September 2005

La Trobe
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Bulletin

Finding a face in the crowd

Alcohol's effect on the brain

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IN THIS ISSUE

Research in Action

Crime prediction and health screening - just two aspects of research related to Knowledge-based Intelligent Information and Engineering Systems at a conference hosted by La Trobe University, see page 6.

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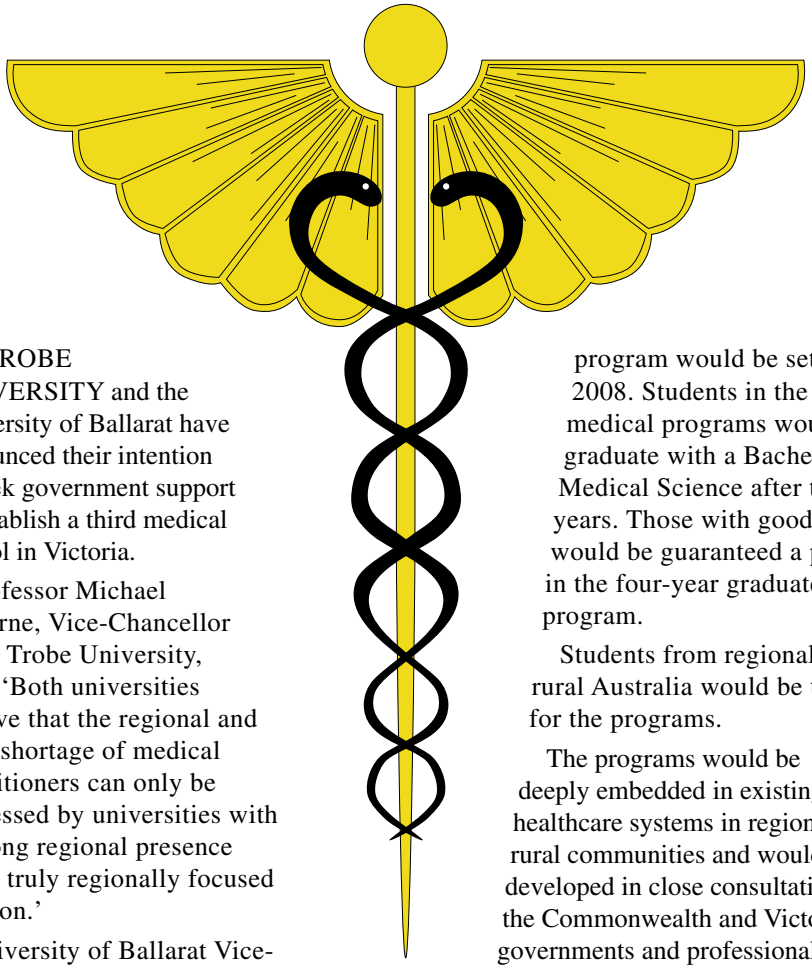
Joint bid for regional & rural medical school



LA TROBE UNIVERSITY and the University of Ballarat have announced their intention to seek government support to establish a third medical school in Victoria.

Professor Michael Osborne, Vice-Chancellor of La Trobe University, said: 'Both universities believe that the regional and rural shortage of medical practitioners can only be addressed by universities with a strong regional presence and a truly regionally focused mission.'

University of Ballarat Vice-Chancellor, Professor Kerry Cox, said: 'Together the two universities are uniquely placed to establish a regional and rural medical program. Combined we have eight campuses across western and northern Victoria and strong associations with hospitals throughout the State.'

Professor Osborne emphasised that the aim of the proposal was not to transplant a metropolitan program into a regional setting since this would not address the national problem of a shortage of regional and rural medical practitioners.

The proposal sees the two universities offering pre-medical programs as well as a jointly run graduate entry medical program based at Ballarat and Bendigo.

The first intake into the pre-medical programs would be in 2007 and the first intake into the graduate entry program would be set for 2008. Students in the pre-medical programs would graduate with a Bachelor of Medical Science after three years. Those with good results would be guaranteed a place in the four-year graduate entry program.

Students from regional and rural Australia would be targeted for the programs.

The programs would be deeply embedded in existing healthcare systems in regional and rural communities and would be developed in close consultation with the Commonwealth and Victorian governments and professional associations, including the Australian Medical Association and the Society of General Practitioners.

Professor Osborne: co-operation to address the problem of a shortage of medical practitioners in regional and rural Australia.

Generous scholarships

for nanotechnology science students

FIVE OF THE STUDENTS accepted into the La Trobe University Bachelor of Nanotechnology/Bachelor of Science double degree in 2006 will each receive a $6,000 scholarship.

The money comes without strings. Winners of the Entrance Scholarship Program may use the money for any aspect of their study or living expenses.

'This is an exceptional course and we want to support the outstanding students it is attracting,' said Dr Paul Pigram, Associate Professor in Physics and co-ordinator of the Nanotechnology course.

The four-year Nanotechnology/Science double degree started in 2005 to blend the emerging disciplines of nanotechnology with a double major in the key enabling sciences of physics and chemistry.

Dr Pigram said the course would attract students interested in the development of new science and new technologies based on the manipulation of atoms and molecules.

'Our program aims to provide students with a broad education in disciplines that will underpin the science and technology, in particular nanotechnology, in the coming years.

'Its structure provides full coverage of subject areas, avoiding the compromises of shorter niche degrees where the supporting sciences are reduced to include the nanotechnology units.

'Students attracted to this course will have a strong VCE background and general interest in physics, chemistry, and mathematics together with an interest in making connections to biological systems.

'We believe the course promises stimulating science and a rewarding career path, leading to careers in industry or research.

'Developments in the field of nanotechnology are proceeding rapidly with the deployment of new devices, improved medical science and control of materials in the nano range.

'The scholarships are sponsored by Nanotechnology Victoria, RealTek Technologies / EV Group, and La Trobe University's Faculty of Science Technology and Engineering and School of Engineering and Mathematical Sciences,' Dr Pigram added.

The program is open to students studying for the VCE, an interstate Year 12 equivalent, or the International Baccalaureate. Additional eligibility requirements apply.

Full details including application materials, eligibility requirements, selection criteria and scholarship conditions are available at: www.latrobe.edu.au/nanotechnology/scholarships.

JOHN FURPHY MEMORIAL LECTURE

La Trobe University recently presented the Inaugural John Furphy Memorial Lecture at its Shepparton Campus. Titled *The Parthenon throughout the Ages*, the lecture was delivered by the Vice-Chancellor, Professor Michael Osborne.

Professor Osborne is an epigrapher and historian, whose research has given us new understandings of life in ancient Athens. Among his works are the four volumes of *Naturalization in Athens* (1981-83) with Sean Byrne and *Lexicon of Greek Person Names, II: Attica* (1994).

Professor Osborne's work has earned him many distinctions, including an Honorary Doctorate from Athens University and Fellowship of the Australian Academy of the Humanities, an Aristotle Award for Services to Hellenic Studies and an Alexander S. Onassis Research Fellowship.

The John Furphy Memorial Lecture has been established in memory of John Furphy (1842-1920), a man very successful at adapting farm machinery to suit the dry conditions of the Goulburn Valley. His iron swingletree, spike roller, and grain stripper were among his notable early products.

His greatest success, however, was the Furphy water cart which made the family name a household word in farming districts of south-eastern Australia by the time of the First World War. During the war, through the association of the water cart with rumour, 'furphy' emerged as soldier's slang. In 1985 the cart was acclaimed by the Institution of Engineers, Australia as an 'outstanding example of agricultural engineering ingenuity'.

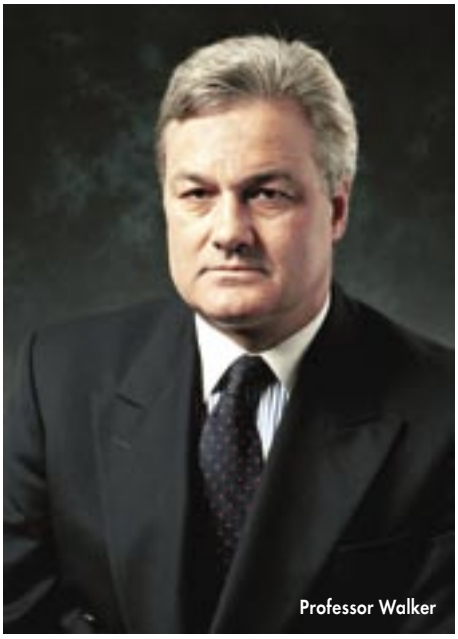
John Furphy expressed his philosophy in his 'Good better best' message on the cast iron ends of the water tank. He took his sons into partnership in 1893, and the firm of J. Furphy & Sons continues in Shepparton today.

A new book which challenges many furphies about the origin of the word 'furphy'- and gives a 'full and authentic account' of the history of the famous water cart - will be published in October. It has been written by La Trobe Emeritus Professor in English, John Barnes, and Andrew Furphy, a descendent of John Furphy.

The authors say the water carts, made for over 90 years, are now collectors' items. Their tank ends, with intriguing moral and political messages in cast iron, are prized as wall plaques. 'In the eyes of later generations they symbolise a rural past of simple verities and individual effort.'

The book, to be distributed by Woods Lane Pty Ltd, will be available from bookstores or www.furphys.com.au

Water carts leave the factory circa 1900.


Professor Walker

La Trobe Law goes global in a big way

La Trobe University's Masters program in Global Business Law is going global in a big way – with fourteen leading American and European legal academics teaching units in 2005 and 2006.

Designed for domestic students and overseas students with a suitable law degree from their home jurisdiction, La Trobe University Professor of Law, Gordon Walker, says the LLM in Global Business Law has proved extremely popular, particularly among foreign lawyers seeking admission to practice in Australia.

The degree, by coursework, can be completed in two semesters or less and is delivered in 'block release' mode.

Units for summer 2005-2006 and winter 2006 range from competition law, US entertainment, contracts, torts, asset securitisation, securities regulation and antitrust law to Chinese company and securities law, international commercial arbitration and an introduction to European Union law.

Professor Walker says the units can also be taken as electives by final year undergraduate La Trobe law students.

Further information from Professor Walker, Tel: (03) 9479 1462 Email: Gordon.Walker@latrobe.edu.au

Two million dollars FOR A GOOD WALK

La Trobe University is one of five leading Melbourne research organisations to participate in a National Health and Medical Research Council Centre for Clinical Research Excellence (CCRE) grant of $2 million over five years to help people with disabilities walk better.

Federal Treasurer, Mr Peter Costello, and Dame Elisabeth Murdoch, patron of the Murdoch Children's Research Institute at the Royal Children's Hospital (RCH), recently opened the Centre for Research into Gait Analysis.

The five organisations will participate in a wide spectrum of research on two aspects of walking – clinical gait analysis, designed to further understanding of how humans walk, and gait rehabilitation, aimed at ascertaining how best to help people with walking problems.

The grant underscores Melbourne's position as the only city in the world with five international standard clinical gait analysis laboratories. Other organisations involved are Melbourne and Monash universities, RCH, and the Kingston Centre in Cheltenham.

La Trobe University's Musculoskeletal Research Centre and the School of Physiotherapy will be involved in research that employs movie and computer game technology to help improve mobility for patients with cerebral palsy, Parkinson's disease, osteoarthritis, stroke and sporting injuries.

Gait analysis uses high technology equipment to asses how people with disabilities walk.

'The goal is to improve the health of Australians through promoting clinical research into nine general areas,' says the leader of La Trobe's team, Dr Kate Webster, a Senior Research Fellow in the Musculoskeletal Research Centre.

Dr Webster, who works on knee replacement research with industry, said the nine areas included improving our general knowledge of measurement, the functional changes that accompany a syndrome or disease, and rehabilitation of walking.

'Other aspects to be examined include improving our knowledge of the cause of gait disorders and musculoskeletal conditions, establishing evidence for gait analysis and multi-disciplinary treatment of gait disorders and using this knowledge to help people maximise walking ability.

'The funds will also help to train clinicians in medicine, surgery, biomechanics and allied health areas, to foster international research with clinical and industry partners, to improve resource use, and to disseminate the knowledge generated from all parts of the program.

'The equipment the CCRE will have available will enable us to examine the walking process across the entire life span. We can study kicking babies, which is a precursor to walking, right through adolescence and adulthood to old age,' Dr Webster added.

European Union award winners

La Trobe University's contribution to studies of the European Union in Australia were recognised recently by the Delegation of the European Commission to Australia and New Zealand with the award of two new student prizes.

Winners were Patrick Boyd, third year Law-Arts (left), and Karen Zipkas, second year International Relations. Mr Boyd wrote his principal essay on the European Court of Justice, while Ms Zipkas' work was on the significance of agricultural issues in the negotiations for admission of central and eastern European countries.

The prizes were awarded by the European Union Ambassador to Australia, Mr Piergiorgio Mazzocchi (centre), and the Counsellor at the Embassy, Mr Paul Strickland.

Dean of Humanities and Social Sciences, Professor Roger Wales, said La Trobe second and third year subject, The European Union, was introduced two years ago as a core component for the new degree, Bachelor of Arts in Contemporary European Studies. 'It is possibly the only one which anchors the contemporary development of the European Union so strongly in an historical framework. It has attracted between 60 and 80 excellent students. This year 21 students achieved A-grades. Another feature is its emphasis on guest lecturers with first-hand experience of the European Union – diplomats, business people, and visiting academics.'

The subject is also taken by many Bachelor of International Relations students and those majoring in History and Politics in the Bachelor of Arts.

Acknowledging the generous contribution of the European Commission to the development of the course, Professor Wales said the University looked forward to continuing its strong relationship with the EU in responding to the popularity amongst students of its European course offerings.

Crime prediction and public health

Global research conference highlights latest in Intelligent Information and Engineering Systems

ONE OF THE LARGEST information technology conferences ever held in Melbourne – the International Conference on Knowledge-based Intelligent Information and Engineering Systems (KES 2005) – is being hosted by La Trobe University's School of Business in September.

The conference involves some 700 delegates from more than 40 countries, many from the Asia-Pacific region. Intelligent Information and Engineering systems, says the conference's general chairperson, Dr Rajiv Khosla, cover applications in an enormous range of endeavour, from finance, banking, tourism, manufacturing and automation to health care, bioinformatics, medical and general diagnosis – as well as security and defence.

News about the latest developments is being delivered by researchers from 400 universities and from industry bodies world-wide, such as the Australia's CSIRO and DSTO; Daewoo from South Korea; Hitachi and NTT, Japan; and Vimtech, Spain.

Dr Khosla, Associate Professor in the School of Business on the University's main Melbourne campus at Bundoora, says about 100 technical sessions demonstrate 'how far intelligent systems have come in translating research into commercial applications in practically all areas of business, commerce and engineering.'

While the main conference venue is at Hilton on the Park in Melbourne, prominent researchers from Harvard University, Tokyo University, Rensselaer Polytechnic Institute in New York, and other institutions are also presenting seminars at the La Trobe University Business Systems and Knowledge Modelling (BSKM) Research Laboratory.

Business Systems and Knowledge Modelling Laboratory

The laboratory, an externally funded research group, is headed by Dr Khosla. It comprises six postgraduate researchers, research assistants and 15 external research affiliates and collaborators from industry and from institutions in Japan, USA, and Europe.

The laboratory engages in applied research and develops IT products and prototypes for commercial applications. Some examples are:

Emotionally Intelligent Smart Recruitment Systems: 'Emotions,' says Dr Khosla, 'form an important component of human behaviour and decision making. The aim of this research is to design and develop a smart sales recruitment and benchmarking tool which will provide HR managers and recruitment agencies with psychological profiles of selling behaviour and the emotional state of sales candidates.'

The technique involves analysis of video images of the candidates. The work also has implications for 'web personalisation' – e-shopping, e-tourism and internet based decision support systems in general. An earlier version of this system was commercialised seven years ago.

On-line Environmental Benchmarking System for Consumer Manufacturing: The aim of this project is to help consumers make choices that might encourage them to buy more environmentally-friendly products. 'Such systems can also be useful for policy makers and regulators in determining industry and product benchmarking, and might lead to cleaner manufacturing processes.' he says.

Besides Dr Khosla, other key figures in this research project include Dr Clare D'Souza from La Trobe University and Dr Mehdi Taghian, now at Deakin University.

Face Detection and Annotation in Natural and Complex Settings: Finding faces in crowds and analysing facial expressions – such as in recent video footage from London underground train stations – is an important problem to be solved for large-scale security screening world-wide.

Dr Khosla's team is developing a system which uses co-operating image processing agents to hone in on certain critical parts of faces.

Automated Diagnostic System for Analysis of Serious Pathological Conditions: Demand for rapid analysis of specimens for diagnostic medicine is increasing dramatically. Dr Khosla says most automated diagnostic systems are used with stained specimens, a process that can interfere with cell characteristics.

'We have developed an accurate method of identifying unstained human cell images for serious pathological conditions such as breast cancer, where a pathologist looks at the grade or the appearance of potential cancer cells under a microscope, and in Chronic Myeloid Leukaemia, where the morphology of the white blood cells changes dramatically.'

Details about the La Trobe University Business Systems and Knowledge Modelling Laboratory can be found on http://www.latrobe.edu.au/bskm

SUPERSIZE ME

The effects of junk food on seagulls

WE THROW THEM FOOD SCRAPS and they swarm in thousands scrounging food from rubbish dumps.

Seagulls love junk food but what effect does it have on their health? PhD student Ms Heidi Auman is trying to answer that question.

She has spent 17 years focusing on human impacts on seabirds and has done research in the US Great Lakes, Midway Island and Heard Island. She is now concentrating on seagulls – more correctly known as Silver Gulls – in two Tasmanian locations.

Although a student at the University of Tasmania, Ms Auman's research supervisor is Dr Catherine Meathrel, head of the Marine Ornithology Group in La Trobe University's Department of Environmental Management and Ecology at the Albury/Wodonga campus.

Ms Auman's PhD research title is: *Effects of anthropogenic food sources on the body condition, chemistry and stable-isotopes of blood in Tasmanian Silver Gulls*.

'This is commonly called Supersize Me: The Effects of Junk Food on Seagulls,' says Ms Auman who finds that a sense of humour and tolerance for the occasional anti-social habits of seagulls helps her work.

'My aim is to assess the effects of human-sourced food from tips and restaurant handouts on Silver Gulls. It has been widely assumed that an increase in consumption of human-derived food is beneficial and has caused an increase in gull populations, but this has not been tested scientifically.

'I am measuring the health effects of differing diets by comparing several health indicators between remote "natural" (Furneaux Island Group) and urban (Hobart) gull colonies.'

Her research aims are three-fold. The first is to establish baseline reference data on blood chemistry and stable-isotopes for Silver Gulls. Secondly she wants to compare several health parameters between the two populations, and thirdly to measure effects of anthropogenic food on the size, weight and nutrient content of their eggs.

The four procedures she will use are blood biochemistry (cholesterol, triglycerides, lipoproteins, glucose and insulin), stable-isotopes (13C/12C and 15N/14N), body condition indices (physical measurements), and chemical analyses of eggs.

'I tell most people that I study "garbivory" in seagulls,' says Ms Auman who has an MSc from Michigan State University and who chose Dr Meathrel as her research supervisor because of her extensive knowledge of Silver Gulls. She has a world-wide reputation and a generous ability to take students "under her wing" if you will pardon the bird pun.

'Many people have negative reactions to the familiar Silver Gulls, but I view them as a highly adaptable species exploiting the abundant food that we unwittingly, or sometimes purposely, provide. Ultimately, we are responsible for any problems, whether real or perceived, with Silver Gulls.

'Holding wild birds in the hand can be a very gratifying honour, even if they bite, scratch, whitewash or regurgitate on me. In fact, I consider each gull like a Christmas gift, since I can never guess what might be inside.

'The especially interesting ones will sometimes cough up cooked chicken, mince, casserole, peas, onions, carrots, dog food, cat food, spaghetti or chips!'

Uneven pattern of ALCOHOL'S EFFECT ON THE BRAIN

SCIENTIFICALLY, getting a little under the weather is not just a question of our whole brain becoming numbed so that our central nervous system relaxes and makes us feel good.

Research at La Trobe University using eye movements to indicate alcohol's effect on the brain, has produced a surprise result not previously suspected – that alcohol taken at relatively low to moderate levels does not appear to depress the whole brain evenly.

Carefully measured doses of alcohol given in a strictly controlled exercise to healthy young male students affected only their posterior cortex – that part located at the rear of the brain which controls reflexive eye movement.

The frontal cortex, the part in the front of their brain which controls voluntary eye movement, was unaffected.

Reflexive movements are those which are used to respond to a stimulus such as the sudden arrival of something into our field of vision while voluntary movement relies on other, less obvious factors.

'The mechanism by which alcohol can affect different parts of the brain is still not fully understood and much more work needs to be done in this area,' says Dr Suzane Vassallo, who carried out the test as part of research for her PhD thesis.

An orthoptist specialising in saccadic eye movement control, Dr Vassallo is an associate lecturer and honours year co-ordinator in La Trobe's Department of Clinical Vision Sciences.

She explained that because our eyes are an extension of our brain, recording eye movements is an effective way to determine brain function. Different types of eye movement reflect activity in different parts of the brain so what happens in these parts of the brain can be gauged by analysing eye movement.

'There is some literature on the effects of alcohol on different eye movements but nothing had previously been done to ascertain the effect of alcohol on different saccadic types in the one population. A saccade is a fast eye movement, like the jerky movement we make as we look from one word to the next while reading,' she said.

With her supervisor, Dr Larry Abel, Dr Vassallo recruited 104 young healthy male student volunteers, most of whom were more than willing to participate. They were divided into four groups.

One acted as the control group and knowingly consumed no alcohol. Members of the second group thought they were drinking alcohol, but were given an effective liquid placebo instead.

Members of the third group drank 1.2 millilitres of alcohol (Vodka) per kilogram of their body weight giving them an average blood alcohol concentration (BAC) of 0.045%. Members of the fourth group drank 2.1 millilitres of alcohol per kilogram of body weight for an average BAC of 0.071%.

Before drinking the alcohol or placebo they were given a battery of eye movement tasks which were recorded using 'infra-red eye movement spectacles' to measures the emission and reception of infra red light. The tests were repeated after consuming the alcohol or placebo.

The device uses two probes – one before each eye – which measures the infra red light absorbed by the coloured part of the eye, the iris and that reflected by the white part, the sclera.

Data thus gained was processed and provided information on the latency – the length of time the brain takes to process the information and tell the eye to move. It also provided information on the speed of the eye movement and its accuracy: whether the eye reached its target or not.

'For the first time in any research of this nature we found that alcohol produced a detrimental effect on the function of the posterior cortex but none we could ascertain on the frontal cortex,' Dr Vassallo said.

'Alcohol is a readily available and widely used recreational drug and our research adds to the pool of knowledge about its effects on the brain. However the mechanism by which it can affect the operation of different parts of the brain differently is not fully understood,' she said.

In using a breathalyser to test the volunteers' blood alcohol concentrations, Dr Vassallo came across an interesting sidelight on the research.

'This was the difference in blood alcohol concentrations recorded among those who had consumed the same amount of alcohol. Those taking the low dose had concentrations between 0.02% and 0.07% BAC and those consuming the higher dose yielded results which ranged from 0.04% to 0.126% BAC.

'It just went to show that we were at the mercy of our participants' livers,' Dr Vassallo said.

Flowering by design?

THE PROSPECT OF DESIGNER crops that flower when it is most convenient for growers is significantly closer as a consequence of molecular biological research under way at La Trobe University and New Zealand's University of Otago.

Two celebrated plant geneticists – La Trobe plant biologist Dr Tony Gendall, who helped British scientists discover the regulatory effects of cold weather on the flowering time of plants, and New Zealand biotechnology research scientist Dr Richard Macknight, who cloned the flowering time gene that helped make this discovery possible – are now working together to identify similar genes and processes in agricultural crops.

The scientists met at the prestigious UK Government- funded plant research institute in Norwich, UK, the John Innes Centre, in the 1990s, where both worked as members of a team of plant geneticists researching plant reproduction.

It was at the John Innes Centre that Dr Gendall and other members of the British team discovered the extent to which many plants regulate their reproductive seasons from clues in their external environment – among them, cold weather.

It was also here that Dr Macknight cloned and characterised the FCA gene - one of the first flowering time genes ever cloned – which encodes an important regulator of plant flowering.

Since then, the scientists have independently pursued their research interests in the molecular processes that induce plant flowering time, and the genetic and environmental factors that influence these. Their interests have now converged in collaborative research around the challenge of identifying and possibly cloning flowering time genes in agricultural crops.

Dr Macknight recently spent six months as an Associate Fellow at the Institute for Advanced Study at La Trobe, working with Dr Gendall to investigate the molecular mechanisms and reproductive pathways in agricultural plant species such as Medicago truncatula (a close relative of lucerne), rice and ryegrass.

The scientists embarked on a quest for genes in cereal crops that perform regulatory functions similar to the FCA gene in the universal model research plant

Arabidopsis – a small annual that is a distant relative of the cabbage, cauliflower and Brussels sprout, produces many seeds and requires vernalisation (exposure to long periods of low temperatures) before it will flower.

They have now identified similar genes in rice and ryegrass that also appear to affect the plants' flowering times; and genetic regulatory pathways in both species that suggest flowering times can be artificially regulated – a desirable outcome in perennial ryegrass because it is widely grown in Europe, North America, Australia and New Zealand as cattle fodder, and has lower nutritional value once it flowers.

'When a plant flowers, it tells us it is going to produce its seed, and one way of improving the quality of ryegrass is by lengthening the flowering time,' says Dr Macknight.

'Potentially the major applications for this would be commercial crops that produce seed. By controlling when they flower, you can dictate when the crops will be harvested, and if you're going to have an earlier flowering time, you might get two seasons in one year, or have a plant that flowers earlier or later.

'What we're really looking for is adjusting the flowering time so it suits local conditions more. You might want a plant that responds well to vernalisation, so you can grow it in areas that have colder winters, or plants that don't respond at all, if you want to grow them in other areas.

'One of the major characters conventional breeding has to breed for is the flowering time, so crops will flower when the growers want them to flower. It's a time-consuming and precise business, so if we are able to identify the genes that contribute to the flowering time, they may be the genes people want to introduce when they're looking for a better type, or just want to add to their variety, but don't know what the genes are.

'What we're hoping to do is show that our genes can be used in a commercially grown crop to affect the flowering time, and the next step is for the primary research institutes or the seed companies who may want to take it further.'

Dr Macknight has returned to his research and teaching work in the Department of Biochemistry at the University of Otago, Dunedin, but the collaboration between the two scientists will continue across the Tasman.

Duality theory

Getting a fix on the doppelgangers

Working 'in the mirror' to solve problems from a new perspective

IF YOU'RE A MATHEMATICIAN or a logician you'll know your duality theory.

Chances are you'll also know that the algebraists of La Trobe University's Department of Mathematics are internationally cutting-edge duality theorists.

They do after all have as an Associate Professor of Mathematics, Dr Brian Davey – one of the founding fathers of duality theory – to ensure that theoretical skills get a regular workout.

They now also have two ARC-funded post-doctoral research scientists working with Dr Davey to take natural duality theory into even higher realms, and to solve some of the most fundamental problems practitioners face in applying it.

Dr Jane Pitkethly, with a PhD from La Trobe University, and Dr Marcel Jackson, who did his PhD at the University of Tasmania but now has a mixed lecturing and research position in the Department of Mathematics at La Trobe, are both working on different aspects of natural duality theory.

What Dr Pitkethly seeks to resolve are big issues in the world of duality theory – fundamental questions dating back to the birth of the theory in 1980 – and Dr Jackson wants to know how its techniques can be applied in Semigroup Theory (an area of algebra related to automata and formal languages).

Dr Pitkethly, in effect, wants to establish the top and bottom lines of duality theory – including whether in some circumstances it doesn't work at all – so that algebraists, logicians, computer scientists and others who use it will not waste time in blind alleys looking for dualities that may not exist.

For the uninitiated, here's how Dr Jackson explains it:

'A duality means there are two sides to something, as with a mirror. When you look into a mirror, you see an opposite version of yourself, but "the person in the mirror" also sees their mirror image, which is you. These two acts cancel each other out.

'With natural duality theory, the notion of duality arises where you have an object, Object A, and you aim to find some kind of "doppelganger" of it – a fundamentally new object that lives in the mirror world. You want to have the doppleganger of the doppleganger of Object A to be essentially what you started with – Object A. Actually, you want a rule for finding these dopplegangers, for whole classes of objects. These notions of duality are everywhere in mathematics, but natural duality is a particularly powerful way in which they can arise.'

Get it? It is a mathematical tool for studying algebra by finding what looks like a double or parallel version of an original problem, and working 'in the mirror' to solve the original problem from a new and perhaps radically different perspective.

It can't be assumed however that dualities always exist, or that when they do they are an 'exact' duality: there are many possibilities from non-existent to full dualities to strong dualities and near-perfect to perfect dualities.

'What we call strong dualities are what we really want,' Dr Jackson explains, 'whereas a duality in general is slightly one-sided, like the mirror example; we exist on one side and when we look in the mirror there's a mirror image, but there's an asymmetry because you can't really start off in the mirror. This can be useful, but it's a whole lot better if everything works starting from the mirror side as well.'

Dr Jackson and his fellow algebraists of La Trobe's General Algebra Group will be just as happy to find that – while natural dualities are everywhere in algebra – they do not exist to the extent hoped for in semigroup theory.

'I'd be happy enough to prove that there is no algorithmic way to decide whether or not a duality exists. You're flying blind when you're trying to prove something, and you don't necessarily know it is possible.'

Dr Pitkethly hopes when her ARC-funded post-doctoral work is completed to give all practitioners of this elusive science more systematic techniques for recognising its limits and its potential – and cheerfully anticipates for every problem she solves she will discover a few more.

DESIRABLE DRUGS IN THE DESERT

La Trobe University senior lecturer in Public Health, Dr Ken Harvey, is playing a leading role in fine tuning a national pharmaceutical drugs policy in the Hashemite Kingdom of Jordan.

Internationally known as a specialist in national pharmaceutical drug policy, Dr Harvey is part of an international team advising the Jordan Government which is currently establishing a system similar to Australia's Pharmaceutical Benefits Scheme.

In July he was one of the principal speakers at the National Workshop in Amman entitled Progress in Jordan National Drug Policy: Towards Implementing an Essential Drug List.

He is a member of an expert group from the Australian Health Insurance Commission which has a World Bank contract to help Jordan to modernise the pharmaceutical sector for its 5,300,000 inhabitants.

At the workshop he gave a paper entitled *Critical Assessment of Jordan's Reasonable Drug Use and Essential Drug List: Progress within the International Context*, as well as chairing a session of the workshop.

Dr Harvey, a specialist in the design of public policy to optimise the use of antibiotics and other medicinal drugs, has helped establish such schemes in a number of countries.

He has worked in 12 Asian countries under the auspices of the World Health Organization, AusAID and other organisations and last year played a major role in introducing a cost efficient pharmaceutical drug scheme for Croatia.

Dr Harvey told the workshop that all countries faced the same difficult problem – how to provide equitable, evidence-based and cost-effective health care within the capacity of a country's ability to pay.

'Given finite health care budgets, inappropriate or unnecessarily expensive prescribing for one patient means that others will miss out. In the private sector, it means that patients may not be able to afford the drugs prescribed,' he said.

'Global economic growth will provide greater resources for the purchase of medicinal drugs and other health services. However, uncontrolled market forces do not assure people affordable access to essential drugs of adequate quality nor do they guarantee that drugs are used wisely. As a consequence, there is much interest in national drug policy to make markets more responsive to health needs.'

On recommendation from the workshop a Reasonable Drug Use Advisory Board was set up.

Cooperative search for anti-fungal drugs

Two American chemistry students recently spent two months at La Trobe University on a joint project aimed at producing new and more efficient antifungal drugs.

Such drugs could be used to treat HIV-AIDS patients to combat infections, which, if untreated, are often fatal.

Crystal Sanchez and Emily Parry, final year students at the San Diego State University, worked between June and August, supervised by chemistry lecturer Dr Andrew Hughes on certain 'peptidic natural products'.

'We are interested in peptidic natural products that are generally highly modified by changes to the amide bonds. Nature makes this modification to improve biological activity, a modification we hope to exploit to make better peptide drugs,' Dr Hughes said.

The students worked on the synthesis of a biologically active heavily N-methylated depsipeptide, called Aureobasidin G, which is a compound recently synthesised in Dr Hughes laboratory.

Dr Hughes collaborates with Dr Shelli McAlpine of San Diego State University.

Ms Sanchez and Ms Parry are financed by the American Minorities International Research Training program which assists people in minority groups to do PhD studies in the biomedical field.

Dr Hughes explained that Aureobasidin G is one of a series of peptides, which show anti-fungal properties.

Being scarce natural products, they need to be synthesised in order to be adapted for use as drugs. Specific antifungal properties are important in drugs to treat HIV-AIDS and other immuno-compromised patients.

'The anti-fungals we are working on offer a new mode of action. They are known to target a critical fungus-specific enzyme known as IPC synthase, an enzyme critical to the construction of fungal cell walls. Because its function is specific, it will affect the effecting fungus, and not the host patient.

'Our compounds are also generally of low cytotoxicity. Because of this low toxicity they are providing strong leads as potential drugs,' Dr Hughes added.

Probing cell pathways **to understand breast cancer**

TWO RESEARCHERS at La Trobe University Bendigo are investigating the role of the hormone oestrogen and oestrogen-like compounds on development and progression of breast cancer.

Dr Terri Meehan-Andrews of the School of Human Biosciences and Dr Chris Bradley of the Department of Pharmacy are examining the intracellular pathways initiated by oestrogen and oestrogen-like compounds which have a similar effect during the development of breast cancer.

They are trying to understand how oestrogens interact with human breast cells to affect either cell death or the production or new breast cells.

Dr Meehan-Andrews says that health statistics show the incidence of breast cancer in Australian women increased by 24 per cent in the 11 years to 2001.

'This increase could be explained by a rising exposure to risk factors, the biggest of which is increased exposure to the female hormone, oestrogens and oestrogen-like compounds mimicking the effects of oestrogens that can be found in our environment.

'To understand the relationship between these compounds and the increasing incidence of breast cancer, research into the ways in which cells respond to oestrogens and oestrogens-like compounds is required.'

Oestrogen is the single name given to a group of hormones of which there are three principal forms in the human body, estrone, estradiol and estriol plus a group of compounds called phytoestrogens – generally found in food – which can have 'estrogens like' effects in the body.

Dr Meehan-Andrews says the mechanism by which these compounds interact with cells is believed to be through interfering with the regulation of the normal cell lifecycle. Normal breast development is controlled by a balance between new cell production and cell death.

'Over recent years strong evidence has emerged indicating tumour growth is not just a result of uncontrolled cell growth but also of reduced cell death.

'Deciphering the intracellular pathways that regulate cell death may highlight important interventions that could be manipulated to maximise and individualise treatment for breast cancer.

'It could also help explain why some tumours fail to respond to certain treatments and indicate alternative treatment regimes.'

The quality of life for **women with HIV/AIDS**

For women in Australia with HIV/AIDS having dependent children means they are significantly more likely to rate their health as 'good or excellent' than women without dependent children.

This is one finding from a new study by La Trobe University's Australian Research Centre in Sex, Health and Society (ARCSHS) in its report *The Journey Continues – Women Living with HIV in Australia.*

The report is the latest in a series about Australians living with HIV/AIDS from the Centre's HIV Futures Survey.

Lead author, Ms Karalyn McDonald, says only 1,200 women are living with HIV in Australia in 2003. World-wide the figure is estimated at nearly 20 million. Nevertheless, women with HIV in Australia report they still experience many challenges and disadvantages associated with infection.

The La Trobe HIV Futures Research Program, which documents these, is the largest of its kind in Australia.

It is designed to provide HIV positive people and their HIV health and funding agencies with a two-yearly picture of the overall health, well-being and social situation of people living with HIV/AIDS.

Some of the key findings are:

The majority of women (67.7%) rate their health as 'good or excellent'. Yet four in ten women say their wellbeing is 'poor or fair', a figure almost double since 2001.

Ms McDonald says more women are taking treatment than recorded in previous surveys. 'Most (69.9%) are on anti-retroviral therapy for HIV, and of these 81.7 % experience difficulties, including side effects, remembering to take the drugs and organising meals around their medication.

Poverty, Ms McDonald says, continues to be a threat. A third of the women are living below the poverty line, and almost all (89%) reported some difficulty in meeting the costs of daily living. Half rely on government benefits or pensions as their primary income.

Discrimination is a common experience. More than half (53.8%) report less favourable treatment at medical services as a result of having HIV.

Ms McDonald says nearly two-thirds have children, 45.3% of them dependent children with an average age of 10 years. 'These women are significantly more likely to rate their health as good or excellent than women without dependent children.'

NEW FOCUS ON ASIA -PACIFIC RESEARCH

La Trobe University is playing an important role in a new initiative to promote cooperative research in the Asia Pacific Region.

It is a foundation member of the Australian Research Council Asia Pacific Futures Network (APFN) which aims to stimulate research to enhance Australia's interactions with, and knowledge of, this region.

The network teams researchers from seven Australian universities with government and industry to stimulate new research, partnerships and training opportunities.

It focuses on governance and security, culture and religion, media and communications, health and population, and trade and industry.

La Trobe Professor of Politics, Robin Jeffrey, is on the eight-member management committee and heads the research 'node' on South Asia. Other 'nodes' deal with West Asia-Islam, Southeast Asia, China, Japan and Korea, Pacific and Australia, and Asia.

SIXTY YEARS ON: AUSTRALIA AND JAPAN TODAY

La Trobe University Politics Society recently held a public seminar dealing with the end of the Pacific War titled *Sixty Years On: Australia and Japan Today*. The seminar examined what Australians and Japanese of today though about their old foes.

Chaired by Professor of Politics, Dennis Altman, speakers included journalist and author Cameron Forbes, La Trobe lecturer Asian Studies, Dr Kaori Okano, and Yoshio Sugimoto, Professor of Sociology at La Trobe.

Professor Sugimoto is an internationally-acclaimed scholar of, and commentator on, Japan. As part of the first post-war generation Professor Sugimoto reflected on his own experience and Australia-Japan relations today.

La Trobe University creates

McGarvie Chair of Socio-Legal Studies

LA TROBE UNIVERSITY has established the Richard McGarvie Chair of Socio-Legal Studies to honour a former Chancellor, the Hon Mr Richard McGarvie AC.

Professor Margaret Thornton has been appointed to the Chair – a research position linked to the University's Institute of Advanced Study.

Professor Thornton, from the La Trobe School of Law and Legal Studies, is a distinguished socio-legal researcher. She has been at La Trobe since 1990 and was the Foundation Head of the Law Program in 1992.

A University Medallist in law from UNSW, she also holds degrees from Sydney and Yale. She has held Visiting Fellowships at London, Oxford, Columbia, Georgetown, York (Can), Ottawa, ANU, Sydney and Victoria.

Professor Thornton is one of a small number of senior judges, legal practitioners and academics recently invited to be Foundation Fellows of the Australian Academy of Law. She is also a Fellow of the Academy of Social Sciences in Australia.

A former member of the Australian Research Council (Humanities and Social Sciences Panel, Appeals Committee and Council), she is also a consultant to international agencies including the ILO and chair of government committees.

Her research fields include citizenship, discrimination, legal education, the legal profession and feminist legal theory. A prize in Discrimination and the Law was established in her name at Macquarie University by Judge Colin Phegan in recognition of her contribution to discrimination jurisprudence.

She is currently completing an ARC-funded project on the impact of the corporatisation of universities on the legal academy and legal knowledge in Australia, the United Kingdom, Canada and New Zealand.

Among her books are *The Liberal Promise: Anti-Discrimination Legislation in Australia*, Oxford University Press, 1990 and *Dissonance and Distrust: Women in the Legal Profession*, Oxford University Press, 1996 which was later translated into Chinese.

Professor Thornton: Technocratic solutions to contemporary problems, such as international terrorism, transnational governance and reform of workplace relations or homicide law, are impoverished without reference to the social context.

Professor Thornton says it is fitting that the new Chair of Socio-Legal Studies should be named for such a distinguished person as Mr McGarvie. Socio-legal scholarship, she explains, involves the study of law in its social context.

'It rejects an arid and formalistic doctrinalism that depoliticises law and cordons it off from the social forces that animate it. Law can be better understood with aid of the insights of disciplines, such as history, philosophy, literature, politics and sociology. The interdisciplinarity of socio-legal scholarship enables justice to be imagined in new ways, as well as enhancing law's standing within the academy as a scholarly rather than an applied discipline.

'Law is a powerful normative force but the complexity of modern society reveals that technocratic solutions to disparate contemporary problems, such as international terrorism, transnational governance and reform of workplace relations or homicide law, are necessarily impoverished without reference to the social. This was a factor appreciated by Mr McGarvie in his support for a socio-legal professional education for future lawyers, as envisaged at La Trobe.'

Professor Thornton hopes to make a contribution to the intellectual life of the Institute of Advanced Study, in conjunction with the School of Law, through her commitment to socio-legal scholarship. In addition to pursuing her own research and supervising students, she will encourage visitors, maintain links with the legal profession and academic institutions, as well as organise seminars and colloquia. She says, as the study of law and legal texts is of increasing interest to scholars in the humanities and social sciences, particularly to those in history, English and cultural studies, they will be especially welcome.

Professor Thornton says that Mr McGarvie, a former Judge of the Supreme Court of Victoria and Governor of Victoria, always promoted the highest principles of social justice.

A prominent jurist, Mr McGarvie served as the University's third Chancellor from 1981 to 1992.

Following wartime service in the Royal Australian Navy, Richard McGarvie embarked on a distinguished legal career which culminated in his appointment as Judge of the Supreme Court of Victoria in 1976.

Mr McGarvie, former Governor of Victoria and Chancellor of La Trobe University from 1981 - 1992.

IT ALL ADDS UP TO BETTER TEACHING AND RESEARCH

LA TROBE UNIVERSITY is playing a pivotal role in the new Australian Mathematical Sciences Institute (AMSI) dedicated to improved mathematics and statistics teaching, research and co-operation with industry.

La Trobe is one of only eight universities which are full members of the organisation. Another 20, and other organisations, such as CSIRO and the Australian Bureau of Statistics, are associate members.

Dr Geoff Prince, Reader and Associate Professor in La Trobe's Department of Mathematics, is AMSI's Executive Director. He says La Trobe has also contributed in other ways.

The recently published AMSI booklet entitled *Maths Ad(d)s* – an annotated sample of advertisements in Australian newspapers to show students that Australian employers seek people with strong mathematical skills – grew out of a La Trobe Department of Mathematics booklet.

AMSI received initial funding in 2002 of $1 million from the Victorian Government's Science, Technology and Innovation Infrastructure Grants Program and matching funds from member organisations to help improve the international competitiveness of Australian industry and commerce and establish national industry-linked research in areas such as security, bioinformatics, optimisation and financial mathematics.

It also offers vacation scholarships. La Trobe winners this year were Sarah Myers, David van Golstein Brouwers, Jingdong Xu, Davide Farchione and Callum McLean. The students are working on research projects ranging from biological studies and numerical simulation of the outer solar system to credit risk modelling.

AMSI, says Dr Prince, now also provides for the installation of 'Access Grid Rooms' in member institutions – advanced national teleconferencing facilities for shared teaching and research programs in the mathematical sciences.

Analysing chemicals with the latest equipment

TWO YEAR 12 PUPILS from Northcote High School are receiving a study opportunity rare for students of their age.

Katrina Mullumby and Mohamed Owynat are spending time each week in the Magnetic Resonance Spectroscopy laboratory of Professor Bob Brownlee in La Trobe University's Department of Chemistry.

They have been fully trained to operate the newly acquired Nuclear Magnetic Resonance (NMR) spectrometer and to interpret the images obtained, known as spectra, to derive structural information about, and confirm the identity of, compounds synthesised in the department.

Ms Mullumby and Mr Owynat operate the spectrometer purchased recently through an Australian Research Council Linkage Infrastructure, Equipment and Facilities grant to the department. The state-of-the-art equipment, called the Bruker Avance 300 MHz spectrometer, is based on an extremely powerful superconducting magnet and is used in the department to identify molecules through their distinctive resonance signature.

Professor Brownlee says that confirmation of structure is vital in any project in medicinal, synthetic or analytical chemistry, and the Year 12 students use the wide range of advanced experiments necessary for structural identification.

Professor Brownlee and Ms Soula Bennett, Science Coordinator at Northcote High School, have developed a program to involve senior students in advanced techniques used in chemistry.

'The idea is to involve them in the real world of chemistry. Many students have a picture of chemists working in white coats in a laboratory with test tubes. This project aims to update this image and to illustrate the wide diversity and interests of chemistry today,' Professor Brownlee said.

Birth

When it's no longer a natural event

Grandmother and child in northern Thailand

IT ONCE WAS CONSIDERED the most natural event in the world – the birth of a baby.

But to many women today, even some living in poor rural areas of Thailand, birth has become an event to be managed using technological interventions.

'Despite this, some things never change,' says Dr Pranee Liamputtong, an Associate Professor in La Trobe University's Department of Public Health. 'The most important never-changing aspect is the huge need for the new mother to have close support and assistance in the month after birth: the "postpartum" period.'

Dr Liamputtong spent a total of 12 months in and around the northern Thai city of Chiang Mai, six months in 1999 and six months in 2003, working with 30 Thai mothers or mothers-to-be recording their most intimate feelings before and after the birth of their babies.

In 1999 she visited all women in their homes, many before their babies were born to ascertain their ideas on birth and what they expected child raising to mean.

On her return in 2003 she again interviewed the women to monitor their progress and establish whether their views had changed.

Half were middle class urban women and the other half of peasant background who lived in conditions considered primitive by western standards. Despite lower levels of housing standards and education, many of the poorer women still had access to modern medical care.

Despite this access, most women in the lower socio-economic group still clung to traditional beliefs and practices during the postpartum period, much more so than urban middle class women whose greater dependence of doctors tended to make them dismissive of such practices.

According to Dr Liamputtong, this gives peasant women considerable advantage over urban middle class women.

She believes that postpartum care incorporating local traditions means peasant women optimise their health when they are at the most vulnerable stage of their lives. She believes such practices should be maintained.

'A woman who has just given birth is vulnerable to dangers and illnesses due to her physical and emotional weakness caused by the act of giving birth. In some circumstances she is also capable of causing danger to others due to her perceived polluted nature of childbirth and its blood,' Dr Liamputtong said.

'Traditional birthing rites of passage are an attempt to safeguard the new mother. She is taken care of by her close female kin where she has no contact with outsiders and her diet and behaviour are monitored.

'In this part of Thailand, these rites help new mothers to cope with the demands of motherhood, making them see motherhood as a positive aspect of their lives, in contrast to the viewpoint of many women in Western societies who may regard it as oppressive.'

Dr Liamputtong says her experience with the project in northern Thailand makes her believe that models of mothering need to take into account ethnicity, 'race' and differing family forms as women come to motherhood by a variety of different routes in different circumstances.

'I believe that these differences must be recognised so that a clearer understanding of motherhood can be achieved. Only then can health services and care be made more meaningful to new mothers.'