

MONTAGE

NEWS AND VIEWS FROM MONASH UNIVERSITY

Portraying a killer

On the eve of the 10th anniversary of Melbourne's infamous Hoddle Street killings and a year after the shock of the Port Arthur massacre, behavioural researchers are yet to make sense of the emerging new breed of mass murderer.

Monash University forensic psychiatrist Professor Paul Mullen said that despite the growing frequency of massacres such as Port Arthur and Dunblane, psychologists and psychiatrists were still struggling to understand what caused these tragedies.

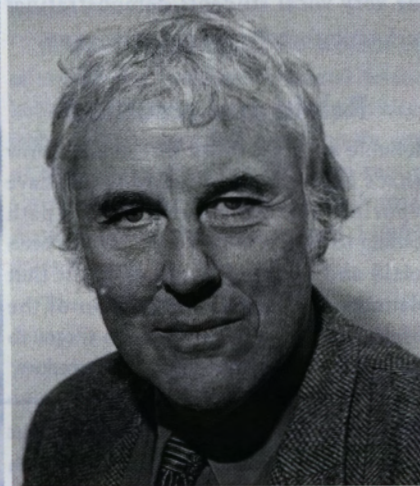
"There is evidence that in the last 30 years more individuals are going out and killing large numbers of people without any obvious motive other than to kill," he said.

Professor Mullen, who prepared the psychiatric report on Martin Bryant for the court, is undertaking what is believed to be the first comprehensive study into what motivates mass murderers.

The research, which draws on his clinical work with other notorious offenders in Australia and New Zealand over the past decade, aims to assist in recognising potential triggers for mass murders while also helping the community make sense of these events.

"The explanation that people most want to hear is that the offenders are mad. But one of the things we do know about massacres is that while the perpetrators like Martin Bryant don't have normal psychosocial and emotional responses, they typically are not mentally ill."

While massacres have been common throughout history, particularly in times of war and social upheaval, Professor Mullen



Monash psychiatrist Professor Paul Mullen: undertaking the first major study into what motivates mass murderers.

says the current trend of multiple killings emerging in Western culture is a relatively new phenomenon.

As part of the research, he is tracing examples of massacres in other cultures, including the murder/suicide known as Amok, which was first described in the Malaysian archipelago.

"The mass murderer in this situation is typically young, male and isolated, and usually has experienced some loss of face or humiliation," Professor Mullen said.

"And when they decide that life is not worth living, they don't just kill themselves, partly because in the Malay culture suicide is taboo. Instead, they take a sword or hatchet and run down the street, killing

apparently at random until they themselves are struck down and killed.

"In this way, causing the death of others and ending their own lives restores face. This model – in which you die and vindicate yourself – becomes very attractive to other angry, suicidal and humiliated young men."

However, despite the striking similarities, Professor Mullen said the Amok practice didn't simply transfer to Western society, "where among other things, the cultural taboo against suicide was not as strong".

In Western culture, he said, multiple killings usually occurred within domestic situations, typically where a depressed or morbidly jealous male killed his partner and children, then committed suicide.

But in recent years there had been a growing incidence of massacres in which the victims were randomly targeted by the killer without any preceding family incident.

Of the 14 mass killings in Australia and New Zealand between 1986 and 1996, eight (including Melbourne's notorious Queen and Hoddle street massacres) involved the random killing of innocent victims.

Professor Mullen said profiles of two distinct groups of mass killers had started to emerge.

The first, similar to the Amok situation, was primarily motivated by a desire to suicide. These included the Queen Street massacre in 1987, where 22-year-old gunman Frank Vitkovic turned the gun on

Continued on Montage 2



Coffin up a fine?

A group of Monash students recently protested against proposed full-fee enrolments by floating a flaming coffin on the new pond at Clayton campus.

The smoky protest was allowed to continue peacefully, despite the fact that it was held on the first total fire ban day ever declared in May.

A demonstration of democracy

Continuing on the topic of student protests – apparently a meeting being held in the



George Lush Room on Clayton campus recently to discuss and review student grievance procedures was suspended until the very vocal students demonstrating/performing outside decided to move on.

Relaid and rerouted

Reliable sources, those who really know what's happening around Monash, have reported "the real reason" the footpath leading to Robert Blackwood Hall has been relaid and rerouted. Rumour has it that planners overseeing construction of the original path nearly 30 years ago forgot to line it up with the Leonard French window.

Another popular theory is that the work was an attempt to limit the grassy area available for students' amorous activities.

Poles apart

Aren't the glitches of renovating funny when they happen to someone else?

One tenant in the new Union building on Clayton campus is now the less-than-proud owner of a specially designed, specially constructed work station.

The reason for the special treatment? The desk had to fit around the centrally-placed pole which holds up the ceiling in the tenant's new office.

Portraying a killer

From Montage 1

himself after killing eight people and wounding five others. Similarly, in 1990 in Armanoana, New Zealand, 33-year-old gunman David Gray killed 13 people and wounded three others before suiciding.

"In the Dunblane incident the perpetrator, Thomas Hamilton, also suicided. However, he also displayed some of the characteristics of the second group of mass

murderers who do not usually set out primarily to suicide, but wish to punish society for not recognising their abilities and entitlements," Professor Mullen said.

"It's a violent rage and resentment in which they are prepared to kill. And while the world is full of resentful, despairing and suicidal men, fortunately only a few go out and kill."

Professor Mullen said characteristics common to both types of mass killer included:

- a fascination with weapons and military-type paraphernalia. "For instance, David Gray, Martin Bryant and Thomas Hamilton all combined a fascination with guns with survivalist and militarist interests."
- social isolation, depression and an inability to form intimate relationships. "Most are sad, inadequate and lonely, and the perpetration of the crime is their moment of glory."
- rigid/obsessive behaviour and narcissistic tendencies.

• an attraction to the activities of other perpetrators of massacres. "There's ample evidence that they collected newspaper clippings on each other. David Gray for example, collected information on (Hoddle Street gunman) Julian Knight."

According to Professor Mullen, the media inadvertently could play a role in fuelling copycat behaviour among mass killers and indirectly feed the egos of perpetrators like Martin Bryant.

"When there is an evil act on the scale of Port Arthur, the perpetrator seeks power from that event.

"The point is to break the link between the power of the event and the individual responsible for causing it. This also will avoid making the event attractive to other disturbed individuals," Professor Mullen said.

"After the initial reporting of Port Arthur, most of the media showed greater maturity in the way that they contrasted the awfulness of Port Arthur with Bryant as a weak, lonely and isolated individual."

BY BRENDA HARKNESS

MONTAGE

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Montage is published by Monash University's Marketing Services and Public Relations office. Views expressed by contributors in Montage are not necessarily endorsed by Monash University.

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Montage may also be viewed on the World Wide Web (WWW) at <http://www.monash.edu.au/pubs/montage/index.html>

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Produced by Publishing and Design. Cartoons by Justin Hewlett.

Imageset and printed by Cherry Graphics Pty Ltd.

Registered by Australia Post: PP 338685/00010.

Talking shop on the Internet

Monash academic and Melbourne software developer Professor Les Goldschlager is making it easier for retailers to set up shop on the Internet with the release of a do-it-yourself store builder package that even beginners can manage.

Professor Goldschlager, managing director of high-tech company Sofcom, recently released the new software package which enables any service or product provider to set up their own on-line shop.

"The Internet Store Builder offers people a very easy, very inexpensive way to sell their products and services to a wide audience," said Professor Goldschlager, who is currently on leave from Monash's Department of Computer Science to pursue the commercial venture.

"One of the key advantages of the package is that anyone with Internet access can use the software with very little technical expertise," he said.

"The software is icon-driven and gives the user various options to choose from when they are setting up their store."

Once the parameters for the store have been selected, the store owner can preview its features before they commit to adding it to the Internet shopping mall. If they do decide to add it to the mall, they simply click on the 'add' icon and the store is ready to trade at a starting price of \$300.

Sofcom provides the infrastructure for store owners by dealing with on-line security issues associated with trading on the Internet. Sofcom also charges a 5 per cent transaction fee on all transactions made via the shops in the mall.

According to Professor Goldschlager, the store builder is aimed at making Internet trading more accessible to small and medium-sized business.

"Most smaller businesses have heard of the Internet. They know it is big and they know it is here to stay but they don't know what it can offer them or do for their business," he said.

"This is a fantastic way for people to get a taste of electronic commerce. Maybe it will work for a specific company and maybe it won't, but for \$300 anyone can find out."



Professor Les Goldschlager: making cyber shopping a reality.

For the shopkeeper, on-line shopping gives the flexibility to instantly change anything in their shop, including prices and store layout. They can also add new products and provide special offers at any time.

"Because the Internet is interactive, shopkeepers can communicate directly with customers and gain valuable market information, including demographic profiles, for their products," Professor Goldschlager added.

And he said the software offered a tremendous benefit to both the retailer and the buyer in a country like Australia because it overcame the problem of geographic isolation.

While the software has only been available for three months, there are already some 45 stores in the Internet shopping mall selling products from gourmet foods and wine to camera equipment and computer software.

With Internet connections more than doubling every year, Professor Goldschlager believes the popularity of on-line services will only gain momentum.

"The Internet is fast becoming the biggest source of information, and so many people already use it in their day-to-day lives," he said.

"Demographics show that Internet users are educated, professional, busy people who don't have time for luxury shopping. On-line shopping is perfect for them."

Professor Goldschlager said some of the biggest users of the on-line shopping mall were expatriate Australians who used it to have goods shipped to themselves or to family and friends at home.

Sofcom also offers individually designed stores for larger organisations who would like to be included in the shopping mall.

The Sofcom shopping mall is at <http://www.sofcom.com.au/mall>

BY JULIET RYAN

Marvelling at Melbourne

In the lead-up to the new millennium, two Monash academics will be co-ordinating a team of researchers delving into Melbourne's past.

Dr Andrew Brown-May and Dr David Dunstan are two of the three principal editors of the *Encyclopedia of Melbourne* – an imaginative and comprehensive history of the city that will be released in book, and possibly electronic, form by the year 2001.

With their Melbourne University colleague Dr Shurlee Swain, they have established 15 working groups to consider what should be included in the reference work, which is expected to run to between 600,000 and 900,000 words.

When the content is finalised later this year, the editors face the daunting task of commissioning up to 300 writers to work on the expected 1600 cross-referenced entries chronicling the complex metropolis from its beginnings to the present day.

"The hardest thing is not deciding what to put in, but what to leave out," Dr Brown-May said.

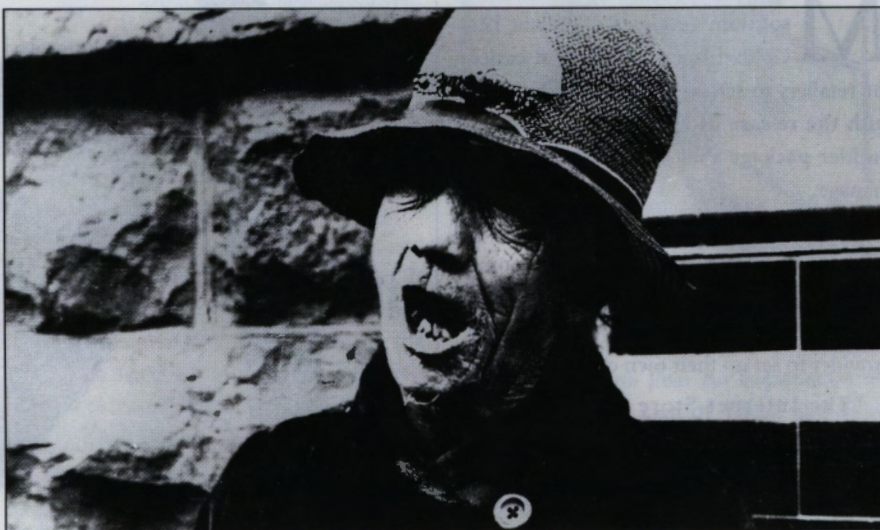
The Monash History department research associate is determined to make the encyclopedia "a metaphor for the city itself" with photos and entries documenting events, people, institutions and cultural practices that had a significant impact on Melbourne's identity.

Entries are likely to cover topics ranging from historic buildings and the casino debate to the city's much-maligned weather and its notorious rivalry with Sydney.

Significant space will also be devoted to biographical sketches of famous Melburnians and of lesser-known citizens whose everyday lives symbolised an aspect of life in the Victorian capital.

"The lives of non-famous people are often good examples of issues we want to discuss in more detail," Dr Brown-May said.

"So we're not just going to concentrate on John Batman." (Although the controversy surrounding the pioneer's claim to fame as Melbourne's founder has meant Dr Brown-May has already received phone calls inquiring about how Batman's life will be recorded.)



'Killarney Kate': A Melburnian whose life could inspire discussion of our past, present and future. Photo courtesy of the La Trobe Picture Collection, State Library of Victoria.

"An entry on someone like Killarney Kate, for example, would not just be an historical record of one of Melbourne's characters, but also could be cross-referenced to discussions of contemporary issues such as the planning of public spaces, the legal system, drunkenness, street beggars and youth homelessness."

Killarney Kate was an impoverished and often-drunken woman who lived on Melbourne's streets, when not in its jails, during the 1920s and '30s and gained some notoriety for her impromptu singing outside theatres and on trams.

"Presenting history in the way we're planning for the encyclopedia allows us to draw links between the past and how the city is experienced now and is planned for the future," Dr Brown-May said.

City encyclopedias are a relatively recent phenomenon, with Cleveland producing the first in 1987. A handful of US cities have since followed suit, but the Monash project will be an Australian-first.

Dr Dunstan said city encyclopedias offered a unique ability to collate an enormous amount of information and present it in a form that was scholarly yet accessible to the general reader.

"The *Encyclopedia of Melbourne* will offer an accessibility that 99 per cent of academic works don't have," he said.

And the Australian Studies lecturer emphasised that while the project was based at Monash, the editors were seeking

community input for content ideas. People or organisations outside the established working groups were welcome to offer suggestions.

He believed that as well as being a valuable reference for historians, or anybody simply interested in Melbourne, the finished work would also be a boon for civic planners, teachers, students, genealogists, journalists, biographers, archaeologists, tourists and policy makers.

"The *Encyclopedia of Melbourne* has the capacity to educate on a wide range of urban issues such as planning, heritage, welfare and infrastructure services, environmental concerns and the nature of past achievements," Dr Dunstan said.

The project is being chaired by eminent Monash historian Professor Graeme Davison, and the editors are currently negotiating with potential publishers. Discussions include the possible production of CD-ROM and on-line versions that could incorporate sound and video clips.

Funding for the initial research and planning has been provided by the Australian Research Council, Monash University and the Monash Arts faculty's Metropolis and Region Project.

The editors are seeking further financial backing from corporate and community organisations. Dr Brown-May can be contacted on (03) 9905 2192.

BY GARY SPINK

The creative accountant

For an accountant who thinks he can't draw, Peter Bonner has had unprecedented success in the art world.

A fourth-year fine arts student at Monash University's College of Art & Design, Mr Bonner was recently awarded the prestigious Dobell Drawing Prize.

Mr Bonner is the first student to win the prize, which is awarded annually by the New South Wales Art Gallery to coincide with the Archibald, Sulman and Wynne prizes.

The award is all the more significant considering that Mr Bonner regards drawing as the weakest of his artistic talents, and it has only been four years since he has taken his artistic career seriously.

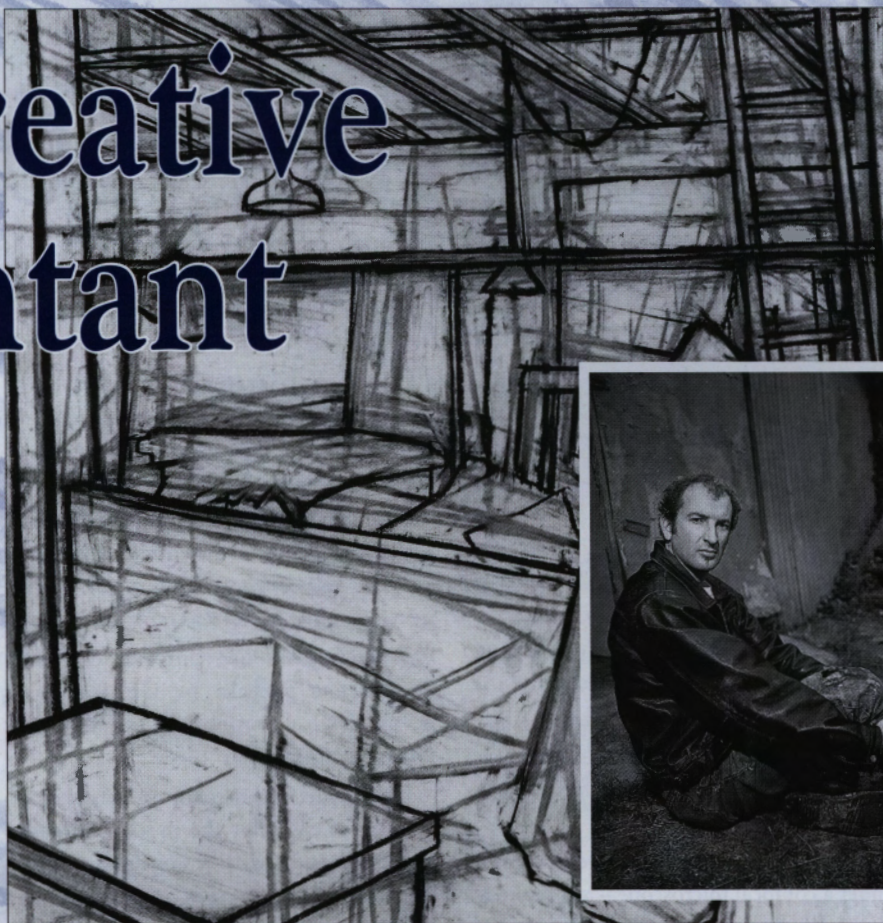
Not so long ago Mr Bonner had a high-flying career in London as a corporate finance recovery manager with accounting firm Price Waterhouse.

You could say he had it all – a top-paying job and an office that had a 180° view from Tower Bridge to Westminster overlooking the Thames.

At the same time he was being exposed to some of the world's great art works. This new interest combined with a forthcoming promotion up the corporate ladder saw him decide to fulfil an entirely different ambition – painting.

"While I was in London, my accounting career started to take off, and I realised I was going to have to devote myself totally to my career and the company," he explained. "But my new interest in art had inspired me to take up a painting course at the London Literary Institute and, bit by bit, art started to take over many aspects of my life.

"I knew that while I was happy with my accounting career, I didn't really love it." Two months before his promotion date, Mr Bonner quit his job and started planning for a full-time career in the arts.



He said the hardest part of his career change was adapting his thinking and problem-solving techniques from his previous line of business, where the concept of risk-taking was undesirable, to art, where risk was a necessary part of creating.

"When there is a problem in the business world, you draw upon your experience and knowledge to achieve a predetermined solution," he said.

"In the art world, if you consciously attack a problem with an end result in mind, you cannot create anything new because you are drawing only on what you already know. There would be no room for investigating new ideas and approaches."

Mr Bonner says he now explores paths, often with no idea where they will lead – "but invariably they lead somewhere".

"If they don't, well, I can draw on the experience of that journey later," he added.

He finds that the most successful pieces of art involve a mixture of head, heart and hand. "There obviously needs to be a lot of expression in a painting but it needs to be tempered by thought and skill."

In fact, Mr Bonner's award-winning drawing *Interior* was never intended for exhibition but rather as a learning exercise to enhance his painting.

Sketchy success: Monash artist Peter Bonner and his award-winning work Interior.

"The drawing was of the interior of my studio – a subject I was painting at the time. It was an attempt to have a good 'look' at my studio, to get to 'know' it better.

"It led to a body of work of paintings and drawings exploring shapes and space and my response to that space."

He is hesitant to discuss his work in too much detail, believing art should stand on its own merits. "So often I go to a gallery and I read an intellectual blurb that attempts to justify the work I'm looking at.

"But when people look at art, they bring all their own values to the experience and so each individual's encounter with a specific piece of art is unique. If you limit a piece of art to a set of words, it's restricting and to me it's not art."

Mr Bonner has not completely turned his back on the business world. He still uses his accounting expertise in his job as a tutor in the Department of Accounting and Finance at Monash's Clayton campus.

Interior will be on show at the Foyer Gallery of the Victorian Arts Centre in St Kilda Road, Melbourne, until 22 June.

By JULIET RYAN

Searching for the key

Fluorescent tags are shining new light on our knowledge of the workings of living cells.

Tim Thwaites reports.

Monash biochemists are utilising a new way of viewing molecular details of the life and death of cells, which could pave the way for developing improved means of treating cancer and other serious diseases.

The new technique, which also provides new information on how cells function, involves inducing cells to make proteins with a fluorescent tag.

These proteins can then be observed under a confocal microscope – a computer-assisted instrument which can construct images in three dimensions.

The position within the cell of tagged proteins can thus be determined, and interactions between tagged proteins studied.

Two confocal microscopes have recently been installed at Monash University, and a research group from the Department of Biochemistry and Molecular Biology, led by Professor Phillip Nagley and Associate Professor Rod Devenish, is developing the new technique.

Already the group has built a fluorescent tag into an enzyme critical to the release of energy to cells. This enzyme, known as ATP synthase, is located in mitochondria – the membranous structures in cells where food is burned to provide energy in the form of ATP.

Intriguingly, mitochondria are now also known to be involved in the processes that trigger cell death.

Senior research fellow Dr Mark Prescott has incorporated the instructions for the tag into the genetic material for building the enzyme. So the tag – a section of protein which fluoresces green under light – is assembled as part of the enzyme itself.

Live yeast cells, in which the mitochondria carry tagged enzymes, have been

studied under the microscope. The tag does not appear to inhibit the enzyme's function and the cells are still able to grow and reproduce, making ATP as normal.

"The tag we use (known as green fluorescent protein or GFP) occurs naturally in a common jellyfish," said Professor Nagley.

"The fluorescent properties develop spontaneously after the protein is made and provide us with a powerful tool to study biological processes."

The researchers have been able to exactly locate the mitochondrial membranes with ATP synthase attached by tracking the fluorescent version of the enzyme within cells.

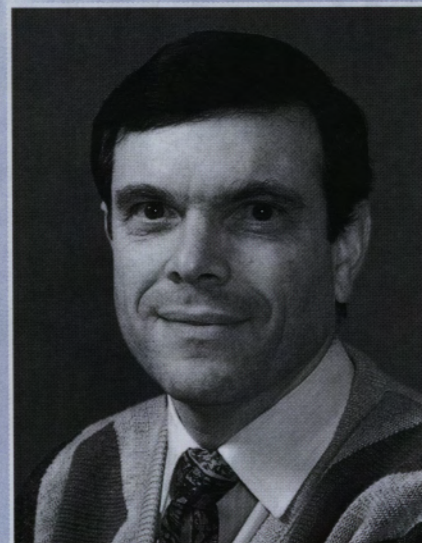
Having demonstrated how the technique works, the group intends to use it to study the location and function of ATP synthase within cells under different physical and chemical environments.

But that is only the beginning. The genetic instructions for the fluorescent tag can be inserted into other mitochondrial proteins and enzymes, so their location and function can be followed in the same way.

And genetic variants of the GFPs fluoresce in different colours, so different proteins can be tagged with different variants, allowing the interaction of two or more proteins to be observed.

It may turn out to be possible to track interactions even more efficiently. For when proteins interact, their electronic environments alter, and this may be reflected in colour shifts in the GFP-tag.

"We can start to unravel answers to a whole lot of questions," Professor Nagley said, "such as whether mitochondria are divided into subcompartments, how and where proteins are concentrated, what specific complexes of proteins do, and



Professor Phillip Nagley: "We can start to unravel answers to a whole lot of questions."

where proteins are assembled and broken down."

He said answers to these questions are important because it is becoming more and more evident that the mitochondria not only play a pivotal role in the biochemical functioning of the cell, but also are important to human health.

They are particularly significant as part of the ageing process and in the development of debilitating conditions such as neurological and muscular diseases.

In the past few years, evidence has been accumulating that mitochondria act like a cellular equivalent of Dr Jekyll and Mr Hyde.

They perform as the benign Dr Jekyll in their role as 'the powerhouse of the cell', the region of the cell where respiration takes place.

In the mitochondria, sugars are combined with oxygen, and the resultant energy is stored as energy-rich chemical compounds such as ATP, which can be used elsewhere in cells to power biochemical reactions.

One reason respiration is confined to the mitochondria is that oxygen and its derivatives are dangerous, reactive substances. They would play havoc with

to cell life

molecular reactions if allowed to spread uncontrolled throughout the cell.

But acting as the site for oxidation in the cell takes its toll on mitochondria. They eventually become damaged and inactive through exposure to reactive oxidative chemicals. When too many mitochondria fail, the cell dies.

It is now apparent that cell death can occur in two ways, according to Professor Nagley. The most obvious way, involving some sort of trauma, is called necrosis.

"We all observe it when we cut or burn ourselves. Our body goes to work to clean up the mess. In the reddening, we can see the characteristic activity of the body's response known as inflammation.

"But there is a second, much cleaner form of cell death called apoptosis. It is a choreographed euthanasia for cells which are damaged and dying. The cell itself is digested, the DNA is cut up and the materials are recycled."

Professor Nagley described apoptosis as the Mr Hyde side of mitochondria. They can give the signal for apoptosis to occur, and it appears that the flow of calcium is an important element in the process.



Calcium is critical to the functioning of many enzymes in the cell. Its orderly flow is controlled by the mitochondria.

But when a mitochondrion becomes so damaged that it cannot function, it can no longer regulate calcium and its outer membrane opens up. Key molecules are released and move to the nucleus.

If enough mitochondria become disabled in this manner, the increase in

Yeast cells five micrometres (five millionths of a meter) in diameter. The brightest areas are mitochondria tagged with GFP.

concentration of these molecules at the nucleus induces apoptosis – and the cell dies.

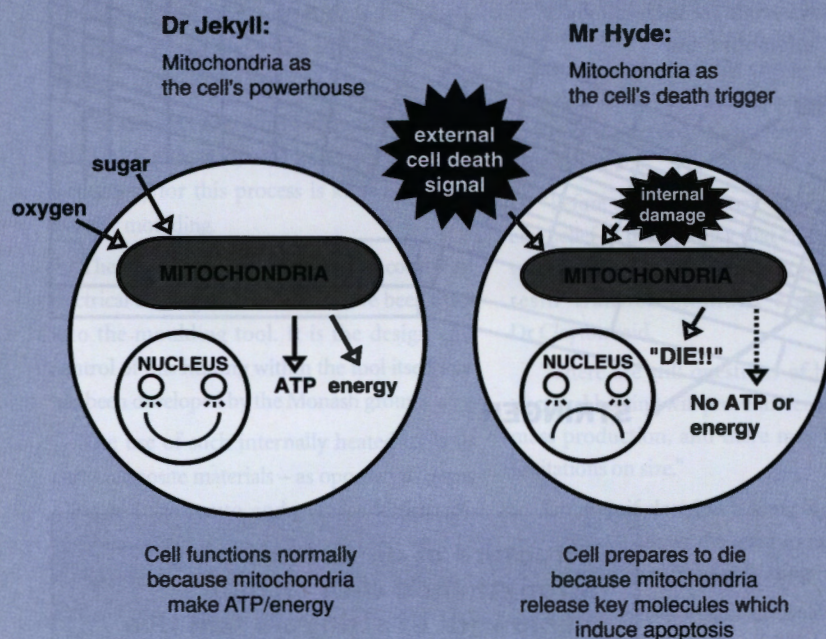
At present, many forms of cancer are treated by attempting to kill off tumour cells by necrosis – subjecting them either to poisonous chemicals (chemotherapy) or to ionising radiation (radiotherapy).

A research team led by Professor Nagley and Dr John Hill of the Department of Neurosurgery and Surgery at the Royal Melbourne Hospital has been working on a means of treating cancer by inducing mitochondria to trigger apoptosis, a method which could turn out to be much more precise and much less traumatic for the patient.

Recently, the group reported the outcome of introducing BOPP – a light-sensitive, chlorophyll-like compound which contains boron – into mitochondria.

The compound is non-toxic, until activated by laser light. But once activated, BOPP generates dangerous oxidative compounds which can damage the mitochondria, and may well trigger apoptosis. Investigations of BOPP's clinical usefulness are continuing.

Two sides of mitochondria



Monash cure set for take-off

Australia's aerospace industry could become a bigger player in global markets with the help of new Monash research. Tim Thwaites reports.

Monash Mechanical Engineering researchers have played a key role in developing technology to reduce the cost of making aircraft parts from composite materials such as carbon fibre/epoxy composites.

The technology, developed in collaboration with the Cooperative Research Centre for Advanced Composite Structures, should boost the ability of the Australian aerospace industry to win contracts to supply parts to the world's major aircraft manufacturers.

The composite materials used to make aircraft parts consist of a mat of fibrous material embedded in a resin. During the fabrication process, the resin is cured or hardened by applying heat and pressure. The result is a material which is lighter than steel, but still possesses good strength and stiffness.

Traditionally, curing has been achieved by placing the whole part in a pressurised oven or an autoclave (steam pressure cooker). But the Monash-CRC research group has developed new methods for applying heat only where it is needed. This saves time and energy, as well as money, without loss of quality.

Head of the Monash team Dr Yee Cheong Lam said

the researchers' work involved developing software to simulate the curing process.

So although the new technique has so far only been applied to the process of making one part of an aircraft wing (longitudinal stiffeners known as stringers), Dr Lam said it could be used to create a whole range of tools using different methods of heating and different composite formulations.

"Now that the modelling process is in place, we can look at all sorts of designs for tools, and select what is most efficient for manufacturing a particular part," said the reader in Mechanical Engineering.

"It should mean that the Australian aerospace industry can make parts which are more complex than previously possible."

But the application of the new technology does not stop at the aerospace industry. Composite materials are increasingly used in the automotive and

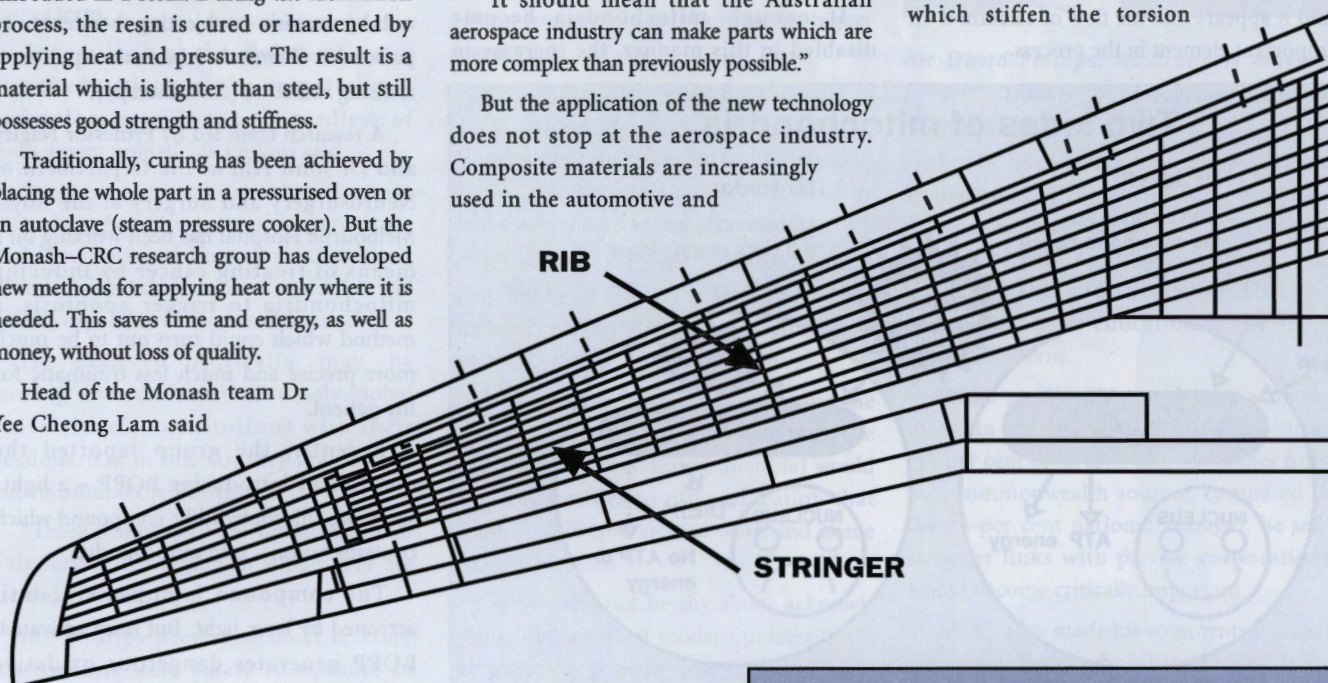
plastics industries. They can even be used to make I-beams for building and engineering purposes.

In fact while the CRC began life in 1991 as the CRC for Aerospace Structures (with Aerospace Technologies of Australia Ltd and Hawker de Havilland Ltd as its industry partners), last November it changed its name to Advanced Composite Structures in recognition of these wider applications.

Two additional industry sponsors, ADI Limited and Goninan and Co Ltd, are not part of the aerospace industry, but are involved in manufacturing land transport vehicles and ships.

The research project emerged from discussions about two years ago between the CRC and Daimler Benz Aerospace Airbus (DBAA), the German arm of the European aircraft manufacturer Airbus Industries.

Airbus was interested in a new design and manufacturing process for the components which stiffen the torsion



Structure of an aircraft wing strengthened with lattice framework of stringers and ribs

box, the central structural element of the wing which extends its whole length (see diagram).

This strengthening framework is a type of lattice formed from stringers that run down the length of the wing and ribs that run crossways.

The CRC, which has research facilities in both Sydney and Melbourne, split the task between the two, with the ribs to be designed in Sydney and the stringers in Melbourne.

The collaboration between the research team at Monash and the CRC's own researchers at Fishermens Bend has been so effective that three stringers, each about 2 metres long, were sent to Germany for testing last November.

"They were developed on schedule and delivered on time," said Dr Lam. "We needed to do a whole lot of things we hadn't done before, and we got them right the first time round."

"The Australian aerospace industry can make parts which are more complex than previously possible."

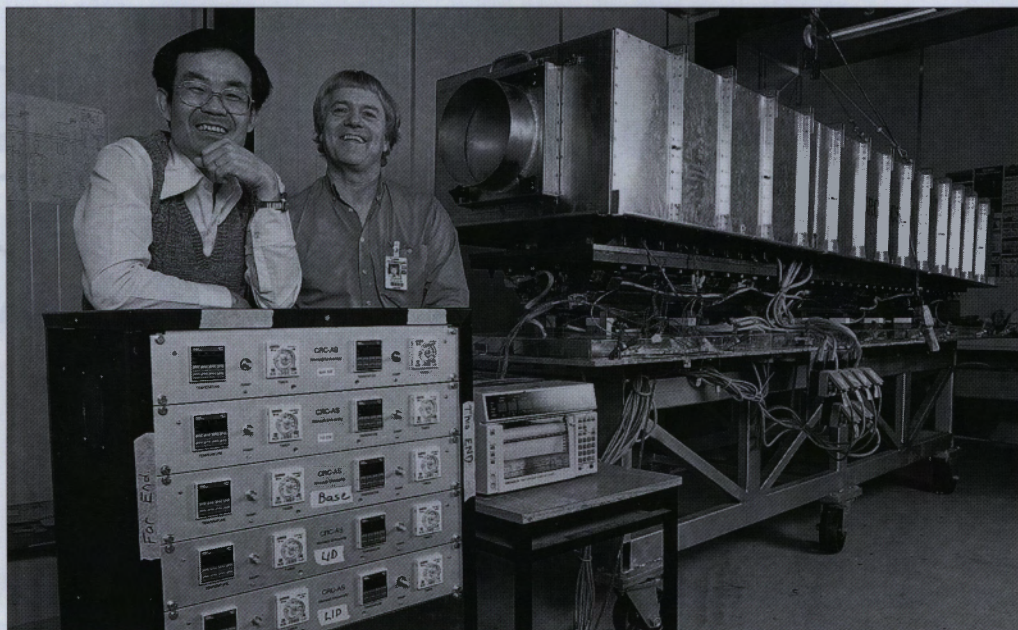
Although the full report on the test results has not yet arrived from Germany, DBAA has indicated that things went well, according to CRC research coordinator Mr Graham Clayton.

"We are now using the same techniques to produce longer stringers for a full-scale composite wing to be tested in Germany later this year," Mr Clayton said.

The stringers are formed in a moulding tool into which resin is injected under pressure. The technology for this process is known as resin transfer moulding.

The resin is then cured by careful control of electrical heating circuits which have been built into the moulding tool. It is the design and control of this heating within the tool itself that has been developed by the Monash group.

The use of such internally heated tools to cure composite materials – as opposed to ovens – began in the auto and plastics industries. Until now the strategy had never been tried in the aerospace industry, where the margin for error is much smaller and the temperatures used for curing much higher.



Winged adventure: Dr Yee Cheong Lam and Mr Graham Clayton at the Fishermens Bend research facility.

The aeronautical environment introduced significant difficulties for the researchers. The temperature of the tools had to be tightly controlled – to within 1.5 per cent at temperatures up to 200° C – and they had to consider that any distortion of the tool itself in the heating and cooling process would affect the critical dimensions of the finished product.

The Monash team approached the problem by simulating the heating and curing process on a computer.

The simulation program allowed the researchers to explore how to heat the right spot to the right temperature to cure the resin, and also how the tool would distort during the process.

They could then use the information to help design a tool which would change shape in such a way as to conform to the part they wished to fabricate at the curing temperature. And they could also determine the fineness of control they needed to exert over the electrical heating circuits.

"Before this project started, there was a general belief in the industry that electrical heating was not necessarily the way to go for making resin transfer moulded aircraft parts," Dr Clayton said.

"There are still questions of how durable electrical heating will prove under conditions of mass production, and there may be logistical limitations on size."

But even if electrical heating is not suitable, the approach allows the team to design similar tools using other forms of heating.

The project has been unusual in that the collaboration with the CRC has allowed

academic researchers to experience immediate application of their work.

"Academics generally are not familiar with production," said Dr Lam. "It is not easy to translate research to industry. But here we have had very rapid transfer of technology all the way to the finished product, and we can see our contribution. It is a wonderful feedback process."

Mr Clayton said it had been a very successful integration between industry and academia.

"It is not easy to translate research to industry. But here we have had very rapid transfer of technology all the way to the finished product, and we can see our contribution."

Apart from Mr Clayton and Dr Lam, the researchers who significantly contributed to this project include designer draftsman Mr Mario Borg, research engineer Mr Paul Falzon and technician Mr Daniel Bitton from the CRC; and research fellow Dr Xiao Lin Liu, professional officer Mr John Miller and PhD student Mr Sunil Joshi from Monash University.

Monash strategist sums up the education scene

Universities of the future will operate in a global market and will need to offer more flexible delivery of their programs with reduced public funding, according to the Monash vice-chancellor's special strategic adviser.

Mr David Phillips recently outlined what he believed would be the major issues addressed by the Federal Government's West committee, set up earlier this year to review Australia's higher education system.

He said the sector was facing a number of influences that would ultimately force universities to diversify their funding sources and be more responsive to student demands.

While he didn't believe that the considerations of the West committee, which is due to report in March 1998, would have a major impact on federal budgets or government policy before the next national election, he said that universities should be planning for the longer term.

"Issues such as the globalisation of higher education and the impact of new technologies will occur regardless of government policy," Mr Phillips said.

"Students have shown that they are increasingly willing to disregard state and international boundaries for their education, and their options to do this will rapidly expand over the next 20 years."

He believed Australia may be moving towards "some genuinely global universities" – institutions with their headquarters in one country and several outlets around the world.

"There will be very few universities that only service the region in which they are located," he said.

Mr Phillips predicted most tertiary institutions were likely to operate in consortia with other universities or private corporations to share infrastructure and develop new forms of education that would attract a broader student base.

"Universities have already established links with media organisations to deliver their programs, such as the involvement of the ABC with Open Learning, and this is an area that is likely to expand in the near future."

"We have a rapid development of pay-TV networks around the globe, and I would not be surprised to see them being used for higher education delivery."

Another global trend affecting the world's leading universities was the reduction in public funding.

"Monash will receive less commonwealth funding in 1999 than it did in 1994. That represents a loss of about 1200 publicly-funded student places, or \$12.7 million, from our previous projections for the next three years."

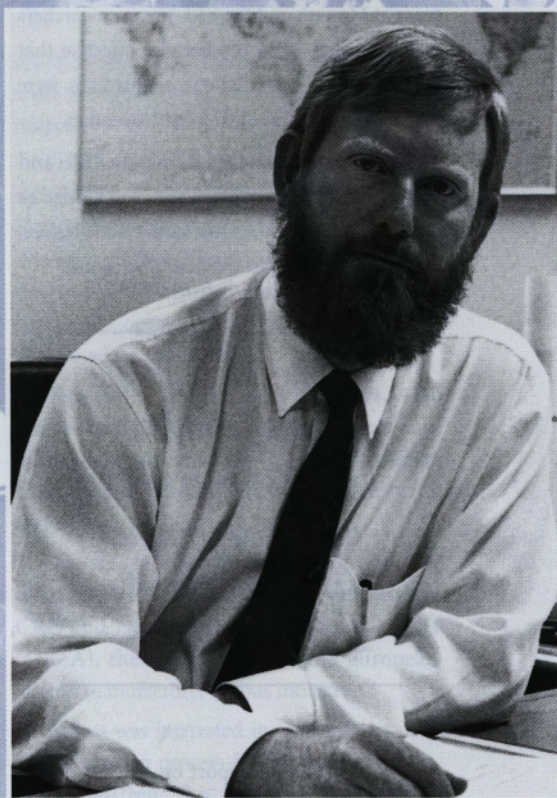
Australian universities, and those from several other OECD countries, were being forced to rely less on the public purse, and Mr Phillips said this would inevitably create a more competitive environment for higher education.

He said that with the recent increases in HECS charges of between 35 and 125 per cent, student fees for Australian courses were among the most expensive offered by public universities around the world.

Students would become more demanding as they were required to pay higher contributions towards education costs.

This demand for quality service and the changing nature of work (where people have several careers during their life) would force universities to offer education that could be delivered around work and home commitments.

"We should not be shy about acknowledging that a role of modern universities is to prepare people for their chosen professions. The future for us is to move closer to industry and the labour market, and be more responsive to the demands of clients," Mr Phillips said.



Mr David Phillips: Australia is moving towards creating "some genuinely global universities".

But he warned that fees from Australian students and extra income from a moderate increase in international student numbers were unlikely to match government cutbacks and the increasing costs of providing higher education in the short to medium term.

While praising Monash's past achievements in securing diverse funding sources (40 per cent of its total revenue comes from non-commonwealth sources, compared to the 31 per cent national average), he said stronger links with private corporations would become critically important.

Mr Phillips made his comments to academics, university administrators and business representatives at a function organised by Monash's Performance Development and Training Branch.

By GARY SPINK

A slice of life

Certain grains and legumes could play a key role in improving the health of menopausal women, according to a recent study.

The study, by Monash University and the Royal Women's Hospital, showed that phytoestrogens in the diets of menopausal women led to fewer menopausal symptoms and could result in improved bone density, decreased risk of cardiovascular disease and even protection against cancer.

In its first week on the market, 500,000 loaves were sold, and the bread will soon be on supermarket shelves in the US, Europe and New Zealand.

Phytoestrogens occur in some plant foods and are chemically similar to oestrogens, which humans produce naturally. They are found mainly in grains and legumes such as soy beans and linseed.

The study was carried out by the head of Monash's Department of Medicine, Professor Mark Wahlqvist, together with a team of specialists from the Perinatal Research Centre at the Royal Women's Hospital, the Jean Hailes Foundation, the Victorian Cytology Service and the Body Composition Laboratory at Monash Medical Centre.

Fifty-two menopausal women were put into two groups. One group ate soy/wheat bread which gave them a daily intake of 45 grams of soy grits and 45 grams of wheat (which contains phytoestrogens, but at a lower level than soy or linseed), while the other group ate bread which gave them the same intake of linseed and wheat.

The study, which was conducted over two 12-week periods, assessed urinary phytoestrogen levels, hot flushes, vaginal cytology, and bone mineral density and content.

The soy/wheat group experienced a significant improvement in vaginal lining as well as increased bone mineral content, while the linseed/wheat group experienced fewer hot flushes.

The results encouraged research sponsor George Weston Foods to release a new bread containing soy, linseed and cracked wheat.

In its first week on the market, 500,000 loaves were sold, and the bread will soon be on supermarket shelves in the US, Europe and New Zealand.

The research is the latest in a series of studies which Professor Wahlqvist began in the late 1980s.

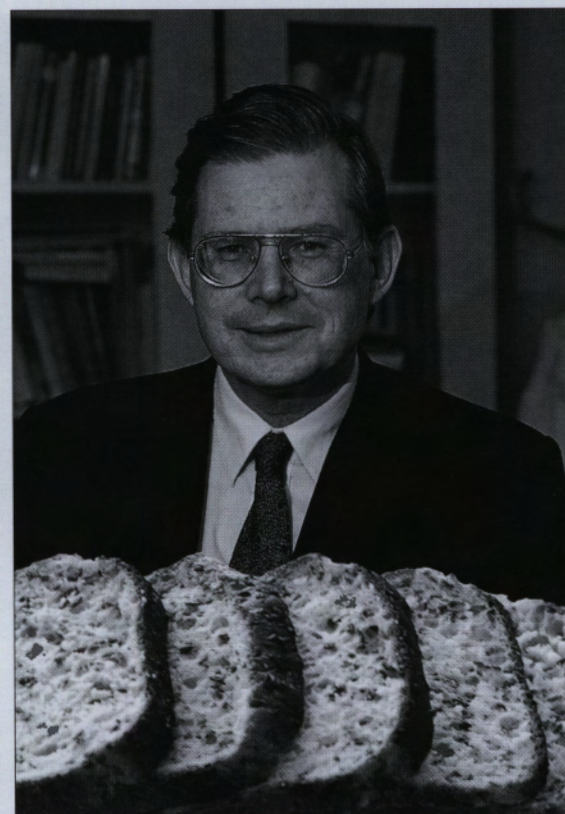
He had always been intrigued by the research findings of agricultural scientist Professor Eric Underwood from the University of New South Wales, who in 1949 had published works showing that clover altered fertility in sheep and therefore might hold oestrogenic properties.

"Professor Underwood was the first to suggest that certain foods could have hormonal-like properties," Professor Wahlqvist said. "We thought it would be interesting to see if these foods affected humans in a similar way."

Professor Wahlqvist first began testing oestrogen-deficient menopausal women, using soy flour, linseed and red clover sprouts. In 1990, he and his group published a report in the *British Medical Journal* demonstrating that the levels of FSH in the women (the hormone from the pituitary gland which increases during menopause) decreased after two weeks of taking any of the foods.

"The fact that the foods being tested suppressed FSH showed they were oestrogenic," he said.

"We were looking at oestrogen compounds that had the ability to work like oestrogen on some tissues, such as the



Professor Mark Wahlqvist.

vagina and the pituitary, but as anti-oestrogens on tissues such as the breast."

Other recent studies have indicated that the incidence of breast cancer in Asian women was directly related to how much soy they ate.

Other recent studies have indicated that the incidence of breast cancer in Asian women was directly related to how much soy they ate.

Professor Wahlqvist believed phytoestrogens may also be effective in reducing the incidence of prostate cancer in men. "Recent studies have indicated that soy may be linked to a low rate of prostate cancer in Asian men. But we are not yet sure that phytoestrogens can help guard against this illness – more work needs to be done."

BY DEBORAH MORRIS

Family ties

Family and private businesses are worth an estimated \$1.2 trillion – three times the value of all Australian-based companies listed on the stock exchange, according to a major Monash University research report.

But only one in three family businesses will survive after the first generation, according to the Australian Family and Private Business Survey 1997 by researchers from Monash's Department of Accounting and Finance.

And the survey shows that despite being the backbone of the Australian economy, the sector's long-term outlook is uncertain.



"The message is that if this change is not managed properly, it could have a devastating impact on the Australian economy," he said.

In order to produce a comprehensive profile of the sector, the researchers estimated the wealth of businesses in the hands of first, second, third and fourth generations.

They found that first generation businesses were valued at \$690 billion, second generation at \$293 billion, and third and fourth generations at \$170 billion.

The study predicts that in the next decade nearly half (47 per cent) of first generation family businesses will sell up, with 39 per cent of second generation businesses and 26 per cent of third and fourth generations also planning to sell.

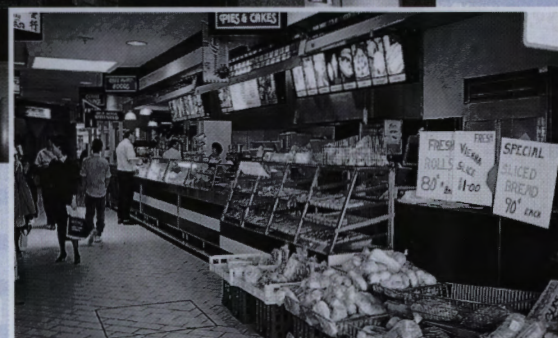
Dr Smyrnios said this was largely because people were more interested in operating a business to suit their lifestyles rather than for the long-term interests of their families.

Professor Romano said the primary objectives of small businesses were to grow quickly, accumulate wealth, increase in value and then sell.

"Of those first generation family companies not planning to exit the business, about 30 per cent made it to the second generation, and of those less than 50 per cent were passed on to a third generation," he said.

The main reasons cited by multiple generation owners for selling up were their concerns for the future of their businesses and the lack of an appropriate family successor.

"Among their key concerns are competition, the availability and suitability of family members to carry on the business, and the threat of family conflict.



"At the same time, most businesses don't have any formal mechanisms to deal with these problems," Professor Romano said.

Dr Smyrnios said family businesses also identified a lack of support services to meet their broad financial and strategic planning needs and indicated a reluctance to deal with the major banks. This reluctance was possibly a reaction to the 1980s when the banks were seen to have been unsympathetic to business.

Family businesses needed a diverse range of services, such as strategic and retirement planning, conflict resolution and financial and taxation advice. They either relied on their accountants or simply left the survival of their operations to chance.

The firms that responded had an average of 34 full-time employees, indicating that private business does not necessarily mean small.

Large organisations such as Murdoch's News Corporation, Bob Jane T-Mart and the Moran Health Care Group are all Australian family businesses.

The survey also revealed that only 3 to 5 per cent of private and family businesses were owned by women.

In response to the findings, National Mutual has signalled the formation of a foundation for family and private business to provide further research, information and education. Details of the foundation are being finalised and are expected to be announced shortly.

BY BRENDA HARKNESS



More than half of the 1160 businesses surveyed said they were concerned for their future, about 80 per cent of first and second generation firms did not have a written business plan, and about one-third said they had no succession plans for future ownership.

The research, the first to quantify the worth of family and private businesses to the Australian economy, was undertaken by Dr Kosmas Smyrnios, Professor Claudio Romano and Dr George Tanewski, supported by National Mutual.

Their findings were based on the responses to 250 questions sent to more than 5000 businesses randomly selected through Dun & Bradstreet. The response rate of more than one-third was consistent with international research.

Dr Smyrnios said the findings were significant as the survey showed that an estimated \$607 billion of wealth in family businesses would have a change in ownership or management control in the next 10 years.

Sydney 2000 – no easy road to gold

Businesses expecting to make a quick fortune out of the Sydney Olympics are likely to be disappointed, an international study warns.

The report, by Monash University senior marketing lecturer Mr Siva Muthaly and co-authors Dr Gary Roberts and Ms Carlotta Roberts of Georgia's Kennesaw State University, highlights the lessons learned by both successful and unsuccessful small businesses during the 1996 Olympic Games in Atlanta.

"If businesses hope to make a quick buck in a short time, it won't be an easy task," Mr Muthaly said.

"The businesses most likely to be successful will be those that are already well-established and have surplus funds to deploy into new ventures in which they can afford to take risks."

The researchers interviewed small business operators and drew on a wide range of other data to profile the factors most likely to contribute to the success or failure of businesses.

The findings have been detailed in their report *Small Business and the Atlanta Centennial Olympics – Lessons and Implications for the Sydney Olympics*.

"When Atlanta was awarded the Games, its business community expected major profits to flow on from increased business generated by the event's 2.5 million visitors," Mr Muthaly said.

"Not only was the City of Atlanta expected to directly benefit, but outlying areas within 100 miles of Atlanta were told by the Atlanta Committee for the Olympic Games (ACOG) that they would profit from the event."

Basing projections on the experiences in Barcelona, where thousands of tourists each day visited towns more than 100 miles away from the city, ACOG raised the hopes of many small business owners. But many eventually saw those hopes dashed, and some were financially ruined.

What went wrong and how can the Sydney Committee for the Olympic Games (SCOG) help small businesses avoid the same mistakes?

Mr Muthaly believes there are two key issues: Small business operators must understand and operate through good business practices, and the Sydney Committee should look at infrastructure planning and management issues such as traffic flow, transport and licences for vendors.

"Our survey showed that the more established the business, the higher the probability for success," he said.

"Niche players that carefully managed their risk seemed to fare very well. And wholesale businesses tended to do better than retail, especially those that insisted on cash as their terms of trade, or at the very least a bank guarantee."

A major problem for many of Atlanta's small businesses was the number of peddlers operating during the Games.

"The Atlanta authorities allowed scores of unlicensed vendors to operate

during the event, creating a frenzy of competition and causing major problems for small businesses," Mr Muthaly said.

And unplanned road closures – some actually diverting the flow of tourists away from prime inner-city locations which vendors had leased at premium rates – brought many small business operators to their knees.

"Established organisations should start working with the Sydney Committee now," Mr Muthaly said. "Master plans should be drawn up so that rules and regulations will be in place very much ahead of the time."

He said tourists had not been persuaded to travel outside of Atlanta, leaving millions of potential tourist dollars unspent. The same scenario can be avoided with forethought.

He believed travel agents and tour companies should already be assessing demand and developing appropriate product ranges.

"They could try to set up special packages where the airfare would include an add-on at the end of the Games.

"ACOG expected people would be travelling to satellite cities around Atlanta, but no one turned up. This time, the travel industry could be looking at selling outside Sydney."

BY DEBORAH MORRIS



Rare old times

In need of a cure for that battle wound, a remedy for rabies or a practical treatment for "windy melancholy"?

Seventeenth-century alchemist-cum-diplomat Sir Kenelm Digby swore by a dose of "sympathy powder" (also known as "weapon salve"), which was applied to the weapon that made the wound to aid the healing process.

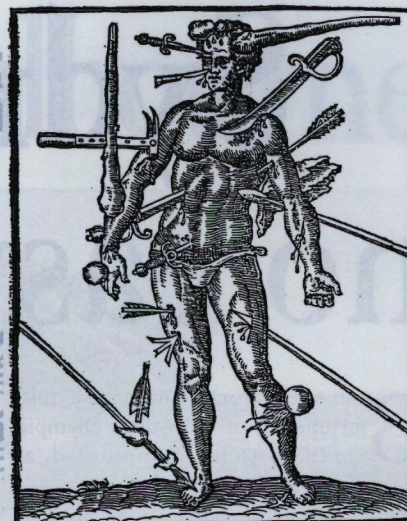
About a century later Dr Joseph Dalby extolled the virtues of a powder of cinnabar and musk mixed into a mortar with butter and formed into a ball as a cure for the bite of a mad dog, and a reported 16th-century cure-all for "the offending wind of a man's [sic] body" was a draught made from cummin powder, anniseeds and other herbs boiled in a pint of wine.

These wonders of early medicine for the treatment of everything from obscure illnesses to everyday complaints can be found in Monash's Rare Book Collection in the Sir Louis Matheson Library on the university's Clayton campus.

While the collection of titles and subjects is extensive, the university is recognised as one of the major Australian archives of medical books, including the Australian Medical Association's collection of medical history texts.

According to rare books librarian Mr Richard Overall, the collection's strength is 17th and 18th-century English books, but it also boasts substantial holdings of 19th and 20th-century Australian.

Among these local assets are a few surviving sets of Ferdinand von Mueller's



Title page vignette from *An Explanation of the Fashion and Use of Three and Fifty Instruments of Chirurgery (surgery)*, 1631 – one of the publications in the Monash Rare Book Collection.

Educational Collections of Australian Plants, as well as von Mueller's own extra-illustrated set of *Flora Australiensis*.

A Little History of Australia

By Mark Peel

Published by Melbourne University Press

RRP \$9.95

When the late Professor Manning Clark chronicled our past, he produced a bookshelf-bending work that ran to six volumes. Monash historian Dr Mark Peel has told the nation's story in 88 pages.

"Some thought writing a history of Australia in 10,000 words was a crazy idea. After reading this book some still might," Dr Peel said.

His pocket-sized effort is written in a witty style, but it is a serious attempt to show how Australian history was shaped by the imagination, thoughts and aspirations of those who lived it.

"Australia's history is not just what happened, nor even how it did. It traces the paths not taken, and the futures which, for good reasons and bad, did not come to be," he said.

Some little bits of *A Little History of Australia*:

"In the seventeenth century, European ships stumbled and sometimes broke themselves upon the reefs of the north-west coast. Convinced there were rich lands

south of the East Indies, others searched more purposefully."

"Most observers noted that Aboriginals expressed little desire to assimilate into European society. Instead, they expected Europeans either to move on, or to recognise the superiority of Aboriginal ways. But that prospect receded as the settlers kept coming and Aboriginals realised that these newcomers wanted to own the land, not share it."

Food & Nutrition

Edited by Mark Wahlqvist

Published by Allen and Unwin

RRP \$49.95

This successor to the highly acclaimed *Food and Nutrition in Australia* is a comprehensive introduction to nutrition and dietetics.

The book focuses on issues and data from throughout the Australian, Asian and Pacific regions, covering topics ranging from the processing of food to its role in culture and evolution.

Designed to serve as a student text and handy professional reference, it also includes much of interest to the lay reader (presuming that the lay reader is interested in things like 'the role of the potato in human history' and 'foods, physical activity and sport').

Professor Mark Wahlqvist is head of Monash's Department of Medicine, a member of the World Health Organisation Nutrition Advisory Committee and national chairperson of the Australian Nutrition Foundation.

Opening Education

Edited by Terry Evans and Daryl Nation

Published by Routledge

RRP \$39.95

The editors have put together a collection of works that examine global efforts to create educational technologies suited to learners in a society with ever-changing needs and expectations.

The overall theme is the relationship between government and organisational policies and the work of practitioners in open and distance learning.

Recognised experts explore a selection of international examples, many of which concern the use of new technologies in education.

Associate Professor Daryl Nation is deputy head of Monash's School of Humanities and Social Sciences, while his co-editor is director of research and head of the Graduate School in Deakin University's Education faculty.

NOW & THEN

Recently

Monash University's reproductive biologists recently announced a breakthrough in their cattle cloning research that was first featured in *Montage* in November 1995.



Designer genes

Reproductive biologists at Monash University have announced a breakthrough in their cattle cloning research that was first featured in *Montage* in November 1995. The research team, led by Professor Alan Trounson from the university's Institute of Reproduction and Development, has managed to create almost 500 healthy clones from a single cow embryo. Nobody had previously managed to create more than 100.

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The success stems from the team's ongoing refinement of a technique known as embryo multiplication and transfer (EMT). Embryos taken from potentially superior cows were allowed to develop to the 20 to 40-cell stage before being split into separate cells.

Using electric current, each identical cell was then fused with a cattle egg cell which had had all DNA removed. The resulting embryos were then grown and the process repeated until hundreds of identical embryos were obtained.

The researchers believe their work could eventually be used to dramatically boost beef and dairy production by improving the genetic potential of stock many times faster than is possible with current artificial breeding techniques.

Genetics Australia, a farmers co-operative and the nation's biggest artificial cattle breeding centre, has formed a partnership with the Monash researchers.

Separate EMT trials by the team have already produced six calves (and about 20 continuing pregnancies) and their progress is being monitored.

This Month Last Year

A Monash study has found that the number of arrests of Aboriginal youths continues to rise at an alarming rate.

A paper by Koorie Research Centre research fellow Mr Michael Mackay showed a 46 per cent jump in the rate of police processing of Aboriginal youth between 1993 and 1995.

Police processing of non-Aboriginal youth in the same period rose by less than 5 per cent.

5 Years Ago

An analysis of prehistoric pollen and charcoal collected by a Monash researcher from the ocean floor off the Great Barrier Reef could rewrite the history of Australia's human colonisation.

Dr Peter Kershaw from the Department of Geography and Environmental Science believes the abrupt change in rainforest pollen patterns in a drill core from the edge of the continental shelf, 80 km east of Cairns, can be attributed to human disturbance of the environment 140,000 years ago.

The surprise discovery suggests that Australia was inhabited by humans 80,000 years earlier than previously thought.

15 Years Ago

The university's Centre for Human Bioethics held Australia's first national conference on in-vitro fertilisation.

On the same day, the Victorian Government announced that it was establishing an inquiry into the social and ethical implications of 'test-tube baby' programs.

The inquiry was chaired by the state's law reform commissioner, Professor Louis Waller, who is on leave from Monash's Law faculty.

25 Years Ago

Two Monash students broke the Australian record for the most number of parachute jumps in one day.

Arts student Bob Courtenay and Law student John Parker made 52 jumps each to break the old record by two – which meant they jumped at an average of once every 12 minutes for nearly 11 hours.

The president and vice-president of the Monash Skydiving Club used the money raised by the 'jumpathon' to pay off a Union loan for a parachute packing shed.

A bitter pill for rural Australia

From *Montage* 16

political party that proposed changes to the present arrangements would be taking a grave electoral risk.

There are also grounds for concern deriving from the US experience with free market health policies. In the US, a reliance on private insurance and a proliferation of costly specialist services has resulted in a very expensive health care system which accounts for about 14 per cent of GDP (compared with 8.4 per cent in Australia).

Nor has a rapid increase in US doctor numbers solved the problems of cost and GP distribution.

On this evidence, reform built around market place incentives hardly seems an appropriate solution. Ironically, the current trend in the US is towards our centrally planned health care arrangements, via health management organisations which coordinate the allocation of medical services.

There is a strong political, moral and perhaps efficiency case for retaining the Medicare system in Australia, but if the recent government initiatives are not to exacerbate the distribution problem they will have to be accompanied by the rationing of Medicare provider rights so as to ensure that the reduced number of new GPs do not set up in oversupplied areas.

The moral justification is clear. The Australian community pays for most of the training costs of doctors and promptly pays all their service bills once the doctors begin practising, thus ensuring high incomes by the standards of other professions.

Doctors are, in effect, public servants. It is therefore not unreasonable for them to serve where they are actually needed.

Dr Bob Birrell is director of Monash University's Centre for Population and Urban Research. A full report of this research was published in the March edition of the centre's journal *People and Place*.

A bitter pill for rural Australia

Restricting doctors' access to Medicare billing rights may reduce national health expenditure, but at what cost to rural Australia, asks Dr Bob Birrell.

Australia is suffering from a well documented inequitable distribution of doctors.

The Royal Australian College of General Practitioners (RACGP) believes there should be a ratio of one doctor for every 1500 people for good medicine to be practised. Currently, there is one full-time equivalent GP for every 1000 residents of Australian capital cities, while our small rural communities have to make do with a ratio of 1:1700.

This inequity is likely to worsen under recently passed federal legislation designed to limit the overall number of practising GPs. The undersupply of GPs practising in rural areas is unlikely to be rectified until the government uses geographical restrictions on Medicare provider numbers.

With the passage of the government's legislation, graduates from Australian medical faculties can no longer practise as GPs without entering the RACGP training program.

In the past, no postgraduate training was required to become a GP provider on the Medicare system.

It is not surprising that the 1996 interns and medical students protested. Gone are the days when a recently registered doctor could put off applying for a training place course and enter an entrepreneurial clinic and earn at least \$100,000 (expense free) if they were prepared to do night and weekend shifts.

By comparison, doctors in RACGP training earn between \$40,000 and \$60,000 a year – including income from Medicare billings while in GP placements.

The government's main aim is to reduce the budgetary costs of Medicare by limiting the supply of GPs. It appears likely to succeed in this endeavour, but in the process may exacerbate the already serious under-representation of GPs in rural and remote areas.

The RACGP has limited the annual intake into its three-year program to 400.

This is just over half the average number of doctors who registered as GPs in Australia every year between 1991 and 1995.

What are those doctors who previously would have entered general practice now going to do?

Between 1100 and 1200 locals will graduate annually over the next few years. Their numbers will be augmented by the more than 200 overseas-trained doctors per year expected to pass through the Australian Medical Council accreditation process.

For those without a training place the future is a salaried career in the hospital system. While this is bad news for doctors expecting access to government-guaranteed fee-for-service medicine, it is good news for non-metropolitan hospitals struggling to fill medical officer positions.

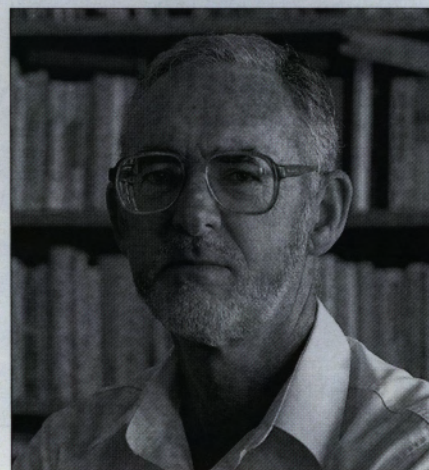
But the good news for country Australians is short-lived when we consider the implications for general practice services.

Government success in slowing the rate of growth of GP numbers means that new registrants will have even less incentive to locate outside metropolitan areas because there will be some abatement in the intense competition for metropolitan patients.

In the absence of further measures to ensure a more equal distribution of doctors, the existing maldistribution will worsen. The government has offered some additional RACGP training places for doctors promising to practise in rural areas, but the restrictions on practice location will probably mean few will take up the offer.

Australian Health Insurance Commission data shows that most of the areas with the very lowest population-to-doctor ratios are the affluent inner and middle suburbs of our capital cities.

If GPs practising in these areas were struggling to win patients, we would expect to find them providing relatively few services. But an examination of Medicare servicing patterns shows that more than



half of these GPs billed for more than 8000 services in 1995–96.

At the average fee charged currently of about \$24, this is equivalent to a gross yearly income of at least \$192,000.

The evidence of such high billings in 'over-doctored' areas implies there must be considerable overservicing. But the unfortunate conclusion is that if so many GPs can flourish in such areas in present conditions, they will be even less likely to move in the future to underserved areas unless the incentives to do so are truly princely.

Put simply, government success in dealing with its number one priority – reducing the number of doctors billing on Medicare – is likely to be achieved at the cost of its number two priority, that of achieving a fairer distribution of the GP workforce.

Opinions on what to do about the problem tend to be polarised.

On the one hand there are the economic rationalists who argue for the abolition of centrally-planned health care, and for its replacement with a free market approach.

They believe that the Medicare system is hopelessly flawed because there are no financial constraints on people seeking medical services, and that the Australian public would be better served if patients paid their own bills through private insurance.

On the other hand there are those who believe that public provision of health care without reference to private means is an important element in Australians' quality of life. Opinion polls have repeatedly shown most voters feel this way, so any

Continued on Montage 15