

La Trobe
UNIVERSITY

Bulletin

Mitochondrial
diseases on
world stage

**NEW
Biosciences
RESEARCH
CENTRE**

Dental bonanza for regions

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Enquiries and submissions to the editor, Ernest Raetz, La Trobe University, Victoria, 3086 Australia
Tel: (03) 9479 2315, Fax (03) 9479 1387
Email: bulletin@latrobe.edu.au

Articles: Adrienne Jones, Ernest Raetz, Rhonda Dredge
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Global focus on La Trobe bioscience discoveries

TWO OUT OF five biotechnology research projects showcased by the Victorian Government at BIO2007 in Boston – one of the world's most influential biotechnology business conferences – have their origins in La Trobe University laboratories.

One, in the field of bio-medical science, has implications for the development of drug therapies to treat mitochondrial diseases, as well as many neurodegenerative disorders where mitochondrial dysfunction plays a central role.

The other, in agri-bioscience, involves new technology that could lead to doubled crop yields by delaying the leaf ageing process.

International focus on these achievements in May coincided with the State Budget announcement for a new \$180 million Biosciences Research Centre to be built on La Trobe University's main Melbourne campus at Bundoora. (*See story next page.*)

The mitochondrial research is led by La Trobe Head of Microbiology, Professor Paul Fisher. It provides a completely new understanding of the mechanisms that cause mitochondrial disease – namely that they may result from a signalling disorder in the cells, rather than an energy insufficiency as was previously thought. (*See story, page 7.*)

State Innovation Minister, Mr John Brumby, told the Boston gathering: 'We hope this finding will lead to new approaches to treating both rare and prevalent diseases involving mitochondrial dysfunction.'

The original scientific discoveries underpinning the leaf ageing project are the work of two groups of La Trobe botanists, one led by Head of Life Sciences, Professor Roger Parish, and the other by former colleague, Dr Charles Pallaghy.

The technology is now being developed by the Department of Primary Industries (DPI) Victorian AgriBioscience Centre on the University's Research & Development Park.

'It will mean farmers can get the same crop yield from half the land being used,' Mr Brumby said. 'The modification of plant ageing, referred to as plant leaf senescence, has important agricultural consequences and leads to a wide range of potential applications.'

'The delayed leaf senescence leads to increased carbon fixation and thus to enhanced seed yields, increased production and quality. This research has huge potential for farmers all around the world.'

State Minister for Agriculture, Mr Joe Helper, said DPI scientists had collaborated with researchers from La Trobe to develop the delayed senescence technology.

'This delayed senescence is based on the targeted modification of cytokinin, the natural hormone that influences growth and development, in plants,' Mr Helper said.

'Using this technology, which has been named LXR, cytokinin levels are increased in plants under the control of a highly developmentally regulated plant gene promoter.'

'The LXR also offers significant opportunities for applications in molecular farming which in turn could result in high value products for health, bioenergy and environmental outcomes.'

DPI Research Director and La Trobe University Professor, German Spangenberg, said initial trials of LXR technology under laboratory and glasshouse conditions had been undertaken using white clover, a key temperate pasture legume.

'Results of the field evaluation of LXR white clover have shown a doubling of seed yields thus demonstrating the potential of the LXR technology to enhance seed production,' Professor Spangenberg said.

Professor Spangenberg said that LXR delayed senescence technology is currently being evaluated in a range of other crops including wheat, canola and lucerne (alfalfa) under laboratory and glasshouse conditions prior to field trials. ●



Professor Parish, right, with colleagues Adjunct Professor John Forster, centre, and Research Fellow, Dr Song Li.



Plans for **new Biosciences** Research Centre

The Victorian Government plans to build a new state-of-the-art Biosciences Research Centre at La Trobe University.

The new Biosciences Research Centre (BRC) will advance genomic plant and animal science and will focus new generation biosciences on threats such as climate change to Victoria's agricultural exports.

La Trobe University's Vice-Chancellor, Professor Paul Johnson, has welcomed the announcement by the Victorian Government in its recent budget.

'We are delighted that the Victorian Government has chosen La Trobe as the site to build this important facility,' he said.

'Researchers from La Trobe working in plant and animal sciences already collaborate most productively with their colleagues in the Victorian Department of Primary Industries (DPI), and co-location will further enhance science outcomes.

'The choice of La Trobe as a partner in the project is a clear indication of the capacity of the University to contribute to critical research and development directed at enhancing and protecting the plant and animal industries so vital to Australia.'

The Victorian Government and La Trobe University are working closely to finalise the proposed partnership arrangements. The government has allocated \$180 million to the project. Subject to finalisation of the business case, La Trobe University is looking to commit up to \$50m to the partnership.

The planned initiative will assist in positioning La Trobe within the top tier of Australian universities, and will boost the University's and DPI's international profile.

With the involvement of other research organisations such as CSIRO, the centre will quickly establish itself as one of Australia's premier science facilities.

Head of the School of Life Sciences, Professor Roger Parish, said the BRC – planned to become one of the largest centres of its type in the world – aims to co-locate some 450 scientists at La Trobe University's main Melbourne campus at Bundoora.

He said the University has a major capability in biosciences and many collaborative arrangements with government, academic and industry research and development groups.

The new BRC – the largest of these ventures so far – will:

- build strategic alliances with DPI, CSIRO and other public and private

research agencies, including those located in the regions

- prepare future generations of scientific leaders in agriculture and related areas via postgraduate training programs
- create synergies with related research areas including ecology, environmental protection, chemistry, physics, mathematics and statistics
- develop strategic projects addressing climate change and its effects on agricultural sustainability
- integrate with La Trobe's socio-economic research on the development of sustainable rural and regional communities
- further strengthen the reputation of Victorian science, boosting employment opportunities in the State and in the La Trobe University bioscience precinct to Melbourne's north.

Professor Parish said the University, with the largest number of regional campuses of any university in the State, recognises agriculture is of critical importance to the nation's economy.

With 30 per cent of Australia's food production based in Victoria, the State's farm dependent economy is estimated to be worth more than \$20 billion, employing 131,000 people in direct and related industries.

Continued page 4

The La Trobe University Precinct

WORLD-CLASS BIOSCIENCE CLUSTER IN MELBOURNE'S NORTH



La Trobe University has a major capability in the broad field of bioscience and has identified this as one of its major growth areas. It is this expertise and commitment that underpins the planned Biosciences Research Centre.

The University is becoming increasingly well-known for its strong links between research and development, and translating that into agricultural and medical biotechnology and commercial applications, both on its campuses and Research and Development (R&D) Parks.

The La Trobe Precinct, centred on the main Melbourne campus at Bundoora,

already comprises the following:

- the University's new \$30 million federally-funded medical Co-operative Research Centre for Biomarker Translation (to develop diagnostic and therapeutic agents for cancer and autoimmune diseases)
- the \$20 million Victorian AgriBiosciences Centre, opened last year
- the \$28 million Victorian Centre for Plant Functional Genomics
- the Microarray and Bioinformatics consortia.

The State Government has also joined with the University in the Centre for Research and Training in Environmental Sciences – which includes the Murray-Darling Freshwater Research Centre in Wodonga and Mildura.

The University operates a successful Technology Enterprise Centre on the Bundoora R&D Park.

Professor Parish says this extensive co-location of expertise fosters an environment that promotes effective interactions, networks and the incubation of spin-off companies. ●

New Biosciences Centre

From previous page

The people

La Trobe University currently has more than 100 scientists and postgraduate students working on a wide range of research projects relevant to the new centre.

They are located across many disciplines in the Faculty of Science Technology and Engineering. They include biochemists, geneticists, botanists, and medical scientists as well as experts in fresh and waste-water science, surface and material sciences, nano-technology, mathematical modelling and statistics.

The research

The new Biosciences Centre will facilitate:

- the establishment of a major centre in animal health and production

- research into plant health and production, including joint projects with the new CRC for National Plant Biosecurity
- expansion of the existing plant biotechnology research being carried out in partnership with DPI's Plant Genetics and Genomics Platform at the Victorian AgriBiosciences Centre on the University's Research and Development Park
- collaboration between scientists in La Trobe's new CRC for Biomarker Translation and DPI animal genetics and genomics researchers
- the expansion of bioinformatics and biometric research using the latest in computer technology to study and manipulate molecules
 - opportunities for expanding teaching programs and expertise at undergraduate level. ●

SOFT DIVORCE GAINS WIDE SUPPORT



RESEARCH has confirmed that sweeping changes made to the Family Court system last July have resulted in happier children and parents.

Dr Jennifer McIntosh, above, Adjunct Associate Professor in the School of Public Health and director of the Family Transitions clinic, was commissioned to study the change from an adversarial system to a softer approach based on European models.

Instead of divorcing spouses lining up with their lawyers to fight it out in court, under the new less adversarial system judges speak directly to the parties, their communication unrestricted by the laws of evidence.

Professor McIntosh studied 38 families divorcing under the old system, and 50 under the new. She found that parents who divorced under the new system argued less, were more likely to have co-operative arrangements for sharing the children, and reported lower emotional distress in their children.

She concluded that the new system demonstrated a greater capacity to respond to the psychological vulnerabilities of divorcing families. Whereas 70 per cent of parents involved in the old system felt the process had a negative effect on them, only 29 per cent felt this way about the new process.

The results of the research were released to wide public acclaim in a report *Finding a Better Way* by the Chief Justice of the Family Court, Diana Bryant, in April. ●

Dental bonanza for regions

New La Trobe dental school based in Bendigo



Above, Professor Tennant. Left, Professor Swerissen and a student in the dental health laboratory on the Bendigo campus.

in that region for the benefit of the local community.'

Australia currently has eight dental schools, each graduating about 50 dentists annually. The new La Trobe school will boost Australia's dentists' work force by ten cent per year. With similar numbers anticipated from the Charles Sturt initiative and at least one other university on the east coast, the number of dentistry graduates by early to mid next decade is expected to increase by more than 20 per cent.

Professor Tennant says the majority of the first two years of the La Trobe course will be focused at the Bendigo campus. The clinical program, which starts at third-year, will be conducted in the three country centres.

He says dental students will be located in clinics associated with local health clinics. 'Working with the dental profession in these locations is a vital part of having a vibrant dental school. The educational component of clinical rotations will be supported by the La Trobe staff.

THE BIGGEST – and best – smiles may soon be in regional Victoria, thanks to major dental initiatives in which La Trobe University is a key player.

By the turn of the decade, clinical placements in regional centres from the new La Trobe University dental school – combined with a growing number of graduates from its existing dental hygienists' and therapists' course – will start making a significant contribution to improving the health of people in country Victoria.

Soon after, from 2012, the University will begin graduating an extra 50 dentists a year. According to Professor Marc Tennant, Head of La Trobe's Department of Oral Health, this will lead to a substantial amelioration of Australia's acute shortage of dentists.

The development of the La Trobe dental school builds on the University's partnership with Dental Health Services Victoria. From 2008, fifty students each year will begin their five-year course, with the first regional clinical rotations starting in about 2010.

Professor Tennant and La Trobe's Acting Dean of Health Sciences, Professor Hal Swerissen, are finalising curriculum plans and accreditation procedures for the new Bendigo-based dental school following the Victorian Government's Budget contribution of \$1.5 million towards the school.

Both men describe it as a 'wonderful initiative', paving the way for a new generation of dental professionals trained to meet the needs of regional Victoria.

'It's only the second new dental program in Australia in 60 years,' says Professor Tennant. The first was at Griffith University on Queensland's Gold Coast about four years ago, which he also headed. 'And the La Trobe school will be the first regionally-based dental school in Australia's history.'

He says it's an even more exciting development for Victoria's rapidly growing north-eastern region, and for southern NSW, following support for a similar school in the Federal Budget for Charles Sturt University in Albury, which plans to open in the coming years.

'The La Trobe program is planning to have one of its three clinical facilities at Albury-Wodonga, and this will enable us to develop some great educational and professional relationships

Continued from page 5

‘The support of the Victorian dental profession has been wonderful, and with this new development the profession can clearly see that the government is helping to address the workforce crisis that is hitting dentistry.’

As well as the State Government’s \$1.5 million contribution to setting up the new school, Victorian Health Minister, Bronwyn Pike, says the government will provide more than \$800,000 a year when the dental school is fully operational – for scholarships and to support pre-clinical and clinical training. La Trobe University and Dental Health Services Victoria will also make significant contributions.

- The establishment of La Trobe University’s new dental school follows the opening in mid 2006 of a one million dollar, 30 chair oral health teaching laboratory at the Bendigo campus.

The Oral Health degree, which trains dental hygienists and therapists, enrolled 12 students last year and 20 this year. It will offer its full complement of 30 places next year to train oral health therapists over six semesters.

A man of many roles

Head of La Trobe University’s Department of Oral Health, Professor Marc Tennant, is a man of many roles. Most relate to boosting the quality of rural and remote dental health care throughout Australia.

With a doctorate of Dental Health Science, he is Foundation Director of the Centre of Rural and Remote Oral Health in the Faculty of Medicine and Dentistry at the University of Western Australia (UWA) – Australia’s first centre devoted to this issue.

He was Clinical Dean of

Griffith University’s School of Dentistry – thus heading Australia’s first new dental school in 60 years, where he remains as an Adjunct Professor.

Professor Tennant is the former Deputy Head of the School of Dentistry in Western Australia where, with a small team, he played a key role in the redevelopment of the school. He is also a consultant to a number of other

universities that are currently developing dental programs.

His interest in rural and remote dental care has resulted in a wide range of research and teaching roles – the latest of which he carries out on a fly-in-fly-out basis at La Trobe’s Bendigo campus.

Professor Tennant began his academic career in the mid 1990s after he completed his dental training and doctorate studies at UWA.

Over the last ten years his research has moved to include a leadership role in national rural and remote oral health research. Originally his doctoral studies were in vascular biology. This research deals with the biology of the use of autologous vein grafts to improve arterial circulation – a technique used in coronary artery surgery to bypass arterial blockages. ●



Probing special needs of ageing in the country

A NEW \$1.5 MILLION research initiative on aged care in country Victoria has been set up on La Trobe University’s Albury-Wodonga campus. It involves a private benefactor, the University’s Faculty of Health Sciences, and the State Government.

Acting Dean of Health Sciences, Professor Hal Swerissen, said demand for health and aged care services will increase dramatically as the population ages.

‘Rural and regional communities face unique challenges in delivering high quality services in response to these demands. This project builds on our existing research expertise in social gerontology and aged care to address important community health issues.’

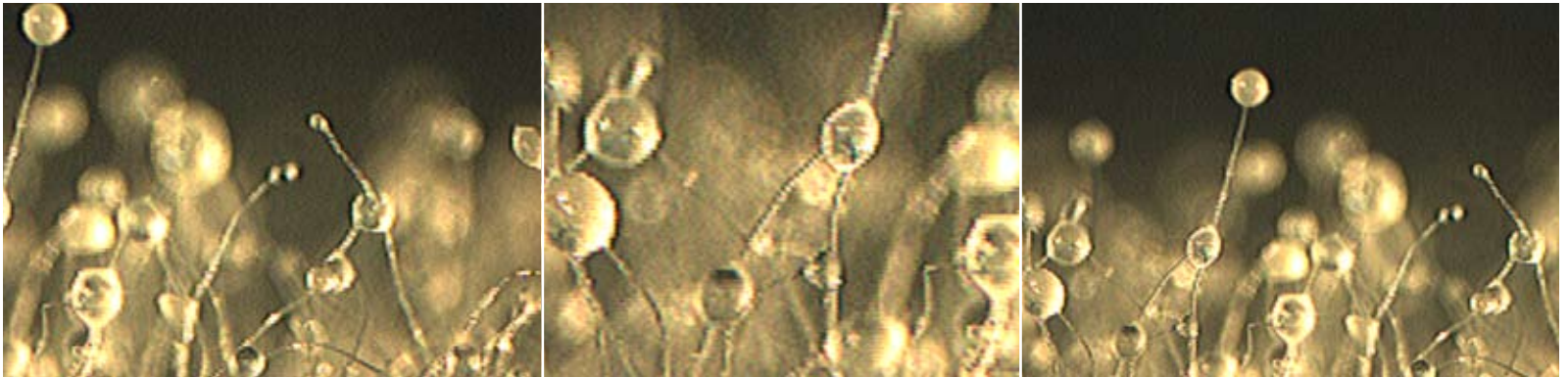
It will also establish a leading rural centre for honours and postgraduate research training for the rural aged care workforce and health delivery initiatives, and raise additional research funds for this purpose from other sources, he said.

Known as the ‘John Richards Research Initiative into Aged Care in Rural Communities’, it was launched in May by Community Services Minister, Mr Gavin Jennings.

Mr Jennings said that by 2021, nearly one in three people living in country Victoria will be 60 years old or over. The initiative will focus on what the aged care workforce in regional Victoria should look like in the future, and map out what is required to deliver that workforce.

‘With demand for services increasing dramatically we need to make sure we recruit and train the right kinds of professionals to deliver the right mix of services,’ Mr Jennings said. ‘A dedicated research team based at La Trobe University will start research on the best way of achieving this.’

- The initiative is named after John Richards, above, a former jackaroo, soldier, farmer, Victorian newsagency association executive and inaugural president of the Yarrowonga District Hospital board of management. His financial contribution has been matched by funds from the State Government and La Trobe University, a total of \$1.5 million over five years. ●



Alarm protein sets off international interest

LA TROBE UNIVERSITY microbiologist Professor Paul Fisher has discovered that a faulty alarm at the cellular level could be responsible for many rare and incurable conditions involving mitochondria – the energy source contained within cells.

The State Government is so impressed by the implications of the La Trobe research, carried out with PhD student Paul Bokko and others in Professor Fisher's laboratory, that it has been selected as one of five Victorian projects promoted in a recent biotechnology push into the United States.

The Minister for Innovation, Mr John Brumby, announced details of the new mitochondrial theory at BIO2007 – a biotechnology conference attracting 19,000 delegates – in Boston in May.

His announcement coincided with scientific publication of the findings in the international journal *Molecular Biology of the Cell*.

'Thanks to this research,' Mr Brumby said, 'we now have a completely new understanding of how mitochondrial disease is caused – from a signalling disorder in the cells, rather than a

fundamental energy insufficiency as was previously thought.'

'The finding has important implications for the development of drug therapies to treat the many different forms of mitochondrial disease, as well as for most major neurodegenerative disorders.'

Professor Fisher's research has attracted substantial international attention, including a piece in the London *Financial Times*, after the findings were presented to journalists attending the World Science Journalists Congress in Melbourne in April.

As a laboratory scientist who has dedicated the last fifteen years of his life to research on signalling pathways in mitochondrially diseased cells, Professor Fisher is grateful for the State Government's support in promoting his work.

He has shown in the laboratory that an energy-sensing protein, known as AMPK, is permanently activated in mitochondrially diseased cells. When energy supplies drop, it begins signalling and interfering with other signalling pathways, causing cell functions to shut down.

So far, Professor Fisher's work has used a type of amoeba called a slime mould (the scientific name is *Dictyostelium discoideum*, Dicty to its friends). Genetically inhibiting the production of the alarm protein suppressed all of the 'symptoms' of mitochondrial disease in Dicty.

'If we can suppress the symptoms in humans as well, this research may provide the first possibility of treating mitochondrial diseases,' Professor Fisher said.

About 1,000 people at any one time suffer from genetic defects of the mitochondria in Australia, resulting in a varied range of symptoms. More than 50 children develop these conditions annually and more than half die before adulthood.

'All of the major neurodegenerative diseases such as Alzheimer's, Huntington's and Parkinson's also involve mitochondrial defects,' Professor Fisher said. 'They might also be turning on this alarm protein.'

AMPK plays a 'smoke alarm' role to censor an impending energy crisis and to take remedial action.

'If there is an energy problem, the cell does not want to embark on division or processes that consume energy,' Professor Fisher said. 'So the protein switches them off before the situation becomes critical.'

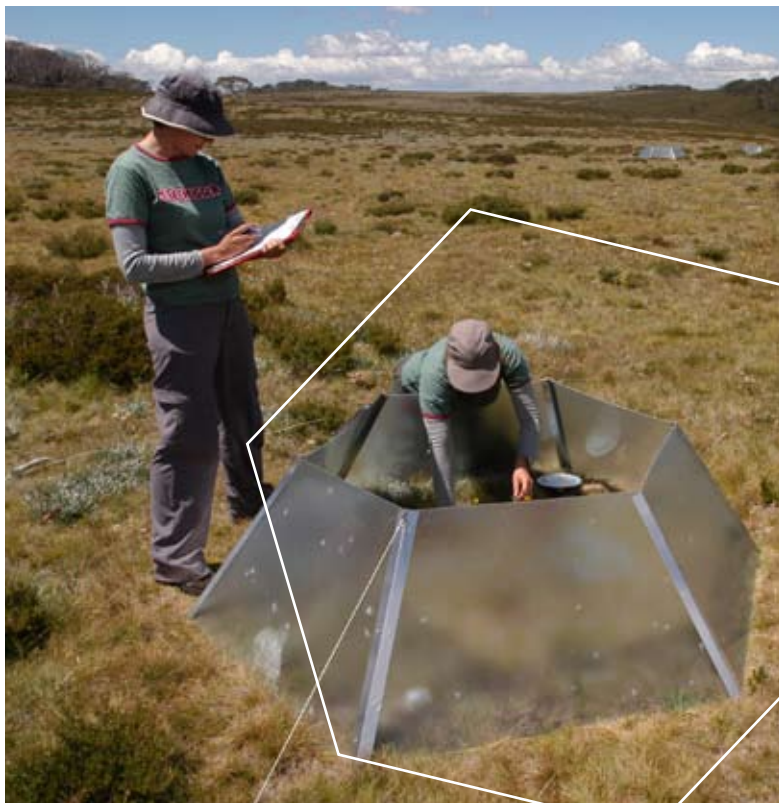
In healthy cells, energy supplies return to normal, as does cell functioning, but in diseased cells AMPK activity may trigger a permanent shut-down.

'In these cases, AMPK acts like an oversensitive smoke alarm that goes off every time you cook toast. Imagine if it locked every window and door to stop the fire spreading and turned off the electricity and gas. This is worse than the problem it tried to solve,' Professor Fisher said.

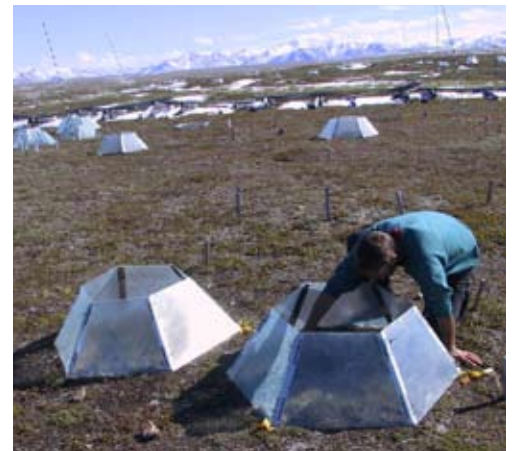
– Rhonda Dredge ●



Professor Fisher, centre, being interviewed in his laboratory by *Financial Times* Science Editor, Clive Cookson, and UK-based freelance biotechnology writer, Nuala Moran.



PhD Botany students, Seraphina Cutler from La Trobe, left, and Lauren Keim from the University of Melbourne, collect data from one of the open topped chambers on Victoria's Bogong High Plains. Right: Dr Wahren retrieves data from a chamber in Alaska.



Global climate TURNING UP THE ON THE HIGH

by *Adrienne Jones*

SCIENTISTS from La Trobe University's Research Centre for Applied Alpine Ecology are collaborating in a multinational study to evaluate how global warming is likely to affect cold climate ecosystems in Arctic and Alpine regions around the world.

The Australian end of the work focuses on experiments in Victoria's high country. Scientists plan to feed data into computer models that will help predict how cold climate plants and animals will respond to rising temperatures – and whether they have the genetic capacity to adapt.

The experiments are a collaborative, multi-disciplinary effort involving three specialist research groups from two universities – La Trobe University's Research Centre for Applied Alpine Ecology, the University of Melbourne's Centre for Environmental Stress and Adaptation Research (CESAR), formerly at La Trobe, the Environmental Science Laboratory from the University of Melbourne's School of Botany – and the CSIRO, with funding from

the Australian Research Council, the Victorian Department of Sustainability and Environment, ES Link and Parks Victoria.

Early results from the Victorian research are being compared with data from similar experiments in the northern hemisphere's collaborative International Tundra Experiment (ITEX), which encompasses more than 11 countries including Sweden, Norway, Finland, Russia, Canada, Tibet and the United States.

By incorporating their Victorian research into this major ITEX project, Australian scientists have ensured that the project now sweeps both hemispheres – making it the world's first truly global experiment to replicate the effects of climate change in equivalent tundra across the globe.

The research combines ITEX field protocols for passive warming experiments, genetic studies and ecological modelling techniques to investigate the effects of rising temperatures on cold climate plants and soils – as well as some animal species,

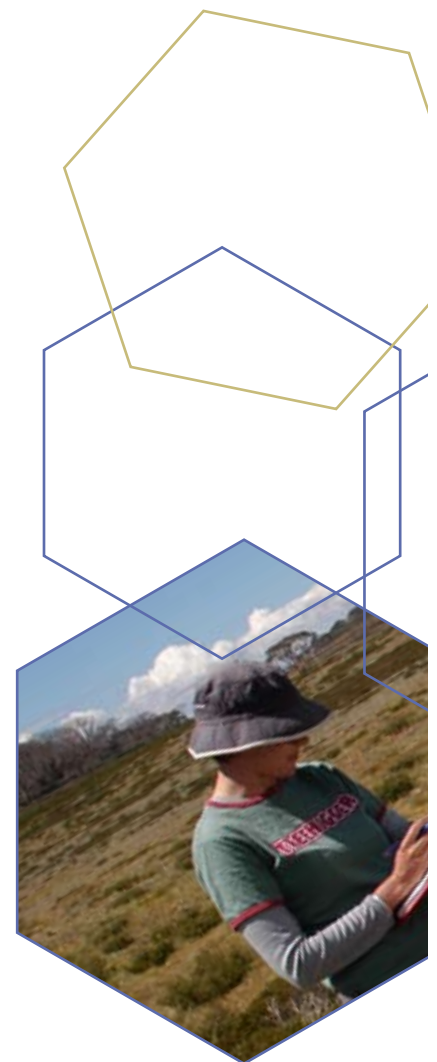
including the endangered mountain pygmy possum.

The field sites are in open heathland on the Bogong High Plains, where, during the snow-free period, scientists monitor ecological responses to elevated temperatures in 40 hexagonal enclosures known as Open-Topped Chambers (OTCs).

The chambers are set out at four sites around September-October each year when the first snows begin to melt – two in vegetation burned during the 2003 bushfires, and two in unburnt vegetation – and removed again in early June with the first snowfalls.

The OTCs function as small greenhouses, raising ambient temperatures inside by about 1.5 degrees centigrade, mimicking the anticipated increase in temperature over the next twenty years or more.

With temperatures elevated inside the chambers, the snowgrasses, shrubs and flowering herbs of the Bogong High Plains get a taste of things to come. And scientists monitor every response: the emergence of a plant's first leaf, its first flower bud, the first flower opening,





its seeding and growth, the behaviour of the soils, even changes in plant litter.

By monitoring what happens inside the chambers and comparing it with what happens outside, they hope to gain a better understanding of the likely consequences of global warming for cold-climate ecosystems. They seek to find out, through warming experiments and genetic and modelling, how individual

by adaptation, scientists need to assess variations in genetic traits that are specifically caused by climate change.

By using genetic markers to assess gene flow and studying variations in specific traits such as leaf shape, under different conditions, they can begin to assess the adaptability of selected plant species – which may then act as early warning signals that climate change is affecting the surrounding alpine system. This potentially provides an ecological management tool for mediating climate change.

The three principal components of the Australian project are closely integrated. Field studies are managed by La Trobe's Research Centre for Applied Alpine Ecology, and the genetic and modelling studies by the University of Melbourne's CESAR and its Environmental Science Laboratory, with additional ecological support from the CSIRO.

The warming experiments began in 2003. The first results were reported to the 2006 ITEX conference in Miami and further results to the 2007 conference in Australia. ●

change

THE HEAT PLAINS

plant species respond, how the responses are reflected in plant populations and patterns across the landscape, and to what degree species can genetically adapt.

While there is some evidence that tundra plants have high levels of genetic variation and thus an inherent ability to cope with climate change

Staring down the crisis of our times

La Trobe University ecologist Dr Carl-Henrik Wahren is happiest working in a snap-frozen, wintry landscape, contemplating the state of the biosphere.

This Scandinavian-born Australian scientist spends months, and sometimes years at a stretch in the treeless, icy tundra of the world's Alpine and Arctic regions engaged in frontline eco-science.

On the Bogong High Plains in the Victorian Alps he and his fellow biologists are staring down the existential crisis of our times: global climate change.

While research into the effects of climate change has been under way for many years in Australia's Alpine regions, the Victorian work represents a new frontier: where scientists can simultaneously interrogate the global warming phenomenon in two hemispheres. (*See main story.*)

As the scientist primarily responsible for bringing Australian research on board with ITEX study sites overseas, Dr Wahren's contribution has been pivotal.

In 2001 he was monitoring the effects of climate change on plants and soils in Alaska using open-topped temperature-controlled chambers. He was struck by the familiarity of the terrain.

'The animals and plant species are different, but the size of the plants, their distribution and dominant growth forms, even some plant families, are the same or very similar,' Dr Wahren says. 'These similarities reflect similarities in climate, especially micro-climate – low temperatures, wind, snow, and a lack of trees, while herbs and shrubs dominate: a trend that continues with increasing latitude and altitude.'

That sense of environmental *deja vu* led to the Australian work. 'I wanted this experiment extended to the southern hemisphere, making it truly global,' he says.

The following year, supported by Warwick Papst from La Trobe's Research Centre for Alpine Ecology, La Trobe botanist Dr John Morgan, Dr Dick Williams from CSIRO and a group of third year biological sciences undergraduates, Dr Wahren set up 40 open-topped chambers on the Bogong High Plains in the Victorian Alps.

Working closely with ecological modellers, climatologists, geneticists and soil scientists from the University of Melbourne and Victoria's Department of Sustainability and Environment, and other international scientists, La Trobe scientists aim to bring many novel strands of research towards one common goal: an understanding of how land, oceans, and atmosphere interact and influence the global climate system.

'This is ecosystem research which is looking at a landscape and trying to understand not only how it is likely to respond to a particular threat, such as an increase in temperature, but how that response helps us to understand how a landscape functions,' says Dr Wahren. 'We can then apply that understanding to other areas – such as agricultural lands.'

'With decreased rainfall predicted for Australia's south-east, and given that most of our water comes from the high country, we are likely to see changes in high country ecosystems which

Continued page 10



Are the world's fisheries in crisis?

No, says a Norwegian expert in fisheries economics

WE OFTEN HEAR about the world crisis in fisheries. Looking at the aggregate figures, Professor Rögnvaldur Hannesson, of the Norwegian School of Economics and Business Administration, Bergen, has another explanation.

'What we see is stagnation,' he says. 'World catches of wild fish have not increased since 1990. We have apparently reached the limit of what can be taken out of the oceans.'

This means that stocks are still being renewed but there is no room for complacency. They could collapse because of mismanagement. And mismanagement is certain to occur if problems involving jurisdiction on the high seas are not addressed.

Professor Hannesson, a visiting scholar at La Trobe's

Institute for Advanced Study, was in Australia recently to look at economic issues related to the tuna fisheries of the Western Pacific. He is collaborating in this research with La Trobe economist, Dr John Kennedy.

'This is a very interesting case,' Professor Hannesson explains. 'The problem of the high seas in tuna fisheries is a difficult one because the tuna migrate so widely. The small island states of the Pacific are not in a good position to control resources. What happens if you give authority to them? They have no fishing industries of their own.'

Most of the harvesting is carried out by distant fishing nations such as the USA, Japan, Taiwan, China and Korea which pay for access. No limits have been set on

their tuna catches. So far, the capacity of the stocks has been such that there is enough to accommodate all those who fish. The total catch has been increasing.

'Sooner or later it will not be able to increase any more,' the fisheries economist warns.

The tuna situation in the Pacific illustrates a major problem with the way fish stocks are controlled internationally, he says. Each coastal nation has an exclusive economic zone of two hundred miles with the power to set quotas and control stocks.

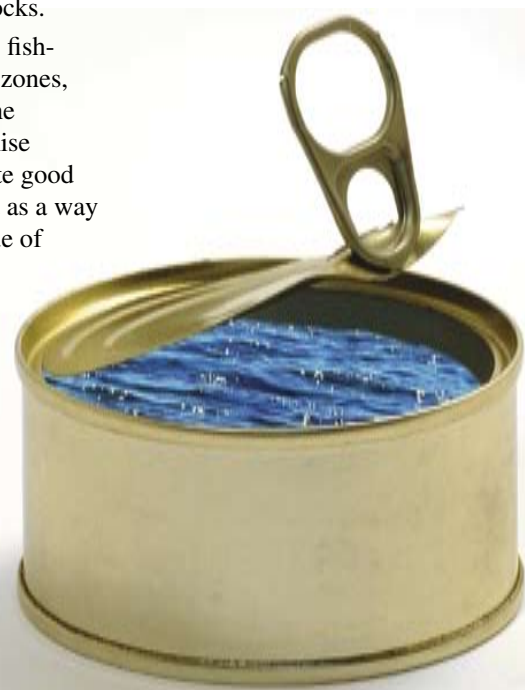
Most of the world's fisheries are within these zones, giving nation states the opportunity to maximise efficiency and promote good fisheries management as a way of preserving the value of their rights. If fishing companies overstep the mark, nation states have the authority to seize boats.

Outside these zones, on the

high seas, jurisdiction lies in the hands of the flag state, the state in which a boat is registered.

'This doesn't work,' says Professor Hannesson. 'Many states are small and poor. Places like Belize and Liberia just keep a boat register to earn money. These are merely flags of convenience.'

He recommends that jurisdiction be extended over the entire ocean. Two hundred miles is an arbitrary distance, he says, that evolved in the 1970s.



Staring down the crisis of our times *Continued from page 9*

can impact on the lowlands.

'If we can predict how these landscapes are likely to respond, we may be able to do something about it.'

The research in the Alps has three components: field studies, involving the passive warming experiments and collecting, storing and interpreting response data; genetic experiments in which key species are cross-planted along environmental gradients to measure their ability to adapt; and ecological modelling, which will result in computerised 'population' and 'habitat' models for translating the data from the warming and genetic studies into predictors for climate change across the landscape.

While scientists caution against interpreting results too early, the research

is already breaking new ground, with evidence that some alpine plant species can adapt genetically to climate change.

These findings – and other new evidence revealing the low genetic diversity of the mountain pygmy possum – were reported to the ITEX gathering in Melbourne earlier this year.

Dr Wahren says it was exciting for researchers to see early results from Australia showing similar trends to those they've seen in the north.

'This is why experiments involving both hemispheres are necessary, because it leads to a better understanding of how the biosphere is responding, and likely to respond, to a changing climate.'

He says the experiment adopts largely a systems approach, popularised through the

Gaia metaphor.

'Atmospheric scientists have long used it, recognising the tightly coupled links between atmosphere, oceans and land. Ecologists have been a little slow to adopt this method, but they've recognised the need, because what happens in one part of the globe often affects other parts.'

Dr John Morgan, of La Trobe's Department of Botany, endorses the global importance of the project.

'We are at the forefront of climate change research in Australia, and important contributors to the international effort to understand potential changes in alpine and arctic areas. Ecological research like this will be vital to understanding how the natural world will respond to global warming.' ●

‘We should carve up what is left. Close all the loopholes. No country will have an incentive to control fish stocks unless it has an exclusive right to exploit the resources.’

Coastal countries could extend their zones half way across the ocean. Australia, for example, could have the right to exploit resources half way to India.

Professor Hannesson has written widely on the topic and consulted on fisheries for the UN’s Food and Agriculture Organization, OECD, World Bank and the governments of Iceland and Norway. In 1998 he participated in a review of fishing quotas in the United States.

It is the job of the fisheries economist to provide estimates of how much stock should be taken out and how the industry should be organised. Some countries like New Zealand, Australia and Iceland have total control of their fisheries. In other cases, fish stocks are shared because they migrate between different economic zones. To manage them effectively, the countries must agree to set limits to how much fish will be caught. ●

Australia’s first joint Centre for China Studies

New light on Sino-British history

LA TROBE UNIVERSITY and two of its associate institutions in China – Peking University and the Beijing Foreign Studies University – launched the first joint Centre for China Studies in Australia at a ceremony held recently on University’s main Melbourne campus at Bundoora.

The Centre was established by the three universities as a resource for academics, students, and the public, to engage in joint research related to China, and to promote Chinese language and culture in Australia.

Located at the Michael J. Osborne Institute for Advanced Study, the Centre was opened by the leaders of the three universities, La Trobe University’s (then) Acting Vice-Chancellor, Professor Roger Parish, Peking University’s President Professor Xu Zhihong, and the President of the Beijing Foreign Studies University, Professor Hao Ping.

Professor Parish said La Trobe University had developed significant academic links with China over the past fifteen years, resulting in a range of cooperative programs at undergraduate and postgraduate level.

‘The Centre provides a unique opportunity to expand our collaboration with two of China’s leading universities, and will play an important role strengthening links between China and Australia.’

The ceremony also celebrated the launch of the first two volumes of

historically significant documents jointly edited by the Centre and the First Historical Archives of China, in the series *The Diplomatic Relations Between China and Foreign Countries in the Qing Dynasty – Correspondence Between China and Great Britain*.

Their publication brings many aspects of diplomatic relations into the public arena for the first time, opening a new window on Sino-British history. They contain correspondence relating to the development of the railways in China, mining, and education. Further volumes will cover trade issues, banking, missionary activity and international affairs.

Most of the documents had been effectively buried among more than ten million archival documents covering the correspondence of China’s Ming and Qing Dynasties housed in the First Historical Archives of China in the Forbidden City in Beijing.

The Chief Editor of the Qing Dynasty publications is Professor Michael Osborne, former Vice-Chancellor of La Trobe, currently a Guest Professor at Peking University. Other participants are Professor Pei Likun, Executive Director of the China Studies Centre, and La Trobe historian, Professor Alan Frost.

Professor Pei Likun said publication of this collection would generate wide interest among international China scholars. The books are being distributed to major Centres for China Studies, including the universities of Oxford and Cambridge, UK; the School of Oriental and African Studies in London; and Berkeley and Princeton Universities and the Institute for Advanced Study at Princeton, in the United States.

PEKING University President, Professor Xu Zhihong, also received an Honorary Doctorate of Science from La Trobe University in recognition of his scientific and academic achievements.

Professor Xu is credited with providing important insights into the action of the plant hormone auxin, which regulates many aspects of plant development. His laboratory has also been in the forefront of protoplast technology in the production of plant clones as a consequence of a technological break-through pioneered by Professor Xu and his colleagues. ●



Professor Hao Ping, left, and Professor Xu Zhihong at the opening ceremony of the Centre for China Studies





Sing a **song of protest** – for lessons in world history

WHAT DO YOU DO as a lecturer when you get that ‘nobody home’ response – the 21st century attention deficit malaise? La Trobe arts academic Dr Sue Gillett, below, has her own sure-fire solution – she puts on an old vinyl 33 or new CD and engages the class with protest music: anything from African-American freedom songs to rhythm and blues or the music of Indigenous Australians like Yothu Yindi or the Warumpi Band.

Often, in good voice, she sings the songs herself. This not only gets her students’ attention, it’s also evidence of the robust longevity of her subject matter: the history of protest music.

In the process her students learn how to write and critique protest songs, and potentially earn a further 20 credit points towards their Arts and Creative Writing degrees.

Beginning with the freedom songs of American slaves and winding up with the contemporary music of Australian and American anti-war songsters, Dr Gillett’s students review large slabs of world history through the folk music of the times.

Apart from the sheer novelty of learning to the beat of *Go Down Moses*, *Let My People Go*, *Follow the Drinking Gourd*, or Billie Holliday’s jazz version of the anti-lynching song *Strange Fruit*, they’re also gaining insights into the American civil rights movement – through the folk songs of Pete Seeger, Peter Paul and Mary, Joan Baez, Bob Dylan, folk-gospel singers Odetta and Mahalia Jackson, and pop star Harry Belafonte, among others.

They get another retrospective on modern political history through John Lennon’s iconic response to Vietnam *Give Peace a Chance*, and the trans-national post-Vietnam peace songs of Sinead O’Connor, U2, Elvis Costello, Midnight Oil, and Tracy Chapman.

Then they experience post-imperialist history in Australia through musicians Yothu Yindi, Tiddas, Kev Carmody, Archie Roach, Christine Anu and Neil Murray, singing protest songs about land rights, the stolen generations and other indigenous issues.

If it’s true that you can’t separate protest songs from their context, poet, singer-songwriter and academic Sue Gillett is better qualified than most to teach both theory and practice.

A long-time sociology, literature, film and cultural

studies teacher, she makes no bones about her life-long passion for social justice and world music – but the connection between them, she says, is for students to explore themselves.

‘We play the songs, look at the lyrics, discuss the music, and I ask the students to discuss the relationship between the lyrics and the music. Then we work our way into the context.’

Dr Gillett encourages her students to bring in protest songs of their own choice, and to write their own, and hasn’t been surprised to discover many contemporary songs she hadn’t heard – mostly about the Iraq War.

‘There’s a lot of despair around. I notice my students, saying “what can we do? Where are the songs like *Give Peace a Chance* or *We Shall Overcome*? What’s happened? Why are there no political protest songs any more?’

‘I’ve taken on board the students’ despair and I’m hoping this subject will be a force against that tide, against the despair itself, and the events that cause it.’

Just to write or sing a song of protest is an act of empowerment, Dr Gillett says, because music is both personal and communal, and even sad songs can be joyous.

‘People can be singing about horrendous experiences, but to listen to those songs, or to sing them, is to feel connected to the people who’ve had those experiences. Even a song you sing by yourself links you with the rest of the human race.’ ●





GLOBAL classroom for agriculture

FORTY-FIVE university students from China, Thailand and Australia recently took part in the most ambitious of La Trobe University's innovative 'Shared-Learning Projects in Agricultural Sciences'.

The final-year students were from China's Yunnan Agricultural University, Thailand's Maejo University and La Trobe.

The first stage of their projects comprised field trips to south east Australia, inspecting farms from Deniliquin in New South Wales to Portland, and over the border into South Australia. This was followed by two weeks of learning in China and Thailand during April.

Project co-ordinator, Associate Professor in Agricultural Sciences, Dr Peter Sale, said the idea is to let students 'see' what is happening across various landscapes, rather than try to describe things in lecture theatres.

'Here they learnt about unique aspects of Australian agriculture, land use and some of our major sustainability problems. Students worked in small teams, shared learning experiences and met agriculturalists who

explained first-hand how and why things are done in certain ways.'

The program compared agricultural themes across different regions, from temperate Australia, through sub-tropical Yunnan, to tropical Thailand.

These themes included new farming systems and technologies that deliver productivity gains and comparisons of how they are managed in each country; sustainability issues where agriculture is causing environmental problems; and how farmers are being helped to improved practices.

La Trobe's Department of Agricultural Sciences pioneered the scheme in 2000 with a visit to Papua New Guinea. This was followed by visits to Indonesia (2002), PNG (2004) and to Yunnan province in China in 2005 and 2006.

Funding support is being provided by the Victorian Committee of the Crawford Fund, the Australia-Thailand Institute, the Rotary Club of Balwyn, and the three universities involved. ●



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and the achievements of our students and staff over that short timeframe, creating a University that is recognised internationally for the quality of its graduates and the excellence of its research.'

However, Professor Johnson has also warned that while a huge amount has been achieved during those forty years, the University cannot afford to be complacent.

'The higher education sector is intensely competitive, and universities that do not identify and build upon their strengths can find themselves slipping down the intellectual and financial league tables.' ●



VICE-CHANCELLOR PAUL JOHNSON, left, at his first graduation ceremony on the Bundoora campus, with PhD graduates from the Faculty of Law and Management, Dr Samantha Farmakis-Gamboni, Dr Liam Lenten, left rear, and Dr Lachlan Watts. In their PhD dissertations, Dr Farmakis-Gamboni, who now works with the Fair Pay Commission, examined wage policy, unionisation and labour market flexibility in Australia; Dr

Lenten, a lecturer in Economics and Finance, dealt with post-war exchange rate cycles from the G7 group of countries; and Dr Watts, who works in banking, investigated the 'News Model' of exchange rate determination. This tries to understand the movement of exchange rates through news reports by examining topics such as current account figures, economic growth, money supply and interest rates. ●

Study seeks to improve heart care



Mr Nally: national data base would be a great outcome.

RESEARCH by critical care nurse and La Trobe lecturer Mark Nally, has analysed cardiac arrest statistics at Bendigo Health over the past seven years.

The data documented patients who suffered cardiac arrest whilst in hospital and their outcomes – whether the patient was successfully resuscitated and survived the attack.

Mr Nally, whose research was conducted with colleague, Leigh Kinsman, said while health care agencies across Australia collected cardiac resuscitation data, he was surprised to discover that very few

were analysing their data and outcomes.

The study used a data collection format called the Utstein Criteria that is recognised internationally. He said the approach enabled organisations to benchmark data with institutions across the world.

The study may provide a model for healthcare agencies across Australia to examine their

resuscitation outcomes to improve the quality of patient care. Mr Nally said he planned to publish the results of the study in national nursing journals.

'A great outcome would be to see a national data base established in Australia where health care agencies can analyse and compare the quality of their work with the overall intention of improving patient care,' Mr Nally said.

Mr Nally has been working in critical care for more than 20 years and is currently employed in a joint position at Bendigo Health and in La Trobe University's Division of Nursing and Midwifery. The study earned him a Masters degree in Nursing Science at the Bendigo campus.

One of an increasing number of regional health professionals seeking to undertake postgraduate study, Mr Nally said his Masters degree was an opportunity to further his skills as a critical care educator and, through his research, contribute to the body of knowledge in this specialised field. ●

Research packs a punch

High-tech revenge helps train boxers

BEING RUMBLLED BY A GROUP of thugs on a suburban beach isn't everyone's cue to a future career ... but it put 15-year-old Warren Proctor on track for a university course in electronics and a passion for martial arts and boxing.

It also took him to this year's finals of the Institution of Engineering and Technology of Australia (IET) Technical Presentation Prize where he was runner-up for the design and presentation of one of Australia's best electronics projects.

Earlier, he won the Institute of Electrical and Electronic Engineers' Hooper Memorial Prize for technical merit and engineering achievement, and its prize for the best electronics project at a Victorian University.

One of the 'don't get mad get even' school, Mr Proctor, now a final year electronics engineering student, recovered from his traumatic assault by learning how to throw a few punches himself, taking up martial arts, boxing, and Thai boxing. Combining his love for his sport with his career choice led to a State junior boxing title and national recognition of his aptitude for electronics.

The IET national award recognises his final year electronics project: a small electronic black box enclosing a wireless device powered by a mobile phone battery that will help boxing coaches monitor the force and acceleration of their boxers' punches, and their heart rates – in real time, on a remote, hand-held LCD screen.

The device has the potential to revolutionise the way boxing is taught in Australia, and is already being tested as a prototype for other industry uses by manufacturers in Australia, New Zealand and the United States.

Some might call it a boxer's revenge, but Warren Proctor calls his device X-SPAR – for Sports Performance Analysis Recorder.

The black box, strapped to a boxer's body, interprets, translates and transmits the physiology of every punch as graphic data to

a palm-pilot sized display on the second device held by the coach.

On this second device, computer-coded graphics incorporating electro-cardiographs and other information allow the coach to plot his boxer's next move in full control of real-time performance data.

'The coach can use that data to map the position of the boxer's hands, see what kind of punch they're throwing – whether it's a left hook or an upper cut – and how much effort they've put in. This can be compared with earlier sessions to see how much they've improved,' says Mr Proctor.

Better still, he can compare the performance of two boxers in training simultaneously, with a box strapped to each. For example, this might reveal one boxer has thrown 112 punches this round, and the other 84; one boxer's heart rate was only 115, and the another's was up to 117

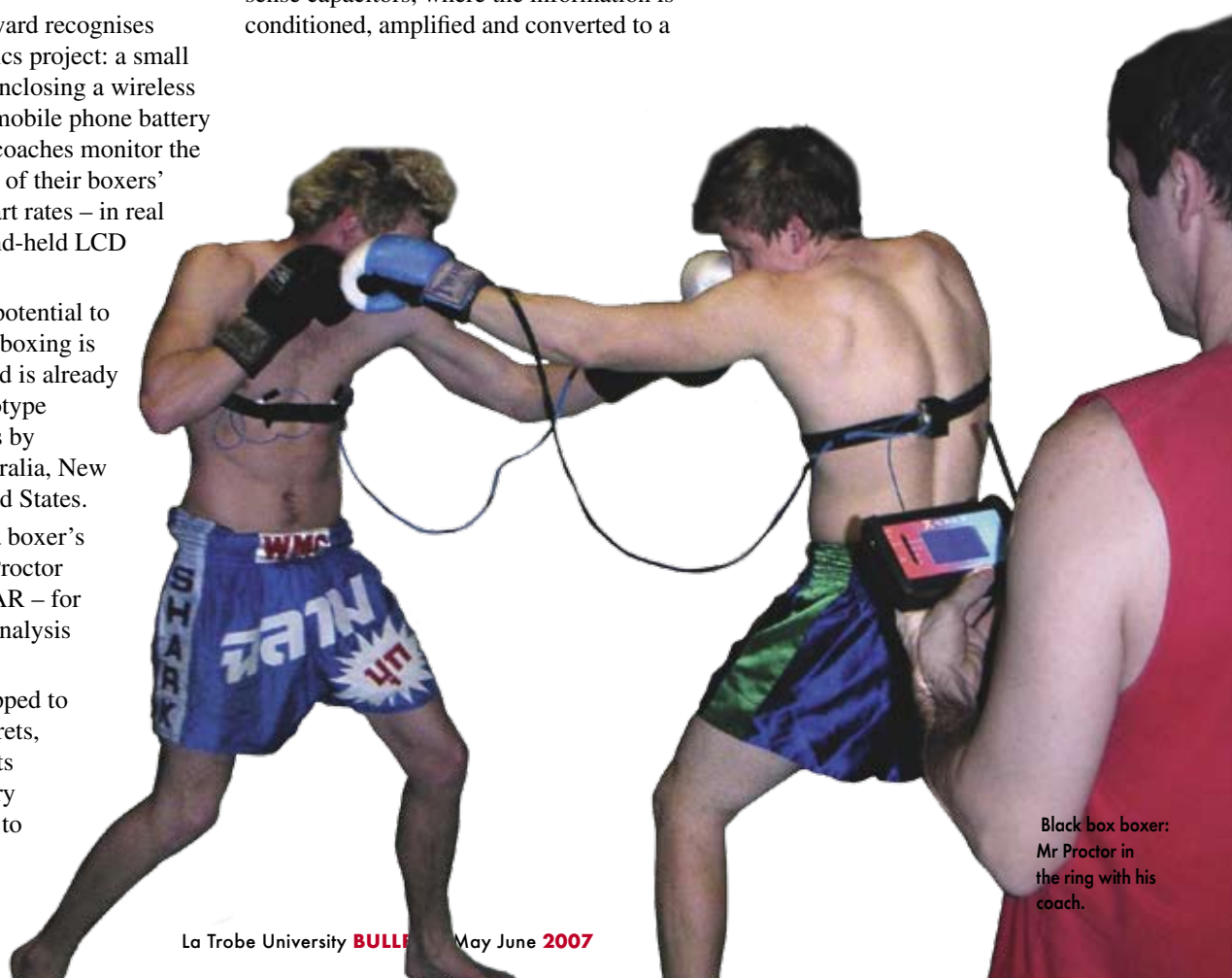
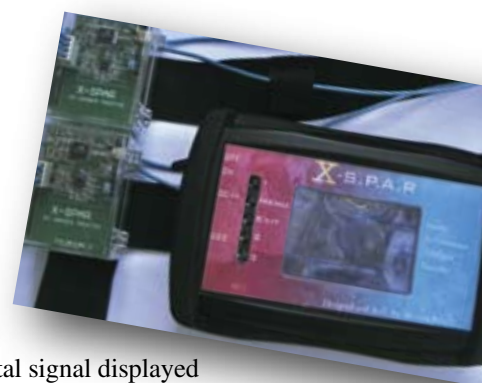
The equipment measures the acceleration of the boxer's movements through microscopic parts that move back and forth as punches are thrown. These are linked to sense capacitors, where the information is conditioned, amplified and converted to a

digital signal displayed as a ratio of acceleration.

Mr Proctor says the prototype has been 'road-tested' by his own boxing coaches and is already being picked up for industry trials in other applications by international systems-engineering designers impressed by its potential.

For example, he says it is being trialled as a sensor-activated tracking mechanism in automatic car parks to allow operators to check how many parking spaces are occupied; as a remote control mechanism for small cranes to lift tilt slabs on building sites; and as a remote timing system for slalom kayak racing.

Mr Proctor says the project presented many engineering and design challenges. And like all inventors, he is still refining. 'It could definitely be smaller,' he says. ●



Black box boxer: Mr Proctor in the ring with his coach.

HIGHER EDUCATION – it's still your best bet!



MBA graduates a first for regional Victoria

At the Bendigo campus, La Trobe University's new Vice-Chancellor, Professor Paul Johnson, centre, congratulates Steven Dimitrovski, left, and Andrew Loorham, two of regional Victoria's first Master of Business Administration (MBA) graduates.

Head of the Graduate School of Management, Professor Geoff Durden, said the MBA, viewed as the ultimate management qualification, had traditionally been delivered in city centres.

'Until now, regional managers wishing to gain this qualification would have to undertake distance education or travel to a capital city.'

The MBA, delivered in Bendigo, offers classes at times that fit in with the time constraints of busy working people. Some classes are held during the evening and on weekends.

Mr Loorham said his course had definitely been worthwhile. He recently took up a position as a marketing manager with multinational agriculture giant, Bayer Crop Science.

Mr Dimitrovski plans to use his new qualification to advance his career in sales and marketing. ●

'It is the nature of learning that you don't quite know where it is taking you. But you have a pretty good idea,' said Professor Paul Johnson, 'that it is going to take you somewhere interesting.'

In Professor Johnson's case, economic historian and former Deputy Director of the London School of Economics, it has taken him to the top ranks of higher education leadership – as new Vice-Chancellor and President of La Trobe University.

Professor Johnson, who has also worked extensively on the economics of ageing and pension reform, made his observations on the benefits of a university education officiating at his first graduation ceremony on the University's main Melbourne campus at Bundoora.

Some 3,500 graduates were awarded their degrees and diplomas during this year's round of ceremonies at Bundoora and four regional campuses.

'Education is a life-long experience,' Professor Johnson said. 'What you have learnt

in your study at La Trobe is a very good preparation for the next phase of your life – but it won't be sufficient to carry you through the next 20 or 30 years. You will continually have to revive your skills, enthusiasm and knowledge through a process of learning.'

'Universities must also challenge and change society'

While this can be done in the workforce and the community, universities are crucial players in the provision of lifelong learning, he said.

Professor Johnson congratulated the new graduates on their success and wished them well in their careers. He said more than 120,000 La Trobe graduates already contributed to their communities throughout

Australia and in more than one hundred countries overseas.

'Higher education makes a fundamental contribution to the global knowledge economy and is an essential element of any dynamic and successful society. But producing the highly skilled and adaptable workforce of tomorrow is just one element, though very important, of any university's mission. Universities must also challenge and change society.'

'Through research, scholarship and teaching they must inspire people to think in different ways, to respect diversity of viewpoint, to engage in rational discussion, to recognise excellence, and to respond to opportunity.'

'This year La Trobe University turns 40 and we can marvel at the vision of our founders

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