

# Road

REVIEW

AUSTRALIAN

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*Linking Australian Science,  
Technology and Business*

# Science dollars on a roll

By Jenifer North

Commercialisation of research in Australia's universities and scientific institutions continues to climb, with a new report finding it reached nearly \$1.2 billion in 2004. The *National Survey of Research Commercialisation* report gathers information from universities, publicly funded research institutions and medical research institutes, providing data for the years 2003 and 2004, as well as incorporating trends during 2000 to 2004. The survey gathered information on intellectual property (IP) commercialisation (for example, patents, licence income, spin-out company formation), research consultancies and contracts, and skills development and transfer.

Overall, the trend data shows an increase in research commercialisation activity and outcomes flowing from Australia's universities, publicly funded research institutions and medical research institutes. This activity created substantial income for the institutions, but the study found that the greatest benefits were realised through the productive application of publicly funded research in the broader economy and community.

In 2004, institutions reported income from licences, options and assignments (LOAs) of more than \$59 million, contracts and consultancies with end-users worth almost \$900 million, and equity holdings valued at almost \$185 million.

Most commercialisation indicators have increased over the period 2000 to 2004. Across all institutions the total number of:

- invention disclosures increased by 77%;
- patents and plant breeder's rights issued increased by 79%;
- LOAs yielding income per year increased by 36%;
- start-up companies operational at the end of each year nearly tripled, with the value of institutional equity in start-ups increasing by 41%; and
- commercialisation staff increased by 74%.

Two exceptions were the number of LOAs executed and the number of start-up companies formed, both of which have decreased. These results indicate that institutions are becoming increasingly strategic in their approach to these activities as the number of LOAs yielding income and the number of start-ups still operational increased over the same period. Based on the findings of a previous survey and commercialisation case studies

New applications for provisional, PCT, innovation and other patents plant breeder rights applications files in 2003 and 2004 (number)

	2003					2004				
	CSIRO	Other PFRAs	Universities	MRIs	TOTAL	CSIRO	Other PFRAs	Universities	MRIs	TOTAL
Number of institutions responding	1	3	38	25	67	1	3	39	26	69
Provisional patents	104	29	241	56	430	119	18	264	49	450
PCT patents	66	5	75	20	166	60	1	92	16	169
Innovation patents	-	-	-	1	1	-	-	1	-	1
Other*	15	0	124	9	148	17	0	197	25	239
TOTAL	185	34	440	86	745	196	19	554	90	859

\* Other types of applications as distinct from those in the table such as National Phase Applications.

SOURCE: DEST

contained in a companion volume to this report, most of the start-ups have been formed from discoveries and technologies based in the life sciences.

The university sector produces the majority of patent applications and LOAs, followed by the publicly funded research institutions and medical research institutes. Most LOA agreements involve very small amounts: in 2004, more than half were for amounts less than \$10,000. A large proportion of the IP and LOA activity is carried out by a relatively small number of institutions, which include CSIRO and a selection of universities. These same institutions account for much of the income generation collected in this survey. In contrast, the majority of institutions are active in both research contracts and consultancies and commercialisation skills development and transfer activities, suggesting these broader activities are important mechanisms for knowledge transfer.

The large number of contract and consultancy agreements entered into (about 14,000 per year in 2003 and 2004) indicates a high level of connectedness between research institutions and the broader innovation system. About a third of these agreements represented 'repeat business' for institutions.

*Continued page 2*

Comparisons with the US, Canada and the UK (after adjusting for research expenditure and purchasing power parity) found that Australian institutions generally devote more human resources to commercialisation activities, execute more LOAs than the UK (but fewer than the US and Canada), generate more LOA income than the UK, about the same as Canada and less than the US, and create more new start-up companies than the US (although fewer than Canada and the UK).

CRCs are important contributors to research commercialisation and knowledge transfer activities, maintaining more than 2100 Australian and overseas patents and generating income of almost \$10 million from LOAs in 2004-05.

The companion volume to this report documents case studies of research commercialisation including:

- air-conditioning technology (**University of Adelaide**)
  - nutrients from waste (**University of Western Sydney**)
  - speech processing strategy (**Bionic Ear Institute**)
  - web-based decision-support systems (**La Trobe University**)
  - falls risk calculator (**Prince of Wales Medical Research Institute**)
  - synthetic rock (**ANSTO**)
  - PolyNovo (**CSIRO**)
  - Trinam\* (**Ludwig Institute for Cancer Research**)
  - macrophage migration inhibitory factor (**Monash University**)
  - ovarian cancer detection (**Prince Henry's Institute of Medical Research**)
  - viral vector delivery platform (**Queensland Institute of Medical Research**)
  - Biosignal (**University of NSW**)
  - monoclonal antibodies in asthma treatment (**Walter and Eliza Hall Institute of Medical Research**)
  - melanoma treatment (**University of Newcastle**)
  - novel opioids Q8003, Q8008 (**University of Queensland**)
  - Australian Orthopaedic Innovations (**University of WA**)
  - tumour suppressor (**University of WA**)
  - hepatitis E diagnostic kit (**Macfarlane Burnet Institute**)
  - Mudpack software (**University of Adelaide**)
- **More information:** [www.dest.gov.au/research/NSRCR03\\_04](http://www.dest.gov.au/research/NSRCR03_04)

## Research ethics

Integrity in research, meeting community expectations and handling allegations of misconduct are the focus of a new national code released by the **National Health and Medical Research Council (NHMRC)**,

the **Australian Research Council (ARC)** and **Universities Australia**.

The *Australian Code for the Responsible Conduct of Research* describes best practice in research for researchers and institutions, as well as setting out a framework for handling breaches of the code. It provides advice on how to manage research data and materials, how to publish and disseminate research findings (including proper attribution of authorship), obligations in peer review, how to collaborate across institutions, and how to manage conflicts of interest. It also provides guidance to institutions when establishing independent external inquiries to evaluate allegations of serious misconduct. The code replaces the *Joint NHMRC/AVCC Statement and Guidelines on Research Practice* (1997).

► **More information:** [www.nhmrc.gov.au/publications/synopses/r39syn.htm](http://www.nhmrc.gov.au/publications/synopses/r39syn.htm)

## Asian energy

The **Australian Government** is committing seed funding of \$5 million to initiate the **Asia-Pacific Network for Energy Technology**. APNet will improve linkages between researchers in the APEC region on emerging low-emissions energy and energy-efficiency technologies, accelerating their development and contributing to medium and long-term reductions in greenhouse gas emissions. The Government will also commit a further \$50 million to the **Asia-Pacific Partnership on Clean Development and Climate** and will establish a \$15.7 million Asia-Pacific Forestry Skills and Capacity Building Program to assist regional countries improve the ability of their forests to capture and store CO<sub>2</sub> and help to develop their forest management expertise.

► **More information:** [www.pm.gov.au](http://www.pm.gov.au)

## \$ for urban water . . .

The **Australian Government** will provide more than \$5 million in funding through the Raising National Water Standards program for five new national urban water projects. The centrepiece is the second stage of the successful Water Efficiency Labelling and Standards scheme, which will receive an extra \$3.077 million to support its continuation to 2010.

A further \$1.015 million will support a national approach to risk assessment for the management of chemical hazards from recycled water. Building on international experience in assessing and communicating the risk associated with recycled water for drinking and environmental release, the project will provide an increasing level of certainty for potential consumers of recycled water for drinking purposes. An additional \$500,000 will be used to develop an 'Ecotoxicity Toolbox' to evaluate water quality for recycling and develop tests to determine the toxicity levels of chemicals associated with recycled water. The toolbox of specialised water tests is expected to build the confidence of water users and environmental managers in the use of recycled water.

The Government will also provide \$250,000 in funding to develop a national database to ensure the community has accurate and transparent information on the performance of urban and rural water utilities.

► **More information:** [www.nwc.gov.au/agwf/rnws/rnws\\_projects.cfm](http://www.nwc.gov.au/agwf/rnws/rnws_projects.cfm)

## . . . and groundwater

Minister for the Environment and Water Resources **Malcolm Turnbull** has launched a new \$52 million **Australian Government** Groundwater Action Plan. The first component of the plan is a \$50 million National Groundwater Assessment Initiative focusing on projects that:

- improve the management of groundwater resources that cross state boundaries;

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#### DESIGN AND PRODUCTION

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- explore the prospects of using aquifers to store urban stormwater;
- develop understanding of the functional relationships between groundwater discharge and important ecosystems;
- improve our knowledge of Australia's northern groundwater systems;
- further our knowledge of the connection between groundwater and surface water; and
- explore deep groundwater resources and their potential use.

A knowledge and capacity-building strategy for groundwater managers and users and the science community will receive \$2 million.

The Government will also invest \$10.5 million from the Raising National Water Standards Program to fund five groundwater projects:

- water for Australia's arid zone (\$4.935 million) – to identify and assess groundwater resources in parts of arid and semi-arid Australia where there are few alternative water resources and very little is known of their sustainability or the effects of their use;
- priority and stressed groundwater catchments in Queensland, WA, SA and Victoria will be targeted through a \$2.626 million program to put in place additional monitoring, metering and modelling programs to help assess and manage these resources;
- better understanding of surface water and groundwater interactions (\$1.390 million) – investigating connectivity in six areas in NSW;
- a \$966,000 coastal groundwater resources project will look at yield estimations and provide early warning of coastal aquifer quantity and quality decline in the Kempsey and the Northern Rivers region; and
- \$600,000 will fund the use of Geographic Information Systems-based 3D tools to improve understanding of aquifers, especially their spatial definition and interaction with the landscape.

► **More information:** [www.nwc.gov.au/agwf/index.cfm](http://www.nwc.gov.au/agwf/index.cfm)

## Pig attack

Australia's most damaging animal pests, including rabbits, foxes, feral pigs and wild dogs, will be targeted through new funding for 17 feral animal research projects. Minister for Conservation **Senator Eric Abetz** says the projects will receive \$700,000 from the **Australian Government Natural Heritage Trust**, and will be overseen by the National Feral Animal Control Program (NFACP). One of the projects involves development of a new fast-acting toxin for inclusion in a manufactured feral pig bait HOG-GONE®, which is an effective, target-specific and humane solution to the feral pig issue. Another project will test ways to reduce the effect of bird pests on Australia's horticulture industry; particularly relevant with the recent spread of starlings into WA. NFACP will also be funding a series of projects to deal with rabbits, which are showing signs of re-emerging as a major pest.

► **More information:** **Quentin Hart, 0427 778 868.**

## Robot weed war

Remote-controlled helicopters could soon be tracking down and destroying some of Australia's most invasive weeds as part of new R&D projects worth \$1.5 million. The Minister for the Environment and Water Resources, **Malcolm Turnbull**, and the Minister for Conservation, **Senator Eric Abetz**, have announced 11 research projects under the **Australian Government's** \$44.4 million Defeating the Weed Menace program. Mr Turnbull says the new R&D funding is on top of \$3.4 million for 14 projects announced in November 2006.

The \$340,000 trial involving robotic helicopters, developed by the **University of Sydney**, aims to map and control populations of alligator weed and salvinia – both among the most highly invasive weeds listed

as Weeds of National Significance. The helicopters will be equipped with sophisticated sensing equipment and a spray mechanism, allowing controllers to attack weeds in previously inaccessible areas.

Other projects in the new round of funding include a \$330,000 plan to assess control measures for the invasive thorny bush mesquite, and a \$260,000 study of the environmental impact of buffel grass.

► **More information:** **Brad Stansfield, 0419 884 666; Brad Burke, 0400 337 252**

## Supersheep

The new **Sheep Industry Innovation CRC** is to receive \$35.5 million from the **Australian Government** over seven years, with an additional \$20.7 million in cash contributions from 20 leading research and industry organisations. A further \$54.7 million will be provided by participants through in-kind contribution of staff and resources.

Chairman **Dr John Keniry** says the new CRC, which will build on research undertaken by the highly successful Australian Sheep Industry CRC, will specifically target slow adoption rates of new technology as a barrier to productivity and quality. "It is important to note that we are a sheep CRC," he adds. "We are not a wool CRC or a meat CRC. We are focused on the whole animal and aiming to optimise its performance."

The new Sheep CRC has four research programs: transforming sheep and their management, next-generation wool quality, next-generation meat quality and the Information Nucleus. The research programs are supported by two programs designed to deliver results to industry: education and training; and commercialisation and adoption.

► **More information:** **John Lamont, 0408 737 450**

## Reef watch

**BHP Billiton**, the **Great Barrier Reef Foundation** and the **Australian Institute of Marine Science** (AIMS) have developed a partnership that will allow three Australian reef sites to be studied as part of the **Census of Coral Reefs** (CReefs), a global research initiative to document and assess the diversity of coral reef ecosystems. This \$3.4 million, four-year project will enable marine scientists and taxonomists to collect and identify samples during a series of field trips to the Great Barrier Reef's Heron and Lizard Islands and WA's Ningaloo Reef.

Launched in 2005, CReefs is the coral reef component of the **Census of Marine Life**, a global network of researchers in more than 80 nations engaged in a 10-year initiative to assess and explain the diversity, distribution and abundance of marine life in oceans.

► **More information:** [www.creefs.org](http://www.creefs.org); [www.coml.org](http://www.coml.org); [www.aims.gov.au](http://www.aims.gov.au)

## Science education boost

Minister for Education, Science and Training **Julie Bishop** announced funding of \$7.6 million through the Collaboration and Structural Reform Fund for 11 innovative projects to promote higher education structural reform and encourage stronger links between universities and industry, business, the community, and education and training providers.

**Charles Darwin University** will receive about \$900,000 to develop shared, high-quality learning materials in chemistry, physics and environmental science. Funding of almost \$1.2 million is being provided for a national internet-based approach to mathematics teaching, while almost \$2 million has been approved for the **Australian Mathematical Sciences Institute** and \$948,000 to **Flinders University** for its electronics-related engineering courses.

► **More information:** [www.dest.gov.au/casr](http://www.dest.gov.au/casr)

## Commercial help

The **Australian Government** has launched a 10-year, \$90.3 million program to help turn Australian innovations into successful commercial products. Commercial Ready Plus will provide matching grants of between \$50,000 and \$250,000 for R&D, proof-of-concept and early-stage commercialisation. "Applicants will not need to be an incorporated company until the stage of signing the grant contract, and the application process has been simplified to reduce the costs involved and give faster access to funding," says Industry Minister *Ian Macfarlane*.

► **More information:** Robyn Foster, 02 6213 6787, [www.ausindustry.gov.au](http://www.ausindustry.gov.au)

## RQF how-to-do-it

The final specifications for the 2008 Research Quality Framework (RQF) have been released. Prepared in consultation with the higher education and research sector, with two rounds of consultation undertaken and trials conducted by 13 universities, the RQF Submission Specifications will assist research groups and institutions in preparing their submissions for the RQF assessment process. Panel-specific guidance is incorporated in these specifications. The RQF Technical Specifications provide advice on submitting data electronically and other guidance relating to the RQF Information Management System. The first assessment process for the RQF will take place in 2008. Funding for the RQF in 2009 will affect two sources of current research block funding: the Institutional Grants Scheme; and the Research Training Scheme.

► **More information:** [www.dest.gov.au/research/rqf](http://www.dest.gov.au/research/rqf)

## Ensis vows renewed

CSIRO and New Zealand Crown Research Institute **Scion** have confirmed their commitment to continue their science collaboration, developed through their joint venture in forest and forest industries research, **Ensis**, which has been in operation since 2004. Ensis chief executive *Tom Richardson* says there will be a modification to the operating structure, changing it from a joint-venture operation to a new collaboration agreement, to take effect from 1 January 2008: "The new model focuses on growing this science collaboration, while reducing some of the complexity of running the unincorporated joint venture."

► **More information:** Dr Tom Richardson, [tom.richardson@csiro.au](mailto:tom.richardson@csiro.au)

## Clean coal for China

Australia and China have signed a partnership agreement that will pave the way for the installation of low-emission coal energy technology in Beijing in 2008. Signed by CSIRO chief executive *Dr Geoff Garrett* and *Li Xiaopeng*, president of China's state-owned energy enterprise, **China Huaneng Group**, the agreement will see a post-combustion capture pilot plant installed at the Huaneng Beijing Co-generation Power Plant.

► **More information:** Dr David Brockway, 02 4960 6046

## Private forest

**Forest and Wood Products Australia**, an industry-owned company limited by guarantee, has taken over work of the Government-owned **Forest and Wood Products Research and Development Corporation** (FWPRDC). The new company will continue the FWPRDC's R&D work, but will also be able to undertake marketing and promotion on behalf of the forest industry. The company will be funded through industry levies and matching Commonwealth payments for R&D.

► **More information:** Brad Stansfield, 0419 884 666

## Earth-size telescope

For the first time, a **CSIRO** radio telescope has been linked to others in China and Europe in real time, demonstrating the power of high-speed global networks and effectively creating a telescope almost as big as the Earth. "This is the first time we've been able to instantaneously connect telescopes half a world apart," says *Dr Tasso Tzioumis* from CSIRO's **Australia Telescope National Facility**.

Data from the telescopes was streamed around the world at a rate of 256 Mb per second – about 10 times faster than the fastest broadband speeds available to Australian households – to a research centre in Europe, where it was processed with a special-purpose digital processor. The results were then transmitted to Xi'an, China, where they were watched live by experts in advanced networking at the 24th Asia-Pacific Advanced Network Meeting.

► **More information:** Dr Tasso Tzioumis, 02 9372 4350

## Nuclear fans

New community research by **Quantum Market Research** for the **Australian Nuclear Science and Technology Organisation** (ANSTO) shows increased awareness of nuclear science and strong support for a nuclear facility in Australia. People are more comfortable with the new nuclear reactor at Lucas Heights than they were when surveyed in 2004, with more than 75% of southern Sydney residents regarding the facility as safe. Significantly, 90% see the presence of an Australian nuclear science and technology facility as important. And more people are aware of what ANSTO does in applying nuclear science to improving the health of Australians, particularly in cancer treatment, and understanding and resolving our environmental problems.

Southern Sydney residents feel the new OPAL nuclear reactor, which commenced operation a year ago, is safer than the old reactor. Perceptions that it is safe have risen by 12% since 2004 to 77%, and perception that it is unsafe is down 13% to 19%. Community interest in nuclear issues is very strong with 62% wanting to know more about the products from the nuclear reactor and how nuclear waste is managed.

► **More information:** [www.ansto.gov.au](http://www.ansto.gov.au)

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By Don Larkin

CEO, AUSTRALASIAN INSTITUTE OF MINING AND METALLURGY

# Looking after the golden goose

In recent weeks there has been much debate as to whether Australia's record economic performance is due to effective policies by the Coalition, or the commodities boom. The real question for this country's leaders is not who should take credit for these earnings, but how can we sustain our current minerals prosperity into the future?

Despite current windfalls due to price and volume increases, constraints have been emerging in the areas of incentives for new exploration, higher education, research and skills needs, inconsistent regulation, infrastructure constraints, and lack of a way forward for emissions reduction for our energy-intensive industries. To date, there has not been political recognition of the fact that the current strength of the Australian minerals sector is due to a longstanding commitment to leading-edge minerals research, innovation and investment in human capital. The Australasian Institute of Mining and Metallurgy (AusIMM), has put together a set of five key election priorities to translate the current commodities boom into a prosperous and sustainable future. The AusIMM Policy Priorities for the 2007 Federal Election are as follows:

- increase Australia's share of global exploration;
- maintain a world-class system of minerals higher education and research;
- remove impediments to women's participation in mining;
- implement a nationally consistent approach to safety and health in mining; and
- establish a technology-based pathway for emissions reduction.

New exploration is the lifeblood of the minerals industry. Given that it is more than a decade between new discoveries being made and operations coming online, our current mining success is due to past exploration efforts. The fact that Australia's share of global exploration has almost halved from 20 per cent to 11 per cent in just 10 years should be cause for alarm.

Proactive policy settings to increase rates of discovery such as fiscal incentives for explorers, more R&D into deep exploration and support for world-class geological data are needed. Otherwise Australia's minerals inventory will simply not be restocked.

The escalating professional skills shortage is another major impediment for the future development of the industry. It is truly bizarre that in the midst of the nation's biggest-ever resources boom, minerals-related departments in universities are shrinking, with 10 geoscience schools closing or downsizing over the past 10 years and only 30 metallurgists graduating in Australia each year. This anomaly is due to the fact that minerals-related courses are small and capital-intensive; in the current user-pays environment, universities are finding that it is just not viable to run them.

AusIMM has submitted that it is absolutely essential that funding for minerals higher education be increased by \$4000 per student, to a level equivalent to agriculture.

In the current climate of skills shortage, increasing the

ability to attract and retain women has increasingly come to be viewed as a priority. A recent report from the Minerals Council of Australia cites that the most common reason women leave the mining industry is lack of accessible, affordable child care. As women in the industry tend to work non-traditional shifts and are away from extended family support networks, the only child care options are in-home care and family day care. For many women the costs of care are prohibitively expensive. The costs of caring are a legitimate cost of working for people in the industry and should be recognised as such. Thus work-related costs of caring should be tax deductible, in line with the recent recommendations of the House of Representatives Standing Committee for Family and Community Services.

A uniform approach to safety and health regulation is also critical. Companies that work across jurisdictions are required to comply with multiple regimes driven by a variety of compliance philosophies. Resolving the detail detracts from the real task of putting in place the most effective safety-management system possible. The state and federal governments have taken steps towards agreeing on nationally consistent safety principles, but it is unclear at this stage whether this will constitute more than an 'on paper' agreement.

The minerals sector needs to see a commitment to the effect that these principles will be implemented in a meaningful way. In particular, a permanent implementation group should be set up to ensure that this excellent initiative delivers real safety results for the industry.

Finally, global warming is a major challenge of our times. The mining industry is well placed to contribute to a technology-based solution to global emissions reduction. We are leaders in clean coal research, major exporters of uranium and possess substantial geothermal energy resources. In a metals-hungry world, the significance of energy improvements in the production of commodities such as iron ore cannot be underestimated. However, in order for business to undertake the long-term technology investments that are needed, both an emissions-trading scheme with a long-term emissions target, and a complementary technology policy are required.

If emissions from key industries are to be reduced globally and over the long term, we need incentives and encouragement for companies to undertake the risks inherent in technology development and commercialisation. This means a coherent national emissions-trading policy and scheme as well as a technology policy. Publicly funded R&D and fiscal incentives for low and zero-emissions technology development are needed.

*Don Larkin:  
"If emissions  
... are to  
be reduced  
... we need  
incentives and  
encouragement  
for companies  
to undertake  
the risks  
inherent in  
technology  
development."*



To view the full AusIMM Election Priorities Statement go to [www.ausimm.com.au](http://www.ausimm.com.au).

## Fish for health

A new report has found that Australian children's health could be at risk unless they start eating five times more fish and other food rich in omega-3s than they are currently consuming. The report has been produced by an international team of nutrition scientists and health experts including *Associate Professor Barbara Meyer* from the **University of Wollongong**.

The report recommends an intake of at least 500mg of omega-3 DHA (docosahexaenoic acid) and EPA (eicosapentaenoic acid) a day for children aged 14 years or over. Research by Professor Meyer indicates that most children only consume between 34 and 118mg per day. The evidence is strong enough to suggest healthcare professionals consider omega-3s as an adjunct in the treatment of children with developmental brain disorders such as ADHD, dyslexia and dyspraxia.

The researchers are calling on the Australian Government to set recommended dietary guidelines for intakes of long-chain omega-3s at a level that will benefit the health of Australian children, saying that current recommendations are too low.

► **More information:** [media.uow.edu.au/releases/UOW036240.html](http://media.uow.edu.au/releases/UOW036240.html)

## Green coal

A new study has found that Australia has black coals capable of producing electricity with near-zero greenhouse emissions. The **CRC for Coal in Sustainable Development (CCSD)** and **CSIRO Energy Technology** have completed a \$1 million industry-sponsored pilot gasification trial program for a range of Australian coals at a German test facility. Coal gasification is one of the three principal technologies for producing energy from coal that allows the capture and storage of CO<sub>2</sub>.

"Australia has coals which are highly suitable for the new greenhouse-friendly power generation technologies of the future," says *Frank van Schagen*, CEO of CCSD. "The tests are a major step in understanding how our coals perform in advanced power generation technologies, which is vital as our coal industry moves towards trading in new and greenhouse-friendly markets."

CCSD program leader for entrained flow gasification,

*Dr David Harris* of CSIRO, says the test program is a major step forward for Australian gasification research. "These trials will provide vital information to determine the most important coal performance factors for developing test procedures and coal selection criteria. They will help optimise operating strategies for the use of Australian coals in gasification technologies."

Mr van Schagen says that instead of burning coal to produce heat and make steam, like current power generation technology, gasification produces hydrogen gas and pure CO<sub>2</sub>. The hydrogen can then be used to produce electricity, while the CO<sub>2</sub> is buried using geosequestration. This eliminates the main greenhouse contribution of coal as a fuel.

► **More information:** [David.Harris@csiro.au](mailto:David.Harris@csiro.au)

## RAN runs deep

**Royal Australian Navy** ship *HMAS Adelaide* is taking part in a project to help scientists predict the influence of climate change on deep ocean currents. The RAN is working with **CSIRO's Division of Marine and Atmospheric Research** to measure deep ocean temperatures and currents through the deployment of robotic ocean profilers that are part of the Argo ocean monitoring program.

Argo is an international collaboration of more than 25 countries that collects temperature and salinity profiles from the upper 2000 metres of the ice-free global ocean. Some profiling floats also measure oxygen, turbidity and deep ocean currents.

The \$25,000 floats (profilers) have a life of about four years. They drift with the currents and cycle between a depth of 2000m and the surface every 10 days, uploading their temperature and salinity data to satellite when on the surface. They are a central feature of Australia's new Integrated Marine Observing System, bringing together existing and new components of a network to observe coastal waters and the deep ocean. Argo data underpins all research into climate change and variability and provides critical input to the joint RAN/**Bureau of Meteorology** and CSIRO project BlueLINK, designed to deliver ocean forecasts to the Australian maritime community.

► **More information:** [www.defence.gov.au/media](http://www.defence.gov.au/media)

## Reef motor

A team of coral researchers is revealing the workings of the mysterious 'engine' that drives the Great Barrier Reef (GBR) and corals the world over. The research is important for understanding why coral reefs bleach and die, how they respond to climate change and how that might affect humanity.

Scientists at the **ARC Centre of Excellence for Coral Reef Studies**, **James Cook University** and the **University of Queensland** have compiled the world's first detailed gene expression library for *Symbiodinium*, the microscopic algae that provides the primary energy source for the entire reef.

"But these microscopic algae are quite weird and unlike any other lifeform: they have different photosynthetic machinery from all other light-harvesting organisms, and they have 100 times more DNA than we do and we have no idea why such a small organism needs so much," *Professor David Yellowlees* says. "They really are like no other living creature we know.

"There's also evidence the corals control its output, suggesting that they are farming their captive plants."

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Working together and using micro-array technology, the team hopes to assemble a picture of the 'chemical conversation' that goes on between the corals and its symbiotic plants that leads to a breakdown in the relationship – a divorce – and the corals starving themselves to death.

► **More information:** [www.coralcoe.org.au](http://www.coralcoe.org.au)

## Wormy aroma

PhD student *Jacqueline Burgess* from **La Trobe University** has identified odour molecules associated with the small brown stomach worm. This takes her a step closer to creating an automatic 'worm sniffer' in her project to determine whether the odour of sheep faeces changes when an animal is infected with parasitic worms, such as the small brown stomach worm, barbers pole worm or the black scour worm.

Her work has been encouraged by the success of Seb the German Shepherd sniffer dog, trained at La Trobe University to detect parasite-infected sheep poo. This success led researchers to ask what compounds the dog is smelling and whether a device to detect those odours can be built – an electronic 'nose'.

The project has replaced Seb with a gas chromatograph coupled to a mass spectrometer. Odour molecules associated with the small brown stomach worm have been identified and research is under way to identify compounds linked with the odour of barbers pole and black scour worms. A detector may ultimately be refined using biosensor technology to check sheep automatically for worms. Researchers are confident they will have a prototype of a poo-sniffing device within five years.

► **More information:** *Jacqueline Burgess*, 0409 287 497

## Bride's revenge

Bridal creeper, one of southern Australia's worst environmental weeds, has been successfully targeted by biological control programs across Australia (with control of up to 95%), but until now scientists assumed that native bush would then recover. New research has shown that this is not necessarily so.

"Generally, native plants are adapted to low-nutrient soils, while exotic invasive species prefer more fertile soils," says *Peter Turner*, PhD researcher at the **University of Western Australia** and **CSIRO Entomology**. "But bridal creeper has no problem invading low-nutrient soils and taking over.

"Our research has shown that once bridal creeper is removed it leaves behind more fertile soil than when it first invaded and these changes in soil nutrients could favour invasion by other weeds rather than the regeneration of the native bush.

"Restoration and regeneration work at sites freed from bridal creeper needs to take into account the increased soil fertility, or it could just be a case of exchanging one weed for another."

► **More information:** [www.csiro.au/news/mediacentre/whatsnew.html](http://www.csiro.au/news/mediacentre/whatsnew.html)

## Deadly diesel

**Deakin University** researchers have found that diesel exhaust is far more damaging to human airway cells than biodiesel exhaust. *Associate Professor Leigh Ackland*, of Deakin's School of Life and Environmental Sciences, led a team of researchers who compared the effects of diesel and biodiesel exhaust on human airway cells. They found that diesel exhaust damaged and killed

the cells, while biodiesel exhaust had little effect.

As it is not possible to study in real time what happens in the human airway, the researchers exposed cultured human airway cells to particulates (the burnt material, including carbon particles) emitted in diesel and biodiesel exhaust fumes.

"Our research found that the particulate matter from diesel exhaust stimulated a 'death pathway' response that the body uses to dispose of damaged cells," Professor Ackland says. "This response caused the airway cells to fuse together and die. We saw hardly any cell death after treatment with biodiesel particulates."

► **More information:** [www.deakin.edu.au/news/media.php](http://www.deakin.edu.au/news/media.php)

## Diabetes deliverance

The largest-ever study of treatments for type 2 diabetes – led by researchers at **The George Institute for International Health** in Sydney – has shown that a combination of two blood-pressure-lowering drugs reduced the risk of death, as well as the risk of heart and kidney disease.

"This treatment reduced the likelihood of dying from the complications of diabetes by almost one-fifth, and could potentially save several millions of lives over the next decade if the treatment was widely implemented," says study leader *Professor Stephen MacMahon*, principal director of The George Institute.

"Importantly, the results showed that patients with type 2 diabetes benefited from this blood-pressure-lowering treatment irrespective of whether or not their blood pressure was elevated to begin with," says study investigator *Dr Bruce Neal*.

More than 11,000 patients with type 2 diabetes in 20 countries participated in the four-year project. Half received daily treatment with a single tablet containing a fixed combination of two blood-pressure-lowering drugs (perindopril plus indapamide) and half received a matching inactive placebo.

► **More information:** [www.thegeorgeinstitute.org](http://www.thegeorgeinstitute.org)

## 'Fat egg' infertility

While obesity has long been thought to be a major factor in couples' inability to conceive, a **University of Adelaide** researcher has discovered why. Using female mice, PhD student *Cadence Minge* found that a protein, called Peroxisome Proliferator-Activated Receptor gamma (PPAR $\gamma$ ), in the cells surrounding, supporting and nourishing the egg is the main reason behind diet-induced infertility.

"Consuming a diet high in fat causes damage to eggs stored in female ovaries," Ms Minge says. "As a result, when fertilised, these eggs are not able to undergo normal, healthy development into embryos."

Importantly, her research also discovered a way to completely reverse the effects of obesity on mouse eggs, enabling afflicted eggs to develop into healthy embryos. When the protein is selectively targeted with the anti-diabetes drug rosiglitazone (marketed as Avandia), the adverse effects of obesity on egg quality are completely reversed.

► **More information:** [www.adelaide.edu.au/news](http://www.adelaide.edu.au/news)

## Arterial unblocker

Within six months of heart disease surgery, up to 60% of patients suffer from their arteries re-blocking. However, *Dr Anita*

**Thomas** and colleagues at the **University of Queensland** have discovered a way to precisely deliver drugs to blockage sites in the arteries, preventing complications after surgery. The technique uses antibodies linked to the drugs to ensure they are deposited in the arteries where doctors want them, rather than in other places in the body where they can have unacceptable side-effects.

“Surgical techniques have been developed to remove these blockages, but in up to 60% of patients they re-occur within six months,” says Dr Thomas, a postdoctoral fellow at the **Australian Institute of Bioengineering and Nanotechnology**. “We thought we could use drugs to prevent this from happening, but they have to be carefully targeted.”

Dr Thomas and **Professor Julie Campbell** observed that the protein fibrin, which is found in blood clots, is deposited in arteries within 10 minutes of surgery to remove the original blockage. They then confirmed that fibrin could be used to attract antibodies, which they linked to drugs to prevent the artery from becoming re-blocked. The targeted delivery of these drugs was effective in preventing re-blocking.

Aspects of the treatment are already being tested and Dr Thomas says it should be in hospitals within five years.

► **More information: Anita Thomas, 07 3346 3170**

## Bone benefit

**University of Western Sydney** (UWS) researchers have found that people aged over 50 who take calcium supplements, or calcium and vitamin D supplements, suffer fewer fractures and enjoy better quality of life.

The meta-analysis of more than 63,000 people taking the supplements, conducted by the **UWS Centre for Complementary Medicine Research** (CompleMED), was published in *The Lancet*. The study found that a regular daily dose of 1200mg of calcium with 800 international units of vitamin D provided the best therapeutic effect, potentially reducing the risk of fracture in the elderly by almost 25%.

Lead author **Dr Benjamin Tang**, an associate researcher with CompleMED says the results confirm calcium supplements have an important role as a preventative medication.

“The results showed the importance of starting supplements early in life, around the age of 50, when bone mineral loss begins to accelerate. And persistence pays off – people who reported taking their supplements at least 80% of the time experienced a 24% reduction in fractures. For those who were less rigorous with their routine the benefit was cut in half.”

► **More information: [apps.uws.edu.au/media/news](http://apps.uws.edu.au/media/news)**

## In the frame

Aluminium-skinned timber-framed windows out-perform other window types when tested for energy efficiency, an evaluation done for **Forests and Wood Products Australia** has found.

The evaluation, undertaken by research consultancy **BRANZ**, compared the operational performance, longevity and broader environmental impacts of timber-framed windows and aluminium-skinned timber-framed windows with their major competitors in the market. The study found window size to be the most important factor in how a window performed throughout its life cycle. This was followed – in order of importance – by whether the window was double- or single-

glazed, frame type and window style.

**BRANZ's Nigel Howard** says aluminium-skinned timber-framed windows performed best, followed by hardwood timber-framed windows, PVC windows and aluminium windows. The biggest differences in performance occurred in harsher climates. “The most surprising result was that in the mildest climate regions double-glazing was not justified because the additional impacts of the double glazing were not paid back over the life of the window from improved energy performance,” he says.

“By understanding the environmental attributes of Australian windows thoroughly, the industry will be able to position itself to promote the legitimate benefits of timber-framed windows,” says FWPA managing director **Dr Glen Kile**.

► **More information: Nigel Howard, BRANZ, 02 9938 6011**

## Climate worriers

The **Lowy Institute for International Policy** has reported that of all external threats to Australians, climate change causes the most concern, with 55% ‘very worried’ about it. Climate change ranks higher than the threats of ‘unfriendly countries developing nuclear weapons’ (50% ‘very worried’), ‘Islamic fundamentalism’ (39%) and ‘international terrorism’ (38%). As a foreign policy goal, ‘tackling climate change’ ranked equal highest in importance for those surveyed (75% thinking it a ‘very important’ goal) together with ‘protecting the jobs of Australian workers’, and ahead of ‘combating international terrorism’ (65%). Asked how convinced they were about certain methods of reducing carbon emissions, 65% responded that ‘renewable energy like wind, solar and geothermal’ was very convincing, and favoured far above other methods proposed, including ‘nuclear energy’ (19% very convinced) and ‘clean coal where emissions are stored underground’ (15%).

► **More information: [www.lowyinstitute.org](http://www.lowyinstitute.org)**

## Internet weeds

The **CRC for Australian Weed Management** (Weeds CRC) says that the increasing popularity of online sales of plants and seeds, through internet-based auction houses such as **eBay** and **Ozton**, is contributing to the nation’s \$4 billion weed crisis and undermining state and territory weed-management laws.

The Weeds CRC says online buyers and sellers should beware of trading in weeds, and warns that 65% of Australia’s weeds are ‘garden escapers’. “The difficulty is that a garden plant in one state may be a declared weed in another state,” says **Sandy Lloyd**, research officer with the Weeds CRC.

Citing the recent case of a Victorian woman fined for selling water hyacinth (*Eichhornia crassipes*) on eBay, Ms Lloyd says that state authorities do monitor online sales of plants, and people will be reported. However, she says that as long as a plant is not prohibited in the seller’s home state, online vendors can sell with impunity to states and territories where it is legislated against.

But it is very difficult to regulate a burgeoning online, mail-order market that allows the legal purchase of a plant in one state that is illegal in another. However, at the moment weeds can easily cross state and territory borders, although new mail-scanning powers have recently been proposed for **Australia Post**, which will help prevent weed-spread via the post.

► **More information: [www.weeds.crc.org.au/publications/media.html](http://www.weeds.crc.org.au/publications/media.html)**

## China hacks

A 'state-sponsored' hacking campaign by China against information systems within Australia, New Zealand and the US is just the tip of the iceberg, **Deakin University's** expert in cyber security has warned. **Professor Matt Warren**, head of Deakin's **School of Information Systems**, says China is the latest country to engage in sponsored hacking. A similar attack reportedly by Russia on Estonian government information systems had almost paralysed that country.

"The fact is, intelligence these days is stored digitally within government and corporations' information systems," he says. "To obtain intelligence a country or state subgroup only needs the resources to be able to hack into those information systems and retrieve the information they require.

"To counteract such attacks we have to address an ethical dilemma: do we use the same resources these groups use but use them to protect ourselves? If we do then a 'global Cyber Arms Race' could develop. Yet if we do nothing then we risk being victims of future attacks and put the security of other countries at risk in the process."

Professor Warren says despite repeated warnings little had been done to protect the security of Australia's critical infrastructure. "The fact is that the critical infrastructure of many countries in the western world, including Australia, will become a target for future cyber attacks.

"The impact for Australia is greater, we lack a centralised critical infrastructure protection centre to coordinate responses against a state-sponsored attack, we have given ASIO the legal powers to 'hack' on Australia's behalf, but what about the resources to protect ourselves?"

► **More information:** [www.deakin.edu.au/news/media.html](http://www.deakin.edu.au/news/media.html)

## Cybertrees

The findings from a major study into applying fertiliser to radiata pine forests have been used to create a computer model that helps forest managers increase the yield and profitability of wood production. The computer model integrates the results from these experiments to predict the growth response and profitability of different rates, forms and application scenarios for nitrogen and phosphorous fertiliser. The system is underpinned by a detailed scientific understanding of the key processes influencing soil nutrient supply and how this drives tree growth.

Inputs for the model include basic information such as stocking, age, volume and site quality; outputs include graphs of annual or cumulative response, harvest yield, actual and discounted fertiliser costs and indications of harvest revenues.

**Ensis** forest scientist **Dr Barrie May**, who helped develop the decision-support system, says it gives forest managers a simple, user-friendly tool to rapidly identify the optimum fertiliser strategy for a particular site, as well as a way to compare relative growth responses and profitability across multiple sites. "Overall, it provides a means to substantially improve fertiliser efficiency by targeting stands that will respond to fertiliser application and then highlighting strategies to boost growth and maximise wood yield using fertiliser regimes," he says.

The decision-support system has been developed by scientists from Ensis funded by the **Forests and Wood Products Research and Development Corporation** in collaboration with **Auspine**,

**ForestrySA** and **Green Triangle Forest Products**. It is based on data from experiments carried out over 12 years at 16 sites in the Green Triangle region in South Australia and Victoria.

► **More information:** [www.csiro.au/news/mediacentre/whatsnew.html](http://www.csiro.au/news/mediacentre/whatsnew.html)

## Bird's-eye view

Researchers at the **University of South Australia** have developed a world-first technology that gives crews inside a command control centre a bird's-eye view of what is happening within a fire, or a search and rescue area, and enables them to communicate directly with people in the field, using visual cues to better manage rescue missions and safely control fires.

Outdoor crews are equipped with mobile augmented reality (AR) systems, comprising a computer backpack with head-mounted screen, which enable them to see 3D, life-sized objects in real time and experience the interactions as though they are looking down from above.

The technology, created by researchers at UniSA's **Wearable Computer Laboratory**, includes a tabletop display system overlaid with information from a ceiling-mounted projector that shows satellite images of an outdoor environment from a top-down perspective, as well as the exact positions of people in the field in real time. Indoor operators can simply use their hands to point to objects on the tabletop or place physical props on the table surface to guide outdoor crews to a particular area, direct them to perform certain tasks or relay further instructions.

PhD researcher **Aaron Stafford** describes the tabletop as a miniature movie set with a blue screen around the tabletop that makes it easier to track what the cameras see. "An indoor operator could place a toy car on the table with a 'follow me' note, and then using the track-ball mouse cause the car to drive across the landscape to guide field crews to their destination. The 3D geometry of objects such as toy cars or animals placed on the surface appear life-sized and realistic-looking to outdoor crews."

► **More information:** [www.unisa.edu.au/news/releases.asp](http://www.unisa.edu.au/news/releases.asp)

## FedSat retires

Launched in December 2002 as Australia's first 21st century satellite, FedSat has finally ceased operations, a year later than expected and after completing 20,000 orbits of the earth (about one billion kilometres). The Australian satellite was developed by the **CRC for Satellite Systems** (CRCSS) as a scientific or research satellite and was launched at the **Tanegashima Space Centre** in Japan. It was the first Australian scientific satellite placed in orbit for more than 30 years and was used by the research community to gather data on space weather and radiowave propagation. The 58-kilogram satellite (the size of a bar fridge) also carried instruments used to test new communications technologies and self-healing space computers.

"Unfortunately the demise of FedSat means we no longer have a space asset with which to conduct new science, at least for the time being," says the former chief executive of CRCSS, **Professor Andrew Parfitt**, Pro Vice-Chancellor for IT Engineering and the Environment at the University of South Australia. "The Australian space science community is now developing its first decadal plan to ensure that Australia remains engaged in space science and technology at an appropriate level."

► **More information:** [www.unisa.edu.au/news/releases.asp](http://www.unisa.edu.au/news/releases.asp)

## Gene silencing revolution

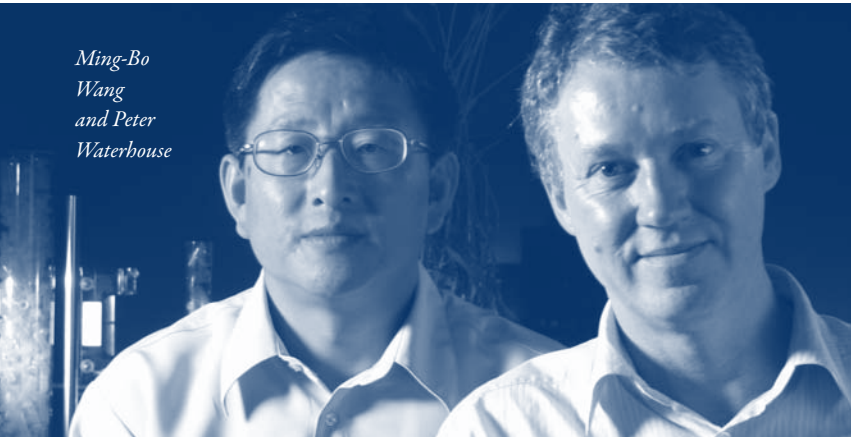
While investigating how plants respond to virus attack, **Peter Waterhouse, Ming-Bo Wang** and their team at **CSIRO Plant Industry** discovered a new way to control plant genes, using the plant's own viral defence mechanisms.

They realised they could harness the plant's immune response to stop information being transferred from any gene in the cell nucleus to the protein factories of the cell. The genes were effectively silenced. The discovery has generated more than 100 patents to date and opened up a new understanding of the workings of plant, animal and human genomes.

For their work, Dr Waterhouse and Dr Wang have received the 2007 Prime Minister's Prize for Science.

In the 1990s, the team was investigating the 'immune system' of plants with the aim of developing better ways to protect crops from viruses. This immunity was first described in the 1920s, but its mechanism remained a mystery. Plant viruses are mostly RNA-based. When they infect cells, the viruses hijack the cellular machinery and make double-stranded RNA as a step to creating new RNA viruses.

*Ming-Bo Wang and Peter Waterhouse*



Normally, there is no double-stranded RNA in uninfected plant cells. In 1995, working with potato and tobacco plants, the research team discovered that plants might be using this double-stranded RNA to mount a defence against viral infection. This led to a series of experiments to understand the mechanism and also to see if it could be harnessed to modify plants – making them less susceptible to disease, for example.

In 1997, Dr Waterhouse and Dr Wang found that plants have mechanisms to identify and cut up the double-stranded RNA produced by invading viruses. The plants then bind these bits of alien RNA to an enzyme (a nuclease), which is able to locate and destroy the normal single-stranded RNA of the virus.

In the meantime, the pair realised that if double-stranded RNA could be used by the plant cell to destroy viral genes, then it could also be used to block the expression of normal plant genes – a useful way of dealing with genes that are not required, such as the ripening gene in fruits, which causes them to bruise and rot early. It could also be used in other ways, for example to silence a gene for a particular colour in flowers.

"We thought 'this is great!'", Dr Waterhouse says. "Now we know how we can kill off any RNA that we like in a cell. All that we have to do is to trick the cell into believing that the messenger RNA of the gene that we want to silence is a virus."

So they created a special gene code to do the job: the gene code, or sequence, for an RNA molecule that loops back on itself to create a hairpin-shaped molecule, which the plant cell recognises as foreign.

To turn off a gene that makes flowers blue, for example, you can insert the special gene sequence into the plant DNA. It will include part of the 'blue flower' gene plus the special sequence to create hairpin RNA. The plant makes RNA from the introduced gene. The special RNA sequence forms the hairpin RNA molecule. The plant cell recognises the double-stranded RNA as foreign, breaks it up and uses the broken-up pieces as a guide to attack any RNA in the cell with the same gene sequence. The message is destroyed and the 'blue flower' protein not made.

At the same time, a US team demonstrated a similar process for gene silencing in animals. They went on to win a Nobel Prize. But as the years passed, researchers around the world have come to realise that Dr Waterhouse and Dr Wang's technique was more powerful and could be used in plant, animal and human cells. Today, the technology is licensed to thousands of researchers and has generated more than 100 patents.

"At one point we seemed to spend more time talking law than we did talking science," Dr Waterhouse says. "But it's led to a strong patent position that gives people the chance to use the technology, and also brings returns to CSIRO and Australia."

While the rest of the world finds new ways to apply the technology, Dr Waterhouse and Dr Wang are applying their work to projects with the capacity to transform agriculture and reduce greenhouse gas emissions.

"I'd like to see gene silencing used to combat climate change," Dr Waterhouse says. "For example, we are working to create plants that could produce biofuels customised for different engines. These crops would be much more efficient at making biofuels than the current processes using corn or sugar. They'd capture the CO<sub>2</sub> when they grow, and release it when used as fuel – a closed circle with no net carbon emissions!"

## Predicting marine dynamics

**Beth Fulton's** unique simulations of marine ecosystem dynamics are delivering answers to the challenge of balancing our competing uses of the oceans. The 34-year-old CSIRO researcher has combined her intuition for maths with a passion for marine biology to create two ecosystem models. Both are being used in Australian fisheries management and by governments around the world to predict and manage human interaction with the marine environment. For her leadership in mathematics and ecosystem modelling, Dr Fulton has received the 2007 Science Minister's Prize for Life Scientist of the Year.

"If you get marine management wrong it's easy to destroy things and end up with a pea-green soup," she says. "The trouble is, it's easy to have the best intentions but still get things wrong."

"In South Africa in the 1990s the hake catch was threatened by competition with seals. The response was a proposal to cull seals. But it turned out that the seals were eating a different species of hake. Culling the seals would increase the numbers of these fish. And they would eat the juveniles of the hake the fisherman were chasing."

Poor decisions can wipe out an entire fishery, as North Atlantic cod fishermen discovered. "They took too many adult fish," Dr Fulton says. "That led to a population explosion of



Beth Fulton

small fish that ate the cod larvae and contributed to the fishery collapse.”

Dr Fulton’s combined strengths in maths and biology have made her a master of ecosystem modelling, which is now

increasingly used to avoid such problems.

For Dr Fulton, maths is an instinct: her earliest memories from school are of maths problems. Brought up on a farm near Goulburn, she also had a curiosity about the natural world. The two interests took her to **James Cook University** in Townsville. The biology and maths lectures always seemed to clash, but she persevered with her interest in both, and moved to Hobart for her PhD. Her thesis was so good that it led to a job offer from **Microsoft** to help model companies as ecosystems. But Dr Fulton turned it down, choosing to stay with marine biology.

Her first model, based on her PhD work, is called ‘Atlantis’. This whole-of-ecosystem modelling framework is the only one in the world that gives equal attention to the biophysical and human components of the system, and is used by the **Australian Fisheries Management Authority** and other fisheries managers. The **UN Food and Agriculture Organization** rated ‘Atlantis’ the best in the world for the strategic evaluation of marine management issues.

Her next model was called ‘InVitro’ and is being used for the evaluation of marine plans as part of Australia’s oceans policy. In particular, it allows simultaneous consideration of multiple uses of the marine environment, including oil and gas, transport, tourism and commercial and recreational fishing.

“To make a model,” Dr Fulton explains, “we talk with the people who have spent their lives studying the different parts of the system – fish, whales, plants, plankton, currents, climate and so on. We spend months attempting to build the model. Then we push the button and see if it works like the real thing – what lives, what dies. Months of fine-tuning follow to make it as accurate as possible.”

Increasingly, her models are revealing new aspects of life in the ocean that marine biologists have then confirmed with direct observation, for example:

- sharks and tunas use jellyfish to get through lean periods;
- species living in shallower shelf waters are more susceptible to ecological pressures than deep-water species, which are susceptible to fishing pressure;
- large populations of jellyfish and squid indicate an ecosystem in trouble; and
- some species (for example, prey species and large seabirds such as skuas) benefit from fishing.

Dr Fulton says there is no better place in the world to do this kind of work. “Australia is at the forefront of marine ecosystem-based management. We can make a real difference.”

## Protecting ocean giants

**Mark Cassidy** is battling the forces of nature – storms, ocean currents and cyclonic winds – that threaten to topple the giant oil and gas platforms off the north-west coast of Australia.

From his geotechnical laboratory at the **University of Western Australia**, he models the way the feet of these giant platforms push into the mud on the ocean floor. And his models work.

His advice is sought by the designers and builders of the platforms and his modelling has led to changes to international safety guidelines. The 33-year-old civil engineer is now taking on a new challenge: how to design and protect pipelines that carry oil and gas from three kilometres under the sea up the continental shelf to land.

For his leadership in offshore civil engineering, Professor Cassidy has been awarded the Malcolm McIntosh Prize for Physical Scientist of the Year.

Physics was a passion at school, but Professor Cassidy wanted to put it to practical use, so he turned to civil engineering at university. A winter holiday job in Norway introduced him to the largest movable objects on Earth – 500-metre-tall oil and gas platforms. He was hooked. For his PhD in the UK he studied mobile drilling platforms and how their 20-metre-wide ‘spudcan’ feet worked in responding to the stresses and strains placed upon them, deep beneath the ocean’s surface.

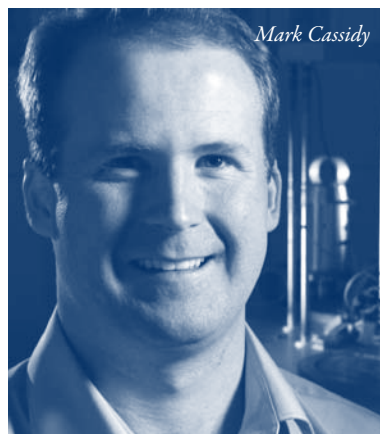
He developed a mathematical model to predict the stability of the feet, a critical issue as four or five platforms fail worldwide every year. At \$250 million each, the failure and replacement of these platforms comes at a great cost. Professor Cassidy’s mathematical model worked, and his career path was set.

Today, his recent, more sophisticated models take into account the impact of soil and wave mechanics, structural mechanics and more. Scaled-down versions of platforms’ legs and feet are tested using giant centrifuges at his laboratory at the university’s **Centre for Offshore Foundation Systems**.

The centre, which he now directs, has grown to be one of three leaders in the field worldwide. Its immediate beneficiaries are the burgeoning oil and gas industries of Australia’s North-West Shelf. The industry is now moving further offshore, with the multi-billion-dollar Gorgon gas field project leading the way.

“We’re in the right place at the right time,” Professor Cassidy says. “The epicentre of the industry is moving from the Gulf of Mexico and the North Sea to Australia and Asia.”

Professor Cassidy is leading an \$11 million CSIRO Flagship cluster that brings six universities together to investigate the challenges of constructing pipelines that will carry oil and gas from depths of three kilometres or more. The pipelines will either rise up to floating platforms far out to sea, or run for some 300km or more along the seabed and up the cliffs of the continental shelf to land-based terminals. They will have to cope



Mark Cassidy

with deep sea cliffs, ocean currents, a moving seabed and other hazards. Professor Cassidy and his colleagues will build the scale models and create their mathematical equivalents – sets of numbers that engineers can use to design innovative engineering solutions.

## Vet farm

The **Australian Government** has announced \$15 million in funding and new university places to support the establishment of a vet school, to be based at the **University of Adelaide's** Roseworthy Campus. The school will have 40 new places each year from 2008, rising to 50 a year for the postgraduate degree, which will begin in 2011. **Professor Phil Hynd** says the school will focus on "emerging areas of national importance, such as aquaculture, biosecurity, production animals and equine health, and will specifically support SA's veterinary industry requirements".

► **More information: David Ellis, 08 8303 5414**

## Medicluster

The **University of Sydney** is investing \$30 million in a new education and research facility within the grounds of **Royal North Shore Hospital (RNSH)**. The funding decision will add four floors of laboratory and administrative space for 200 extra researchers. The now 10-storey building will comprise three levels of education and seven levels specifically for medical research. The building will bring together groups currently scattered across the RNSH campus and will connect to the new main hospital building, allowing easy access to the research area for staff members engaged in active clinical research.

► **More information: Elizabeth Heath, 02 9351 3168**

## Vegies & milk

Two new research centres have been opened at the **Tasmanian Institute of Agricultural Research (TIAR)**. Primary Industries and Water Minister **David Llewellyn** and **University of Tasmania (UTAS)** Vice-Chancellor **Professor Daryl Le Grew** have hailed the \$25 million investment over 10 years as a marvellous boost for the state's economic future. Mr Llewellyn says establishing the two new research centres at TIAR is a chance to further the successful research partnership between the University of Tasmania and the **Tasmanian Government**.

The **Vegetable Centre** and the **Dairy Centre** will allow for a seamless approach to research, development and extension in the vegetable and dairy industries, and enhance a more cooperative approach between the university and the Government. Under the move, the Forthside (vegetable) and Elliott (dairy) Research and Demonstration farms will transfer to the university.

► **More information: 03 6233 6573**

## Brain report

Despite the growth of the knowledge economy there are huge variations in the way organisations report intellectual capital, new research shows.

"For many industries intangible intellectual assets are significant factors driving their business success," says **Professor James Guthrie**, Chair of the Discipline of Accounting at the **University of Sydney**. Professor Guthrie, who has recently released two reports in this area, found a wide discrepancy in the level and quality of intellectual-capital reporting by Australian and Hong Kong organisations. He suggests that a 'stakeholder taskforce', coordinated by the accountancy profession, should

be established to increase awareness about the importance of intellectual-capital management and reporting, and to assist the development of reporting policies and guidelines.

► **More information: Kath Kenny, 02 9351 2261**

## Aceh aid

An Australian higher-education collaboration has been officially launched to help rebuild research capacity in the Indonesian province of Aceh. The **Aceh Research Training Institute (ARTI)** is a direct response by Australian academics to the devastation caused by the 2004 Indian Ocean tsunami. The Australian director of the ARTI program, **Professor Michael Leigh**, from the **University of Melbourne's Asia Institute**, says following the tsunami he was overwhelmed by enquiries from academics with connections to the region, who wanted to know how they could help, in practical terms.

Working closely with his colleague **Dr Darni Daud**, Rector of **Universitas Syiah Kuala (Unsyiah)**, Professor Leigh conducted a 'rapid-needs-analysis' in February 2005. It became clear that while many aid efforts were rightly directed to restoring physical damage and relieving human suffering, there was a substantial gap in educational resources and research capacity. Based at Unsyiah, ARTI now draws on the commitment of academics and postgraduate students from a consortium of eight Australian and four Indonesian universities, with financial underwriting from the **Myer Foundation** and **AusAID's** Australia-Indonesia Partnership for Reconstruction and Development.

In its first six months ARTI has provided research training programs for 245 Acehnese academics, community, government and NGO workers, with 12 introductory courses in research methods already delivered out of a total of 24 introductory courses expected to run over the three-year life of the project.

► **More information: Katherine Smith, 03 8344 3845, smitk@unimelb.edu.au**

## JCU joins innovators

**James Cook University** has joined the select group of **Innovative Research Universities Australia (IRUA)** – the first new member since the group was formed five years ago. The founding members of the group are the **University of Newcastle, Macquarie University, Griffith University, Flinders University, Murdoch University** and **LaTrobe University**. IRUA is one of three university alliances recognised by the peak body **Universities Australia**. The other two are the **Group of Eight**, and the five-member **Australian Technology Network**.

► **More information: Jimi Orien, 07 4781 4822, 0418 892 449**

## Sunshine design

The **University of the Sunshine Coast** will introduce a Bachelor of Design degree in 2008 that includes an Australian first – a specialisation in the topical area of 3D Eco Design. This highly specialised discipline will give students the ability to design for sustainability, as well as functionality, using state-of-the-art technology.

► **More information: www.usc.edu.au**

## Mucus mover

**Pharmaxis** has announced that its phase III B301 study of Bronchitol for the treatment of people with bronchiectasis has met its two primary efficacy endpoints: quality of life and mucus clearance. Bronchiectasis is an incurable, degenerative and chronic lung condition. Pharmaxis expects Bronchitol to be the first targeted medication for this patient group in more than 20 years.

Data from the 362-subject study demonstrated a highly significant improvement in quality of life after 12 weeks of treatment with Bronchitol, as assessed by the St George Respiratory Questionnaire (a patient-reported-outcome tool for measuring quality of life). There was also a highly significant difference in mucus clearance at 12 weeks for patients receiving Bronchitol versus those patients receiving a placebo. The trial was conducted at 22 hospitals in Australia, New Zealand and the UK.

There were no serious adverse events attributable to treatment and the incidence of adverse events did not significantly differ between the placebo and the Bronchitol groups. The dropout rate was less than 10%, indicating that treatment was well accepted.

"This is the largest study ever conducted in bronchiectasis, and we have collected a lot of data on a variety of secondary endpoints which are still being analysed," says Pharmaxis chief executive **Dr Alan Robertson**. "With no products currently indicated for bronchiectasis we look forward to discussing our complete data set and next steps with the regulators."

► **More information:** [www.pharmaxis.com.au](http://www.pharmaxis.com.au)

## Ovarian advance

**Novogen Ltd's** subsidiary **Marshall Edwards Inc** has enrolled the first patient in Europe in the phase III Ovature (OVarian TUmour REsponse) clinical trial of phenoxodiol in women with advanced ovarian cancer resistant or refractory to platinum-based drugs. The patient has been enrolled at the **Catholic University of Leuven**, Belgium, under the direction of **Professor Ignace Vergote**, head of gynaecologic oncology.

"We are hopeful that a positive outcome of this multi-centre study will be a significant medical advance for thousands of women with late-stage ovarian cancer whose tumours have become insensitive to the existing chemotherapeutic drugs," Professor Vergote says. "As one of Europe's largest cancer institutions, it is important for us to be a part of these worldwide studies. It is important that we continue to develop new ovarian cancer treatments. It is only through constant research that we will learn how to battle this deadly disease effectively."

The Catholic University of Leuven is one of 26 sites in the UK and Europe that will be recruiting patients into this major multi-centre multinational ovarian cancer study to determine the safety and effectiveness of the drug phenoxodiol, when used in combination with the chemotherapy drug, carboplatin.

There will be an additional 30 sites in the US, of which seven are now recruiting patients, and there are four sites open in Australia. The total number of patients to be treated is 470.

The primary outcome of the trial is the assessment of the relative time it takes for the ovarian cancer to progress. An analysis of interim results will be possible after 95 patients have progressed with their disease.

► **More information:** [www.novogen.com](http://www.novogen.com)

## Brain rehab

**Neuren Pharmaceuticals** has completed cohorts 1 and 2 of its phase Ib trial to test the safety, tolerability and pharmacokinetic action of NNZ-2566 as a compound to treat traumatic brain injury (TBI). The completed cohorts provide Neuren with sufficient safety data to be able to proceed with its moderate TBI phase II trial, and Neuren expects to file the ethics application in the last quarter of 2007. Each cohort in the Phase Ib study comprised seven patients – five who received the drug and two who received a placebo.

A safety report on the two cohorts has been submitted to the local ethics committee in Australia for review and has resulted in a recommendation to proceed with dosing of cohort 3. Cohorts 3 and 4 aim to provide higher doses and longer infusions for severe TBI. The completion of cohorts 3 and 4 will enable Neuren to proceed with a severe TBI phase IIa trial, which is due to start in the US in mid-2008 in conjunction with the **US Army**.

Development of clinical protocols for the phase II trial in moderate TBI and the phase II trial in severe TBI is nearing completion with approval by Neuren's clinical advisory board expected imminently.

The moderate TBI trial protocol includes a comprehensive set of end points that Neuren believes provides the greatest chance of an efficacy signal. These endpoints include an assessment of cognitive performance, mood state, activities of daily living, post-concussion symptoms, global disability outcomes, and access to a novel set of brain injury biomarkers under development by US company **Banyan Biomarkers Inc**.

► **More information:** [www.neurenpharma.com](http://www.neurenpharma.com)

## Pig cell go ahead

**Living Cell Technologies Ltd (LCT)** has obtained the regulatory and ethics approvals required by the New Zealand Minister of Health before proceeding with its type 1 diabetes phase I/IIa clinical trial in New Zealand. LCT expects that clinical trials of DiabeCell® in type I diabetes patients will commence soon in New Zealand.

Earlier this year, LCT received regulatory approvals from **Medsafe** and the Gene Technology Advisory Committee, the regulatory bodies that led the international review of the health status of LCT's unique pig herd and certified its DiabeCell® manufacturing plant to Good Manufacturing Practice (GMP) standards for supplying medical-grade pig cells for use in humans.

► **More information:** [www.lctglobal.com](http://www.lctglobal.com)



## Fewer dogs

**Peptech Ltd's** wholly-owned subsidiary, **Peptech Animal Health Pty Ltd (PAH)**, has signed an exclusive agreement with **Virbac SA (Virbac)** to distribute its contraceptive implant for male dogs, **Suprelorin®**, throughout Europe. Virbac will undertake all sales, marketing and distribution of the product with the launch expected to occur in early 2008. French-based Virbac, one of the world's largest veterinary pharmaceutical companies, had sales of nearly \$400 million in Europe in 2006.

The contraceptive implant sterilises male dogs for periods of more than six months by inhibiting the production of testosterone and sperm. As infertility is only induced temporarily, **Suprelorin®** simply intervenes rather than damages the dog's reproduction system. **Suprelorin®** also inhibits the production of testosterone, which helps to reduce the aggressive behaviour associated with establishing territorial dominance.

"Virbac is recognised globally as one of the world's foremost veterinary companies," says **Dr Paul Schober**, general manager of PAH. "It has the reputation of focusing not just on animal health but on the quality of relationships with its customers as well as targeting innovative products. The size and strength of Virbac in Europe, with almost 1250 employees, should ensure a successful launch of **Suprelorin®** there."

► **More information:** [www.peptech.com](http://www.peptech.com)

## Russian MS trial

**Antisense Therapeutics Ltd** is conducting an 80-patient, phase IIa clinical trial to assess the safety and efficacy of **ATL1102** in relapsing-remitting multiple sclerosis (MS) patients in Poland, the Czech Republic, Bulgaria, Romania, the Slovak Republic and Germany. Fifty-eight patients have now been enrolled into the study and more than half have completed the dosing phase of the trial.

Approval for the drug's clinical trial has also been granted by regulatory authorities in Russia. While the company anticipated the timeframe for trial approval in Russia, various administrative processes in Russia have delayed the start of the clinical trial at the Russian sites, affecting the projected timeline for its completion. The company now expects that all the remaining patients will be enrolled and the study completed in time for trial results to be reported in early 2008.

► **More information:** [www.antisense.com.au](http://www.antisense.com.au)

## Brain pain

**NeuroDiscovery**, a neurology-focused R&D company, is updating the status of its trial of **NSL-043** for the treatment of neuropathic pain, undertaken in collaboration with its partner **Sosei Group Corporation**. Due to the trial's emerging positive safety profile, the company has decided to extend the trial to explore higher doses than the original 600mg, and is awaiting approval from the UK's **Medicines and Healthcare Products Regulatory Agency** to proceed.

Neuropathic pain is pain related to peripheral or central nervous system injury and can persist for months or years after the initial insult. The condition has a poor prognosis and is a significant cause of morbidity.

The trial was a double-blind, placebo-controlled, single-

dose, sequential-group, dose escalation trial in 40 healthy male volunteers to assess the safety, tolerability and pharmacokinetic profile of **NSL-043** administered as an oral dose. Two additional higher-dosing cohorts are now planned with an expected administration of the first dose in mid-October 2007.

► **More information:** **David McAuliffe, 0408 994 313**

## Hep C promise

**Giaconda Ltd** has announced that **Hepaconda®**, its product for the treatment of the hepatitis C virus (HCV), was listed in **Thomson Scientific's** quarterly publication *The Ones To Watch* as one of "The Five Most Promising Drugs Entering Phase II Trials". **Hepaconda®** was the only gastrointestinal therapy noted in the report, which covers new drug approvals and promising candidates entering phase II and phase III clinical trials.

On 25 June, the company announced the start of the phase IIa clinical trial of **Hepaconda®** for the treatment of HCV genotype 1 refractory to current therapy. **Giaconda** expects to report on the trial results in early 2008. Genotype 1 HCV has the lowest response rate to standard treatment compared with other genotypes and carries a higher risk of post-treatment relapses and progression to liver cirrhosis and liver cancer. The current standard treatment for chronic HCV has limited efficacy, especially in genotype 1, and poor tolerability, with the result that many patients cease treatment.

"The cost of hepatitis C to the Australian healthcare system was \$156 million in 2004-05 and in 2006, 197,000 Australians were estimated to have chronic hepatitis C," says **Giaconda** chief executive **Patrick McLean**. "The cost to the healthcare system in the US is currently estimated at US\$600 million."

► **More information:** [www.giacondalimited.com](http://www.giacondalimited.com)

## Profit hike

Australian eHealth company **IBA Health Ltd** has announced an after-tax profit of \$22.9 million for the year to 30 June 2007, up 50% from last year. Revenue increased by 26% to \$74.7 million.

"We are delighted with this strong result especially as we have topped the earnings guidance issued in our half-year report," says executive chairman **Gary Cohen**. "The results reflect the continuing success of our acquisition strategy and our ability to unlock the value of these acquisitions to generate organic growth."

"IBA is now established in five Asian countries as well as in the Middle East, Africa, Australia and New Zealand. With our world-class solutions, low-cost infrastructure, centre of excellence in Bangalore and our network of offices throughout the region we are well positioned to capitalise on major opportunities as these countries upgrade their health infrastructure."

► **More information:** [www.ibahealth.com](http://www.ibahealth.com)

## Growth control

**Antisense Therapeutics Ltd** has released positive data from its **ATL1103** research program, describing how administration of an antisense drug targeting the growth hormone receptor (GHR) significantly suppressed blood vessel overgrowth in a mouse model of retinopathy. The finding has been published in the journal *Molecular Vision*.

**ATL1103** is a second-generation antisense drug designed to

block the expression of GHr, thereby reducing levels of insulin-like growth factor-I (IGF-I) in the blood, and is a potential treatment for diseases associated with excessive growth hormone action, including acromegaly (an abnormal growth disorder of organs, face, hands and feet) and diabetic retinopathy. IGF-I suppression is a recognised clinical marker of a drug's activity in the treatment of these diseases.

The study, conducted by *Associate Professor Jennifer Wilkinson-Berka* from **Monash University**, adds to previously published mouse data on the suppression of IGF-I hormone in blood.

Manufacture of ATL1103 for pre-clinical studies and human clinical trials is under way, with pre-clinical animal toxicology studies expected to commence before the end of the year.

► **More information:** [www.antisense.com.au](http://www.antisense.com.au)

## Stem cell progress

**Mesoblast Ltd**, an Australian adult-stem-cell company, has reported that Mesoblast and its US-based sister company **Angioblast Systems Inc.** have sufficient capital to execute each company's commercial milestones in a timely and strategic manner. At 30 June 2007, the company's total cash position was \$12.5 million. The funds at-hand are sufficient to enable completion of two phase II clinical trials, one in each field of orthopaedic and cardiovascular disease, under the guidelines of the **US Food and Drug Administration (FDA)**.

The phase II trials utilise the company's patented allogeneic, or 'off the shelf', adult stem cells. This is in line with the company's unique business model to produce a low-cost stem cell therapy obtained from one donor for use in thousands of unrelated recipients. Similar to a pharmaceutical, the therapy will be available at the time and place of need and is expected to generate a high-margin commercial return.

Both companies are advancing the shared platform technology for a variety of common diseases that have unmet medical needs and large market opportunities. Mesoblast is commercialising the patented adult stem cells for orthopaedic indications such as spinal fusion, long bone fractures, degenerative intervertebral disc disease and arthritic cartilage degeneration in the knee and other joints. Angioblast is commercialising the technology to treat diseases of the heart and blood vessels, including heart attacks, congestive heart failure, angina, peripheral vascular disease and other applications.

► **More information:** [www.mesoblast.com](http://www.mesoblast.com)

## Clearer vision

Wavefront imaging company **Iatia** has signed a contract with an international ophthalmology and optometry manufacturer for the production of an autorefractor featuring its quantitative phase imaging (QPI) technology. Iatia stands to make a 15% return on each product sold, which equates to approximately \$2750 return per unit. About 6000 autorefractors are sold each year worldwide, and it is expected that this new product will enjoy a substantial portion of the market.

The contract also provides an upfront payment of 50,000 euros (about \$83,000) to Iatia and states that the manufacturer will be responsible for all product manufacturing, marketing and distribution and will manage any warranties.



The autorefractor is one of up to five co-development projects currently in discussion with the manufacturer. The next project focuses on developing a product that assists with the early detection of glaucoma, now the second most common cause of blindness in the world, affecting an estimated 65 million people. Locally, glaucoma is the second most common cause of registering for the blind pension in Australia.

► **More information:** [www.iatia.com.au](http://www.iatia.com.au)

## CCC reports

**Clinical Cell Culture Ltd (C3)** has released its preliminary final results for the 2007 financial year. Sales revenue was \$931,954 compared with \$1,102,274 last year. This decrease in revenue reflects the delivery of stocking orders in the prior year and the impact of putting on hold the marketing of CellSpray® and CellSpray XP®.

During the year, C3 continued to focus on achieving sales penetration for ReCell® in key approved markets. Following a strategic review earlier in the year, the board elected to make a number of changes to the company's operations including putting on hold the active marketing of CellSpray® and CellSpray XP®. These decisions were difficult but necessary to maximise the company's cash resources.

C3 chief executive officer **Andrew Cannon** says the 2007 financial year was a period of significant change for the company but the impact of these changes was already being seen in reduced levels of expenditure and the benefit of a more direct marketing approach in key markets.

During the year, the centres involved in the ReCell® FDA trial were selected and personnel trained. Following slower than expected patient recruitment, changes to the protocol were requested and these have now been approved by the FDA. The company is confident that an increase in the speed of patient recruitment will now be seen.

The net loss for the year was \$15,065,061 compared with a

loss of \$11,973,869 in the previous period. During the year C3 completed a successful share purchase plan and placement raising \$13.7 million. The company is in a strong cash position, with a cash balance at 30 June 2007 of \$12.3 million.

► **More information:** [www.clinicalcellculture.com](http://www.clinicalcellculture.com)

## Panbio profit

International medical diagnostics company **Panbio Ltd** has announced an after-tax profit of \$554,000 for the year ended 30 June, representing an increase of 58% from last financial year.

Sales revenue was \$18.8 million, up 9% from last year, achieved across the company's product portfolio. Sales of dengue-related products grew by 18% and all other products grew by 5%. Seven of the top-10 products achieved record annual sales. The strength in dengue sales from the tropical regions of Asia-Pacific and Latin America has driven revenue to record levels. Total product sales in Australia also reached record levels. Sales in Europe ended the year slightly up on FY2006 after some signs of softening in the first half of the financial year. The strength in these regions has offset softening in sales in the US.

The strong performance of the Diagnostics Division produced positive operating cashflow of \$1,432,000 for the year. As a result, the company was able to invest \$1,694,000 in research activities and a further \$455,000 in the acquisition of equipment and licences. The company also invested an additional \$495,000 in the diagnostics business with the majority of funds being spent on the acquisition of equipment to assist in driving further efficiencies in the manufacturing process.

► **More information:** [www.panbio.com.au](http://www.panbio.com.au)

## Orphan drug

The **Commission of the European Communities** has granted orphan product designation for **Progen Pharmaceuticals Ltd's** PI-88 for the treatment of hepatocellular carcinoma, or primary liver cancer. This follows the positive recommendation received in August from the **European Agency for the Evaluation of Medicinal Products (EMA)** Committee for Orphan Medical Products for PI-88 in this indication.

► **More information:** **Justus Homburg, 07 3842 3333**

## Euromove

**Giaconda Ltd** has entered a cooperative development agreement with the Czech Republic's **Prague Clinical Services** to further the development of its lead product, Myoconda®, for the treatment of MAP infection in Crohn's Disease. Under the terms of the agreement Giaconda and Prague Clinical Services will collaborate to complete a phase III clinical study across Europe, as well as regulatory development on Myoconda® to enable registration with the UK's **Medicines and Healthcare Products Regulatory Agency**.

On the basis of regulatory advice, Giaconda believes that the phase III trial will satisfy the requirements of the European regulatory agencies for a submission of a registration dossier if the results of the trial are strong. The trial will also provide the data needed by the **US Food and Drug Administration (FDA)** according to the Investigational New Drug (IND) application, which was granted earlier this year, although it is expected that

the FDA will require a further phase III trial to be undertaken.

The European phase III trial and a related pharmacokinetic study will take 52 weeks to complete once permission to conduct the trial is given by the European regulatory bodies. Organisation of the study is expected to begin before the end of 2007.

► **More information:** [www.giacondalimited.com](http://www.giacondalimited.com)

## Cashed up

**Phylogica Ltd's** recent share option exercise period has closed with the vast majority of option holders choosing to exercise their options. A total amount of \$5,024,112.77 was received by the company, leaving a shortfall of only \$685,999.25, which was covered under the company's underwriting agreement with **Australian Heritage Group** (announced in June this year).

► **More information:** [www.phylogica.com](http://www.phylogica.com)

## Prana shares

**Prana Biotechnology**, a biopharmaceutical company focused on the research and development of treatments for neurodegenerative disorders, has announced – subject to shareholder approval – a private placement of approximately 24.56 million new shares at a subscription price of 28.5¢ per share, with a 2 for 6 free attaching option. Prana will receive approximately \$7 million before allowing for issue costs from institutional and professional investors in Australia and the US.

The funds will be predominantly used for the ongoing development of its lead compound, PBT2, currently in a phase IIa trial in patients with Alzheimer's disease. This trial is a double-blind, placebo-controlled safety and tolerability study in patients with Alzheimer's disease, scheduled for completion in December 2007. The trial is well advanced: more than 70% of patients have been dosed, and almost half of the target 80 patients have already completed the trial.

► **More information:** [www.pranabio.com](http://www.pranabio.com)

## Antimicrobial deal

**Phylogica Ltd** has entered into an agreement with Perth-based company **Dynamic Microbials Ltd** (Dynamic) to license anti-microbial applications of its proprietary Phylomer technology.

Based on the results of a technical evaluation, funded by Dynamic, at the **Telethon Institute for Child Health Research** over the past six months, Phylogica will grant a licence to Dynamic to develop anti-microbial drugs. The initial technical evaluation involved the generation of potent Phylomer peptides against *Acinetobacter baumannii*, a medically important bacteria that is the cause of a number of nosocomial (hospital-acquired) infections, which has shown antibiotic resistance in an increasing number of cases. Initial proof-of-concept research identified 10 peptides with significant antibacterial activity.

Dynamic will have exclusive rights to develop anti-microbial drugs for human applications in defined fields (anti-microbial, anti-protozoan and anti-fungal), and non-exclusive rights for human anti-viral applications. In return for licensing these rights, Phylogica will receive a strategic equity position in Dynamic, together with a royalty on direct sales of products and a percentage of commercialisation income.

► **More information:** [www.phylogica.com](http://www.phylogica.com)

## Vic, WA mediboost

In Victoria, Innovation Minister *Gavin Jennings* announced grants totalling \$25.7 million for 15 major medical research institutes. The Operational Infrastructure Support (OIS) grants provide annual funding for the day-to-day operations of key medical research bodies such as the **Burnet Institute**, **Walter and Eliza Hall Institute** and **Murdoch Children's Research Institute**.

Mr Jennings said previous OIS funding has helped the Burnet Institute win an international health program management contract worth more than \$24 million from the **Australian Government**. "Working through **AusAID**, the Burnet Institute will manage the **China-Australia Health and HIV/AIDS Facility**," Mr Jennings said. "This is a major project for the world's most populated country that will focus on three key themes: HIV/AIDS, emerging infectious diseases, and health system strengthening."

Institutes receiving OIS Program grants for 2007-08 are:

- **Baker Heart Research Institute** \$2,321,860;
- **Bernard O'Brien Institute of Microsurgery** \$254,716;
- **Bionic Ear Institute** \$408,292;
- **Brain Research Institute** \$ 235,972;
- Burnet Institute (incorporating **Austin Research Institute**) \$3,786,176;
- **Centre for Eye Research Australia** \$395,596;
- **Howard Florey Institute** \$1,837,396;
- **Ludwig Institute for Cancer Research** \$1,473,428;
- **Mental Health Research Institute** \$607,848;
- **Monash Institute of Medical Research** \$1,603,872;
- Murdoch Children's Research Institute \$2,381,756;
- **National Stroke Research Institute** \$366,024;
- **Prince Henry's Institute** \$875,972;
- **St Vincent's Institute of Medical Research** \$1,379,420; and
- **Walter and Eliza Hall Institute of Medical Research** \$7,771,672.

The **WA Government** is providing \$2 million to 18 frontline health and medical teams. **Princess Margaret Hospital** (PMH) health professionals working on ways to improve care for country-based children and teenagers suffering eating disorders will receive a slice of the funding.

"Specialist clinical psychologist *Julie McCormack* from PMH's psychological medicine department and her team will use the grant to trial promising techniques for treating country teenagers and children who have eating disorders," says WA Health Minister *Jim McGinty*.

The Minister announced that several of the other research projects to receive funding also focused on developing ways to improve access to care for people living in remote and regional areas. These include:

- *Dr Rhonda Marriott*, **Murdoch University**, for improving wound care in indigenous communities;
- *Dr Sutapa Mukherjee*, **Sir Charles Gairdner Hospital**, for improving sleep apnea diagnosis for rural patients; and
- *Professor Kanagasigam Yogesan*, **Lions Eye Institute**, for eye telemedicine to improve access to eye health and early detection of eye disease.

► **More information:** Victoria, [www.dpc.vic.gov.au](http://www.dpc.vic.gov.au); WA, 08 9422 3000

## Cancer cluster

Victoria's new cancer precinct is a step closer with the announcement of \$5 million for detailed planning works to start. Premier *John Brumby* says planning for a comprehensive cancer centre will investigate bringing together parts of the **Peter MacCallum Cancer Centre**, the **Royal**

**Melbourne Hospital**, the **Ludwig Institute for Cancer Research**, the **Walter and Eliza Hall Institute of Medical Research** and health research facilities from the **University of Melbourne**.

Mr Brumby says development of the proposal will focus on the former Dental Hospital site adjacent to the Royal Melbourne Hospital, which has been identified as the most appropriate site because of its proximity to existing clinical and research strengths in Parkville. An initial proposal for the centre will be developed by early next year, with a full proposal due by the end of 2008.

In another move to boost cancer research, the **Cancer Council Victoria** and consortium members **Austin Health**, **Melbourne Health**, **Peter MacCallum**, and **Southern Health** have all joined forces to create the **Victorian Cancer Biobank**.

Victoria's Innovation Minister *Gavin Jennings* says the \$16 million Biobank will hold a collection of blood and tissue samples taken from healthy individuals as well as patients diagnosed with cancer. He says the Biobank will work with the **Australian Cancer Grid** and the **Victorian Cancer Agency** to give researchers and healthcare providers access to one of the world's most comprehensive collections of cancer-related tissue samples and data. These samples will be available to cancer researchers within Australia and internationally, for use under ethical guidelines, to enable them to continue pioneering new therapies. Mr Jennings joined with the Cancer Council Victoria and the Biobank in calling for the public to support this important initiative by donating tissue.

► **More information:** [www.dpc.vic.gov.au](http://www.dpc.vic.gov.au)

## Water savers

The **Victorian Government** is providing \$5 million to encourage smarter ways to save water in cities and regional towns. The Smart Water Fund provides seed funding for water conservation, water recycling, R&D projects and bio-solids management projects.

Two funding streams are available for sustainable water use projects:

- up to \$3 million for Victoria-wide urban community and business innovations; and
- up to \$2 million for R&D into some of the key challenges facing the water industry. Targeted project descriptions that address these challenges are available on the Smart Water Fund website.

The Brumby Government's Smart Water Fund is an initiative of Melbourne's water businesses – **City West Water**, **South East Water**, **Yarra Valley Water**, **Melbourne Water** – and the Department of Sustainability and Environment.

► **More information:** [info@smartwater.com.au](mailto:info@smartwater.com.au), [www.smartwater.com.au](http://www.smartwater.com.au)

## Native plants

A new collaboration between the **Western Australian Government** and the **University of Western Australia** (UWA) is expected to boost the understanding and conservation of native plants. Environment Minister *David Templeman* announced that the Department of Environment and Conservation (DEC) had signed a memorandum of understanding with UWA to share funding for two positions in the university's School of Plant Biology and the **WA Herbarium**. The Minister said that by combining forces, UWA and DEC were able to fund two shared positions in the specialised field of plant biology, including taxonomy.

Mr Templeman says the partnership will not only significantly contribute to DEC and UWA's research, it will also benefit students: "Part of the agreement is that in addition to undertaking scientific research at DEC, the positions also include lecturing third and fourth

year students and overseeing postgraduate students in the field of plant conservation biology," he said.

Mr Templeman also launched an interactive facility to FloraBase, the state's authoritative online source on WA plants. "The introduction of an interactive keys module will take FloraBase to a new level of utility and accessibility," he said. "FloraBase provides access to the WA Herbarium, considered a leader among the world's herbaria in providing authoritative, integrated and up-to-date information on plants in its region."

Interactive keys are computer-aided identification tools that assist with finding the correct name for an unidentified specimen. The keys incorporate more than 500 scientific characters to describe and identify virtually all the families and genera of flora in WA. Users will now be able to identify unknown plant specimens to nearly 200 families and more than 1000 genera. Having narrowed down the group to which a specimen belongs, the keys integrate with published literature and FloraBase to help the user reach a full identification to species level.

A DEC bioinformatics team spent the past year developing methods to publish the interactive keys. Their project was funded by 'Saving our Species', the WA Government's two-year, \$15 million biodiversity conservation initiative.

► **More information:** FloraBase, [www.naturebase.net](http://www.naturebase.net)

## GM ban strengthened

The **Western Australian Government** has introduced legislation to Parliament to further protect the state's moratorium on the growing of genetically modified (GM) crops. The *Seeds Amendment Bill 2007* will allow the Agriculture and Food Minister to declare GM seed to be 'prohibited seed'.

"Under the proposed changes, it will be an offence to import, sell or be in possession of prohibited seed in WA for the purposes of cultivation," says Minister **Kim Chance**. He says that traces of GM contamination have been detected in the state's canola crop, despite the fact that all canola-growing states of Australia have a moratorium in place. Mr Chance has established a Ministerial Reference group to prepare a discussion paper for public consultation on the risks and benefits of GM canola to farmers and markets. The discussion paper should be available for public comment in early 2008.

► **More information:** 08 9213 6700

## Ecomove

ACT Chief Minister **Jon Stanhope** has welcomed the appointment of **Dr Maxine Cooper** as the new Commissioner for the Environment and has announced an expansion of the commissioner's role. Mr Stanhope says that the **ACT Government** has recently reviewed the role of the Office of the Commissioner for the Environment, in light of the priority the government was placing on sustainability and climate change. On the basis of that review it had been decided to substantially expand the role of the commissioner, making it a full-time position, to be known as Commissioner for Sustainability and the Environment. The position may also incorporate some elements of the current role of Conservator of Flora and Fauna, following the completion of the review of the *Nature Conservation Act*. Further work will be required to flesh out the expanded role, including some legislative changes.

Mr Stanhope says he wants the expanded Office of the Commissioner for Sustainability and the Environment to be fully

operational before the end of the year. In the meantime, Dr Cooper will fulfil the Commissioner for the Environment position and also refine the broader functions for the new office. Dr Cooper will continue to investigate and provide advice on water catchment issues and help drive the implementation of the government's 'Weathering the Change' climate change policy. In addition, she will work across government to help all agencies reduce their water and energy consumption.

► **More information:** Penelope Layland, 02 6205 9777

## ICT hub plan

Community consultation has begun on a master plan to turn the **Bentley Technology Park** in Perth into Australia's premier hub for information and communications technology (ICT). Industry and Enterprise Minister **Francis Logan** has announced an \$8.5 million transformation of the park to create an ICT cluster in WA. "An appointed taskforce is working on the master plan that will turn the park into a technology precinct, to draw diverse but complementary technology organisations together in one central location," he said.

The Minister said the Bentley Technology Precinct master plan would incorporate the government's vision of creating an exciting technology-driven destination that co-located WA's diverse and experienced ICT industry.

► **More information:** [www.techparkwa.org.au](http://www.techparkwa.org.au)

## Russia with love

The **Queensland Government** has a new strategy to spearhead investment and trade opportunities and strengthen ties between the state and the **Russian Federation**. The three key elements of the new plan will include:

- 'Partnerships In Innovation' – building links between Smart State universities, researchers and companies, including satellite and related technologies, agriculture, mining and energy;
- 'Regional Russia' – linking flourishing regions of Russia with Smart State industries and services, including signing protocols of cooperation, business partnering and staff and student exchanges; and
- 'Trade and Investment Growth Plan' – this will include a Trade Mission to Russia in 2008, increasing Queensland's visibility within Russia, attracting Russian delegations and media to visit and take part in events in Queensland, and providing targeted training and mentoring for Queensland companies. It will also include providing targeted training and mentoring to Queensland companies entering the Russian market.

► **More information:** Premier's Office, 07 3224 4500

## Sunshine start-ups

Work is under way on a new home to help some of the Sunshine Coast's brightest technology firms get on their feet before entering the commercial world. The **Queensland Government** has committed \$3.6 million towards the multi-million-dollar **Business Accelerator**. Twenty high-tech companies and some 150 people will eventually reside in the Accelerator when it is operational early in 2008. The facility will be pivotal in fast-tracking the success of Sunshine Coast businesses involved in the smart technology industries of the future.

► **More information:** Chris Brown, 07 3224 7349; Elouise Campion, 07 3224 6784



*Dr Catriona Bradshaw*

## Anticorrosive

**Dr Bruce Hinton**, from the Defence Science and Technology Organisation, has won the 2007 Minister's Award for Achievement in Defence Science. Dr Hinton's innovative research has saved the Defence Force millions of dollars over the years in maintenance and repairs while ensuring the availability of aircraft for operational use. One of the most important contributions made by Dr Hinton and his research team has been their pioneering use of preventative compounds for treating corrosion, saving many maintenance hours, reducing downtime and raising aircraft safety.

## L'Oréal lustre

Four Australian women have won L'Oréal For Women in Science Fellowships for 2007. **Jenny Gunton**, Garvan Institute of Medical Research, will use her award to investigate the link between diabetes and low levels of vitamin D. **Ilana Feain**, CSIRO Australia Telescope National Facility, will use her fellowship to answer the question: "What are black holes doing to the galaxies in which they live?" **Sarah Pryke**, Centre for the Integrative Study of Animal Behaviour, Macquarie University, will study the evolution and conservation of Gouldian finches in the Kimberley Ranges. **Catriona Bradshaw**, Monash University, will use her fellowship to study the spread of bacterial vaginosis, with the aim of developing improved treatment regimes.

## Brain Sale

A University of Adelaide student whose research is helping us to better understand how the brain works has become the 2007 Young Scientist of the Year.

**Martin Sale**, a physiology postgraduate student in the School of Molecular and Biomedical Science, has won the honour thanks to his involvement in the national Fresh Science competition. Fresh Science helps to identify new and interesting research being done by early-career scientists around the country, and gives them the opportunity to communicate their science to the media and the public.

## Ryan heir

Innovative research that is relevant to industry, nationally and internationally, is the focus of Southern Cross University's new Pro Vice-Chancellor (Research), **Professor Neal Ryan**. Professor Ryan, formerly the Executive Dean of the Faculty of Business and Law, has been appointed following the retirement of **Professor Peter Baverstock**, who has steered the growth of research at Southern Cross University



*Martin Sale*



*Professor Neal Ryan*



*Professor Shabbaz Khan*

since 1988. Professor Ryan has a PhD (Public Policy), Master of Philosophy (Science and Technology Policy), Master of Science and Bachelor of Science in Physical Mathematics, all from Griffith University.

## Water gong ...

Charles Sturt University's **Professor Shabbaz Khan**, director of the International Centre for Water, senior principal scientist and research leader with CSIRO Land and Water, and regional coordinator of the Asia-Pacific office of UNESCO IHP-HELP, continues to attract accolades for his world-leading water research. Professor Khan has been awarded the Modelling Society of Australia and New Zealand Biennial Medal for Natural Systems.

## ... and air gong

The premier award of the Clean Air Society of Australia and New Zealand – the 'Clean Air Medal' – has been awarded to **Dr Peter Manins** of CSIRO Marine and Atmospheric Research for "distinction in the atmospheric sciences".

## Greenstein

**Professor Martin Green**, from the University of New South Wales, has won the 2007 SolarWorld Einstein Award for his work in photovoltaics developing new solar power technologies. The award carries prize money of 10,000 euros (A\$16,600).

## Regal laurels

Two University of Adelaide researchers have been awarded medals by the Royal Society of South Australia for their outstanding scientific contributions. **Professor Martin Williams**, Foundation Professor of Environmental Studies, from the university's School of Social Sciences has been awarded the Royal Society's highest honour, the Verco Medal, for his outstanding research on landscape evolution and climate change. **Professor Barry Brook**, Sir Hubert Wilkins Chair of Climate Change within the university's School of Earth and Environmental Sciences, has been awarded the 2007 Andrewartha Medal in recognition of his outstanding contribution to understanding climate change.

## Big fish

**Peter Neville** is the newly appointed Chairman of the Fisheries Research and Development Corporation (FRDC). Mr Neville is a former Deputy Director-General of the Queensland Department of Primary Industries and Fisheries, and was actively involved in introducing reforms into fisheries management in Queensland. He

is Chairman of the Southern Bluefin Tuna Management Advisory Committee and Chairman of the Queensland Biosecurity Advisory Council. He is also a director of Ocean Watch Australia, a private company dealing with fisheries-related environmental matters.

Narrabri cotton grower, **Michael Logan**, has been appointed Chairman of the Cotton Research and Development Corporation (CRDC). Mr Logan has long been a strong advocate of best practice use of natural resources in the Australian cotton industry. His cotton farm was the first in the world to gain ISO certification for compliance with world's best practice principles for environmental management. Mr Logan also spent six years on the board of Land and Water Australia where he played a leadership role in a number of key programs dealing with irrigation and climate variability. He is also a past director of Cotton Australia.

Businessman **Ian Knop AM** is to be the new Chairman of the Sugar Research and Development Corporation (SRDC). Previously Mr Knop chaired the Sydney Ports Corporation, Soccer Australia and the Australian International Hotel School Management Board and held directorships with Austrade, the Canberra Tourism & Events Corporation, the NSW Financial Institutions Commission and the Voluntary Service to Indigenous Communities Foundation.

## Bourne ascendancy

The inaugural Queensland Lifetime Contribution to Science Award has been presented to CSIRO Honorary Fellow **Anne Bourne**. A statistician with CSIRO from 1969 to 1991, 82-year-old Mrs Bourne has been a role model for her colleagues. This award recognises her dedication to science and entomology, which includes giving her expertise and time to the research organisation for 17 years after she retired.

## Transpacific

The American Australian Association has announced a number of awards. The Sir Keith Murdoch Fellows are **Paul Giacomini** (Adelaide University/University of Pennsylvania), **Amanda Hutchinson** (University of Adelaide/University of Colorado), **Christine Lu** (University of New South Wales/Harvard Medical School), **Peter Moyle** (University of Queensland/Rockefeller University), **Theresa Puthussery** (University of Melbourne/Neurological Sciences Institute) and **Andrew Zaleski** (University of Melbourne/Massachusetts Institute of Technology). Other awards include the Macquarie Bank Stanford Fellow – **Spencer Maughan** (University of Melbourne/Stanford University), Merck Company Foundation Fellow – **Simon Corrie** (University of Queensland/University of Washington), Dow Chemical Company Fellow – **Deanna D'Alessandro**, (James Cook University/University of California), Alcoa Foundation Fellow – **Nicholas Aberle** (University of Melbourne/Yale University), and QANTAS Fellow – **Anna Dart** (University of Queensland/Tufts University, Boston).

## Energy review

**Engineers Australia** has released *Australia's Energy Future*, a review of energy and climate-change policy issues, and finds that failure to take a leadership role, domestically and internationally, may jeopardise Australia's sustainable development.

The chief executive of Engineers Australia, **Peter Taylor**, says Australia should be prepared to shoulder responsibility for its share of the necessary reduction in global greenhouse gas emissions to stabilise the world's climate. While the Sydney Declaration went some way to demonstrate leadership, it is considered to have failed to provide tangible examples of Australia's 'bona fides'.

"The Kyoto Protocol, with its defects, and the UNFCCC are, at present, the only comprehensive international mechanisms aiming for focused global action on climate change," he says. "Engineers Australia believes that the **Australian Government** should ratify the Kyoto Protocol, before or at the UNFCCC meeting in Bali in December. Australia needs a robust national climate stabilisation policy which is supported by all governments and all political parties. The climate stabilisation policy needs to include interim and long-term emissions targets and a robust emissions trading scheme."

► **More information: John Bright, 0407 234 490**

“Engineers Australia believes that the Australian Government should ratify the Kyoto Protocol, before or at the UNFCCC meeting in Bali in December.”

## Fast sludge

The **Environmental Biotechnology CRC** has received more than \$800,000 in **Australian Government** funding to develop technology to remove nutrients from industrial wastewater. Molecular biologists will link with European researchers to advance the new 'fast sludge' process which targets mainly nitrogen, phosphorus and carbon. Program leader **Professor Linda Blackall** says that wastewater treatment plants based on novel aerobic granular sludge represent a potent innovative alternative, avoiding or minimising the drawbacks of the conventional floccular systems.

"The extraordinary settling characteristics of aerobic granular sludge has superior organic carbon conversion capacities and produces substantially less sludge than the traditional systems," she says. "Additionally, the aerobic granular process occupies only a quarter of the space of conventional plants and energy consumption is reduced by a third due to lower water pumping requirements and more efficient utilisation of provided dissolved oxygen."

Professor Blackall says the grant would allow researchers

to cooperate with two leading international organisations, the **Istituto di Ricerca Sulle Acque** in Rome, Italy, and the **Technical University Delft (TUD)**, in the Netherlands. The research is also funded by **Meat and Livestock Australia**, with the CRC investing more than \$1.9 million over two and a half years as part of its advanced biotechnology programs for industry.

► **More information: Linda Blackall, 07 3365 3365**

## Biodiesel

Researchers, farmers and industry leaders attended a workshop in Canberra to discuss a new blueprint for the sector's future. The Biodiesel for Agriculture Workshop also saw the launch of the **Australian Agricultural Crop Technologies' (AACT) Regional Sustainable Model** for biodiesel. The AACT plan proposes farmers begin growing an industrial oil crop, Indian mustard, through a regional grower network. The cooperative would then convert the crop to biodiesel through local enterprise hubs and use the product to fuel their farms.

Opening the workshop, Parliamentary Secretary to the Minister for Agriculture **Sussan Ley** said that the study found real potential to propel the fledgling biodiesel industry towards a new production base. "It is a refreshing approach – producing an oil crop in regional cooperatives and delivering local ownership of renewable energy. This model is a great starting block for a sustainable biodiesel industry, and an agriculture sector that produces and consumes its own fuel needs."

The study was funded by the **Rural Industries Research and Development Corporation**.

► **More information: Verity Williams, 02 6277 4503**

## Medallist's vision

Winner of the 2007 Farrer Memorial Medal **Dr Tony Fischer** says it is continued conventional breeding and agronomic research that will play the key part in achieving improved wheat yields at least in the medium term. This is despite the excitement of functional genomics, with the prospect of genetically engineering wheat for higher yields, he said.

Dr Fischer outlined his vision for the future of wheat breeding in Australia while giving the Farrer Memorial Medal Oration in Canberra. An Honorary Fellow with **CSIRO's Division of Plant Industry**, Dr Fischer received the Medal in recognition of outstanding contribution to agricultural research in Australia, and in particular, his world-renowned work in cropping physiology.

► **More information: Trudy Glasgow, 02 6391 3312**

## GM trial

Western Australia's first broadacre field trial of genetically modified (GM) canola has been placed on hold. State Agriculture Minister **Kim Chance** advised his Ministerial GM Reference Group that the GM trials, scheduled for Esperance in 2008, were now in danger of not going ahead. Mr Chance confirmed that the **South East Premium Wheat Growers Association (SEPWA)**, which he approved to conduct the trials, has hit a brick wall in its attempts to source GM seed from **Monsanto** and **Bayer**, the companies who own the plant breeding rights to the technology.

SEPWA vice president *Andrew Fowler* says the indications from Monsanto and Bayer were that they did not see the up-side to releasing the GM seed for the trial in WA, and envisioned that they would soon see commercial action in NSW and Victoria if the moratoriums on GM commercial crop production were lifted.

► **More information:** Farmonline, 31 August, [www.farmonline.com.au](http://www.farmonline.com.au)

## Geothermal for SA

**Torrens Energy Ltd** has won a \$3 million REDI (Renewable Energy Development Initiative) grant from the **Australian Government** to develop a modelling process to help locate geothermal energy sources in South Australia. The process will identify where optimal geological conditions coincide with high temperatures in areas close to markets and infrastructure. The software could result in more efficient exploration of a resource that is expected to reduce Australia's CO<sub>2</sub> emissions and provide a reliable source of energy for up to 10% of Australia's needs over the next few decades. The technology could also be applied in other exploration areas to identify deep geothermal targets.

► **More information:** Lisa Chalk, 02 6277 7580

## Engineers galore

An additional 560 tertiary places for engineering students have been announced by the Federal Minister for Education, Science and Training, *Julie Bishop*. While **Engineers Australia** welcomed the announcement, chief executive Peter Taylor added that the basis for enhancing and expanding Australia's engineering skills base needs to start in primary schools.

"Australia's children are losing interest in maths and science mid-way through primary school and by the end of secondary school, fewer than 15 per cent of all students are studying advanced maths and science that will lead to the opportunity to take up careers like engineering. Strategies also are needed to ensure that all students gain a broad base in the enabling sciences and the primary school curriculum should be restructured to present science and engineering concepts in ways that will excite interest and motivate our children."

► **More information:** John Bright, 0407 234 490

## Metal menace

Technology that can detect if local water or air is contaminated with dangerous levels of toxic heavy metals is under development by the **CRC for Contamination Assessment and Remediation of the Environment** (CRC CARE). The CRC's *Andrew McKay* is studying the changes that take place in a unique water microbe when it is exposed to arsenic, cadmium and lead, industrial and natural contaminants found around the world. The test could prove vital in helping to tackle one of the world's greatest disasters – the poisoning of tens of millions of people in Bangladesh and West Bengal, India, through naturally occurring arsenic in their household well water.

"Our goal is to develop a simple field test that can warn people or environmental authorities if dangerous levels of toxic metals or metalloids (metal-like substances such as arsenic) are present in the environment," Mr McKay says.

Arsenic problems in Australia arise from the tens of

thousands of old sheep and cattle dips (where arsenic was used to control pests), old gold-mining sites, tailings dumps from metal mines, and wetlands that were used to trap contaminated runoff. Old factories that produced paint or batteries have left historical residues of lead, and fertiliser plants and other industrial processes have deposited cadmium and other toxic metals.

Mr McKay reports good progress in developing water organisms as an early warning tool for such contamination, especially where a mix of toxic contaminants is involved. "We've found a number of readily observable changes that take place in the organism when it is exposed to increased levels of toxic metals and metalloids: their growth and reproduction rates slow, their shape changes (to star or v-shaped) and, of course, at high levels of the toxins they die." These changes will enable scientists to use the pond creatures as biosensors for toxic metal contamination.

► **More information:** Andrew McKay, 07 3274 9060

## Resistant weed detector

A new molecular tool to help farmers tackle herbicide resistance has been developed by **NSW Department of Primary Industries** (DPI) and Japanese researchers.

More than 305 types of weed in 50 countries have been reported to be resistant to at least one herbicide, and an increasing number of weeds owe their success to their genetic diversity. Scientists say techniques are needed to detect mutations when they first occur, so that farmers can test for herbicide resistance in the field and manage weeds accordingly.

Focusing on herbicide resistance in two of the worst weeds affecting Australian cropping systems – wild oats and rye grass – DPI molecular biologist *Dr Mui-Keng Tan* and her team investigated a technique called eco-tilling and found it offers a quick, cheap and reliable means of detecting early signs of herbicide resistance in weeds. Unlike the traditional molecular approach, eco-tilling uses reverse genetics. Genes are not fully sequenced, rather mutations in single nucleotides are identified purely on the basis of their location in the genome. Dr Tan says new mutations can be detected, and known ones can be screened for, at a fraction of the cost of alternative genetic methods, making it a powerful and low-cost alternative to full sequencing.

► **More information:** Joanne Finlay, 0428 491 813

## Northern window

A new internet resource provides a one-stop shop for accessing the latest research on the social, environmental and economic issues facing development in northern Australia.

The Northern Australia portal, available through the **Council of Rural Research and Development Corporations** website, provides cross-industry access to information on more than 30 projects and programs being carried out by the rural R&D corporations and their partners in the region. The portal groups projects and programs under the Government's Rural Research Priorities announced earlier this year: Productivity and Adding Value, Supply Chain and Markets, Climate Variability and Climate Change and Natural Resource Management.

► **More information:** [www.ruralrdc.com.au](http://www.ruralrdc.com.au)

Senior Lecturer/Associate Professor  
& Head

**Pacific Health, University of Auckland** 31 October

Lecturer/Senior Lecturer in Structural  
Engineering

**University of New South Wales** 31 October

Research Fellow/Senior Research Fellow  
– Petrophysics

**University of Tasmania** 31 October

OCE Postgraduate Scholarship 2007  
– Molecular genetics of floral development  
in cereals

**CSIRO** 31 October

OCE Postgraduate Scholarship 2007  
– Genetic improvement using SNP  
genotyping arrays in livestock

**CSIRO** 31 October

OCE Postgraduate Scholarship 2007  
– Australian rainfall teleconnection with  
Indo-Pacific climate drivers

**CSIRO** 31 October

OCE Postgraduate Scholarship 2007  
– Stable isotope tracing nanosafety in the  
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materials for CO<sub>2</sub> capture

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– advanced ultra-wide band (UWB) radar  
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Flagship PhD Scholarships

Collaboration Fund

**CSIRO** 31 October

OCE Postgraduate Scholarship 2007  
– Cosmic magnetic fields

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Senior Environmental Economist

**CSIRO** 31 October

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Professor – Geoscience (Marine and  
Continental-Margin Sedimentation)

**University of Sydney** 31 October

Active Source Seismologist

**GNS Science Limited** 31 October

Lecturer/Senior Lecturer – Forest  
Economics

**University of Canterbury** 12 November

Associate Professor/Professor –  
Organisational Psychology

**Macquarie University** 16 November

Massey Postdoctoral Fellow – Inorganic  
Chemistry

**Massey University** 16 November

Massey Postdoctoral Fellow – Comparative  
Research in Mathematics Education

**Massey University** 16 November

Massey Postdoctoral Fellow – Molecular  
Genetics

**Massey University** 16 November

Massey Postdoctoral Fellow – Social  
Sciences

**Massey University** 16 November

Massey Postdoctoral Fellow – Inorganic  
and Nanoparticle Chemistry

**Massey University** 16 November

Lecturer/Senior Lecturer/Associate  
Professor – Applied Psychology

**University of Canterbury** 16 November

Lecturer/Senior Lecturer/Associate  
Professor – Industrial/Organisational  
Psychology

**University of Canterbury** 16 November

Research Fellow – Augmented Reality  
Industrial Visualisation

**University of South Australia** 23 November

Chair – Bioengineering

**University of Melbourne** 4 December

Chair – Computational Bioinformatics

**University of Melbourne** 4 December

Chair – Mechanical Engineering

**University of Melbourne** 4 December

Chair – Geographic Information  
Engineering

**University of Melbourne** 4 December

Chair – Hydrology and Water Resources

**University of Melbourne** 4 December

Golder Associates Chair of Geotechnical  
Engineering

**University of Melbourne** 4 December

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Dr Natalie Borg  
PETER DOHERTY FELLOW, MONASH UNIVERSITY

# Solving the immune system's fat problem

By Gio Braidotti\*

The immune system seems to hold a special fascination for Australian researchers, especially Melbourne-based ones, who have notched up an impressive array of pivotal discoveries over the years, not to mention several Nobel prizes.

Luminaries include Sir Macfarlane Burnet, Sir Gustav Nossal, Jacques Miller and Peter Doherty.

As another key discovery was made in 2007, it seems appropriate that the lead researcher is not only Melbourne-based and Australian, but she is also the recipient of a Peter Doherty Fellowship, an award established to cultivate and retain the next generation of Australian biomedical researchers.

Dr Natalie Borg is a structural biologist, one of those uncanny scientists with the rare gift for crystallising proteins and then visualising their atomic structure using X-rays.

"Once the structural data is available it can be correlated to biological function and that is important," Dr Borg says. "It is the structure-function relationship that allows us to interpret the underlying reason for specific biological effects."

Dr Borg explains that 'antigen-presenting' molecules capture fragments of molecules from within the cell and present them at the cell surface for surveillance by T-cells from our immune system. If the captured fragment is unfamiliar to our body, as would be the case if it were derived from a bacterium, then an interaction takes place that results in the activation of an immune response. Overall, this process ensures that our cell contents are kept in check and not harbouring any abnormalities or foreign substances.

In a world first, Dr Borg and her colleagues succeeded in imaging how a specific T-cell – a natural killer T-cell – interacts with a lipid fragment that has been captured by an antigen-presenting molecule called CD1d. This interaction can result in the activation of an immune response, which has downstream implications for diseases such as rheumatoid arthritis, juvenile onset diabetes and some types of cancers.

"A great deal was at stake," Dr Borg says of the work recently published in *Nature*. "Visualising the interaction has increased our understanding of the scope of our immune system. It's the first time we've visualised the interaction between a T-cell receptor and a captured lipid fragment. Previously we've only visualised similar interactions with captured peptide fragments. This now opens the door for therapeutic interventions in human disease."

To pull off the feat, she first made the individual protein components using recombinant protein technology, combined them and placed them into thousands of different chemical conditions until she found the right mix that allowed the molecules to crystallise.

"Basically, with crystal growth you need to be really quite observant and try a lot of parameters," she says, naming pH, temperature, protein concentration, precipitants and buffers,

before realising just how daunting that list can sound. "If you are not lucky enough to get crystal growth initially, you need to look for promising signs – things like promising protein precipitates – and use it to get an edge on what might actually enable crystals to grow."

While an in-house X-ray source was available to her to test her crystals, the final data was collected at a synchrotron in Chicago.

"All the tests were giving us a thumbs up when eight individual crystal samples were sent to Chicago in liquid nitrogen – and getting that on board a plane these days is tough work! The data came back and once we solved the 3-D structure, it became a race against time to publish."

She recalls that period – when she essentially lived at her computer – as extraordinarily competitive, intense and exciting. "It took us two weeks to turn it around – analyse the structure and submit the paper – and that is a phenomenal team effort," she says, adding praise for co-author, Professor Jamie Rossjohn, who heads the Protein Crystallography Unit at Monash University. "He is just an absolute machine, he is a gun."

Professor Rossjohn earns more praise as someone who is excellent at promoting young scientists. She also mentions receiving crucial support from her family and boyfriend, for which she is immensely grateful.

However, despite the support and success, when asked directly about efforts to attract young people to science, the 31-year-old provides a surprising answer: "To be honest, if I was to go back to when I was a student and know what was ahead, I

*Structural biologist Dr Natalie Borg: part of a team that succeeded in visualising the interaction between a T-cell receptor and a captured lipid fragment – a world first.*



GIO BRAIDOTTI

would probably have considered another career option."

She describes an unrelentingly consuming, competitive and tough profession with little job security and constant pressure to 'publish or perish'. More worryingly, she concedes it is difficult for scientists on fellowships to have long-term financial security.

However, she does add that, as a woman, she loves being a scientist: finding a sense of empowerment in being educated and able to create knowledge that might eventually help someone. Laughing, she adds that there is also a perception issue, which she rather enjoys: "A lot of people have a stereotypical impression of a scientist and, frankly, that is not a young female. It can knock people for six."

\* Gio Braidotti, a PhD in molecular genetics, is the Melbourne editor of R&D Review.

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[www.sciencealert.com.au/events](http://www.sciencealert.com.au/events)

**American Institute of Professional Geologists 2007 National Meeting**  
 7 to 11 October, Traverse City, Michigan

**Auswind 2007 Conference and Exhibition**  
 8 to 10 October, Melbourne

**Advanced Computing, Grid Applications and eResearch (APAC 07)**  
 8 to 12 October, Perth

**Advanced Infrared Technology and Applications (AITA) 2007 Giorgio Ronchi 9th International Workshop**  
 8 to 12 October, León, Mexico

**The Global Environment 2007**  
 9 to 11 October, London

**6th World Congress on Stress**  
 11 to 13 October, Vienna

**Australian Conference on Science and Medicine in Sport**  
 13 to 16 October, Adelaide

**Association of Science-Technology Centers Annual Conference 2007**  
 13 to 16 October, Los Angeles

**Australian Energy User 2007**  
 17 to 18 October, Gold Coast

**19th International Geophysical Conference**  
 17 to 22 October, Perth

**Coral Reef Futures 07**  
 18 to 19 October, Canberra

**2nd Asia-Oceania Ceramic Federation Conference**  
 18 to 20 October, Daegu, South Korea

**AusBiotech National Conference**  
 21 to 24 October, Brisbane

**World Gold 2007**  
 22 to 24 October, Cairns

**Fire Australia 2007 – Fire Protection & the Environment: Planning a Sustainable Future**  
 22 to 24 October, Perth

**Chemeca 2007**  
 23 to 26 October, Melbourne

**Thermoplastic Elastomers TPE 2007**  
 23 to 24 October, Cologne

**18th International Symposium on Environmental Biogeochemistry**  
 28 to 31 October, Denver

**2nd IWA-ASPIRE Asia-Pacific Regional Group Conference & Exhibition**  
 28 October to 1 November, Perth

**12th World Lakes Conference**  
 28 October to 2 November, Rajasthan, India

**Mining 2007**  
 31 October to 2 November, Brisbane

**8th Conference of the Asian Crystallographic Association**  
 4 to 7 November, Taipei, Taiwan

**Crop Science Society of America, International Annual Meeting**  
 4 to 8 November, New Orleans

**13th Conference of the International Graphonomics Society**  
 11 to 14 November, Melbourne

**Partnerships in Rehabilitation Conference**  
 14 to 16 November, Melbourne

**International Congress on Biohydrogels**  
 14 to 18 November, Lucca, Italy

**19th International Geophysical Conference**  
 18 to 22 November, Perth

**Laboratory Managers Conference**  
 19 to 21 November, Brisbane

**Ecological Society of Australia 2007 Conference**  
 25 to 30 November, Perth

**2nd International Conference on Knowledge, Science, Engineering and Management**  
 28 to 30 November, Melbourne

**Transformations and Technology**  
 30 November to 1 December, Perth

**Australian Physiological Society Annual Meeting**  
 2 to 5 December, Newcastle

**Environmental Research Event 2007**  
 2 to 5 December, Cairns

**Groundwater Quality 2007: Securing Groundwater Quality in Urban and Industrial Environments**  
 2 to 7 December, Fremantle

**Australasian Conference on Interactive Entertainment**  
 3 to 5 December, Melbourne

**Australasian Society of Clinical and Experimental Pharmacologists and Toxicologists Annual Meeting**  
 3 to 6 December, Adelaide

**Australian Society for Limnology and the New Zealand Freshwater Sciences Society**  
 3 to 7 December, Queenstown

**8th Invertebrate Biodiversity & Conservation Conference 2007**  
 3 to 7 December, Brisbane

**High Performance & Specialty Elastomers**  
 5 to 6 December, Frankfurt

**Second International Conference on Mechanics of Biomaterials and Tissues**  
 9 to 13 December, Hawaii

**International Conference on Adaptive Science & Technology**  
 10 to 12 December, Accra, Ghana

**9th International Symposium on Environmental Issues and Waste Management in Energy and Mineral Production**  
 11 to 13 December, Bangkok

**Joint Meeting of the American Mathematical Society & the New Zealand Mathematical Society**  
 12 to 15 December, Wellington

**Egyptian Mathematical Society 2nd International Conference**  
 27 to 30 December, Cairo

**2008**

**Biofilm Technologies**  
 8 to 10 January, Singapore

**Australasian Computer Science Week**  
 22 to 25 January, Woollongong

**11th International Symposium on Current Topics in Infectious Diseases**  
 29 January to 1 February, Grindelwald, Switzerland

**Australian and New Zealand Biocontrol Conference**  
 10 to 13 February, Sydney

**American Association for the Advancement of Science (AAAS) Annual Meeting 2008**  
 14 to 18 February, Boston

**Women's Health**  
 16 February to 1 March, Sydney

**3rd IASME / WSEAS International Conference on Energy & Environment**  
 23 to 25 February, Cambridge

**3rd International Conference of the CRC for Construction Innovation**  
 12 to 14 March, Surfers Paradise

**Materials Research Society Spring Meeting 2008**  
 22 to 24 March, San Francisco

**International Conference on Biotic Plant Interactions**  
 27 to 29 March, Brisbane

**2nd International Salinity Forum – 'Salinity, water & society: global issues, local action'**  
 31 March to 3 April, Adelaide

**International Conference on Cellular and Molecular Biology**  
 6 to 8 April, Indore, India

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**17th International World Wide Web Conference (WWW2008)**  
 21 to 25 April, Beijing

**38th Annual Scientific Meeting of the Australian & New Zealand Society of Nuclear Medicine**  
 1 to 6 May, Gold Coast

**16th Australian Weeds Conference**  
 18 to 22 May, Cairns

**CeBIT**  
 20 to 22 May, Sydney

**Sampling 2008**  
 27 to 28 May, Perth

**8th World Biomaterials Congress**  
 28 May to 1 June, Amsterdam

**2nd International Conference on Environmental Toxicology**  
 4 to 6 June, Granada, Spain

**17th World Hydrogen Energy Conference**  
 15 to 19 June, Brisbane

**1st Global Conference on GMO Analysis**  
 24 to 27 June, Como, Italy

**21st Congress of the International Commission for Optics**  
 7 to 10 July, Sydney

**OECC/ACOFT 2008**  
 8 to 10 July, Sydney

**Euroscience Open Forum (ESOF) 2008**  
 18 to 22 July, Barcelona

**Australian Earth Sciences Convention 2008**  
 20 to 24 July, Perth

**33rd International Geological Congress**  
 6 to 8 August, Oslo

**XVI Congress of the Federation of the European Societies of Plant Biology**  
 17 to 22 August, Tampere, Finland

**6th International Symposium on In Vitro Culture and Horticultural Breeding**  
 24 to 28 August, Brisbane

**BA Festival of Science 2008**  
 8 to 12 September, London

**Australasian Sexual Health Conference 2008**  
 15 to 17 September, Perth

**20th Australasian Society for HIV Medicine (ASHM) Conference**  
 17 to 20 September, Perth

**18th International Congress of Biometeorology**  
 22 to 26 September, Tokyo

**Next Generation Biofuel Markets**  
 4 to 5 October, Amsterdam

**IBS 2008 – 13th International Biotechnology Symposium & Exhibition**  
 12 to 17 October, Dalian, China

**Association of Science-Technology Centers Annual Conference 2008**  
 18 to 21 October, Philadelphia

**6th Australasian Viral Hepatitis Conference**  
 20 to 22 October, Brisbane

**2009**

**5th World Congress of Pediatric Cardiology and Cardiac Surgery**  
 22 to 26 June, Cairns

**16th World Congress on Basic and Clinical Pharmacology**  
 17 to 23 July, Copenhagen

**10th International Congress of Ecology**  
 1 to 30 August, Brisbane