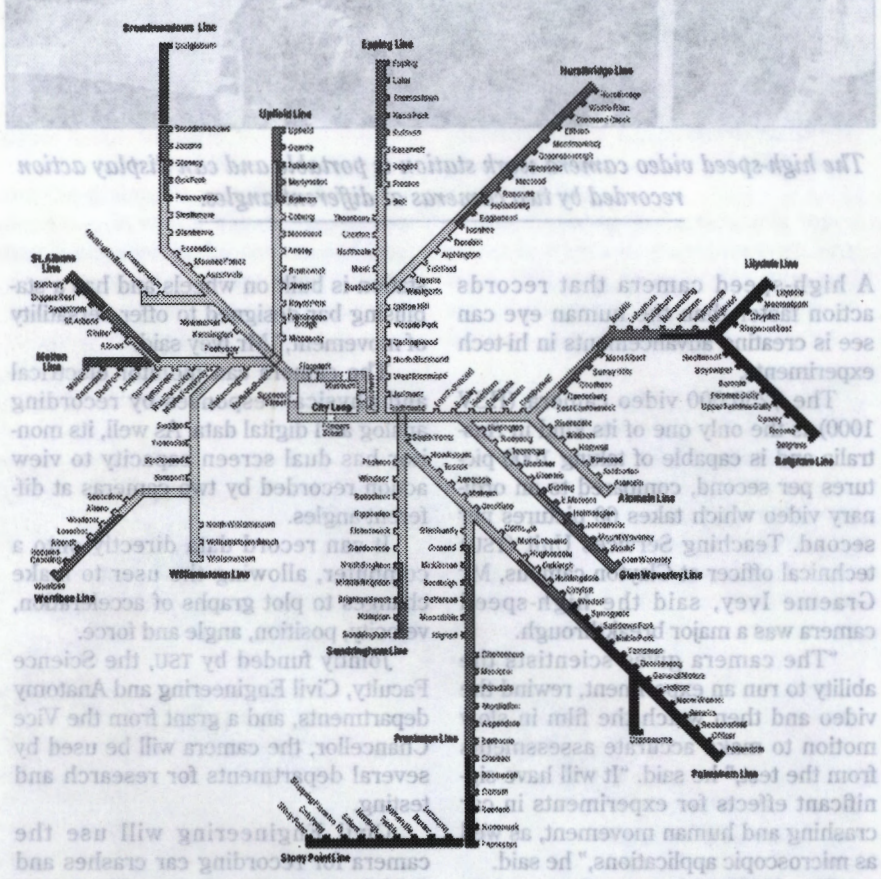
He points out that Melbourne's inner-city workforce has remained almost static for several decades; the growth in office space has merely provided more lavish space for the same number of workers.

Melbourne's real job growth is likely to occur in non-central locations, and are likely to be concentrated in recreation, tourism, construction, wholesale and retail, personal and community services, education, research and development, and home-based work. More importantly – from the viewpoint of public transport – the growth in jobs is likely to involve significant growth in part-time work, shared work, shorter working hours, itinerant work and home-based services.

This is likely to lead to a reduction in average work-trip length, an increase in local-area travel, a smoothing of the 'peakiness' in travel, and an increase in the number and proportion of non-work trips. Overall, this will result in more complex travel patterns, with people combining several destinations and trip purposes in one journey, and a reduced emphasis on long-distance commuter trips to the central city.

Such trends do not augur well for existing public transport technologies, because more and more trips will be short and randomly oriented, rather than focused in particular corridors. Melbourne needs to prepare itself for higher levels of walking and bicycle use, Professor Ogden says.

Continued on Research Monash 4



Melbourne's extensive train network was not a result of enlightened planning for commuters; rather, it provided profit for land speculators on the urban fringe in the late 19th century.

Dense networks emerge

From Research Monash 3

Paradoxically, these emerging trends could actually assist public transport's traditional city-centred role. A strong metropolitan centre requires strong, economically vigorous suburban development: without it, there is little role for a central city, and Melbourne's core would stagnate.

What of the future? Professor Ogden points to a historic trend for transport and communications networks to become more dense or "less sparse" with time. Last century, transport flows were concentrated on a few, high-capacity links (hence the importance of ports and rail), and industry tended to grow around the nodes or along the links.

This type of growth occurred largely because information systems were primitive, slow and inflexible; similarly, industries tended to be rigid, inflexible and inefficient. Industry was quick to take advantage of the 'densification' of networks. Trams supplemented rail, and both were eventually augmented by road-based transport networks, which were more dense than either.

But the densest networks of all have emerged in this century: the telecommunications networks. It began with the telephone, and has now 'densified' into mobile phones, satellite links, faxes, and computer-based electronic mail.

"The key thing about communication networks is that, once one is connected to the network, the cost of using it hardly varies with distance," Professor Ogden said.

"This has the absolutely revolutionary effect that location hardly matters at all for those activities which are concerned with processing information, while for those industries still concerned with processing material things, control can be exercised from a distance, and in real time. Any tendency towards telecommuting (working from home) will only accentuate this trend.

"The effect of these changes on the future of our cities is certain to be profound. Indeed, one might even question the very concept of a city, if a person can communicate as easily with someone across the world as across the road."

Professor Ogden says if current research is any guide, the vibrant cities of the future will be associated with creativity, communication, cultural ambience and competence.

The key factors in their growth will not be access to traditional things like ports or cheap land, but to major airports, strong internal road networks (for the movement of goods), and high-capacity, high-speed inter-regional surface transport links.

But the most important single variable will be the city's ability to attract and hold creative, skilled people. That means ready access to quality education, a rich cultural ambience and the availability of outdoor recreation.

In short, Professor Ogden says, the nature and form of interactions within our cities will be increasingly dependent on 'dense' networks, most notably communication and road networks.

Today's 'sparse' networks will not be redundant, because people will still require intra-urban rail and tram services, but the emergent wealth-creating activities will increasingly be focused on electronic and road networks.

Diabetes linked to thrifty gene

From Research Monash 1

A plausible theory about NIDDM is that it results from a 'thrifty gene'. Indigenous peoples in many parts of the world have developed NIDDM after changing from a traditional, low-calorie, low-carbohydrate diet to a carbohydrate and fat-rich Western diet.

Ms Delaney's Israeli rats may also be exhibiting this response when they switch from their salty, low-calorie natural diet to a calorie-rich diet of rat chow. Because rats are much shorter lived than humans and their life processes are accelerated, it may be possible to track the biochemical and physiological events that lead to NIDDM

"My primary interest in rats is whether insulin deficiency, whether it is relative or absolute, plays an important role in nerve dysfunction," Ms Delaney said. "In other words, is it high blood glucose that causes nerve damage, or is it directly linked to a lack of insulin, or the body's inability to respond to it?

"It would be worthwhile just to be able to answer this question. Even though these animals have been studied since the 1960s, there has been very little study of the complications.

"If the rats are a good model for Type 2 diabetes, they should develop human-like complications with the onset of insulin resistance. If they don't, then they would not be a good model for studying the human disease."

If the Israeli rats do provide a model, Dr Westerman says they will make it easier to identify the factors involved in the development of obesity and insulin resistance. "We could then start to look for particular biochemical deficits in organs, and experiment with therapies that may ultimately lead to the development of therapies for humans," he said.

Dr Westerman says one of the interesting aspects of diabetes is that muscle cells and fat cells require insulin before they can take up glucose, but nerve cells do not. If nerve cells are exposed to abnormally high levels of glucose, they may deal with it by shunting it into alternative metabolic pathways.

Alcohol-based sugars such as sorbitol may accumulate to toxic levels, damaging the nerve cells. In rodents, compounds that block these alternative pathways have shown an ability to protect nerve cells against toxic sugars. Disappointingly, most of these compounds have proved either ineffective or toxic when tested in humans, but at least one such compound (Tolrestat) is now showing some promise.

Predicting new polymer blends

From Research Monash 2

The new centre will also be studying new blends, synthesised to improve their processing properties by bringing down their melting points or improving their flow properties. RMIT has special expertise in polymer processing and rheology (the science of fluid flow), while Monash University and DSTO's Materials Research Laboratories have complementary expertise in the physical and mechanical properties of materials, including tensile strength, abrasion resistance and toughness.

Cray Research will contribute its special supercomputer software and its expertise in computer modelling. The new CRC will try to develop computer models of polymer behaviour, which may allow researchers to design compatibilisers, based on a knowledge of the contribution of individual polymers to the mix.

"We would like to be able to predict what happens when we mix A and B, but we can never really be sure what will happen because it depends not only on the basic physical properties of the polymers, but on the conditions under which they are processed," Dr Rizzardo said.

"There are so many permutations that it is a huge challenge, and progress worldwide has been very slow. We want to be at the forefront. Having the Plastics Industry Association as an affiliate means that we have access to the expertise of their membership.

"Further down the track, we expect to commercialise the intellectual property from the centre with help from PIA members. At the end of our seven-year funding period as a CRC, we want to be in a position to fund our continuing research ourselves."

Camera captures all the high-speed action

The high-speed video camera work station is portable and can display action recorded by two cameras at different angles.

A high-speed camera that records action faster than the human eye can see is creating advancements in hi-tech experiments.

The $250,000 video camera (HSV 1000) is the only one of its kind in Australia and is capable of taking 1000 pictures per second, compared to an ordinary video which takes 60 pictures per second. Teaching Services Unit (TSU) technical officer at Clayton campus, Mr Graeme Ivey, said the high-speed camera was a major breakthrough.

"The camera gives scientists the ability to run an experiment, rewind the video and then watch the film in slow motion to make accurate assessments from the test," he said. "It will have significant effects for experiments in car crashing and human movement, as well as microscopic applications," he said.

The HSV1000, manufactured in Japan by NAC, can be used with one or more cameras and comes with a work station consisting of a monitor, recorder and hand-held control unit. "The work station is built on wheels and has a stabilising bar designed to offer versatility of movement," Mr Ivey said.

The camera can monitor electrical and physical responses by recording analog and digital data. As well, its monitor has dual screen capacity to view action recorded by two cameras at different angles.

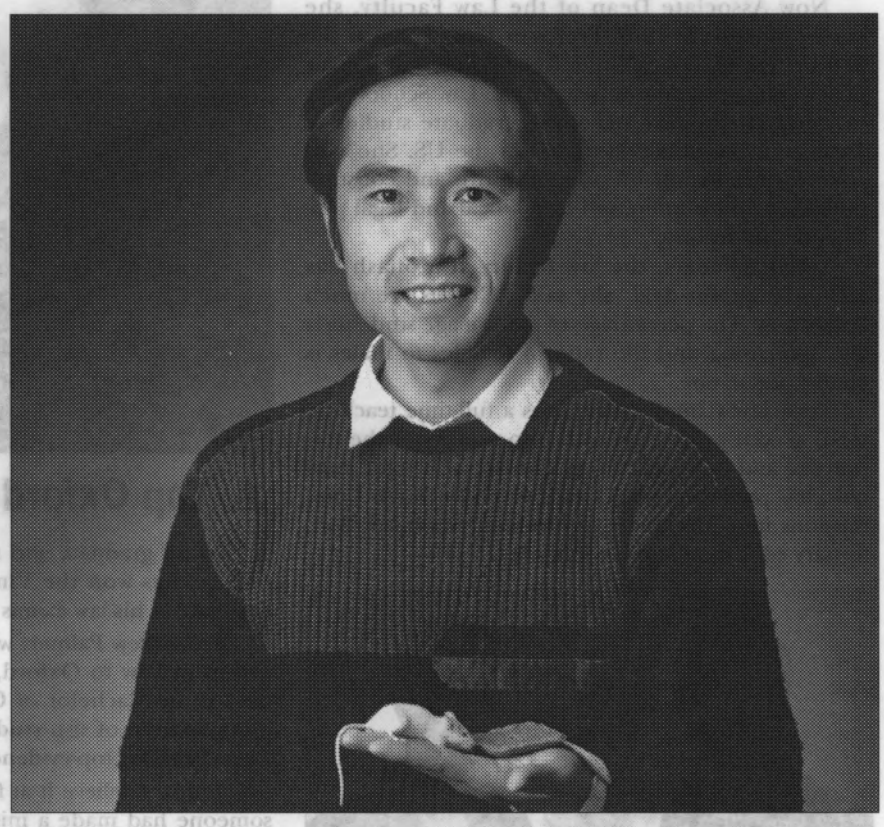
It can record data directly onto a computer, allowing the user to make changes to plot graphs of acceleration, velocity, position, angle and force.

Jointly funded by TSU, the Science Faculty, Civil Engineering and Anatomy departments, and a grant from the Vice Chancellor, the camera will be used by several departments for research and testing.

Civil Engineering will use the camera for recording car crashes and fluid dynamics experiments. Physiology will study human movement and Ecology and Evolutionary Biology will use it to record experiments involving algal sperm motility.

Controlling the feral animal plague

Australia is plagued with feral animals. Over the past 200 years, introduced species have wrought environmental havoc, damaging ecosystems and driving some native animals to extinction. Perhaps animal contraception is the answer.



Dr Yuan Gao: Mice are attracted to soft wax cakes that contain cereal grains embedded with a chemosterilant compound.

Mammals that evolved in other parts of the world have flourished in Australia in the absence of their natural predators and diseases, displacing or destroying indigenous species and endangering native plants.

Rabbits and pigs have destroyed huge tracts of vegetation, feral cats and foxes have decimated small mammal and bird species, and large populations of brumbies, donkeys, goats and camels are roaming the semi-arid rangelands, causing severe damage to sensitive ecosystems. Rats and mice are often in plague proportions, threatening native birds and reptiles on offshore islands, and causing tens of millions of dollars in losses to grain farmers.

Professor Roger Short and Chinese-born postdoctoral researcher Dr Yuan Gao, both of the Department of Physiology, are proposing a radical new approach to controlling feral mammals in Australia, which would limit or even eliminate pest species by blocking their reproduction. They believe that new anti-fertility compounds originally developed for human population control – such as methyl testosterone, the new gestagen Org 5933, and antigestagens like the abortifacient drug, mifepristone (RU486) – could rapidly bring feral animals under control, and could actually eliminate them from islands.

Their idea was inspired by the spectacularly successful program to control the screw-worm fly, a serious pest in the cattle industry. Female screw-worm flies mate only once in a lifetime, and if they mate with a sterile male, there are no offspring. In Florida, the release of millions of sterile males has exterminated the fly, and it has recently been wiped out in North Africa, where it was introduced by chance during the 1980s.

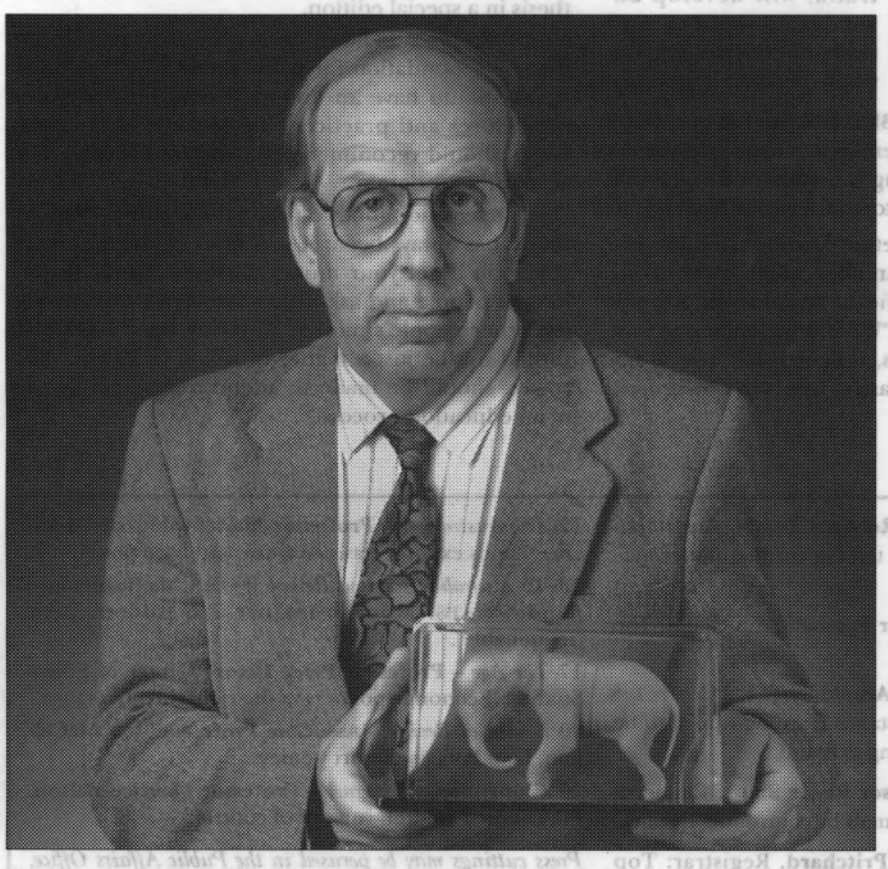
The dilemma of managing African elephant populations provides a good example of how fertility control drugs could be used in animals. Ivory poachers have devastated wild elephant populations, but animals brought into the relative sanctuary of game reserves have bred prolifically, destroying large areas of woodland by browsing and so ruining the habitat for other species.

In *New Scientist* last month, Professor Short says that recent research has shown elephants to be highly intelligent and capable of lasting affection. They can communicate over long distances with infrasonic sound, too low for human hearing. Elephants develop life-long family bonds, grieve over death, and do not forget. In parks that cull their animals by shooting, elephants avoid human contact; in parks where there is no culling, they move freely among human visitors.

Professor Short believes an ideal strategy would be to allow young females to go through puberty at the normal age of 11, conceive, and then use a drug like RU486 to induce abortion in mid-term, before the fetus is large enough to trigger the maternal bonding reflex. The normal length of pregnancy in the elephant is 22 months, the longest of any mammal.

If every alternate pregnancy was aborted, increasing the interval between births by two years, it would actually reduce the elephant population. The drug would need to be administered to each pregnant female only once every six and a half years.

Dr Gao has been experimenting with new chemosterilant compounds for rats and mice for the past four years, using a type of bait that rats and mice find irresistible – cereal grains embedded in green-dyed paraffin wax. Rodents apparently enjoy the sensation of gnawing on the soft wax, which provides a perfect medium for fat-soluble chemosterilants like steroids. The wax cakes protect the drug against leaching and weathering and, because of their colour, do not attract birds or carnivores.



Professor Roger Short: The dilemma of managing African elephant populations provides a good example of how fertility control drugs could be used in animals.

Dr Gao obtained some wild mice from wheat farms near Ouyen, in the Victorian Mallee. He put seven males and seven females in each of four open-air enclosures, with a hay bale for shelter and a liberal supply of the best laboratory rodent chow. Mice in the first cage were given paraffin baits containing a high level of methyl testosterone, the second received a medium dose, and the third a low dose, with the fourth serving as an untreated control.

After four months, there were 31 mice instead of the original 14 in the control pen, but in the low and middle dose pens, there had been only two and four mice added. The high-dose pen had 33 additional mice, apparently because the high dose made the bait unpalatable and the mice refused to eat it.

The most exciting result, Professor Short says, was that a very low dose of methyl testosterone effectively suppressed breeding through its impact on female infertility. He said chemosterilisation could be integrated with poisoning programs for animals such as rats and mice to prevent the emergence of resistance to commonly-used poisons.

"Poisoning is a more effective way of controlling animals than shooting or trapping, but when you put a poison down, certain animals will always survive," he said. "Mice and rats, if they survive poisoning, will display bait shyness – they will refuse to take that type of bait again. Rats and mice can also develop resistance to poisons. The idea would be to alternate poisons with chemosterilants. Since a chemosterilant steroid mimics the animal's own hormones, the animal can't become resistant to it".

Professor Short would like to make a quick start on field experiments, pointing out that current CSIRO research projects to develop new techniques of virally vectored immunosterilants to control foxes and rabbits are somewhat speculative, and at best will not be ready for a number of years. The CSIRO is also investigating the use of tiny worm-like nematodes to control mouse plagues.

"It's also important to note that you can't tackle rabbits without first controlling foxes, because rabbits make up a very large proportion of the diet of foxes," he said. "In the absence of rabbits, foxes would decimate native wildlife, yet CSIRO does not yet have any idea how to control the fox. CSIRO can't tackle the rabbit without first tackling the fox. We could start a fox-control program based on antigestagens as early as next year."

Professor Short and Dr Gao have been conducting their research with support from a Melbourne technology company and their methyl testosterone trial on wild mice was funded by the Grains Research and Development Corporation. Although the experiments conducted so far have been successful, Professor Short's research group does not have funds to continue the work.

Meanwhile, he has received inquiries from a number of authorities interested in controlling rats on offshore islands. The Australian National Parks and Wildlife Service is very interested in the idea of using chemosterilants to eliminate rats from Lord Howe Island and Norfolk Island where egg predation has brought two native birds, the green parrot and the boobook owl, to the brink of extinction.

"Rats are also threatening the kentia palm industry on Lord Howe Island, the island's main export," Professor Short said. "On both islands, rats are exterminating several unique species of ground-nesting birds.

"Cats introduced onto Ascension Island in the Atlantic have hunted the Wideawake Tern almost to extinction, and in New Zealand, ferrets and cats are wiping out albatrosses, and rats are threatening the tuatara (a unique, primitive lizard-like reptile regarded as a living fossil)."

Professor Short says offshore islands would provide natural laboratories for experiments to test the new chemosterilant approach for controlling introduced feral animals.

■ Celebrating 25 years

Professor Enid Campbell recently celebrated her 25th year at Monash.

Now Associate Dean of the Law Faculty, she joined Monash in 1967. Professor Campbell was the first woman in Australian to be appointed to a chair of law and take a post as Dean of the Law School.

After completing her undergraduate studies in Tasmania, she obtained a PhD in the US. She now concentrates mainly on administrative and constitutional law and is interested in political and legal philosophy and history.

"Over 25 years, the law faculty at Monash has changed a great deal" she said. "Classes are much larger now. The percentage of mature age students is also increasing and the ratio of females to males is almost one to one."

Professor Campbell manages a full-time teaching load, as well as her research into aspects of the law practice and its effectiveness. She also writes for journals, has published books and served on Royal Commissions into Australian government administration, tertiary education and law schools.

▲ Insurance law prize

Final year law student, Ms Elspeth Hensler, has won the SIO Consumer Appeals Centre Insurance Law Prize for 1991.

Ms Hensler's entry was judged the best of 10 submitted 3000-word essays on a topic relating to a consumer's legal rights.

Presenting the $250 prize, SIO consumer Appeals Centre director, Mr Simon Smith, said: "It's good to see law students coming to grips with the consumer aspects of insurance law. This is an area which deserves the attention of our universities".

■ Agriculture medal

Mr Michael Reed, a Monash honours student, has been awarded the inaugural Nancy Millis Gold Medal from the Victorian Government and Department of Agriculture.

The medal is one of a series of prizes for excellence in agricultural science and technology, open to applicants from around Australia. The award, which entitles the recipient to do a PhD over three years with the Department of Agriculture Research Institute, will be presented annually.

Mr Reed is undertaking a Bachelor of Science (Hons) in Microbiology at the Victorian Institute of Animal Sciences, which is affiliated with Monash. His research project is on molecular cloning and characterisation of genes encoding for multi-drug resistance in liver flukes.

▲ Top Oxford award

A Monash graduate and now lecturer in the Faculty of Law, has won the Vinerian Scholarship for top graduate in his law exams at Oxford.

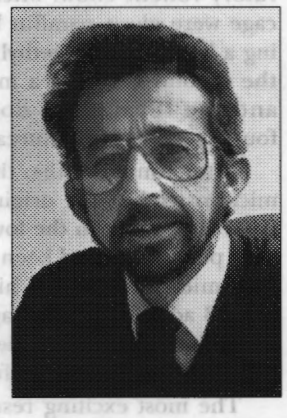
Mr Andrew Palmer, who won the Menzies Scholarship in Law to Oxford, obtained First Class Honours in his Bachelor of Civil Law to win the prestigious mantle of top student, as well as the Rupert Cross Prize for top evidence student.

"I didn't believe it at first and really thought that someone had made a mistake," Mr Palmer said. He joins a select few Australian students who have won the Vinerian prize at Oxford. "Oxford is great place to study, it has an intellectual environment which makes you feel invigorated," he said.

The Menzies scholarship, which is awarded annually to law and medical students, enabled Mr Palmer, accompanied by his wife and two children, to study in England.

He graduated with a Bachelor of Law from Monash in 1989 after completing an English literature degree in New Zealand. He was awarded the Supreme Court Prize for top law student at Monash, as well as several subject prizes, before holding a position as research fellow at Melbourne University.

▼ Polymer centre head



The Monash-based Cooperative Research Centre for Polymer Blends has appointed a director. He is Dr Ezio Rizzardo.

The Cooperative Research Centre (CRC) for Polymer Blends, the only one of its kind in Australia, will develop advanced polymers and skills encompassing the whole product life cycle.

The CRC for Polymer Blends is funded by a $8.69 million Federal Government grant over seven years and brings together leading scientists in a collaborative research project (see story in *Research Monash*).

"The centre brings together leading scientists and engineers in polymer technology which gives us the opportunity to make significant advances in polymer blends," said Dr Rizzardo. "We will be looking at ways to improve polymer blends, reduce costs, how to improve processability of plastics and ways to recycle polymeric materials."

▼ German week

In dieser Woche müssen alle nur Deutsch sprechen! (Translation: This week everyone must speak only German.) So said all the signs announcing the German department's 'Deutsche Woche' (German Week).

During this annual event normal classes are cancelled and time is given over to spoken, written or aural German. Activities included visitors from the Goethe Institute speaking on Max and Moritz (two famous German cartoon characters), film sequences, plays, conversation workshops, a lecture on German cake cooking, a quiz program, film marathon, students reporting from Germany and instructions on the art of beer brewing (with tasting of German brands, natürlich).

The week concluded with an awards ceremony for outstanding students in each year. Ms Simone Duxbury (below) won the 1991 Goethe Prize for the best academic result in first year.

■ Accounting honour

Dr Claudio Romano, recently appointed an associate professor in the School of Accounting, has been named 1992 Accountant of the Year by the industry publication *New Accountant*.

He has won international accolades for his ground-breaking PhD thesis, titled *The Role of Formal Planning and Control Systems in the Growth of Small Business*. It is regarded as a benchmark by US Examiner, Don Sexton, who sets it as compulsory reading for his PhD students.

At the recent American Marketing Association Symposium on marketing and entrepreneurship, held in France, conference adjudicators described the paper as a "trailblazer" and the editor of *Journal of Business Research* offered to publish the unabridged thesis in a special edition.

Dr Romano believes an accounting qualification is a solid foundation for many careers. "All entrepreneurs should have an understanding of accounting procedures and practices," he said. In fact, he says banks should recommend that borrowers attend an accounting program.

"Banks lend money out on false security. Their attitude has always been: if you have an asset to mortgage you'll get your money. Instead, banks should look at people and ask if they are capable of managing other people's money. Applying for a bank loan should not be just a matter of filling in a form. Borrowers should be made to attend a program as part of an education process."

Press cuttings

A selection of recent Monash print media coverage

August

1 *New Scientist* – **Professor Roger Short**, Physiology: Elephants and birth control.

10 *The Age* – **Associate Professor Jeffrey Northfield**, Education: Teachers, the overworked and forgotten victims of the VCE.

11 *Financial Review* – **Ms Rebecca Smale**, Australian Studies Centre: Academics talking up the conference circuit.

12 *The Age* – **Professor Peter Fensham**, Education: The way is open for many faiths.

12 *The Australian* – **Mr John Arnold**, National Centre for Australian Studies: More distance learning tipped to be approved with hopes of easing demand.

12 *Canberra Times* – **Professor Roger Short**, Canberra Times: Eliminating feral animals by controlling fertility.

12 *Herald-Sun* – **Mr Tony Pritchard**, Registrar: Top marks to TV students.

12 *The Australian* – **Professor Mark Wahlqvist**, Medicine: Foods exports between a wok and hard place.

13–19 *Australian Campus Review Weekly* – **Ms Juanita Fernando**, MAPS: Monash mature-age student plan 'inequitable'.

17 *The Age* – **Professor Peter Dixon**, Centre of Policy Studies: 'Economic policy is in the right direction'.

20 *Financial Review* – **Associate Professor Ron McCallum**, Law: Policy will hurt women.

20 *Courier Mail (Brisbane)* – **Professor Maurice Balson**, Education: Children run out of control.

Press cuttings may be perused in the Public Affairs Office, Gallery building, Clayton campus.

DIARY & EVENTS

SEPTEMBER

14 *Greek, Roman and Egyptian Studies seminar* 'Ancient Jerusalem: History, Geography and Archaeology', by Dr Gideon Biger, Tel-Aviv University. R7, Clayton. 1.05 pm.

Lunchtime concert 'Searching for the Ark?', by the Melba occasional choir and ensemble. Chisholm Hall, Caulfield. 1 pm.

Librarianship, archives and records seminar 'Secondary sources and their importance for Colonial newspaper history', by Mr Ross Harvey. Room 403, Menzies building, Clayton. 2.15 pm.

15 *Anthropology and sociology seminar* 'The Mataungan Association: Social change on the Gazelle Peninsula', by Mr Peter Kean. Room 1010, Menzies building, Clayton. 12 noon.

15–16 *Continuing education seminar* 'Team building group dynamics conflict management', by Mr Robert Hockley. Contact: extn 73 2809.

16 *Genetics and developmental biology* 'Development and monitoring of gram negative bacteria with useful catabolic abilities', by Dr Chris Saint. Room 662, Biology building, Clayton. 4.15 pm.

Comparative literature and cultural studies seminar 'Ruskin renames nature', by Dr Chris Worth. Room 809, Menzies building, Clayton. 3.15 pm.

Syme leadership seminar by Dr Michael Deeley, Managing Director, ICI Australia. Clayfield Room, Caulfield. 5 pm.

16&18 *Staff development seminar* 'Speed reading'. Inquiries: Ms Di Barker, extn 75 6049.

17 *Robotics and digital technology seminar* 'Dynamic motion compensated video coding', by Mr Nick Jian. Room A1.40, Caulfield. 1 pm.

Staff development seminar 'Introducing Monash'. Gallery Theatrette, Clayton. 9.15 am

Continuing education seminar 'Anger: An occupational hazard for health professionals', by Mr Robert Hockley. Further details: extn 73 2809.

Lunchtime concert by the Peter Clinch Clarinet Quartet. The Religious Centre, Clayton. 1.10 pm.

Law staff seminar 'Recent developments in labour relations law in the UK and Australasia', by Dr David Lewis, Middlesex University, London. Staff library, second floor, Law building, Clayton. 1.10pm.

Ecology and evolutionary biology 'Evolution of the genera of Dictyopthales: A first synthesis', by Dr Julie Phillips. Lecture Theatre S8, Biology building, Clayton. 1 pm.

South East Asian studies seminar 'The impact of NGO aid in Vietnam', by Ms Gillian Braybrook. Room 515, Menzies building, Clayton. 11.15 am.

17–26 *School of Early Childhood and Primary Education workshop/exhibition* 'Children working with wood', sponsored by Mitre 10. Royal Show Grounds.

18 *Software development seminar* 'Hypermedia with Hypercompass', by Mr Daniel Jitnah. A1.37, Caulfield. 12.30 pm.

Higher education research and development seminar 'Assessment', by Mr Neil Paget of HEARU. Clayfield Room, Caulfield. 2 pm.

Psychology colloquium 'Handling of objects: How do we know their shapes?', by Dr Tony Goodwin, University of Melbourne. Room 306, Biology building, Clayton. 1 pm.

Accounting and finance seminar 'The impact of capital adequacy requirements on financing and investment decisions of retail banks', by Professor Don Stokes, University of Southern Queensland. Room 954, Menzies building, Clayton. 2.15 pm.

History seminar 'Surgery in Australia in the late nineteenth century', by Ms Monika Wells. Room 614, Menzies building, Clayton. 2.15 pm.

20 *Shankar in Concert* A 22-member dance and music troupe present folk, tribal and cultural dances of India. Robert Blackwood Hall. 8 pm.

21 *School holiday program for the children of staff and students.* Clayton campus. Until 2 October. Contact: extns 75 3186 and 75 4119.

21&24 *Staff development seminar* 'Effective writing skills'. Inquiries: Ms Di Barker, extn 75 6049.

22 *Staff development seminar* 'Managing yourself in a time of stress and overload'. Inquiries: Ms Di Barker, extn 75 6049.

23 *Genetics and developmental biology* 'Second hand chloroplasts: Can protozoans become algae?', by Dr Geoff McFadden, University of Melbourne. Room 662, Biology building, Clayton. 4.15 pm.

23&30 *Staff development seminar* 'Hold the line please – telephone techniques'. Inquiries: Ms Di Barker, extn 75 6049.

24 *Lunchtime concert* by Les Ms, a women's a capella vocal ensemble. The Religious Centre, Clayton. 1.10 pm.

South East Asian studies seminar 'Music in Goa: Influences and developments', by Ms Maria de Souza. Room 515, Menzies building, Clayton. 11.15 am.

25 *Accounting and finance seminar* 'The provision of other services by auditors: Pricing and independence issues', by Mr Roger Simnett, University of NSW. Room 954, Menzies building, Clayton. 2.15 pm.

Staff development seminar 'Feeling less stressed'. Inquiries: Ms Di Barker, extn 75 6049.

29 *David Syme Faculty of Business seminar* 'The cross-cultural generalisability of the relation between budget emphasis and job related attitudes: A theoretical analysis', by Mr Neale O'Connor, RMIT. Clayfield Room, Caulfield. 11 am.

Staff development course 'Introduction to scientific terminology', by Mr Roger van Sonsbeek, Training consultant. 9.30 am. Contact: Ms Di Barker, extn 75 6049.

'Gala performance', by Monash University Orthodox Society and the Greek Orthodox Archdiocese of Australia – Central Youth 10th year anniversary. Robert Blackwood Hall, Clayton. 8 pm. Inquiries: 696 2488.

OCTOBER

2 *Software development seminar* 'Persistence programming: An implementation in Eiffel', by Mr Glenn Maughan. A1.37, Caulfield. 12.30 pm.

Accounting and finance seminar 'Performance auditing in the Australian Federal public sector: A mutable masque', by Professor Lee Parker. Room 954, Menzies building, Clayton. 2.15 pm.

Engineering research seminar 'Industrial design of solar commuter vehicles', by M. Wilken. Lecture Theatre B2.14, Caulfield. 1 pm.

5 *Librarianship, archives and records seminar* 'Petherwick's contribution to Australian libraries', by Ms Marie Cullen. Room 403, Menzies building, Clayton. 2.15 pm.

6 *Anthropology and sociology seminar* 'Work organisation and leisure: A comparative study of the work ethic', by Associate Professor Ross Mouer. Room 1010, Menzies building, Clayton. 12 noon.

Staff development seminar 'Professional secretary'. Inquiries: Ms Di Barker, extn 75 6049.

7 *Genetics and developmental biology* 'The short-chain alcohol dehydrogenase superfamily', by Dr Zygmunt Krozowski, Baker Medical Institute. Room 662, Biology building, Clayton. 4.15 pm.

Comparative literature and cultural studies seminar 'Is the post-Soviet post-colonial', by Dr Marko Pavlyshyn. Room 809, Menzies building, Clayton. 3.15 pm.

7&14 *Staff development seminar* 'Be a better public speaker'. Inquiries: Ms Di Barker, extn 75 6049.

8 *Robotics and digital technology seminar* 'Issues/implementations of MPEG', by Mr Gary Bell. Room A1.40, Caulfield. 1 pm.

Ecology and evolutionary biology seminar 'Pattern of vegetation change on the Bogong High Plains', by Mr Henrick Warren. Lecture Theatre S8, Biology building, Clayton. 1 pm.

9 *Software development seminar* 'Logic programming and software engineering', by Mr Leon Sterling. A1.37, Caulfield. 12.30 pm.

Psychology colloquium 'Human motion perception', by Dr Simon Cropper, University of Melbourne. Room 306, Biology building, Clayton. 1 pm.

Engineering research seminar 'Management of new product development', by K. Sietsma. Lecture Theatre B2.14, Caulfield. 1 pm.

Accounting and finance seminar 'Equity raising by Australian small business: A study of access and survival', by Ms Li-Anne Woo, University of NSW. Room 954, Menzies building, Clayton. 2.15 pm.

Linguistics seminar 'Gender differences: Meaning and interpretations', by Ms Joanne Winter. Room S426, Menzies building, Clayton. 11 am.

History seminar 'New light on Masaccio's Frescoes in Florence's Brancacci Chapel', by Dr Nick Eckstein. Room 614, Menzies building, Clayton. 2.15 pm.

Staff development seminar 'Working with overseas students'. Inquiries: Ms Di Barker, extn 75 6049.

Arts & Minds

THEATRE OFF CAMPUS

■ The Malthouse CUB

The newest Playbox show, *The Emperor Regrets* by Therese Radic, is a highly theatrical and provocative play about honour, guilt, responsibility and the Emperor of Japan. The play centres around Hirohito who occupied the Chrysanthemum Throne for 70 years before his death in 1989. As he lies dying, ravaged by cancer and visited by ghosts in his morphine-induced nightmare, he tries to reconcile his past.

The Emperor Regrets investigates the complicated and often terse relationship between Australia and Japan and the unsettled issue of sadism and cruelty in war. The play is directed by Barry Kosky and stars Anthony Wong as Hirohito. The season opens on 3 October.

For further information and bookings phone the Malthouse Box Office on 685 5111.

IN THE GALLERIES

■ Australian Centre for Contemporary Art

The Australian Centre for Contemporary Art's newest exhibition features the Havana-born, Sydney artist Ruark Lewis, *Ruark Lewis – Transcription Drawings 1988–1992.*

Lewis uses the structure of newspaper pages from *Le Monde* to construct space through his own marks superimposed over the newsprint. His drawings are also composed as transcribed music and might therefore be described as visual sound.

The exhibition opens 4 September and runs till 11 October. For further information call the centre on 654 6422.

■ Monash University Gallery

The gallery presents the minimalist-conceptual work of distinguished artist Ian Burn until 3 October. His work raises visual questions, critically analysing patterns of perception, convention and the ultimate value of painting.

Correction: Ian Burn is not a Western Australian, as reported in last month's column. He is from Tasmania

To list a cultural event, contact Ms Suzie Bourne on extn 75 5329.

Is voting in crisis or just misunderstood?

by Nicholas Economou

AUSTRALIA IS one of the world's oldest liberal democracies. Elections have been an integral part of this country's political experience since the mid 1800s.

Indeed, between 1856 and 1902 Australia led the way with reforms that abolished property qualifications for the franchise, instituted the process of secret ballots and extended the franchise to women. Australian elections have rarely witnessed the levels of violence and terror that characterise elections in a number of European and Asian states. The results of Federal and State elections enjoy a high rate of acceptance and, consequently, legitimacy.

The democratic electoral tradition is an integral part of the Australian political culture. But is the claim that there is significant popular respect for the electoral process accurate? A quick flick through newspaper commentaries and leader articles written by 'senior' or 'expert' correspondents point to another developing trend. These commentators talk of a growing disillusionment with politics and politicians, with a consequential decline in popular respect for electoral institutions.

They claim to speak for a growing public disquiet with the frequency of elections in Australia. They identify the election of independent representatives first in North Sydney and then more recently in Wills as symptoms of a deep malaise in the body politic. They hint that the increasing incidence of informal voting and non-attendance are further signs of a system in crisis.

While public opinion polls may well suggest that there is widespread scepticism about the motivation of politicians (and, if Adlai Stevenson's remark that electors get the governments they deserve is any guide, politicians may well be reflecting something about the community itself), very little statistical evidence exists to prove that the electoral system is in crisis. The persistence of high voter turn-outs at elections and the relative stability of the pattern of informal voting, particularly in Federal elections, do not bear out the crisis hypothesis.

Critics would, of course, make a number of counter-assertions. They would say that citing participation rates is inappropriate, given that voting is compulsory. Moreover, they would point to the 1984 election result in which the informal vote for the House of Representatives (HOR) leapt from a national rate of 2.1 per cent (1983) to 6 per cent, as evidence of something amiss within the system.

In some states the variation was even higher. In Victoria, the informal vote of 8.15 per cent was up from 2.2 per cent, and in South Australia it rose from 2.77 to 8.45 per cent. The significant leap in 1984, certainly stands in stark contrast to the stability of the informal rate since 1949. And while the 1984 figure represented a plateau from which the rate has since been in decline, informal voting still remains higher than the historical norm.

The phenomenon can be explained by simply noting the rate of informal voting for the Australian Senate. The first noteworthy point is the persistence of a particularly high informal vote throughout the same period that the HOR informal vote was so low. The turning point for informal voting for both houses was 1984, with the HOR figure of 6.8 per cent leaping above the Senate figure of 4.7 per cent for the first time.

Particular attention should be paid to the decline in informal Senate voting (from 9.9 per cent in 1983 to the 4.7 per cent rate of 1984). This is surely as dramatic a decrease as the HOR figure was an increase. Moreover, while the HOR informal vote for elections since 1984 has declined, there has been no concomitant rise in the Senate rate.

The reason is that in 1983 the Federal Labor Government reformed the electoral process. Among the raft of alterations to the electoral regulations undertaken was a proposal to simplify voting for the Senate. The Senate is elected by the complex system of proportional representation that transfers surplus votes among candidates until they achieve the quota required for election. Senate ballot papers are quite different to those for the HOR. Since 1974, there has been a tendency for the number of people seeking election to resemble a Melbourne Cup field.

When confronted with ballots containing anywhere between 30 and 70 names, voters were more likely to incorrectly complete their Senate ballots than their HOR papers. By virtue of the sociology of Labor's core vote (blue-collar, less well educated, more likely to have English as a second language) the complexity of Senate ballots tended to disadvantage the ALP more than the conservatives.

In a bid to solve this problem, the Government introduced a new format for the Senate ballot in which voters could choose either to fill in all their own preferences or cast a vote on an official party ticket by indicating their first preference in a separate square. The success of the reform was reflected in the dramatic decline in Senate informal voting.

There was, however, a catch. The HOR ballot paper remained virtually the same, although the reforms did permit the printing of the party affiliations of candidates for the first time. Clearly, mixing the options for voters was confusing. A significant number of voters believed that they could also vote for the HOR by indicating their first preference only.

While we have no figures for the breakdown of informal voting in the crucial 1984 election, the Australian Electoral Commission (AEC) did perform an analytical survey of informal voting in 1987. These figures appear to confirm the hypothesis that most informal voting is caused by people making a mistake in their bid to cast a preferential vote.

The survey found that 73.3 per cent of the informal votes cast were the result of such errors (25.3 per cent had a tick or a cross, 48 per cent were somehow defective in indicating the full list of preferences). Of the remainder, 15.9 per cent of the ballots were blanks, and 10.1 per cent had some form of writing upon them.

Given that compulsory voting involves turning up at a polling station to have your name marked off the role, one might expect disenchanted voters to either leave their ballots blank or to suitably inscribe them. Once again the figures would suggest that if this is happening, it is not enough to warrant the crisis tag.

This does not suggest that there might not be a crisis in the system at some point in the future. Indeed, the trends in informal voting are important indicators of some potential problems within the polity. However, greater caution should be employed when reacting to figures that only point to some deviation from the statistical norm.

The electoral process is deeply rooted within the Australian political culture, and even though Australians do not necessarily have a great deal of respect for their politicians, there is sufficient evidence to indicate that they still do have healthy respect for their democratic institutions.

Mr Nicholas Economou is a senior tutor in the Department of Politics.

FORUM

From Dr Robert Hill
Research School of Earth Sciences
Australian National University

Your recent article featuring the work on mantle convection conducted at Monash by Dr Greg Houseman and which compares conclusions from Dr Houseman's studies with the work of an ANU group, reported recently in *Science*, gives a good idea of the excitement currently felt within the earth science community that we may be in sight of finally developing a dynamically-based model of "how the Earth works".

Comparison with the work at the ANU may give your readers the impression that Dr Houseman's work compares favourably only with other work done in Australia. This is not true, and the quality of Dr Houseman's work in this area is best illustrated by a topical example.

A presentation of modelling mantle convection by a very respected American group at the 1992 meeting of the American Geophysical Union in Montreal elicited from Professor Dan McKenzie of Cambridge University the comment that "I would like the audience to know that you have now got to where Greg Houseman was two or three years ago". The Australian work, in which his [redacted] played an important part, is having a big impact overseas.

Why, your readers might ask, should this be of interest to them? Isn't it a little esoteric? Will it help Australian mining companies. The answer to the last question is certainly yes. In fact, part of the work at the ANU developed from an industry-supported project to provide a more scientific basis for exploration for gold and nickel deposits in the Eastern Goldfields of Western Australia.

At present, it would appear that the ANU group is more advanced in exploring applications of these new models to the development of mineral and oil and gas deposits. This is partly because of the initial emphasis provided by the industry support, but must come also because of the greater level of resources that four full-time researchers can bring to a project, as compared with Dr Houseman who must balance research with a major commitment to undergraduate teaching.

At the Australian Geological Convention in Ballarat earlier this year we reported applications to developing exploration strategies for nickel, gold, chromium, the platinum group elements and diamonds. We are now integrating some of Dr Houseman's older work on modelling crustal deformation into our larger-scale Earth model with the aim of better understanding the origin of oil and gas deposits.

It is clear that his varied contributions will continue to play an important role in improving our understanding of the Earth, as well as in developing new ways of exploring the mineral and energy resources on which the Australian economy is likely to depend for some time yet.

Robert Hill
Canberra, ACT

Editor's note: Dr Hill died unexpectedly in July.