

# Australian R&D REVIEW

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*Linking Australian Science,  
Technology and Business*

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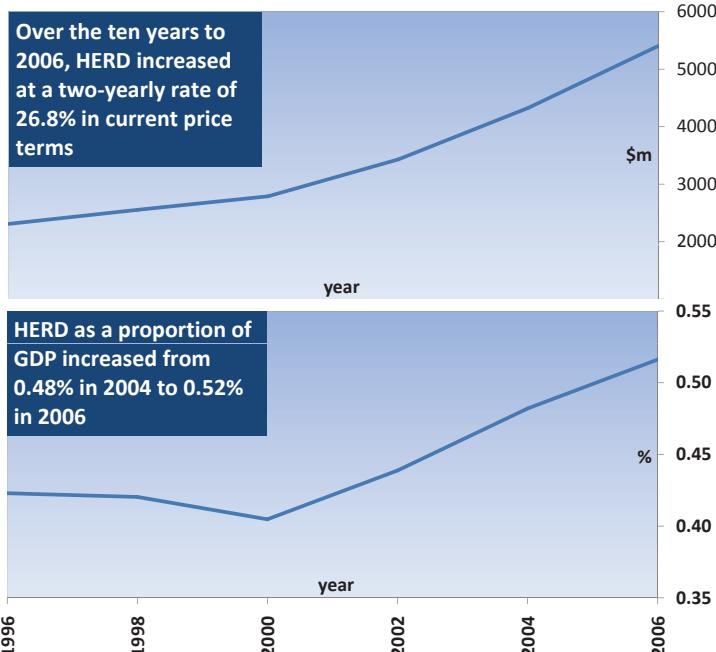
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## Oz: increasingly clever

Higher education expenditure on R&D (HERD) in Australia in 2006 was \$5,404.4 million, according to the latest report *Research and Experimental Development, Higher Education Organisations, Australia, 2006* released by the **Australian Bureau of Statistics**. This represents an increase of 24.9% in current price terms over 2004.

Over the ten years to 2006, HERD increased at a two-yearly rate of 26.8% in current price terms. As a proportion of Gross Domestic Product (GDP), HERD increased from 0.48% in 2004 to 0.52% in 2006.

The majority of HERD in 2006 came from general university funds (\$3,199.5 million or 59.2% of HERD) and Australian competitive research grants (\$979.8 million or 18.1%). These were also the major sources of funds in 2004.



In 2006, 43.3% of HERD (\$2,337.6 million) was directed towards applied research, 27.4% (\$1,479.2 million) to pure basic research and 22.2% (\$1,201.5 million) to strategic basic research. The remaining 7.1% of HERD (\$386.1 million) was directed towards experimental development. The distribution of HERD across type of activity was largely unchanged from 2004. Applied research was the only activity to show an increase in the proportion of HERD from 2004.

Largest expenditure was in the research field of medical and health sciences (\$1,454.7 million), followed by engineering and technology (\$594.3 million) and biological sciences (\$560.9 million). Medical and health sciences was the only research field with a change in relative share of HERD of more than one percentage point, with an increase of 1.7 percentage points from 2004.

Almost a third (30.8% or \$1,663.0 million) of HERD in 2006 was directed to health related socio-economic objectives (SEOs). This included the understanding and treatment of clinical diseases and conditions and the provision of public health services. The next most prevalent SEO was non-oriented research, which accounted for 17.5% (\$945.8 million) of HERD. This included R&D contributing to the general advancement of knowledge without having a specific application. The proportion of HERD dedicated to health increased by 2.9 percentage points from 2004, compared to a decrease of 2.5 percentage points for non-oriented research.

In 2006, almost three quarters of HERD was located in New South Wales (\$1,538.7 million), Victoria (\$1,404.6 million) and Queensland (\$919.3 million). Between 2004 and 2006, Victoria recorded the largest growth in HERD in both absolute and percentage terms, rising \$342.3 million or 32.2%. Victoria also had the highest increase in HERD as a proportion of Gross State Product (GSP) from 2004. The Australian Capital Territory and Western Australia experienced decreases in their HERD/GSP ratios, while ratios for Tasmania and the Northern Territory remained the same.

Australian higher education institutions devoted a total of 58,810 person years of effort (PYE) to R&D in 2006, up 6.5% from 55,204 PYE

in 2004. Most of the human resources devoted to R&D in 2006 were postgraduate students (57.7%) and academic staff (28.9%), with the remainder being other staff directly supporting R&D (13.4%). As with HERD, New South Wales, Victoria and Queensland accounted for almost three quarters (74.0%) of total human resources devoted to R&D in 2006.

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

## Broadened endowment

The Minister for Education, **Julia Gillard**, and the Minister for Innovation, **Senator Kim Carr**, have announced the opening of the 2009 round of the **Australian Government's** major higher education infrastructure investment fund. The Education Investment Fund (EIF), announced in the recent Budget, is an \$11 billion fund that will fuel strategic investment in Australia's universities, vocational education institutions and major research institutes. The EIF expands and broadens the Higher Education Endowment Fund (HEEF).

The 2009 funding round will focus on higher education institutions with \$304 million available for new research facilities or capital expenditure in Australia's universities. Guidelines for this funding round have been developed by an Advisory Board led by **Mr Philip Clark**. Mr Clark has been consulting widely in the higher education sector over the past months to shape this round of funding and he will be advising the Government on the full development of the EIF.

The first EIF funding round, embracing the full scope of university, vocational education and major research activity will be conducted in 2009. Minister Gillard and Minister Carr encouraged Australian universities to develop innovative projects for consideration in the round. Higher education institutions are encouraged to submit expressions of interest for project funding, outlining strategic plans for infrastructure improvement to enhance their teaching, learning, research and/or research training capacity.

Expressions of interest for funding close at 5 pm (AEST) on 14 August 2008. These submissions will be considered, and those short listed will be invited to submit full applications. Successful projects will then be announced in July 2009.

► More information: [media@deewr.gov.au](mailto:media@deewr.gov.au), **Catriona Jackson, 0417 142238**



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## Education review

A discussion paper for the Review of Australian Higher Education has been issued by panel chairman **Emeritus Professor Denise Bradley**. The discussion paper provides an opportunity for stakeholders from all sectors — business, industry, community groups, education and individuals — to comment on the role of higher education and how it can best meet the future needs of the Australian community and economy. The paper outlines a number of issues on which feedback is sought, including social inclusion, resourcing, the student experience and links with industry and the vocational education sector.

Submissions close 31 July 2008. All submissions will be posted on the review's web site.

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

## Linked up

A new hair examination technique that is set to revolutionise forensic science is one of 208 new Linkage research projects sharing in \$63,717,139 from the **Australian Research Council** (ARC) over the next five years.

The **University of Canberra** 'Silent Witness' project is a collaboration with the **Australian Federal Police** and **Leica Microsystems Pty Ltd**, and aims to improve the quality of evidence drawn from human hair.

Other Linkage Projects research programs funded in this round include:

- using polyphenols contained in the waste products from sugar refining to reduce body fat and insulin resistance with the intention of addressing the increasing problem of obesity and metabolic syndrome (**La Trobe University** with **Horizon Science Pty Ltd**);
- developing new technology for the delivery of peptide based T cell vaccines for tumour immunotherapy against a wide variety of cancers (**Monash University** with **Cancer Therapeutics Limited**);
- targeting a next generation of low cost silicon solar cells that will significantly reduce the costs of generating electricity from sunlight by depositing cells onto glass as it comes from a glass factory (**The University of New South Wales** with **CSG Solar Pty Ltd**);
- developing a precision three-dimensional localisation system for underground mining vehicles that offers improved productivity and personnel safety (**University of Technology, Sydney** with **Pempek Systems Pty Ltd**).

Top funding of \$11,410,443 will go to The University of New South Wales to support 22 projects, followed by \$8,085,401 to **The University of Queensland** for 21 projects, and \$8,047,807 to **The University of Melbourne** for 28 projects.

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

## Coastal rescue

The **Australian Government** is providing \$2.8 million for three new projects to help Australia's vulnerable coastal communities plan for the effects of climate change.

The three projects are:

- \$2 million to develop a high resolution 'Digital Elevation Model'

for coastal urban areas to map the inundation risks from climate change in priority urban areas such as Perth, Brisbane, the Gold Coast, Sydney, Melbourne and Adelaide. The project will be implemented in collaboration with key national organisations such as the **Cooperative Research Centre for Spatial Information**, the **Australia and New Zealand Land Information Council**, **Geosciences Australia**, **CSIRO**, and relevant state government agencies and commercial terrestrial mapping and monitoring companies;

- \$310,000 to develop an interactive web-based tool to enable planners, engineers and policymakers incorporate projections of high sea-level events into their planning codes; and
- \$479,000 to develop a tool to project how climate change affects variations in offshore wave characteristics by combining climate modelling and spectral wave modelling. The project will be developed in partnership with relevant national and international scientific research bodies as well as the **NSW Department of Environment and Climate Change**.

► More information: [www.environment.gov.au/minister/wong/2008/pubs/mr20080613.pdf](http://www.environment.gov.au/minister/wong/2008/pubs/mr20080613.pdf)

## Psycho-geriatric research

The **Australian Government** is providing \$2 million in research funding to assist in the study of the care and treatment of people with psycho-geriatric conditions in aged care homes. Psycho-geriatrics include older people who have either an age-related illness or life-long mental health problems. It also includes people who have diseases of the brain such as Alzheimer's, which tend to affect predominantly those who are old.

The work is being undertaken collaboratively between the **Department of Health and Ageing** and the **National Health and Medical Research Council**.

► More information: 02 6277 7280

## Futuristic defence

The development of futuristic materials for use in ships, aircraft and combat vehicles is becoming a reality, with the new **Defence Materials Technology Centre** (DMTC) now in operation.

"The DMTC is the first centre of its kind, and will bring together some of Australia's brightest talents in the field of materials technology research," says Minister for Defence Science and Personnel, **Warren Snowdon**. "Participants such as **Bluescope Steel**, **BAE Systems**, **Thales Australia**, **GKN Aerospace**, **Surface Technology Coatings**, the **Australian Nuclear Science and Technology Organisation**, **Wollongong University** and **Queensland University** have been unstinting in their commitment and co-operation."

A board of directors has been elected, and **Dr Mark Hodge** has been appointed as chief executive officer. The DMTC is headquartered at **Swinburne University** and will receive **Australian Government** funding of \$30 million and a further \$52 million from the collaborative partners. Its program is designed to develop specific future defence capabilities not currently addressed by the Australian defence industry.

► More information: **Lorraine Mulholland (DSTO)**, 02 6128 6385, 0424 779 498

## Listed impact

The **Australian Research Council** (ARC) has launched a consultation period on a draft journal rankings list, one of the indicators that will

be used on a discipline-specific basis to evaluate research as part of the Excellence in Research for Australia (ERA) initiative.

ARC chief executive officer **Professor Margaret Sheil** says this is the second phase on the journal rankings. In late 2007, the four **Learned Academies** and a number of peak bodies, undertook the initial journal ranking exercise to develop this draft for their relevant disciplines. More than 19,000 unique peer reviewed journals have been identified to form the draft list of ranked journals.

Submissions will close on Thursday 24 July, 2008.

► More information: [www.arc.gov.au/era/indicators.htm](http://www.arc.gov.au/era/indicators.htm)

## Big wet friends

The **Australian Government** has provided a \$1 million funding boost to the Hobart-based **Australian Marine Mammal Centre** to help advance Australia's push for reform of the **International Whaling**

*Humpback in singing position*



**Commission**. The new funding will include about \$600,000 to supplement the existing competitive marine mammal research fund and about \$400,000 for activities in support of the Government's policies, including work towards the establishment of the first International Whaling Commission conservation management plan and a Southern Ocean non-lethal whale research partnership.

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

## Withdrawal symptoms

**Ausbiotech**, **Research Australia** and the **Australian Private Equity and Venture Capital Association Limited** (Avcal) have written a strongly worded letter to **Dr Terry Cutler**, chair of the Review of the National Innovation System about the Federal Budget decision to discontinue the Commercial Ready and Commercial Ready Plus programs.

"As a broad alliance of industry, investment and research organisations dedicated to supporting Australia's innovative future, we write to you to emphasise the implications this decision will have on our national innovation system, as well as the potential costs to innovative companies, the community and the economy if this issue is not addressed as a matter of urgency," they write.

They say the ramifications of the withdrawal of a program to assist commercialisation of R&D are that

1. products will not be commercialised – many small companies will fail to commercialise their products without the additional government support; there is a high risk that we will lose a significant proportion of companies that were relying on this grant for short term cash flow to speed up the research in order to take advantage of a market opportunity;

2. intellectual property will be lost overseas;
3. there will be a reduction in capital flowing to early stage sector R&D;
4. lost leverage – the loss to the industry is well above the approximately \$700 million in ‘savings’ taking into account the matched funding; and
5. Australia’s reputation as a ‘clever country’ will be diminished. “The removal of Commercial Ready will impede many businesses from commercialising their innovation and will prohibit the creation of numerous successful enterprises to support the Australian economy. In your capacity as chair of the National Innovation Review Panel, we urge you to strongly recommend appropriate measures to redress this problem as a matter of urgency.”

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

## Rights and responsibilities

The Federation of Australian Scientific and Technological Societies (FASTS) has issued a summary of some general principles developed following a discussion forum it organised in February 2008 on the rights and responsibilities of scientists. The forum was organised in response to the move by Minister for Innovation, Science and Technology, Senator Kim Carr, to develop public speaking charters for scientists working in Australian government research agencies such as the **Australian Institute for Marine Science** (AIMS), the **Australian Nuclear Science and Technology Organisation** (ANSTO) and the **Commonwealth Scientific and Industrial Research Organisation** (CSIRO).

FASTS believes that such charters could also be adapted to provide guidance for scientists who conduct research:

- funded by the **Australian Research Council**, the **National Health and Medical Research Council** and other government agencies;
- in the **Defence Science and Technology Organisation** and other defence-related organisations;
- in Cooperative Research Centres;
- in rural R&D corporations;
- in State/Territory Government research agencies;
- in universities; and possibly in private sector research.

FASTS believes obligations on scientists could include:

- providing scientific knowledge and evidence in a form that can be usefully applied and widely understood;
- contributing to public debate on issues that scientific knowledge underpins;
- ensuring that others are not misled about the current state of the science;
- educating themselves in the best ways to disseminate scientific knowledge; and
- ensuring that their organisation or their stakeholders are given a “heads up” on their forthcoming public commentary when time permits.

The charters of rights and responsibilities will represent a pact between Government and scientists in public research agencies. Therefore FASTS maintains that there is a complementary set of obligations on Government, which could include:

- fostering an atmosphere and environment that stimulates open discussion;
- disseminating the scientific knowledge and evidence that underpins major decisions;
- providing the resources to educate young people with the skills

needed to communicate scientific knowledge;

- being open to scientific findings which may change current understanding; and
- conversely, to seek and recognise the current consensus of scientific thought.

FASTS says that while every scientist should have the right to freedom of speech, it is not clear that every scientist should be obliged to speak out in every situation. Some are better or more experienced at doing this than others. It is these people who should be empowered to contribute to the wider dissemination of the science produced by themselves and by their colleagues.

It is well recognised that while speaking out in areas of scientific expertise should be encouraged, public commentary on government policy by employees of Government organisations is inappropriate. However, FASTS warns the boundary between speaking on scientific matters and advocacy relating to Government policy is not always clear.

Although charters may provide indications of desirable behaviour, they are made more effective by reward systems that encourage such behaviour. This may require auditing the organisation’s enactment of the charter to ensure cultural adoption. While censure is one way of ensuring that the charter is enforced, rewarding organisations whose scientists contribute responsibly to the virtuous cycle may be another means of creating a favourable environment, in which frank and fearless debate on scientific issues is promoted for the benefit of the wider community.

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

## Defence capability

Australian companies and universities will share \$21.5 million in the latest round of defence capability development funding from the Capability and Technology Demonstrator (CTD) Program. The twelve projects include:

- **Ka Band Satellite On-The-Move Communications System (EM solutions)** – A novel Australian mounted battle command-on-the-move X and Ka band communications system. The proposed system would be able to be integrated onto a variety of military platforms and would provide the **Australian Defence Force** (ADF) with enhanced mobile situational awareness while in hostile territory;
- **Field Portable Supersonic Particle Deposition unit (Rosebank Engineering)** – A compact field-portable Supersonic Particle Deposition machine for use at ADF facilities (e.g. air and naval bases). The machine is used to apply corrosion protective coatings to metallic surfaces and to repair surface-damaged components, currently only available in large-scale facilities;
- **Special Sonar for Submarines (Sonartech Atlas)** – A new submarine sonar that can detect and track close-in contacts;
- **Elongate Solar Cells for Energy Generation (The Australian National University)** – Flexible solar panels with high efficiency under both normal and subdued light and with high power-to-weight ratios. These solar cells would allow soldiers to generate power in the field and reduce the need for batteries;
- **Adaptive Tuned Mass Damper for Submarine Engines (University of Adelaide)** – Improved vibration absorbers for submarine engines to reduce the vibration from engines. This is vital in reducing the acoustic signature of Australian submarines and will improve the operational effectiveness.

The **Defence Science and Technology Organisation** manages the CTD Program on behalf of Defence.

► More information: [www.dsto.defence.gov.au/collaboration/3743/](http://www.dsto.defence.gov.au/collaboration/3743/)

# Shaping up: the Garnaut review draft report

**R**eleasing the Garnaut Climate Change Review draft report at the **National Press Club**, **Professor Ross Garnaut** said that strong global mitigation could significantly reduce the predicted severe impacts of dangerous climate change.

"Australia would be hurt more than other developed countries by unmitigated climate change, and we therefore have an interest in encouraging the strongest feasible global effort," Professor Garnaut said.

The Draft Report provides suggestions on the design of the emissions trading scheme (ETS) which should cover as many sectors as practicable.

It advocates full auctioning of emissions permits and proposes that half the proceeds from the sale of all permits is allocated to households, around 30 per cent provided for structural adjustment needs for business, and the remaining 20 per cent allocated to research and development and the commercialisation of new technologies.

Key recommendations addressing research and development include:

- a large increase in Australia's commitment to research, development

## Reactions:

### **Professor Kurt Lambeck, president of the Australian Academy of Science:**

"The report accepts the realities of climate change and recognises there are some scientific uncertainties but it also notes that the cost of inaction now is to increase risk in the future. The key point is the recognition that the massive global effort in research, development and commercialisation of low emissions technologies is definitely important."

Professor Garnaut suggests this could be up to \$100 billion a year in global activity and that Australia should be able to contribute \$3 billion per year to this. I think that is a realistic assessment. The government's recent budget commitment was a long way off the mark. The suggestion of \$3 billion is far more realistic and one that we strongly endorse."

### **Professor John Quiggin, Australian Research Council federation fellow, University of Queensland:**

"There is no doubt that the review has shifted the terms of the debate substantially. The issue now is not whether to set an emissions target or not but whether we have time to make the drastic cuts in emissions necessary to avoid severe climate damage."

### **Professor Barry Brook, director of the Research Institute for Climate Change and Sustainability, University of Adelaide.**

"Our great natural assets – the Great Barrier Reef, the wetlands of Kakadu, the enormously productive agricultural basin of the Murray-Darling system – will be severely degraded or all but eliminated within the lifetimes of current generations."

By explicitly recognising these harsh realities, the Garnaut Report positions the economic and social arguments within the right frame of reference – one in which urgent action is required, and where forward-looking domestic action from the developed world, especially nations that are exquisitely sensitive to climate change impacts, must be the trigger for international multilateral agreements – which are ultimately the only way to solve the problem, and at the same time spawn the energy revolution of the new century – renewables, not fossil carbon."

and commercialisation of low-emissions technologies, to over \$3 billion per annum;

- an Australian system of matching grants for private investors demonstrating externalities, low emissions and innovation, to achieve an effective commercialisation effort on a sufficiently early time scale;
- a new research council charged with elevating, coordinating and targeting Australia's effort in low-emissions research.

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



*Australia's high-altitude species are at risk. According to the Garnaut climate change draft report, these species are already at their range limits due to the low relief of Australia's mountains, and lack suitable habitat to which they can migrate. For example, a 1°C temperature rise, anticipated in about 2030 for south-eastern Australia under all four cases, will eliminate 100 per cent of the habitat of the mountain pygmy possum (*Burramys parvus*).*

### **Dr Mark Diesendorf, University of New South Wales:**

"Professor Garnaut's draft report sets out some of the key requirements for an effective emissions trading scheme, in particular, wide coverage, including transport fuels, and 100% auctioning of emissions permits. Coverage should be further extended by including forestry."

The draft report contains a basic inconsistency. On one hand it acknowledges the seriousness of global climate change and the need for urgency, but on the other hand it envisages a slow tightening of the cap on emissions and hence a slow transition to a high carbon price. In reality, a price of at least \$20 per tonne of CO<sub>2</sub> is needed to allow combined-cycle gas-fired power stations to compete with conventional coal power and at least \$40 per tonne of CO<sub>2</sub> to allow wind to compete. An initially low carbon price is a recipe for a scheme that will fail to change rapidly the structure of electricity generation in Australia. It is essential for both gas and renewables to be brought into the mix from 2010."

### **Professor Snow Barlow, professor of horticulture and viticulture, University of Melbourne:**

"No pain, no rain... Professor Garnaut had it right in his analysis of the potential impacts of inaction in climate change. This interim report is an excellent basis to develop policy action that may put the nation on the 'high' road to a low emissions economy."

While the report advocates comprehensive coverage it reserves its decision on agriculture on the grounds of measurement and transaction costs and appears to have dodged the methane 'problem'. This is the problem Australian agriculture must address regardless of how agriculture is eventually included in a trading scheme, either directly or in an 'upstream' manner. Methane from ruminant animals is second to power generation in terms of our national emissions and must be addressed by the research and development mechanisms proposed on a scale approaching 'clean coal'. In an increasingly hungry and affluent world seeking animal protein, methane from animals is worthy of global, extensive research and one which may help us in our competitive position. The global food equation is going to get much tighter as we value carbon in this way because of increasing competition for land."

## Foot-and-mouth test

Researchers at the CSIRO's Australian Animal Health Laboratory have developed a new test for foot-and-mouth disease that involves no infectious viral material and can differentiate infected from vaccinated animals (DIVA). This 'DIVA' test, published in the *Journal of Immunological Methods*, could transform how foot-and-mouth disease is controlled in future, because it's safe and inexpensive.

*Ruptured vesicle on the snout showing the characteristic epidermal papillae before healing begins by granulation.*



photo: CSIRO Animal Health laboratory

large scale applications.

By using antibodies and viral protein that are both genetically engineered and produced in bacteria, a world first according to the researchers, the new DIVA test is an important improvement. The production of genetically engineered protein in bacteria is cheap and can be done in large quantities.

The test itself is not used for primary diagnosis but in the control and recovery phase where material being tested is highly unlikely to be of an infectious nature and testing can be carried out at a lower level of biocontainment.

Foot-and-mouth disease is considered the most economically devastating viral disease affecting farm animals worldwide. It spreads rapidly and is a huge threat to trade. An outbreak in Australia would instantly shut down the meat and livestock industry and would cost between \$8 and \$13 billion in terms of lost production, trade and disease eradication.

In a major outbreak in 2001, the **British Government** decided against using vaccination to control the spread because the tests available to them could not distinguish between infected and vaccinated animals.

The outbreak was finally contained only after the slaughter of more than six million animals. Most were not infected.

► More information: [www.csiro.au/science/FMDDIVA.html](http://www.csiro.au/science/FMDDIVA.html)

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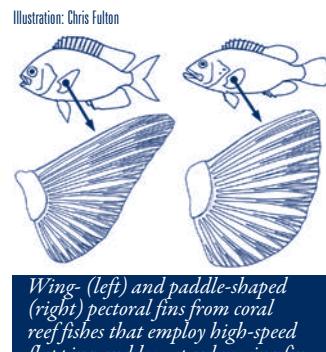
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## Underwater wings

Certain small reef fish use wing-like fins to 'fly' underwater, allowing them to cruise at speeds equivalent to tuna.

The wing-like fins, discovered by researchers from the **ARC Centre of Excellence for Coral Reef Studies**, allow these fish to handle strong water currents with ease and if these specialised fish are lost to overfishing, reefs worldwide would suffer.



*Wing (left) and paddle-shaped (right) pectoral fins from coral reef fishes that employ high-speed flapping and low-speed rowing fin*

"Some species of parrotfish, wrasse and surgeonfish have developed wing-like fins which they move in a flapping motion, just like a bird," says **Dr Chris Fulton**, a lecturer in the School of Botany and Zoology at the **Australian National University**. "This allows them to generate high swimming speeds with relatively little energy so they can move easily around their turbulent, wave-swept habitats."

Dr Fulton says reef fish just 10 cm long can cruise all day at an average speed of 3.6 km per hour, which is the equivalent of a typical person swimming at more than 60 km per hour. The researchers found fishes with these unusual wing-like fins on coral reefs all around the world which, says Dr Fulton, have evolved the same answer to survival in wave-swept habitats. "...it's a beautiful piece of convergent evolution in action," he says.

Most reef fish have paddle-shaped fins, which they move in a rowing action: a backward power stroke to create thrust, followed by a forward recovery stroke limiting their swimming speed.

"We discovered that the fastest reef fishes have tapered fins, which they tend to flap in a figure-of-eight sweep that creates thrust on every stroke. This flapping motion creates lift forces from water flowing over the fin, just as with air moving over the wing of a bird."

The work has caught the interest of the **US Office of Naval Research**, and may influence the design of future remote control submersibles.

"While we are seeing rapid advancements in submersible design, such as the multi-finned Madeleine recently developed by **Vassar College**, we are yet to match the speed and efficiency achieved by these wing-finned coral reef fishes," Dr Fulton says. "We still have much to learn from over 50 million years of reef fish evolution."

► More information: [www.scienceinpublic.com/scienzenow/2008/christopher\\_fulton.htm](http://www.scienceinpublic.com/scienzenow/2008/christopher_fulton.htm)

## Electrostatic attraction

Cutting-edge wool textile technology developed for industrial air filtration systems has found its first lucrative commercial application in the manufacture of respirators for the personal protective equipment (PPE) market.

A collaboration of **CSIRO**, **Australian Wool Innovation Ltd.** (AWI) and **Michell Pty Ltd**, the new filters consist of a combination of wool and synthetic fibres. Project leader **Dr Jurg Schutz** says independent tests confirmed the new filters outperform a range of commercially available competitive products.

"The secret to efficient fibre-based filtration is the application of an electrostatic charge to the fibres during production of the non-woven filter mat," he says. "These electrostatic charges attract dust and pollutant particles, and hold them in the filter, greatly improving efficiency."

CSIRO's researchers optimised the wool/synthetic fibre blend ratio, and developed manufacturing processes for the production of the electrostatically-charged filter material.

Michell Pty Ltd's managing director **Peter Michell** says his company has recently secured a commercial commitment from one of the world's major producers of personal respirators for the production and Australian distribution of over 500,000 personal respirators and refill cartridges fitted with wool-rich filters in the next year.

Other industrial applications for wool-rich industrial filters are under development as wool begins to regain the market share in filter media that it held decades ago.

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

## Fixated advantage

A team of scientists may have solved the riddle of why plants that work with bacteria to convert atmospheric nitrogen gas into an essential biological nutrient (ammonia) tend to prevail in the world's tropical regions rather than higher latitudes.

Published in *Nature*, Dr Ying Ping Wang from the Centre for Australian Weather and Climate Research and colleagues developed a theory providing a unifying framework for nitrogen fixation that explains the different levels of fixation observed in a wide range of climatically and geographically-defined terrestrial ecosystems right around the world.

Nitrogen fixation has long been recognised as an important process in controlling responses of many ecosystems – particularly boreal and temperate forests – to global environmental change, says Dr Wang.

"However, there have been significant discrepancies between real-world observations and the theories used to predict nitrogen fixation patterns across major sectors of the land biosphere," Dr Wang says.

The team found that nitrogen-fixing species in phosphorous-limited tropical savannas and lowland tropical forests enjoyed a clear advantage over nitrogen-fixing species found in mature forests at high latitudes, where modern-day temperatures appeared to have constrained their numbers and nitrogen-fixing abilities. The finding led to two new hypotheses that could help explain the distribution of nitrogen fixing plants across global ecosystems.

The first is that temperature constrains the distribution of nitrogen fixation, contributing to the lack of nitrogen-fixing trees in mature forests at high latitudes. The second – that nitrogen-fixing plants hold an advantage in terms of their ability to acquire additional phosphorus – provides an explanation for the persistence of nitrogen-fixing plants in mature lowland tropical forest and savannas.

Based on these hypotheses, Wang and colleagues produced a model to better predict the effect of climate change on different ecosystems and the interactions between terrestrial biosphere and climate change at decadal-to-century time scales.

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

## Know thy worm

CSIRO scientists have moved a step closer to developing a novel DNA test for one of the biggest threats to sheep health in Australia, the barber's pole worm. Barber's pole worm, *Haemonchus contortus*, is one of the top three nematode parasites of sheep. Nematode parasites cost the Australian industry hundreds of millions of dollars each year in lost production, veterinary drugs, and animal deaths.

The discovery of DNA markers by CSIRO Livestock Industries researchers working at Armidale, NSW, will allow producers in the future to implement control strategies that specifically target the worm strains



JULIETTE SAWYER

present on their own properties, potentially reducing the impact of worm resistance to veterinary drugs, reducing drug usage and leading to better health and welfare outcomes for sheep.

Research scientist **Dr Peter Hunt** says new work published in the *International Journal for Parasitology* reveals for the first time that different strains of barber's pole worm can have dramatically differing effects on their hosts. "We have found ways to identify these different strains of worms via their DNA, so that with a simple test a producer could determine which strain is present and therefore what to do about it. At the moment, if faecal counts show animals are infected, the main management option is for producers to drench their sheep."

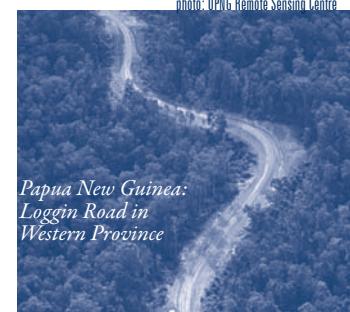
Dr Hunt says that this research will trigger a new outlook on sheep management and, in the short-term, will increase the importance of on-farm quarantine.

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

## PNG running out of forests?

As Papua New Guinea pushes Australia and other developed countries to pay for forest conservation as a carbon sink, a new analysis says that PNG may be running out of forests to protect.

The report *The State of the Forests of Papua New Guinea*, the result of imagery analysis of forest cover change between 1972 and 2002, was produced by scientists at the University of Papua New Guinea Remote Sensing Centre and their colleagues at the Australian National University. The researchers spent five years analysing satellite images that document 30 years of destruction in an area that contains a major portion of the world's third largest tropical forest. Only the Amazon and Congo forests are bigger.



Papua New Guinea:  
Loggin Road in  
Western Province

They estimate that in 2001, Papua New Guinea's accessible forests were being cleared or degraded at a rate of 362,000 hectares a year – amounting to a combined annual rate of deforestation and degradation of 1.41%. At that pace, by 2021, the authors estimate that 83% of the country's accessible forest (and 53% of its total forested area) will be gone or severely damaged. Even in so-called conservation 'protected areas' forest destruction is occurring at the same pace as in unprotected regions.

Rich countries are asked to pay for conserving the vast tropical forests, yet the destruction of these forests is continuing and, without urgent action, most areas accessible to loggers will have been harvested within 13 years. Half of PNG's forests will be gone. It may not be too late to act. "Papua New Guinea is still one of the most heavily forested countries in the world," the scientists say. "For the first time, we have evidence of what's happening in the PNG forests. The government could make a significant contribution to global efforts to combat climate change. It is in its own interest to do so, as this nation is particularly susceptible to negative effects due to loss of the forest cover."

► More information: [www.scienceinpublic.com/png\\_forests.htm](http://www.scienceinpublic.com/png_forests.htm)

## Fish highway

A review of the Murray Darling Basin Commission (MDBC)'s 'Sea to Hume' program of fishway construction along the Murray has found the 10 new 'fish ladders' are setting a new worldwide standard for ecosystem restoration.

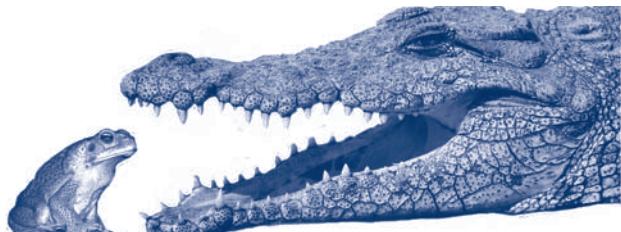
The MDB has just released the report of a team of freshwater fish scientists from three Basin states (NSW, Victoria, South Australia) which has quantitatively assessed fishway performance and associated longer term benefits from improved fish passage.

The team, known as the Fish Passage Task Force, studied 242,500 fish at the tidal Barrages, Locks 1 to 3 and Locks 7 to 10.

MDBC chief executive **Dr Wendy Craik** says many overseas designed fishways were designed to pass only a few large-bodied economically important fish species. "But the Murray River fishways are uniquely designed to restore passage for the majority of the migratory fish community," she says. The new fishways are passing more than 1,000 fish a day, with a high diversity of about 13 species and a wide size-range of between 31 mm to 1040 mm long.

The \$60 million 'Sea to Hume' project is part of the MDBC's Native Fish Strategy which plans to restore native fish populations to 60% of their pre-European settlement levels by 2050. Dr Craik says a tagged fish can now be tracked up and down the Murray River for its whole lifetime providing useful ecological data and has resulted in substantial advances in the knowledge of native fish species within the Murray-Darling Basin. "Small fish species, such as carp gudgeon, murray rainbowfish and unspecked hardyhead, previously thought not to be migratory, have been recorded within the fishways in their thousands."

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



## Croc vs toad: it's a toad's game

The first evidence has been found for the destructive effect of the cane toad invasion on one of northern Australia's top predators, the freshwater crocodile. Researchers from the **University of Sydney** have found that cane toads have caused a 75% drop in freshwater crocodile numbers in the **Northern Territory's Victoria River District**.

This confirms anecdotal reports about the introduced pests' effect on the native predator. "The impact of invasive species is particularly important as their removal can generate a substantial cascade of secondary effects in the local environment," says **Dr Mike Letnic**, who led the study.

Freshwater crocs are more susceptible to the pest than their saltwater cousins, which occur also throughout southern Asia and may have evolved with toad species similar to cane toads.

► More information: **Jake O'Shaughnessy, 61 2 9351 4312 or 0421 617 861;**  
(see also 'Opinion' p5)

## Soya not guilty

Drinking soy milk or soy-based formula does not trigger peanut allergy in children, researchers from the **Murdoch Children's Research Institute** have found. Their work challenges the results of an influential previous study.

Peanut allergy is the most common cause of anaphylaxis in children. In the past research suggested a link between the use of soy products and the development of peanut allergy. Both legumes produce sets of similar proteins and this was presumed to trigger a cross-reaction in interactions with the immune system.

The new study published in the *Journal of Allergy and Clinical Immunology* shows, however, that the association between soy consumption and peanut allergy is coincidental: parents, whose children are at higher risk of peanut allergy due to a family or personal history of cow's milk allergy, tend to give their children soy. The study found no evidence that drinking soy increases the risk of peanut allergy, says PhD student and epidemiologist **Jennifer Koplin**. She analysed data from the Melbourne Atopy Cohort Study, which closely followed 620 children from the time of their birth until they were two years old.

► More information: [www.scienceinpublic.com/scienzenow/2008/jennifer\\_koplin.htm](http://www.scienceinpublic.com/scienzenow/2008/jennifer_koplin.htm)

## Alzheimer's diagnosis...

An Australian research project may bring forward the detection of early stage Alzheimer's disease by up to 18 months.

Alzheimer's disease is characterised by very high levels of a molecule called beta-amyloid in the brain. The project has demonstrated that a neuro-imaging scan called PiB PET can be used to identify individuals who will develop Alzheimer's disease up to 18 months earlier than all currently available diagnostics. **Professor Christopher Rowe** of the **Austin Hospital** in Melbourne led the research and says early diagnosis and treatment presents the best opportunity to delay the onset of Alzheimer's.

"While the discovery is at an experimental stage, this work places Australia at the forefront of neuro-imaging in Alzheimer's disease," Professor Rowe says.

PiB PET can show the beta-amyloid in the brain, which potentially allows clinicians to distinguish patients with early Alzheimer's disease from others without the disease, even before clear signs of memory loss are present.

The research was undertaken as part of the **Australian Imaging, Biomarkers and Lifestyle (AIBL) Flagship Study of Ageing**.

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

## ...and treatment

**Queensland Brain Institute (QBI)** neuroscientists at the **University of Queensland** have discovered a new way to reduce neuronal loss in the brain of a person with Alzheimer's disease.

Memory loss in people with Alzheimer's disease can be attributed to several factors including a build-up of the neuro-toxin beta amyloid, the major component of amyloid plaques found in Alzheimer's patients, and the corresponding degeneration of a specific population of nerve cells in the basal forebrain.

Research by QBI's **Dr Elizabeth Coulson** has established that the molecule known as p75 neurotrophin receptor is necessary for beta amyloid to cause nerve cell degeneration in the basal forebrain.

"Discovering how beta amyloid triggers neuronal degeneration has been a question bugging neuroscientists for decades, and we have identified an important piece of the puzzle," Dr Coulson says.

Dr Coulson's team further found that it was possible to completely prevent beta amyloid toxicity by removing or blocking the p75 cell death receptor. Dr Coulson already has patented molecules that can block p75 and is ready to begin testing them in animal models of Alzheimer's disease.

"If such therapy is successful, it probably wouldn't cure this multifaceted disease," says Dr Coulson. "But it would be a significant improvement on what is currently available for Alzheimer's disease patients."

► More information: **Dr Elizabeth Coulson, 3346 6392**

Professor Rick Shine

PROFESSOR IN BIOLOGY, UNIVERSITY OF SYDNEY &amp; FEDERATION FELLOW OF THE AUSTRALIAN RESEARCH COUNCIL

# Who's afraid of the big bad toad?

In 1935, agricultural scientists from the Bureau of Sugar Experiment Station near Cairns committed one of the great blunders of biological control. They brought 102 cane toads from Hawaii to Cairns, and released their progeny. Ignoring the beetles they were meant to eat, these warty South American interlopers have spread across more than a million square kilometers of tropical real estate, leaving a trail of environmental destruction in their wake. The southern front is moving only slowly through northeastern New South Wales, but the western front accelerated as it moved through the Northern Territory. With the first wet-season rains of 2008, Western Australia will join the list of Australian states that are reluctant hosts to this most unwelcome invader.

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In the midst of this doom and gloom, a new approach to toad control has emerged from an unlikely direction: 'pure' research.

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So, are the toads unstoppable? Ecologically-based research has given us a new arsenal of weapons, such as toad-specific parasites and pheromones, providing a glimmer of hope for toad control.

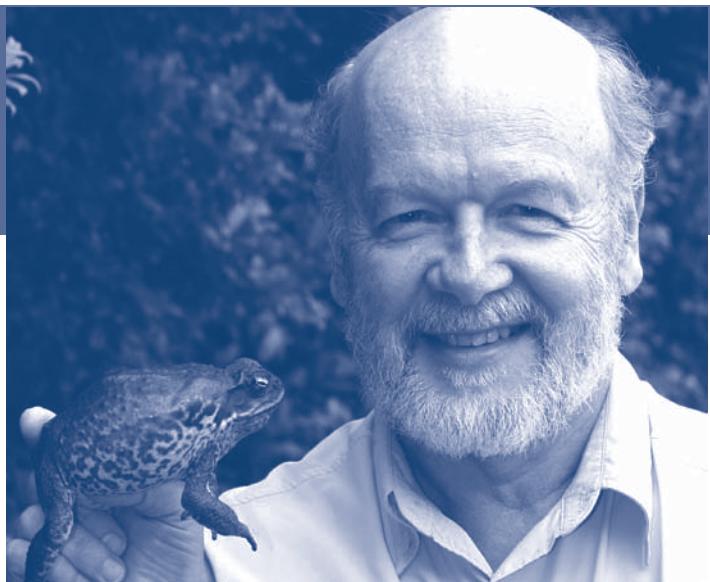
The toad's high public profile and its predicted impact on biodiversity spawned millions of dollars in research funding, and enthusiastic community "toad-busting", yet failed to slow the toads' invasion. CSIRO was the primary recipient of funding, and spent several years researching toad biology and pathogens in the animal's native range in Venezuela, and several more years trying to construct a genetically-modified virally-vectorized toad-killer. The work hit technical snags and looks unlikely to continue – perhaps fortunately. Many have pointed to the risks of ecological catastrophe if a genetically-engineered toad-killing virus escaped Australian shores to massacre toads in their native range. Community attempts at toad control have been equally frustrating – despite massive effort, the toad front has continued to sweep westwards. A single female cane toad can produce up to 30,000 eggs in a single clutch, so the mathematics of population reduction are formidable.

In the midst of this doom and gloom, a new approach to toad control has emerged from an unlikely direction: 'pure' research. For more than 20 years, the Australian Research Council has funded my research on the ecology of reptiles at Fogg Dam, midway between Darwin and Kakadu National Park. The work was designed as "pure" research, but we ended up in the right place at the right time. As the cane toad invasion front raced westwards, it became clear that the knowledge base and infrastructure at Fogg Dam provided a unique opportunity to find out exactly what cane toads are doing and what effects they have on the Australian fauna.

Remarkably, the massive prior expenditure of public money on cane toad research had mostly gone to targeted attempts to kill or remove toads. Apart from Ross Alford's group at James Cook University, few people had tried to understand toad ecology or behaviour. And as soon as we started work on these topics, opportunities for new approaches to toad control began to accumulate like toads around a cowpat. In particular, we soon found features in which cane toads differ from Aussie frogs (Australia doesn't have any toads of its own) – a critical issue if control attempts are to avoid collateral damage to native frogs. For example, cane toads are

very picky about where they breed, preferring shallow sun-exposed pools surrounded by open ground; so that planting grass up to the edges of your backyard pool may be a more effective toad deterrent than going out every night with a golf club. And the more we can concentrate toad breeding, the more the toads will help us by controlling their own numbers through competition and cannibalism.

More importantly, we have found that cane toad tadpoles communicate with each other using specific chemicals. For example, a frightened or injured cane toad tadpole releases an "alarm pheromone" that warns its fellow tadpoles to flee the danger. If we consistently add this "alarm pheromone" to pools, about half the toad tadpoles are so stressed



out that they die – and the ones that survive turn into toadlets so small that they are vulnerable to predators and drying out. And best of all, the tadpoles of native frogs don't react to these chemicals.

Even more encouraging is our work on lungworm parasites. Laboratory trials show that these nematodes can kill up to 30% of the tiny toads they infect, and our genetic work has recently shown that the parasite in cane toads is a different species than that in the native frogs. So again, we have a chink in the toad's armour – a way to target control efforts at toads without risking collateral damage to frogs. And lastly, many of the native predators that we expose to toads in laboratory trials have proved to be much smarter than we expected – so long as the first toad they try to eat is a small one (so it isn't a fatal meal), animals like fishes, frogs and small marsupials quickly learn to stay away from cane toads. As a result, releasing a few small toads slightly ahead of the main invasion front (which consists entirely of large and hence lethal toads) might teach predators early enough to let them survive the amphibian onslaught.

It's early days yet for these new approaches to toad control, and the toad is a desperately difficult adversary. Nonetheless, our emerging arsenal of anti-toad weapons reinforces the value of basic research in suggesting answers to "applied" questions.

Taking the time to understand the enemy – that is, to conduct detailed ecological studies of a threatening pest – ultimately may pay greater dividends than spending money on untested methods, or on a high-tech search for silver bullets.

► For more information about cane toad research: [www.canetoadsinoz.com](http://www.canetoadsinoz.com)

## Robo-clarinet

A remarkable Australian-designed robot clarinet player has won first prize at an international orchestra competition in Athens, beating in the final a Dutch developed guitar-picking robot and a Finnish piano-playing machine.

The robot was developed by a team of engineers and scientists from **NICTA**, Australia's Information and Communications Technology Research Centre of Excellence, and the **University of New South Wales**.

The Artemis Music Orchestra competition is to raise awareness about the growing capacity and applications of embedded computer systems, special-purpose computer systems that usually perform specific dedicated functions, for example in digital watches, MP3 players and traffic lights. By contrast, personal computers can be programmed to do many different tasks.

**John Judge**, a senior research engineer at NICTA who led the development of the clarinet player, describes the robot as "an embedded computer system connected via specially constructed electronics to actuators that control the keys and mouthpiece of the clarinet."

Two tiny motors apply force to the clarinet's reed, emulating the action of the human lip, and mimic the action of the human tongue. The fine-tuning required to control the reed and air pressure flowing through the clarinet was achieved through collaboration with **Joe Wolfe** of UNSW's Music Acoustics Laboratory.

A video-clip featuring the robot is currently uploaded on **Google YouTube**.

► More information: [www.science.unsw.edu.au/news/hot-licks-from-robo-clarinet/](http://www.science.unsw.edu.au/news/hot-licks-from-robo-clarinet/)

## Don't call us

Australians have listed more than 2.3 million telephone numbers on the **Do Not Call Register** since its launch in 2007.

The register is overseen by the **Australian Communications and Media Authority** (ACMA) and prohibits most kinds of telemarketing calls to domestic and private fixed line and mobile telephone numbers listed on the register in the absence of consent.

According to ACMA's chairman **Chris Chapman**, a recent ACMA-commissioned survey found the register is being well received by consumers and is delivering results. "Nearly 90% of those surveyed who had listed their numbers on the register reported a drop in the number of telemarketing calls they received."

► More information: [www.acma.gov.au/WEB/STANDARD/pc=PC\\_311181](http://www.acma.gov.au/WEB/STANDARD/pc=PC_311181)

## Global reach

Australian universities are teaming up with **Apple** to make their teaching and research available for free to a global audience.

**Swinburne University** is one of seven universities in Australia and New Zealand to begin using Apple's content distribution system, iTunes U on the **iTunes Store**.

iTunes U is currently used by educational institutions in North America allowing them to distribute audio and video content for free to students and the general public. Users can download the content to their Mac or PC, transfer the information to their iPod or MP3 player and listen to or view it anytime, anywhere.

Initially, Swinburne's presence on iTunes U features research conducted at the university, short films produced by students from Swinburne's Film and Television school, previews of stereoscopic 3D movies produced by the Centre for Astrophysics and Supercomputing and introductory lectures in public relations writing.

**Dr Lisa Germany**, educational coordinator with Swinburne's Digital Learning Initiative, says a presence on iTunes U allows existing students and new audiences to discover Swinburne's key areas of expertise and to access content wherever and whenever it's convenient for them. Through iTunes U, she says, "Swinburne can reach out beyond the classroom, allowing not only students, but the global community at large to extend their learning, explore interests and engage in education."

► More information: [www.swin.edu.au/corporate/marketing/mediacentre/core/releases\\_latest.php](http://www.swin.edu.au/corporate/marketing/mediacentre/core/releases_latest.php)

## Trial guidelines

The **Australian Communications and Media Authority** (ACMA) has released guidelines on how it will handle applications for licences to trial new technologies that make use of radiocommunications spectrum, such as digital broadcasting or wireless internet technologies.

The guidelines outline the process by which ACMA will issue radiofrequency apparatus licences to applicants seeking to use both broadcasting and non-broadcasting frequencies, where available, for technical tests of new technology.

The new process replaces previous ACMA procedures for the issue of licences for this purpose, including the *Digital Radio Trials Using the Broadcasting Services Bands' Policy Guidelines* previously released by ACMA in March 2006.

"The guidelines will assist applicants who wish to use spectrum to test the technical functions of new communications technologies," says **Maureen Cahill**, acting general manager, Inputs to Industry Division.

The guidelines come into effect immediately.

► More information: [www.acma.gov.au/WEB/STANDARD/pc=PC\\_311205](http://www.acma.gov.au/WEB/STANDARD/pc=PC_311205)

## Internet therapy

Online psychological treatment (therapy) can be as effective as face-to-face therapy for treating mental health disorders, according to a new study by **Swinburne University** researchers.

Published in the *Journal of Medical Internet Research*, the study found that therapist assisted e-therapy is highly effective for the treatment of panic and panic-related symptoms.

It revealed that when online treatment programs are supported by health professionals they can achieve patient outcomes comparable to best-practice face-to-face therapy.

"Mental illness is a growing problem worldwide," says lead author and psychologist **Kerrie Shandley**. "In Australia, it accounts for 13% of health problems and one in 10 adults report that they suffer from a long-term mental or behavioural problem."

The study found that when panic disorder sufferers used the e-therapy program 'Panic Online' in conjunction with support from a general practitioner, their panic disorder and panic-related symptoms were reduced with around 30% losing their symptoms altogether.

► More information: [www.swin.edu.au/corporate/marketing/mediacentre/core/releases\\_latest.php](http://www.swin.edu.au/corporate/marketing/mediacentre/core/releases_latest.php)

# It's the water, stupid!

In the lead up to the July 3 meeting of the Council of Australian Governments (COAG), our greatest fear was that there would be no recognition of the urgency of the desperate situation facing the Murray Darling Basin. There's been a litany of reports. The recently released Sustainable Rivers Audit points out that all but one are in either poor, very poor, or extremely poor condition. It's an old problem that's been with us for a long time. In 2002, before the drought, we put a dredge in the mouth of the River Murray because it had stopped flowing. We knew then, as a nation, that the river was in serious strife. More recent reports warn us to expect serious ecosystem losses in a matter of months. Parts are already lost and other areas already beyond saving.

On 3 July, our national leaders chose more plans above rapid action, politics above vision. At a time when they should have empowered someone to solve this problem and solve it quickly, they have choked. Perhaps if our leaders had visited enough ecosystems on the point of collapse, inhaled the smell of acid sulfate soils and talked to local irrigators, they may have acted differently.

To be fair, COAG did agree to appoint an independent authority and this is important. However, the authority has not been empowered to act quickly. It hasn't been made responsible for delivering results – to maintain the river at a minimum level, and set up the water that's necessary to do that and to deliver the environment in all states a share of inflows. The River Murray needs an authority that can make decisions as quickly as rivers and rainfall change.

COAG also confirmed significant investments in infrastructure and pipes, but it will take a long time before this delivers any water to the River Murray's water dependent ecosystems. There is a real risk that we could end up gold plating parts of the system that should have been closed down.

One can only guess that with such a lack of urgency evident, COAG must have instead decided to pray for rain. The problem is that rain won't fix our chaotic water management systems or a failed water sharing regime. The Prime Minister and Premiers know that big decisions need to be made. All know that the real need was to replace the existing sharing regime and cap on the maximum amount of water that can be pumped out of the river with a system that gives all states and the environment a share of inflows.

Australia is learning the hard way that long dry periods are common. We had a long dry that started in 1938 and lasted for twelve years. During the wetter second half of last century, we almost forgot what a long dry was. Nature has reminded us. Could we cope if the current dry period lasted for twelve years, until 2014? Australians need to ask whether or not we are managing the river in a state that would enable us to last for another four or five years in the climatic regime we're in now. Are we ready for it?

Australia, as a nation, needs to understand that small losses in rainfall mean very, very large reductions in the amount of water that's available for

consumptive use, and for the environment. In a standardised river model (see table) a small 10% reduction in rainfall can mean a whopping 2/3 reduction in the amount of water available for use – unless we are prepared to abandon agreed plans. A reduction in rainfall of 10% typically means around 30% less run-off, but the amount of water that evaporates still has to be found. The fixed costs of running a river remain!

The sad thing is, we already know the solution. It isn't rocket science. As the late Peter Cullen said, it is really pretty simple housekeeping - how much water do we have to allocate? Cullen also said "We don't have all the answers – nobody does – but before we start laying bricks and mortar, we have got to get the foundations right, otherwise the cathedral will tumble

*An illustrative overview of the consequences of a shift to a drier regime for a 10,000 GL system similar to the River Murray's.\**

*(Readers are encouraged to enter their own assessment of how best to configure such a system if, as Perth has experienced, there is a 20% decline in mean rainfall).*

Mean rainfall shift	10% reduction in mean rainfall	20% reduction in mean rainfall
Mean inflow	<b>10,000</b>	<b>7,000</b>
Mean evaporation	2,000	2,000
Mean flow to the sea	<b>2,000</b>	<b>2,000</b>
Net volume available for discretionary use	<b>6,000</b>	<b>3,000</b>
Environmental entitlement	1,500	1,500
Consumptive user entitlement	<b>4,500</b>	<b>1,500</b>
Unallocated water	<b>0</b>	<b>0</b>
Reduction in mean volume available to consumptive users		67%
		....%

\* Murray-Darling Basin historical records indicate that mean annual inflows into the southern River Murray system including the Lower Darling is 11,229 GL per annum and the median inflow is 9,033 GL per annum.

with the smallest of tremors."

Scientists have said time and time again that we need to know how water flows into the system, to manage that, to manage forestry, farm dams and ground water. It should be obvious to anyone that if we don't start balancing the books for the system as a whole, then we go further into the red.

Many Australians would be shocked to learn that advice being given to Ministers is they should expect a decline in inflows into the system of 2,570 GL by 2023. A predicted result of this long list of unaccounted processes. But the largest number anyone has ever proposed to recover for the river is 1,500 GL! The reality is that net effect of all the plans currently on the table is to reduce not increase river flow. What's critical is that we move quickly. We must move quickly for the sake of the communities and quickly for the sake of the river, but more importantly, quickly for the sake of Australia.

One of the immediate measures that needs to be taken is to require offset of the impacts of all new forests, farm dams and other forms of interception high up in the catchment where water comes from.

Whether as a nation we opt to use a rapid Coles-Myer like share buyback and go in and pay well above market price for water, or whether we pay compensation payments to irrigators, the one thing we can and must do right now is give the environment some water.

► **More information: see 'Water works' on page 21**

## Trans-Tasman innovation

A new trans-Tasman \$30 million research commercialisation fund for local universities will drive cross-disciplinary research into developing life-saving medical technology. Research is expected to include developing antibodies for treatment of cancer and other serious diseases and regenerative medical treatments for conditions such as neurodegenerative disorders, diabetes, arthritis, musculo-skeletal and cardiovascular diseases.

The Trans Tasman Commercialisation Fund is a joint initiative of the **University of Adelaide**, the **University of South Australia**, **Flinders University**, **Monash University** and the **University of Auckland** in New Zealand. Industry superannuation fund **Westscheme** is investing \$30 million over five years in the fund. The **South Australian** and **Victorian Governments** will each contribute \$1.25 million and the **New Zealand Government** will contribute \$NZ 1 million.

► More information: Robert Chalmers, [robert.chalmers@adelaide.edu.au](mailto:robert.chalmers@adelaide.edu.au); [www.dpc.vic.gov.au](http://www.dpc.vic.gov.au)

## Uni makeover

**Murdoch University** in Western Australia has created seven new research institutes and appointed two new institute directors.

The new institutes are:

- **Institute for Health Research;**
- **Institute for Resource Technology;**
- **Institute for Sustainable Ecosystems;**
- **Institute for Animal Research;**
- **Institute for Crop and Plant Science;**
- **Institute for Media, Creative Arts & Information Technology;** and
- **Institute for Sustainable Societies, Education & Politics.**

The two appointed directors are:

- **Professor John Pluske – Institute for Animal Research.** Professor Pluske was previously Associate Dean of the Faculty of Health Sciences, working in the School of Veterinary and Biomedical Science. His research interests include comparative digestive physiology, feedstuffs evaluation, interactions between nutrition and enteric bacterial diseases, and nutrition of the young.
- **Professor Jacqueline Phillips – Institute for Health Research.** Professor Phillips has been teaching veterinary physiology and biomedical sciences at Murdoch. Her research covers three major biomedical health areas: cardiovascular disease, chronic pain and tumour neurobiology.

► More information: [www.murdoch.edu.au/](http://www.murdoch.edu.au/)

## Autism first

**La Trobe University**, supported by a generous private donation, has launched Australia's first dedicated research centre for Autism Spectrum Disorders. The **Olga Tennison Autism Research Centre** will focus on both basic and applied research into the nature and causes of autism.

The centre is a joint initiative with **Autism Victoria**, the peak autism body in the State, which will play an important role in supporting and promoting its work. The centre will also focus on training and continuing education for health and educational practitioners. It will foster collaboration between community services, research centres and other universities involved in autism research and build partnerships with international research groups.

► More information: Dr Cheryl Dissanayake 03 9479 1162, [c.dissanayake@latrobe.edu.au](mailto:c.dissanayake@latrobe.edu.au)

*Melanoma with a border that is uneven, ragged, or notched. Part of the ABCD's of melanoma detection*

## Trial partners

US based biotechnology company

**Provectus Pharmaceuticals Inc** and the **Australia and New Zealand Melanoma Trials Group** (ANZMTG) have joined forces to advance melanoma research at the **University of Sydney**. In a new sponsorship, Provectus Pharmaceuticals has provided funding for a research fellowship at the ANZMTG to support essential personnel infrastructure in both Australia and New Zealand. The sponsorship of a new research fellow will enable the ANZMTG to engage a senior biostatistician who will design and analyse clinical trials for new treatments in melanoma and provide a model for future partnerships in this area.

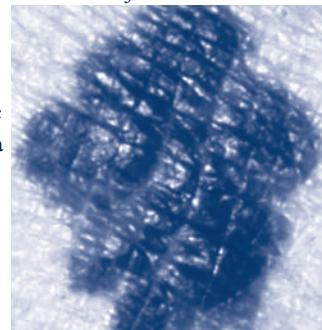


photo: NCI National Cancer Institute

The ANZMTG plans to commence a multi-centre trial of whole brain radiotherapy in melanoma in the next couple of months.

► More information: Jake O'Shaughnessy, 02 9351 4312, 0421 617 861, [jacob@media.usyd.edu.au](mailto:jacob@media.usyd.edu.au)

## Brain rescue

**The University of New South Wales (UNSW)** and the **Cure for Life Foundation** are jointly establishing a research facility in neuro-oncology.

Two million dollars will be spent over the next five years in establishing a chair in neuro-oncology and strengthening research in the field at the new **Lowy Cancer Research Centre** at the University New South Wales. Initially the research will focus on brain tumour causes and treatment, with a particular emphasis on Glioblastoma Multiforme (GBM), one of the most aggressive brain tumour cancers.

► More information: [www.unsw.edu.au/](http://www.unsw.edu.au/)

## 'Lifely' computation

**The Victorian Government** will invest \$50 million, complementing the **University of Melbourne's** funding of \$50 million, to establish a new supercomputer at the university's **Parkville Precinct**. It will be used for research into cancer, cardio-vascular and neurological disease, chronic inflammatory diseases, bone diseases, diabetes and other life-threatening diseases. As part of the initiative the University of Melbourne will develop a **Life Sciences Computation Centre** to undertake peak computing operations and share its computational biology expertise with other institutions in the Parkville Precinct. The university will release initial expressions of interest for the peak computing facility in 2008, with major installations planned for 2009 and 2011.

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

## Some like it hot

Alice Springs' emergence as a research hub will be strengthened with the creation of the **Central Australian Research Network**. **Professor Rolf Gerritsen**, Alice Springs-based research leader at **Charles Darwin University (CDU)**, has announced the formation of the research network, which aims to pool research resources for the benefits of local government, industry and community. The network will bring issues of national significance to central Australia with an opening workshop tackling scenarios of climate change in central Australia.

► More information: **Rolf Gerritsen**, 08 8959 5256.

## Water giving

**Amcor** is undertaking a national water-giving project, which will involve harvesting rain water from the roof at manufacturing sites, and giving this water to the local community. This is a community engagement program and therefore Amcor employees and community groups are engaged in a collaborative process to determine how the collected water will be used at the local level to support water conservation.

The national water giving project was launched at the **Amcor Flexibles** (Converting) site in Moorabbin and will be closely followed by another manufacturing site in Keys Road Moorabbin. These two sites have the potential to collect approximately 4 million litres of water, which will be used in a partnership formed with the **City of Kingston** for their 3,000 trees planted each year.

The water-giving project will be implemented in Amcor manufacturing sites across Australia over the next five years.

► More information: [www.amcor.com/about\\_us/sustainability/social/csr/teamcor/about\\_env\\_teamcor\\_water\\_giving\\_project.html](http://www.amcor.com/about_us/sustainability/social/csr/teamcor/about_env_teamcor_water_giving_project.html)

## Body traveller

A miniature microscope invented by Melbourne company **Optiscan** is being rolled out across the globe, and will also be installed in three Australian hospitals. Travelling through the human body, the miniature microscope offers magnifications of 1000 times compared to 30-40 times in traditional endoscopy. This will allow clinicians to detect gastrointestinal tract cancers and diseases rapidly and precisely at very early stage without the need for potentially error-prone and invasive biopsies.

"Three Melbourne hospitals, the **Western and Box Hill Hospitals** and the **Monash Medical Centre** will be added to the 30 hospital rollout worldwide," says **Senator Kim Carr**, Australian Minister for Innovation, Industry, Science and Research. The global medical centres, says Senator Carr, include the prestigious **John Hopkins Hospital** in the US which will use the technology for the diagnosis of ulcerative colitis, gastritis and gastric cancer, coeliac's disease, colon cancer, colorectal adenoma, Crohn's disease and Barrett's oesophagus, and other oesophageal diseases.

"This is a great example of how Australian innovation can better people's lives through the early detection of diseases," Senator Carr says. "This is also a breakthrough in the diagnosis of gastrointestinal disease in children, because it can provide diagnosis and treatment in the one visit in some cases – rather than the child having to endure separate surgical procedures for a biopsy and treatment."

According to Optiscan chief executive officer **Ms Vicki Tutungi**, one of the most exciting applications of the new endomicroscope is in the diagnosis of Barrett's oesophagus and its potential sequel, oesophageal cancer, allowing more accurate and less invasive monitoring of patients with precursor symptoms to a particularly aggressive form of oesophageal cancer.

► More information: [minister.industry.gov.au/SenatortheHonKimCarr/Pages/default.aspx](http://minister.industry.gov.au/SenatortheHonKimCarr/Pages/default.aspx)

## Fields of gold

Food manufacturers will soon have access to a new **CSIRO**-bred barley variety, which has significant human health benefits.

"The recent signing of a license agreement between the **CSIRO / Australian Capital Ventures Limited** joint venture and **Austgrains Pty Ltd** has paved the way for large scale commercial crops of BARLEYmax(r) - unique grain developed by CSIRO using conventional plant breeding

techniques," says the director of the **CSIRO Food Futures Flagship**, **Dr Bruce Lee**. "It contains more than twice the amount of insoluble and soluble fibre found in wheat or oats, as well as resistant starch, which helps promote healthy digestive bacteria."

Austgrains' managing director **Warren Hannam** says: "Austgrains specialises in supplying grain and functional food ingredients to the food manufacturing industry, making BARLEYmax a perfect fit for our company".

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

## Asian venture

**IBA Health Group Limited**, an Australian listed health information technology company, has announced a \$2 million contract with Singapore based **International SOS** – the world's largest medical assistance company – for a primary care solution at its clinics throughout Asia.

Initial delivery work will be undertaken at International SOS's headquarters in Singapore and its clinic facilities in China. The second stage of the delivery programme will then get underway in Indonesia and Vietnam. The five year contract includes the flexibility for International SOS to develop a standard deployment model throughout its medical services delivery locations.

International SOS will install and implement IBA's suite of clinical and administrative applications delivering healthcare information in a multi practice, multi disciplinary environment initially at a major clinic in Beijing. IBA will undertake a degree of localisation to ensure that the system meets International SOS corporate requirements including interfaces to existing core business systems and with radiology and laboratory systems at selected larger clinics. Ultimately, up to 2,500 clinical staff will have the potential to access vital patient information in what will become one of IBA's largest implementations in the corporate primary care market.

► More information: [www.ibatech.com/html/](http://www.ibatech.com/html/)

## Traceable purity

**Stem Cell Sciences plc** (SCS), a leading provider of stem cells and associated technologies for drug discovery, has announced the licensing of certain rights to green fluorescent protein (GFP) technology from **Prolume Ltd** (Arizona, USA).

SCS will incorporate the GFP technology, which acts as a gene expression marker, into its SC Proven research reagents portfolio as well as certain stem cell technologies used in service assays for high-throughput drug screening and toxicity testing. SCS provides physiologically relevant stem cells as well as corresponding reagents and services on an industrial scale to pharmaceutical and biotechnology partners as tools to facilitate drug discovery and testing.

By introducing the gene for GFP into stem cells (both embryonic and adult), scientists are able to efficiently select for enriched stem cell populations and isolate particular cell types believed to have been derived from these cells. This allows for pure populations of specific cell types that are valuable in a variety of applications.

In addition, through highly sensitive fluorescent monitoring of changes in specific gene expression levels, the GFP technology enables researchers to follow cellular responses that may result from external influences such as those experienced in drug screening or when stress is placed on a cell during toxicity testing.

► More information: [www.stemcellsciences.com/pressoffice/releases.html](http://www.stemcellsciences.com/pressoffice/releases.html)

## Control switch

The European Patent Office (EPO) has granted **Stem Cell Sciences plc** a second patent for Nanog, a key factor expressed in embryonic stem cells, which can be used to convert adult cells back into a pluripotent state. The reprogrammed adult cells behave like embryonic stem cells, thus avoiding the controversy associated with using embryos. The granted patent, EP Patent 1698639, covers mouse Nanog, complementing the company's existing patent, EP Patent 1470155, which covers human Nanog.

The resulting pair of patents have claims which cover manipulating expression of human and mouse Nanog, cells containing introduced human and mouse Nanog genes, reprogramming methods using human and mouse Nanog, and related culture media products.

Acting like a control switch, Nanog protein can bind to DNA encoding many genes and regulate their pattern of activity, explains **Dr Tim Allsopp**, chief scientific officer of Stem Cell Sciences. "In effect, we can use the Nanog gene to turn back the developmental clock in cells and induce an embryonic status in which the cells have the hallmark features of indefinite growth and pluripotency in culture."

► More information: [www.stemcellsciences.com/investorrelations/news\\_and\\_announcements.html](http://www.stemcellsciences.com/investorrelations/news_and_announcements.html)

## Superhumanising success

Biotechnology company **Arana Therapeutics Limited** has successfully completed a second collaborative project with its pharmaceutical partner **CSL Limited** (CSL).

Provision of the final report triggers a payment to Arana from CSL under the terms of the collaboration agreement between the two companies. CSL will now confirm the results.

Arana utilised its Superhumanisation™ technology to successfully develop humanised versions of a lead antibody from the CSL pharmaceutical pipeline. The humanised products have been further optimised using Arana's **EvoGene™** technology. Should CSL choose to develop one of these antibodies through clinical testing Arana will be eligible to earn milestone payments and will earn royalty payments on the sale of all marketed products.

This represents the third partnered product that has been successfully engineered to date. Completion of successful engineering of the first CSL product was announced in November 2007. In March 2007 Arana announced successful validation of its first project with another of its partners, international pharmaceutical company **GlaxoSmithKline** (GSK). A follow up announcement in August 2007 confirmed commencement of a second project with GSK, again on a lead product from the GSK pipeline.

► More information: [www.arana.com/news\\_media.htm](http://www.arana.com/news_media.htm)

## Quick-drying replacement

The US Food and Drug Administration (FDA) has given clearance for the commencement of **Acrux**'s pivotal Phase III trial of Testosterone MD-Lotion®.

The trial has been designed to support global registration of the product and Acrux remains on schedule to submit marketing applications to the FDA and European regulatory authorities in the fourth quarter of 2009. The open-label trial will enrol up to 150 hypogonadal men at 27 sites in the USA, Europe and Australia.

The primary objective of the trial, conducted under an approved Investigational New Drug Application (IND), is to demonstrate that

Testosterone MD-Lotion® restores average blood levels of testosterone into the normal range. Secondary objectives include the assessment of quality of life and sexual health.

The global market for testosterone replacement therapy is currently US\$0.8 billion per annum, growing strongly at 20% as awareness of the condition increases and more user-friendly treatments become available. The market is currently dominated by testosterone gels. The Acrux product is applied as a precise dose of quick-drying lotion to the armpit once daily, via a 'no-touch' applicator. In recent independent market research with users of gels in the USA, two thirds of patients confirmed, after trialling the Acrux product for four days, that they would prefer it to their existing gel treatment.

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

## Synthetic thinner

**Alchemia Ltd** has announced the granting of the first two patents in the 'Synthetic Heparin Oligosaccharide' family of patents. Australian patent 2002331426 and divisional patent 2007203325 were recently sealed by **IP Australia**. A further two divisional applications (2008200567 and 2008200616) have completed the examination process and have been accepted to grant. Both of these are expected to be sealed in the next few months. These patents are currently being examined in other major markets.

According to vice president of Intellectual Property for Alchemia **Michael West**, this patent family provides legal protection for Alchemia's processes for the synthesis of fondaparinux sodium through to 6 September 2022. "These patents and the corresponding applications in other jurisdictions provide a good framework to protect our industrial synthesis of fondaparinux," he says.

Alchemia and its manufacturing partner **Dr Reddy's Limited** have made significant progress towards commercialization of fondaparinux, with approval and launch expected in the first half of 2009, depending on review time at the **US Food and Drug Administration**.

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

## Thinning alternative

A Tasmanian biotechnology company, **Marinova**, has developed a pharmaceutical equivalent to heparin, used medically as an anticoagulant, from seaweed harvested from the waters of Tasmania.

"Marinova has been harvesting seaweed from the waters of Tasmania since 1988, and has developed highly sophisticated techniques for extracting specific derivatives from the raw material," says **Senator Kim Carr**, Minister for Innovation, Industry, Science and Resources. "The company has isolated a chemical analogue of heparin from organic seaweed. The molecules have demonstrated similar efficacy to heparin and are currently being used in the treatment of wounds. Clinical trials of the Marinova product have been positive."

The derivatives being isolated by Marinova are fucoidans, a naturally occurring family of large sulphated polysaccharides that are similar (from a pharmaceutical point of view) to heparin but, according to Marinova, there are no safety issues with fucoidans.

Marinova works closely with researchers from the **University of Tasmania** and the **Southern Cross University** and is collaborating with industry on an innovative wound healing application.

The company has developed a range of high and low molecular weight fucoidan fractions and is able to characterise these molecules to

meet regulatory standards of the **US Food and Drug Administration** for medical device and pharmaceutical use. Marinova is also able to modulate the efficacy of fucoidans to individual medical applications.

"Fucoidans have the potential to replace heparin across a wide range of indications," says **Nick Falk**, chief executive officer of Marinova.

"Here we have a completely natural, traceable, heparin alternative that has no toxicity problems and is not synthetic – this is potentially a huge market," Mr Falk says.

► More information: [minister.industry.gov.au/SenatortheHonKimCarr/Pages/default.aspx](http://minister.industry.gov.au/SenatortheHonKimCarr/Pages/default.aspx)

## HepC focus

Australian biotechnology company **Avexa Ltd** will collaborate with **TargetDrug** on its Hepatitis C virus (HCV) program. The focus will be on the development of novel lead inhibitors of HCV replication.

The introduction of this discovery programme into Avexa's portfolio is the result of the successful nomination of lead compounds from both the HIV-integrase and the antibiotic programmes for progression into IND-enabling studies.

**Datamonitor** estimates the HCV market will grow to \$4.4 billion in 2010 and \$8.8 billion in 2015. According to **Dr Julian Chick**, chief executive officer of Avexa, Hepatitis C affects 180 million people globally.

"With only half of all HCV patients benefiting from current therapy, unmet medical needs are clearly very high," he says.

The Hepatitis C virus, the leading cause of chronic liver disease resulting in liver inflammation, cirrhosis and liver cancer, spreads within its host by replicating its RNA to make the components that form new viruses. Avexa intends to target this replication process to identify novel inhibitors.

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

## Phase 2 go-ahead

The **US Food and Drug Administration** (FDA) has cleared an Investigational New Drug submission by Australian regenerative medicine company **Mesoblast Limited**'s US based sister company, **Angioblast Systems Inc**, to commence a Phase II trial of the stem cell platform technology for treating patients with congestive heart failure.

The trial will enroll 60 patients with heart failure at multiple major centres across the US. Fifteen patients will serve as controls and 45 will receive one of three doses of the company's patented allogeneic (donor unrelated or 'off the shelf') adult stem cells. Study endpoints will include measurement of heart muscle function and improvement in heart failure systems at six and 12 months.

In the trial, the company's patented allogeneic cells will be injected into damage heart muscle by cardiac catheter, in a similar way to the company's ongoing Phase II trial in patients with heart attacks. The cardiac catheter technology for this trial will be provided through an ongoing collaboration with the **Johnson and Johnson** companies **Cordis Corporation** and **Biosense Webster**.

In parallel with this Phase II trial, Angioblast will continue its ongoing preclinical collaboration with **Abbott**, a major global broad-based health care company, to jointly develop a heart failure product. The company expects that the results of both the Phase II clinical trial and its preclinical collaboration will support the subsequent filing of a pivotal, Phase IIb/III clinical trial.

In a recent Australian pilot trial, injection of the company's autologous cells (patient's own) resulted in improvement in heart muscle function and

reduced symptoms of both heart failure and severe angina. Additionally, the company's allogeneic cells have been shown to improve heart muscle function and reverse established heart failure in preclinical trials.

Company founder **Professor Silviu Itescu** says: "Treatment of heart failure is a major unmet clinical need and a huge commercial opportunity for us. If our initial clinical and preclinical results are mirrored in this Phase II trial, we will have a unique and highly effective product for this massive, and growing, market."

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

## Formal recognition

The **European Patent Office** has granted a patent that protects **Stem Cell Sciences plc**'s existing range of embryonic stem cell culture media. The media, marketed in Europe under the brands **HEScGRO™** and **EScGRO™**, are used in the culture of embryonic stem cells from human and mouse, respectively. The granted patent, EP Patent 1504086, covers cell culture media that use a combination of signalling molecules called Bone Morphogenetic Protein (BMP) and Leukaemia Inhibitory Factor (LIF). Stem Cell Sciences' BMP+LIF media products can be used to culture both human and mouse embryonic stem cells without the use of animal serum.

To meet the higher control requirements of human cell culture, **HEScGRO™** is in addition fully defined and free from animal components, the use of which, according to chief scientific officer **Dr Tim Allsopp**, is in many applications deemed unacceptable by the clinical community and regulatory authorities. Dr Allsopp says the use of serum is highly undesirable in all stem cell research, because serum contains signalling molecules that can cause stem cells to differentiate."

According to chief executive officer **Dr Alastair Riddell**, Stem Cell Sciences has granted an exclusive licence to **Millipore**, a world leader in the field of life science consumables, to produce and distribute its **HEScGRO™** and **EScGRO™** products. "We are delighted that the intellectual property covering these products has now been formally recognised in Europe," he says.

► More information: [www.stemcellsciences.com/investorrelations/news\\_and\\_announcements.html](http://www.stemcellsciences.com/investorrelations/news_and_announcements.html)

## On hold

**Metabolic Pharmaceuticals Limited** has announced that their Oral Peptide Delivery Platform has been placed on hold, and their Neural Regeneration Peptides (NRP) project is awaiting results of further animal studies.

Metabolic has been developing a platform to create new, oral versions for a variety of peptide drugs, which are usually injected as they do not survive digestion when swallowed and/or are poorly absorbed. The platform has several unresolved issues, despite assistance from a number of external experts and use of the best technologies available to the company. In particular, Metabolic has not been able to detect significant blood levels of the orally administered new peptides, suggesting that they are either too rapidly cleared from the blood or too quickly broken down in the body to be detected.

For these [and other] reasons and to conserve cash pending other strategic decisions, development of the Oral Peptide Delivery Platform has been placed on hold.

Metabolic has also been working in collaboration with **Neuren Pharmaceuticals Limited** (NZ) to develop NRPs, a group of human derived, small peptide drugs that appear to protect nerves from damage and help them recover. Previous animal studies have suggested that, from

this group, a possible lead drug candidate, NNZ-4945, has the potential to treat motor neuron disease and peripheral neuropathy. Metabolic is currently awaiting results of further animal studies to confirm the potential value of the NRPs.

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

## Going spain

**Novogen Limited**, the registered owner of the European Patent *Use of isoflavone phyto-oestrogen extracts of soy or clover* (EPO 656786 B1) has reached an Agreement with **Laboratorios Casen-Fleet** for a licence in Spain to the Novogen patent.

Laboratorios Casen-Fleet, the Spanish affiliate of the US multinational healthcare company **Fleet Laboratories**, has recently acquired the red clover isoflavone based menopause product Fitogyn from **Laboratorios Gynéa S.A.** In conjunction with the product acquisition Laboratorios Casen Fleet and Novogen have agreed on confidential terms for a Patent Licence Agreement.

**Christopher Naughton**, chief executive of Novogen, says Novogen is dedicated to the development of isoflavonoid technology, protected by intellectual property, in both the dietary supplement and prescription pharmaceutical arenas. In Europe, Novogen has negotiated Patent Licence Agreements with Laboratorios Casen-Fleet and **Melbrosin International** (manufacturer of Menoflavan).

Novogen's patented dietary supplement products are Promensil, for women's health including the relief of menopausal symptoms, and Trinovin, for prostate health. These brands are marketed directly by Novogen in Australia, Canada and UK, and under licence to distributors in the US, Europe, South East Asia and South Africa.

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

## Anti-cancer co-operation

**Arana Therapeutics Limited** and Germany-based **greenovation Biotech GmbH** have entered into a collaborative agreement to develop next generation anti-cancer antibodies.

Arana and greenovation will combine their respective technologies to develop up to five potent anti-cancer antibodies. The combination of these technologies is expected to lead to enhanced potency next generation antibodies and more effective anti-cancer therapies.

Arana will contribute its proprietary protein engineering technologies, Superhumanization™ and EvoGene™ to generate optimised drug candidates. greenovation will then utilise its Bryotechnology – a novel moss-based protein glycoengineering and production platform – to further optimise and produce the antibodies.

Both companies share in the costs of development and commercialisation revenues.

► More information: [www.arana.com/news\\_media.htm](http://www.arana.com/news_media.htm)

## Continued as planned

**Novogen Limited**'s subsidiary **Marshall Edwards Inc.** has announced the **Independent Data Monitoring Committee** (IDMC), which was constituted to oversee the conduct of the Phase III OVARIAN TUMOR REsponse (OVATURE) trial, has recommended continuation of the study.

The OVATURE trial is a major multi-centre international Phase III clinical trial to determine safety and effectiveness of investigational drug

phenoxodiol orally-administered in combination with carboplatin in women with advanced ovarian cancer resistant or refractory to platinum-based drugs.

Following a scheduled review of safety and efficacy data, the IDMC has recommended that the study remains open and continue as planned towards its accrual target of 340 patients.

The OVATURE trial is recruiting ovarian cancer patients whose cancer initially responded to chemotherapy, but has since become resistant or refractory to traditional platinum treatments. Patients are being recruited at clinical sites across US, UK, Europe and Australia. Currently, more than 25 sites in the US, 20 sites in Europe/UK, and six sites in Australia are participating in this clinical study.

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

## Long study completed

Pharmaceutical company **Pharmaxis** has announced that the 12 month Phase III clinical trial evaluating the safety of Bronchitol in 100 subjects with bronchiectasis has completed.

This 12 month treatment period was an open label extension to a three month efficacy trial which has already reported, showing that Bronchitol improved quality of life and mucus clearance. The objective of the open label extension was to determine the adverse event profile of Bronchitol following prolonged use.

Pharmaxis chief executive officer **Alan Robertson** says following receipt of the study report, Pharmaxis intends filing its first marketing application in Australia for Bronchitol next quarter.

"We are receiving strong demand to continue treatment after participation in the trial has concluded and, where possible, we make this available."

It is estimated that more than 600,000 people in the major pharmaceutical markets suffer from bronchiectasis and Pharmaxis expects Bronchitol to be the first targeted medication for this patient group in 20 years, addressing an important medical need.

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

## Halfway there

**Ventracor** has announced enrolment in the US Bridge to Transplant (BTT) clinical trial of its VentrAssist® left ventricular assist device (LVAD) was now over 50% complete.

Commenting on the achievement, Ventracor chief executive officer Peter Crosby says: "With over seventy patients enrolled in the Bridge to Transplant Trial, we expect we will be able to take the 'early look' at the results before the end of this year. If the results in the pivotal trial continue in the manner achieved in the Feasibility Trial, it is anticipated that the BTT Trial will reach a statistical end point earlier than initially projected."

Enrolment in the US Destination Therapy (DT) EVERLAST™ trial has improved recently, with 36 patients now enrolled in the trial.

Ventracor also confirms that the number of cumulative implants has now exceeded the lower limit of guidance announced in February.

Ventracor's VentrAssist LVAD is a third generation centrifugal flow blood pump that is market released in Europe and Australia. It is one of only two devices in the US which has been implanted in both a BTT and DT clinical trial. There are more implants of the VentrAssist LVAD than all other centrifugal LVADs combined.

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

## R&D in state budgets (cont.)

### New South Wales highlights

- climate change initiatives including \$74.5 million as part of the \$340 million Climate Change Fund;
- \$11.5 million for major projects and programs addressing issues such as air quality, noise, climate change, land and conservation management;
- \$2.8 million to construct a new laboratory to upgrade research facilities at Wagga Wagga; and
- \$1.5 million for the biosecurity upgrade of **Elizabeth Macarthur Agricultural Institute**.

► More information: [www.treasury.nsw.gov.au/](http://www.treasury.nsw.gov.au/)

### Queensland highlights

- \$120 million over four years (\$25 million in 2008-09) for the Smart State Strategy 2008-2012 to focus on attracting and retaining researchers, developing and commercialising ideas, and encouraging collaboration between the industry and research sectors. Significant initiatives under this strategy include:
  - \$60 million for the Innovation Projects Fund to support collaborations between research institutions and industry;
  - \$23.3 million for the Innovation Skills Fund to support researchers in research institutes and industry-research exchanges;
  - \$25.6 million for the Health and Medical Research Program to attract clinicians, health professionals and researchers to translate research into better health services; and
  - \$3 million for Designing Queensland to increase the profile of Queensland design expertise and lift industry competitiveness through design;
- \$6.5 million recurrent funding (\$12.5 million over four years) from the Innovation Project Fund to support the **Queensland Brain Institute**'s ongoing research efforts and \$4 million recurrent funding (\$10 million over two years, starting in 2007-08) to expand the **Institute of Glycomics** to become a world-class institute;
- \$30 million from the Queensland Future Growth Fund to complement \$600 million from the Queensland coal industry over 10 years for the development of clean coal technologies;
- the Smart Energy Savings Fund (\$50 million over five years, starting in 2007-08), which will provide grants and secured concessional loans to assist Queensland businesses implement energy-efficient technologies;
- a new Queensland Renewable Energy Fund (\$50 million over five years, starting in 2007-08) to provide grants and secured concessional loans for Queensland-based renewable energy projects;
- \$133 million to continue the design and construction of the **Ecosciences Precinct** at Boggo Road and the **Health and Food Sciences Precinct** at Coopers Plains;
- \$52 million to help research bodies to upgrade their facilities and to fund important research projects;
- 1.6 million to establish the **Mackay Renewable Biocommodities Pilot Plant**;
- 23% budget increase for the **Environmental Protection Agency**, including:

- up to \$30 million for new climate change initiatives from the Queensland Climate Change Fund;
- a review of Queensland's climate change strategy, ClimateSmart 2050, to ensure the State's response to climate change takes into account community views and concerns as well as significant new scientific evidence; and
- employment of 60 additional staff to increase the agency's capacity and ability to monitor and investigate activities which have the potential to harm the environment.

► More information: [www.budget.qld.gov.au/](http://www.budget.qld.gov.au/)

### Tasmania highlights

- \$1 million to establish an **Office of Tasmanian Chief Scientist** and increased funding for the **Tasmanian Climate Change Office**, from \$1 million a year to \$2.43 million in 2008-09;
- \$18.5 million over four years for health information technology to help develop integrated health information systems and related infrastructure to support reform in health service delivery; and
- \$500,000 for the IT Transformation Project, which focuses on opportunities to drive productivity improvements.

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

## Efficiency boost

Funding totalling \$675,000 for energy and water efficient business technology has been approved under the latest round of the Queensland Government's Sustainable Energy Innovation Fund.

Successful applicants are:

- tidal desalination for remote communities: **HydroGen Power Industries Pty Ltd** will use renewable energy from tidal turbines to power reverse osmosis desalination;
- electric vehicle conversion package: **Deep Green Research** will research the conversion of conventionally powered vehicles to full electric operation;
- forward osmosis system for water desalination: **Aquatec Maxcon** will realise an affordable way to achieve high quality water in a process that does not rely on high pressures as required in the standard reverse osmosis systems; and
- energy management system: **Spire Lighting** will find ways to save energy in compact fluorescent emergency lighting devices.

The Queensland Sustainable Energy Innovation Fund assists innovative Queensland businesses to help develop projects that reduce the use of fossil fuels or water, lead to more efficient energy use or enhance the use of renewable energy.

► More information: Peter McCarthy, 07 3336 8004

## Solar energy alliance

In a new alliance, the **Queensland and Victorian Governments** will pay for outstanding Queenslanders and Victorians to work with some of the world's leading experts on solar thermal technology. The governments will contribute a total of \$680,000 to establish the fellowships and create a 'solar atlas' to identify the best locations for solar energy generation with suitability and transmission network overlays. The fellowships will be open to local solar thermal energy researchers or industry participants,

to undertake a three month internship with leading US or European based solar thermal firms.

Queensland will also enter a strategic partnership with the **William J Clinton Foundation** to explore the potential of establishing a solar thermal park in Queensland. The Clinton Foundation is sending experts from the United States to work with the **Department of Mines and Energy** in preparing a pre-feasibility study over the next two months. It will also look to play a facilitation role in encouraging US companies to invest in the park.

► More information: [statements.cabinet.qld.gov.au/MMS/index.aspx; www.dpc.vic.gov.au](http://statements.cabinet.qld.gov.au/MMS/index.aspx; www.dpc.vic.gov.au)

## Pluripotent partnerships

The Victorian Government and the California Institute of Regenerative Medicine (CIRM) have signed an agreement to promote collaborative stem cell research, with a particular focus on accelerating treatments of disease. The initial avenue for collaboration will be the CIRM Disease Team grants. These grants will provide an opportunity for researchers in California and Victoria to collaborate, broadening the potential pool of expertise that can be applied toward research in a specific area.

In a new collaborative research program Australian stem cell scientists will build on the recent discovery that stem cells can be made from skin cells. **Sydney IVF Limited** and the **Australian Stem Cell Centre** have received \$550,000 from the **New South Wales** (NSW) and Victorian Governments to progress this new frontier of stem cell research. The Australian scientists will spearhead a program to compare cells generated from skin cells, known as induced pluripotent stem cells, with stem cells derived from embryos or from a somatic cell nuclear transfer process using clinically unusable eggs. The scientists hope to develop a routine, repeatable method of making patient-specific stem cells within the nationally approved legislative guidelines.

The NSW Government is starting a new program to provide scholarships for PhD research in the area of induced pluripotent stem cells. The scholarship program will be named in honour of **Dr Paul Brock** in recognition of his efforts in promoting innovative research into serious diseases, in particular motor neurone disease.

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

## Cancer support

The Mater Medical Research Institute (MMRI) and the **Wesley Research Institute** (WRI) will share \$2.19 million from the **Queensland Government** over three years. The funds will mainly support running costs for the two facilities, with smaller amounts allocated to specific research.

The WRI focuses on research to identify faster and more accurate diagnosis, better treatment, fewer side effects and improving patients' quality of life at home. The MMRI focuses on developing ways to make the body smarter and more effective in preventing or curing cancer and other disease.

► More information: **MIMR**, 07 3316 3888; **WRI**, 07 3232 6289

## Climate and energy agreement

Clean coal research will be one of the key focuses of a new agreement between Victorian and Canadian scientists to work together on clean energy technologies to spearhead crucial work to address climate

change. The **Victorian Government** has signed a new three-year Memorandum of Understanding (MoU) with the Canadian Province of Manitoba to cover climate change research and technology.

Victoria and Manitoba share significant brown coal reserves, similar environmental and agricultural conditions and a strong innovation focus.

The MoU encourages the establishment of commercial joint ventures, licensing agreements, collaborative research projects and joint economic development missions.

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

## Smart boost

Attending the Bio2008 biotechnology convention in San Diego Queensland Premier **Anna Bligh** has announced several Smart State Innovation Projects Fund grants including:

- \$19.7 million to help buy scientific and analytical equipment for the **Molecular and Clinical Pathology Research Laboratory** at the **Princess Alexandra Hospital** in Brisbane;
- \$2 million to the **Queensland University of Technology** (QUT) to help fund a new research program to treat prostate cancer. QUT will use the funding as part of a \$15.639 million project to establish the **Australian-Canada Prostate Cancer Research Alliance**;
- \$1.25 million for the **Head and Neck Cancer Centre of Excellence for Asia Pacific** at the **Princess Alexandra Hospital** to focus on the diagnosis and treatment of Head and Neck Squamous Cell Carcinoma and Nasopharyngeal Carcinoma;
- \$808,168 to the **University of Queensland** to develop novel Magnetic Resonance Imaging biomarkers to aid accurate and early diagnosis of Alzheimer's disease; and
- \$650,000 towards a joint research project between the **University of Queensland** and the **University of Washington**, to support a project that will more accurately improve the diagnosis of malaria and dengue fever.

► More information: 07 3224 4500

## Under one roof

The **NSW Government** has pledged \$20 million towards a new \$120 million national HIV research centre in Sydney.

The **National HIV Research Centre** will bring together 300 of the nation's top HIV/AIDS researchers under one roof. Head of the centre will be **Professor David Cooper**, who is currently director of the National Centre in HIV Epidemiology and Clinical Research (NCHECR).

According to Minister for Science and Medical Research **Verity Firth**, the facility will combine academic and clinical skills. "The aim is for researchers and doctors to work together to take new knowledge from our labs to hospital bed-sides and into communities affected by HIV," says Ms Firth. "It will attract high calibre researchers and provide an environment that nurtures and supports the training of new scientists in HIV research."

The Commonwealth is expected to match funding, with the aim of the \$120 million development being funded one-third by Government, with the balance provided by philanthropy and UNSW on land provided by the Sisters of Charity.

► More information: [www.osmr.nsw.gov.au/news](http://www.osmr.nsw.gov.au/news)



Gavin Brown



Mark Kendall



Jean Palutikof



Alan Dyce

## Royal head

The retiring vice-chancellor of the University of Sydney, **Professor Gavin Brown**, is to become the inaugural director of the Royal Institution of Australia, which is to be patterned on the Royal Institution of Great Britain. The Australian arm is scheduled to open early next year in Adelaide.

## Marine chair

The chief executive officer of the Australian Institute of Marine Science, **Dr Ian Poiner**, has been appointed chair of the International Scientific Steering Committee of the Census of Marine Life. This agency, which began in 2000 and whose secretariat is based in Washington DC, is a growing global network of researchers in more than 70 nations engaged in a 10-year initiative to assess and explain the diversity, distribution and abundance of marine life in the world's oceans, past, present and future.

## Risk managers

Associate Dean (Research) **Professor Martin Loosemore** and director of Research Students, **Professor Patrick Zou** of the Faculty of the Built Environment at UNSW have been awarded the UK Chartered Institute of Building's International Construction Project Management Association Award for their contribution to the Risk Management system developed for the 2008 Beijing Olympics. The awards were established to encourage innovation and research, and to create a greater awareness of the importance of higher education in the industry.

## Needle-free expert

University of Queensland researcher **Professor Mark Kendall** has been awarded the 2008 Amgen Medical Research Award for his excellence in translational medical research studies. This national award is made annually by the Australian Society for Medical Research as part of Medical Research Week. Professor Kendall leads a research team at the Australian Institute for Bioengineering and Nanotechnology developing needle-free delivery of vaccines targeting the skin.

## Appointed adapter

**Professor Jean Palutikof** has been appointed director of the new National Climate Change Adaptation Research Facility, based at Griffith University. Professor Palutikof managed the five-year preparation of the report Climate Change 2007: *Impacts, Adaptation and Vulnerability* while working for the Intergovernmental Panel on Climate Change working group in the UK. She has served as Climate Research Unit director and professor in the School of Environmental Sciences at the University of East Anglia.

## Blood-sucker authority

An honorary fellow with CSIRO Entomology, **Mr Alan Dyce**, has been awarded the Australian Medal of Agricultural Science by the Australian Institute of Agricultural Science and Technology. Mr Dyce is recognised globally as a leading authority on biting midges (*Culicoides*) and other blood sucking insects, many of which transmit significant livestock diseases such as bluetongue. Last year, with support from the Australian Biological Resources Study, he and two colleagues published the *Pictorial Atlas of Australasian Culicoides Wings*, which includes images of more than 290 species from Australia and neighbouring countries.

## Enzymatic achiever

**Professor James Whisstock** has been awarded the 2008 Commonwealth Health Minister's Award for Excellence in Health and Medical Research. Professor Whisstock heads a large group of researchers at Monash University Department of Biochemistry and Molecular Biology. His research has led to discoveries in the role a family of enzymes, known as proteases, play in human diseases. The award recognises outstanding achievement, and potential for future achievement, by an Australian researcher who has received their PhD or MD within the last 12 years.

## Brain saver

**Dr Benjamin Wei**, who has played a key role in demonstrating how to prevent the risk of meningitis following cochlear implant surgery, has been awarded the 2008 Victorian Premier's Award for Health and Medical Research. The award is an initiative of the Victorian Government and the Australian Society for Medical Research and is presented annually to an outstanding Victorian postgraduate health or medical researcher scholar.

## Innovator returns

**Professor Michael Cowley** is coming back to Victoria from the US thanks to a Victorian Endowment for Science, Knowledge and Innovation (VESKI) Fellowship. Victorian expatriate, Professor Cowley has been working at the Oregon Health and Science University in the United States. He has developed innovative ways of analysing and managing how the human brain controls energy intake and expenditure, making it possible to control more effectively the development of obesity. This work is now being commercialised by Orexigen Therapeutics, a company Professor Cowley founded. Professor Cowley's VESKI Fellowship, complemented by matching funding from Monash University, will allow him to continue his research at the Department of Physiology at Monash University's Faculty of Medicine, Nursing and Health Sciences.

## Pest manager

The Australian vegetable industry has acknowledged the work of a Yanco-based NSW Department of Primary Industries scientist, **Dr Sandra McDougall**, at its annual awards ceremony. Dr McDougall was presented with the AUSVEG Bayer CropScience Researcher of the Year Award for her work with integrated pest management (IPM). Dr McDougall recently conducted an IPM stocktake to help develop a strategic approach to funding IPM research and adoption.

## First of five

**Professor Moyez Jiwa** has been appointed as the first of five professors of health innovation with Curtin University of Technology's new health research institute. He was formerly a professor of primary care at Curtin and also the Co-Director of the Western Australian Centre for Cancer and Palliative Care (WACCPC), a joint partnership between Curtin and Edith Cowan University.

## Iron deficiency quest

A University of Adelaide researcher will lead an Australian project to help address the world's biggest nutritional deficiency - lack of iron. **Dr Alex Johnson** has been awarded nearly \$300,000 to work with the Bill Gates-funded HarvestPlus Challenge Program to increase iron content in rice and other cereal grains. Dr Johnson, who is based at the Australian Centre for Plant Functional Genomics at the Waite Campus, will work on increasing iron content in cereal foods by improving the delivery of iron from the leaf to the seed.

## Engineering professor

**Professor David Smith** has been appointed to lead The University of Western Australia's Faculty of Engineering, Computing and Mathematics. Professor Smith is currently Associate Dean (Academic) in the School of Engineering at Melbourne University and has served as Associate Dean (Research) at the University of Newcastle and as head of Department of Civil and Environmental Engineering at the University of Melbourne.

## Oil breeder

**Dr Rod Mailer** from the NSW Department of Primary Industries has won the American Timothy Mounts Award for his research into the science and technology of edible oils. Dr Mailer, who is the Principal Research Scientist of the Australian Oils Research Laboratory based at Wagga Wagga, is working on oil quality and a breeding program for canola, which has produced 22 varieties to date for the Australian industry.



James Whisstock



Sandra McDougall



Michael Cowley



Moyez Jiwa



Rod Mailer

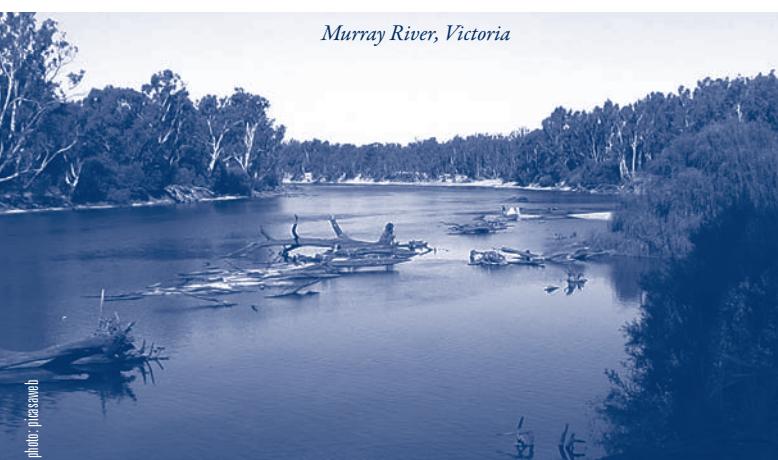
## Water works

The Council of Australian Governments (COAG) meeting on 3 July saw the states and territories sign an intergovernmental agreement on the management of the water starved Murray-Darling Basin. The agreement will see a unified and independent Murray-Darling Basin Authority setup to oversee and develop policy for the management of the basin to supersede the Murray Darling Basin Commission.

The Federal Government has also committed close to \$3.7 billion for projects aimed at improving water infrastructure in South Australia, New South Wales, Victoria, Queensland and the ACT. All project funding is subject to due diligence. The breakdown is:

- New South Wales: \$1.358 billion, including \$650 million to private irrigators to support infrastructure upgrades, and \$708 million for a range of projects including upgrading water metering to make them more accurate;
- Victoria: \$1.103 billion to modernise the three irrigation districts of Merbein, Mildura and Red Cliffs and funding for the Stage 2 Food Bowl Project.
- South Australia: \$610 million, including \$220 million for projects that upgrade irrigation infrastructure and improve river management, \$110 million to assist projects aimed at reinvigorating the irrigation

*Murray River, Victoria*



sector, \$80 million immediately available for the purchase of water entitlements from willing sellers and \$200 million to support an enduring response to the environmental problems facing the Lower Lakes and Coorong.

- Queensland: \$510 million, including \$350 million for the future purchase of water entitlements from willing sellers in the Queensland section of the Murray-Darling Basin and \$115 million to assist Queensland Government to roll-out community level irrigation planning and infrastructure investment and \$40 million to assist the modernisation of water delivery systems to reduce loss.
  - ACT: \$85 million to implement measures to reduce salt outflows
- For reaction to the COAG communiqué see Opinion on page 11.

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

## Minerals flagship

CSIRO's Minerals Down Under National Research Flagship has been officially launched.

"Since funding was announced around 12 months ago, the Flagship has developed its research projects, tested and refined its approach through a high-level, industry-based advisory committee, created a solid financial

and governance base, and demonstrated early research success," says Flagship director, **Dr Peter Lilly**.

"It has also established collaborative links with eight CSIRO Divisions, **Geoscience Australia** and all State and Territory Geological Surveys, the **Australian Nuclear Science and Technology Organisation**, peak research bodies such as the **Australian Minerals Industry Research Association**, 10 universities, three Cooperative Research Centres and a number of other research bodies."

**Minerals Council of Australia** chief executive **Mitchell Hooke** says the industry will work closely with CSIRO and partner research agencies to ensure the Flagship achieved its overarching goal of assisting the industry to exploit new resources with an estimated 'in-situ' value of \$1 trillion by 2030.

The Flagship's budget for 2007-08 includes CSIRO appropriation of \$27.7 million plus anticipated external earnings of \$15.5 million.

► More information: Dr Peter Lilly, 08 6436 8613, [Peter.Lilly@csiro.au](mailto:Peter.Lilly@csiro.au)

## Sealing leaks

The **Australian Government** has provided \$8.6 million for a new research project into how changed farming practices can simultaneously improve water use and productivity, while delivering better environmental outcomes. "The Farms, Rivers and Markets Project will develop a 'how to' guide for farmers to integrate their farm water needs with broader environmental needs," says Minister for Climate Change and Water, **Senator Penny Wong**. The project will involve farm-scale demonstrations exploring how the latest technology in water measurement and management, combined with better use of water markets, can boost farm profits and productivity, improve delivery of water to the farm gate, reduce leakage, and improve water use efficiency.

The project will provide farmers with practical ways to make the most of available irrigation water supplies through better planning, technology and predictive tools.

The three year project will run out of the **University of Melbourne's** Dookie research farm and the surrounding Goulburn-Broken River catchment. It will be managed by Uniwater (a joint initiative of the University of Melbourne and Monash University).

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

## Water fuel

The **Australian Academy of Science** has put out a new report, *Towards development of an Australian scientific roadmap for the hydrogen economy*, that examines Australia's contribution to a future fuelled by hydrogen.

The report, which analysed Australian publications in and funding of hydrogen energy research, found that while Australian research is a minor component overall, Australian researchers are making significant contributions in areas such as hydrogen storage materials, carbon capture and storage, and solar-thermal reforming of natural gas.

The report also makes a number of recommendations for increased government support for hydrogen energy research and coordination. According to the report, the small research-based industry sector working on commercializing hydrogen energy technologies in Australia will have difficulty growing without government support.

The Academy report calls for the development of an **Australian Hydrogen Energy Initiative** with continuing support for hydrogen energy R&D, establishment of an industry association, and funding for early-stage startup companies. "Countries with targeted R&D strategies

for reducing carbon emissions, and the development of cleaner energy sources for baseload power and for transport will be the early winners," says **Professor Philip Kuchel**, secretary for science policy at the Academy.

► More information: [www.science.org.au/reports/hydrogen.pdf](http://www.science.org.au/reports/hydrogen.pdf), **Joe Hlubcek**  
0404 289 167

## Deep down

The environmental, economic, regulatory and social issues raised as a result of the mining industry's increasing interest in extracting rich deposits of minerals from Australia's seafloor are discussed in a new report, *Exploring the social dimensions of an expansion to the seafloor exploration and mining industry in Australia*, from **CSIRO**. The report recommends the creation of an improved information base, enhanced communication between stakeholders, and an improved understanding of the policy and legislative process.

Director of CSIRO's Wealth from Oceans National Research Flagship, **Dr Kate Wilson**, says record world demand for minerals now means the seafloor around Australia is increasingly being seen as a new frontier. The report identifies a particular concern with the levels of uncertainty about the environmental impacts of seafloor activity.

"Perceptions of risks are heightened when the risks are unknown," Dr Wilson says. "Building detailed scientific knowledge about the impacts of this activity is essential to any development of Australia's seafloor minerals sector to ensure social and economic wealth while maintaining environmental integrity."

► More information: **Dr Joanna Parr**, 02 9490 8566, [Joanna.Parr@csiro.au](mailto:Joanna.Parr@csiro.au)

## Eastern treasure hunt

The New South Wales Government will invest \$52.9 million in the State's mining industry as part of the 2008/2009 Budget. According to NSW Minister for Mineral Resources **Ian Macdonald**, there will be an additional \$16.5 million spent on the successful New Frontiers exploration initiative. "The Government will extend this important program for a further three years until June 2011 at \$5.5 million a year," says Mr Macdonald. "Specifically we will be looking for mineral and petroleum opportunities in the frontier regions in the far west of the State, which are largely unexplored and have potential for the discovery of mineral and gas resources."

The New Frontiers program has stimulated private mineral and petroleum exploration expenditure in NSW which reached \$190 million in 2006-07, says Mr Macdonald. "The mining industry is the largest commodity export industry in NSW, the total value of mineral production in 2006-07 was \$12.3 billion."

► More information: **Jenny Ward**, 02 8289 3925

## Good times ahead

The Australian Bureau of Agricultural and Resource Economics' (ABARE) June release of *Australian Fisheries Statistics* indicates gross value of Australian fisheries production has increased by 2% to \$2.18 billion, despite a 2% fall in the volume of production in 2006-07.

ABARE's acting executive director, **Karen Schneider**, says the increase reflects strong growth in production of Tasmanian farmed salmonid. The combined value of prawn, tuna, abalone and scallop production, however, fell by \$89 million during the same period.

ABARE's June issue of *Australian Commodities* also forecasts a strong increase of 40% for Australia's commodity export earnings, indicating a

record \$212 billion in 2008-09.

Commodities with projected export earnings to increase include wheat, barley, canola, pulses, grain sorghum, cotton lint and seed, sugar and wine, depending on seasonal conditions..

Major windfalls are expected with Australia's minerals and energy exports, projected to increase in value to around \$178 billion in 2008-09, compared with an estimated \$120 billion in 2007-08. According to Ms Schneider a result of continued strong demand for minerals and energy and only a modest increase in global supply.

Further price increases in 2008-09 are forecast for many minerals and energy commodities, including iron ore, coal, crude oil, gold and aluminium. In addition to higher prices, the volume of Australian mineral resources exports, in aggregate, is forecast to rise markedly in 2008-09.

► More information: [abare.gov.au/publications\\_html/news/news/news.html](http://abare.gov.au/publications_html/news/news/news.html)

## Precious returns

The Australian Government plans to buyback water licences from irrigators will be displayed on a new website to be launched on 10 July.

The new Government site will provide detailed information on water entitlement purchases made as part of a \$50 million water entitlement buy-back, including aggregated data on volumes, entitlement type, amount spent and water source. The Government's initial \$50 million buy-back has secured entitlements to 35 billion extra litres of water for Murray-Darling Basin rivers from willing sellers. This was the first ever direct purchase of water by the Australian Government for the Murray-Darling Basin for which it has set aside a total \$3.1 billion under the *Water for the Future* plan.

A link to the new website will be available from 10 July 2008 at: [www.environment.gov.au/water](http://www.environment.gov.au/water).

► More information: **Ilisa Colson**, 0418 368 639

## Thought required

A new report *High Food Prices: Causes, Implications and Solutions* funded by the **Rural Industries Research and Development Corporation** (RIRDC) found that protectionist measures by Governments to protect the population from the current spike in food price could worsen the problem.

The exception is where immediate humanitarian concerns outweigh fears about market distortions.

The report finds that supply side factors causing the food price increase are:

- weak recent production growth relative to demand that has seen reductions in stocks;
- rapid growth of real agricultural input prices, most notably oil and fertilisers;
- below average harvests in major exporting nations in recent years; and
- government restrictions on production and trade in food.

**Dr O'Brien**, RIRDC managing director says high food prices in the longer term increase production and stimulate investment in capital and research and development. "The report argues that protectionist policies in the developed world that drove down food prices in the 1980s and 1990s led to a reduction in R&D that is now resulting in slower productivity growth." He says that high food prices are likely to remain high for 1-2 years but if governments think long-term "the market will right itself."

► More information: **Danny O'Brien**, 02 6271 4175 or 0438 130 445

By Gerd Winter

# Hydrogen: holy grail of energy?

**t is not a fruit hanging low! Yet, the tantalising possibilities of hydrogen have kept us reaching out for it ever since it was discovered as a potential energy carrier. How close are we to realising the dream?**

In 1839, Sir William Grove used electricity to first split (electrolyse) water in to its components hydrogen and oxygen, to then reverse the process, producing an electric current. The device was simple enough: two separated chambers filled with either oxygen or hydrogen and two platinum strips dipped in diluted sulphuric acid. He called it 'gas voltaic batteries' – what would, some 50 years later, become 'fuel cells'. However, hydrogen as a potential energy carrier was quickly sidelined. Instead it became the century of ready-to-use hydrocarbons: petroleum provided the ideal source of fuel for robust combustion engines. But the times of fruit hanging low may be over.

The hydrogen option has always received considerable attention when its big brother, oil, went scarce. So in the 70s, when a 'hydrogen economy', a term coined by Australian electrochemist John Bockris, seemed just around the corner. The vision was a system in which hydrogen would be used to transport energy from renewable sources over large distances and stored in large amounts.

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**The hydrogen option has always received considerable attention when its big brother, oil, went scarce.**

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Now, in 2008, we are still far from it.

Hydrogen has to be manufactured, using a primary energy source. Most of the hydrogen produced today is by heating hydrocarbon and steam in the presence of a metal-catalyst – a process also called steam reforming – which, unless captured, releases CO<sub>2</sub>, a less desirable option in an era of climate change. The hoped for alternative would be electricity generated by renewable energy sources, but the process of electrolysis is quite inefficient. There are other considerable hurdles. Hydrogen is a highly flammable, low density gas requiring space and special safety provisions, obvious challenges for storage and efficient transport. Its usage as an economically viable fuel alternative in cars is also uncertain. Governments and multinational corporations have spent billions of dollars on the development of fuel cells, yet they are still struggling to reach market potential. "Fuel cells have been a dream since they were discovered but it is still a very expensive technology," says Dr David Rand, senior research scientist with CSIRO Energy Technology.

Nevertheless, the advantages of hydrogen as an energy carrier are too compelling to be overlooked: its sources (mostly water or methane) are abundant, and it can be used to power a myriad of applications, from computers and mobile phones to transport vehicles, producing only water and heat as by-products.

No wonder there are diverging views on the issue, which became apparent at the recent 17th World Hydrogen Energy Conference (WHEC2008) in Brisbane.

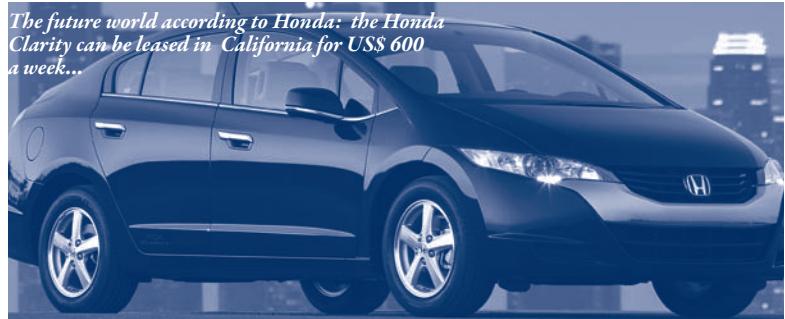
According to Rand, views ranged from "hydrogen romantics", who see hydrogen as the ultimate solution to energy sustainability problems, to people that point to the pretty formidable technical challenges in the whole chain from hydrogen generation, distribution, storage and utilisation to issues of safety, codes and standards. Rand's own view is

that the drivers in terms of energy security, dwindling oil reserves and environmental aspects, such as urban pollution and climate change, demand "that we look at all possible options for transport fuels in the future. Hydrogen is one of those." However, he says that while it is a great idea, it's going to be hard to get there. "Every step will require a breakthrough in science and there is a limit to what can be developed in a short time."

There are significant developments, though, around the world and also in Australia (see also 'Water fuel' p21).

How to store generated energy so that electricity can be supplied 24 h a day is a pressing question plaguing the renewable energy industry. At the end of last year, Melbourne-based Solar Systems, which is also building a \$450 million solar power plant in Victoria, announced a \$62 million commercialisation program for its base-load solar power technology. At its core is a patented procedure that stores energy generated in sunny conditions as hydrogen, allowing an on-demand power supply in sunless periods. At room temperature the electrolysis of water is quite inefficient but this changes as water is heated to very high temperatures. Solar Systems technology captures sunlight and directs it as concentrated beams onto photovoltaic (PV) solar cells, where the energy is translated into electricity. PV cells can only use the visible part of sunlight. The considerable energy of infrared rays, part of the invisible light spectrum, is usually lost as excess heat. Solar Systems has developed filters that selectively reflect the infrared rays before the beams hit the PV cells. These rays are bundled and the thermal energy fed into a system in which water is electrolysed at around 1000 degrees Celsius. Under these conditions, 100 watts of electricity can yield 140 watts of hydrogen, which compares to only about 60 watts at room temperature. Demonstrated so far only on a small scale, John Lasich, technical director of Solar Systems, believes that once demonstrated on a commercial scale, the system could also provide hydrogen for transport vehicles, with a price tag competitive with petrol.

*The future world according to Honda: the Honda Clarity can be leased in California for US\$ 600 a week...*

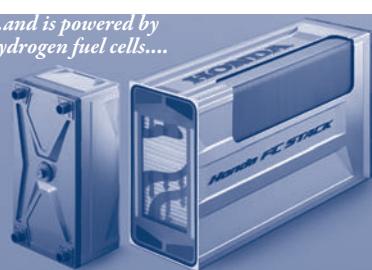


These developments are encouraging but address only one, although important link in the chain. Iceland, having an abundance of geothermal energy that can be used to produce hydrogen, had already committed to establishing a hydrogen economy in 1998. Yet a decade later Iceland faces very similar problems to Australia. Dr John Wright, director of the CSIRO Energy Transformed Flagship, says it is a chicken and egg situation. "They are ready to go but they do not have the (hydrogen fuelled) cars at a reasonable price yet. Neither do we in Australia, therefore there is no use for it, so nobody is building the infrastructure. And when there is no infrastructure car manufacturers are not going to make the cars needed." The promises, particularly regarding fuel cells, have not lived up to the hype. Yet there is movement, in Australia with a recent trial in Perth with buses running on fuel cells. And in June Honda released the

world's first fuel cell powered car intended for mass production. The car currently costs several hundred thousand dollars each to produce. Honda is, though, confident that within a decade the price will come down below US\$ 100,000 as production increases. Meanwhile the Honda Clarity can be leased in California for US\$600 a week. "20 years ago we did not have the gas infrastructure we have now and that shows how quickly this can change," says Wright. There are strong drivers on the horizon that could change the tide: rising oil prices, a price on carbon with the implementation of an emissions trading scheme in 2010 and a renewable energy target of 20% by 2020.

In the lead up to the conference, Wright says, they did some modelling and were positively surprised by the results. The modelling was based on the Honda Clarity leasing option at \$600 a week, and assuming a steady price of oil at 130 US\$/barrel of oil, a prize of carbon at around 70\$

*...and is powered by hydrogen fuel cells....*



per ton of CO<sub>2</sub> and a national electricity emission intensity going down from about 1 ton of CO<sub>2</sub> per MWh to 150 kg per MWh by 2050. On the basis of these numbers, the CSIRO energy models predict that by 2022-24 Hydrogen fuelled cars will start being imported into Australia and

by 2050 having a share of about 1/4 of all kms travelled. Hydrogen would account for 8% of transport fuel consumption. This modelling is obviously dependant on highly volatile variables. Oil at US\$200 dollars a barrel, not an unlikely scenario, would see fuel cell cars imported into Australia much earlier. "I think it'll come, maybe not as quickly as some people would like but it's all a balance between the competing technologies and what makes economic sense," says John Wright. Australia's role is likely to be that of a technology taker rather than maker, he says. "We are good in some niche areas, but in regard to fuel cells, the amount of work that is going on overseas just overwhelms anything that we can do."

The speed of the process will depend on market forces but also on the political framework. Last year a report to a Senate inquiry into alternative fuel came to a cautious assessment of Hydrogen as an alternative primary

*"I think it'll come, maybe not as quickly as some people would like but it's all a balance between competing technologies and what makes economic sense," says John Wright.*

energy carrier. The final report states: "In the committee's view, hydrogen is a fuel that might be considered in the distant future, but is not a useful option to consider in Australia's current or medium term transport fuels mix." And it cites Mr Kevin Black of the Natural Gas Vehicle Group saying: "Everybody seems to be pinning their hopes on hydrogen, which is still, frankly, pie in the sky.... The greatest fear of hydrogen researchers in this country is that governments and the media will hype it up so much that people will have expectations that will never be met."

Dr Gary White, research program manager at the CRC for Advanced Automotive Technology, believes the Committee was well informed. He says that Australia is uniquely positioned in that it "has cleaner fuels (natural gas, LPG) in more abundance than other countries and a lower population to take advantage of it." He says given the challenges associated with hydrogen "we can make some big steps with technology that is just about ready to go and will have much lower disruptive impact on lifestyle

and business alike." The announced Toyota Camry hybrid vehicle, a project receiving Federal Government support, is an exciting development but he would also like to see a stronger penetration of LPG into the market. "There is also natural gas, which is likely to emerge in the short term as a viable alternative fuel for conventional engine technology. In the medium term, plug-in electric vehicles accessing greener energy sources represent a good solution for Australia."

Ian Lowe, emeritus professor of science, technology and society at Griffith University and president of the Australian Conservation Foundation, is sceptical about electric cars as a convincing alternative. Looking at the material requirements to equip the existing Australian vehicle fleet with batteries, he believes "the hydrogen fuel cell is the power source of the future." Natural gas and LPG could be a short term solution, with reforming natural gas to hydrogen providing a transition to hydrogen produced from renewable energy sources.

But, he says, we now need to plan a transition towards a Hydrogen economy and face up to the reality of the two main driving forces: peak oil and climate change.

The current debate in Canberra about how to ease the pain inflicted by high petrol prices indicates, he says, that both major parties have not yet accepted the reality: petrol prices will continue to rise, as was predicted

*"...the hydrogen fuel cell is the power source of the future," says Ian Lowe.*

30 years ago. Low says that future oil price hikes are unlikely to be a steady increase. Instead it is likely there will be power struggles rather than equitable sharing of diminishing oil reserves and the possibility of serious interruptions in supply.

To prepare the nation will require, above all, political leadership.

In the case of Iceland there are a set of unique circumstances. As an island nation its transport system does not have to compete with anyone else allowing for independent decisions; they have a solid base in science and technology; and they have a relatively small population per unit land area. Australia shares all these characteristics, he says, except it lacks the political leadership to make long-term rational decisions.

He thinks that the Rudd Government, however, may bring about a more proactive stand, instead of leaving the lead to the market, which in terms of its push towards developing hydrogen fuel technology is well ahead of governments. It is not too surprising, he says, that forward looking elements in the oil industry, like Shell and BP, have prototype hydrogen filling stations, he says. "Whatever we are buying, they want to be selling it."



*...and can be charged at a Home Refuelling Station producing hydrogen using natural gas (experimentally operating in Torrance, California, since 2003).*

More events or jobs go to [www.sciencealert.com.au](http://www.sciencealert.com.au)

## On the Radar...

- 16 July - Government Green Paper
- 24 July - ARC journal ranking submissions
- 31 July - Review of Australian Higher Education submissions
- 14 August - Higher Education Endowment Fund, expression of interest
- End of July - Review National Innovation System, Green Paper

## EVENTS

- Australian Earth Sciences Convention 2008**  
20 to 24 July 2008, Perth, WA
- 41st Annual Australian Institute of Food Science & Technology (AIFST) Convention 2008**  
21 to 24 July 2008, Sydney, NSW
- Australian Space Development Conference**  
21 to 23 July 2008, Adelaide, SA  
Canberra, ACT
- FoodPro 2008**  
21 - 24 July 2008, Sydney, NSW
- 9th World Meeting of International Society for Bayesian Analysis**  
21 to 25 July 2008, Hamilton Island, QLD
- International Conference on Photochemical Conversion and Storage of Solar Energy**  
27 July to 1 Aug 2008, Sydney, NSW
- International Conference on Electronic Materials**  
28 July to 1 August 2008, Sydney, NSW
- 2008 Western Pacific Geophysics Meeting**  
29 July to 1 Aug 2008, Cairns, QLD
- 2008 - From Babies to Blokes - The Making of Men**  
3 to 6 August 2008, Perth, WA
- Australasian Aquaculture 2008**  
International Conference & Trade

- Show**  
3 to 6 August 2008, Brisbane, QLD
- 5th World Congress of Society of Environmental Toxicology and Chemistry**  
3 to 7 August 2008, Sydney, NSW
- XXII International Congress of The Transplantation Society**  
10 to 14 August 2008, Sydney, NSW
- 3rd Australian International Green Build, Design & Technology Show**  
15 to 17 August 2008, Sydney, NSW
- National Science Week**  
16 to 24 August 2008, throughout Australia
- Food Innovation: Emerging Science, Technologies and Applications - FIESTA 2008**  
17 to 18 August 2008, Brisbane, QLD
- Coast to Coast 2008**  
18 to 22 August 2008, Darwin, NT
- 12th Sustainable Economic Growth for Regional Australia (SEGRA) Conference**  
18 to 20 August 2008, Albury, NSW
- 2nd Australian Lung Cancer Conference 2008**  
21 to 24 August 2008, Gold Coast, QLD
- 6th International Symposium on In Vitro Culture and Horticultural Breeding**  
24 to 28 Aug 2008, Brisbane, QLD
- Zinc Processing 08**  
25 to 26 Aug 2008, Brisbane, QLD
- Endocrine Society of Australia & Society for Reproductive Biology Annual Scientific Meeting**  
25 to 28 August 2008, Melbourne, VIC
- Automated Mineralogy '08**  
27 to 28 August 2008, Brisbane, QLD
- 12th World Congress of the World Federation for Ultrasound in Medicine and Biology**  
30 to 3 September 2008, Sydney, NSW
- Fire, Society and Environment 2008: from Research into Practice**  
1 to 3 September 2008, Adelaide, SA
- Bushfire CRC National Conference**
- Show**  
1 to 3 September 2008, Adelaide, SA
- Brain Injury Australia National Conference 2008**  
1 to 3 September 2008, Melbourne, VIC
- 11th International Riversymposium**  
1 to 4 September 2008, Brisbane, QLD
- 5th World Conference on Promotion of Mental Health and the Prevention of Mental and Behavioral Disorders**  
10 to 12 September 2008, Melbourne, VIC
- 12th International Lupin Conference**  
14 to 18 September 2008, Perth, WA
- 2008 Excellence in Mining & Exploration**  
14 - 16 September 2008, Sydney, NSW
- 2008 World Congress of WATOC (theoretical and computational chemists)**  
14 to 19 September 2008, Sydney, NSW
- Australasian Sexual Health Conference 2008**  
15 to 17 September 2008, Perth, WA
- 46th Annual Scientific Conference of the Australasian Association of Clinical Biochemists**  
15 - 18 September 2008, Adelaide, SA
- 11th International Conference on Principles of Knowledge Representation and Reasoning (KR 2008)**  
16 to 19 September 2008, Sydney, NSW
- 4th Innovative Foods Centre Conference**  
17 to 18 September 2008, Brisbane, QLD
- Leura VI International Breast Cancer Conference 2008**  
18 to 21 September 2008, Sydney, NSW
- World Sustainable Building Conference**  
21 to 25 September 2008, Melbourne, VIC
- 14th Australian Society of Agronomy Conference - Global Issues, Paddock Action**  
21 - 25 September 2008, Adelaide, SA
- 43rd APS Annual Conference**  
23 - 27 September 2008, Hobart, TAS
- Open Access and Research Conference 2008**
- Show**  
24 to 25 September 2008, Brisbane, QLD
- A Climate of Change in the Rangelands**  
28 September to 2 October 2008, Charters Towers, QLD, Australia
- eResearch Australasia 2008**  
29 September to 3 October 2008, Melbourne, VIC
- 2008 Australian Systematic Botany Society (ASBS) National Conference**  
29 September - 03 October 2008, Adelaide, SA
- 3rd Annual Conference of the Aus and NZ Chapter of the Society for Risk Analysis**  
30 September to 1 October 2008, Canberra, ACT
- 26th Annual Conference of the Australasian Primate Society**  
3 - 5 October 2008, Adelaide, SA
- 34th Annual International Conference of the Australian College of Mental Health Nurses**  
6 - 10 October 2008, Melbourne, VIC
- Drilling for Geology Conference**  
8 - 10 October 2008, Brisbane, QLD
- 3rd Australian and New Zealand Falls Prevention Conference**  
12 - 14 October 2008, Melbourne, VIC
- Australian Institute of Medical Scientists (AIMS) 2008 National Scientific Meeting**  
13 - 17 October 2008, Melbourne, VIC
- Third IAPR International Conference on Pattern Recognition in Bioinformatics**  
15 - 17 October 2008, Melbourne, VIC
- RANZCR 59th Annual Scientific Meeting (radiology and radiation oncology)**  
16 to 19 October 2008, Adelaide, SA
- Terry Leach Symposium 2008: The application of Petrology to Geological Models in Mineral Exploration**  
17 October 2008, Sydney, NSW
- 6th Australasian Viral Hepatitis Conference**  
20 to 22 October 2008, Brisbane, QLD

## JOBS

- Professor of Nursing**
- Professor/Associate Professor of Midwifery**
- Principal Research Scientist- Physical Limnologist-Physical Oceanographer-Hydrodynamic Modeller**
- Lecturer / Senior Lecturer / Associate Professor Health Sciences**
- Professor in Physiotherapy**
- Clinical Education Director**
- Rural Medical Practitioner/Lecturer/Senior Lecturer**
- Director, PetroSkills master of Technology Program**
- Project Manager/Fellow - Early Intervention Research Program**
- Professor of Obstetrics and Gynaecology (Perinatal Medicine)**
- Dean of Science**
- Associate Professor/Professor in Industrial Design**
- Deputy Head of Institute of Design for Industry and Environment**
- Lecturer / Senior Lecturer In Veterinary Pathology**
- Senior Systems Scientist - Compact Array**
- Postdoctoral Fellow or Research Fellow in Molecular Biology**
- Senior Systems Scientist - Compact Array**

## INSTITUTION

		CLOSING DATE
Southern Cross University - Health and Human Sciences   NSW		28 July
Southern Cross University - Health and Human Sciences   NSW		28 July
CSIRO Land and Water   ACT		1 August
University of Queensland   QLD		31 August
University of Canberra   ACT		25 July
University of Melbourne   VIC		20 July
University of New South Wales - Faculty of Medicine   NSW		23 July
Curtin University of Technology   WA		4 August
Charles Darwin University - School for Social Policy and Research   NT		18 July
University of Queensland   QLD		11 August
University of Melbourne   VIC		18 August
Massey University - Institute of Design for Industry & Environment   NZ		1 August
Massey University - Institute of Design for Industry & Environment   NZ		1 August
University of Melbourne   VIC		1 August
CSIRO - Australia Telescope National Facility   NSW		31 July
University of Queensland - School of Health and Rehabilitation Sciences   QLD		23 June
CSIRO - Australia Telescope National Facility   NSW		31 July

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