

MONTAGE

NEWS AND VIEWS FROM MONASH UNIVERSITY

E-shoe gives athletes a kick start

Putting spring into your step might become more than a metaphor with the development of a revolutionary new shoe design by Monash researchers.

Initial research has found that adding a carefully refined carbon fibre 'spring' into the sole of an ordinary running shoe can halve the impact of heel strike and double the rebound energy of that force as the foot leaves the ground.

Dubbing its development the 'E-shoe' (E for energy), the research team believes the shoes could improve athletic performance, reduce the risk of sports injury, and become an important orthotic device to give greater mobility to injured or disabled people.

Monash Rehabilitation Technology Research Unit (RehabTech) manager Mr Bill Contoyannis said the team had tried to replicate the shock absorption effect of running on sand while combining it with the rebound effect of a trampoline.

"The tricky part has been refining the spring's design so that it will match a person's gait. The timing of when the mechanism unloads is as important as the unloading action itself," Mr Contoyannis



said. "You need to get the rebound energy when it will complement your walking or running action."

After a series of mechanical and video testing, Mr Contoyannis and his research colleagues Jan-Mark Seewald and Ross Stewart are about to begin a series of trials with people of different weights and activity levels.

One of their prototypes was featured on the ABC science show *Quantum* last year, and Mr Contoyannis said this had led to

numerous calls from people with back, knee and ankle problems.

"We should be able to help these people if our trials show our shoes can reduce impact force by as much as the mechanical testing has suggested," he said.

But refinement beyond the current 'on-people' trials and practical application of the E-shoe will probably depend on commercial interest.

RehabTech's research relies on Federal Government funding for specific projects.

Continued on Montage 2

NOW & THEN

25 Years Ago

About 3000 new students join Monash for the first time today.

It will bring the total number of undergraduate students to 9950 – just 1400 short of the planned maximum enrolment for Monash.

The new students will get their first taste of university life in Orientation Week, which begins today (we promise it's not always like this). The Week is a curious mixture of fun, frivolity and the serious.

15 Years Ago

Monash University celebrates its 20th birthday this month.

It was on Saturday, March 11, 1961 that the then Premier of Victoria, Henry Bolte, officially opened the University in a ceremony held in the courtyard formed by the first buildings on campus – now the central science block, the eastern science lecture theatre, first year chemistry and first year physics. Some 2000 guests attended.

On the following Monday – March 13 – Monash's first students arrived: 363 in all. In 1980 our student population was 14, 096.

5 Years Ago

A specialised health unit for people with intellectual disabilities – the first of its kind in Australia – is to be set up at Monash University.

Funding for the unit will be provided by the state government as part of a unique medical services agreement.

Under the agreement funds now used to employ medical officers in institutions will be redirected to the departments of community medicine at Monash and Melbourne universities to help develop expertise in medical practice for the intellectually disabled, as well as to undertake research and education.

This Month Last Year

Monash physicists have been loading logs into a CAT-scanner at the Royal Melbourne Hospital.

They are using the hospital scanner to construct three-dimensional images of the wood. As with humans, the images illustrate where the wood is diseased or otherwise abnormal.

Researchers will use this technology to develop a scanner which could add \$200 million a year to Australia's forest products industry. It is also possible that the technology itself could earn substantial export revenue.

E-shoe gives athletes a kick start

From Montage 1

So far, no money has been allocated for the development of the E-shoe, and its progress has depended on donated material and time that staff can spare from other work.

Fortunately, the highly competitive sports footwear industry is keeping an eye on the testing, and major players have begun exploring the commercial potential of the E-shoe.

Mr Contoyannis said that while several companies already had products on the market based on the minimum shock/maximum rebound principle, the Monash design took the concept to a new level.

"The existing products use foam rubber construction, which isn't in the same league as carbon fibre," he said. "They (footwear companies) set out to design a Commodore and they came up with a good Commodore; we are building a Lamborghini."

Unfortunately, with production methods geared to foam rubber construction, it would

be a major step for the companies to switch to the carbon fibre design.

But the RehabTech team have been encouraged by the initial interest in their product and have applied for a patent for their design.

Their faith in carbon fibre as an orthotic material stems from their success in building a special artificial leg for Australian paralympic discus thrower John Eden.

Ordinary 'solid' artificial legs do not allow the smooth pivoting action needed for discus throwing, nor do they have the natural springiness of human limbs that enhances performance.

The carbon fibre leg designed by RehabTech provided both, and Mr Eden used the device to win a silver medal at the Barcelona Paralympics with a throw of more than 39 metres.

BY GARY SPINK



Spike

And heading the bulletin...

Deputy vice-chancellor Professor Robert Pargetter is suffering an acute identity crisis after the media scanning agency Media Monitors reported that radio station 2KY had interviewed a certain Professor Robert Hargettiledler.

Malapropism

Can anyone clarify whether the cocktail party to celebrate Professor Logan's AC and *The Australian* newspaper's Australian of the Year award was a malfunction? This was the vexed question raised at the time by more than one notable personality.

Elvis was a communist

A final-year visual arts student at Gippsland recently presented an exhibition of artifacts celebrating the life and times of Russian folk singer Elvich Presnilkov. *Elvis was a Communist* is a humorous post-modernist assault on pop culture: "The Elvis that we all know was a CIA front, modelled on a folk singer and war hero from the birth of the Soviet Union."

So that's where the King had been – hiding behind the Iron Curtain!

MONTAGE

NEWS AND VIEWS FROM MONASH UNIVERSITY

Montage is published by the Monash University Office of University Development. Views expressed by contributors in *Montage* are not necessarily endorsed by Monash University.

No responsibility is accepted by the university or the editor. Articles may be reprinted in whole or in part by permission of the editor.

Montage may also be viewed on the World Wide Web (WWW) at <http://www.monash.edu.au/pubs/montage/index.html>
Staff writers: Georgie Allen, Juliet Ryan, Brenda Harkness, Gary Spink.
Editor: Georgie Allen, Public Affairs Office,
phone (03) 9905 5333, fax (03) 9905 2097.

Imageset by Colour Image Makers. Printed by VIP Printing.
Registered by Australia Post: PP 338685/00010.

The chemistry of love

Any scientist will tell you that romantic euphoria has nothing to do with Cupid's arrows, unless the little sprite has dipped them first in the unromantically-named chemical phenylethylamine.

Scientists have known for a century about phenylethylamine, and in recent times some have held the hormone responsible for our 'feelings of love'.

But recent discoveries about its molecular shape by Monash scientists could help advance treatment of mental illnesses, simplify chemical research and save drug companies millions of dollars.

Phenylethylamine (commonly dubbed the 'love molecule') is a natural chemical similar to an amphetamine, suspected of causing the 'high' experienced by lovers.

The theory is that production of phenylethylamine in the brain can be triggered by something as simple as the meeting of eyes or the touching of hands. The heady emotions linked to racing pulses, sweaty palms and heavy breathing can be clinically explained as the result of an overdose.

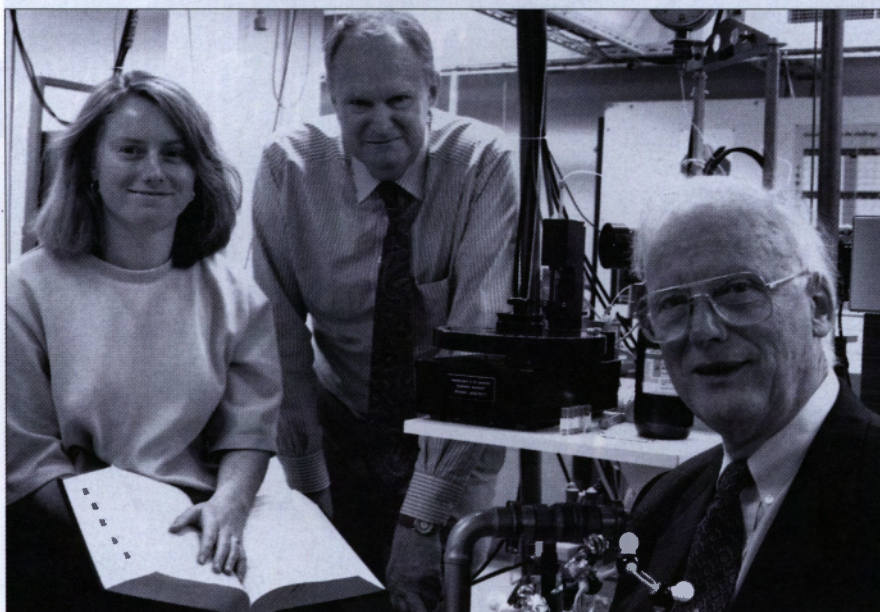
Some scientists have noted that high levels of phenylethylamine also occur in chocolate and have theorised about rational explanations for why people buy their partners chocolates rather than boiled lollies on St Valentine's Day.

So when Monash researchers Dr Peter Godfrey, Dr Lynette Hatherley and Emeritus Professor Ron Brown last year announced that they had determined the arrangement of atoms that make up the phenylethylamine molecule, the media went into a frenzy about the possibility of creating love potions.

"It could be possible in the future to produce synthetic drugs to heighten or suppress the natural euphoric effects of love, but there's more immediate interest in how this discovery can help other areas of chemical research," Dr Godfrey said.

Every year, chemical companies spend millions of dollars researching new products. As a short-cut, much of the testing is done using computer models before progressing to practical experiments.

But Professor Brown said accurate programming of the computers relied on precise



Dr Lynette Hatherley, Dr Peter Godfrey and Emeritus Professor Ken Brown.

knowledge of the molecular shape of compounds used in the new drugs in order to understand exactly how they 'sit' on the body's receptor cells.

"Designing a drug is a bit like making a key to fit a lock. The drug molecule will only 'sit down' on the appropriate cells in the human body if the molecule is the right shape to fit the receptor cell," Professor Brown said.

"The more we know about the molecular shapes of chemicals and receptors, the more we can refine the computer programs used in testing, and the more confident we can be that the computer is providing an accurate prediction of what will happen in experiments."

Dr Godfrey said anybody spending vast amounts of money on research in this area would obviously value any knowledge that could minimise guesswork: "You don't want to spend months testing something that turns out to be worthless."

The research team said the phenylethylamine breakthrough is especially important because it is one of the simplest 'neuro-transmitters', and their research success opens a path for future testing of related (but more complex) chemicals associated with mental illness.

"Phenylethylamine is a structural relative of a series of hormones, some of which are linked to human motor system functions and the occurrence of Parkinson's disease, while

others such as serotonin effectively dictate our emotional balance," Dr Godfrey said.

The team, from the university's Centre for High Resolution Spectroscopy, spent a year bombarding phenylethylamine with microwaves, using technology that Monash scientists have spent 30 years continually adapting and upgrading.

Their *Millijet* machine (otherwise known as a microwave absorption spectrometer) converted the phenylethylamine to a gas before firing it with microwaves and recording how the molecules absorb different wavelengths.

Each test can produce a 50-metre printout that takes several weeks to analyse, but eventually the data results in a three-dimensional image of what the molecule looks like.

The team are also aware that the advances they have made customising the *Millijet* technology for their specific research needs have created a valuable tool for monitoring levels of additives and contaminants in foods and beverages.

They are now working on wider applications of the *Millijet* in environmental monitoring, fuel combustion technology and process control in chemical manufacturing, using a \$1 million grant from a private research syndicate organised by the university's commercial arm, Montech.

BY GARY SPINK

Plugging the dropout drain



As thousands of first-year students converge on campuses across Australia, Monash University researchers will investigate why a growing number fail to survive the transition from school.

National findings show that up to 40 per cent of first-year students at Australian universities face problems balancing their newfound freedom with the demands of study.

And of these, at least one-third will either fail or leave before the end of second semester, according to Monash deputy vice-chancellor Professor Robert Pargetter.

"An unacceptably high proportion of students who have been successful in Year 12 experience significant difficulty or drop out of their first year at university," he said.

"This trend occurs, in varying degrees, at all universities and impacts on most studies, particularly the larger, less

structured courses such as arts, commerce and science."

Professor Pargetter, who is also a government education adviser, said that while the problem was not new, it appeared to be on the rise. "There have always been able students who have 'flunked' or 'dropped out' in their first year. However, there is strong evidence that recently revised Year 12 programs may not be helping to address the problem as they were expected to."

In a bid to resolve the problem, Monash has spearheaded a research project to track the progress of more than 500 students moving from school to university.

One of the most comprehensive investigations of its type to be undertaken, the study will examine students' experiences of the school-to-university transition, as well as look at teaching and learning strategies in both the secondary and higher education systems.

The research, led by Monash's Dr Mark Peel who is also a first-year history lecturer, will focus on at least 15 secondary schools representing the university's diverse first-year intake.

Dr Peel will interview teachers about learning objectives and will track students moving to Monash as well as to other institutions and post-secondary programs.

The aim is to identify differences in teaching and learning environments, examine students' experiences and better understand what shapes student and parental perceptions of university life.

The researchers plan to use the findings to develop strategies for managing the transition and expect to forge closer collaboration between school and university teachers.

Professor Pargetter said preliminary studies revealed that much of the transition problem arose from the popular image of university as being a ticket to "freedom and partying". The strength of these "basic misconceptions" had led to essential first-year survival skills such as self-management being overlooked.

But claims that the problem resulted from a new generation of school leavers who were lazy and lacked the motivation and intelligence of their predecessors were refuted by Professor Pargetter.

During the preliminary Monash studies, which involved interviews with both teachers and students, the image emerged of schools giving students a map to help them get to university, but leaving them without a compass to navigate their way through the critical first year.

Students reported general concerns such as not knowing the format or purpose of lectures and tutorials, and expressed concern about the lack of social and teacher support networks.

Dr Peel said the project's objectives were not to minimise students' responsibilities for making the adjustment to university.

Instead, he said, they aimed to demystify the process so that students could make better sense of the demands and expectations of higher education.

By BRENDA HARKNESS

New drug gives hope to arthritis sufferers

A drug that has successfully treated joint problems in greyhounds and race horses is being used to help osteoarthritis sufferers.

Dr Indi Rasaratnam and Clinical Associate Professor Peter Ryan from Monash University's Department of Medicine are testing a modified version of Cartrophen, a drug that has been used widely in the veterinary world, on humans with the debilitating disease of osteoarthritis.

With between 30 and 40 per cent of Australians over the age of 65 suffering from osteoarthritis in varying degrees, the economic cost to the community runs into billions of dollars per year.

"The osteoarthritic cartilage becomes damaged by various chemicals that circulate in the fluid. Cartrophen neutralises those destructive chemicals."

Osteoarthritis is the most common form of arthritis. It develops due to the deterioration and wear of cartilage that normally acts as a cushion for the body's joints.

"Joints also have fluids which act as lubricants," Dr Rasaratnam explained. "The quality of fluid deteriorates in the joints of people with osteoarthritis and does not lubricate the joint as well."

Of the estimated three million Australians who suffer from osteoarthritis, a significant number are disabled and have to modify their lives, some giving up jobs because of the pain.



Dr Indi Rasaratnam tests a new drug on an osteoarthritis patient.

There is no known cure for osteoarthritis, and current treatment can only provide symptomatic relief – therapies such as physiotherapy and hydrotherapy help keep the joints mobile to a certain degree. Many sufferers rely on regular doses of analgesics, with some patients also needing anti-inflammatory drugs. Many become so disabled that they eventually require a joint replacement.

Dr Rasaratnam is using Cartrophen as a preventive measure for osteoarthritis. The drug acts on the joint in several different ways.

"One abnormal feature in osteoarthritic joints is a lack of hyaluronic acid, the major lubricant in the fluid around the joint," Dr Rasaratnam said. "Cartrophen is actually thought to replenish the acid in terms of quantity and quality."

"The osteoarthritic cartilage also becomes damaged by various chemicals that circulate in the fluid, and Cartrophen neutralises those destructive chemicals."

The drug also seems to help the joints by unblocking the blood vessels that supply the cartilage with blood.

"Cartilage itself does not have blood vessels but is supplied by a diffusion process from the surrounding bone," Dr Rasaratnam explained. "The blood vessels around osteoarthritic joints become blocked, and Cartrophen is thought to reopen them, leading to improved nutrition for the cartilage."

The current trial program involves 50 people, with half of these being given a placebo. Participants are aged over 25 and have osteoarthritis in only one of their knees from an unknown cause, which excludes sporting injuries, operations or falls.

Professor Ryan said that if the drug was successful in treating osteoarthritis in humans, it had the potential to treat a disease that the majority of Australians would develop in some form during their lives.

BY JULIET RYAN

APEC forges a spirit of environmental cooperation

The fast-growing Asian economies are increasingly following Australia's lead in developing competitive but cleaner production processes, according to a Monash environmental chemist.

Head of the Monash Centre for Environmental Science Associate Professor Martin Hooper said that as developing APEC countries faced the need for sustainable development, they were discussing their problems more openly and actively seeking Australian input.

But he warned there was a risk of reversing the new spirit of cooperation within the region if Australia reverted to its paternalistic attitude when dealing with sensitive environmental issues in developing countries.

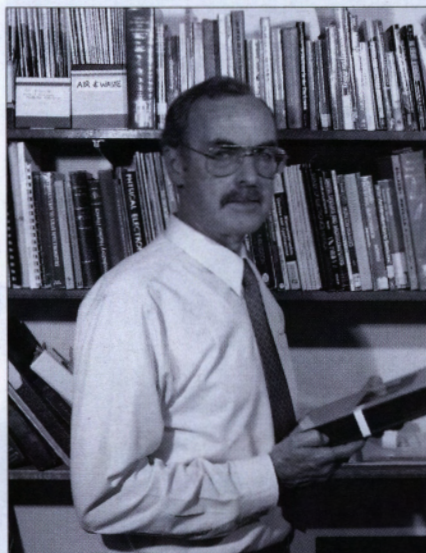
Dr Hooper, who was part of the push to form an international researchers' network on environmental cooperation, said efforts to reduce environmental degradation by "imposition" had often proved futile, frustrating hopes of long-term progress in the region.

But new alliances such as the recently formed ETERNET-APR network meant there were now greater opportunities to rectify existing environmental problems and develop strategies for new developments.

ETERNET-APR, which grew out of the recent inaugural APEC Symposium on Environmental Technology Cooperation in Nagoya, Japan, aimed to create a framework for collective action on environmental initiatives at a regional level.

Dr Hooper, the only Australian academic invited to deliver a keynote address, said the network's formation signalled the strength of APEC's commitment to the environment.

It opened the way for a better flow-on of information, which developing countries could access and tailor to their own economic and cultural needs, helping them meet acceptable environmental standards.



"Because of the diversity and complexity of the developing APEC economies, environmental technologies should be sensitive to the different economic, political and cultural factors," Dr Hooper said.

"It is essentially about transferring technologies that are appropriate to management practices and cultures. And the only way to really understand these issues and sensitivities is through a collaborative regional effort."

Australia's environmental strategies outlined by Dr Hooper at the APEC symposium included waste minimisation techniques for manufacturing, better land use planning in transport and infrastructure development, risk minimisation in agriculture and cutting-edge technology to improve energy efficiency.

While recognising that population growth, urban development and resource consumption were key contributors to environmental degradation, Dr Hooper said the problems of polluted air and degraded land and waterways were not insurmountable.

One success story profiled at the conference was the dramatic clean-up the severely polluted Japanese city of Yokkaichi, near Nagoya.

Driven by growing community health concerns, the city's leaders introduced a range of strict environmental standards and policies to improve living conditions within the major chemical manufacturing area.

"By applying technologies such as spray eliminators (devices which collect airborne pollutants), they were able to significantly reduce the level of emissions from chimneys that once belched toxic chemicals into the city's skyline," he said.

Another successful measure included introducing tight controls to minimise pollution in waste water streams emanating from power stations and chemical factories.

Interest in environmental technology transfer has already resulted in increased collaborative environmental research efforts between universities in Australia and developing APEC countries.

"Many partnerships have already formed, and there is evidence of growing interest in student and academic exchanges between the region's universities," Dr Hooper said.

"These exchanges have paved the way for a number of ongoing joint environmental research ventures. For example, an Indonesian student who worked with Jakarta's Bureau of Meteorology received an AusAID scholarship to complete a science masters degree at Monash. This led to a major environmental study involving the student, her supervisors in Jakarta, and Monash."

Dr Hooper said the small to medium-sized business sector in Australia had also taken greater interest in research and development projects focusing on environmental technology transfer.

And micro-economic reform in Australia, especially within energy and service sectors such as power and communications, has led to more private sector involvement in the field.

By BRENDA HARKNESS

Survival patterns of the fittest plants

A discovery by Monash researchers could change the management of dry rangelands throughout the world.

Dr David Dunkerley and Ms Kate Brown from the Department of Geography and Environmental Science have found that striking banded patterns of vegetation characteristic of arid regions may be natural, stable and ancient.

The patterns are formed where strips of vegetation between 30 and 100 metres wide, and running along contour lines, alternate with zones which are completely bare. This phenomenon had previously been thought to be the product of overgrazing or similar land degradation, but senior lecturer Dr Dunkerley and assistant lecturer Ms Brown have now assembled strong evidence that the process is natural.

"The banding has been in New South Wales for thousands of years. It's an ecosystem survival mechanism. The plants only cover half the area, but gather twice the annual rainfall for themselves," Dr Dunkerley said.

A puzzling observation provided the first clue to unlocking the mystery of the vegetation bands.

To study erosion rates in a 40-square-kilometre catchment near Broken Hill, the researchers dug pit traps at random and measured how quickly sediment washed into them. They found, to their surprise, that there were marked differences between traps very close to one another, and they began to suspect that it had something to do with the distribution of vegetation.

When they looked more closely at rainfall run-off, they discovered that in the zones devoid of vegetation the soil surface had formed a hard crust impervious to water. But the water run-off slowed when it reached a band of vegetation, the plants trapping the water and absorbing it. In fact, the plant bands were harvesting the rainfall, and immediately downslope less water was available. The effect was all the more striking because the plant bands were located on land of greater slope.

Dr Dunkerley and Ms Brown began to recognise that the regularity of the strips of vegetation across the landscape was not random. It occurred because of a kind of natural selection of plants. When a plant germinates in arid lands, it requires sufficient water to survive, and it will receive the water it needs only if it is far enough away from the next patch of vegetation.

But once plants establish themselves, the process becomes self-reinforcing. The plants slow the flow of water, absorb the run-off and begin to grow. They drop leaves and other organic matter which gives the soil better structure and helps it to trap water. The leaf litter is swept against the stems of the plants and forms a barrier to trap yet more water, which then begins to bank up or pond and nourish neighbouring plants.

The researchers have now simulated this process on computer and can show that what starts out as a random pattern of germination resolves into regular bands of plants as the vegetation the right distance apart thrives at the expense of plants in the intervening areas.

The researchers have now also assembled evidence of the antiquity of the pattern by analysing the rock fragments or gibbers washed from an outcrop down a slope banded by vegetation. Under normal circumstances without vegetation, the fragments should be sorted according to size – larger fragments left at the top of the slope, the smaller fragments carried further down the slope.

Despite the existence of vegetation barriers, this is exactly what Ms Brown and Dr Dunkerley found. But there was another pattern superimposed. There were no rocks among the vegetation – they were all confined to the bare areas.

The researchers' explanation was that the sorting according to size must have occurred at a time when there was little vegetation, when the climate was even drier – perhaps during the last glaciation thousands of years ago.

But when the climate moistened and the banding set in, the soil within the vegetation zones became subjected to wetting and drying, with subsequent shrinking and swelling of clays. It formed a surface of hummocks, building up the soil under the vegetation. Rock fragments were then washed down these slopes into unvegetated areas. None of this could have occurred without vegetation bands that have been stable for thousands of years.

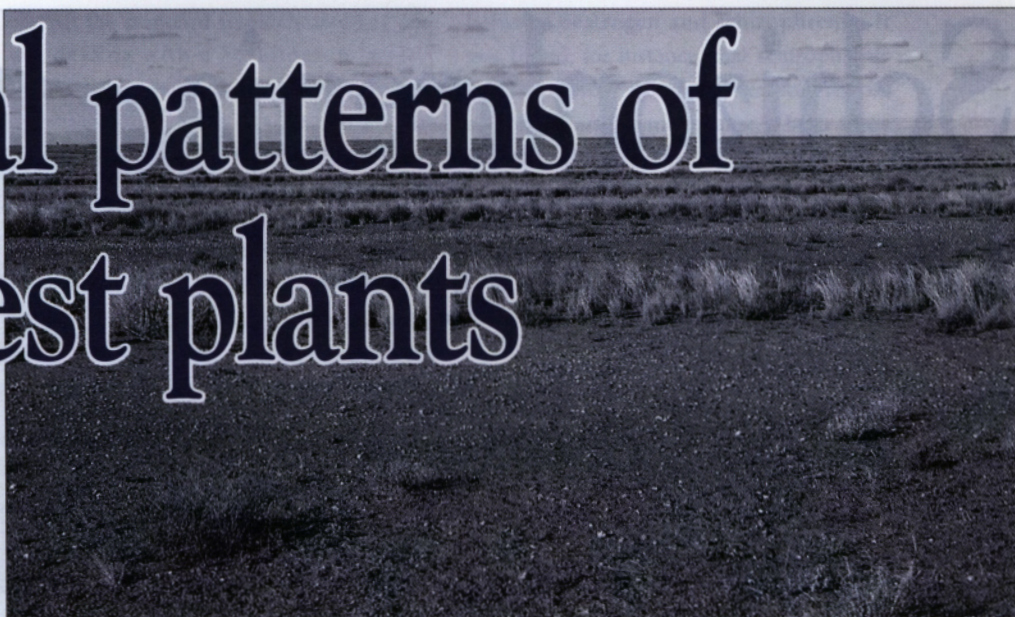
The implications for arid land management are important – and not just in Australia. Vegetation banding is widespread, occurring in areas which are flat and dry, such as Mexico and the Southern Sahara.

While it is clear that overgrazing has had a dramatic impact on much arid landscape, Dr Dunkerley said the process of vegetation banding seemed robust. "Even if the plants are eaten off, the banding structure stays in place a long time," he said. "We probably don't need to be as concerned about these areas and can concentrate on other regions of arid lands which are more sensitive."

"We've got to understand the landscape better. Currently we are tinkering blind. We also must look at landscapes more holistically and recognise how plants are intimately involved in landscape formation."

Dr Dunkerley and Ms Brown will present their findings at an international conference on arid and semi-arid environments, in Paris later this year.

BY TIM THWAITES



Schizophrenia treatment – are women losing out?

Monash researchers believe oestrogen may be the key to treating women with schizophrenia.

Tim Thwaites reports.



Women with schizophrenia are being treated with higher than necessary doses of antipsychotic drugs with harmful side-effects, according to Monash researcher Associate Professor Jayashari Kulkarni.

Dr Kulkarni said that because most schizophrenia research had been conducted on men, who were generally heavier than women, and because the disease affected women and men differently, women were being inappropriately treated.

The Research Group for Women's Mental Health (RGWMH), established and directed by Dr Kulkarni in Monash's Department of Psychological Medicine, found that side-effects in women of currently prescribed doses of antipsychotic drugs included motor disturbances, and "Parkinsons-like" stiffness, shuffling and drooling.

"Women have a double problem, because they don't respond as well to the drugs as men do, and they experience these side-effects," she said.

Dr Kulkarni has found a strong link between hormonal imbalance and schizophrenia in women, as well as evidence that

oestrogen is effective in treating women with the disease.

A pilot study conducted by RGWMH may help explain why the symptoms of schizophrenia are different in men and women.

Schizophrenia is a severe mental illness with symptoms including hallucinations, thought disorders, lack of motivation and inappropriate, sometimes violent behaviour.

During the study, the antipsychotic drugs prescribed to treat 11 women undergoing acute episodes of schizophrenia were supplemented with oestrogen at levels lower than normally found in contraceptive pills. The drug treatment for another seven schizophrenic women was left untouched.

Dr Kulkarni said that by the third day of treatment, the symptoms in those taking oestrogen showed a 60 per cent improvement, a level of recovery not normally reached until after 10 days of therapy. The effect was so dramatic that an experienced mental health nurse rang Dr Kulkarni demanding to know what she had done.

"Oestrogen seems to kick-start the drug treatment. The women also felt better in terms of their general health," she said.

Although she recognises that the trial will have to be repeated on a much larger and more rigorous scale before oestrogen can become a standard part of therapy, Dr Kulkarni believes the benefits could be enormous.

"We may be able to prescribe lower doses of antipsychotic drugs and expect that women will experience fewer side effects and be out of hospital sooner."

The study is one of a series of RGWMH projects examining gender differences in the course of schizophrenia from several perspectives. In addition to 11 researchers at Monash, the RGWMH has four affiliated researchers interstate and five overseas. It is collaborating closely with a group at Harvard University in Boston.

The Harvard group has been researching schizophrenia in women for more than a decade and has found that the onset of schizophrenia in women is on average about five to 10 years later than in men.

Also, the symptoms are different. Women tend to have hallucinations and delusions, whereas men lose physical and mental motivation and become violent. And the recovery rate is better in women.

Dr Kulkarni said these differences may explain, in part, why twice as much research has been done on male as female patients. "Because the onset in men is typically in the late teens and they are more violent, they come to the attention of doctors sooner."

Women typically show the first signs of schizophrenia in their mid-20s, and the effects appear to be less severe.

But Dr Kulkarni said that schizophrenia in women could be more socially destructive. "Men in their late teens have few permanent relationships; women in their 20s can have jobs, families, even children, all of which may suffer."

Despite the gender differences, almost all studies on the drugs used in treating schizophrenia have been carried out on men, many in veterans' hospitals in the US. It was difficult to find a similar large group of schizophrenic women, and researchers simply assumed that what was found in men would apply equally to women.

"All the standard research assumes you are dealing with a 70-kilogram male," Dr Kulkarni said. As the average woman generally weighs much less than the average man, the standard doses prescribed for antipsychotic drugs are generally too high for women. This can mean the drugs are less effective therapeutically, with more side effects.

And if oestrogen actually makes the drugs more effective, as seems likely from the work of Dr Kulkarni and others, the doses prescribed for women should be lower still. "We may have been overdosing women," Dr Kulkarni said.

In the past 18 months, the importance of gender differences in drug therapy has been officially recognised in the US.

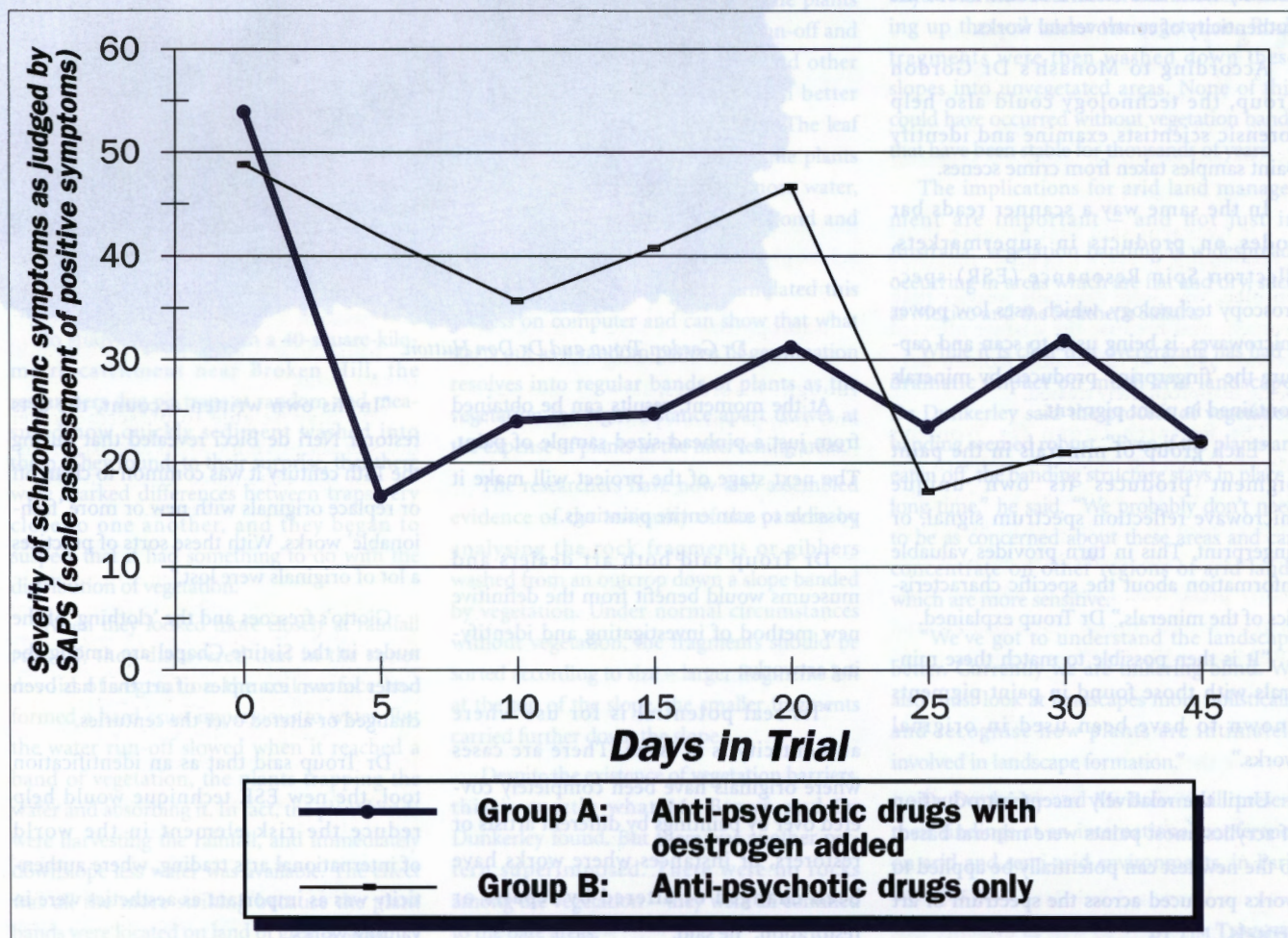
Following lobbying by the Harvard group, the US Food and Drug Administration has issued guidelines specifying that the testing of any new drugs must be carried out on equal numbers of men and women.

Many of the most obvious differences between the sexes can be traced back to the operation of the sex hormones. But there were other, more direct reasons why the researchers decided to investigate the link

between oestrogen and schizophrenia. It was found, for instance, that schizophrenic women showed a tendency towards relapse after birth and at menopause – both times of low oestrogen levels.

And women with schizophrenia often reported fluctuations in their symptoms over the menstrual cycle as levels of oestrogen varied. Dr Kulkarni said that in one study she asked 40 schizophrenic and 40 non-schizophrenic women to work out the timing of their menstrual cycles. The schizophrenic women were far more aware of the timing of their cycles because they were sensitive to the times in the cycle when things seemed to go wrong.

Work on rats has even provided a biochemical mechanism as to how oestrogen might help protect women against schizophrenia. Dr George Fink, an affiliate of the RGWMH who works in Edinburgh, Scotland, has studied the effect in rats of oestrogen on the biochemical compounds that act as messengers between the nerve cells in the brain. He found that oestrogen changes the sensitivity of cells to the messenger compounds, which is exactly the way antipsychotic drugs work.



Fingerprinting masterpieces

The art world will benefit from new techniques that make it easier to detect forged paintings and fake gems. Brenda Harkness reports.

New techniques being developed at Monash will help load the dice for art collectors and dealers when identifying valuable artworks.

The technology, developed as part of a joint research project by Monash physicists and researchers at Florence's CNR Electromagnetic Waves Research Institute, offers the art world a potentially powerful and 'non-invasive' tool which can help identify fakes and resolve debate about the authenticity of controversial works.

According to Monash's Dr Gordon Troup, the technology could also help forensic scientists examine and identify paint samples taken from crime scenes.

In the same way a scanner reads bar codes on products in supermarkets, Electron Spin Resonance (ESR) spectroscopy technology, which uses low power microwaves, is being used to scan and capture the 'fingerprint' produced by minerals contained in paint pigment.

"Each group of minerals in the paint pigment produces its own unique microwave reflection spectrum signal, or fingerprint. This in turn provides valuable information about the specific characteristics of the minerals," Dr Troup explained.

"It is then possible to match these minerals with those found in paint pigments known to have been used in original works."

Until the relatively recent introduction of acrylics, most paints were mineral based, so the new test can potentially be applied to works produced across the spectrum of art periods.



Dr Gordon Troup and Dr Don Hutton.

At the moment, results can be obtained from just a pinhead-sized sample of paint. The next stage of the project will make it possible to scan entire paintings.

Dr Troup said both art dealers and museums would benefit from the definitive new method of investigating and identifying artworks.

"Its real potential is for use where authenticity is at issue. There are cases where originals have been completely covered over by paintings by different artists or restorers, or instances where works have been changed or altered by repairs or restoration," he said.

"In his own written account, the arts restorer Neri de Bicci revealed that during the 14th century it was common to clean off or replace originals with new or more 'fashionable' works. With these sorts of practices a lot of originals were lost."

Giotto's frescoes and the 'clothing' of the nudes in the Sistine Chapel are among the better known examples of art that has been changed or altered over the centuries.

Dr Troup said that as an identification tool, the new ESR technique would help reduce the risk element in the world of international arts trading, where authenticity was as important as aesthetics were in valuing works.

"Development of a 'non-invasive' technique that enables whole canvases to be scanned will also significantly lower the risk of damage as it does not require the removal of even a tiny bit of paint," he said.

"This is important given that there is already strong criticism about the impact on artworks of the so-called 'invasive' restoration and cleaning methods in use today."

The ESR method, which uses low-power microwaves, is also comparatively less expensive than other identification tools which are based on either optical or infra-red spectroscopy.

The idea of applying the ESR method to artworks evolved from existing techniques, pioneered by Dr Troup and Monash's Dr Don Hutton over two decades, to distinguish between fake and real gemstones, including rare diamonds.

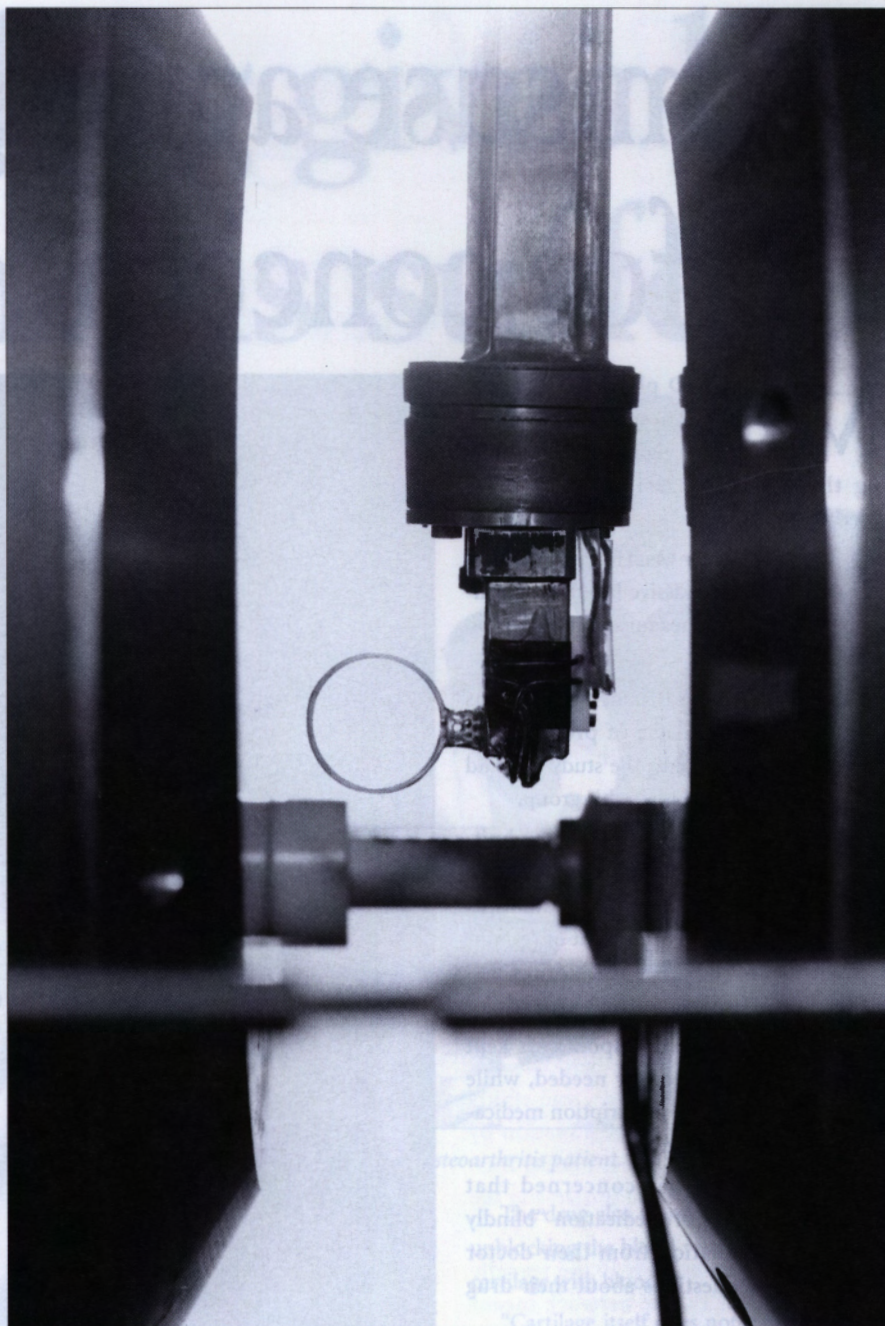
"As the minerals in gemstones give off their own optical or microwave reflection spectra, it was logical to apply the ESR technique to paint pigment," Dr Troup explained.

"Each group of minerals in the paint pigment produces its own unique microwave reflection spectrum signal, or fingerprint."

"We also knew it was possible to scan canvases in the same way we had been scanning precious and rare gemstones."

The researchers are currently developing an apparatus capable of scanning small to medium-sized canvases. It involves modifying the resonant cavity in the ESR device, so that it has a very low microwave loss (high Q), and a slot where the magnetic field is maximum and the electric field is zero.

The slot in the cavity lets out the electromagnetic field, which penetrates the canvas and is absorbed by the pigment. This absorption is then reflected as the signal. There is a very small loss or resistance in the cavity, and when this resistance is changed by the absorption in the pigment, it changes the signal (reflection) from the cavity.



Low-power microwaves scan the 'fingerprint' produced by minerals in a diamond.

Dr Troup's expertise in ESR and quantum electronics first took him to Florence during the 1960s.

He became involved in the joint CNR arts project about 18 months ago, when the researchers, led by Professor Mario Bacci, were developing and testing infra-red spectroscopy for use in conserving and studying major artworks.

In one of the projects, infra-red multi-wavelength imaging was successfully used to discover the way in which a 12th-century wooden crucifix, the Sarzana Cross, was restored.

The piece – painted by Maestro Gulielmo in 1138 – had been restored in the

14th century, but the restorer had used cheap indigo blue, instead of the precious original lapis lazuli blue.

While artists traditionally used either cheap or expensive mineral paints, Dr Troup said their differences were not always obvious: "The human eye is not a very good judge of colour, but by using infra-red or ESR imaging we can detect dramatic differences in the pigment spectra."

Dr Troup recently presented his ideas to the Australian and New Zealand Institute of Physics annual 'Condensed Matter' conference in Wagga, New South Wales.

The findings will be released in a joint paper in Florence later this year.

Drug misuse among elderly cause for concern: researcher

Monash PhD pharmacy student Ms Sally Thompson has called for greater vigilance in monitoring the use of prescription drugs by elderly people.

A recent study by Ms Thompson found that the elderly are passive health care consumers who sometimes misuse prescription medication.

Although not confirming concerns about extensive misuse of prescription drugs among the elderly, the study did find evidence of some misuse in this group.

Nine per cent of 151 respondents admitted to having used more of a drug than had been prescribed, and 16 per cent admitted to having used less. Five per cent of respondents had borrowed prescription drugs, and 9 per cent had lent medication to friends.

And almost half the respondents kept medication they no longer needed, while about 20 per cent kept prescription medication past its expiry date.

Ms Thompson was concerned that many elderly users of medication "blindly accepted" information from their doctor and asked few questions about their drug treatment.

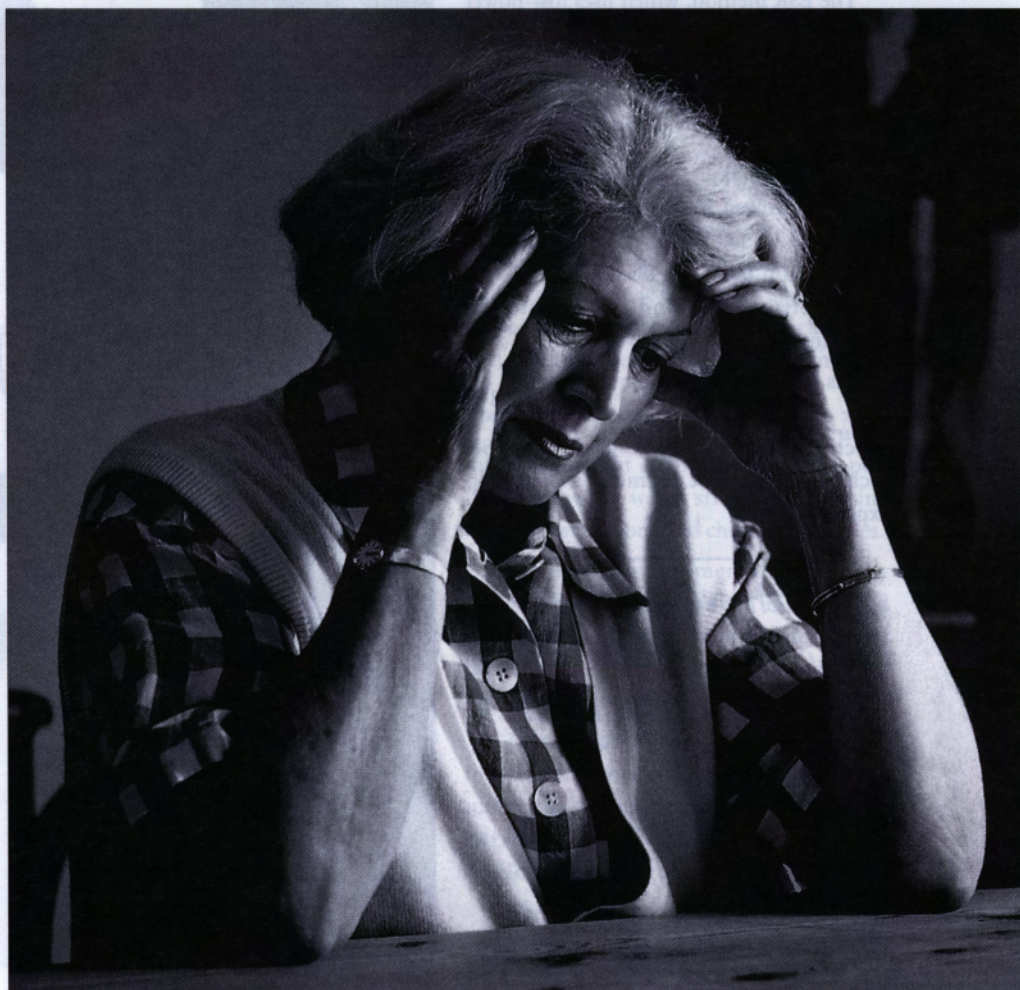
"It's important that older people learn to work as part of a team with their doctors and pharmacists regarding their medication programs," she said.

She was also concerned that some elderly people were taking medication for longer periods than necessary.

Similarly, elderly medication users, who could be taking multiple drugs at one time, often did not connect side-effects with their medication.

"It's all part of the communication problem that often exists between elderly people and health professionals."

Ms Thompson said she was very surprised that nearly half the respondents did not use pharmacists as a source of information about prescription medication, and



20 per cent said they rarely or never discussed their medication with their doctors.

She was also surprised that, despite much media attention, many consumers were still not aware that the same drugs could be manufactured and marketed by different companies.

And many of those who were aware that they could use other brands of medication were reluctant to try them, even when they were cheaper than the ones they had been taking.

Patency of a newly-discovered drug lasts 10 years, after which other companies can produce and market bio-equivalent drugs.

Ms Thompson conducted more than 200 in-home interviews with people aged

between 65 and 93. The elderly currently constitute about 11 per cent of the population, and this group is expected to increase to 16 per cent by the year 2020.

There has been much media attention given to the problem of the elderly misusing medication. Concerns have arisen because of multiple drug use among this group and the trend towards the elderly remaining in their own homes and being responsible for administering their own medication.

"There has been concern by health professionals and consumer groups about the risks of prescription drug use among this group as it continues to grow," Ms Thompson said.

BY GEORGIE ALLEN

Short-circuiting traditional music

Stephen Adam was never a stickler for convention. The Monash computer music composer, who has become renowned for his ability to make music out of the sound of stirring tea in a cup or drilling a hole, began his music career on a one-string guitar.

It was one of the many instruments Adam "invented" back in his teens when he described himself as more of an "instrument builder and circuit-dabbler" than a musician.

A childhood fascination with microphones and tape recorders and a teenage interest in synthesizers and amplifiers led to a degree in electronics and a job as a studio engineer for the ABC.

These days Adam, 36, is challenging his audiences to redefine traditional expectations of a musical performance.

He describes his compositions as "eclectic electro acoustic art" and says his music is not composed for those who "need to have a melody to whistle".

Adam's music is haunting, evocative and often surreal. It is a challenging experience for the listener, requiring close attention to sound metaphors that trigger vivid images.

Computer composition has become an integral part of the contemporary music industry.

Most television and radio jingles, as well as techno and modern dance music, are composed using MIDI (Musical Instrument Digital Interface), which applies computer technology to traditional music making. As Adam says: "It's cheaper to have a virtual orchestra than a real orchestra."

A more sophisticated level of computer composing involves incorporating non-musical sounds manipulated by complex sound modifying software, with more traditional music.

Adam records everyday sounds from his environment, such as raindrops falling or tea being poured, on DAT (small high-

quality cassettes) or CD and converts them from analogue to digital signals. He then analyses the sounds and distorts them, searching for rhythmic qualities and unusual tones.

Using sophisticated computer equipment recently acquired by Monash University's Music department, Adam changes the timing and spectral characteristics in a process he calls "sculpting the sound".

His composition is often interactive, with the computer taking on part of the creative process. He programs into the computer formulas and algorithms used in the compositional process, generating the musical structure and allowing the computer to do much of the work.

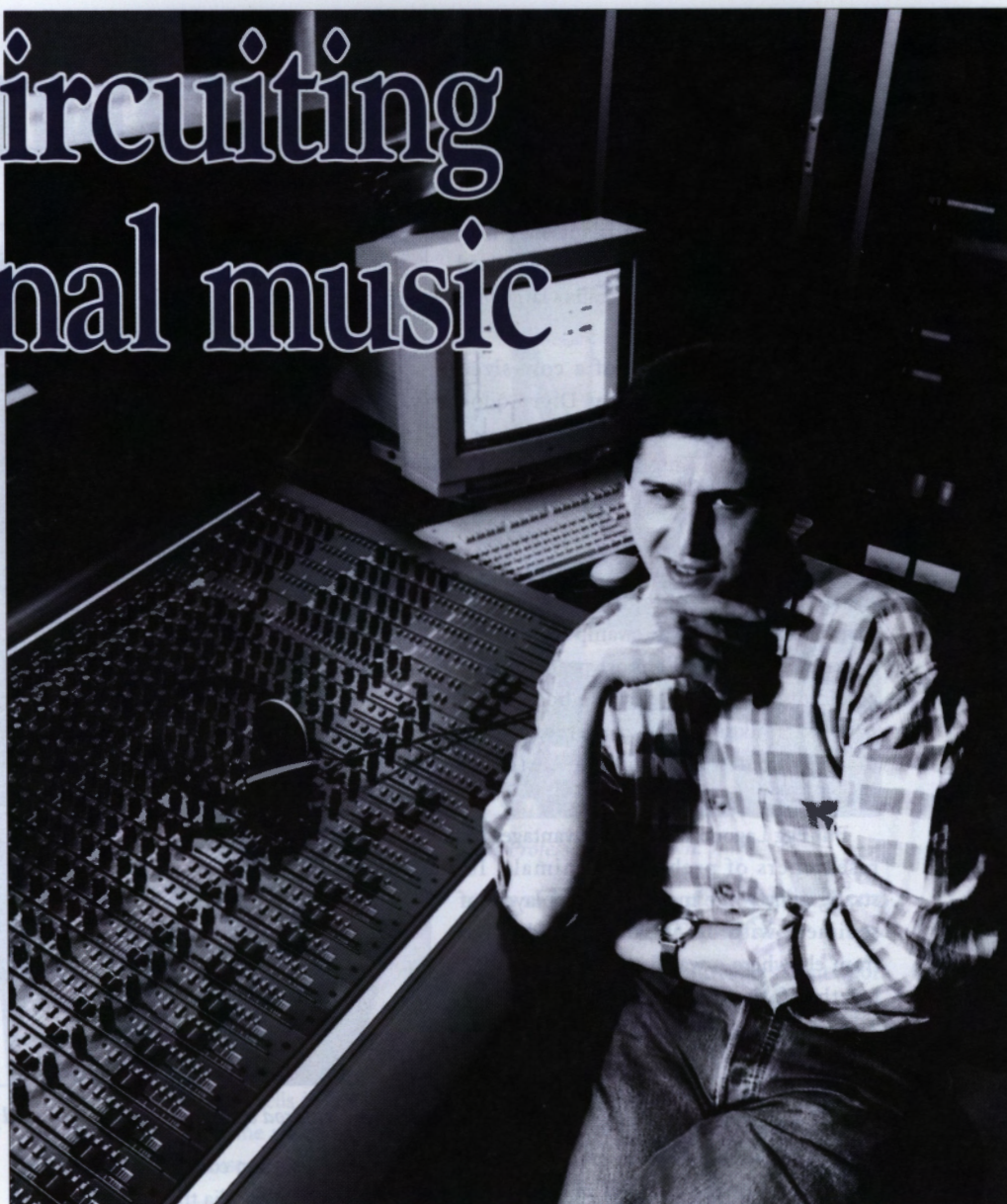
"Some compositional tasks can be considered algorithmic, so computers can do much of the composition according to pre-defined algorithms."

He predicts that as computers become more 'creative', they will take an increasing role in the compositional process. "Computers can already 'compose' music, although not necessarily anything that, performed without accompaniment, anyone would like to listen to."

Adam has had some major compositions performed at prestigious international computer concerts over the past few years, in Japan, Canada and Germany, and is currently working on a major composition to be performed at the Adelaide Festival of Arts this month.

He has also composed a more traditional choral piece to be performed by the Monash choir Vive Voce at the launch of the university's Performing Arts Centre this month. The song will incorporate a quote attributed to Sir John Monash.

BY GEORGIE ALLEN



Did man conquer beast?

Excavations on King Island may help determine whether humans caused the extinction of Australia's large prehistoric terrestrial animals.

Part of the skeleton of a cow-sized grazing marsupial known as Diprotodon and several giant kangaroos have already been found at the King Island peat swamp, Egg Lagoon, which was drained earlier this century.

Dr John Grindrod of Monash's Department of Geography and Environmental Science, said the swamp was unusual for Australia. While most peat bogs are acidic and therefore corrode bones, Egg Lagoon is alkaline and preserves bones, providing clues to the fate of Australia's megafauna.

But Egg Lagoon has other advantages for researchers of prehistoric animals. Its stratigraphy – the matching of its layers of sediment with others known and dated from elsewhere – was detailed in the 1950s by the father of geomorphology in Australia, Dr Joe Jennings. And the swamp has recently been surveyed extensively for fossil pollen by Monash PhD student Ms Donna D'Costa. The results of Ms D'Costa's study provide a detailed background of the changes in vegetation and climate over at least the past 100,000 years.

"The swamp shows a record of glacial and interglacial cycles, the occurrence and retreat of rainforests and the changes in sea levels."

Dr Grindrod said this data meant that any fossil remains of animals could be well located in time and environment. "The swamp shows a record of glacial and interglacial cycles, the occurrence and retreat of rainforests and the changes in sea levels. During the past 100,000 years, King Island



Dr John Grindrod examines a 50,000-year-old fossil wallaby jawbone found at the Egg Lagoon site.

has been more often connected to Tasmania and the rest of Australia than not."

In the Pleistocene Era (the past two million years) a group of very large terrestrial animals – mammals, reptiles and birds – roamed the earth. These 'megafauna' largely disappeared between about 50,000 and a few thousand years ago. In Australia, about 80 per cent of genera of these large terrestrial animals were lost. They were predominantly marsupials, but also included a giant reptile, the carnivorous giant goanna *Megalania*, and a huge bird, *Genyornis*.

A similar phenomenon occurred in North and South America, where about 70 to 75 per cent of the megafauna were lost. It happened just at the time when humans were spreading throughout those lands. "There is good evidence that people were involved in the demise of the megafauna of North America," Dr Grindrod said. The same thing occurred within recorded historic times in Madagascar, where the giant mongoose became extinct soon after

humans arrived, and in New Zealand, which lost its 12 species of Moa birds.

"But in Australia, there is almost no evidence one way or the other. The megafauna story is not well known because the environment in Australia does not preserve bones well. Studies so far rely on surface scatters of bones, and there is no stratigraphy to go with them."

At this stage Dr Grindrod and his team have dug only one pit, seven metres deep, but are planning to do much more digging. They have found plenty of bones, but none from the megafauna.

The research is being assisted by Ms Sanja van Hewet, a megafauna expert from the Department of Earth Sciences, and Dr Jim Cull, who is interested in determining whether remote sensing by ground-piercing radar can help locate bones.

The work is being financed by the Australian Research Council and the National Geographic.

BY TIM THWAITES

The Recollections of Geoffrey Hamlyn

Edited by Patrick Morgan, Stan Mellick and Paul Eggert

Published by University of Queensland Press

A new edition of a major early work of Australian literature, *The Recollections of Geoffrey Hamlyn* by Henry Kingsley, has been launched in Canberra.

Mr Patrick Morgan from the School of Humanities and Social Sciences on Monash's Gippsland campus coedited the new scholarly edition, which includes annotations, historical background and textual variations from the original novel.

The edition is first in the series 'Academy Editions of Australian Literature', in which Australian classics such as *Robbery Under Arms* and *For The Term of His Natural Life* will be issued in a similar format.

Kingsley's novel concerns early squatters in east Gippsland, as well as escaped convicts from Van Diemen's Land landing on the Gippsland coast and making their way north to the Omeo area.

The novel contains the first written account of the notorious Bogong Jack, who led a gang of bushrangers and cattleduffers at the time. The new edition provides historical background to such events.

The book, which was launched in Canberra recently, was funded by the Australian Research Council.

The Weather and Climate of Australia and New Zealand

By Andrew Sturman and Nigel Tapper

Published by Oxford University Press

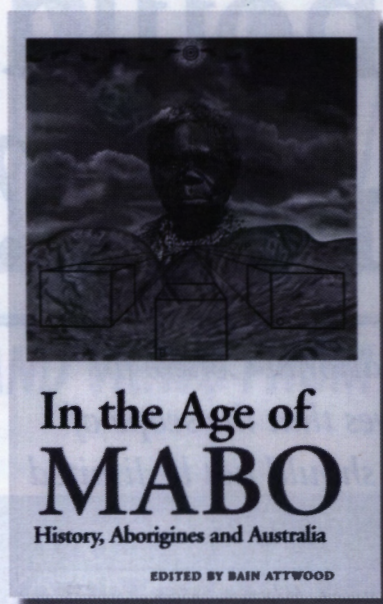
RRP \$59.95

This book was written for those studying or working in fields related to atmospheric processes and phenomena in the Australia/New Zealand region.

It covers the basic science of the atmosphere, the characteristics of air masses and atmospheric motion, interactions that produce mid-latitude and tropical weather systems, aspects of the mesoscale, local weather systems and forecasting.

The book also examines future scenarios and possible links between human activity and climate variability.

Nigel Tapper is associate professor and leader of the Environmental Climatology Group within Monash's Department of Geography and Environmental Science.

In the Age of Mabo: History, Aborigines and Australia

Edited by Bain Attwood

Published by Allen and Unwin

RRP \$24.95

The High Court's 1992 Mabo decision has provoked much controversy and debate in contemporary Australia.

This book analyses the implications of Mabo on Australian law, history, politics and culture. It also discusses the outcomes of Aborigines presenting their histories, not only for the law and the disciplines of history, archaeology and anthropology but also for the politics of identity.

In the Age of Mabo looks at the way that Aboriginal past is represented in a range of national discourses and discusses the importance of Aboriginality in debates about national identity and the republic. The book's contributors include leading historians, archaeologists and anthropologists.

Bain Attwood is senior lecturer in history at Monash University.

Constitutional Conflicts In Contemporary Malaysia

By H. P. Lee

Published by Oxford University Press

RRP \$16.95

In just over a decade, Malaysia has experienced three major constitutional conflicts, shifting the balance of power by eroding the influence of its hereditary rulers and the judiciary and strengthening the executive arm of the government.

This book explores the constitutional and political dimensions of these crises,

analysing the altering patterns of constitutionalism in the context of a changing Malaysian society.

H. P. Lee is associate professor of law at Monash University and is coeditor of *The Constitution of Malaysia – Its Development: 1957–1977* (OUP, 1978) and *The Constitution of Malaysia: Further Perspectives and Developments* (OUP, 1986).

Painting Australia: A Child's Guide to Australian Paintings

By Margaret Plant

Published by Craftsman House

RRP \$29.95

This introduction to Australian art is designed for both children and adults.

Themes telling the story of Australian art from the colonial period to contemporary times include children, families, gardens, sea and sand, the bush, and the centre of Australia.

The text provides a guide to the visual experience of the paintings and explains how they are made.

Margaret Plant is professor of visual arts at Monash University.

What should school children read?

From Montage 16

of literature paradoxically sets free. Leave made-to-order books – glumly relevant tracts about teen angst or post-modern babble designed to numb the best undergraduates to slide out of fashion – out of sight. Above all, teachers should never forget that canons of literature are chiefly the fluid, pragmatic constructions of creative writers and not of critics. In the way that writers have always learned to read – by judicious, self-directed exploration of the great works of the past as well as the present – so can our school children.

What should school children read?

Peter Pierce from the National Centre for Australian Studies believes that the scope of children's reading material should not be limited by trendy political agendas.

Who really benefits when geography students are taught to love wild rivers rather than learn the capitals of countries? Can they find Bosnia on a map, let alone comprehend anything of the political geography of the Balkans during this century?

The teaching of English has similarly been bedevilled by ersatz humanist agenda which has limited students' scope of reading. The fatuous assumption is that students will only find relevant, or be engaged by, fiction (poetry being forgotten) that reflects their own teenage backgrounds. This is a policy – fortunately not conducted everywhere or systematically – which impoverishes minds and hearts.

To inquire what students read at secondary school is not the same as to decide what body of knowledge they ought to have gained prior to their tertiary years.

Late in January three academics – Helen Hughes, John Hirst and Chris Wallace-Crabbe – reported to the Victorian Government on what students should know about their own country.

The impetus for this study owed something to E. D. Hirsch's controversial and prescriptive American publication *Cultural Literacy* and something to the nebulous feeling that Australian students need a foundation in civics which a fuller, and to some degree a common acquaintance with, national history, culture and geography might afford.

'Multiculturalism', a term so slippery as to elude dissection, values difference rather than a shared heritage or even a similar experience of contemporary Australia.

The authors of the Victorian project were predictably, and no doubt hardly to their surprise, assailed by interested parties. Why were more women and their achievements not mentioned? Why were more migrants and Aborigines not on the list of what and who essentially should be known?

By contrast, authors of school syllabuses often seem to be arguing for a narrower, rather than a more inclusive, range of reading material for children. This would be pernicious if it flourished unchallenged as doctrine or practice.

Confronting the brutal stupidity of complaints that many books long valued in our culture have been written by "dead white males", Harold Bloom acidly remarked in *The Western Canon* that these authors were "a lot more alive" than ever their critics would be. Young people, of various reading abilities, are sold short, now and in their future, by the supposition that some texts are too hard or old-fashioned for them. Senior students should be exposed to Shakespeare and Dickens by teachers who value the literary craft, the powers of language and the capacity to shift and enrich readers' moral focus that these writers exemplify.

And they should read works written in and about Australia. These may well deal with current adolescent predicaments, but the fiction of, say, John Marsden, fits those specifications without talking down to his audience. Curricula might include some of Henry Lawson's short stories, but taken not in isolation but in conjunction with his outstanding contemporary Barbara Baynton. Nor should students' reading be predomi-



nantly of prose. The recent influx of poetry anthologies means that abundant Australian verse is readily at hand. Its teaching could imaginatively be integrated, and in some schools surely is, with interpretation of painting and of social and cultural history. Such an approach is neither elitist nor does lip service to passing fashion.

Whether educators like it or not, the most creative reading is done beyond the classroom and the curricula of schools. The paramount issue is how young people should read, rather than what. They should read for delight. Encouraged and inspired they can be, but the individual drive to read deeply is unteachable. They should read promiscuously, finding material by chance, venturing through many works by one author if they wish, and not worrying if the particular genre was once stigmatised as 'low-brow' or 'popular'. One consequence of this recommendation is that boys and girls should read uncritically at first – for story and language, surprise and enchantment. They should not try to exercise a critical faculty which will be better brought into play when their experience of language is catholic, and without preconception or prejudice.

Let them loose in second-hand bookstores as well as libraries. Foster in them the dreaming habit, that imaginative delinquency which close attention to many kinds

Continued on Montage 15