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*Linking Australian Science,
Technology and Business*

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Patents in the spotlight

Recent months have brought a renewed focus on Australia's intellectual property system, with a broader review by **IP Australia*** of current legislation, the *Patents Act 1990*, and a report by the **Advisory Council on Intellectual Property (ACIP)** on what should be patentable in Australia. The following article attempts to bring together the most relevant aspects of these reports and provide a broader context to the current debate on whether human genes should be patentable.

* (see also 'Patent or not to patent', ARDR November 2010)

This debate heightened in February, when a private member's bill was introduced to the **House of Representatives** proposing critical amendments to current legislation. It followed on from a similar private Senator's bill in November 2010, which is now the subject of an inquiry by the **Legal and Constitutional Affairs Committee** with a report due by 16 June 2011.

Specifically, the proposed changes would remove the ability to patent "biological materials including their components and derivatives, whether isolated or purified or not and however made, which are identical or substantially identical to such materials as they exist in nature," further defining the nature of such 'biological materials' as DNA, RNA, proteins, cells and fluids.

The bill received strong criticism from industry lobby groups but also broader academia, including the **Australian Academy of Science (AAS)**.

In its [submission](#) to the Senate inquiry, the AAS echoes some of the concerns raised by industry lobby groups, although it acknowledges that during a period between 1976 and 2000



"patenting was permitted of many DNA sequences without further evidence of usefulness and of originality." The AAS says the proposed legislation would go too far, resulting in significant negative ramifications for Australian biomedical research and the biotechnology industry. The Academy instead supports a strict interpretation of existing patent legislation "so that a DNA sequence on its own is not patentable".

In early March, an open letter [signed](#) by a number of organisations representing research, science, patient and consumer groups, the legal community and investors urged the

rejection of the proposed amendments, which they say would not improve access to innovative medicines and diagnostic tests but instead "put at risk such potentially life-altering products being available in a timely manner to anyone in Australia".

The proposed amendments to current legislation do also not follow the conclusions of a recent inquiry into the patentability of human genes by the **Legal and Constitutional Affairs Committee**, which in its [final report](#) in November last year

...continued page 22

Defensive food



Following the announcement by the **Australian Government** that it will [commit](#) \$18.7 million to the redevelopment of the **Defence Science & Technology Organisation's** nutrition research facility at Scottsdale (Tasmania), the Minister for Defence Science and Personnel, **Warren Snowdon** [foreshadowed](#) a new partnership between **DSTO**, **CSIRO** and the **University of Tasmania** to establish a **Research Centre in Food Innovation**. The centre would be able to support and enhance the research activities at DSTO Scottsdale which provides a dedicated food science and technology capability for Defence, Mr Snowdon said. The centre will draw on existing synergies between the partners for the development of novel approaches to nutrition and food science.

► [More information](#): www.minister.defence.gov.au

Watch dogs

Jointly administered by the **ARC** and the **NHMRC**, the **Australian Research Integrity Committee** (ARIC) is now [open](#) for business, tasked with providing a review system for a responding to allegations of research misconduct. The terms of its operations were outlined in the ARIC framework [released](#) in February.

In January, members of the committee were [announced](#), including its chair **Mr Ron Brent**, who is currently Aircraft

Noise Ombudsman, **Dr Kerry Breen**, *Emeritus Professor Sheila Shaver* and *Ms Julie Hamblin*.

Although not replacing institutional investigations, ARIC will review the processes by which these institutions, including universities, medical research institutes and hospitals, investigate allegations of research misconduct, ensuring that they meet the requirements set out in the **Australian Code for the Responsible Conduct of Research** (2007). Reporting to the **ARC** and **NHMRC** chief executive officers, the committee will publish de-identified information on its activities at least annually.

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



Informed servants

The art of having an informed debate

In May 2010, the then Prime Minister **Kevin Rudd** announced that the Government would invest \$111.7 million to establish a public policy precinct at the **Australian National University** (ANU) – and at its core a new **Australian National**



Institute for Public Policy (ANIPP). The institute was to integrate public policy expertise available through ANU and its various specialist centres, including an **Australian Centre on China in the World** and the **National Security College**, and the **Australia and New Zealand School of Government** (ANZSOG).

In February, the institute welcomed the first group of 550 public servants taking part in courses covering economics and demography, public policy, innovation and strategy, and Indigenous Australia. ANU Vice-Chancellor **Professor Ian Chubb** said at the launch that the ANIPP would provide policy makers access to the best and latest thinking as Australia faces many highly complex public policy challenges.

► [More information](#): <http://minister.innovation.gov.au>

Cooperative winner

The **Cooperative Research Centre for Advanced Composite Structures** (CRC-ACS) has formally launched its new \$65 million over five years research program, supported by \$14 million from the **Australian Government**.

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A further \$50 million cash and in-kind contributions are from 28 participating institutions, which will collaborate with **Australian universities**, the **Defence Science & Technology Organisation (DSTO)**, as well as a range of smaller Australian businesses. The CRC-ACS extension program will focus on key areas of **Aerospace, Defence and Oil & Gas**. At the launch, chief executive **Professor Murray Scott** highlighted the high level of international engagement in the centre, which he said is moving into a “new phase, where Australian industry is working directly with international organisations in a research program focussed on Australia”.

Of the collaborating partners in the centre, nine are from outside Australia, and representatives of **Airbus, Cassidian Air System** and the **German Aerospace Center (DLR)** were present at the formal launch.

The program will strengthen Australia’s ties with the European aerospace market, with the **European Aeronautic Defence and Space Company N.V. (EADS)** subsidiary **EADS Australia Pacific** conducting its first major Australian R&D through this initiative. The DLR will also commence its first major composites R&D engagement in Australia, providing access to important facilities in the development and implementation of aerospace technologies.

But **Professor Scott** also highlighted developments outside of Aerospace, with Malaysian oil company **Petronas** adopting and implementing composites technology.

► **More information:** www.crc-acs.com.au

New dawn

The visit of Mongolian Prime Minister **Sukhbaatar Batbold** to Australia came at the time of a new era of bilateral scientific and particularly resource related investment and trade relations

(see also ‘[Doing it abroad](#)’), such as Australia’s involvement in developing major mining projects in Mongolia, including the **Oyu Tolgoi** copper and gold mine.

In 2009, Rio Tinto and Ivanhoe Mines (majority owner) were tasked with developing the world’s largest new copper and gold project.

The strengthening trade



The Oyu Tolgoi mining project, aside from massive undeveloped copper and gold deposits, there is also considerable silver.
image: (bottom) public domain

relationship is also reflected in Austrade opening a permanent office in Ulaanbaatar in 2011 to assist the growing number of Australian companies engaging in the country.

A flurry of bilateral agreements during the visit by the Mongolian Prime Minister included a Memorandum of Understanding between the **Australian Academy of Science (AAS)** and the **Mongolian Academy of Sciences (MAS)** to promote the exchange of ideas and the review of collaborative opportunities in scientific fields of common interest, such as geology, water resources and agriculture. The MAS is the 18th international science organisation to have formed relationships with the AAS.

► **More information:** www.pm.gov.au/press-office/australia-mongolia-joint-statement

Come, meddle with me

The **Australian Government** has [released](#) draft legislation for the establishment of a **Tertiary Education Quality and Standards Agency (TEQSA)**, as was recommended in the **Bradley Review of Higher Education** and had been announced in the 2009-2010 Budget. The Government then had [allocated](#) \$57 million over four years for the development of the agency, and the development of a new quality assurance framework for higher education.

The *Tertiary Education Quality and Standards Agency Bill 2011* will for the first time allow an open debate on the initiative, after a period of closed consultations with representatives of the higher education industry. Criticism over the ‘rushed’ process led in November 2010 to a deferral of the legislation by the Education Minister Senator **Christopher Evans** (see ‘Fast shooters hold back’, ARDR November 2010).

Throughout the process, there has been significant opposition by representative bodies of the higher education sector, with the Go8 [declaring](#) in October last year that the government’s proposed approach to higher education involved “a degree of central regulation and intrusion which is beyond that found in other OECD countries and which is unprecedented in Australia.”

The legislation will also be subject to a Senate debate.

TEQSA is a national approach to ensure the quality of higher education as the sector expands. The independent body will combine regulatory activities of nine federal, state and territory bodies, and quality assurance activities currently undertaken by the **Australian Universities Quality Agency (AUQA)**. This includes accrediting providers and carrying out quality audits, as well as providing more efficient regulatory arrangements.

The new body will also affect the ability of universities to self-accredit courses, which is seen as an important element of academic freedom and would now have to adhere to academic standards set by the agency.

A Government summary of the draft legislation describes TEQSA’s approach, executed by five commissioners, as

proportionate and risk-based. The body will have to comply with three 'basic principles for regulation' including:

- a regulatory necessity principle which requires that TEQSA must not burden the higher education provider any more than is reasonably necessary;
- a reflecting risk principle, under which TEQSA will have to regard a range of factors, including a provider's history of scholarship, teaching and research; its students' experiences; its financial status and capacity; and its history of compliance with the Act.
- a proportionate regulation principle, requiring TEQSA to act in proportion to any non-compliance, or the risk of future non-compliance, by the provider.

TEQSA's focus will be on higher risk providers, allowing higher quality, lower risk providers to operate without unnecessary intrusion, it says. Major regulatory decisions can only be taken by the Commission as a whole, and there are a range of limitations the potential delegation of decisions.

The Government emphasised in the legislation that TEQSA will be an independent body – at "arms length" from Government – with the Minister only giving direction if necessary to protect the integrity of the sector. Its functions and powers will include:

- registering and re-registering higher education providers;
- accrediting and re-accrediting courses of study;
- conducting thematic and quality assessments;
- monitoring and enforcement activities, including undertaking compliance assessments and investigative actions;
- making recommendations to the Minister on matters regarding the quality or regulation of higher education providers; and
- collecting, analysing, interpreting and disseminating information relating to: higher education providers and awards; quality assurance practice, and quality improvement; and the **Higher Education Standards Framework**.

A Higher Education Standards Framework will provide the context under which TEQSA will evaluate the performance of higher education providers. Providers will have to meet certain 'standards', of which some will be newly established by the Government. These include Teaching and Learning Standards, Research Standards, Information Standards and others. Developing the new standards will be assisted by a **Higher Education Standards Panel**, which will advise both the Minister and TEQSA.

Other standard domains, such as the 'Provider Standards' covering registration and accreditation, and Qualification Standards will be established based on the existing **National**



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Protocols and the Australian Qualifications Framework.

These will take account of the new requirement for higher education providers to register with TEQSA rather than with state and territory bodies, and to be listed in a National Register of Higher Education Providers.

The draft legislation has been welcomed by representative bodies in the sector, with **Universities Australia** [supporting](#)

"the national regulator 'having teeth', including the power of de-registration", also saying that the current pattern of State-level regulation has operated unevenly. However, the body also said there were caveats, including remaining uncertainty around the important issue of 'self-accreditation' and what form it will take in the 'Provider Registration Standards'.

The **National Tertiary Education Union (NTEU)** [said](#) that the legislation now explicitly recognises the differences between providers "and therefore do not present the same risks". This should minimise the regulatory burden on low risk providers, NTEU said.

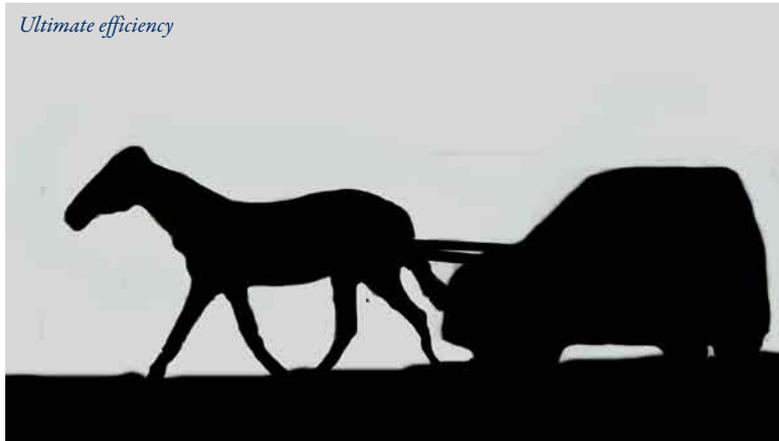
► [More information: www.deewr.gov.au](http://www.deewr.gov.au)

Uneasing reports

Alleged issues with the safety of operations at ANSTO's radiopharmaceutical production facility were the focus of a flurry of media reports in February. According to the **Australian Broadcasting Cooperation (ABC)**, serious concerns about

ANSTO's safety practices were [raised](#) in an internal and confidential Government report by the workplace safety regulator **Comcare**. This included the alleged under-reporting of incidences and breaches of safety standards at the **Lucas Heights** reactor. The investigation by Comcare, now itself under review, followed on from a report by the **Australian Radiation Protection and Nuclear Safety Authority** (ARPANSA) in 2010, which dealt with claims of safety breaches at the production facility by a former employee of ANSTO, **Mr David Reid**. The ARPANSA report [detailed](#) a number of safety issues and recommendations to improve safety practices and safety culture at the facility.

Ultimate efficiency



In response to the media reports, ANSTO [issued](#) a statement rejecting the claims by Mr David Reid as false and incorrect, saying that in the Comcare investigation ANSTO was denied procedural fairness. "ANSTO is disappointed that Mr Reid has not accepted the findings of seven investigations, including two by ARPANSA, which found there was no significant radiological event, nor was there an attempt to cover anything up ... Mr Reid has claimed to be personally present at events where he demonstrably was not, which severely damages the veracity of claims he continues to make."

Innovation Minister **Senator Kim Carr** [said](#) he would take the allegations very seriously, and announced a review of health and safety practices at the ANSTO facility.

The panel of the review will be [chaired](#) by **Mr Mark Paterson**, who is secretary of the **Department of Innovation, Industry, Science and Research**, and will further include former Australian Chief Scientist **Dr Jim Peacock**; the director of **Allen Consulting**, **Mr Grabame Cook**; and **Mr Tim Ayres**, the NSW secretary of the **Australian Manufacturing Workers' Union**. The panel is due to report by 31 May 2011.

[More information](#): <http://minister.innovation.gov.au>

\$149 million drive away

February also saw the launch of the Australian-made Holden Cruze at the company's Elizabeth plant in South Australia, a development supported through a \$149 million investment from the Government's **Green Car Innovation Fund**, which was scrapped in January to finance the flood recovery in

Queensland and Victoria.

Innovation Minister **Kim Carr** said, however, that the Government is committed to all other elements of the \$5.4 billion **New Car Plan for a Greener Future**.

The Cruze will be offered with two versions of petrol engines and a version with a two-litre turbocharged diesel engine, which at present is claimed to be the most fuel efficient locally built car with a consumption of 5.6 litres of fuel per 100 kilometres travelled. The project also received \$30 million from the **South Australian Government**.

[More information](#): <http://minister.innovation.gov.au>

Research on the block

In 2011, the **Australian Government** will provide \$1.51 billion in block grants through a number of performance-based schemes supporting research and research training by Higher Education Providers (HEPs). The ARC assessed the funding using criteria such as research student load, the number of completed studies, research income and resulting publications, as well as previous program payments.

By contrast to the **Australian Competitive Grant** scheme through which the Government supports specific projects or fellowships, the block grants are meant to provide HEPs with considerable autonomy in allocating funds for research projects, personnel, equipment and infrastructure. The schemes supported include:

- **Australian Postgraduate Awards** (APA) – supports students who undertake a Higher Degree by Research (HDR);
- **International Postgraduate Research Scholarships** (IPRS) – supports international students to undertake a postgraduate research qualification in Australia;
- **Research Training Scheme** (RTS) – supports research training for students undertaking Research Doctorate and Research Masters degrees;
- **Commercialisation Training Scheme** (CTS) – supports training in commercialising research-based ideas;
- **Joint Research Engagement** (JRE) – supports an effective research and research training system in the higher education sector, which was previously targeted by the Institutional Grants Scheme (IGS);
- **Research Infrastructure Block Grants** (RIBG) – are allocated to HEPs to enhance their development and maintenance of research infrastructure; and
- **Sustainable Research Excellence** (SRE) – an additional \$510 million over 2009-10 to 2012-13 to address the funding gap for the indirect costs of university research.

The allocation of funds also highlights the huge differences

in research capacity between Australian universities, with the top ranking universities of **Melbourne, Sydney, Queensland** and **NSW** receiving between \$167.5 million and \$129 million, compared to Australia's smaller universities such as **Charles Darwin, Charles Sturt, Southern Cross** and **Bond** receiving between \$10.4 million and \$3.8 million.

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

Cream of the health crop

A bucket full for nine

Nine teams of high profile medical researchers were awarded between \$5.2 million and \$23.3 million over five years to continue their research in areas such as immunology, public health research in stroke, mental health, breast cancer and a common childhood cancer. The recipients of **NHMRC Program Grants** commencing in 2012 include:

- **Professor James McCluskey (University of Melbourne)** – \$14.7 to investigate various immune cell types and how the structure of selected cell surface molecules relates to their function in immune responses.
- **Professor Mark Smyth (University of Melbourne)** – \$12.6 million for work on white blood cells and their ability to destroy diseased body cells. The research will also focus on why some cancers are not detected by the immune system and how chemotherapy can be used to boost the immune response and eliminate tumours.
- **Professor Christopher Goodnow (Australian National University)** – \$15.7 million for research on how immune and inflammatory responses are controlled in both health and disease. The project will involve 3 institutions, spanning disciplines of clinical and experimental immunology, therapeutics, signalling and genetics.
- **Professor Nic Nicola (Walter and Eliza Hall Institute)** – \$17.1 million for a study on blood cell formation and function, which will combine multidisciplinary genetic/genomics approaches, expert biochemistry, cell and molecular biological techniques with translational studies in humans. The project may open up novel avenues for therapies in blood cell diseases such as leukaemia and autoimmune and inflammatory disorders.
- **Professor Jerry Adams (Walter and Eliza Hall Institute)** – \$21.3 million for research on the enhanced cell survival and stem cell-like behaviour of rare 'rogue' stem cells, the eradication of which in bulk tumours may require novel therapies.
- **Professor Geoffrey Donnan (National Stroke Research Institute)** – \$8.7 million for research on stroke evaluating new therapies and early secondary preventions through a novel bench to bedside program.
- **Professor Georgia Chenevix-Trench (Queensland Institute of Medical Research)** – \$5.6 million to study the underlying mechanisms that predispose some women to develop breast cancer, the process that lead to the spread of the cancer sites such as the brain and lungs, and the role of DNA repair proteins.
- **Professor Michelle Haber (Children's Cancer Institute Australia)** – \$5.9 million for research on improved therapies for children with neuroblastoma, conducting clinical trials using existing and new drugs in novel combinations. The work will also develop prevention strategies for this and other embryonal cancers.



- **Professor Stewart Einfeld (University of Sydney)** – \$5.2 million for research on the occurrence of mental health problems in people with developmental disabilities. This will include evaluating the 'Stepping Stones' model of parenting training across three states to determine if this can lessen this problem.

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

...and a healthy shower for six...

The **NHMRC** has also awarded six **Australia Fellowships**, worth in total \$24 million, with each recipient, two of which are currently working in the US, receiving \$4 million over five years. Minister for Mental Health and Ageing **Mark Butler** highlighted the high calibre of the successful candidates, including US researcher **Professor John Quackenbush**, who previously worked on the human genome project before becoming director at the **US Dana-Farber Cancer Institute (DFCI)** and professor at **Harvard School of Public Health** in the US. Co-located at the **DFCI** and the **University of Queensland** he will study the genomics of ovarian cancer and genetic programs behind cell differentiation, and train the next generation of scientists in computational biology and genomics. Other recipients include:

- **Professor Ashley Bush, University of Melbourne**, will complete the clinical testing of a new type of drug designed to treat Alzheimer's Disease (AD) and potentially prevent the progression of age-related cognitive decline. He also aims to develop a comprehensive set of diagnostic markers in blood to monitor the progression of AD.
- **Professor Geoffrey Hill, Queensland Institute of Medical Research**, will study new treatments to overcome potentially fatal side-effects associated with stem cell transplantation therapies for Leukemia.
- **Professor Edward Holmes**, a US researcher, will develop at the

University of Pennsylvania State and the University of Sydney a 'virtual laboratory', to support the analyses of genome sequences of emerging pathogens.

- **Professor Jamie Rossjohn, Monash University**, will study the balance between infection and immunity by linking structural and biochemical findings to *ex vivo*, *in vivo* and clinically-based studies;
- **Professor Jane Visvader, Walter and Eliza Hall Institute of Medical Research**, will study genetic modulators of breast development and cancer, working towards developing new strategies aimed at switching off breast tumour growth.

► **More information:** www.nhmrc.gov.au

...and early tickets to the market

The NHMRC has also awarded **Development Grants**, which are meant to support health researchers who want to develop their inventions into marketable products. This round will provide \$7.4 million for 18 projects ranging from nano-particles that can be used in identifying narrowed blood vessels to treatments for spinal cord injuries.

► **More information:** www.nhmrc.gov.au

Tickets to the market

Another round of **Commercialisation Australia** grants has been announced by Innovation Minister **Senator Kim Carr**.

Established in 2010 as a replacement of the previous **Commercial Ready** scheme, the \$196 million program centres around three support elements, of which two provide direct capital assistance to entrepreneurs in the early stages of commercialisation. These include between \$50,000 and \$250,000 in support offered as matching grants

kind of skills, knowledge and linkages required for successful commercialisation, can benefit from help provided by Case Managers or from grant support for engaging experienced industry executives.

In 2010, its first year of operation, Commercialisation Australia invested \$33.6 million in 88 projects. In this new round, \$13 million are offered for a diverse set of 34 projects ranging from a cloud-based call centre platform and a whole-body vibrating machine, to dementia treatment medicine and a termite barrier for buildings. Selected grants include:

- **Euclidean Pty Ltd** (\$1.98 million) is marketing novel 3D technology. According to the company, which had its **Unlimited Detail Technology** covered in a *New Scientist* [article](#) in April last year, the technology is based on a special search algorithm, which creates 3D images with vastly higher geometry than with current polygon based technology. This would also save costs and offer greater portability between platforms. The company says their software provides 'unlimited' detail, as it uses billions of dots to create a 'point cloud' representation of the image. By contrast to polygonal based technology would not require incremental improvements of resolution through more powerful graphic cards. This could have benefits for applications such as architecture, games, mining and the sciences.
- **Aldicion Corporation Pty Ltd** (\$1.47 million) is developing an intelligent health record, which allows real-time clinical analysis to assist decision making in hospitals and community care.
- **Planet Innovation Pty Ltd** (\$0.22 million) has developed a more efficient hot water system, which uses heat pumps that source solar heated air from roof cavities. According to the company, this invention can reduce energy use by up to 50%.

► **More information:** <http://minister.innovation.gov.au>

Riders in the storm

In February the **Australian Government** established an independent **Climate Commission**, which will be headed by **Professor Tim Flannery** from **Macquarie University**. The commission will provide expert advice and information on climate change to the Australian community.

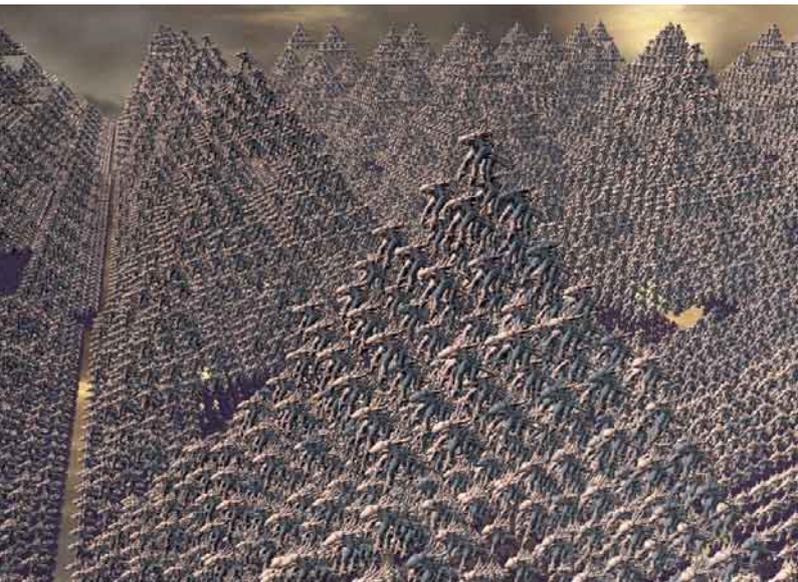
Professor Flannery is world renowned for his work as mammalogist and paleontologist, but became more prominent with his advocacy on environmental issues and climate change.

He will be joined by:

- **Professor Will Steffen**, executive director of the **ANU Climate Change Institute** at the **Australian National University**;
- **Professor Lesley Hughes**, **Macquarie University**, an expert on the impacts of climate change on species and ecosystems;
- **Dr Susannah Elliott**, biologist and science communicator, currently director of the **Australian Science Media Centre**;
- **Mr Gerry Hueston**, a former president of **BP Australasia**;
- and **Mr Roger Beale**, executive director of economics and policy at **Pricewaterhouse Coopers**.

Supported by a **Scientific Advisory Panel**, the group is to provide independent scientific advice on climate change to the general Australian public.

► **More information:** www.climatechange.gov.au/minister/greg-combet/2011/media-releases/February/mr20110210.aspx



3D computer image generated with Euclidean's Unlimited Detail Technology, which the company says provides more detail and more utility than polygon based technology.

for an initial proof of concept stage, and matching grants worth \$250,000 to \$2 million to support the next phase of development up to the stage where the product can be marketed. In addition to this direct capital support for product development, new entrepreneurs not yet equipped with the

Trialling times for Australia

Clinical trials are big business in Australia. According to a report by the **Clinical Trials Action Group (CTAG)**, which the **Australian Government** released in early March, the sector is worth around \$1 billion per year to Australia, which compares to the \$2.8 billion spent nationally on R&D (estimates for 2004-05). It also attracts direct foreign investment of over \$450 million per year. However, the total number of clinical trials notifications recorded by the Therapeutic Goods Administration (TGA), an indicator of trial activity in Australia, appears to have peaked in 2006-07 after a steady increase in previous years.

In October 2009, the Australian Government followed a recommendation by the 2008 **Pharmaceuticals Industry Strategy Group (PISG)** and implemented a **Clinical Trials Action Group (CTAG)** to identify impediments for the clinical trials sector and to outline the best way forward for the industry. The group was co-chaired by the parliamentary secretaries for Health, **Mark Butler**, and Innovation and Industry, **Richard Marles**.

In carving out a roadmap to become a more competitive clinical trials location, the report of the group [released](#) in March proposes micro-economic reforms centered around:

- reducing the time and uncertainties of getting approval;
- harnessing the benefits of e-health for clinical trials;
- improving patient recruitment;
- and providing support for clinical trials networks.

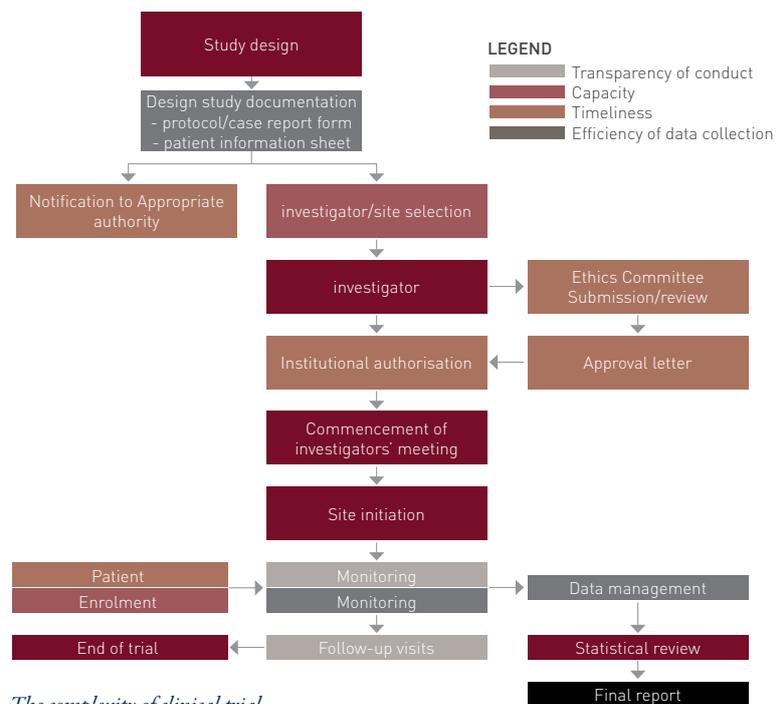
According to the report, possible benefits strengthening the sector may also flow from proposed legislations such as the **R&D Tax Credits**, currently again debated in the Parliament, and the **National Health Reform (NHR)**, for which a Heads of Agreement was signed at the **Council of Australian Governments (COAG)** meeting in February.

The NHR could, for example, collect national datasets

Increasing Australia's competitiveness to attract foreign investment will not only require supporting clinical research capacity but also increased support for the pharmaceutical and biotechnology sector, as the sectors complement and enhance each other.

relevant for clinical trials, the report suggests.

The overarching theme of the report is to remove unnecessary complexities built into the current system of



The complexity of clinical trial

image: Clinically Competitive: Boosting the business of clinical trials in Australia 2011; Clinical trials action group report

ethical approval and governance of clinical trials, much of which is an inheritance of the historically fragmented Australian health system.

Not only industry would benefit from reform through more transparent, timely and cost efficient approval and conduct of clinical trials but also patients through better access to trials and faster access to new evidence-based treatments; the health system through more efficient processes and better use of resources; and researchers, through increased collaboration with industry and the maintenance of high levels of experience and knowledge.

Clinical trials are a complex industry, involving a great number of different specialist areas of expertise and sectors, such as pharmaceutical and biotechnology industries, research institutions and hospitals, governments and other organisations concerned with education, training and commercialisation.

Increasing Australia's competitiveness to attract foreign investment will not only require supporting clinical research capacity but also increased support for the pharmaceutical and biotechnology sector, as the sectors complement and enhance each other.

The benefits flowing back to society are equally complex. Notably, as the report *Clinically competitive: Boosting the*

business of clinical trials in Australia outlines, there are direct benefits for the broader health system and for patients involved in trials who generally receive better outcomes due to close monitoring and application of best evidence-based clinical care. Treatments are often available years before commercial availability and other patients benefit faster from lessons learned in well documented trials. This also benefits the Australian economy – around \$100 million is saved each year as a result of clinical research subsidising standard treatments for participants.

Australia's strength lies in being a highly skilled, cost-effective and timely place to conduct high-value drug development activities, but not in being the lowest cost location...

While Australia has traditionally been an attractive market for clinical trials, there is increased competition from developing countries, which are improving their capacity to perform later stage clinical trials but at lower cost.

Australia's strength lies in being a highly skilled, cost-effective and timely place to conduct high-value drug development activities, but not in being the lowest cost location, the report says.

While in the past Australia has been considered a lower cost trial destination, this has been eroded in recent years. The CTAG calls for a more consistent fee structure that applies for the various elements of conducting a clinical trial – ranging from fees for ethical and governance review services, pharmacy fees, site initiation costs and institutional overheads. It also proposes the development of a table of standard costs associated with trials, and this could be assisted through initiatives as part of the NHR.

The country still attracts a significant and growing number of Phase 1 clinical trials, which have greater growth potential than later stage trials and provide the first step in translating research discoveries into clinical practice. While this should be conducive to more expensive later stage trials, Australia's small market size is a general barrier as companies may prefer to conduct these costly trials in key markets such as the US and Europe, and increasingly in developing countries.

In addition, the report identified anecdotal evidence suggesting that, particularly in later stage clinical trials (Phase 2 – 4), approval processes are now slower in Australia than in some other comparable countries, with increasing time and cost involved in obtaining separate ethics and governance approvals for each site of a multi-site trial. Adding to the common difficulties in recruiting patients, this contributes to a decline in Australia's competitiveness.

The report cites recent survey results*, which found that when trials were cancelled or sites were closed prior to commencement of patient recruitment this was due to either delays in governance (63%) or **Human Research Ethics**

Committee (HREC) approval (37%).

According to recent industry surveys, the time for ethics and research governance reviews are highly variable, with ethics reviews taking between 14 and 297 days and research governance between 2 and 350 days. Some states have implemented time benchmarks ranging from 30-60 working days for ethics approval but their impact on timeliness is yet to become apparent.

In Australia, ethical issues related to a trial are subject to Human Research Ethical Review (HREC), which is conducted separately from the review of research governance. However, the majority of HRECs are based in the institutions that conduct the trial, and these are usually sub-optimally resourced. In addition, few institutions are yet to clearly separate the administrative support for ethical reviews from that required for research governance, CATG finds.

There are approximately 250 HRECs in Australia, of which the busiest meet eleven times a year, with decisions conveyed to applicants commonly within seven to ten days of monthly meetings.

According to the report, there is a widely held view that the time taken for ethics committees to review and approve applications can be unnecessarily excessive. On many occasions, the stated reasons for delays are trivial or in fact governance issues, and hence CATG recommends measures that bring about a better separation of reviewing ethics from governance.

This is also an implicit part of the **Harmonisation of Multi-centre Ethical Review** (HoMER) initiative, which the

... there is a widely held view that the time taken for ethics committees to review and approve applications can be unnecessarily excessive. On many occasions, the stated reasons for delays are trivial or in fact governance issues.

NHMRC started in 2006 to overcome Australia's fragmented approval environment. It aims to create a single ethical review of multi-centre human research.

CATG sees HoMER as critical for overcoming issues related to slow uptake of single ethical review, undeveloped and inconsistent processes for governance review and poor support structures for both ethics and governance approval processes. It urges its implementation by July 2011, which would include setting a maximum timeframe for both ethical and governance reviews of sixty calendar days.

While progress has been made in implementing standard protocols and a national certification scheme, there are a number of roadblocks hindering the uptake of HoMER, despite the attractiveness of reducing workload by reducing duplicated reviews. There are structural issues such as the variety of IT systems in use in different jurisdictions and institutions.

... continued page 27

Professor Stuart White and Dr Dana Cordell
INSTITUTE FOR SUSTAINABLE FUTURES AT THE UNIVERSITY OF TECHNOLOGY, SYDNEY*

Phosphorus: A crisis we do not have to have

A looming peak of energy resources such as oil may not be the only trouble we face in future. Professor Stuart White and Dr Dana Cordell write about a potentially peaking resource that could threaten our food security...

You would be hard pressed to think of a link between the recent Queensland floods, and the unrest in North Africa, except that they were occupying the news at the same time.

However, one link is evoked by the aerial photographs of the turbid floodwaters moving into the ocean, flushing out the soil of the fertile agricultural areas.

You won't easily guess it, but that link is phosphorus, large volumes of which were lost to the sea along with that soil, in which it was bound up, waiting to be taken up by plants or to be washed out by erosion. However, as Australian soils are naturally deficient of phosphorus, much of it would have originated from North African phosphate mines, and been added through the use of fertilisers in order to sustain our food industry.

Phosphorus is an element that is essential for life and plant and animal growth, and global food production is heavily dependent on supplies from Morocco, including from mines in Western Sahara, which is occupied by Morocco in violation of UN resolutions.

A disruption to the regime of King Mohammed VI of Morocco would generate a major disruption to food security worldwide.

A disruption to the regime of King Mohammed VI of Morocco would generate a major disruption to food security worldwide...

Phosphate rock, which is now the main source of this crucial fertiliser, is highly concentrated in a few countries. Recent estimates put the Moroccan reserves at 85% of the world's remaining stocks, with China holding the next

biggest share, wisely protected behind a 130% export tariff. While phosphorus is not scarce in the Earth's crust, accessible concentrations will become so, and as a result it will become

Recent estimates put the Moroccan reserves at 85% of the world's remaining stocks, with China holding the next biggest share, wisely protected behind a 130% export tariff.

harder and more costly to mine. In much the same way that oil is now recognised as entering a peak in production, our research indicates that so will phosphate rock sometime this century, and possibly before mid century.

There is growing demand for phosphorus, principally as emerging economies (such as China and India) start to eat higher up the food chain (consuming more meat and dairy products) and as biofuels demand more fertiliser. In 2008, the price of phosphate rock soared 800% due to this growth rate, dropping only due to the global financial crisis, but not back to previous lows. It is now starting to steadily grow, and is



Recent heavy floodwaters in Queensland carried phosphorus-rich sediment from inland fertile topsoils to the ocean, including the Great Barrier Reef, as captured in this NASA satellite image.

Image: NASA's Earth Observatory <http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=49438>



What is surprising is that we have little reliable and public information on the reserves or the current use of phosphorus, despite its strategic significance.

expected to continue as the gears engage on the global economy.

What to do? We could do nothing, which is pretty much what governments all over the world have done thus far. This is likely to lead to a 'hard landing', with increasing food prices,

global inequity, conflicts and increasing pollution.

Alternatively, we could start to develop a greater understanding of the issues and engage the key stakeholders, develop new processes, institutions, incentives and regulations to manage this scarce resource more sustainably. This gives us a chance to make a 'soft landing', reducing, reusing and recycling phosphorus, supporting farmers and maintaining food security.

Currently, less than 20% of the phosphorus that comes from the mine ends up in our food due to resource mis-management

Currently, less than 20% of the phosphorus that comes from the mine ends up in our food due to resource mis-management and inefficiencies.

and inefficiencies.

The kind of futures thinking methods that can be used to develop scenarios for a soft landing include backcasting, in which a future (2050 or 2100) is imagined where reserves of phosphate rock are extended by means of strategies developed and applied in the intervening years. This would include major improvements in the efficiency of phosphorus use in agriculture, widespread reuse of manures and human excreta, changing diets to eat less meat and dairy, major reductions in wastage of food through the entire chain from paddock to plate.

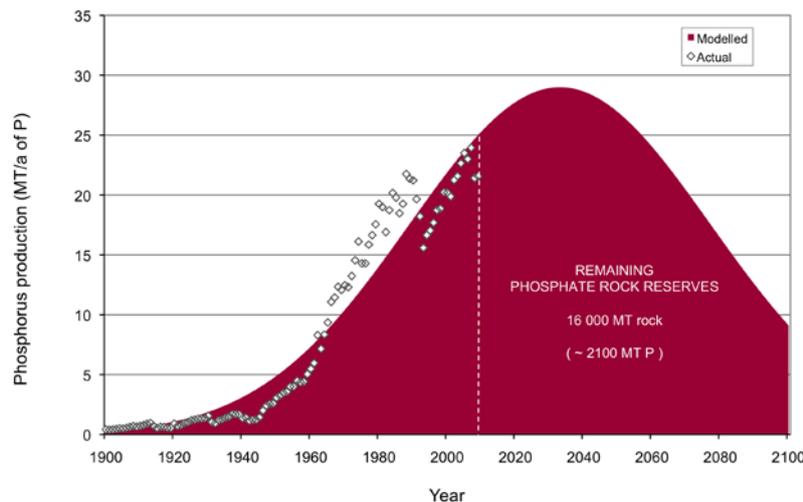
These strategies are all possible, and in many cases have significant co-benefits or positive synergies. For example, improving the efficiency of fertiliser input to agriculture reduces the run-off of nutrients to waterways, a serious pollution problem, for example, in the Peel-Harvey estuary in Western Australia, the Great Barrier Reef and the source of blue-green algal blooms. Similarly, changing diets to reduce the demand on phosphorus resources will reduce the growth in greenhouse gas

emissions and the strain on freshwater supplies which are much greater for producing animal products.

What is surprising is that we have little reliable and public information on the reserves or the current use of phosphorus, despite its strategic significance. The major phosphate mine in Australia, Phosphate Hill, is not required to provide data on production because it is classified as a fertiliser company rather than a mining company

New phosphate deposits are being explored in Australia, however these are of substantially lower grade (%P) and much of the phosphate is already destined for overseas markets, such as

Cordell, D., Drangert, J.-O., and White, S., (2009) The Story of Phosphorus: Global food security and food for thought. *Global Environmental Change*, 2009, 19(2009): p. 292-305



India, a country totally dependent on imported phosphate.

A recent report by the International Fertilizer Development Center revised the Moroccan reserve figures upwards by a factor of 10, based on scant data from 1989 regarding the extrapolated phosphorus concentrations of this resource. This is the first task, to establish the phosphorus stocks and flows through the food system. Secondly, there is an urgent need to further develop the options for a secure phosphorus future, to refine them and to analyse the costs and benefits. Thirdly, to do this, we need to get this issue on the agenda of governments in Australia and around the world, to help develop the necessary institutions and processes.

There are signs of growing interest, and there is still time to try and ensure a 'soft landing', if we act quickly.

**Professor Stuart White and Dr Dana Cordell are Director and Research Principal respectively at the Institute for Sustainable Futures at the University of Technology, Sydney and, with Swedish colleagues, founders of the Global Phosphorus Research Initiative. (www.phosphorusfutures.net).*

ERA: an ailing emperor's new clothes

On 31 January, the Australian Government announced the outcome of the first full evaluation the ARC conducted under the Excellence in Research for Australia (ERA) initiative. While there has been some commentary about the now more transparent achievements of the sector, Dr Fiona Wood reviews the massive undertaking in light of changes in the direction of research policies overseas.

"...it's humbling to look at how small Europe actually is: today, 80% of researchers, 75% of research investment, and 69% of patent applications happen outside the EU."

(ERAB 2009 Preparing Europe for a New Renaissance. A Strategic View of the European Research Area
[First Report](#) of the European Research Area Board – 2009)

If the European Research Area Board (ERAB) is 'humbled' by how small Europe is, perhaps Australia can learn something from the Board's response?

The Board recommends that if the European Research Area is to deliver excellence then half of the European Commission's funding for research will be committed to frontier, high-risk research by 2030, and a further third of funding will be aimed at research addressing grand societal challenges in areas such as climate change, ageing populations and sustainability.

To support the development of investigator driven frontier, high-risk research the European Research Council (ERC) was established in 2007 as part of the European Commission's 7th Framework Program (FP). It has an annual budget expected to reach 1.7 billion Euros by 2013 and its President Helga Nowotny wants to have this doubled in FP 8.

The ERC developed the term 'frontier research' to describe activities directed towards fundamental advances at and beyond the 'frontier' of knowledge. It is this type of research that the ERC believes will help deliver 'new and unpredictable scientific and technological discoveries – the kind that can form the basis of new industries, markets, and broader social innovations of the future'.

Grand societal challenges, on the other hand, will require

Australia has no agency awarding grants for ground-breaking, frontier research on the basis of excellence alone. Nor do we have one that realistically prioritises research addressing Australia's grand challenges. We have a hotch-potch of grant agencies that try to do both and fail to do either.

much more focussed research. ERAB proposes that, by 2030:

- A third of public, non-military research will be geared



to grand societal challenges, with a multi-disciplinary approach.

- 30% of all scientists, including humanities and social sciences, will be trained in research fields relevant to the Grand Challenges.
- Multi-disciplinary academic training will be generalised to educate our research community into the complexity of the Grand Challenges, without diminishing the importance of discipline-based expertise.
- The tools of 'e-science' will be deployed throughout the European Research Area, permitting international collaboration so that all researchers will see themselves as part of the global research system.

Recognising the increasingly global competitive nature of science, the European Parliament in 2009 was urged by five advisory panels to 'overhaul its research, development and innovation policy to prevent being left behind'. And the comparatively more aggressive efforts of European and

Asian countries to respond to 'rapid and deep changes in the

global economy, investment patterns, advancing science and technology, and the global redistribution of skilled workforces, education, and innovation-driven industries' was emphasised by the authors of the 2010 US National Academies Press publication *Rising Above the Gathering Storm, Revisited: Rapidly Approaching Category 5* in the context of its own competitive challenges.

In late 2010 the vision outlined earlier by ERAB for Europe has been translated into a set of concrete actions to be taken forward into the Commission's new Research and Innovation Policy: *Realising the New Renaissance. Policy proposals for developing a world-class research and innovation space in Europe 2030*.

But if European policy needs overhauling, what about Australia's?

Australia has no agency awarding grants for ground-breaking, frontier research on the basis of excellence alone. Nor do we have one that realistically prioritises research addressing Australia's grand challenges.

We have a hotch-potch of grant agencies that try to do both and fail to do either.

The Excellence in Research for Australia (ERA) 2010 initiative does not begin to fix the problem. Once again it mixes basic with applied and excellence with application. It eliminates the prospect of funding excellence for its own sake, and fails to recognise the need to prioritise the rest.

If government wants to be serious about spending its research dollar effectively it needs to decide what it wants.

The European Commission is already travelling in this space with the ERAB proposal: 50% of EC research funding should go to frontier, high-risk research and development and 33% to grand challenges.

New Zealand has decided: in addition to targeted research investment, the New Zealand Government has a separate pot for essentially 'blue skies' research – the Marsden Fund. The fund supports research excellence in science, engineering and maths, social sciences and the humanities, is investigator initiated and is

We've committed just over \$35 million, occupied over 600 peoples' time, and assessed 330,000 research outputs from 41 higher education institutions without addressing any of the real questions.

not subject to government's socio-economic priorities.

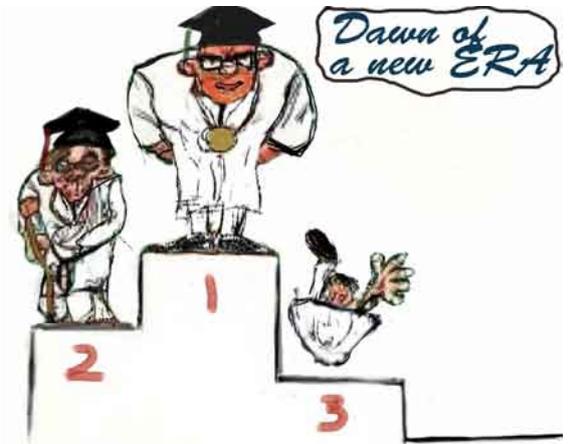
China has decided: 'Central government spending on science and technology is slated to rise 8% to \$24 billion in 2010, of which \$4 billion is basic R&D'.

How come Australia doesn't get it? A mish-mash of research

funding with a veneer of random application is not going to cut it. We

need to clearly allocate a significant part of our research funding to fundamental curiosity-driven research, and another large part to addressing the seriously grand social, environmental and economic challenges that we now face.

Meanwhile, if we are going to apply the highly subjective



The Excellence in Research for Australia (ERA) 2010 initiative does not begin to fix the problem. Once again it mixes basic with applied and excellence with application. It eliminates the prospect of funding excellence for its own sake, and fails to recognise the need to prioritise the rest.

ERA process to a fundamentally flawed research funding system, then we'd better make sure that it:

1. tells us something we don't already know;
2. addresses basic and applied research separately;
3. addresses basic research solely on the basis of excellence;
4. addresses applied research in relation to Australia's societal challenges;
5. recognises the role of research in developing regional economies and societies;
6. increases collaboration rather than competition;
7. reverses decline in support for social sciences and humanities;
8. doesn't add another stress to an already overburdened system;
9. employs an evaluation process that is transparent at all stages with a clear definition for 'performance at world standard' and specific indicators of this.

The current ERA initiative does none of these things – and it is unlikely that the next round will either. We've committed just over \$35 million, occupied over 600 peoples' time, and assessed 330,000 research outputs from 41 higher education institutions without addressing any of the real questions.

** Fiona Q. Wood is a former academic who consults to a range of international organisations on research funding and evaluation and manpower issues. She was a member of the European Commission RDG expert working group 'Realising a single labour market for researchers in the context of the Green Paper on 'The European Research Area: New Perspectives'. Fiona can be contacted at fqwood@gmail.com*

** SCIENCE (2010) 327: 1440

Super cytokine

In chronic infections, such as hepatitis B and C, HIV and tuberculosis, reinvigorating the body's own defence mechanisms may hold the key for effective treatment. Indeed, many chronic infections are marked by a failure of the immune system to properly develop and then sustain the fight, sometimes referred

to as an 'immune exhaustion'. Better knowledge of the factors that inhibit the immune response in such infections could provide new avenues for therapeutic intervention.

An international study published in *Cell*^{*}, with lead authors from the **Walter and Eliza Hall Institute**, used a mouse model of an HIV-like infection with *Lymphocytic choriomeningitis virus* (LCMV) to investigate this

concept. They focussed on a critical mediator of immune responses, a cytokine called interleukin-7 (IL-7), which they found was able to overcome some of the factors that thwart an effective immune response during chronic viral infections. The study also provides insight into the pathways that impede sustained immune responses. The authors conclude that IL-7 could be a useful adjuvant in anti-retroviral therapies for HIV and chronic hepatitis infections.

In mice chronically infected with LCMV, administered IL-7 boosted the activity of virus specific T-immune cells (T-cells), and helped the animals to gradually clear the virus. The authors discovered that in T-cells the cytokine reduced the activity of a gene called Socs-3, a repressor of cytokine production in immune cells required to sustain a persistent immune response. The function of Socs-3 could be to prevent the significant 'collateral damage' of the body's own tissue caused by persistent immune attacks. However, in overwhelming infections the immune system may 'slam on the breaks' too early, and the infection persists, the authors speculate.

IL-7 also has a secondary protective effect, which could prevent liver damage in hepatitis C infections, as it promotes the cytoprotective cytokines IL-6 and IL-22.

Unrelated to this research, French company **Cytheris** is currently conducting clinical trials into the use of IL-7 for a number of viral infections and cancer.

► **More information:** www.wehi.edu.au; *Pellegrini et al (2011) *Cell*, 144:1-13

Toxic 'junk'

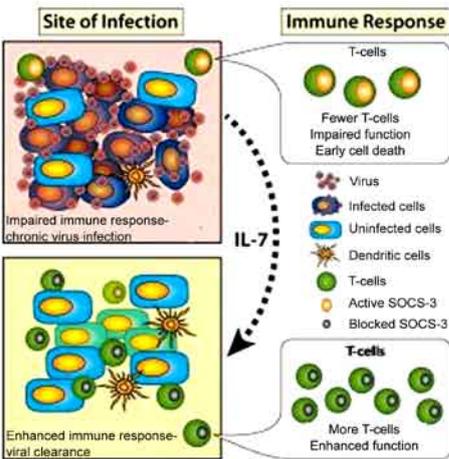
Of the two forms of age-related macular degeneration (AMD) affecting one in every seven Australians over 70, the dry form – as opposed to the wet form – is more common and at present not accessible to treatment. 'Dry' AMD patients progressively experience a blurring or darkness in the centre of their vision as cells in the pigmented layer outside layer of their retina die prematurely, leading to an advanced stage 'geographic atrophy' (GA).

A large international study^{*}, led by US researchers and also involving scientists from the **ARC Centre of Excellence in Vision Science** and the **University of New South Wales**, have now discovered a potential mechanism underlying the disease. The Australian **Lions NSW Eye Bank** donated eyes from GA patients, in which the researchers detected lower levels of an enzyme DICER-1. They also found that mice, in which they induced a localised depletion of DICER-1, the retinal pigment epithelium (RPE) cells degenerated, confirming the importance of the enzyme in the development of the disease.

DICER-1 is important in the processing of RNA to smaller pieces, and its primary product is so called micro RNA, which is involved in the silencing of genes. However, changes in the levels of micro RNA were not responsible for the eye disease.

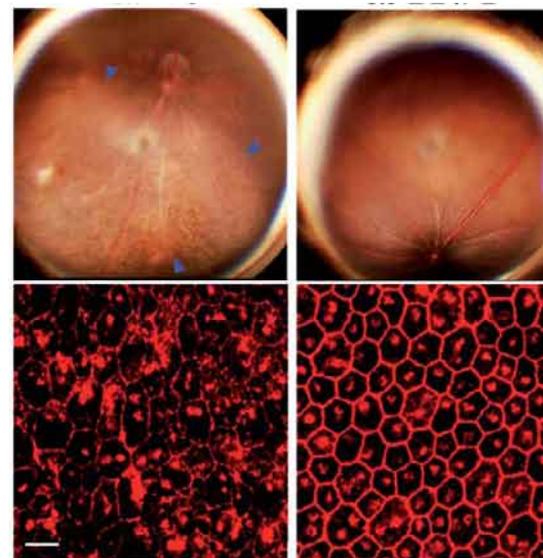
Instead, the development of the atrophy was associated with an accumulation of so called *Alu* RNA derived from small repetitive *Alu* elements of DNA in the human genome. With more than one million copies in the genome of primates *Alu* elements were thought of as 'junk DNA', although they may have important biological functions. They are also known to affect the genome by 'jumping' from one place in the DNA to another and can give rise to diseases such as cancer, although their product – *Alu* RNA – has previously not been described as directly causing cell death.

The researchers discovered that low levels of DICER-1 cause longer unprocessed *Alu* RNA to accumulate, and these were found to activate an enzyme caspase-3 involved in programmed cell death. Intriguingly, the activated enzyme then in turn can



In the course of overwhelming viral infections SOCS-3 dampens the immune response leading to chronic infections. This can be reversed with IL-7 repressing the SOCS-3 function, re-invigorating the immune response and reducing the viral load.

image: adapted from Peter Maltezos and Marc Pellegrini, Walter and Eliza Hall Institute



A reduction of DICER1 induces geographic atrophy indicated in the retinal photograph in top panel, left (blue arrowheads). This is prevented by blocking *Alu* RNA, indicated in top panel, right. The bottom panel shows this on a cellular level, with RPE cells degenerating due to reduced levels of DICER1 (bottom panel, left) which is prevented by blocking *Alu* RNA (bottom panel, right).

image: Ambati Laboratory/University of Kentucky

convert the DICER-1 enzyme into a DNA degrading enzyme, potentially triggering a disease amplifying feedback loop.

While it remains unclear what causes the reduction of DICER-1, the authors findings open a potential avenue for a treatment, as they also demonstrate that direct inhibition of the *Alu* RNA could prevent cell degeneration in mice.

► **More information:** *Kaneko et al (2011) *Nature*, doi:10.1038/nature09830

Worthwhile segregation

Australian canola farming has seen a massive expansion, particularly in the 90s, when it became a major crop in Southern Australian farming systems, with Australia now being the world's second largest exporter. However, crop diseases, such as the blackleg disease caused by the parasitic fungus *Leptosphaeria maculans*, remain a significant challenge to the industry, despite the use of disease resistant canola varieties.

Stem canker or blackleg disease of canola
image: INRA, Marie-Hélène Balesdent & Thierry Rouxel



A major international study with Australian participation, published in February in *Nature Communications**, established how the blackleg fungus rapidly develops genetically diverse populations to overcome resistance genes in canola crops, which in some cases has caused seasonal yield losses of more than 50%.

Analysing the fungus' genome with its 12,500 genes, the researchers found alternating blocks, which were either gene rich or gene poor, and reminiscent of a similar regional separation found in primate genomes. Disease promoting factors were identified and found localised in gene poor regions embedded within areas of so called 'junk DNA', where mutations frequently occur. The authors speculate that this genomic structure evolved after a massive invasion of 'transposable elements', repetitive elements also known as 'jumping DNA'. These then lost their ability to move as rapid mutations occurred creating regions of junk DNA. The underlying mechanism causing these mutations is known as repeat-induced point mutations, used by fungi as a defence mechanism against such transposable elements. The authors speculate that the bipartite genome organisation,

with areas of disease promoting factors placed within highly dynamic regions, was maintained as it allowed the fungus a rapid response to selection pressures. This would underpin "the evolutionary potential of the fungus to adapt rapidly to novel host-derived constraints."

According to co-author **Professor Barbara Howlett** from the **University of Melbourne**, the study was also able to identify molecular markers that can predict a potential outbreak of the disease and could inform farmers when to plant a different canola variety.

► **More information:** <http://newsroom.melbourne.edu>; *Rouxel et al (2011) *Nature Communications* doi:10.1038/ncomms1189

Plant invaders

You make it here, you make it there...

A major concern for biosecurity authorities is the loss of biodiversity and ecosystem functions as introduced non-native plants, particularly invasive species, dominate the new habitat. There is a common 'abundance assumption' that despite the 'home advantage' of native species, introduced non-native species have a selective advantage and will become more abundant at sites where they are introduced than they were in their home range. This is based on theories such as that the introduced species is away from specialist enemies or that the introduced 'weapon arsenal' is more effective at a site removed from evolved interactions with competitors and natural enemies.

For example, the weed English Broom infested large parts of eastern Australia and New Zealand and is thought to be such a successful invader because of the absence of natural enemies and its ability to fix nitrogen, giving it competitive advantages over native species.

However, an international study of 26 plant species in 8 countries found a similar pattern of abundance at native and introduced sites. The success or abundance of a plant species in its home range turned out to be a good predictor of how it would fare at the new site. Plants also tended to group together in both their native and introduced area creating similar 'communities' of species, with similar abundance hierarchies.

"This finding makes it possible for biosecurity authorities to make better predictions concerning the potential abundance of a new introduced species if it should 'escape' into the wild." said **Dr Jennifer Firn** from the **Queensland University of Technology**, lead author of the paper in *Ecology Letters**,

English broom, the prototype of a successful invader in Australia



to which 35 scientists contributed as part of the **Nutrient Network**. The collaboration is the only one of its kind in which individual researchers have set up the same experiment at sites around the world.

► **More information:** www.news.qut.edu.au; *Firn et al (2011) *Ecology Letters* doi: 10.1111/j.1461-0248.2010.01584

...changing rapidly

While some smaller scale studies have previously suggested rapid changes occur in introduced plant species, an Australian-New Zealand collaboration has found that these may evolve more rapidly, more commonly and at much greater magnitude than previously thought.



Facelis retulisa, a short perennial herb, native to South America, showed the largest change, with a decrease in height of 125% per 100 years.

Published in the *Journal of Ecology**, the study analysed how 23 plant species have changed in their morphology since they were introduced to New South Wales around 150 years ago. The researchers found that 70% of the plants had changed at least one morphological trait, most commonly the height, as they may have adapted to different conditions in the new environment. Six plants decreased in height, with most changes observed in western NSW, where dry and low nutrient conditions may favour

shorter plants. The authors say the observed changes were surprisingly large with one species now growing to less than half the height, while the leaves of another species are now twice the size they were a century ago.

Instead of the thousands of millions of years, timescales usually assumed in the context of evolution, the research suggests that rapid evolution in plants might be a common phenomenon. This could play an important role in how introduced plants can become problem weeds, the authors speculate, while also providing some hope that plants, particularly those with shorter generation times, have the potential to adapt to future environmental changes more rapidly than previously thought.

The researchers are now trying to identify factors that could be used to predict the likelihood that plants may become invasive or are able to cope with environmental pressures imposed, for example, by climate change.

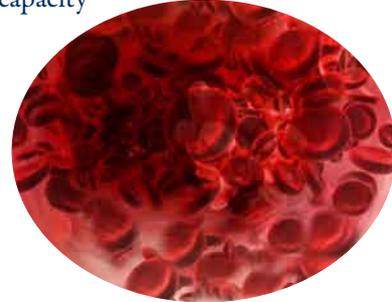
► **More information:** www.unsw.edu.au; *Buswell et al (2011) *Journal of Ecology* 99: 214-224

Eternal living

Different types of stem cell research are at the forefront of therapy development for many human diseases, although our understanding of the molecular mechanisms underlying their regenerative capacity and their multi- or pluripotency is still limited. Hopes for the immanent therapeutic use of so called induced stem cells (iPSCs), which are reprogrammed body cells, were, for example, somewhat dampened in February as

US researchers **discovered** that human iPSCs are not completely reprogrammed and still can have a 'memory' of the somatic cell from which they came from.

A more direct potential for therapeutic use is offered by blood stem cells, which as part of the natural replenishing of blood cells have both multipotent capacity to mature into blood cells and the ability to regenerate themselves. However, too few can be accessed from individuals to be of direct practical use, and their growth in the laboratory is hampered by the frequent loss of the cell's ability to regenerate as they turn into more mature cells.



If scientists are to seize the potential of blood stem cells for regenerative therapies, they will need to understand the molecular events at the basis of self renewal and differentiation. Taking an important step, researchers from the **Walter and Eliza Hall Institute** have now described in *Genes and Development** a crucial piece in the still incomplete puzzle of cellular self-renewal – the gene *Erg*.

In a mouse model, the researchers found evidence that *ERG*, which is vital for the proper function of adult blood stem cells, acts during embryonic development at the centre of a regulatory program that maintains the self-renewal capacity of blood stem cells. Without *ERG*, new blood stem cells rapidly decrease as they divide to produce more blood. The researchers could show that in embryonic development *ERG* controls two genes, *GATA2* and *RUNX1* at the blood producing stage. Both these genes are so called transcription factors, which again regulate the activity of further genes. Individually, *GATA2* and *RUNX1* were not essential for regeneration, but without both, the stem cells quickly exhausted. Lead author **Dr Samir Taoud** said, "This is a key part of the puzzle, but we will continue to work on how these genes directly control self-renewal, and the signals that actually tell the stem cell to regenerate."

► **More information:** www.wehi.edu.au; Taoudi et al (2011) *Genes and Development*, 25: 251-262

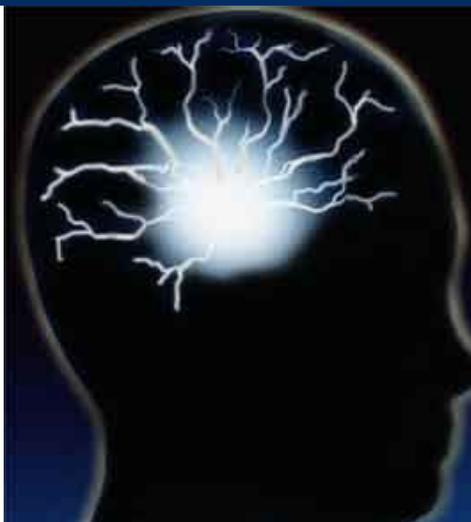
Brainy news

Cognitive highways

We tend to think of cognitive functions as being performed in isolated parts of our brain mainly involving grey matter. Similarly, age related decline of cognitive abilities was thought to primarily relate to regional changes in the brain's grey matter, disregarding the fact that the brain performs as a neural network, in which white matter interconnects one brain region to another.

Australian researchers have now mapped for the first time how the efficiency of the brain's network of cortical fibre connections influences in the elderly processing speed and

cognitive functions.* These include the ability to navigate in space and executive functions, which describe a set of cognitive abilities controlling other functions and behaviors and which are required for goal-directed behavior.



Using a specialised method of magnetic resonance imaging (MRI), the researchers scanned the connections among brain regions in elderly patients and then measured the properties of the neural connectivity they observed applying a mathematical technique called graph theory. Summarising the findings, lead author of the study **Dr Wei Wen, University of New South Wales**, said that greater processing speed was significantly correlated with better connectivity of the cortical regions of the brain, highlighting the crucial importance of information flow within and between regions. The authors note that for example in Alzheimer's disease, the progressive impairment of 'fibre-track' connectivity is an important component in the development of the disease.

The findings help explain how cognitive functions are organised in the brain, and the more highly distributed nature of some functions over others. By examining the factors that affect age-related changes in brain network efficiency the researchers now hope, given the plasticity of these networks, that they may be able to influence age-related decline of cognitive abilities.

► **More information:** www.unsw.edu.au; * Wen et al (2011) *Journal of Neurosciences*, 31: 1204-1212



Smoking kills - your brain

Loss of cognitive function associated with damaged grey matter was the focus of a paper in *NeuroImage** published by researchers from the **University of Western Australia**. The study found that in the elderly, chronic smoking leads to a marked reduction of grey matter in certain brain regions. The results of the study, which included the screening of brains using a novel method of magnetic resonance imaging (MRI), support growing evidence that smoking accelerates cognitive

decline and increases the risk of dementia. This contradicts earlier suggestions of potential benefits for cognitive functions associated with the effects of nicotine on specific receptors in the brain.

Importantly, when trial participants did quit smoking, they lost less brain cells and as a result retained better intellectual function than those who continued to smoke, said study leader **Professor Osvaldo Almeida**. Two years after quitting they then had lower rates of decline similar to people who had never smoked.

► **More information:** www.news.uwa.edu.au; *Almeida (2011) *NeuroImage*, doi:10.1016/j.neuroimage.2011.01.063

Bipolar ecosystem

Ecosystems with the potential to switch between stable states are generally seen as being at the brink of environmental disaster, as changes in the environment can push a system locked in a desirable state into a non-desirable one, which is then hard to switch back. However, the existence of such alternate stable states may also provide opportunities and solutions for environmental problems, a study published in *Nature** by a team of Australian scientists suggests.

The team examined why in the billabongs of the Kakadu National Park biological control of the South American aquatic weed salvinia through the salvinia beetle has been 'fitful and incomplete', while highly successful in many other parts of the world.

Salvinia is able to double in biomass every 3–4 days, and to regenerate vegetatively even after severe damage or drying. Forming dense mats up to 1 metre thick, the weed can clog waterways and crowd out native species.

In the Kakadu billabongs, two states exist in which the weed is either controlled by the beetle or it has escaped control. When salvinia is in low density it is growing fast developing buds, which the adult weevil feed upon. In this state, the weed is



Before and after pictures of salvinia at Jabiluka in the Northern Territory. The aquatic weed was cleared by the tiny salvinia weevil.
image: CSIRO

susceptible to biological control. When salvinia has escaped the control, and is at high density, it grows slowly and has less new buds to support the weevil.

Either state is stable until an annual flooding event perturbs the system.

This also provides a window of opportunity as after flooding the system teeters between states, and with carefully targeted intervention could be pushed into the desired outcome, the authors propose. The team, led by researchers from the CSIRO Ecosystem Sciences, is now investigating how to introduce weevils when salvinia is especially vulnerable, thus ensuring years of control.

► **More information:** www.csiro.au; *Schooler et al (2011) *Nature*, 470, 86-89

Menace breaker

The much loathed cane toad appears to have an achilles heel that could offer a new approach – it's thirst for water and inability to cope with longer dry seasons.

A study by researchers from the **Universities of Sydney, Western Sydney, and Melbourne** suggests that toads, just like bushfire spots ahead of a fire front, spread by establishing satellite populations or 'invasion hubs' around permanent water sources such as dams.

Built across the semi arid outback to sustain valuable livestock, dams are now also providing toads with a permanent water refuge to sit out the dry season. The authors describe how the area toads will colonise in Australia – currently 2.2 million square kilometres – could be reduced by nearly 38% or 1 million square kilometres by excluding toads from non-natural

water sources with fencing or replacing open water storage with enclosed poly-tanks. This would also keep them out of ecologically fragile areas such as the **Pilbara**.

In a trial at the Northern Territory's Victoria River, the

researchers found that radio-tagged toads outside the fenced areas were dying within 72 hours, while those tagged at the control sites with free access to water survived.

Team leader **Dr Mike Letnic**, from the **University of Western Sydney**, said that, while costly, such changes would be compatible with running cattle in the outback and would not affect native animals. Such measures may well be worth the effort, as the unchecked spreading of toads into the semi arid outback threatens key top order predators such as goannas – a healthy food source for Indigenous people – and other reptiles such as crocs, which are killed by eating the toxic toads.

However, as Professor **Ross Alford** from **James Cook**



University pointed out, the method will not be applicable for the many natural water bodies that also exist in semiarid regions because of potentially severe negative impacts on many non-target species.

► **More information:** http://pubapps.uws.edu.au/news/index.php?act=view&story_id=2904

Dry outlook

There is still considerable uncertainty how anthropogenic climate change will effect regional weather patterns, with the **Intergovernmental Panel of Climate Change** having warned



A farmer and his two sons during a dust storm in the 'dust bowl drought' in Cimarron County, Oklahoma, 1936.
Photo: Arthur Rothstein, public domain

that rising temperatures could cause prolonged droughts in semi-arid regions.

Droughts regularly effect Southwestern North America, including the infamous 1930s 'Dust Bowl' event that lasted some six years. Published in *Nature**, a new international palaeoclimatic study that had also **Western Australia** and **Curtin Universities** participating, reconstructed climatic variability between 370,000 and 550,000 years ago, spanning two interglacial periods. The analysis of sediments in the Valles Caldera National Preserve ranged from collecting biochemical data on bacterial walls to studies on what trees and shrubs grew and how much calcium was in the cracked mud in the dried lake bottom. Using these 'paleoclimatic proxies' they established a detailed record which revealed drought conditions lasting centuries to millenia when the mean annual temperature (MAT) was similar or higher than the MAT of the present.

The Earth's orbit around the sun is a major factor affecting climate as small changes influence how the earth is shielded from the sun's variation. This is believed to have been largely responsible for past megadroughts and periodic ice ages.

In one of the studied interglacial periods the Earth had an orbital configuration very similar to the present Holocene and therefore was shielded against the sun's radiation in a similar way. This period also lasted unusually long – around 50,000 years. In a commentary accompanying the study, **Associate Professor John Williams, University of Wisconsin**, writes that this provides unique insights into the potential trajectory for the contemporary climate system, in the absence of humanity's effects. On that account, however, the southwestern climates should be trending towards a somewhat cooler and wetter stage.

While the study's authors warn that the risk of prolonged droughts is heightened by anthropogenic factors, Associate Professor Williams concludes in his commentary that "perhaps, just perhaps, these natural trends will partially mitigate the projected drying in the southwest."

Professor Steven Sherwood, co-director of the **Climate Change Research Centre** at the **University of New South Wales**, said the study is a reminder that global temperature swings can cause profound local changes to rainfall.

"This observation will make an interesting test for climate models; if and when they pass this test, we will know a lot more about past and future rainfall changes," he writes.

► **More information:** www.aus-smc.org; *Fawcett et al (2011) *Nature* 470: 518-521; ** Williams (2011) *Nature* 470, 473-474

Universal promise

A team of researchers led by **University of Adelaide's Dr Darren Miller** have shown in mice that a simple synthetic vaccine delivered through a nasal spray can protect against influenza. The results of the trial, in which the **CSIRO**, the **University of South Australia** and Adelaide's **SA Pathology** also participated, were published in the *Journal of General Virology**. The researchers say the study outcome raises the possibility of developing a universal vaccine which would

not have to be reformulated every year as is necessary with current seasonal influenza vaccines. The vaccine is based on peptides derived from a portion of an influenza virus protein – the precursor haemagglutinin (HA0) cleavage loop.

HA0 is a glycoprotein bound in the membrane of the virus, and needs to be cleaved for the virus to become infective. The peptide connecting the cleavage site contains aminoacids that do not vary between influenza A and B viruses, and therefore are potential targets of a universal vaccine.

The synthetic vaccine candidate used in the study triggered a 100% protection against a laboratory virus (H3N2) and 20% protection against a highly pathogenic virus (H5N1, "bird flu"). The results are comparable with the protection levels achieved with commercially available anti-influenza drugs.

While it could also be injected, the delivery of the drug through a nasal spray may have advantages for people afraid of needles. In addition, this would only stimulate local immune responses at the natural site of virus entry. Because it is synthetic,

the vaccine may also overcome a problem associated with current flu vaccines produced in eggs, which cannot be used in some people who are allergic against egg proteins.

► **More information:** www.adelaide.edu.au; *Miller et al. (2011) *Journal of General Virology* doi:10.1099/vir.0.028985-0

Sexy favourites

The project will aim to produce female-only prawns and to improve current ways of breeding female-only Atlantic salmon.

images: CSIRO



A new international collaboration, the **CSIRO led Sex Ratio and Sterility Cluster**, will investigate how commercially important animals can be bred in a way that produces a desired sex ratio in the offspring. The cluster will invest more than \$6.6 million over three years in the project, with Australian university partners receiving \$2.5 million from **CSIRO's Flagship Collaboration Fund**. The research outcomes are expected to boost productivity and profitability of cattle and aquaculture industries, for example by developing ways to breed prawns that produce only sterile females, as they grow 30% faster than their male counterpart.

Producing more animals of the desirable sex to re-stock the herd, pond or sea cage can have commercial benefits but can also address sustainability and welfare issues by cost effectively controlling unwanted pregnancies. One part of the project will address this by testing an immunocastration vaccine for female cattle, which is based on proteins of the zona pellucida, an outer membrane of eggs responsible for the binding of sperm. It is hoped that this approach will induce an immune response against the ovaries, making the animal sterile.

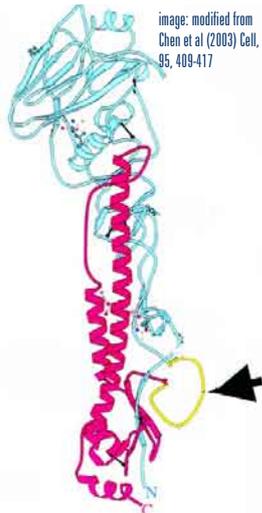
Professor Michael Holland from the **University of Queensland** (UQ) said that preventing pregnancies in the cattle industry through non-surgical means would provide major productivity and welfare benefits. "We expect to have a profound impact on the profitability and global competitiveness of Australia's animal industries, the reliability of our food supply, and potentially create new life-science technologies for application both in Australia and internationally."

By bringing together the expertise from CSIRO, UQ, the **University of Newcastle**, the **Canadian Simon Fraser University** and the **US Central Michigan University**, it is hoped that significant outcomes will be produced more rapidly.

► **More information:** www.csiro.au

Structure of the Hemagglutinin Precursor and location of the exposed Cleavage Site (see arrow) the vaccine is based upon. The structure was revealed by Jue Chen and coworkers in 2003.

image: modified from Chen et al (2003) *Cell*, 95, 409-417



Farming in the carbon mitigation age

On 24 February, the **Australian Government** proposed a new climate change policy framework, under which a fixed carbon price on emitted carbon would be introduced in July 2012, and then over a period of 3-5 years would lead to a 'cap and trade' emissions trading scheme.

The announcement followed the [release](#) of Australia's emissions projections 2010, which are part of an annual update on the nation's emissions trajectory. According to the report, Australia is on track to meet its Kyoto protocol target of limiting emissions to 108% of 1990 levels, but due to the strong demand

for Australia's energy exports, emissions are projected to increase to 24% above 2000 levels under the current policy arrangements. Australia will

require substantial additional abatement of carbon emissions. According to a statement by Climate Change Minister **Greg Combet** this would amount to reductions of 160 million tonnes of CO₂ equivalent on top of the 109 million tonnes of savings provided by existing measures, if the Government is to meet its proposed target of reducing carbon CO₂ by 5% below 2000 levels by 2020.

The initial proposal by the **Multi Party Climate Change Committee** (MPCCC) is still poor on detail but sets out the high level architecture of the scheme and also outlines possible transitional arrangements in the lead up to a carbon trading scheme. This then would also take account of international arrangements and their potential impact on the Australian economy and households.

During the fixed price phase, it would not be possible to use international emissions units (offsets), but these could then be considered after the transition to the flexible arrangement. However, the document explicitly leaves open the possibility of a deferral of the carbon trade mechanism at the end of the 3-5 year transitional period.

The document does not yet detail a set price for carbon or possible assistance arrangements, but sets out that all six greenhouse gases considered under the Kyoto protocol would be counted across the following sectors:

- the stationary energy sector;
- transport sector;
- industrial processes sector;

- fugitive emissions (other than from decommissioned coal mines); and
- emissions from non-legacy waste.

The framework would exclude, however, all activities covered under the **Carbon Farming Initiative**, which the Government announced in November last year (see below). This broadly covers all agricultural emission sources, which according to the *2009 National Greenhouse Gas Inventory* is responsible for around 15% of Australia's emissions. Most of that is on account of two gases – methane and nitrous oxide, mainly produced in the livestock industry.

The Australian Government is [addressing](#) the agricultural sector outside of the legislative framework for a carbon price through the **Carbon Farming Initiative**, for the general design of which a consultation paper was released in November last year, with a respective exposure draft legislation [released](#) in December.

The initiative includes:

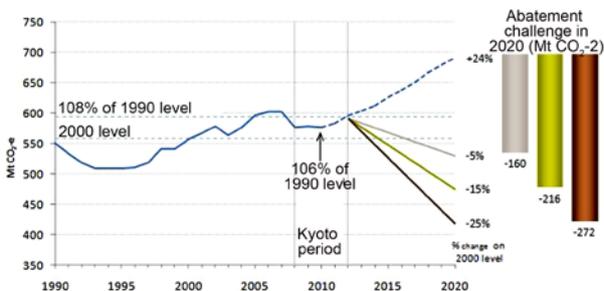
- Legislation to establish a carbon crediting mechanism;
- Fast-tracked development of methodologies for offset projects; and
- Information and tools to help farmers and landholders benefit from carbon markets.

Providing a carrot rather than a stick approach, the CFI, due to commence in July 2011, will offer farmers, foresters and landholders the opportunity to generate carbon credits, which then, after being assessed and verified by an independent regulator, can be sold on Australia's voluntary carbon market or in overseas markets to individuals or corporations that can use them to compensate for their own carbon emissions.

The credits will be a source of domestic offsets under the **National Carbon Offset**

Standard (NCOS), a mechanism that allows abatements meeting internationally recognised standards to be counted even when they are

not covered under the Kyoto protocol. The carbon credits for such certified emission reductions, however, would only be traded in domestic voluntary markets. Non-Kyoto activities include for example soil carbon, avoided deforestation and savanna burning. This would also include biochar, which the ARDR [covered](#) extensively in its March 2009 edition ("The



Note: Trajectories to the 2020 target range are *illustrative*, they begin in 2011-12 at 108 per cent of 1990 levels (consistent with Australia's Kyoto Protocol first commitment period target) and assume a straight line reduction to the target.

Potential eligible abatement activities include:

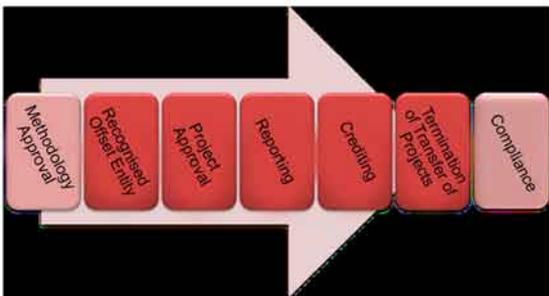
- Reforestation and revegetation;
- Reduced methane emissions from livestock;
- Reduced fertiliser emissions;
- Manure management;
- Reduced emissions or increased sequestration in agricultural soils (soil carbon);
- Savanna fire management;
- Avoided deforestation;
- Burning of stubble/crop residue;
- Reduced emissions from rice cultivation; and
- Reduced emissions from landfill waste deposited before 1 July 2011.

biochar option' lead story)

A crucial element of the Carbon credits is that they need to be generated through certain approved methodologies, for the development of which the Government [released Draft Guidelines for Submitting Methodologies](#). Developed by stakeholders including Government Departments, they will then be assessed by the [Domestic Offsets Integrity Committee](#), an independent panel of experts established by the Government in October 2010.

A methodology would provide a procedure of estimating abatement relative to an established baseline of emissions, including potential leakages (such as increases in emissions elsewhere). It would also include project monitoring, appropriate record keeping and reporting protocols.

The Government expects that abatement activities in



Scheme processes
image: DESIGN OF THE CARBON FARMING INITIATIVE Consultation Paper, Department of Climate Change and Energy Efficiency

general produce benefits for farm productivity, biodiversity and natural resource management but also acknowledges concerns about potential negative impacts of carbon offset projects for

water and food production, or could see a conversion of native forests into biochar. The Government hopes these concerns will be addressed through strict approval processes.

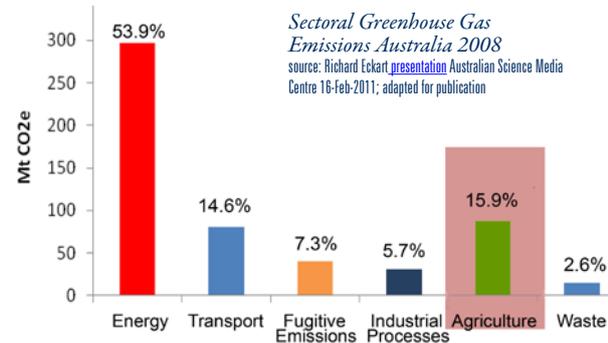
The NCOS mechanism requires carbon credits to meet certain Integrity Standards, which ensures for example that a project achieves additional and permanent abatement, does not result in increased emissions elsewhere ('leakage'), is measurable and verifiable, conservative and internationally consistent and that any scientific evidence used is supported by peer review or comparable validation processes.

The issuing, transferring and cancelling of credits could be through the **Australian National Registry of Emissions Units** established under the Kyoto Protocol, which would allow proponents to have Kyoto units and CFI units in the same registry.

In a [background briefing](#) by the **Australian Science Media Centre** in Adelaide, **Professor Annette Cowie** (**University of New England**), who is director of the **National Centre For Rural Greenhouse Gas Research**, said that reforestation would be an example of a straight forward offset project under the CFI scheme, as the carbon stored in tree biomass is relatively easy to measure.

Agriculture has typically led to substantial losses of soil

carbon, providing an opportunity as an estimated 50-60% of the lost carbon may be replaced, **Dr Jeff Baldock** from the **CSIRO Sustainable Agriculture Flagship** said in his presentation. Increasing soil carbon could be a potential win-win situation as it removes carbon from the atmosphere at the same time potentially improving soil productivity. However, he said this is unlikely to provide a long term solution as the capacity of soil is finite



and increases in stored carbon are typically less than 0.5 tonnes of carbon per hectare per year. There are also challenges due to the different types of agricultural production systems, various soils and climatic conditions across Australia.

Dr Richard Eckard (**University of Melbourne**) described a range of ongoing research addressing greenhouse gas emission associated with farming, such as enteric methane from ruminant livestock, and this should provide a range of options for farmers participating in the CFI to consider. He said the focus would have to be on 'win-win' opportunities which bring productivity growth together with a reduction of emissions. However, in Australia the largest contribution to carbon emissions occur in less intensive livestock farming, which also provides less opportunity for intervention.

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

Money to adapt

The **Australian Government** will [invest](#) \$2million into research on the possible impacts of climate change on primary industries, in addition to \$5 million on research on the social and economic implications of climate change for Australian communities. In support of the research, two research plans have been prepared by the **National Climate Change Adaptation Research Facility** to identify priority questions to meet adaptation knowledge and information needs. *The National Climate Change Adaptation: Primary Industries* research plan will inform primary producers and industries of the relative advantages and risks of different types of adaptation; and *The National Climate Change Adaptation: Social, Economic and Institutional Dimensions* research plan will inform decision-making about adaptation by households, businesses, community groups and governments.

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

...continued from page 1

made a qualified rejection of radical reform:

“While the Committee acknowledges IP Australia’s defence of the current approach as being analogous to other classes of patents, such as chemical products, the Committee strongly rejects the reasoning which says that, for the purposes of the Patents Act 1990 (the Act), genetic information that is ‘isolated’ from its naturally occurring state in the human body may be classed as an invention, and therefore properly be the subject of a patent (where the other requirements of patentability are satisfied). The Committee considered this to be the strongest justification for recommending that the Act be amended to include an express prohibition. However, a number of considerations persuaded the Committee that it would not, at this point in time, recommend that the Act be amended to expressly prohibit the patenting of genes.”

On March 12, *The Australian* cited from a letter co-ordinated by **Cancer Council Australia** (not yet available to the ARDR at the time of publication), which states that the bill would not compromise medical research or reduce access to healthcare products. “The bill aims to do the opposite: protect competitive research by eliminating commercial monopolies over naturally occurring biological materials or those that have been immaterially altered; and to help ensure that diagnostic tests remain available in public laboratories.”

Similar arguments have been put forward during the course of the debate also in opinion pieces in the *ARDR*, such as by prominent lawyer **Luigi Palombi** or the head of Business Development at the **Walter & Eliza Hall Institute**, **Dr Julian Clark**.

The breadth of view points on this topic was demonstrated in an ARDR commentary by **Paul MacLeman**, the chief executive officer of **Genetic Technologies**, which had in 2008 set off a wave of critique for its attempt to enforce patent rights for breast cancer gene tests it had licensed from US company **Myriad**. He wrote: “Before Genetic Technologies began offering BRCA testing, some medical institutes were taking up to four years to provide results to high risk women patients.” He then continues saying that while Genetic Technologies paid substantial licence fees for the breast cancer tests, some medical institutes chose not to, while operating in a semi-commercial twilight zone. “If the gene patents rights were to be removed in Australia, Genetic Technologies would benefit in not having to make royalty payments to Myriad. We would therefore be on a level competitive playing field with the large medical institutes,” he said.

... a number of considerations persuaded the Committee that it would not, at this point in time, recommend that the Act be amended to expressly prohibit the patenting of genes.

There have been other examples of public debate on what should or should not be patentable. Tasked by Innovation Minister **Kim Carr** to review current legislation defining ‘patentable subject matter’, the report by the **Advisory Council on Intellectual Property** (ACIP) sought to provide a broader framework through which patentability – a step precluding the consideration of the newness and usefulness of a patent – should be tested.

The ACIP explicitly notes the patent system, aside from addressing economic goals, cannot nor should be immune to ethical issues, and by considering both should provide a net benefit to Australian society. Any test of patentability, it says, should be assessed against a statement of objectives describing the purpose of the legislation, which ACIP says should strike a balance between the competing rights of patent holders, users of such technology, and Australian society as a whole.

Such a statement, currently missing in the current legislation, would need to be compliant with the **World Trade Organisation’s Agreement of Trade Related Aspects of Intellectual Property Rights** (TRIPS Agreement), which Australia is a signatory to.

Australia’s patent legislation is one of very few in the world that still refers to the 400 year old **Statute of Monopolies 1623** to define what is meant by patentable subject matter, and the wording is confusing, ACIP says. As a result non-experts are unable to understand the key test for patentability. Indeed, the courts have repeatedly acknowledged that a patentable invention does not have to be either a ‘manufacture’ or a ‘manner of manufacture’ – as it is defined in the 1623 statute. In 1959 the **High Court** clarified this by establishing principles of ‘inherent patentability’, according to which an invention should be “an artificially created state of affairs in the field of economic endeavour.”

The ACIP recommends that this should be clearly codified in the Patent Act 1990. This would specify that a “patentable subject matter cannot be just a discovery, fundamental concept or principle – there must be some useful product, physical phenomenon or effect resulting from the working of a method. In addition, the subject matter must relate to the useful, rather than the fine, arts.”

ACIP argues that this would define the features of an invention clearly using the language that has evolved in court decisions, and would also remove uncertainty created through overlaps with other tests of patentability such as novelty, inventive step and utility.

In addressing ethical concerns, it proposes a framework of exclusions of patentability, which would retain the specific



exclusion of patenting human beings and biological processes for their generation already present in the current legislation.

However, in the crucial question of disallowing the patenting of human genes or genetic products, ACIP concurs with the qualified rejection of this proposition by the Senate Committee, stating that

there is “neither the clear case nor the consensus justifying

change at this time”.

It therefore does not recommend a specific exclusion for mere discoveries as the principles of inherent patentability would provide the appropriate test, ACIP states.

An important line of argument is that specific exclusions lack flexibility and would need to be updated as the conditions they are based upon change.

By contrast, a general exclusion paragraph, aligned with the one included in the TRIPS agreement, could serve the purpose by addressing ethical concerns as they arise. It proposes amendment of the legislations so as to “exclude from patentability an invention the commercial exploitation of which would be wholly offensive to the ordinary reasonable and fully informed member of the Australian public.”

To apply such a general exclusion appropriately in the absence of guiding court rulings, the Commissioner should be allowed to seek external advice, the ACIP says. And it also concludes that the Standard of Proof the Commissioner uses in deciding whether an invention is patentable should be strengthened. In this the ACIP review is consistent in its conclusion with a broader review of the patent system by IP Australia, which [released](#) in early March an exposure draft legislation outlining sweeping reforms to current legislation (Intellectual Property Laws Amendment (Raising the bar) Bill 2010).

The current Standard of Proof test on patentability requires the Commissioner to accept a patent unless it is almost certain that the patent would be invalid. If contested in civil courts, the Standard of Proof would then, however, be on the basis

of probability. This problematic discrepancy may have been justified in times when the Commissioner would have found it hard to obtain enough material for a concluded opinion, but not in times of the internet. The ACIP – and in similar terms IP Australia – propose amending legislation such that the Commissioner of Patents would need to be satisfied on the basis of probability that an invention is patentable before accepting an application for a standard patent or certifying an innovation patent. This would then be consistent with how the Commissioner is required to decide whether a patent is ‘novel’ or has an ‘inventive step’, and be in line with the rules applied in civil court.

The improved access of global information through the internet and the need to align Australian patent legislation with global IP standards are recurrent themes in IP Australia’s proposal. The changes would affect the patentability of patents, improve access to patented innovations for research and regulatory activities, but also address procedural processes in the assessment of patents and trademarks, such as reducing delays, assisting the operations of the IP profession, improving mechanisms of enforcement and simplifying the IP system. Importantly, the recommendations by IP Australia would raise the bar for patents to be approved, bringing it more in line with patent laws of our major trading partners.

The inventive step, for example, is currently assessed taking into account the common general knowledge expected from a worker in the art in Australia. By contrast, the patent laws of many of our major trading partners would not restrict this to a worker in the art in a particular geographical location. IP Australia proposes lifting this parochialism of current legislation, such that the “prior art base for inventive step will be all publicly available information”.

An important element of patentability is also usefulness, which is to exclude patents that have no practical application or do not work. This utility criterion has been most controversial in contentious areas of patent law, such as gene patents. IP Australia recommends to bolster the broad term of ‘useful’ by the requirement that the invention has a specific, substantial and credible use.

One other aspect of the broad ranging reforms addresses the lack of a statutory provision in current legislation clarifying a researcher’s freedom to conduct experiments and the scope of their liability for patent infringement. To that end, the bill implements such a statutory exemption from infringement for research and experimental activities, which draws “a line between research and commercial activities, leaving researchers free to conduct their experiments without worrying about the patent system”.

► More information: IP Australia: www.ipaustralia.gov.au; ACIP: www.acip.gov.au

Crossing bridges

The **Australian Technology Network (ATN) of Universities** is establishing new **Industry Doctoral Training Centres (IDTC)**, with a pilot centre for mathematics launched at the *13th Annual ATN Symposium* in February.

Following the example of similar centres in the UK, the Australian IDTCs will provide for researchers who are engaged with industry and have associated skills to be effective and productive beyond conducting research itself. Mathematics was chosen to pilot the initiative because of the strong demand for doctorates in the field, projected to rise 37% between 2011 and 2020, and its application in a wide range of fields.

ATN chair **Professor Ross Milbourne** said it was time to explore more formally incorporating 'industry leadership skills' into research degrees. Developing these skills will be part of a 4 year PhD program, and all projects undertaken within the centre will have an industry context.

► **More information:** <http://www.atn.edu.au>

Big is better

Work has begun on the **La Trobe Institute for Molecular Science (LIMS)**, a \$97 million undertaking at the university's Bundoora Campus, to which the **Australian Government** has contributed \$85.8 million. The institute will bring together

different disciplines (biochemistry, chemistry, genetics, pharmacy, plant biology, physiology, physics, molecular archaeology) in a shared work-space, with the aim not only to push new frontiers in basic science but advance new findings to commercially viable products.

The LIMS science hub will provide infrastructure for collaborative projects involving partners such as the **CRCs for Biomarker Translation and Cancer Therapeutics**, the **ARC Centre of Excellence for Coherent X-ray Science**, the **NHMRC Program Grant on Apoptosis and AgriBio** – the Victorian Centre for AgriBioscience.

The project will include the construction of a 6-storey research and teaching building, which at completion will offer 35 modern research laboratories, associated support facilities and offices for staff and students.

► **More information:** www.latrobe.edu.au/lims/research/index.html



The 6 storey LIMS research centre, which will be constructed at the La Trobe Bundoora Campus (design Lyons).

image: courtesy Lyons

Mindful focus

The new \$21 million **ARC Centre of Excellence in Cognition and Disorders (CCD)** has opened at **Macquarie University**,

with further nodes located at the **University of Western Australia** and the **University of New South Wales**. It will be headed by **Professor Stephen Crain**, who outlined the mission of the centre as a coordinator of research in five areas of cognition: language processing, reading, systems of belief, person perception and memory.



Australia has outstanding researchers in these areas, which are also theoretically well understood, he said. Through the centre's approach, which will also draw from international expertise, formal cognitive theory will better inform neural imaging research and the assessment and treatment of cognition and its disorders, he said.

The centre will conduct large scale multi-site studies of cognitive disorders, which would otherwise be virtually impossible.

► **More information:** www.mq.edu.au

Fabricated node

The Western Australian node of the **Australian National Fabrication Facility (ANFF)** has been launched at the **University of Western Australia**. The centre will be led by Winthrop **Professor Lorenzo Faraone**, whose team is working on advanced microelectronics, optoelectronics, nanotechnology, photonics and microsystems technology.

Established under the **National Collaborative Research Infrastructure Strategy**, the ANFF links 19 institutions nationally grouped into eight nodes, providing researchers and industry access to fabrication facilities with existing capabilities that allow users to process hard materials (metals, composites and ceramics) and soft materials (polymers and polymer-biological moieties) and transform these into structures that have application in sensors, medical devices, nanophotonics and nanoelectronics.

The WA node will provide access to infrared technology and micro-electromechanical systems, capabilities in high

demand and unique in Australia. UWA pro vice-chancellor (Research) **Professor Alistar Robertson** said the node would enable collaboration and facilitate the transfer of research into applications in industry.

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

Deep freeze in WA

New equipment installed at the **University of Western Australia**, the Finnish \$400,000

BlueFors dry dilution refrigerator, will provide a temperature close to the coldest temperatures possible, less than eight thousandths of a degree above minus 273 degrees Celcius.

Filled with \$50,000 worth of Helium 3 gas, it will be based at the **Australian Research Council Centre**

of **Excellence in Engineered Quantum Systems (EQuS)**, and there used to cool devices down to temperatures where it is possible to examine the workings of quantum mechanics.

The refrigerator is the only one of it's kind in the southern hemisphere, and will enable scientists to engineer complex, multi-component, quantum systems for new science and new applications.

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



image: Screenshot of a demonstration video at www.youtube.com

Fish meal

The **University of Tasmania** and the States' government have signed an agreement that will see the **Tasmanian Aquaculture and Fisheries Institute (TAFI)** incorporated into the

university's **Institute for Marine and Antarctic Studies (IMAS)**, which was established in 2010 to encourage collaborative research in marine and Antarctic science between various collaborating agencies. UTAS acting vice-chancellor

Professor David Rich said the aggregation of TAFI and IMAS was a natural progression, and announced that **Professor Colin Buxton**, who has led TAFI in the past, will also lead fisheries and aquaculture research within IMAS.

Minister for Primary Industries and Water **Bryan Green** highlighted recent collaborations between the TAFI and the



Professor David Rich said the

university, such as research on sustainable management of key fisheries providing policy direction in aquaculture production. This includes a recent [report](#) on rock lobster, its vulnerability to climate change and adaptation response options.

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

Holistic food focus

The **University of Melbourne** and the **Victorian Department of Primary Industries** have launched the **Primary Industries Climate Challenges Centre (PICCC)**, which is expected to bring together research activity worth \$30 million annually.

According to a statement by the university, the new centre is unique in that it will "holistically look" at challenges presented by climate change to primary industries, including production, environmental and social issues.

Dr Michael Robinson, University of Melbourne, will be interim director of the institute, which he says will take a lead role on behalf of Australia in providing research to address issues arising from changes in climate and variability.

► [More information: http://newsroom.melbourne.edu](http://newsroom.melbourne.edu)

MASSIVE launch

Monash University, the **Australian Synchrotron**, **CSIRO** and the **Victorian Partnership of Advanced Computing** have launched the \$8 million **Multi-modal Australian ScienceS Imaging and Visualisation Environment (MASSIVE)** supercomputer facility, which according to a statement by Monash will have direct impact on the study of diseases such as cancer, diabetes and AIDS, and the development of future treatments for malaria and lung malfunction in premature babies. For the first time scientists will be able to create, analyse, view and interact with high-resolution 3D samples of their work in close to real time.

The Australian Synchrotron's head of science, **Associate Professor Andrew Peele**, said that past technology "just didn't exist to capture or view data or manipulate samples in a three-dimensional sense."

The project is funded by the collaborating partners, the **Victorian Government** and the **National Computational Infrastructure (NCI)** - a national body supporting the creation of high-end computing services. It will include infrastructure located at both the Australian Synchrotron and Monash University, and will be available to its partners and Australia-wide through the NCI.

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



image: Monash University

Dr Mark Horsburgh

PRESIDENT-ELECT, LICENSING EXECUTIVES SOCIETY OF AUSTRALIA AND NEW ZEALAND (LESANZ)

Licensing key to future Australian innovation

The mining boom won't last forever. In an article I wrote last year, I warned that Australia needed a long term plan to build other revenue streams that will support the economy once we can't rely on our natural resources. Support is mounting for this idea.

Some say the higher education sector is vital for Australia's future, others believe Australia should develop globally competitive sectors in biotechnology, agricultural sciences and healthcare. ANZ's chief executive said this month that the services sector should play a big role in reshaping the Australian economy away from the mining industry, and look to offshore expansion to leverage Asia's growing economies.

All of these are valid arguments. Whether things change in five years or fifty, we need to be prepared for what comes after the mining boom. If not, our standard of living will suffer while we struggle to replace mining income with something else.

The question is, where do we look? Australia's lack of a viable manufacturing industry

means we simply cannot value add there. Agriculture has the same problem as mining; it is a primary industry that may not support our standard of living in the future (the decline of wool demand is a case in point). Education is a large export but our universities are arguably not in the same class as the United States and Europe.

I've said it before, and I'll say it again. The answer is intellectual property. And not just the creation of IP, but the commercialisation of it. Licensing should play a major role in this. Already, licensing impacts almost all aspects of our daily lives. From entertainment to medicine, from what we eat to what we wear, licensing is the catalyst that enables the development and transfer of knowledge, technology, content and value across industries borders.

As a small population with limited infrastructure, Australian industry should focus on developing smart solutions that can be licenced to other countries that do have productive industries. In the past, taking intellectual property to emerging economies like China has been a scary prospect for many companies, with

rumours rife about IP theft and cultural clashes. But the global market is shifting to support a knowledge-based economy, with the major emerging consumers markets like China and India strengthening their IP laws.

Think about it this way: at the moment our balance of payments works as long as we export roughly one hundred times more natural resources than we import processed products. For example, for every tonne of iron ore we sell at \$150 we can buy a car at \$15,000 a tonne. It works as long as we want to buy 100 times less tonnage of cars as we export iron ore, and that is suitable for Australia given our small population. However, if the price of iron ore goes down, the cost of cars goes up, or the

As a small population with limited infrastructure, Australian industry should focus on developing smart solutions that can be licenced to other countries that do have productive industries.

population increases, the equation doesn't work anymore.

We can do the same with intellectual property. If Australia generates enough new ideas, we can licence for a 10 per cent share of the value generated by the licensee. Of course, to do this it's essential to create a large number of new ideas compared to the small population. Sweden and Finland are countries with even smaller populations than ours, yet they have created large revenue streams from their IP – in either products sold to the world or licensed IP.

While it's clear that the creation of a true knowledge-based economy won't happen overnight, even small, positive steps will go some way to protect our future. Commercialisation Australia is one example of this, and has the potential to take not just small steps, but leaps and bounds if only it were given the opportunity through increased funding.

It's a matter of playing to our strengths. Australia has some of the greatest innovative minds in the world. What we need to do is capture that innovation and commercialise it in the most productive way.

Global licensing is a promising option. Instead of relying on a resources boom that will not last, or building industries that will find it hard to become competitive given our comparatively small stature, we should create the ideas and licence them to other countries that already have competitive industries, like manufacturing, in place.

The 2011 Annual Conference of the Licensing Executive Society of Australia & New Zealand is being held in Sydney from March 31 to April 2. The theme of the conference is 'licensing in society' and will include speakers from The Heart Foundation, Telstra, FreemantleMedia Enterprises, the Nine Network and more to talk about their licensing practices and the key issues they face. For the full program, and to register, visit www.lesanz.com.

...continued from page 9

There would also be a need for a central advisory and dispute resolution system.

While single ethical review processes were established within some States, the move towards a single process across states is complicated by differences in State and Territory jurisdictions. For example, there are uncertainties about the indemnity status of the administering bodies and the need to ensure that researchers comply with the various jurisdictional requirements. "It is valuable to note that state and territory insurers have endorsed the proposal in which any institution that has their ethics approval process certified by HoMER will be indemnified against misadventure by the state or territory in which they operate. This will be the case regardless of the origin of the HREC approval or the location of the clinical trial within Australia," the report notes.

The issue is further complicated by the possibility that HoMER, while intended to streamline the process, could in fact place additional demands on institutions, many of which will also want to retain HRECs for internal purposes. Research ethics offices with strained budgets may therefore be reluctant to embrace the system, and be concerned about the detail and complexity of the processes required for the certification of reviewing HREC s under HoMER .

The report notes that many research offices administering ethics committees are also responsible for the complexities of research governance, which include insurance, indemnity, contracts and legal issues, adverse events, monitoring, reporting, and acquittance. At times, this process can take even longer than ethical approval as the required range of staff and skills is rarely present in such offices.

An important plank for improvements to the system are the use of the internet and the e-health technologies, providing electronic means to capture, store and analyse clinical trials data. "The ultimate goal for Australia in e-health clinical trials field would be to develop a seamless interface from a nationally accepted, whole of healthcare, clinical data collection system to any clinical trials database, without the need for double data entry," the report concludes.

Since 2005 the **National E-Health Transition Authority** (NEHTA) has been developing an Australian e-health system, and the CATG group recommends that the agency is also tasked with integrating clinical trials needs.

For example, through access to electronic medical records of

trial participants trials could be monitored and verified remotely, significantly reducing travel time and cost involved in on-site trial review of patient data.

CATG also proposes a national electronic system for greater transparency of trials activities for all stakeholders. The information, disseminated possibly through a web portal, could comprise all relevant information related to clinical trial activities in Australia, and make the breadth and depth of clinical research in Australia more visible.

"E-Health and improved ICT systems will be key enablers to enhance the performance of the Australian clinical trials sector."

"E-Health and improved ICT systems will be key enablers to enhance the performance of the Australian clinical trials sector."

However, a major barrier to this are the myriad of electronic systems implemented in hospitals at the state and national level.

The report also proposes a new Australian based consumer-orientated open access webportal including information on all current clinical trials in Australia, searchable and targeted towards lay people, who would also be able to register interest in trials addressing a particular therapeutic area. Such a comprehensive register to assist patients and practitioners in locating suitable trials is currently missing in Australia as Australian trials need only to be registered 'somewhere'. This could address the considerable problem of recruiting patients, which recent surveys have suggested causes delays in over 90% of industry sponsored Australian trials.

Specifically, the CATG recommends investigating the feasibility of

implementing an Australian based webportal similar to the US trial registry www.clinicaltrials.gov, where all Australian trials would have to be registered. This would be more comprehensive than the current **Australian New Zealand Clinical Trials Registry** hosted by the **University of Sydney**.

The report lists a number of potential mechanisms that could improve the environment of clinical trials.

For example, a number of countries have implemented clinical networks, such as the UK National Institute of Health Research Clinical Research Network; the US National Institutes of Health clinical trials networks; and KoNECT, a Korean Government initiative, and such a scheme may also be appropriate in the Australian context.

► **More information:** www.innovation.gov.au



Renewable efforts

Hot innovation

Cost competitiveness is a significant barrier for the adoption of renewable energies, including a potential contribution of geothermal energy to Australia's energy mix.* Through the development of next generation geothermal turbine and power plant technology, a new collaboration between the **Queensland Geothermal Energy Centre of Excellence (QGECE)** at the **University of Queensland (UQ)** and the US turbine and power plant manufacturer **Verdicorp** seeks to reduce the price for geothermal energy below that of gas-fired electricity, and in some cases increase geothermal productivity by 50%.

The new four year project will develop so called supercritical turbines and cycle equipment; heat exchangers and air-cooled condensers; and new cycle fluids and fluid mixtures suitable for supercritical cycles, which involves pumping a supercritical fluid into an underground formation to fracture the rock. This creates a reservoir for geothermal energy production and heat transport.

In an initial stage a high-pressure supercritical turbine and cycle testing facility will be built at UQ later this year, including a portable test plant for testing and demonstrating the benefits of the new power plant technologies at remote geothermal sites.

The QGECE was established in 2009 with a 5 year program through an investment by the **Queensland Government** of \$15 million, and \$3.3 million in-kind contribution by UQ*.

► **More information:** www.uq.edu.au; ***Long et al**, **Australian Geothermal Research 2011** (conference paper)



Feed-in frenzy

Surplus renewable energy fed from household sources into the grid poses challenges for the supply of electricity at a regulated voltage. This is due to possible changes in the direction of energy flow and hence the voltage profile along a distribution line. As a result voltage levels can rise above safe limits and cause network failures.

RMIT University researchers have started a project with **MIL-Systems**, a local inverter manufacturer, to find better ways of integrating home-generated solar power into the electricity grid. This will involve the development of a leading edge reactive power control (RPC) inverter to better regulate the flow of power within the grid that results from energy injected from renewable systems. And the RMIT team will also investigate how to control large numbers of RPC inverters to maintain voltage regulation along a distribution line as local loading conditions vary.

"This research is an essential precursor to allow the widespread implementation of enhanced voltage regulation for electricity grids with integrated solar energy systems," said RMIT's **Professor Grahame Holms**.

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

Heated investment

Desert Knowledge Australia is a cross border organisation, which together with its sister organisation, the now ceased **Desert Knowledge Cooperative Research Centre**, has its roots in the **Desert Knowledge Movement** in early 2000.

In 2007, both organisations were co-located in the Desert knowledge precinct on the outskirts of Alice Springs with the objective of using the opportunities of the desert for the development of sustainable desert economies.

One of the major projects of the DKA is the **Desert Knowledge Australia Solar Centre (DKASC)**, which it developed together with solar consultancy firm **CAT projects**.

The centre was launched in 2008 as a resource for the developing solar industry in Central Australia. Three years later there are

30 different solar installations at the centre, and the DKA says that more are planned amid strong interest from manufacturers to demonstrate their technology.

In February, German company **Q-cells**, a global provider of photovoltaic technology, [announced](#) it had used the DKASC test centre for a trial of its new solar modules as the dry desert climate at the Alice Springs facility was one of the most demanding, and the DKASC data is sought after for investment and purchasing decisions. According to a [statement](#) by the DKA, the Q-Cells investment was the first purely commercial demonstration of technology at the DKASC, with installations completely self funded by the German company.

The data collected at the site can be viewed live on line at www.dkasolarcentre.com.au, and is, according to the DKA, one of the most comprehensive freely available longitudinal solar PV performance datasets in the world.

► **More information:** www.desertknowledge.com.au



image: Alice Solar City

Biotech update

Find me

Genetic Technologies Limited (GTG) and the **New South Wales Police Force** have [extended](#) their 3 year **Forensic DNA Testing Agreement** for another year. Under the agreement, GTG will conduct forensic DNA analysis on 'complex volume crime' samples such as materials relating to break-ins and motor vehicle theft or related crimes and malicious damage offences. According to GTG, this would represent higher value-add work compared to the types of tests conducted during the first three years of the arrangement.

The company says it is the only non-Government NATA-

accredited forensics testing laboratory in Australia, which provides stable revenue supporting its healthcare research.

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

Home-grown benefit

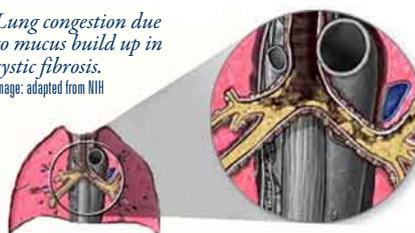
Pharmaxis is in full swing in bringing Bronchitol, a dry-powder formulation of mannitol for the treatment of cystic fibrosis, to the market. Following positive [results](#) in its second international Phase 3 trial in December, and with a [review](#) of its European marketing application in its final stages, the company has jumped a last hurdle in Australia by receiving marketing approval from the **Australian Therapeutic Goods Administration** (TGA). The product is now to be included in the **Australian Register of Therapeutic Goods** (ARTG).

Around one in 2500 babies are born with the recessive genetic disorder, in which body cells are unable to effectively transport salt ions across their outer membrane. Many organs are effected, but patients particularly suffer from the build up of thick secretions in the lungs and digestive tract. In the lungs of patients, sticky mucus restricts the clearing of airways promoting life-threatening lung infections. This condition is helped by a ‘five-way action’ of inhaled Bronchitol.

Chief executive officer **Dr Alan Robertson** labeled the approval as an “historic milestone” for the company. “It is fitting for a product that has been discovered and developed in Australia to be made available first to Australian patients”, he said.

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

Lung congestion due to mucus build up in cystic fibrosis. image: adapted from NIH



Penetrating benefit

With its versatile TPM® (Targeted Penetration Matrix) drug delivery system, **Phosphagenics** has positioned itself for multiple collaborations with the aim to improve the delivery of a broad range of compounds through the skin.

The company’s own [lead](#) product is a treatment for chronic pain using a patch of the opioid oxycodone and the TPM® delivery platform. Other applications in development include the delivery of insulin and the topical local anaesthetic lidocaine.

A year ago, the company formed a partnership with US based **Métier Tribeca LLC** for the marketing of TPM® based cosmetics in the US, which will [expand](#) with eight new products to be added in April.

A fat degrading peptide licensed from **Calzada** forms the bases of a new [cellulite](#) cream the company is set to launch in Australia over the next few months.

In February, the company [entered](#) a partnership with a private dermatology company in the US by signing the



company’s first dermatology agreement.

The collaboration will develop a prescription drug for the treatment of psoriasis, a common chronic autoimmune disease, in which skin cells rapidly reproduce developing into dry patches of thickened



TPM Technology: Vitamin E (alpha Tocopherol) phosphate mixtures form layers that can be used to encapsulate and deliver key ingredients - here shown in a cream application. image: modified from elixia.com.au for the purpose of this publication

skin. An **Investigational New Drug** (IND) application for the development of the drug,

which will combine the TPM® delivery platform with a known anti-psoriasis compound, has already been approved by the **US Food and Drug Administration** (FDA), clearing the path for a Phase 1 clinical study in the US.

Phosphagenics has also entered a partnership with dairy research company **Mastitis Management Australia** (MMA). Announced in March, the collaboration will use the TPM® platform to deliver a formula, which MMA developed for the treatment of mastitis. The persistent inflammation of udder tissue in dairy cows is estimated to cost farmers globally \$54 billion per year. It occurs when white blood cells are released into the mammary gland, usually in response to a bacterial infection of the teat canals.

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



image: wikipedia

Woman saviour

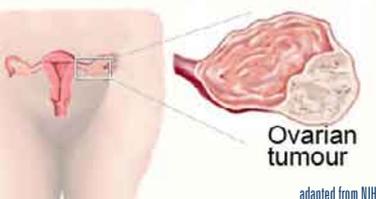
The chances of a woman with ovarian cancer surviving increases sharply when the cancer is detected in earlier stages. However, the diagnosis is difficult and around 75% of ovarian cancers are only detected at an advanced stage. While there is a blood test available, which is based on the detection of the biomarker CA125, it has a relatively low specificity and sensitivity, a problem in diagnosing early stage cancer.

HealthLinx’ new ovarian cancer test OvPlex™ includes a set of 5 biomarkers including the CA125 protein, and the company hopes this will provide a more accurate and sensitive alternative to the current test based on CA125 alone. In a first multi-national study, OvPlex™ showed an overall specificity of 94%, which the company aims to further improve to 97% by including two further biomarkers AGR2 and HTX010.

In a current second multi-national trial, initial results of the first 500 of a total of 1150 samples [confirmed](#) the improved specificity and sensitivity of the OvPlex™ test compared to the detection of CA125 alone, and this was particularly significant

in the most relevant group with early stage cancer.

A review of the data by the company's scientific advisory committee [found](#) that a screen with OvPlex™ had 32% less misdiagnoses than the CA125 only test when samples were used from healthy women and women with malignant tumours. By



including the biomarker AGR2 this was further improved to 56% less misdiagnoses.

To account for the normal clinical situation, where women with benign gynaecological conditions often present with

similar symptoms to those with ovarian cancer, an analysis was undertaken with patients with benign conditions included in the control group. This still maintained a 30% reduced number of misdiagnoses with the OvPlex™ compared to CA125 alone.

In an update on this analysis in early March, the company confirmed that after remodelling with these benign cases, the OvPlex™ test correctly identified malignant ovarian cancer in more than 93% of cases. Based on these positive initial data, the company will progress with the trial and the commercial development of ARG2 as a cancer biomarker, which is also to be integrated in the OvPlex™ test.

HealthLinx had also an important [win](#) in protecting its intellectual property over the OvPlex™ product, with a patent granted in the UK covering the use of the biomarkers, and the methodology of the test.

► [More information:](#) www.healthlinx.com.au

No pain, still gain

In February, **QRxPharma** successfully [completed](#) a pivotal Phase 3 registration trial of its **MoxDuo™ IR** product for the treatment of patients with severe pain after a total knee replacement surgery.

The trial [started](#) in December to compare a flexible dose regimen with higher doses of the product against a low-dose regimen, and its positive outcome is expected to now pave the way for a **New Drug Application** with the **US FDA**. The higher flexible dose regimen of the 'immediate release' opioid formulation of morphine and oxycodone was found to reduce pain significantly more than the low dose treatment.

According to chief executive officer **Dr John Holaday**, this should satisfy basic clinical requirements for the NDA filing.

Another important step in the marketing of MoxDuo™ IR in the US and Europe will be the outcome of a Phase 3 trial [comparing](#) the tolerability and safety of MoxDuo™ IR to either morphine and oxycodone given in doses that provide the same level of pain relief. Incidences of drug related events of nausea, vomiting and dizziness and also changes in respiratory function will be studied in patients that had a bunionectomy, a surgical procedure removing an inflamed or irritated enlargement at the base of the big toe. The study is expected to demonstrate advantages in taking MoxDuo as it requires a lower dose of the

opioids to produce a similar analgesic effect. The results of the trial will form part of a **European Marketing Authorisation Application** (MAA) filing expected this year.

► [More information:](#) www.qrxpharma.com

Fatty collaboration

By exploiting the magnetic resonance of certain atomic nuclei in a strong magnetic field, the power of magnetic resonance imaging (MRI) increasingly changes clinical research and diagnoses, as it is non-invasive, while also not requiring potentially harmful ionizing radiation.

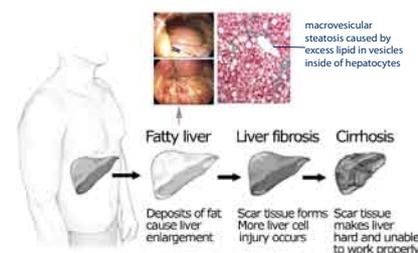
Resonance Health has specialised in developing clinical applications using MRI technology, with its lead product **FerriScan** available as a non-invasive measurement of liver iron concentrations.

The company also developed the application of MRI for the measurement of liver fibrosis, the potentially fatal outcome of, for example, non-alcoholic fatty liver disease affecting one in five Americans. In May 2010, the company announced that it had found the technology [performing](#) well in detecting early stages of liver fibrosis, although not sufficiently competitive in the diagnosis of later stages. Pursuing the

technology development also for the measurement of liver fat, the company discovered that a combined MRI test for liver fibrosis and measuring liver fat could [offer](#) the necessary marketing advantage.

Resonance Health has now entered a collaboration with **Pfizer** to [assess](#) a potentially higher level of accuracy of its improved MRI-based method in distinguishing between the various stages of liver fibrosis, when compared to liver biopsy and other currently used methods.

► [More information:](#) www.resonancehealth.com



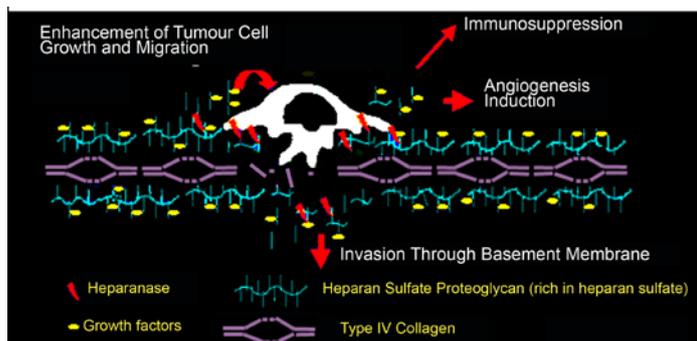
Progressive stages of liver damage caused by fatty liver, and, in a progressed stage, nonalcoholic steatohepatitis, which also features tissue inflammation.
image: adapted from NIH and other sources;

Dual action

Progen Pharmaceuticals recently announced progress in several of its anti-cancer technology developments targeting Heparanase. The enzyme degrades heparan sulfate, a critical component of the extracellular matrix, and this process is implicated in angiogenesis, metastasis and inflammation.

The company's two most advanced Heparanase inhibitors are PI-88 and PG545.

PI-88 – now called muparfostat – has now [advanced](#) into Phase 3 stage of clinical trials for the treatment of post resection liver cancer, under an exclusive world-wide licensing agreement with **Medigen Biotechnology Corporation**. In a latest update in November, **Progen** had informed the market that Medigen



Simplified outline of the role of heparanase in basement degradation by metastatic tumour cells (adapted from a diagram by Motowo Nakajima, <http://www.glycoforum.gj.jp>.) Degradation of the extracellular matrix and vascular basement membrane by heparanase promotes migration of tumour cells forming metastases. Growth factors bound by heparan sulfate are released inducing angiogenesis.

purchased materials for clinical trials and that manufacturing of the 'heparan sulfate mimetic' PI-88 had commenced.

A potentially superior inhibitor is PG545, a drug candidate obtained in a research program the company conducted with partial funding through **Start** and **Commercial Ready** grants by the **Australian Government**. End of January, Progen **obtained** a patent entitled *Sulfated Oligosaccharide Derivatives*, which covers the products that resulted from this research. The so called PG500 series of small molecule compounds, which also includes PG545, consist of fully synthetic heparan sulfate mimetics with potential therapeutic use in a number of areas, including oncology, inflammation and other indications.

Following positive data from preclinical trials, PG545 is in the first clinical stage **testing** safety and tolerability in cancer patients with non-haematologic, malignant solid tumours.

In February, the company **released** data published in the *British Journal of Cancer*,* which Progen says detail a dual angiogenesis and heparanase action of PIG545 by inhibiting tumour growth as well as reducing metastasis. The study also suggests potentially wider applicability of PG545 in several indications.

The anti-tumour activity was found to be potentially enhanced if combined with other established angiogenesis inhibitors such as Nexavar®, while only PG545 was found to also inhibit the spread of cancer cells to other tissues. Interestingly, this suggests that not all angiogenesis inhibitors impact on metastasis, reinforcing the particular potential of PG545.

► **More information:** www.progen.com.au; *Dredge et al (2011) *British Journal of Cancer* 104, 635-42

Breathless diagnostic

The discovery that high blood levels of vascular endothelial growth factor-D (VEGF-D) are associated with the rare lung disease lymphangiomyomatosis (LAM) has led to the first blood based diagnostic test for the rare disorder.

The US **Cincinnati Children's Hospital** (CCH) and its partner **Circadian Technologies**, which owns the intellectual property rights for VEGF-D, have now **launched** the LAM diagnostic as laboratory test compliant with CAP (College of American Pathologists) /CLIA regulations.

The disorder affects almost exclusively women, with symptoms usually starting in child bearing age, when abnormal growth of smooth muscle tissue in the lungs is beginning to obstruct small airways.

While there are only few known cases with LAM, Circadian estimates that up to 250,000 women worldwide may be unaware of having the disease. This is based on a recently established link

of LAM with the genetic condition Tuberosus Sclerosis Complex (TSC), in which case the proliferative smooth muscle tissue in the lung originates from a benign kidney tumour. The company believes that with increasing screening for LAM in patients the number of tests could exceed 25,000 within the next few years.

► **More information:** <http://circadian.com.au>

Who protects what?

Encapsulating protection

The **Australian Patent Office** has **granted** **Living Cell Technologies Limited** a patent for IMMUEP™, the company's technology used for encapsulating living cells prior to transplantation. IMMUEP™ is used, for example, in LCT's lead product DIABECCELL®, in which insulin producing porcine islet cells are packaged in a selectively permeable capsule and then transplanted into patients without the need for immunosuppressants.

► **More information:** www.lctglobal.com

As all others start to fail

BioDiem Ltd has been **awarded** in the US and China a patent entitled *Antimicrobial and radioprotective compounds*, which also covers its antimicrobial compound BDM-1. The drug is in development as a broad spectrum antimicrobial against a range of pathogenic micro-organisms including clinically important methicillin-resistant *Staphylococcus aureus* (MRSA) bacterial infections as well as invasive fungal disease.

BioDiem is currently seeking a partner for the development of the compound for these conditions.

The company also announced it has **earned** royalty payments for the September quarter totalling US\$248,310 resulting from private market sales of **Nobilon**' Nasovac in India. The vaccine for H1N1 (swine flu) is based on BioDiem's live attenuated influenza vaccine (LAIV) technology and sold in India under an agreement between Nobilon and the **World Health Organisation**.

► **More information:** www.biodiem.com

Humanising rights

Agenix Limited has been **granted** a key European patent, *Humanised antibodies derived from DD-3B6/22, specific for the D-Dimer fragment of Fibrin*, which relates to its lead diagnostic product ThromboView® for the detection of live blood clots in patients.

ThromboView® has successfully completed two US Phase 2 clinical trials, and is positioned as a so called 'theranostic' to support Novel Oral Anti-Coagulant (NOAC) therapies. The term theranostics refers to the ability of a diagnostic to monitor or predict the response to a therapeutic intervention. It is often used in the context of 'personalised medicine'.

In November 2010, Agenix announced its **plans** for a low cost China SFDA Phase III trial of ThromboView® and that it

seeks a development partner to commercialise the indicator in China.

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

Not to be sneezed at

Immuron Limited has been granted an Australian patent for its dairy-derived polyclonal antibody product candidate Imm-255, which the company hopes will provide broader protection against influenza viruses.

To date, the product has been shown to prevent and successfully treat influenza in mice and Immuron has commenced work in ferrets to further explore the potential of Imm-255 as a preventative treatment against human epidemic and pandemic influenza viruses. The patent covers claims for the treatment and inhibition of influenza infection by applying anti-influenza antibodies to oral and respiratory surfaces.

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

Skin protection

Light story

Clinuvel's business focus is on the development and marketing of SCENESSE®, a skin protectant used for the treatment of disorders that are related to exposure to light or UV.

The mechanism of action is based on stimulating the production of the skin pigment melanin through its active component afamelanotide, which is a derivative of a peptide hormone released by skin cells in response to ultraviolet radiation (UVR). Clinuvel's clinical program include

indications such as erythropoietic protoporphyria (EPP), actinic keratosis, and polymorphic light eruption.

EPP, the product's lead indication for SCENESSE®, is a rare inherited disorder affecting around 10,000

people worldwide. In these patients a precursor of hemoglobin accumulates in the skin and reacts there chemically when exposed to sun light, causing swelling and scarring associated with extreme pain.

By injecting a controlled-release implant underneath the skin of patients melanin production can be induced enhancing the protective shield against the effects of UV light. This was found to reduce the number and severity of the phototoxic reactions.

In May last year, Italian authorities [included](#) the product on a list of reimbursable drugs for the treatment of EPP. A Phase

3 trial was [conducted](#) successfully in Australian and European patients, and in November 2010, SCENESSE® was [granted Orphan Drug Designation](#) by the TGA for the treatment of EPP and a related congenital disease, congenital erythropoietic porphyria.

Confirmatory Phase 2 (US) and Phase 3 (Europe) trials are underway. In announcing the [completion](#) of the first of the US Phase 2 trials, chief executive officer **Dr Philippe Wolgen** said that due to the lack of effective alternatives there was strong demand by patients, and the company was in discussions with the US FDA to facilitate drug access for EPP patients.

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

Colouring prospects

SCENESSE® is also being [investigated](#) as a repigmentation therapy for vitiligo, a common disorder in which patients gradually lose skin pigment or tone developing white skin patches.



Patchy depigmentation in vitiligo patients.
image: NIH

In March, the US FDA gave the [go-ahead](#) for a pilot trial of SCENESSE® in nonsegmental vitiligo, the most common form of the autoimmune disease, which affects over 45 million individuals globally. A currently recognised narrow-band ultraviolet B light therapy (NB-UVB) requires treatment of up to 18 months and clinical visits twice- or thrice-weekly to reactivate skin pigment producing cells in vitiliginous lesions.

The International SCENESSE® Pilot Repigmentation Evaluation (INSPIRE) trial will test whether the required dose of radiation and time of treatment can be reduced by using Clinuvel's drug in combination with the NB-UVB therapy.

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

Modulating promise

Virax Holdings Limited has [embarked](#) on a new cancer program by obtaining a license from French company **Transgene** for the development of an immunotherapeutic compound TG1042 as a treatment for skin cancer.

TG1042 is a DNA vaccine in which a viral vector is used to induce within body cells the production of the cytokine interferon gamma. Usually injected into the area of the body affected by the cancer, the vaccine thus promotes an effective anti-cancer immune response.

Previously, TG1042 was effective in a Phase 2 clinical trial for the treatment of the rare cancer cutaneous B-cell lymphoma – a particularly encouraging finding in this orphan indication, Virax says. On the back of Australia's significant skin cancer trial resources, Virax intends, following a successful raising of capital, to rapidly move into a Phase 1/2 clinical stage, targeting patients with nodular Basal Cell Carcinoma (BCC). Transgene will assist this by supplying clinical grade product.

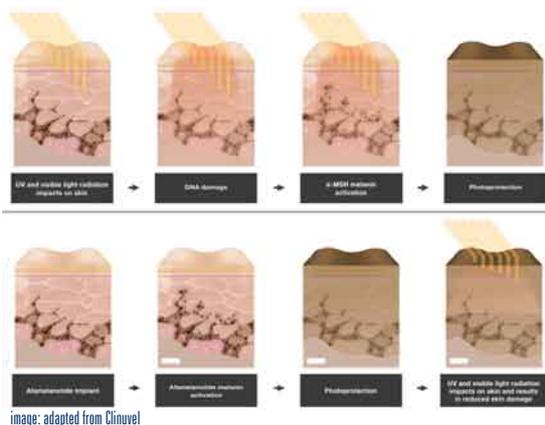


image: adapted from Clinuvel

According to Virax, the new program is a major opportunity as BCC occurs in Australia three times more frequently than all other cancers combined, with incidences likely to grow as the population ages. The nodular form is common and a significant portion difficult to operate due to the size and location of the cancer, making an alternative treatment desirable.

Under the agreement, Virax obtains a global license, and will be due for milestone payments on first product approval and royalty payments on sales to Transgene.

Amicable separation

The **Virax** and **Transgene** partnership had also a set back in February, after pharma giant **Roche** terminated a license agreement which it had entered into in 2007 to develop Transgene's therapeutic vaccine candidate TG4001 for the treatment of pathologies related to Human Papilloma Virus.

The collaboration earned Transgene Euro 23 million, from which Virax profited through milestone payments and license fees, which relate to its Co-X-Gene technology utilised in the project. Roche's decision was for strategic reasons, a Transgene statement said, and while unusual did not relate to any data from an ongoing Phase 2b trial. Transgene remains committed to the project and announced it would, if the trial was successful, prepare for a Phase 3 registration trial. This was welcomed by Virax.

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

Rare hope

It was a story widely publicised last year, and also a [feature](#) on the ABC's *Catalyst* program. **Dr Alex Veldman**, a Neonatal Specialist at **Monash Children's Hospital**, and collaborators in Australia and Germany – also including the German company **Orphatec Pharmaceuticals** – [published](#) in *Paediatrics** a groundbreaking case study on the first successful treatment of Molybdenum Cofactor Deficiency (MoCD), a rare and usually fatal metabolic disorder which rapidly leads to neurological damage.

The cofactor is the product of a complex biosynthetic pathway and it was found that in most MoCD patients, there is also a lack of an intermediate product the cofactor, cyclic pyranopterin monophosphate (cPMP).

When a newborn baby had been diagnosed with the disorder, Dr Veldman conducted a successful substitution therapy with cyclic pyranopterin monophosphate (cPMP).

In February, US company **Alexion Pharmaceuticals** [announced](#) it had acquired the patents and assets to the investigational therapy of MoCD (Type A) from Ophartec and also established a research collaboration with key MoCD researchers from Orphatec to accelerate the regulatory approval for the therapy. "This accelerates the hope for families that a treatment for children with MoCD Type A will one day be available to save the lives of these infants", Dr Veldman said.

► [More information: www.alxn.com](http://www.alxn.com); *Veldman A, et al. (2010) *Pediatrics* 125: e1249-54.

Buy me

bioMD Limited, which specialises in regenerative tissue engineering technologies, has announced that – [subject](#) to conditions including shareholder approval – it will [offer](#) to buy all shares in unlisted **Allied Medical Limited**.

In a company statement, bioMD said that this would create a diversified healthcare group focused on distributing and commercialising new medical technologies.

Allied Medical has a major investment in the DNA vaccine development company **Coridon Pty Ltd**, which was established in 2000 to develop and commercialise vaccine technology licensed from the **University of Queensland**. Having a focus on herpesvirus infections, the company aims to utilise new optimising technology for the production of DNA vaccines in a range of clinical indications.

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

Oral protection

Immuron Limited's core focus is the potential use of oral immunotherapies based on polyclonal antibody products derived from bovine colostrum in a number of indications. Its key product Travelan, a prophylactic treatment against E.coli infections, is marketed by **Nycomed Pty Ltd** and according to company forecasts, revenue sales are expected to increase in 2011 by 50% over sales in the previous year.

Immuron's activities target broadly infectious diseases in the gastrointestinal tract, chronic diseases such as type II diabetes and fatty liver, and influenza. The company's premise is to either directly block viruses or bacteria at mucosal surfaces or to influence the cell-mediated immune system by inducing regulatory T-cells in an antigen-specific manner.

In March the company announced a significant result in preclinical trials indicating its human influenza candidate is effective in ferrets. According to Immuron, ferrets are the 'gold standard' because they are susceptible to human influenza virus.

A new line of research investigates whether bovine produced antibodies can neutralise HIV virus effectively and thus prevent virus transmission during sexual intercourse. In March, Immuron released data on laboratory studies performed in collaboration with a team led by **Dr Damian Purcell** at the **University of Melbourne**, in which a preparation of Immuron's antibodies was found to successfully neutralise a broad range of HIV strains.

A large portion of the antibodies were found to specifically bind antigens located on the outer envelope spike of the HIV virus there facilitating the infection of white blood cells. The data presented at the *18th Conference on Retroviruses and Opportunistic Infections* in Boston. According to Dr Purcell, the antibodies can be produced in large quantities at relatively low cost, and thus potentially used for HIV prevention in high risk individuals.

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

Better not forgotten

In its latest announcements before the State election, the **NSW Labor Government** pledged \$16 million to boost NSW neuroscience research. The funding would include:

- \$10 million for the **University of New South Wales** led **Australian Advanced Clinical Trials** project, a clinical research and teaching facility which, according to UNSW vice-chancellor **Professor Fred Hilmer**, will better integrate the university's medical research – including research on neuro-psychiatric disorders such as depression, Alzheimer's and schizophrenia – with education and clinical care; and
- \$6 million to Sydney's **Neuroscience Research Australia** (NRA) as a contribution towards the new **Neuroscience Research Precinct** building at the **Prince of Wales Hospital** campus.

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

Woody headaches

Momentary pain relief..

In March, the Tasmanian forestry industry and environmental groups reached an interim agreement to stop logging in native public forests while securing wood supply for saw millers. The deal was brokered by independent facilitator **Bill Kelty**, who was appointed in December last year to oversee the implementation of a Statement of Principles by forest industry and environment non-government organisations.

The *Tasmanian Forests Statement of Principles to lead to an Agreement* was signed in October 2010

by key stakeholders with the intent to resolve the ongoing conflict over forests in Tasmania, protect native forests, and develop a strong sustainable timber industry. However, considerable differences between the negotiating parties and other stakeholder groups have emerged since then. The interim agreement now reached includes a six months moratorium on logging of around 600,000 hectares in High Conservation Value (HCV) areas including the Weld, Styx, Tarkine and Florentine valleys. Exemptions will be to meet existing timber contracts or for the assurance of wood supply for existing industry.

[Commenting](#) on the agreement, Mr Kelty cautioned in



a statement by the State Government that this was a positive step in a difficult process towards reaching a final and lasting agreement.

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

...and recurring pain

It has been a long time coming but federal Environment Minister **Tony Burke** has [approved](#) the three remaining

modules (L, M and N) of the **Gunns Bell Bay** pulp mill environmental impact management plan which relate to discharge and monitoring and reporting requirements. This fulfills all the requirements under federal environmental law for the go-ahead of the highly controversial project.



image: NASA

The history of the approval has been long and complex, including the conditional approval by former Environment Minister **Malcolm Turnbull**, who approved the Gunns Pulp Mill in October 2007, on the condition of an environmental impact management plan being developed. In January 2009, his successor, **Peter Garrett** deferred the decision on the three modules until Gunn had completed detailed studies on potential marine impacts.

The Government also [released](#) the advice the decision was based on, including advice by the **Independent Expert Group**.

The approval has been met with strong opposition by Tasmanian environmental groups, the **Greens** and also the **The Wilderness Society**, which [reportedly](#) could also affect a moratorium on logging in high conservation value native forests that was just negotiated between industry and environmental groups.

Environmental groups also disputed the results of a review by Insight Economics commissioned by Gunn, which [found](#) that the mill could generate a total value of \$10 billion to the Tasmanian economy over a 20 year period – a return of four times the original investment.

► [More information: www.environment.gov.au/minister/burke/2011/mr20110310.html](http://www.environment.gov.au/minister/burke/2011/mr20110310.html)

Warming to the future

The **Tasmanian Government** released two new reports as part of the **Climate Futures for Tasmania** project (see also Opinion by Dr Tony Press, ARDR November 2010).

According to a Government [statement](#), the *Impacts on Agriculture* report examined the predicted changes in climate indices such as frost, drought, chilling and growing-degree on a number of key agricultural sectors. It found that while agricultural conditions will change in future climates, those changes may be slow, allowing agricultural producers to adapt.

A second report *Water and Catchments* established that Tasmania will continue to maintain a water advantage in comparison to other regions in Australia, although there will be some changes, particularly to seasonal runoff across Tasmania, with subsequent changes to large irrigation storages and catchment areas.

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

Digging deep

The **South Australian Government** sees the opening of the Kanmantoo copper gold mine in the Adelaide Hills, South Australia as a further vindication of the **Plan for Accelerating Exploration** (PACE) policy, which was expanded in 2010 as the **PAGE 2020** initiative.



South Australia's third largest copper gold development Kanmantoo.

The program provided direct financial assistance to **Hillgrove Resources'** early redevelopment program of the copper mine, which had its first 28 years of operation from 1846, then producing 3200 tonnes of copper every year.

The redeveloped mine is now expected to yield 21 000 tonnes of copper a year through the use of modern mining technologies.

With bipartisan support consecutive South Australian governments have pushed the development of the State's resource sector. In 1999, a **Resources Taskforce** established significant opportunities in South Australia to produce minerals and attract exploration and development investments.

PACE was implemented in 2004 to help realising this potential. The State's Minister for Mineral Resources Development **Paul Holloway** said at the launch of the Kanmantoo mine that 16 mines are now operating or close to

completion, which compares to just four at the start of PACE.

According to data [presented](#) by SA chief geoscientist (Exploration & Mapping) **Martin Farclough**, at the *13th Quadrennial Lagod Symposium 2010* in Adelaide, minerals were in 2008/09 the largest single sector contributing to SA exports, accounting for \$2.7 billion or 29% of total export earnings. This compares to \$1.2 billion or 13% in 2003/04. Over the period, SA's export earnings remained fairly constant, however, with a slight increase from 9 billion to 9.5 billion, mainly due to a significant decline in manufacturing.

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

Direct benefit wanted

The **Western Australian Government** has established a \$5.2 million **Targeted Research Fund** (TRF) to support medical research with direct impact on the health of Western Australians. The fund will target areas including:

- primary care access;
- chronic health conditions;
- public health issues significant to the WA community;
- rural, remote and Aboriginal health;
- emerging health risks; and
- health service delivery models.

A project already selected for funding is a clinical trial of compounds developed in WA for the treatment of muscular dystrophy patients. Receiving \$647,000 over three years, the project will be conducted by **WA Health**, the **Australian Neuromuscular Research Institute** and the **Muscular Dystrophy Association of WA**.

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

Resourceful WA

Drill, baby, drill...

With the aim to secure the long-term sustainability of the Western Australian resources sector, the **WA Government** has established an \$80 million **Exploration Incentives Scheme** (EIS). The scheme is funded through the **Royalties for Regions** agreement, according to which the equivalent of 25% of the State's mining and onshore petroleum royalties has to be returned to the State's regional areas as an additional investment in projects, infrastructure and community services.

The EIS initiative has six components, ranging from supporting innovative drilling projects in greenfield areas, 3D geological mapping projects to initiatives assisting sustainable relations with indigenous communities.

In February, the State Government announced the 2011-12 round of the co-funded drilling program under the EIS initiative. Applications are currently open to explorers in all commodities including geothermal energy (due by 25 March).

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

...with a bit of help

Mines and Petroleum Minister **Norman Moore** highlighted the significance of the EIS initiative for producing geological survey data that assist exploration projects in the state.

In February, the **Geological Survey of Western Australia** (GSWA)

[released](#) new data collected from recent regional surveys of the Eucla and the Capricorn Orogen (including the Gascoyne Province).

The Capricorn deep seismic reflection survey was conducted across unexplored parts of the Pilbara and Gascoyne regions with geological data acquired along six lines stretching across more than 1200 kilometres. The images and unprocessed data will provide new insight into the make-up of WA's crust and the nature of major fault zones. In addition, the data also cover airborne magnetic and radiometric surveys of the Eucla basin up to the State border with South Australia.

Together the data provide a detailed picture of Proterozoic basement rocks buried beneath sand and the relatively thin Cenozoic limestones of the Nullabor Plain.

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

Energetic vision

The **Western Australian Government** has launched a *Strategic Energy Initiative: Energy 2031* directions paper as part of its **Strategic Energy Initiative** (SEI) to establish a 20-year vision for the the State's energy sector. According to Energy Minister **Peter Collier**, the State, whose energy consumption has doubled over the past 20 years, currently lacks a cohesive, long-term energy policy.

The backdrop of the directions paper is a sector that differs significantly from that of other states with a unique set of challenges. For example, according to [projections](#) by ABARE, Western Australia will have the highest growth rate in energy consumption over the next two decades, largely driven by the demands of the expanding mining industry. Already, mining accounts for 23% of WA's primary energy demand. WA also differs in its primary fuel mix significantly from that of other States as coal accounts for only 13% (compared to 53% in

NSW or 67% in the Northern Territory), while the essentially cleaner energy source natural gas shares 55% of the primary fuel mix.

The directions paper proposes a series of strategies within six major themes:

- promoting security and diversity in energy supply and fuels;
- ensuring efficient provision and utilisation of energy infrastructure;
- improving the energy efficiency of the WA economy;
- maintaining continuity of downstream energy supply;
- ensuring effective and efficient downstream energy markets;
- ensuring universal access to essential energy supplies.

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

Crutches needed

The new **Victorian Government** has established a **Victorian Competition and Efficiency Commission** (VCEC) inquiry into the State's manufacturing industry, which it says has not only seen a sharp overall decline over the past decade but also a decline as a share of the national manufacturing industry.

Minister for Manufacturing, Exports and Trade **Richard Dalla-Riva** encouraged all interested parties, including small-to-medium enterprises, to contribute to the inquiry into the sector, which employs around 310,000 people in a range of industries such as automotive car and components, advanced electronics and machinery, defence suppliers, chemicals and plastics, pharmaceuticals, fabricated metals, TCF, and food processing.

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

Dredgeful news

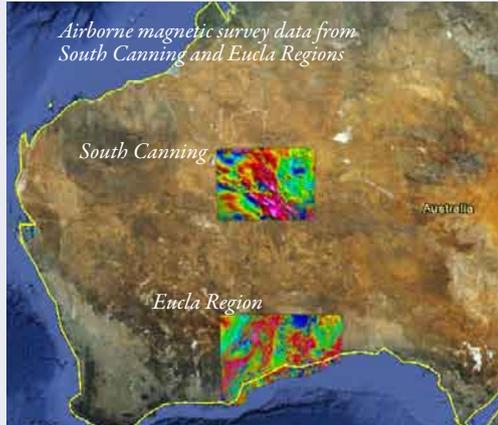
The provision of adequate port infrastructure will be an important element for the developing LNG export industry in Queensland. The **Gladstone Ports Corporation** (GPC) plans to undertake Australia's largest dredging project to provide sufficient access to existing and proposed Gladstone Western Basin Port (Port Curtis, from Auckland Point to The Narrows) facilities.

The project has received conditional federal and environmental approval. GPC announced that joint venture partners **Van Oord** and **Dredging International Australia** will commence the first stage of the project, worth an estimated \$387 million.

The **Port of Gladstone Western Basin Dredging and Disposal Project** comprises dredging associated with the deepening and widening of existing channels and swing basins and the creation of new channels over a 20 year period.

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

image: Google earth image with data from Eucla, South Canning and Stansmore areas 2010 regional airborne surveys; Geological Survey WA



Surprise resignation

Just 2 1/2 years after being appointed as Australia's first full-time Chief Scientist of Australia, renowned astronomer **Professor Penny Sackett** resigned from the position in February, effective from 4 March. Her resignation came as a surprise to the science community. In highlighting her achievements, Innovation Minister Kim Carr singled out Professor Sackett's stewardship of the two recent reports to PMSEIC on Australia and Food Security in a Changing World and Challenges at Energy-Water-Carbon Intersections.

Penny Sackett

Slippery positions

Former NSW Labor State Minister **Craig Knowles** will lead the Murray-Darling Basin Authority (MDBA) as its new chair, replacing **Mike Taylor** who resigned from the position at the end of last year. Mr Knowles was a member of the NSW Legislative Assembly from 1990 to 2005, and served as State Minister in various portfolios. He has been previously extensively involved with water reform and is notably credited as an important driver in the development of the 2004 National Water Initiative. The MDBA is now also on the hunt for a replacement for **Dr Diana Day**, who resigned in February from the MDBA board.

Craig Knowles

Radiating appointments

Vice-chancellor of the University of Queensland **Professor Paul Greenfield**, who was recently appointed as chair of the Go8, will now also head the board of the Australian Nuclear Science and Technology Organisation (ANSTO). Professor Greenfield has been a member of the board since 2007 and will lead ANSTO following the departure of **Dr Ziggy Switkowski** in December last year. **Mr John Ryan** joins the board as a new member. Mr Ryan is currently executive director of Cloon Economics and inaugural chair of the National Research Infrastructure Council (NRIC).

Paul Greenfield

Beaming appointments

The Australian Synchrotron has appointed **Associate Professor Andrew Peele** as new head of Science. Associate Professor Peele is currently head of the Department of Physics X-Ray Science group at La Trobe and has previously been the Victorian Branch Chair of the Australian Institute of Physics (AIP) and co-chair of the AIP Congress. He has extensive experience in synchrotron science and will join the Australian Synchrotron on secondment. The Australian Synchrotron has also appointed a new head of External Relations, **Dr Shirley Lanning**, who is a science professional with over 25 years experience working in the life sciences sector in the UK and Australia, focusing on technology commercialisation, marketing, corporate and scientific

communications, and general management.

Humane leader

Ms **Angela Magarry** is the new executive director of the Council for the Humanities, Arts and Social Sciences (CHASS). Previously she was director of Policy and Analysis for Universities Australia where she managed policy development in relation to teaching, research and international education dimensions for higher education.

Stepping up

University of Melbourne vice-chancellor **Glyn Davis** will be the next chair of Universities Australia, following **Professor Peter Coaldrake**, who will step down in May this year. Universities Australia represents Australia's 39 universities, whose vice-chancellors are its members.



Glyn Davis

Humanising leader...

Charles Darwin University has appointed anthropologist **Professor Sharon Bell** as new deputy vice-chancellor for its research and international portfolio. Currently a professorial fellow and senior program developer at the LH Martin Institute, University of Melbourne, she will start the position in April, taking over from **Professor Bob Wasson**. Professor Bell has extensive expertise in the development of Indigenous and community engagement programs.



Sharon Bell

...and resourceful manager

Charles Darwin University will also be joined by **Andrew Campbell** as new director of the university's new Research Institute for Environment and Livelihoods (RIEL). Mr Campbell said that the RIEL would further extend the university's strengths in integrated environmental, social and economic research, tailored for the needs of the tropical and desert landscapes of northern Australia. He was previously managing director of Triple Helix Consulting, a consultancy on issues related to climate, water, energy, food and biodiversity. He was also senior executive in the Australian Government, and chief executive officer of Land and Water Australia.



Andrew Campbell

New kids on the block

Mr Mark Paterson and **Mr Hutch Ranck** will join the CSIRO Board, replacing outgoing board members **Mr Douglas Rathbone** and **Ms Deborah O'Toole**. Mr Paterson is secretary of the Department of Innovation, Industry, Science and Research and

was previously head of the Australian Chamber of Commerce and Industry. Mr Ranck was most recently the group managing director, ASEAN for DuPont Limited. He has held leadership positions in the finance, chemicals and pharmaceuticals sectors. He has been a member of the Prime Minister's Science, Engineering and Innovation Council and the Business Roundtable on Sustainable Development.

Evolved winner

Evolutionary biologist **Professor Marcus Feldman** from Stanford University's School of Medicine, who graduated in 1964 with a Bachelor of Science at the University of Western Australia, is one of three category winners of the Dan David Prize. Named after international businessman and philanthropist Dan David, the prize will provide each of the winners with \$1 million. Professor Feldman is an expert in the societal consequences of models of evolution.



Marcus Feldman

Chancellor appointments

Former chairwoman of the CSIRO and Lieutenant Governor of Victoria, **Professor Adrienne Clarke** will be the new chancellor of La Trobe University. She has been director of a number of public companies and authored four major scientific books dealing with chemistry, cell biology and genetics. According to vice-chancellor **Professor Paul Johnson**, she is joining the University at a critical time, with the establishment of the \$288 million Agribio Centre and the \$94 million La Trobe Institute for Molecular Science. She will take up her post in February, following the retirement of **Sylvia Walton**, who has been chancellor since 2006. Swinburne University of Technology has appointed Curtin's deputy vice chancellor (research and development) **Professor Linda Kristjanson** as new vice chancellor and president. She will take up her position in May 2011. From 2001 to 2006 she was The Cancer Council of Western Australia's chair of Palliative Care and member of the NHMRC Council from 2003 to 2006. In 2002 she was named the Australian Telstra Business Woman of the Year for her entrepreneurial work in health and science.



Adrienne Clarke



Linda Kristjanson

Healthy translator

Professor Ian Frazer will take up a role as chief executive of Brisbane's Translational Research Institute (TRI) from July. The \$354 million institute is the nation's first to convert research into accessible and potentially life-saving health treatments. It is due for completion in 2012. Professor Frazer said if the TRI and its manufacturing capabilities had been established at the time of the development of Gardasil and Cervarix, much more of the economic benefit from its \$5 billion-plus of worldwide sales would have returned to Queensland.

Mining for clean waters

By-product materials generated from mining processing could offer a cost-effective and environmentally-friendly strategy for the removal of nutrients from natural waters or wastewater, a study by the **CSIRO** and the **Western Australian Department of Water** has found.

Following on from CSIRO's success with its Phoslock[®], a product now widely used for the removal of phosphorus from surface water, the four year study [assessed](#) a range of compounds for their ability to remove nutrients or reduce acidity. One by-product, which was tested as a soil additive at turf farms in the Swan Canning catchment, was found to remove 97% of phosphorus and 82% of nitrogen from shallow groundwaters,

Surface skimming of blue-green algae (or cyanobacteria) in the Swan River, Perth, WA, 2000.
image: CSIRO



while also reducing water use and improving turf health. Over the 400 hectares of turf farms under cultivation in the Swan Coastal Plain the use of this by-product could remove around two tonnes of phosphorus

and nitrogen from groundwater each year, by that reducing key nutrients potentially contributing to algal blooms.

The Swan and Canning Rivers and their tributaries are under great pressure from high nutrient concentrations, and were identified as a coastal 'hot spot' by the **Australian Government's Coastal Catchment Initiative (CCI)**. In 2009, the **Swan River Trust** [developed](#) the *Swan Canning Water Quality Improvement Plan*, which aims to reduce the annual nitrogen load of the Swan and Canning rivers by 120 tonnes, and the phosphorus load by 12 tonnes.

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

Doing it abroad

While Australia is eager to attract foreign investment on Australian soil, there are also considerable investment opportunities, particularly for Australian mining technology companies, in resource rich regions elsewhere. This was recently highlighted in reports on increasing Australian investments in Mongolia and Africa.

African adventures...

According to a recent survey by the **Australian Government**, Australia's commercial interests in the African resources sector are [expanding](#) rapidly, almost tripling in number since 2005. There are now approximately 220 Australian mining and oil companies with some 595 projects across 42 countries in

Africa. According to Australian High Commissioner to South Africa **Ann Harrap**, around 48 companies and 143 new projects were added in 2010 alone.

"Australia's mineral and resources companies have more projects in Africa than in any other region of the world, covering all types of mining projects from exploration to smelters and service company offices, and all the major minerals," she said.

This was recently highlighted at one of the world's largest mining trade shows, the Mining Indaba, where Australian companies exhibiting included:

- Queensland company **Runge**, which launched its online mining course Smartminer;
- NSW's aerial survey company, **Hyvista Corporation**, which recently has attracted a major contract to process aerial survey data and produce geological and mineral maps for the **Namibian Geological Survey (GSN)**;
- Victoria's **Gekko Systems**, a mineral processing and gravity solutions company, which has a major presence in Africa with installations of Gekko's latest innovative technology, the 'Python' modular gold processing plant, the first modular plant that can be installed in a conventional five metre by five metre drive close to the mine face.



Gekko System's Python Plant installed near Johannesburg, South Africa
image: Gekko Systems Pty Ltd

...and Mongolian treasures

Austrade has [launched](#) a new report *Mongolian Mining Projects Report 2011*, which outlines investment opportunities in Mongolia, its system of mining regulation and the broader market for resources in North Asia, including rare earths.

Mongolia has some of the world's richest deposits of gold and copper, uranium, coal, fluor spar and rare earth metals.

Australia's Trade Minister **Craig Emerson** said in a Government statement that "many Mongolians are now being educated in Australia under our scholarship programs and then returning to leading roles in Mongolian business and government is also creating closer and friendlier ties".

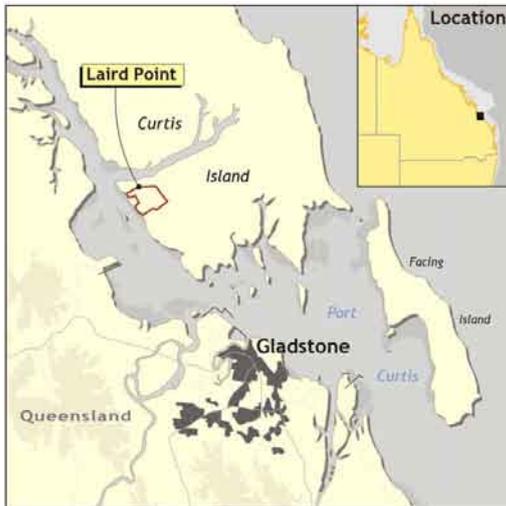
He announced that the Austrade would open a new office in Mongolia in the second half of this year, to provide advice on doing business in Mongolia, arrange appointments with key business and government decision-makers, as well as support business already in the country.

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

And then they were three

After the US\$16 billion **Gladstone LNG (GLNG)** project and the US\$15 billion **Queensland LNG (QLNG)** project, a third Queensland coal seam gas to LNG mega project, the

APLNG project: Location of the planned LNG processing plant
image: APLNG



\$35 billion **Australia Pacific LNG (APLNG)** project, has jumped the final environmental approval hurdle.

Just! The final nod by federal Environment Minister **Tony Burke** has strict environmental conditions attached, after approval was

delayed in December last year when traces of the carcinogen benzene were found in fluid samples from the company's CSG wells in Queensland.

But the **Queensland Government** is now celebrating the prospect of 6000 jobs potentially created through the 50:50 joint venture of **Origin Energy** and **Conoco Phillips**.

The project will exploit Australia's largest CSG reserves after further development of the venture's existing gas fields in the Surat and Bowen basins. The project will include the construction of a 450 kilometre long pipeline connecting the gas fields with a multi-train LNG processing plant to be built on Curtis Island in Gladstone. At completion the plant will produce LNG at a capacity of 18 million tonnes per annum (Mtpa).

Following the approval, the venture signed a Heads of Agreement with **China Petrochemical Corporation** (Sinopec) over the supply of up to 4.3 Mtpa of LNG for 20 years. Under the non-binding agreement, Sinopec will also take on a 15% stake in the venture, which would see the ownership of the two current partners reduced to 42.5% each.

It was a long road travelled, after the Queensland Coordinator-General declared the project as significant in April 2009. In a company statement, APLNG states that it had met with more than 6,000 stakeholders including landowners and non-government organisations during an 18 month period, and had received thirty-six formal submissions from government agencies and the public to secure the first approval on State level in November 2010.

► **More information:** www.environment.gov.au

Australia and the world

According to **CSIRO** estimates, Queensland's total resources of CSG are estimated to be 250 trillion cubic feet (TCF), which is more than the combined known conventional gas resources of Australia.

Globally, *International Energy Outlook 2010* data estimate gas consumption will increase strongly by 44% from 108 TCF in 2007 to 156 TCF in 2035, largely driven by increased

consumption in non-OECD countries, which are also expected to have the highest increases in supply, from 67 TCF to 111 TCF over the period. Australia is estimated to have the strongest growth in natural gas production among the OECD, increasing from 1.7 TCF in 2007 to 4.5 TCF in 2035.

LNG accounts for a growing share of world trade gas with LNG production capacity increasing 2.4 fold to 19 TCF by 2035. Most of the increases in LNG production capacity are in the Middle

East and Australia, which is likely to remain China's main supplier of LNG because of its geographical proximity.

► **More information:** www.eia.doe.gov/oiaf/ieo/nat_gas.html

Weedy business

A new study led by **University of Melbourne's Dr Jane Catford** found that the control of the River Murray's flow by dams and weirs has led to floods now occurring every 24 years instead of every 10 years, and these human-induced changes in the flow of the river have led to mass weed invasion and reduced biodiversity in wetlands along the riverbank.

The introduction of alien plants has dramatically changed the structure and function of these wetlands, which provide crucial habitat and food for a range of birds, fish, turtles and other animals and also play a critical role in filtering water.

These changes to wetland flora have impaired these functions, which contribute an estimated \$2.1 billion dollars annually to the local economy, Dr Catford said.

The study on 24 wetlands also examined the effect of human-mediated weed dispersal, grazing, soil and water characteristics, but flow regulation was clearly the main factor driving weed invasion.

As a result of the evidence, the scientists are now calling for a change in how we manage the flows that are allocated to go back into the environment. The scientists recommend that the limited environmental water available be used to augment natural floods, which typically occur in spring. "Increasing the

Figure 37. Change in World natural gas production by region, 2007-2035 (trillion cubic feet)

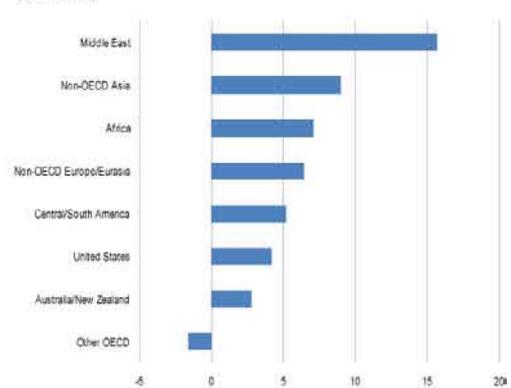
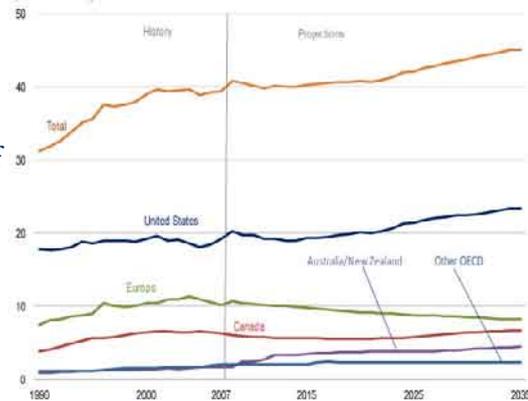


Figure 43. OECD natural gas production by country, 1990-2035 (trillion cubic feet)



size of mid-range floods in particular will kill most of the weeds and will encourage growth and reproduction of native plants.”

► **More information:** <http://newsroom.melbourne.edu/news/n-454>

Domestic fuelling

While Australia's LNG export industry is booming, the domestic use of LNG, although also rapidly **growing**, is still in its infancy, particularly as a fuel for the transport industry. A major reason for this is that the bulk of the industry is located in Western and Northern Australia, far away from major population centres. However, with the development of new gas fields in the Gippsland, Bass and Otway Basins offshore Victoria, and the massive coal seam gas (CSG) reserves in Queensland and New South Wales, a major source of gas emerges closer to the densely populated eastern seaboard.

Taking advantage of this, **BOC Australia** is currently heavily **investing** in establishing a network of LNG refuelling stations on the east coast of Australia. The company was the first in Australia to produce LNG in Australia at a facility in Dandenong, Victoria, opened almost 30 years ago.

It now takes aim at transforming the currently mainly diesel fueled trucking industry. To this end, BOC plans to process natural gas in new Micro LNG plants it will establish at several sites in eastern Australia. In March

last year, the company **signed** a 15 year, \$100 million supply agreement with QGC for the supply of CSG from the Queensland Surat basin, and one of these Micro LNG plants will be constructed close to QGC's **Condamine Power Station**, a project about to start this year.

However, the first example of this type of LNG processing plant, which converts natural gas to LNG and delivers it to transport operators of heavy duty trucks through a network of refuelling stations, was opened in March at Westbury in Tasmania.

At the opening of the \$150 million plant, Premier **Lara Giddings** **said** that using LNG as a fuel not only lessens the transport sector's carbon foot print but is an indigenous fuel that is sourced from Australian resources.

“It offers security of supply compared to other liquid fuels which are predominantly imported,” she said.

► **More information:** www.media.tas.gov.au

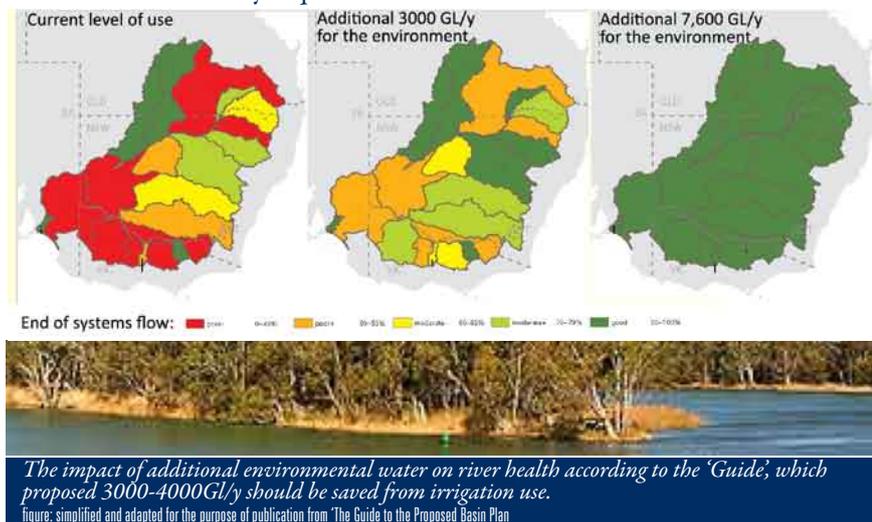


BOC Australia's proposed network of LNG refuelling stations.

Slippery balance

Releasing Victoria's submission to the controversial **Guide to the Murray-Darling Basin Plan**, the **Victorian Government** has formally advised the **Murray-Darling Basin Authority** it will not support the plan in its current form. In January, the State's Water Minister **Peter Walsh** wrote in a letter to former MDBA chair **Mike Taylor** that the Basin plan must seek to balance the social and economic needs of its communities with those of the environment.

“The Victorian Government believes the social and economic impacts of the guide are not yet properly understood,” Mr Walsh wrote, emphasising that two Commonwealth Parliamentary inquiries into these matters needed to be



The impact of additional environmental water on river health according to the 'Guide', which proposed 3000-4000GL/y should be saved from irrigation use. Figure: simplified and adapted for the purpose of publication from 'The Guide to the Proposed Basin Plan'

fully considered before a Basin plan was released for public consultation.

“An effective Basin plan will include environmental engineering works and infrastructure investment to get measurable water savings for the environment, rather than drastic cuts in water entitlements held by food producers,” Mr Walsh said. A new process would:

- be based on an agreed vision for the Basin;
- support agreed environmental, social and economic outcomes;
- be informed by comprehensive evidence and analysis;
- be developed through open and informed community-based decision making;
- provide smart and efficient solutions for the environment and consumptive water users;
- support communities through change;
- set out clear implementation pathways and clearly defined roles and responsibilities;
- maintain business and community confidence; and
- use a management approach that builds on existing knowledge, compacts and programs, including the **Murray-Darling Basin Agreement**, **Living Murray Initiative**, **Water for Rivers** and other relevant COAG commitments and agreements.

► **More information:** <http://premier.vic.gov.au>

Talkin' 'bout next generation

Global IT company **Hewlett-Packard** (HP) will establish a multi-million dollar **Next-Generation Data Centre** in Western Sydney, a move welcomed by the Minister for Broadband, Communications and the Digital Economy, **Senator Stephen Conroy**. He said the centre “will provide vital infrastructure that will, among other things, allow more Australian businesses to move their IT operations to cloud computing, thereby reducing costs and improving information sharing”.

According to HP, the centre will be operational by the end of 2011 and will help businesses to become Instant-On Enterprises – “where technology is embedded in everything they do to serve customers, employees, partners, and communities with whatever they need, instantly”. The company says the centre will feature an architecture that integrates server, storage, networking and management resources into a modular design adaptable to future IT requirements.

HP expands its commitment in Australia – “home to one of the world’s top 10 financial centres and a growing base for multinational companies” – as part of the company’s US\$1 billion transformation to retire legacy assets and build new, modernised facilities.

► [More information: www8.hp.com](http://www8.hp.com)

Risky connectivity

The **Kokoda Foundation** has launched a report *Optimising Australia’s Response to the Cyber Challenge* which identifies cyber security as a “fundamental” weakness in Australia’s national security. According to the report, the evolving threats rapidly outpace the Government’s cyber responses despite progress being made in implementing the *2009 Cyber Security Strategy*.

Australia has the fifth-highest level of malware infections in the world and this could endanger critical infrastructure such as electricity grids, water storage and distribution, aviation and maritime transport and telecommunications networks. Recommendations to address this include:

- assigning the lead to coordinate cyber-related security issues across government to the **Office of the National Security Adviser**;
- appointing a Minister with oversight responsibility for cyber issues, together with a ministerial committee such as a sub-group of the **National Security Committee of Cabinet**;
- developing a **National Cyber Strategy** to provide a 10-year vision of what needs to be achieved in the security and management of cyberspace in Australia; and,
- disconnecting the power grid and any control system transporting people, managing gas or petrol production or controlling the flow of water from the wider Internet.

The report highlights challenges to cyber security that could come with the **National Broadband Network** (NBN), as



high-speed broadband services through fibre-optic cable are set to reach an estimated 93% of households.

As responsibility for maintaining cyber security will rest with retail service providers rather than **NBN Co**, the rollout of the NBN could present a significant opportunity to engage the public for a better understanding

of the vulnerabilities that exist and that could be exploited. Any delay in taking action may prove utterly unaffordable in the long-term, the report says.

Welcoming the report, Attorney-General **Robert McClelland** said the *2009 Cyber Security Strategy* was at the heart of the Government’s response and has led to date to initiatives including the establishment of a **Computer Emergency Response Team** (CERT Australia) and a **Cyber Security Operations Centre** (CSOC) in the **Defence Signals Directorate** (DSD), as well as a **Cyber Policy Coordinator** within the **Department of the Prime Minister & Cabinet**.

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

NICTA wonders

Picture hunt

Australia’s ICT Research Centre of Excellence, the **National ICT Limited** (NICTA), has joined forces with **Microsoft Research Australia** in a project, which will use technology developed by NICTA’s for the automation of video surveillance systems to improve online image and video searches. These are at present largely based on textual information in titles, tags or descriptions.

By contrast, NICTA’s technology, which recognises and models video-based actions, will allow for a hierarchical search process integrating action words from titles and descriptions with action segments in the video, thereby including visual similarities in the search. The NICTA team will develop



algorithms and prototype software and test them using Microsoft's video metadata.

It will be the first such project between Microsoft Research Asia and NICTA.

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

Fool proof computing

Following the first formal machine-checked proof of a new general-purpose operating system kernel seL4 in 2010, NICTA's spin-out company **Open Kernel Labs** (OK Labs) has now released the microkernel software under the **OKL4 Verified**

brand name.

A kernel is a central component of a computer operating system connecting application software to hardware components. The seL4 kernel is unique in providing a flawless performance of computer systems with a mathematically guaranteed reliability previously not possible. Because it is mathematically proven to operate correctly, trusted and

un-trusted software can be separated, protecting critical services from failure or malicious attack. For example, seL4 could ensure that on a mobile phone trusted financial transaction software from secure sources such as banks or stock exchanges can operate securely alongside 'untrusted' software, such as games downloaded from the Internet. It could also provide a secure and reliable environment for mission-critical defence data, operating on the same platform as everyday applications like



Function call graph showing the complexity of the seL4 kernel software with each dot representing a C function in the kernel.

email. NICTA's team leader **Gerwin Klein** said the seL4 kernel is the only kernel with a source code mathematically proven to implement its specification correctly - the fruit of a combined 15 years of research at NICTA and the **University of New South Wales**.

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

Decongestive opportunity

In 2010, NICTA entered a 5 year collaborative agreement with the German **Fraunhofer Institute for Experimental Software Engineering** (IESE), with both organisations committing \$11 million to a joint project group tackling problems in the transport and logistics sector.

Led by **Dr Mark Staples**, the **Fraunhofer Project Group on Transport and Logistics** has now [launched](#) its first project, the **Future Logistics Living Lab** at Sydney's **Australian Technology Park**. The project is a collaborative innovation network, which provides a physical platform for users to showcase and validate next-generation technology. The project brings together logistics companies, research organisations, universities, and IT providers for the development of new smart technology solutions that can improve transport and logistics productivity.

The founding members of the first such laboratory in Australia and the only Living Lab in the world with university and industry participation dedicated to logistics – are joined by the **NSW Government**, two universities and eight leading logistics and IT companies in the venture.

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

Administrative helper

The placing of students in work, training and study programs is a considerable administrative challenge

In 2010, Victorian company **QuantumIT** launched a new online web based solution for the management of student placements by university, TAFE and other education providers. Implemented in three Australian universities, The **InPlace** system is now also successful internationally, after six UK universities signed a deal for the technology to manage their health faculty work placement program.

According to Quantum IT managing director **Guthrie White**, the company's technology is 1-2 years ahead of competition and is expected to expand the user base for InPlace throughout Australia and overseas in the next 12 months. "With almost 300 universities and higher education institutes in the UK alone, we have a great opportunity there."

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

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