

R&D

REVIEW

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*Linking Australian Science,
Technology and Business*

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R&D and climate change

This month three major reports were released dealing with aspects of R&D and climate change:

Garnaut report

In his interim report on climate change released in February, **Professor Ross Garnaut** states that Australia has the human and natural resources to do relatively well within an ambitious international mitigation of climate change effort. Australia's advantages include:

- an exceptional human resource based in engineering, management and finance related to the resources sector, placing it well for competitive participation in innovation in the emerging, low emissions industries. This strength is already providing a basis for important new export industries, which will be greatly strengthened by Australia moving from the rear to the middle ranks of developed countries in its domestic mitigation efforts;
- major exports of minerals, notably uranium, and natural gas, an advantage in the context of a strong international mitigation effort;
- exceptionally rich resources for renewable energy – solar, geothermal and wind energy and possibly tidal and wave power and biofuels – on a per capita basis, amongst the most favoured few in the developed world;
- large deposits of high quality (i.e. low emissions per unit of energy) coal, which means that it's share of global coal supply would increase in a world of comprehensive mitigation;
- exceptionally good sites for carbon capture and storage (CCS), which, should CCS technology be successful commercially, would support strong expansion of the Australian coal-based energy industry;
- large livestock industries that are less emissions-intensive than competitors in the Northern Hemisphere, and which would gain competitively if incorporated into a comprehensive regime of greenhouse gas pricing;
- Australia's past profligacy in energy use has left an exceptional legacy of opportunities for low-cost energy savings in business and amongst households.

How Australia fares under all but the 'business as usual' scenario will depend crucially on whether it is able to implement a coherent set of

policies that remain stable over long periods.

There is a strong case for high investment in the early years in research on climate change, and in research, development and commercialisation of mitigation technologies and approaches, to reduce the uncertainty on both sides of the equation.

New technologies will be needed in energy production, new manufacturing techniques and the development of new product lines. Establishing a credible and efficient Emissions Trading Scheme (EFT) will address the primary market failure of uncapped greenhouse gas emissions and will encourage research and development on low-emissions technology. However, the public good nature of basic research and the positive externalities of innovation mean that simply establishing a price on emissions is not enough.

Of particular importance is the development of low-emissions technologies for the energy sector. In 2005, emissions from energy-related sectors accounted for almost 70% of total greenhouse gas emissions. Stationary energy alone accounted for 50% of emissions and was the source of the largest percentage increase in the 15 years from 1990 to 2005. These contributions are much higher (42.6%) than for other developed countries, which have proportionately more stationary energy coming from renewable sources.

According to Garnaut, basic research is a non-rival public good because, once it has been created, its use by one agent does not reduce the amount or quality available for use by others. This makes it undesirable to ration access to it. It is also non-excludable, as once supplied it is hard to deny access to other users, and hence its benefits cannot be captured by the entity that conducts the research. These features provide a rationale for government funding and support in the early stages of R&D. The research



PHOTO: modified from Eric-posters.com

outcome may have no immediate commercial application, but is widely applicable, easily transferable, and bears public good characteristics.

Australia's total expenditure on R&D relevant to transition to an emissions-constrained economy should be seen as a contribution to international public goods. It should be calibrated to represent a proportionate contribution to a global R&D effort by developed countries, focussing on areas of Australian comparative advantage. This, in turn, can play an important part in a wider international agreement on mitigation.

Garnaut says that despite the desire to avoid 'picking winners', there is inevitably a good deal of discretionary judgement in decisions on allocation of public funding for public goods R&D. The important thing is that institutional arrangements for allocating funding apply appropriate expertise in a disciplined manner, and take appropriate account of Australian comparative advantage. This will be discussed at greater length in the full reports to be issued later in 2008.

► **More information:** www.garnautreview.org.au

McKinsey report

"Significant reduction in Australian greenhouse gas emissions is achievable – 30% below 1990 levels by 2020 and 60% by 2030 – without major technological breakthroughs or lifestyle changes. These reductions can be achieved using existing approaches and by deploying mature or rapidly developing technologies to improve the carbon efficiency of our economy." This is the conclusion of a new report *An Australian Cost Curve for Greenhouse Gas* issued by the **McKinsey Company** a few days before the Garnaut Report.

This report says achieving significant emissions reductions requires prompt action from government, business and consumers, which includes fast tracking the commercialisation of key technologies.

McKinsey analysed abatement opportunities grouped into six industry sectors: power, forestry, industry, building, agriculture and transport. R&D on abatement opportunities in some of these sectors are listed as:

- power – carbon capture and storage for coal and gas, onshore wind and geothermal power;
- industry – improving electric motor efficiency and reducing fugitive emissions of methane from natural gas production and the mining of black coal;
- building – improving commercial air handling, air conditioning and

residential water heating systems;

- agriculture – changes in tillage, improved fertilisation techniques and methane capture from landfill sites; and
- transport – biofuels and increased fuel efficiency, hybrid vehicles.

McKinsey recommends that governments ensure funding supports R&D of low-emissions technologies (such as carbon capture and storage, biomass, geothermal, solar, improvements in vehicles, industrial processes and appliances). The aim should be to fast track development and deployment to the point that technologies become cost competitive.

► **More information:** www.mckinsey.com/client/service/ccsi/pdf/Australian_Cost_Curve_for_GHG_Reduction.pdf

REN21 Report

A report on the global status of renewable energies in 2007 by the **Renewable Energy Policy Network for the 21st Century**, REN21, states that in 2007 more than \$100 billion was invested in new renewable energy capacity, manufacturing plants, and research and development. "So much has happened in the renewable energy sector during the past five years that our perceptions lag far behind the reality of where the industry is today," comments *Mohamed El – Ashry*, chairman of REN21.

The report covers trends in global markets, investments, industries, policies and rural (off-grid) renewable energy. Key points include:

- Renewable electricity generation capacity reached an estimated 240 gigawatts (GW) worldwide in 2007, an increase of 50% over 2004. Renewables represent 5% of global power capacity and 3.4% of global power generation. (Figures exclude large hydropower, which itself was 15% of global power generation).
- Renewable energy generated as much electric power worldwide in 2006 as one-quarter of the world's nuclear power plants, not counting large hydropower. (And more than nuclear counting large hydropower).
- The largest component of renewables generation capacity is wind power, which grew by 28% worldwide in 2007 to reach an estimated 95 GW. Annual capacity additions increased even more: 40% higher in 2007 compared to 2006.
- The fastest growing energy technology in the world is grid-connected solar photovoltaics (PV), with 50% annual increases in cumulative installed capacity in both 2006 and 2007, to an estimated 7.7 GW. This translates into 1.5 million homes with rooftop solar PV feeding into the grid worldwide. Rooftop solar heat collectors provide hot water to nearly 50 million households worldwide, and space heating to a growing number of homes. Existing solar hot water/heating capacity increased by 19% in 2006 to reach 105 gigawatts-thermal (GWth) globally.
- Biomass and geothermal energy are commonly employed for both power and heating, with recent increases in a number of countries, including uses for district heating. More than 2 million ground-source heat pumps are used in 30 countries for building heating and cooling.
- Production of biofuels (ethanol and biodiesel) exceeded an estimated 53 billion litres in 2007, up 43% from 2005. Ethanol production in 2007 represented about 4% of the 1,300 billion litres of gasoline consumed globally. Annual biodiesel production increased by more than 50% in 2006.

► **More information:** www.ren21.net/pdf/RE2007_Global_Status_Report.pdf

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Cars in focus

The Minister for Innovation, Industry, Science and Research, *Senator Kim Carr*, has announced a comprehensive review of Australia's automotive industry to be conducted by *Mr Steve Bracks*, former Premier of Victoria. The review will consider the impact of global concern about climate change and the impact of changing consumer vehicle preferences on the industry. This will help to inform the implementation of the Government's \$500 million Green Car Innovation Fund.

Mr Bracks will be supported by an expert panel comprising:

- *Mr Tim Harcourt*, chief economist, **Australian Trade Commission**;
- *Mr Peter Upton*, former chief executive officer, **Federation of Automotive Products Manufacturers**;
- *Dr Elizabeth Webster*, principal research fellow, **Melbourne Institute of Applied Economic and Social Research**; and
- *Mr Nixon Apple*, industry and investment policy adviser, **ACTU**.

The review will consult widely with stakeholders and will call for public submissions. It will provide an interim report to the government by 31 March 2008, with a final report to be completed by 31 July 2008. The automotive review will take place concurrently with the recently announced review of Australia's national innovation system and will have regard to the issues raised in that review.

The panel has been asked to make recommendations including measures to boost innovation in the sector and take advantage of the innovative nature of the automotive industry.

- ▶ **More information:** www.innovation.gov.au/automotivereview/Pages/ReviewofAustralia'sAutomotiveIndustry.aspx

Biosecurity review

Australian Minister for Agriculture, Fisheries and Forestry *Tony Burke* has announced details of a comprehensive, independent review into Australia's quarantine and biosecurity systems. The Minister said he had appointed consultant and former secretary of the **Department of Environment and Heritage**, *Roger Beale*, to head the review. Other members of the review panel are former deputy chairman of the **Quarantine Export Advisory Council**, *Andrew Inglis*; a commissioner of the **National Water Commission** and former **National Farmers' Federation** deputy executive director, *David Trebeck*; and former executive director of the **Australian Poultry Industries Association**, *Jeff Fairbrother*.

This is the first major review of quarantine and biosecurity since the former Labor Government commissioned a review by *Professor Malcolm Nairn* in 1995. The independent review will consider a range of issues including:

- the functions of the **Australian Quarantine and Inspection Service (AQIS)** and **Biosecurity Australia**;
- the effectiveness of import and export inspection and certification;
- the scope and adequacy of the current animal and plant quarantine arrangements; and
- previous reports on Australia's quarantine and biosecurity arrangements.

Specifically, the panel is to provide recommendations on the appropriateness, effectiveness and efficiency of:

- current arrangements to achieve Australia's appropriate level of protection;
- public communication, consultation and research and review processes;
- resourcing levels and systems and their alignment with risk in

delivering requisite services; and

- governance and institutional arrangements to deliver biosecurity, quarantine and export certification services.

In undertaking this review, the panel should consult with relevant domestic and international stakeholders and, where appropriate, benchmark Australia's arrangements in an international quarantine context. The panel will take into account the 1996 Nairn Review into quarantine, and other relevant reports, and is due to deliver its report and recommendations to the Minister by 31 July 2008.

The independent panel review process will run separately to the commission of inquiry into the outbreak of equine influenza being conducted by *Mr Ian Callinan*.

- ▶ **More information:** *Ann-Marie Wilcock*, 0413 872 275

Cashed up

More than \$124 million will be invested by the **Australian Government** in new medical and health research projects through the **National Health and Medical Research Council (NHMRC)**:

- \$74.8 million will be for 133 fellowships, 171 scholarships and 75 career-development and training awards to help Australian researchers further their careers.
- \$48.4 million will be for four program grants, allowing leading Australian researchers to pursue collaborative work into cardiovascular disease, colon cancer, HIV/AIDS, and hepatitis C and contribute at an international level:

– *Professor Antony Burgess*, from the **Ludwig Institute for Cancer Research**, will receive \$19.6 million to research new ways to detect colorectal cancer.

– *Professor David Cooper*, from the **University of New South Wales**, will receive \$17.7 million to undertake studies to better understand immunity against HIV and Hepatitis C. The program combines researchers with skills in virology and immunology with those who have expertise in translating findings in the laboratory into human clinical trials.

– *Professor Patrick Sexton*, from **Monash University** and his team of researchers, will receive \$6.5 million to reduce the "hit and miss" in the development of drugs used to treat human disease. He will study how the fundamental properties of important receptor targets of diseased cells work. This will help with the development of new drugs to treat metabolic, cardiovascular and central nervous system disease.

– *Professor Thomas Marwick*, from the **University of Queensland**, will receive \$4.5 million to study the most effective treatment of patients at risk of cardiovascular disease or its complications. The disease study will consider a screening program for pre-clinical vascular disease, a screening and management program for atrial fibrillation and a program for more effective identification of treatment response in patients with congestive heart failure.

- \$0.83 million will be to facilitate international collaboration with research institutions and researchers in the EU and China.

Recipients include:

– *Professor Nick Martin*, from the **Queensland Institute of Medical Research**, to map the genes responsible for causing migraines. Professor Martin is internationally recognised in his field for using twins and families to investigate genetic traits.

– *Professor Georges Grau*, from the **University of Sydney**, to investigate cerebral malaria, a life-threatening complication of infection caused by parasites. The project aims to study the

characteristics of the endothelial micro-particles released during cerebral malaria, in relation to clinical symptoms, disease severity and disease outcome.

In addition, funding has been provided to two international researchers to enable them to provide training in basic clinical or public health research within the biomedical sciences in Australia. The training fellowships are offered through a French **Institut national de la sante et de la recherche medicale** (INSERM) exchange fellowship. INSERM Fellow **Mr Ziad Touat** has been awarded funding to further his research into vascular biology and serious heart conditions. He will collaborate with **Monash University**. **Dr Luciano Pirola**, also an INSERM fellow, has been awarded funding for further research into epigenetic control in type-2 diabetes. He will collaborate with **Baker Heart Research Institute** in Victoria.

► **More information: Michelle Wells, 0422 008 512, www.nhmrc.gov.au**

Helping hands

As a first step in the process of improving the quality and effectiveness of Australia's overseas aid, the **Australian Government** is implementing an enhanced three-year Development Research Strategy and will provide \$8.8 million for 27 new Australian Development Research Awards (ADRA).

The Development Research Strategy includes more research funding, higher quality research, improved communication and sharing of research findings, a commitment to build research capacity in the Asia-Pacific region, and a focus on research into the problems facing fragile states. The strategy will also strengthen important research partnerships across the Australian Government and with major donors in the region.

This inaugural round of the ADRA will fund 27 research proposals including seven proposals from overseas-based institutions. Through these awards, Australia's research base will be strengthened in six key sectors: economic growth, gender equality, humanitarian assistance, health systems, HIV/AIDS and environment, forests and climate.

► **More information: Sabina Curatolo, 0400 318 205**

Biotech booms

Australian and New Zealand biotechnology companies are performing surprisingly well, despite low share prices, poor media interest and funding difficulties, according to a recent report by **Innovation Dynamics Pty Ltd**. The study focused on companies' underlying operational performance indicators. The data and analysis reveal that a number of major biotechnology and medical devices companies will complete pre-market clinical trials in the next couple of years and launch new products. In addition, the study found that the number of companies involved in clinical trials increased 40% over the 12 month period, with over half of these companies entering into later stage, phase II or III trials.

Dr Kelvin Hopper, executive chairman of Innovation Dynamics and co-author of the review, says: "We have been monitoring the industry for many years and we believe it poised for real growth as the top companies start to earn revenues for the first time."

Further analysis of the biotechnology sector showed that over 460 research and commercialisation alliances were announced between the life science companies and major research institutions. Over 70% of these alliances were with overseas organisations. Dr Hopper says: "These alliances are essential to strengthen these companies and increase the chances of their reaching specified milestones and markets. There has also been greater use of hybrid business models as companies try to balance

the need for development funds with revenues generated from the sale of products or royalties or investor finance. Medical devices companies especially are doing well, with more than half of the listed companies exceeding over \$1 million in revenues from operations."

The 2008 BioIndustry Review was launched in late February.

► **More information: Dr Kelvin Hopper, 0412 607 448, www.innovationdynamics.com.au**

Era of quality

The Minister for Innovation, Industry, Science and Research, **Senator Kim Carr**, has announced his plans for a new research quality and evaluation system, the Excellence in Research for Australia (ERA) initiative, which will be developed by the **Australian Research Council** (ARC) in conjunction with the **Department of Innovation, Industry, Science and Research** (DIISR).

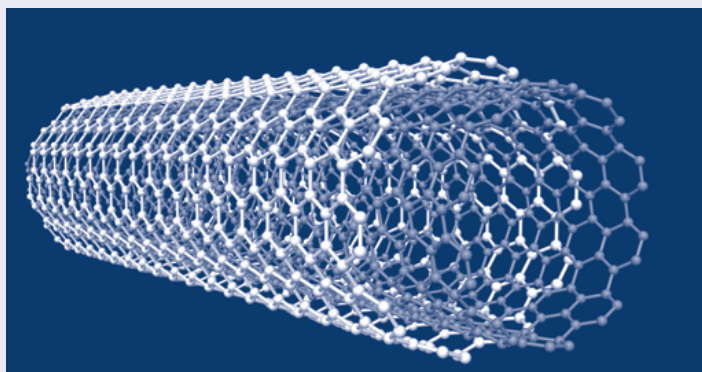
Replacing the now defunct Research Quality Framework, it will assess research quality using a combination of metrics and expert review by committees comprising experienced, internationally recognised experts.

"ERA will use leading researchers to evaluate research activity progressively in each of the ARC discipline clusters and several clusters covering health and medical research that will be informed by experts from the National Health and Medical Research Council [NHMRC]," says Senator Carr. "Each cluster report will detail by institution and by discipline those areas that are internationally competitive, together with emerging areas where there are opportunities for development and further investment."

ERA will start with those disciplines where the metrics are most widely accepted, for example, in the physical and biological sciences. In parallel, consultations with other disciplines will continue about metrics appropriate to their disciplines. Senator Carr says that some measures will be appropriate to all disciplines and that for all disciplines expert review of the metrics will be essential.

ERA will build on work done to date in defining areas of strength, and will aid the development of the 'hubs and spokes' model for research infrastructure that is based on all universities having centres of excellence in specified fields. It will also assist with the Government's plans to introduce funding compacts for universities. Until ERA is fully developed, the current arrangements for the block grants funding will be maintained and will remain the responsibility of the DIISR.

► **More information: Catriona Jackson (DIISR), 0417 142 238; Fiona Skivington (ARC), 0412 623 057**



Mark Seggie (Resin Design, Victoria): 'Nanotubes'; see 'In Focus', p. 23

By Julian Cribb
 ADJUNCT PROFESSOR OF SCIENCE COMMUNICATION AT UTS

Committed to a nanoblunder?

There are few more exciting scientific fields today than nanotechnology. The rush by research institutions to set up new nanocentres and nanoteams has been one of the most positive episodes in recent Australian research investment.

But is the nanobrigade about to make the same mistake as the biobrigade? Will they do magnificent science, only to see it rejected, stalled and criticised by society? Will the investment fail to deliver because nobody bothered to ask: is the community prepared to accept it?

I was somewhat shocked, in attending a conference of molecular biologists, to discover most had quit the field of gene transfer and were instead focusing on gene markers. This was clearly a market reaction by scientists (and science funders) to the market reaction by farmers who in turn were responding to the market reaction to GM food by consumers and governments.

This outcome was probably totally unnecessary. Public opinion research clearly suggests most consumers would eat GM food, provided it was safe and had an obvious benefit to them. Unfortunately, most of the early trans-genes used were to the selfish benefit of the corporate and scientific institutions, not consumers – though this is now starting to change.

By picking the wrong genes, science set back public acceptance of GM food in Australia at least 10 years, maybe an entire generation. It wasted millions of dollars and not a few scientific careers, all because of a faulty, untested assumption that people would accept it. There are signs the nanofolk are heading down the same track.

Scientists bewail the lack of scientific literacy in the community, but rarely accept the corollary: a more scientifically literate public asks harder questions. As pounded by former UK Chief Scientist, Bob May: if you teach 'em more science, they become more like scientists, i.e. sceptical. If we want a knowledge society, then listening and responding to its concerns is something science needs to get its head around.

Nanotech has several handicaps. First, it is highly complex and most people have only a dim idea what it is about. Much of the language is opaque and alienating. Second, there are unanswered questions about the safety of (quantum) nano devices and how they will interact with living tissue.

Third, there has been a lot of hype about wonderful new applications, which makes the public nervous about the inevitable downsides they are not being told about.

Fourth, major investors include defence establishments, who clearly hope nanotechnology will deliver better ways to kill people. Harmful applications are already in contemplation and the public is aware of this.

Fifth, quantum computers and nanobots/nanosensors - once invented - will have undreamed-of power to amass data on every person living in an advanced society and to observe, store, mine and analyse their words and deeds over a lifetime.

This could become the worst assault on personal liberty in history and nanotech experts have few answers for how it is to be prevented and give an impression of not caring.

As with GM, while there are benefits to industry there are, so far, few obvious consumer benefits on offer (except maybe sunscreen and self-cleaning paint!).

There has been almost no dialogue to determine how society wishes nanotech to be applied or regulated. This smacks of technocratic arrogance and “we know what’s best for you” and begs for technology

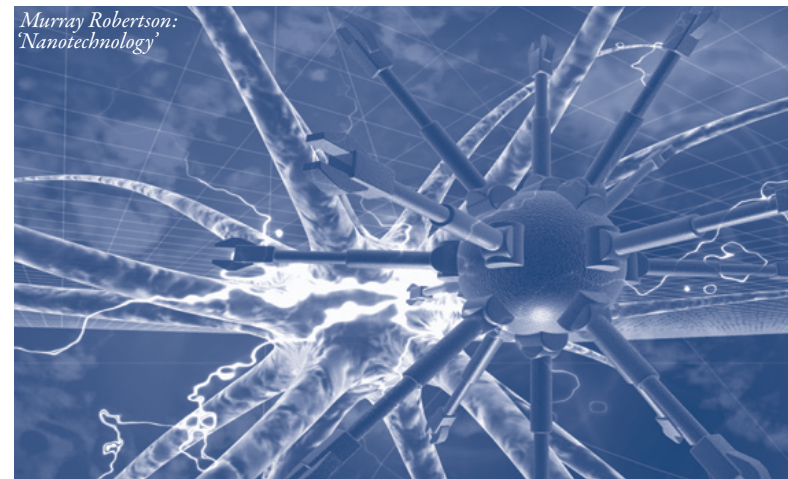
rejection. Also, most nanotech research is publicly funded, yet many outcomes are likely to be secretively privatised, irritating the taxpayers who paid for them.

These concerns add up to a perception of ‘loss of control/freedom’ on the part of society in determining how nanotechnologies are applied, which is likely to generate anger, concern and resistance, calls for regulation and moratoria. In some cases this may include loss of public sanction to perform research.

If Australia aspires to be a leading player in the introduction and application of nanotech then it must ensure there is:

- effective public dialogue and consultation on the technology and its application;
- much better communication on what nanotech is, what it does or can do, and what its drawbacks are;
- transparency and opportunity for public scrutiny;
- independent (not in-house) ethical oversight;
- proof that science is investigating potential risks and downsides;
- regular consultation on how the public would like to see the technology applied for their benefit;
- new human rights that protect freedoms against intrusive new technologies;
- adequate regulation and oversight.

The irony in all this is that science, which relies on data to form its views of the world, prefers to use gut instinct (usually wrong, as scientists are not typical members of society) when it comes to assessing the willingness of the public to adopt new technologies.



With statistician Dr Nick Fisher, I have been working on a technique that enables scientists and scientific institutions to ‘listen in’ to what the public is thinking, to understand more clearly what is behind their views – and to take early action to avoid technology rejection, or to identify new market opportunities.

This technique is low cost, based on sound statistical principles and provides a “moving picture” (as opposed to a snapshot) of what the public thinks on a given topic. It is still experimental, but already promises to deliver what scientists need to know about the probable societal response to new and disruptive technologies.

At the end of the day, the future of a nation depends less on the quality of its science than on its ability to rapidly adopt high quality science and turn it into prosperity, social and environmental wellbeing. In order to do this it is essential to know what society is thinking.

An effective dialogue will put Australia at the world forefront in nanotech application and adoption. Its absence may torpedo our efforts.

Uneven comfort

The **Swinburne** National Technology and Society Monitor (SNTSM) has provided its 2007 'snapshot' of public perceptions of new technologies, science and technological change.

The main findings are that Australians are comfortable with the rate of technological change in general, but the degree of comfort varies for specific technologies. They are much more comfortable with the thought of wind farms than with the thought of nuclear power in Australia.

Significant differences in comfort ratings for nuclear power are related to gender and political affiliation – men and Liberal voters are more comfortable with nuclear power than women and Labour voters.

The degree of comfort with genetically modified (GM) plants and animals for food is relatively low, but is higher for GM plants for food than with GM animals for food.

Australians trust scientific institutions and the non-commercial media for information about new technologies. They report high levels of trust in their family doctors and report similar levels of trust in medical specialists as in scientific institutions. They do not trust government institutions, major companies or the churches, and have the least trust in the commercial media.

The specific aims of the SNTSM are to gauge public attitudes and perceptions of emerging technologies and science in order to compare Australia with other countries, examine attitudes toward controversial technologies (e.g., stem cell research, DNA paternity testing) and emerging technologies with important social consequences (e.g., the digital divide, internet relationships). The surveys also examine patterns of change in attitudes and perceptions over time, and explanations for these changing patterns.

► **More information:** www.swinburne.edu.au/lss/acets/monitor.html

Glowing damage

Australian chemists have devised a novel way to see the level of damage plastic has suffered from environmental exposure by making it glow.

"What makes this technique unique," says **Dr Kathryn Fairfull-Smith** from the **Queensland University of Technology** and member of the **ARC Centre of Excellence for Free Radical Chemistry and Biotechnology**, "is that we have designed a molecule with two functions.

The first is that the molecule begins to glow as the plastic is damaged by free radicals, which themselves form as a result of environmental exposure. The second function is that the mechanism which turns on the 'glow-switch' also acts as a trap for the free radicals so that plastic degradation is retarded."

The new research, published in the **American Chemical Society's** journal *Macromolecules*, is more sensitive than current techniques at detecting free radicals that cause changes in the plastic during the initial stages of environmental degradation.

The process that causes plastics to become brittle and paintwork to flake is brought about by free radicals, which form following exposure to the sun. "We can't stop the sun from shining," says Dr Fairfull-Smith. "However, with our new compound we are able to lock-up the free radicals so that degradation is slowed down and see in real time the damage that is being done."

► **More information:** **Dr Kathryn Fairfull-Smith, 0431644356; Felicity Jenz, 0404804384, felicity@freeradical.org.au**

Fish talk

The spectacular colours of coral reef fishes represent a 'language' that has been around for at least 50 million years – to which humans have lost the key. Colour in fish is most probably a highly developed form of communication, some of which we can interpret, but much of which remains cryptic, says **Professor David Bellwood** of the **ARC Centre of Excellence for Coral Reef Studies** and **James Cook University**. "By brightening or darkening their hues they can display aggression or fear, identify mates, advertise status, hide from danger and probably many other things we can only guess at."

Professor Bellwood studied preserved fossil specimens of reef fish from Monte Bolca, Italy, which reveal that even as far back as 50 million years ago fish were spotted, striped and probably highly coloured. "If it has lasted this long, bright colouring is clearly a highly successful trait. The odd thing is that mammals, including humans, appear to have lost it," says Professor Bellwood. "We know the colours that contrast most strongly under water are blue and yellow, and that blue and yellow fish tend to have more yellow stripes towards the back end. This may be a way of drawing the predator's eye in the wrong direction."

In such ways fish colour appears to communicate both information – useful for finding mates and advertising status in the pecking order – and disinformation, intended to mislead predators and competitors, and this ambiguity makes it hard to interpret, says Professor Bellwood.

"We do know that the most brightly coloured fish are associated with very clear waters – round coral reefs and in the Great Lakes of Africa, for example. But the meaning their colours convey is still not entirely clear, despite many decades of scientific study."

► **More information:** www.coralcoe.org.au/news_stories/fishcolour.html

Heated strength

Car components with doubled mechanical strength, higher fatigue resistance and improved energy absorption are the result of a revolutionary **CSIRO** heat treatment process for high pressure die casting (HPDC) of aluminium.

"Our heat treatment methods offer major improvements in tensile mechanical properties and enhancement of a range of other material properties for HPDC components," says metallurgist **Dr Roger Lumley**

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of the CSIRO Light Metals Flagship. “Components treated with the new process do not show surface blistering or dimensional changes, they retain an as-cast appearance.”

Fatigue resistance of aluminium HPDC components heat-treated with the new process can be as high as for some wrought aluminium products, tending towards limiting behaviour usually observed in steel. The new procedures may also substantially raise energy absorption during fracture, which has significant implications for crash-sensitive structural components made by high pressure die-casting. For example, one common secondary alloy almost doubles in energy absorption when heat treated specifically for this purpose.

Additionally, treated parts exhibit thermal conductivity about 20 per cent above their as-cast status, meaning that for engine or transmission applications heat can be transferred or removed more efficiently and quickly. Potentially, since heat extraction operates more effectively, heat-treated HPDC parts could operate with lower amounts of fluid in cooling and lubrications systems.

The heat treatment process can easily be implemented in existing manufacturing facilities using conventional heat treatment equipment such as continuous belt furnaces, fluidised beds or furnace systems designed specifically for rapid heat treatment.

► **More information:** www.csiro.org/news/mediacentre/whatsnew.html

Viral pressure

Researchers at Adelaide’s **Women’s & Children’s Hospital** and the **University of Adelaide** have made a world-first discovery that links viral infection with high blood pressure during pregnancy and pre-term birth.

The research findings, published in the *British Journal of Obstetrics & Gynaecology*, are a major step forward in unravelling the mystery of the cause of high blood pressure in pregnancy.

The research has been conducted by the South Australian Cerebral Palsy Research Group, based in the University of Adelaide’s School of Paediatrics & Reproductive Health and the Women’s and Children’s Hospital Microbiology & Infectious Diseases Department.

Their work demonstrates, for the first time, that exposure to viral infection - especially viruses of the herpes group - may be associated with pregnancy-induced hypertensive disease (pre-eclampsia) and also with pre-term birth.

The research discovered the presence of viral nucleic acid in heel-prick blood samples from 1326 newborn babies, taken over a 10-year period. More than 400 of these babies were diagnosed with cerebral palsy.

“This is an exciting finding and further studies are now required to look at the link between viral exposure in pregnancy and genetic susceptibility to adverse pregnancy outcomes, such as high blood pressure, premature delivery and cerebral palsy,” says **Professor Alastair MacLennan**, leader of the research group.

The group has also found an association between several hereditary gene mutations with changes in inflammatory proteins that may cause dysfunction and constriction of the blood vessels of the placenta and brain, thus causing the rise in blood pressure in pregnancy. If not controlled, this can be lethal.

“We are just beginning to understand the interaction and importance of exposure to viruses and genetic susceptibility to infection both in pregnancy and the newborn,” says **Associate Professor Paul Goldwater**, the virologist with the team.

► **More information:** www.adelaide.edu.au/news

Gas finger

Like a fork piercing a fried egg, a giant finger of hydrogen gas is poking through our Milky Way Galaxy from outside, astronomers using **CSIRO** radio telescopes at Parkes and Narrabri have found.

The location of the intrusion may give a crucial clue to the fate of the little galaxies the gas flows from, the Large and Small Magellanic Clouds.

Research team leader **Dr Naomi McClure-Griffiths** of CSIRO’s Australia Telescope National Facility says that “...it is usually extremely hard to get distances to such gas features”.



Gas streaming from the Magellanic Clouds is piercing the disk of our Milky Way

The gas finger, called HVC306-2+230, is running into the starry disk of our Galaxy about 70 thousand light-years (21kpc) away from us. In the sky, the point of contact is near the Southern Cross.

The finger is the pointy end of the so-called Leading Arm of gas that streams ahead of the Magellanic Clouds towards the Milky Way. Knowing where the Leading Arm is crossing the Galactic Disk may help astronomers to predict where the clouds themselves will go in future.

Until last year, astronomers generally thought that the Magellanic Clouds had orbited our Galaxy many times, and were doomed to be ripped apart and swallowed by their gravitational overlord. But then new Hubble Space Telescope measurements showed the clouds were moving much faster than previously thought. In turn, this implied that the clouds are paying our Galaxy a one-time visit rather than being its long-term companions.

► **More information:** www.csiro.org/news/mediacentre/whatsnew.html

Risky business

Managers and administrators are less likely to suffer from cancers, according to a study published in the *Medical Journal of Australia*.

Dr Deborah Schofield, **University of Sydney**, and her co-authors from the **Northern Rivers University**, Department of Rural Health, studied chronic health conditions among Australia’s older workers. “Older workers with chronic conditions are more likely to be employed in certain industries such as retail trade, and health and community services,” says Dr Schofield, who identified industries and occupational groups with higher numbers of older workers with chronic work-limiting health conditions. “Workers in the retail trade industry were found to be more likely to suffer from musculoskeletal conditions, while those in health and community services had higher rates of cardiovascular disease.”

Managers and administrators were found to be less likely to suffer

from cancers, possibly because they are less exposed to risk factors or because they can more easily afford to retire when their health deteriorates.

Measures to prevent chronic health conditions may be essential to increasing future labour force participation, says Dr Schofield.

► **More information:** www.usyd.edu.au/news

Drip records

New research has shown that cave stalagmites can be used to reconstruct past rainfall cycles and help predict future rainfall patterns. “By carbon dating young stalagmites and comparing the water drip factor which helped create them, with modern weather bureau statistics, scientists at ANSTO, Newcastle University and the Australian National University

were able to show that stalagmites hold near-accurate records of rainfall for the period studied,” says ANSTO’s **Dr Henk Heijnis**.

The scientists’ main challenge was the matching of correct sections of the stalagmite with the instrumental data. Conventional dating techniques were not applicable to young stalagmites so carbon dating was applied.

“This is because the carbon signature left in the atmosphere in the 1950s during the key period when the atomic bomb was being tested, gives a clear age benchmark to work from,” says Dr Heijnis.

Stalagmite and cave dripwater geochemistry has clear symmetry with recorded rainfall over periods of up to 80 years from locations as diverse as Wombeyan Caves in NSW, Margaret River Caves in WA and Smiths Cave, Christmas Island.

► **More information:** www.ansto.gov.au/information_for/for_media.html

Dirty drift

The rise of human-generated pollution in the global atmosphere is forcing a change in ocean circulation in the Southern Hemisphere, in turn affecting our region’s weather systems.

In new research published in *Geophysical Research Letters*, **CSIRO’s Dr Wenju Cai** and **Mr Tim Cowan** found that the changes in ocean circulation in turn influence our weather systems and are partially responsible for a southward shift of these systems away from southern Australia and other mid-latitude regions.

“Aerosols cool the Northern Hemisphere’s ocean surface, which induces a hemispheric imbalance. This causes an increase in the transport of heat from the Southern Hemisphere oceans to the Northern Hemisphere oceans via the south Atlantic,” says Dr Cai, from the CSIRO Wealth from Oceans National Research Flagship. “For the first time, we see that human-generated aerosols are partly responsible for intensifying features such as larger ocean gyres, causing them to shift southward. They also cause the southward movement of maximum sea surface temperature gradients, mid-latitude storms and the westerly jet stream.

“The process intensifies atmospheric features such as the Southern Annular Mode, a system that describes variations of pressure contrasts between mid and high latitudes,” he says. “Using an ocean and atmosphere

climate model, we can see this intensification extends higher into the troposphere and then feeds back to the Earth’s surface to reinforce the ocean circulation and weather system changes.”

Just as volcanic aerosols have a strong cooling signature on ocean heat content with implications for sea level rise, human-generated aerosols cause heat redistribution through the world’s oceans causing a shift in the positioning of the Southern Annular Mode and consequently in weather patterns across southern Australia.

► **More information:** www.csiro.org/news/mediacentre/whatsnew.html

Noise solution

Australian scientists at **NICTA**, Australia’s Information and Communications Technology Research Centre of Excellence, have invented a patented technology to identify the causes of noise in optical cables, a key part of the backbone of the Internet. It will allow doing a job for a few thousand dollars that today would cost more than \$100,000 and would require multiple types of test equipment. It will also allow phone companies to confidently increase the speed ratings on long haul optical fibres - from 10 gigabits per second to 40 gigabits per second or more without losing data in the noise in line.

The new device, known as multi-impairment monitor, can identify the distinct visual patterns created by the common forms of noise and distortion in optical fibres. “The current tools available in the marketplace only count the errors in the data, telling the operator a problem exists but not what that problem is, where the problem is or what caused it,” says **Trevor Anderson**, principal researcher at NICTA’s Victoria Research Laboratory. “Our device can already identify the top four sources of noise and we expect to be able to do all six.”

He anticipates the device will be ready for market in 12 months.

Patents have been lodged for the technology in the new device and telecommunications companies are lining up to discuss the potential.

► **More information:** **Kelly Mills 02 8374 5489 or 0448 434 858**

Dealing with fire

Handling the increased risk of catastrophic wildfires must be a key issue to be addressed by leading international forest scientists, according to **CRC for Forestry** chief executive officer **Professor Gordon Duff**.

“Over the past two decades we have witnessed increases in both the incidence and intensity of wildfires, in comparison with all our previous knowledge of Australian forest fires. We know that temperatures will be higher and there will be more very hot days under climate change,” says Professor Duff. “It means we have to think seriously about how we adapt our management to the increased fire risk, as well as the need of various forest types to migrate to cooler or damper regions.”

One issue looming is the role of old growth forests as carbon stores. “If you want to maximise the stored carbon, you have to manage the whole forest and get the age-class distribution of trees right,” says **Dr Steve Read of Forestry Tasmania**.

Related to this is the opportunity to convert forest residues into ‘green’ energy for both transport and static uses, adds Professor Duff.

“The bottom line is that there is a very complex set of tradeoffs between conserving old growth forests, timber and energy production, fire control, pest management and other issues, which has still to be worked out,” he says.

► **More information:** **Professor Gordon Duff, 03 6226 7947 gordon.duff@crcforestry.com.au**



PHOTO: James Ray
Dr Janece McDonald looking at drips forming at Stalagmites at Wombeyan Caves

Rules for nano

Nanotechnology is the subject of science fiction, media hype and loads of promise. To some commentators, this heterogeneous family of technologies will provide solutions for curing cancer, feeding the poor and generating cheap, environmentally friendly energy. To others it will revolutionise military capabilities, lead to new classes of 'nano-weapons', exacerbate current economic divides, and result in a myriad of unintended and unpredicted consequences. As with earlier technologies, the truth will probably lie somewhere in-between.

There is little doubt that this tiny technology will be of increasing importance to traditional industry sectors. Nanotechnologies exploit the novel physico-chemical properties of matter that exist at the nanoscale. In Australia, innovative companies, including Starpharma, CAP-XX, Micronisers, and Advanced Nanotechnology, have already cemented their positions as global leaders in the development and commercialisation of nanotechnology-based products and applications. Their current applications include nano-pharmaceuticals, supercapacitors, nano-scale powders for sunscreens, cosmetics, and industrial chemicals. Many more applications and products are likely just around the corner.

Former Industry Minister, Ian Macfarlane, suggested that nano-enabled products and applications may be worth up to \$50 billion annually to the Australian economy. To assist in realising this goal, a four year, \$21.5 million, National Nanotechnology Strategy (NNS) was initiated in 2007. Its broad objective was to equip Australia with the necessary knowledge and skills to balance the anticipated economic and societal benefits against potential risks. In doing so, it acknowledged the need to invest in these areas, while realising that the current regulatory paradigm may not be adequate for all dimensions of the technology. Such concerns and policy directions have been recognised around the world.

Public sector spending on nanotechnology R&D continues unabated. This includes research into human and environmental health and safety and the regulatory challenges posed by nanotechnologies, within jurisdictions such as the EU and the US. Yet recent reforms to Australia's NNS have meant that the current Strategy will cease after two years, saving some \$12 million to the Australian Government's budget. Perhaps in the broader context of Australia's innovation policy, and the present Cutler Review (see 'Innovation at the crossroad', R&D Review, February 2008), this change is not so surprising. Looking forward though, Australia's innovation policy faces real challenges identifying and lowering unnecessary barriers to innovation, whilst encouraging a role for nanotechnology as part of Australia's future global competitiveness.

In terms of our future, some current regulatory frameworks may need to be revised or strengthened. Why? Because the novel properties that make nanotechnology so attractive to industry and consumers also bring new challenges. Scientific studies suggest that some engineered nanoparticles appear to exhibit greater toxicity than their larger scale equivalents. Other studies indicate that the current risk assessment methodologies – which primarily rely on mass metrics for evaluating safety – may not be appropriate for evaluating the hazards of engineered nanoparticles, potentially resulting in an underestimation of their potential risks.

Nanotechnology-based applications and products continue to be regulated in Australia through conventional regulatory regimes. For the most part, these regimes treat nanotechnology-based products as being equivalent to their non-nano counterparts. A commercially available cosmetic product that is subsequently reformulated to contain, for

example, nano-scale aluminium oxide (alumina) particles in preference to larger particles would be considered by the regulatory regime to be equivalent to the traditional cosmetic product. A risk assessment of the nanoscale alumina by the relevant regulatory agency would therefore be unlikely as the alumina nanoparticles will be considered to be a 'prior existing chemical' and not 'new.' Despite their novel properties, and potentially different risk profiles, it would appear in this case that the nanoparticles fail to trigger regulatory oversight. So the sensible thing to do here is for the regulator agencies, scientists and industry to proceed with a degree of caution..

Is this a concern from a public health point of view? At this stage, scientists and regulators simply do not know and are unlikely to know for some time. For this reason, a number of leading commentators have called on government to introduce nano-specific amendments to current regulatory frameworks. These advocates want engineered nanoparticles be considered as 'new' and subject to risk assessment regimes even when larger-scale counterparts have already been approved. Others have called for more extensive reforms. Some civil society groups have called for a moratorium on the use of engineered nanoparticles in applications such as food, food products and cosmetics. A moratorium is however highly unlikely. For one thing it is probably logistically impossible. But importantly, too, many uses of nanotechnologies are likely to be benign. As such it is important that we do not therefore overreact and undermine public confidence in the existing regulatory arrangements. A needless public backlash against the technology would be both damaging for industry as well as society more generally, given the potential and wide-ranging benefits offered by nanotechnologies.

So what might we conclude overall? Nanotechnologies are destined to play a significant role in driving Australian innovation forward. But without doubt greater scientific and regulatory certainty is required. And herein lays the challenge: regulating unknown risks and balancing these against the public interest without compromising the development of a promising technology. While the Cutler Review may not in itself be able to address these concerns in the short term, the Review will play a crucial role in laying the foundations for innovation policy more generally. In doing so, the Review represents a tremendous opportunity to advance Australia's scientific future, in which nanotechnology will undoubtedly play a central role. Regulation will of course be a facet of the governance solution. But it will only be one part of a multi-dimensional approach needed to ensure the successful development and commercialisation of this promising technology.



Nanotechnologies are destined to play a significant role in driving Australian innovation forward. But without doubt greater scientific and regulatory certainty is required.

Automatically revealed

Deakin University researchers *Professor Kate Smith-Miles*, head of Deakin's School of Engineering and Information Technology, and PhD student *Xin Geng* have developed an improved technique to estimate a person's age that will have implications for national security, law enforcement and restricting children's access to inappropriate web sites.

According to Professor Smith-Miles the automatic age estimation method AGES (AGing pattErn Subspace), which uses mathematical algorithms, is more accurate in estimating age based on photographs of people's faces than other existing methods. "While recognition of most facial variations, such as identity, expression and gender, has been extensively studied, automatic age estimation has rarely been explored," says Professor Smith-Miles. "In contrast to other facial variations, aging presents several unique characteristics which make age estimation a challenging task." In experiments with over 2000 faces, the AGES method outperformed existing approaches, and even outperformed human perception of age estimates when the humans were given only the same tightly cropped face images to view as those fed into our algorithm.

Logging on to inappropriate websites by under-age computer users would be more difficult with the AGES technique, says Professor Smith-Miles. "That's just one practical and obvious way in which the work we're doing could be used."

► **More information:** www.deakin.edu.au/news/media.php

Portable trust

CSIRO has developed a prototype portable device that will allow to do business across the internet on any computer in a trusted manner.

Known as a Trust Extension Device (TED), the TED consists of software loaded onto a portable device, such as a USB memory stick or a mobile phone. It is able to minimise the risk associated with performing transactions in untrusted and unknown computing environments.

"The problem is that trust is currently tied to specific, well-known computing environments," says CSIRO ICT Centre's, *Dr John Zic*.

"TED makes that trust portable, opening the way for secure transactions to be undertaken anywhere, even in an internet cafe."

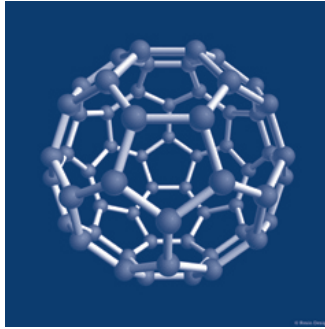
The concept behind TED is that an enterprise issues a trusted customer with a portable device containing a small operating system, as well as a set of applications and encrypted data. This device creates its own environment on an untrusted computer and, before it runs an application, it establishes trust with the remote enterprise server. Both ends must prove their identities to each other and that the computing environments are as expected before a transaction takes place.

The CSIRO ICT Centre is currently calling for expressions of interest from parties interested in licensing the technology. For information about business opportunities, contact *Dennis Silvers* at dennis.silvers@csiro.au.

► **More information:** www.csiro.org/news/mediacentre/whatsnew.html

Cast of thousands

Australia's Academic and Research Network (AARNet) has connected Australian students to the fifth annual Megaconference Junior event - the



Nanoart – Mark Seggie (Resin Design): Bucky Ball: see 'In Focus', p. 23

world's largest virtual classroom.

Megaconference Junior links several thousand K-12 students from 215 schools across 13 countries, including Japan, Portugal, Hungary and the US as well as Australia. The students at **Scots College** presented "A Truth Acknowledged", a documentary on their responses to global warming.

AARNet is providing connectivity through its National Video Conferencing Service (NVCS). Bridging services, supplied via MCUs (Multipoint Control Units) allow disparate video sites, using different kinds of conferencing technology, to work together.

The Scots College students' documentary was transmitted to the US via a high-definition feed, up to nine times the quality of standard video conferencing, made possible by AARNet's high-definition Codian MCU.

AARNet is heavily involved in the use and testing of cutting-edge video communications systems under the direction of video conferencing support manager *Jason Bordujenko*, who came on board last year.

Only one other player, AARNet's Swiss counterpart **Switch**, is using similar equipment. Mr Bordujenko says: "We work with researchers who are always pushing the edge of the performance boundary... the strength in video conferencing is to have as many people able to talk to each other as possible. They may be using Macintosh, they may be using a (Windows) PC or Linux, or they may be sat in a lecture theatre. We're moving away from the vendor lock-in. That's essential in the academic world."

► **More information:** www.aarnet.edu.au/Article/News.aspx?p=43

Attempted pullout

The **Australian Competition and Consumer Commission** (ACCC) has issued a discussion paper on **Telstra's** application for exemption from its obligations to supply a range of telecommunications services to **Optus** in areas of Sydney, Melbourne and Brisbane where Optus has deployed its HFC network. Telstra lodged its exemption application with the ACCC on 18 December 2007.

Telstra submits that granting the exemption will promote competition by encouraging Optus to invest in and more fully utilise its HFC network. As a result, granting the exemption would lead to better prices, quality and choice for end-users.

Under the Trade Practices Act 1974, the ACCC must decide within six months whether granting Telstra the exemption would be in the long-term interests of end-users.

Contrary to recent media reports, the ACCC has not yet decided on Telstra's exemption application and will assess the application on its merits. The release of the discussion paper represents the first step in the ACCC's assessment process.

Interested parties are invited to respond to issues raised in the discussion paper, such as the extent to which Optus uses regulated access to Telstra's fixed line network within its HFC footprint, and the technical and economic factors relevant to Optus' ability to upgrade its HFC network within its current footprint.

The discussion paper as well as Telstra's application and supporting materials will be available at www.accc.gov.au. The ACCC will consider submissions lodged with the ACCC by Tuesday, 25 March 2008.

► **More information:** www.accc.gov.au/content/index.phtml/itemId/2332

By Dr Philippe Martin*

Europe: Riding the nanowave

As funding priorities and levels attest, public authorities in large countries like the US or China and the EU as well as smaller countries like Switzerland have chosen nanoscience and the nanotechnologies as the next technology wave to ride. This wave is moving much faster than previous waves like biotechnologies and information and communication technologies (ICTs). Moreover, while biotech and ICTs delivered identifiable products and services, nanoscience and the nanotechnologies will more likely be a contributing part of products or make them conceptually or technologically possible.

Nanoscience and the nanotechnologies qualify as enablers. They will affect virtually all sectors of the economy. The “nanotech” value chain includes fields as varied as energy capture, transformation, production, storage, and distribution, medical diagnostics, targeted drug delivery, and regenerative medicine, materials science, water treatment and environmental remediation - and every step of the food chain, from agricultural production, to industrial manufacturing and processing, conservation including intelligent packaging and quality sensors, and, finally, consumption as “functional foods”, “nutricosmetics”, “neutraceuticals”, and supplements.

The challenges and opportunities of nano applications stem to a large extent from the novel nature of nanomaterials, defined as materials with one or more dimensions on order of 100 billionth of a meter or less. At some point, making things smaller makes them not just different but alters their behavior. First, small objects have greater reactive surfaces for a given mass.

Europe wants innovation, but innovation with safety.

To illustrate, cocoa powder dissolves much easier than a chunk of chocolate. Second, for very small objects the laws of classical physics cease to apply because of quantum effects. More problematic still, nanomaterials may hover between the classical and quantum physics domain in the no man’s land of meso-physics, which physicists and engineers have only recently entered to derive rules rather than laws.

For this reason, material scientists remain vague and argue that the gates of the nano-scale open somewhere around a few hundreds of nanometers. Scientists cannot predict the new characteristics and behavior that materials acquire in the nano-range. Thus, sponsors of a nano-product cannot assume that they know the behavior of a nanomaterial on the basis of its properties in bulk. Moreover, they must document the characteristics of a material in its specific nano-form, since within the nano-scale these characteristics may vary as well.

Third, small size reduces the effectiveness of cellular membranes as barriers to the entry of foreign objects into the body and their movement within it. Consequently, risk assessment must operate on a case-by-case basis after having checked the appropriateness of risk assessment methods, protocols and tests.

Taking a special look at applications of nanoscience and the nanotechnologies to food, only two European companies currently advertise the production of nanofood products.

Furthermore, apparently they do not market the products in the EU.

Is it because a growing number of European consumers favor simpler foods containing fewer or no additives? Citizens’ conferences do reveal a priori concerns about nanofood. In addition, they highlight the need for business operators to show real benefits to the consumer, to demonstrate product safety, to communicate more about their corporate vision in the area, and to provide information on the products that they place on the market. However, current manufacturing costs and production capacities present greater barriers to the commercialization and diffusion of nanofoods than consumer preferences, acceptance, and needs. Market analysts expect that the enabling, horizontal nature of nanoscience and the nanotechnologies will eventually offer profit-making opportunities to businesses, new benefits to consumers as well as further improvements in the safety of the food and feed chains.

The EU has consistently provided significant funding for R&D in nanoscience and the nanotechnologies including research on health, environment, and workers’ safety. For the period 2006-2013, it has allocated a total of 3.4 billion euros. Moreover, the EU has given itself a strategy and a European Action Plan to ensure the “safe, integrated, and responsible development” of nanoscience and the nanotechnologies.

In support of risk assessment, the European Commission has asked the independent experts of its non-food scientific committees for scientific opinions, requested a scientific opinion on nano-food from the European Food Safety Authority (EFSA), and asked for an ethical opinion on nanomedicines from the European Group on Ethics.

After consultation with stakeholders, the European Commission has recently proposed a Code of Conduct for responsible R&D in nanoscience and the nanotechnologies. The European Commission plans to publish shortly a legislative review on regulatory aspects of nanotechnologies. Finally, the EU is funding a project on ‘Policy Approaches to Promoting the Safety of Nanotechnologies’.

Current EU food and feed legislation do not include specific provisions for products of nanoscience and the nanotechnologies, although it covers in principle potential health and environmental risks relating to nanomaterials. Firstly, in the EU, business operators cannot place unsafe food on the market and are responsible for their safety. Secondly, business operators using nanoscience and the nanotechnologies will more often than not modify their existing production process or incorporate new ingredients, creating a “novel” product according to EU legislation. Such “novel foods” require a safety assessment and a pre-market authorisation. So, as a rule of thumb, producers and distributors of nanoproducts will have to perform specific tests and submit pre-market authorisation applications for a simple reason. Europe wants innovation, but innovation with safety. *Dr. Martin oversees nanotechnologies policy and coordination at the Directorate-General for Health and Consumers of the European Commission.

For more information: www.AustralianRDreview.com/Martin.pdf



Flu boost

A team of researchers from the **Australian National University** (ANU) will lead a new joint research centre with China conducting research into treatments for Avian Influenza (Bird Flu). The **Australia-China Centre for Phenomics Research** will be in the John Curtin School for Medical Research at ANU. “The funding will be used to study alterations in the genome code that lead to increased resistance to Avian Influenza,” says **Dr Edward Bertram**, who instigated the undertaking. “It’s hoped that this work will help us to identify targets for designing new treatments to boost the immune system against Avian Influenza.”

The Australian program will be led by ANU researchers Dr Edward Bertram, **Dr Steve Winslade** and **Professor Chris Goodnow**, but will also involve some of Australia’s top immunologists including Nobel Prize winner **Professor Peter Doherty**, **Dr Stephen Turner** from the **University of Melbourne**, **Professor Doug Hilton** from **The Walter and Eliza Hall Institute of Medical Research** and **Professor Paul Hertzog** from **Monash Institute of Medical Research**.

The Chinese team will be led by **Professor Hong Tang**, director of the Centre for Infection and Immunity, Institute of Biophysics, **Chinese Academy of Sciences** in Beijing and **Professor Hualen Chen**, director of the **National Avian Influenza Reference Laboratory** in Harbin.

The Australian funding of \$1,536,200 comes from the China-Australia International Scientific Linkages Fund from the former **Department of Education, Science and Training** and matches funds from the **Chinese Ministry of Science and Technology** and support from the **Australian Phenomics Facility**.

► **More information: Dr Edward Bertram, 02 6125 132, 0419 263 616; Dr Steve Winslade, 02 6125 4810, 0448 804 920**

Tiny peep

The **South Australian Regional Facility for Microscopy and Microanalysis** (SARF) has been launched as part of a national network of microscopy and microanalysis research infrastructure and expertise.

SARF director **Professor Hans Griesser** says: “Microscopy and microanalysis are enabling technologies, and this facility will help Australian researchers do cutting-edge research in a broad range of disciplines with application across industries like defence, health, biotechnology, mining, manufacturing and pharmaceuticals.”

SARF’s Ultra High Resolution Dual Beam Instrument – a \$3.5 million combination focused ion beam scanning electronic microscope – is the only one of its kind installed in the Southern Hemisphere and gives researchers the ability to look at the tiniest parts making up the structure of materials at smaller than nanometre level.

SARF will be the South Australian node of the **Australian Microscopy and Microanalysis Research Facility** (AMMRF), created under the **Australian Government’s** National Collaborative Research Infrastructure Strategy (NCRIS). SARF is a collaboration between the **Ian Wark Research Institute** at the **University of South Australia**, **Flinders University’s** School of Chemistry, Physics and Earth Sciences, and the **University of Adelaide’s** Adelaide Microscopy. SARF is funded by the Australian and State Governments, and the universities.

The super microscope will be directly used by mining and defence companies, green energy companies, the universities, and other research bodies, such as the **CSIRO**, **Defence Science and Technology Organisation** and the **South Australian Research and Development Institute**. A second highly advanced instrument for SA’s Microscopy and

Microanalysis Research Facility is due to be commissioned next year, with both instruments attracting international industry clients.

► **More information: Professor Hans Griesser, 08 8302 3703, hans.griesser@unisa.edu.au**

Fertile venture

A \$5 million **Mosaic Fertilizer Technology Research Centre** (MFTRC), to be based at the **University of Adelaide’s** Waite Campus, aims to develop more advanced fertilisers for agricultural use. It has been established in a joint commercial venture with one of the world’s largest fertiliser companies, the United States-based **Mosaic Fertilizer LLC**.

Mosaic has previously obtained an option to commercialise two fertiliser technologies developed jointly by the university and **CSIRO Land and Water**, and emerging from the research of **Professor Mike McLaughlin**, **Dr Sam Stacey** and the university/CSIRO research team. Professor McLaughlin and Dr Stacey will lead the work of the new centre. Under an agreement with the university’s commercial development company, Mosaic will fund research at the new centre in return for commercialisation rights and a share of the intellectual property.

► **More information: Professor Mike McLaughlin 08 8303 8433, 0409 693 906.**

Medical devices

A \$3.3 million Medical Devices Partnering Program based at **Flinders University** will bring together university researchers with commercial backers, manufacturers and end-users of medical assistive technology. A funding grant of \$565,000 from the **Premier’s Science and Research Fund** for the new program was announced in December. The program’s partners, including a significant contribution from the Commonwealth’s **Office for the Ageing**, will supply additional funding.

The Medical Devices Partnering Program is a collaborative initiative that will enable the early involvement of all the relevant parties in identifying clinical needs and levels of demand for medical devices, and will also streamline the complex process of bringing new products to the market.

► **More information: Charles Gent 08 8201 2965, charles.gent@flinders.edu.au**

Right to publish

The **Group of Eight** (Go8) has welcomed the **Australian Government’s** recent steps to strengthen the independence of the **Australian Research Council** and clarify the rights and responsibilities of researchers based in publicly funded research agencies by issuing a statement on the academic right to publish. The statement emphasises that Go8 universities are dedicated to expanding knowledge through rigorous research and to disseminating the results for the benefit of the public. Publication of results obtained from properly constructed research and carried out by experts is a fundamental component of academic freedom, says the statement, and dissemination should not be unduly influenced by external funding bodies. Go8 universities hold that it is inappropriate to accept external funding where the funder has the right to interfere in, or alter the conduct of sponsored research; or where the funder has the right to alter, suppress or indefinitely delay publication of all or part of the outcomes. Go8 universities recognise that commercial or other considerations might require short, finite delays in publication, but will vigorously assert their right to publish the results of all research in a timely manner.

► **More information: Tim Payne 02 6239 5488, www.go8.edu.au**

Delivered protection

Imugene has updated the market on its Fowl Adenovirus Vector (FAV), a gene delivery system for poultry, and Porcine Adenoviral Vector (PAV), a gene delivery system for pigs.

The planned trial of Imugene's vaccine against major poultry disease coccidiosis will be undertaken by collaboration partner, **Abic Biological Laboratories Teva Ltd**. The trial is expected to commence this quarter.

A candidate selection trial of the vaccine to prevent Porcine Reproductive & Respiratory Syndrome (PRRS) was undertaken in the US. The results enabled selection of an 'optimised' vaccine construct. Laboratory work has progressed quicker than expected and the optimised PRRS vaccine candidate is likely to be ready for efficacy trialing this quarter.

► **More information:** www.imugene.com/investor_announcements.asp

A for Acne

Phosphagenics Limited has announced the initiation of a human clinical trial for its lead dermatological product, retinoic acid, a form of vitamin A. This trial represents the company's first clinical trial to take place in the US and denotes the start of the company's planned expansion into targeted, non-systemic delivery of drugs.

This trial follows a number of pre-clinical studies demonstrating both an increase in dermal absorption of retinoic acid when formulated with Phosphagenics' proprietary drug delivery platform (TPM), and a significant reduction in irritation scores. The clinical trial is a double blinded study that will involve 90 subjects and is being conducted at **cyberDERM Inc**, a contract research organisation focused on developing and refining innovative bio-instrumental and computerised methods for non-invasive analysis of skin structure, its functions and effects of topical treatments. Completion is expected by the middle of the year.

Retinoic acid is prescribed most often as the topical treatment of choice for acne. However, it is poorly soluble, is associated with irritation and dryness of the skin and, in some cases, can cause liver damage when substantial amounts enter the systemic circulation. Irritation though, is the most common adverse effect and is observed in approximately 90% of users.

► **More information:** www.phosphagenics.com/main/News_Releases.htm

Encouraging safety

pSivida Limited has announced the results of the Phase IIa clinical trial of BrachySil™ to treat advanced, inoperable pancreatic cancer presented at the **American Society of Clinical Oncology-GI (ASCO-GI)**.

The trial, designed as a safety study, successfully showed that BrachySil™, in combination with standard chemotherapy (gemcitabine), was well tolerated with no clinically significant adverse events related to BrachySil. Data showed disease control in 82% of patients and an overall median survival of 309 days. BrachySil was found to be easily deliverable by endoscopic ultrasound. BrachySil™ is a novel oncology product which comprises a combination of BioSilicon™, a proprietary porous silicon, and the isotope ³²Phosphorus, a proven anti-cancer therapeutic.

"These findings are very interesting, and although this was a small study and was not designed to prove efficacy, these results are encouraging," says study investigator **Dr Paul Ross**, a consultant medical oncologist at **Guy's and St Thomas' NHS Foundation Trust**.

In the trial, 17 patients were treated with BrachySil injected directly

into the primary tumors via endoscopic ultrasound (used to assist in locating the delivery point). All patients had advanced inoperable pancreatic cancer and received gemcitabine in addition to BrachySil. CT assessments of response were performed at weeks 8, 16 and 24. The study was conducted at three major centers for cancer therapy: Guy's and St Thomas' NHS Foundation Trust, UK, **University Hospital Birmingham NHS Foundation Trust**, UK and **Singapore General Hospital**.

At least 80% of pancreatic cancer patients present with inoperable locally advanced or metastatic disease. Median survival following diagnosis is typically less than six months, demanding more effective therapies.

► **More information:** www.psvida.com/news/ASXAnnouncements.asp

Peer approval

A paper presenting the results of **Virax's** VIR201 Phase IIa human clinical trial has been published in the scientific journal *Human Vaccines* (Vol3, p. 260-267). The paper contains data that has not until now been available in the public domain.

VIR201 which utilises Virax's proprietary Co-X-Gen™ Technology and fowlpox virus technology is being developed as a therapeutic vaccine for the treatment of HIV/AIDS. The manuscript describes in detail the ability of VIR201 to suppress reappearance of the HIV virus when individuals infected with HIV discontinue anti-retroviral therapy. This was not observed when HIV infected individuals were vaccinated either with placebo (salt solution) or a related recombinant fowlpox virus that did not utilise Co-X-Gen™ technology. Because of this encouraging data Virax is planning to further develop VIR201 with a clinical trial planned for South Africa where it is currently awaiting regulatory approval.

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

All-in-one better

Giaconda Ltd has announced results of a study investigating the predicted effectiveness and safety of Myoconda® for the treatment of Mycobacterium avium paratuberculosis (MAP) infection in Crohn's Disease. The components, Rifabutin, Clarithromycin and Clofazimine, are all approved for use in humans as separate agents. This pilot pharmacokinetic study was designed to optimize the formulation of Myoconda® by combining the three components into a single capsule following discussions with the **US Food and Drug Administration (FDA)**. The study was included as part of the Investigational New Drug Application that was approved by the FDA last year.

The study used 24 normal, healthy, non-smoking male and female subjects under a randomized, open-label, single-dose, 1-way 2-arm, parallel design. There were no significant or serious adverse events reported.

The significant finding was that, in the 'all-in-one' formulation, the blood concentrations of Rifabutin and Clarithromycin achieved were more optimal for both components, causing no significant adverse effects with potentially increased efficacy. Previous studies indicated that concomitant use of these two agents can elevate the levels of Rifabutin in the blood, increasing the potential for side effects and reduce the levels of Clarithromycin, thus potentially reducing the efficacy of this important active ingredient. The new formulation has improved both the pharmacokinetic availability of both ingredients and reduced the side effect potential, providing a novel and significant improvement on previous formulations. A patent application has been filed by Giaconda Ltd to protect the novel formulation technique.

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

Combined effective

Phosphagenics Limited has announced results of a pre-clinical study demonstrating that the combination of its APA-01 product candidate and the statin atorvastatin (Lipitor™), the world's largest selling drug, significantly reduced serum lipids and inflammatory proteins involved in the development of atherosclerosis, compared to treatment with atorvastatin alone.

Studies were performed in ApoE mice, animals that spontaneously form atherosclerotic plaques and represent a well-established model of human atherogenic hypercholesterolemia. Among animals treated with the APA-01 and atorvastatin combination, total cholesterol levels fell by up to an additional 12% compared to atorvastatin alone. Triglycerides were decreased by 92% compared to 72% with atorvastatin alone.

APA-01, combined with atorvastatin, also enhanced the statins effects on lowering inflammation that contributes to the development of atherosclerotic plaques.

"Current therapies for atherosclerosis focus on drugs that lower serum cholesterol levels," says **Dr Esra Ogru**, executive vice president of research and development at Phosphagenics. "Experimental and clinical evidence suggests that the efficacy of these drugs may also be related to their ability to reduce oxidative stress and inflammation in the endothelium, or blood vessel lining, where atherosclerotic plaques develop. We believe that APA-01's apparent enhancement of a statin's anti-inflammatory functions could potentially provide a novel therapeutic approach to treating atherosclerosis. In particular there is an unmet need for a more effective treatment for elevated triglycerides and APA-01 has demonstrated efficacy in this area in this pre-clinical study.

► **More information:** www.phosphagenics.com/main/News_Releases.htm

Orphan Drug status

Novogen Limited's subsidiary, **Marshall Edwards Inc** announced today that triphendiol (previously known as NV-196) has been granted Orphan Drug status by the US **Food and Drug Administration** (FDA) for treatment of Stage IIB through Stage IV malignant melanoma.

An Orphan Drug refers to a product that is intended for use in a disease or condition that affects fewer than 200,000 individuals in the United States. A grant of Orphan Drug status provides seven years of market exclusivity for the orphan indication after approval by the FDA, as well as tax incentives, study design assistance, and eligibility for grant funding from the FDA during its development.

Triphendiol has previously been granted FDA Orphan Drug status for the treatment of pancreatic cancer and for the treatment of cholangiocarcinoma (bile duct cancer). No adverse effects of triphendiol were recorded in any of the laboratory in vitro or animal studies. In two Phase I clinical trials completed thus far, the investigational drug has demonstrated acceptable pharmacokinetic profiles in human volunteers with no reported side effects.

In animals bearing human melanoma cells, triphendiol administration caused tumour reduction and also demonstrated a synergistic effect when administered in combination with dacarbazine, an approved melanoma treatment agent, and cisplatin.

In vitro triphendiol is active against a panel of human melanoma cell lines causing apoptosis, presumably by down regulation of over-expressed X-linked inhibitor of apoptosis (XIAP), which leads to the activation of executioner enzymes known as caspases.

In addition to inducing cell death as a single agent, triphendiol was

found to chemosensitize resistant melanoma cells to other chemotoxic drugs such as cisplatin, dacarbazine, paclitaxel and gemcitabine.

Malignant melanoma accounts for only 3% of all skin cancers but causes the greatest number of skin cancer-related deaths worldwide and is responsible for more than 77% of skin cancer deaths.

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

Discontinued treatment

Solbec has received notification from the Sponsor of the Physician's IND (Investigatory New Drug), **Dr Robert Nagourney** of **Rational Therapeutics**, that due to the progression of the patient's disease a decision has been made to discontinue the Coramsine® treatment.

On 16 October 2007 Solbec announced to the market that a Physician's IND had been opened with the United States **Food and Drug Administration** on the basis that this specific patient's tumour had shown ex-vivo sensitivity to Coramsine® where other conventional chemotherapeutics had failed. The patient has advanced stage renal cell carcinoma and unfortunately, despite several months of Coramsine® treatment, the patient's advanced disease has progressed.

The company has been informed that a report from Dr Nagourney detailing the patient's treatment regime and the patient's response to the treatment regime will be made available once treatment and response data has been collected and analysed by Rational Therapeutics.

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

Rapid turnout

Biota Holdings Limited has announced that its long acting neuraminidase inhibitor (LANI), CS8958, an antiviral influenza treatment, has completed enrolment for its Phase II clinical study in Japan. The Phase II trial commencement was advised in an ASX Release on 22 November 2007.

Biota chief executive officer **Peter Cook** says: "Early onset of the influenza season in Japan has assisted us in achieving rapid patient enrolment for this study. Enrolment admission to the study was always going to be a critical element in the length of this clinical trial".

► **More information:** www.biota.com.au/

Bony success

Mesoblast has announced successful results from its clinical trial at the **Royal Melbourne Hospital**, in which 10 patients suffering from non healing, long bone fractures of the legs were implanted with Mesoblast's adult stem cells. All 10 patients have now been followed up for at least six months post implantation with stem cells produced using Mesoblast's proprietary technology. All patients have shown new bone formation. No adverse events related to mesoblast's cells have occurred in any patient.

Seven patients have achieved union of their long bone defects within a median time period of 4.9 months, and three continue to show progressive new bone formation. In contrast, none of the 10 had shown any evidence of new bone formation for 5-41 months prior to stem cell implantation. All patients with successful long bone union have been able to fully weight bear and resume daily activities. Mesoblast's technology eliminated the need for a second operation to harvest bone from the pelvis.

The study demonstrated a direct relationship between increasing the dose of stem cells implanted and shortening the time to heal the bony defect, indicating that the stem cells worked in a similar way to

a pharmaceutical drug. In patients whose fractures united within four months of treatment, the median dose of stem cells implanted was 14% higher than in those uniting later, and 33% higher than those who have not yet achieved union.

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

Hearty deal

The United States-based sister company of **Mesoblast, Angioblast Systems Inc**, entered into a collaborative agreement with **Abbott**, a global broad-based healthcare company, which will develop and commercialise Angioblast Systems' catheter-based cell therapy product for heart failure.

Abbott will provide funding for the collaborative program, which on completion is expected to result in an Investigational New Drug (IND) submission from Angioblast to the US **Food and Drug Administration** for a Phase II clinical trial in heart failure.

In addition, Abbott has made an equity-based investment of US\$5 million in Angioblast. Under the terms of the Investor Rights Agreement between Mesoblast and Angioblast, Mesoblast has the right to subscribe for further equity in Angioblast on the same terms as Abbott to maintain its 39.2% equity in Angioblast on a fully diluted basis. The ascribed asset value of Mesoblast's aggregate investment of \$18.1 million in Angioblast through two rounds of funding has now appreciated over three-fold.

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

Exclusive deal

Phosphagenics Limited and **Nestlé Nutrition** have announced that their joint Phase II human clinical trial to establish the efficacy of Phosphagenics' Phospha E* in the management of metabolic syndrome is advancing at three sites in Adelaide, Australia.

Based on current recruitment rates of study participants, the double-blind Phase II trial, which is fully funded by Nestlé, is expected to be completed in mid-2008.

This Phase II clinical trial follows two pre-clinical dose response trials completed by Nestlé and Phosphagenics in 2006. The results of those studies confirmed that, when given orally, Phospha E* significantly reduces many of the key biomarkers associated with metabolic syndrome.

The principal terms of a commercialisation agreement will grant a worldwide exclusive license to Nestlé for the use of Phospha E* in medical foods and for Phosphagenics to be the exclusive manufacturer and supplier of Phospha E* to Nestlé. The final commercial agreement is due to be signed on completion of the Phase II trial.

► **More information:** www.phosphagenics.com/main/News_Releases.htm

Brainy deal

Stem Cell Sciences plc has entered an agreement with the **Myelin Repair Foundation** (MRF) in California to develop techniques that will lead to scalable and sustainable sources of uniform human brain cells for research, target validation and drug discovery assays. Being able to use human brain cells would be a significant step forward to confirm results from animal research experiments in demonstrating the relevance of any new drug therapy for CNS disorders.

Under the terms of the agreement, researchers at the MRF-supported **Human Neural Assay Center**, located at **Case Western Reserve University** (Cleveland, Ohio), will optimise sustainable methods for culturing SCS' human neural stem (NS) cells and subsequent

differentiation into the three principal cell types normally found in the brain: neurons, oligodendrocytes and astrocytes.

Historically, access to primary human brain tissue suitable for cell culture has been extremely limited and tissue that was available has been difficult to sustain in culture. NS cells overcome this problem by providing a constant, dependable and unlimited source of brain cells.

"The inherent limitations of animal models in all disease research have been a source of considerable frustration to scientists and those involved in commercial drug discovery," says MRF chief operating officer **Russell Bromley**. "The inability to achieve concordance between the results achieved in animal models and humans is one of the most common reasons for the failure to advance even the most promising drug targets into commercial development and patient treatments."

► **More information:** www.stemcellsciences.com/News/Releases/

Raised funds

Novogen Limited has announced that its 81% owned US subsidiary company **Glycotex Inc** had received approximately \$US0.5 million from the second tranche of a private share placement. These funds are in addition to the \$US1.6 million received in the first tranche of the private share placement in February 2007.

The second tranche funds follow the recent announcement by Glycotex that it had obtained an active Investigational New Drug Application from the US **Food & Drug Administration** for the start of a Phase IIa clinical trial of its lead product candidate, GLYC-101, administered topically for the treatment of burn wounds.

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

Royal profit

Biota Holdings Limited has announced a half-year net profit after tax of \$5.5 million, (1H F07: \$4.1 million), a 35% improvement over first half F2007. Profit before tax was \$7.5 million (1H F07: \$4.1 million), up 83%. The result was driven by Relenza royalty revenues and growing collaboration income. Biota continues to achieve progress on all of its drug development programs. Total revenues were \$30.4 million, up from \$20.4 million in the comparable period last year, up 49%. Relenza royalties were \$16.5 million (1H F07: \$12.7 million) principally from sales of influenza pandemic stockpiling orders on **GlaxoSmithKline** (GSK; see 'Royalty Payments' below). Collaboration income increased significantly to \$9.6 million (1H F07: \$5.9 million) reflecting activities from licensing agreements with **MedImmune Inc** and **Boehringer Ingelheim**.

Total expenses of \$22.9 million (1H F07: \$16.3 million) reflect the costs associated with increased activity in both clinical and preclinical programs, some of which were reimbursed by licensees. Expenditure associated with the litigation against GSK was \$8.6 million (1H F07: \$3.4 million) and reflects the preparation for trial, scheduled to commence on 4 August 2008. The litigation against GSK in the Supreme Court of Victoria for GSK's failure to use its best endeavours in the development and marketing of Relenza, has progressed significantly. Currently, mediation has been scheduled to be completed by 31 July 2008 and the trial to commence on 4 August 2008.

The company also intends to undertake an on-market share buy-back of up to 5% of the issued ordinary shares, as part of its ongoing capital management strategy.

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

Royalty payment

In a related story, **Biota Holdings Limited** has received written notification from **GlaxoSmithKline** (GSK) that Relenza sales for the three months to 31 December 2007 were A\$171.4 million or GBP75 million. Biota estimates indicative royalties to be \$12.0 million for the three months to 31 December 2007. This will bring cumulative royalties in the six months to 31 December 2007 to \$16.5 million, up from \$12.7 million for the comparable period last year. Biota chief executive officer **Peter Cook** comments: "This confirms the sustainability of the global stockpiling market on an ongoing basis. The increase in GSK's sales of Relenza stand in contrast to the decline in Tamiflu sales, as reported by **Roche**. We expect that GSK will sell its installed capacity over the year."

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

Sell off

Biotechnology company **Arana Therapeutics Limited** has sold its animal health subsidiary – **Peptech Animal Health Pty Limited** ("PAH").

The sale has been completed after a substantial worldwide sale process over a period of 18 months. "This has been a long and very difficult process. While the business has potential it is currently losing money and this has turned many potential buyers away from the business," says chief executive officer **Dr John Chiplin**. "In the short term, Arana will be \$2 million - \$3 million per annum better off by not incurring the ongoing losses from operating the animal health business in its development phase. In the longer term, if the new owners can build a successful company, Arana will receive a useful royalty stream."

The animal health division has been acquired by a private investment company, **Parma Corporation Pty Ltd**, controlled by **Mel Bridges**, a former chairman of Peptech. Details of the transaction, which represent only a minor part of Arana's \$309.2 million net equity, are to remain confidential.

► **More information:** www.arana.com/news_media.htm

Better merged

Clinical Cell Culture Ltd (C3) and **Visiomed Group Ltd** announced that the **Federal Court** in Perth has approved the schemes of arrangement between the two companies. Court approval was the last legal requirement of the merger process after Visiomed shareholders unanimously voted in favour of the schemes at a meeting in February 2008.

C3 chief executive officer **Andrew Cannon** says the merger of the two organisations would place both companies in a stronger position for growth. "As a merged entity, we are now a more financially robust medical device group with a stronger balance sheet, better cashflows and an outstanding line of products."

► **More information:** www.clinicalcellculture.com/

Pfizer pays

pSivida Limited has received US\$500,000 as the first quarterly research and development payment from **Pfizer** under the terms of the exclusive worldwide Collaborative Research and License Agreement signed in April 2007 for pSivida's controlled drug delivery technologies in ophthalmic applications.

Over the last 10 months pSivida has received US\$12 million from Pfizer, including equity investments, under the terms of that agreement and will receive up to an additional US\$153.5 million in development and sales

related milestones. Pfizer is the largest shareholder in the company holding approximately 10% of the outstanding shares.

► **More information:** www.psvida.com/news/ASXAnnouncements.asp

Clearing the air

Pharmaxis will apply for Australian marketing approval of Bronchitol for patients with bronchiectasis, following a meeting with the **Australian Therapeutic Goods Administration** (TGA).

Bronchitol is being developed as a twice daily therapy for people with the incurable lung condition Bronchiectasis. A successful completion of a Phase III clinical study of Bronchitol in the second half of 2007 demonstrated significant improvement in quality of life for treated patients and significant difference in their mucus clearance.

Pharmaxis has the only product in Phase III clinical trials for bronchiectasis anywhere in the world.

Pharmaxis will submit its marketing authorisation application following the conclusion of the ongoing safety component of the Phase III trial – an optional 12 months extension to determine the safety of long-term Bronchitol treatment, which will complete mid-year. Pharmaxis will file the marketing application during the third quarter of 2008.

Over 600,000 patients worldwide suffer from bronchiectasis. Total US medical care expenditure is US\$13,000 per bronchiectasis patient, double that of patients without the disorder; and an increased overall cost of US\$630 million. Pharmaxis is developing Bronchitol as a daily treatment administered by inhalation to the patient's lungs.

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

Milestone pay up

Biotechnology company **Arana Therapeutics Limited** has announced the successful achievement of a milestone in its collaboration with partner **CSL Limited**. Achievement of the target and confirmation of the data by CSL triggers a success-based payment by CSL. Financial terms are to remain confidential.

The project involved utilising Arana's Superhumanisation™ technology to develop "humanised" versions of lead antibodies from CSL's pharmaceutical pipeline. These humanised products were then further improved using Arana's EvoGene™ optimisation technology.

Should CSL choose to further develop the product, Arana will be eligible to receive additional milestone payments as the product progresses through development by CSL. Arana is also set to earn royalties on product sales should it be approved and launched on the market.

► **More information:** www.arana.com/news_media.htm

iSOFT awarded

IBA Health Group Limited, Australia's largest listed specialist information technology company, has announced that **iSOFT Germany**, which is part of the IBA Health Group, has been awarded two contracts worth \$1.2 million (€734,000) and has also signed two distribution agreements to increase its presence in key European markets.

iSOFT Germany has also granted distribution rights to partners in Russia and Switzerland to increase its foothold in these markets and provide local support. iSOFT has strengthened its position in Russia's healthcare market after a partnership agreement with **ML Park** of Moscow to distribute, implement and support **LabCentre**, in Europe a market leader in laboratory information systems.

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

Care support

The **Victorian Government** is to provide nearly \$6 million in research grants for cancer research into treatments and techniques to improve clinical practice and care of cancer patients. The grants, made through the newly-created **Victorian Cancer Agency**, are an increase of nearly 300% on those awarded last year. This year's grants include nearly \$2 million for tumour-related research, over \$2 million for clinical trials and related infrastructure, more than \$1 million for supportive care, nearly \$500,000 for regional research and infrastructure and nearly \$300,000 for early career 'link and learn grants'.

► **More information:** www.victoriancanceragency.org.au

Worker support

The **Australian** and **South Australian Governments** have announced a \$50 million package to support workers and the region affected by **Mitsubishi Motors Corporation's** decision to close the Tonsley Park vehicle assembly plant at the end of March 2008. The package includes a \$40 million **South Australian Innovation and Investment Fund**.

This Fund will:

- support projects that create sustainable, full-time jobs;
- be directed at projects that diversify and strengthen the capacity of South Australia's manufacturing and industry sector;
- encourage projects supporting the introduction of new innovations or technology, including investment in emerging and growth sectors such as defence and ICT;
- focus on the southern suburbs of Adelaide, and the possible use of the Tonsley Park site and facilities (subject to decisions by Mitsubishi Motors Australia on disposal of the site); and
- provide up to \$10 million for strategic infrastructure that improves the competitiveness of the region.

The Fund will operate over three years from 2008-09 to 2010-11, supported by an investment of \$27.5 million from the Australian Government and \$7.5 million from the South Australian Government. Mitsubishi Motors Australia has indicated its willingness to invest \$5 million in the Fund, subject to final internal approval.

► **More information:** **Catriona Jackson, 0417 142 238,**
Lachlan Parker 0417 810 890

Coming in handy

Victoria's Government will invest \$3.9 million in 14 projects and initiatives, including research into traumatic brain injury in children and rehabilitation to improve hand function for people with quadriplegia, through its Victorian Neurotrauma Initiative (VNI).

Projects funded through this round of grants will include:

- \$292,279 for the **Murdoch Children's Research Institute**, working with the **Royal Children's Hospital**, the **Brain Research Institute**, and the UK's **University College** to develop a world-first speech diagnostic system for children with speech disorders caused by traumatic brain injury;
- \$162,388 for the Murdoch Children's Research Institute, the Royal Children's Hospital, and the **Sunny Hill Health Centre for Children** in Canada to investigate the use of virtual reality

technology for improving upper limb function in children with traumatic brain injury; and

- \$452,177 for a team from the **University of Melbourne, Austin Health**, and the **University of Alberta** in Canada to work together to investigate the use of Functional Electrical Stimulation (FES) – assisted exercise therapy to improve hand function in people with quadriplegia.
- **More information:** www.dpc.vic.gov.au

Warm advice

A high-level independent council has been formed to advise South Australia's Premier **Mike Rann** on reducing greenhouse gas emissions and adapting to climate change. Established under Australia's first legislation to set greenhouse reduction targets, the Climate Change and Greenhouse Emissions Reduction Act 2007, the Premier's **Climate Change Council** features representatives with significant backgrounds in business.

The Council will advise on achieving energy efficiencies, increasing the use of renewable energy, finding ways to remove greenhouse gases and achieving relevant targets. Its 10 members have been drawn from public, private and not-for-profit sector business leaders.

Appointed for periods of up to three years, the Council's members include:

- **Ms Julie Pettett** – chief executive officer, **Conservation Council of South Australia**;
 - **Mr John Kerr** – private business consultant and director of **Capital Strategies Pty Ltd**;
 - **Mr Robert Chapman** – managing director, **BankSA**;
 - **Mr Jim White** – general manager, business sustainability, **Onesteel**;
 - **Professor Emeritus Mary O'Kane** – executive chair of **Mary O'Kane and Associates Pty Ltd**;
 - **Ms Dianne Davidson** – managing director, **Davidson Viticulture Consulting Service**;
 - **Mr Don Bursill AM** – director, **Playford Trust**, adjunct research professor at the **University of South Australia**;
 - **Ms Verity Sanders** – strategic planner (environmental policy), **Local Government Association**; and
 - **Dr Suzanne Miller** – director, **South Australian Museum**.
- **More information:** www.ministers.sa.gov.au/news.php

Wet announcement

At the launch of the \$4.6 million **Centre for Sustainable Water** in Werribee, Victoria's Water Minister **Tim Holding** announced a new research program into expanded use of recycled water.

The new centre, jointly funded by \$1 million from the **Victorian Government** and \$3.6 million from **Victoria University**, will become an important research resource for industry and the local community. According to Mr Holding, finding new ways to treat and reuse wastewater from **Melbourne Water's** Western Treatment Plant is a key aim.

The research centre will focus on:

- increasing the use of recycled water for non-drinking purposes;
- improving the efficiency of desalination, membrane technologies

and other processes that remove total dissolved solids (TDS), total suspended solids (TSS) and other biological organisms from waste water; and

- developing cleaner production technologies for surrounding industry trade waste water.

Victoria University director of the **Institute for Sustainability and Innovation**, **Professor Stephen Gray**, says the centre will also collaborate with local industry to encourage water efficiency and set up links with industry, water authorities, and other research centres.

“Our vision is to create a research centre which focuses on new technology and process development, and seeks to provide the Werribee region with water appropriate for specific industry needs,” Professor Gray says. “The centre will look at the water needs of the Werribee Irrigation District and of broader industry, and examine re-use and recycling solutions which are particularly tailored to water sustainability issues in the region.”

► **More information:** www.dpc.vic.gov.au

GM-free SA

Premier **Mike Rann** says South Australia will maintain the current moratorium on growing genetically modified (GM) canola in the State beyond the end of April this year when the current regulations lapse. He released the findings of the **GM Crops Advisory Committee**, which was formed last year to review the current legislation, the Genetically Modified Crops Management Act 2004.

Premier Rann says: “The Committee recommended the lifting of the current moratorium in SA, except on Kangaroo Island, after April 28 this year. However we have also considered a number of significant market signals that have occurred since then that has led us to believe that maintaining the status quo is more responsible. It makes sense for us to maintain our current position until there’s more certainty regarding the impact of exporting GM grains.”

Agriculture Minister **Rory McEwen** says that in South Australia there is no immediate need to give the go-ahead for what would have been only a small number of growers wanting to grow crops from the two GM canola seeds developed by companies, **Monsanto** and **Bayer**.

“We will be watching to see how NSW and Victoria address the key issues of segregation and regulation in their States, as well as monitoring the benefits of keeping a moratorium in WA and Tasmania,” says Mr McEwen.

Western Australia’s Agriculture and Food Minister **Kim Chance** endorsed South Australia’s decision because it meant both States would be able to maintain their clean and green image, making it easier to promote their produce to export markets. Significantly, the South Australian decision now meant that Australia’s leading grain export States would remain GM-free. The Minister said there was a lack of independent information about the performance of GM canola in Australian growing conditions and evidence of strong rejection by consumers both in Australia and in important overseas markets.

► **More information:** www.premier.sa.gov.au/news.php?id=2744;
WA Minister’s office, 08 9213 6700

Informed breath

Construction of a new \$10 million facility for advanced medical research has begun at the **Australian Synchrotron** in Victoria. Planned to open in late 2008, the new beamline will be the first at the centre

to be used for research into new techniques for medical diagnosis and therapy. It will also further medical research that could help premature babies.

“Synchrotron x-rays allow researchers to see for the first time what happens when mammals take their first breath,” says Minister for Innovation, **Gavin Jennings**. “It is not well understood how our lungs go from a fluid to an aerated state when we are born and for premature babies, this process can be problematic due to the immaturity of their lungs. Through the examination of lungs in animals, the Synchrotron will enable us to build a model that will help take the guesswork out of ventilation in humans in to the future.”

► **More information:** www.dpc.vic.gov.au

Snowy committee

The **New South Wales** and **Victorian Governments** have established the **Snowy Scientific Committee** to monitor and advise on environmental flows in the Snowy River. The six-member committee will advise on the adequacy of environmental releases, as well as programs for managing and restoring river catchments across the hydro scheme, including monitoring and ongoing research. Its work will help restore habitats for native fish and other aquatic species along the length of the Snowy River, and in other mountain rivers affected by the Scheme’s diversion of water for power generation and inland irrigation.

The committee’s members are:

- **Dr Jane Roberts**, an ecological consultant based in Canberra – Chair;
- **Dr Arlene Buchan**, **Australian Conservation Foundation’s** Healthy Rivers campaigner;
- **Dr Michael Curll**, who has more than 40 years public service experience with agricultural and natural resource industries in Australia;
- **Professor Wayne Erskine**, professor of natural resource management at the **University of Newcastle**;
- **Mr Noel Kesby**, general manager of the **Southern Rivers’ Catchment Management Authority**; and
- **Professor Sam Lake**, professor in ecology at **Monash University**.

The committee will also produce an annual state of the environment report on the rivers and catchments affected by the Snowy Mountains Hydro-electric Scheme.

► **More information:** www.dpc.vic.gov.au

Cloud seeding

A project aimed at increasing rainfall throughout south-east Queensland catchments by injecting clouds with rainmaking particles has started.

Minister for Sustainability, Climate Change and Innovation, **Andrew McNamara**, says the **Queensland Government** is investing \$7.6 million over four years in the cloud seeding research project. The project is being overseen by a Scientific Advisory Group, chaired by **Professor Roger Stone** from the **University of Southern Queensland**, to provide expertise and technical guidance for the project.

The Queensland Climate Change Centre of Excellence within the **Environmental Protection Agency** is managing the project, working closely together with the **Bureau of Meteorology**, which is providing radar technology and weather pattern expertise.

► **More information:** www.climatechange.qld.gov.au



Basil Hetzel



Andrew Constable



Laurie Hammond



Brad Norman

Iodinator

The King of Thailand has awarded the Prince Mahidol prize to three internationally-distinguished physicians for their lifetimes of dedicated service to improving health. One of the three is **Professor Basil Hetzel**, chairman emeritus of the International Council for Control of Iodine Deficiency Disorders, an organisation that he founded. Professor Hetzel is one of the world's leading experts in the adverse affects of iodine deficiency in the field of public health. He and his team demonstrated the effect of iodine deficiency on brain development and the central nervous system. He showed that severe iodine deficiency can lead to maternal and foetal hypothyroidism causing endemic cretinism and mental retardation. His studies also proved that compared to children in areas without iodine deficiency, the IQ of children who have resided in areas with iodine deficiency decreased by 13.5 points.

Krill saviour

Dr Andrew Constable, leader of the Antarctic Marine Ecosystems program at the Antarctic Climate and Ecosystems Cooperative Research Centre in Tasmania, has been awarded the 2008 Pew Fellowship in Marine Conservation to help prevent unsustainable exploitation of Antarctic krill fisheries. He will create sophisticated ecosystem-based management plans for fisheries in the Southern Ocean, and work with Antarctic scientists and authorities to implement them. By incorporating broad environmental factors rather than focusing solely on krill, the plans will also safeguard populations of endangered baleen whales, penguins, and seabirds who feed primarily on these shrimp-like animals.

Moth collector

A senior CSIRO entomologist, **Dr Marianne Horak**, has won the inaugural JO Westwood Medal for her book *Olethreutine Moths of Australia*. Dr Horak's book is the first to provide detailed descriptions of Australia's 90 olethreutine moth genera in a single comprehensive volume. Named in honour of leading 19th century British entomologist, John Obadiah Westwood, the JO Westwood Medal, will be awarded every second year by Britain's Royal Entomological Society and the Department of Entomology of the Natural History Museum, London, for excellence in insect taxonomy.

Emerging explorer

Australian whale shark researcher and Rolex Laureate **Brad Norman** is one of US magazine National Geographic's 2008 class of Emerging Explorers, the first Australian to be so honoured. National Geographic's Emerging Explorers Program recognises and supports uniquely gifted and inspiring

adventurers, scientists, photographers and storytellers making a significant contribution to world knowledge through exploration while still early in their careers. The Emerging Explorers each receive a US\$10,000 award to assist with research and to aid further exploration.

Geoscience president

Tony Milne has been elected president of the IEEE Geoscience and Remote Sensing Society (GRSS) for 2008-09. GRSS is one of 38 societies that make up the Institute of Electrical and Electronic Engineers (IEEE), the world's largest technical professional body with over 320,000 members. Tony Milne is currently a visiting professor of geography and remote sensing at the University of New South Wales, and remote sensing science manager in the Cooperative Research Centre for Spatial Information. He is also a co-director of Horizon Geoscience Consulting Pty Ltd.

Sheep appointment

The Sheep CRC has appointed **Professor Julius van der Werf** to lead its "Information Nucleus" research and development program. This program is pivotal to the CRC's work to transform wool, meat and the sheep that produce them, as it will enable an acceleration of the rate of genetic gain across all sectors of the Australian sheep industry. Professor Van der Werf was previously head of the Cattle Breeding and Genetics Institute at Lelystad in the Netherlands. He is a currently a member of the Genetics Committee of the Australian Herd Improvement Scheme and is on the Technical Committee for Sheep Genetics.

Legume improver

Professor William Erskine has commenced as director of the Centre for Legumes In Mediterranean Agriculture (CLIMA) as it consolidates its third phase as a research centre within the University of Western Australia. He was previously the assistant director general (research) at the International Center for Agricultural Research in the Dry Areas in Syria. Professor Erskine intends to maintain CLIMA's focus on beneficial outcomes for WA legume growers and industry, while improving links to other Australian and overseas legume research groups.

Crawford leader

The Crawford Fund has announced the appointment of **Dr Denis Blight** as its new executive director. Dr Blight recently retired from the position of director-general of CAB International, an intergovernmental body in research, training and publishing in the applied life sciences. Before that he spent 15 years with IDP Education Australia, formerly the international development program of Australian universities and colleges.

Trembling expert

The Royal Astronomical Society in London has awarded its 2008 Gold Medal for Geophysics to **Professor Brian Kennett**, director of the Research School of Earth Sciences at the Australian National University. Professor Kennett works on determining the structure of the Earth using the waves generated by earthquakes and man-made sources. His reference models for the structure of the Earth have been adopted as standards for the location of earthquakes across the globe, and are widely used in imaging the planet's interior.

Smart care innovator

Edith Cowan University researcher **Dr Alfred Tan** has been awarded a US\$100,000 funding grant from Microsoft to develop a foetal monitoring system utilising 'smart phone' technology. Dr Tan is one of 14 researchers from around the world awarded funding from Microsoft for research into innovative ways to advance healthcare services and solutions using mobile 'smart phone' technology. Dr Tan's proposal aims to extend the availability of quality antenatal care to remote and rural Australia, especially amongst indigenous communities, using inexpensive foetal heart rate monitoring equipment and mobile phone technology.

Maths medal

Professor Jim Hill has been awarded the 2008 ANZIAM medal for outstanding achievements in applied mathematics and service to ANZIAM (Australian and New Zealand Industrial and Applied Mathematics). Professor Hill is head of the Nanomechanics Group in the School of Mathematics and Applied Statistics at the University of Wollongong.

Appointed investor

Laurie Hammond has been named as the new chairman of the Cooperative Research Centre for Mining (CRCMining). He is a venture capital investor and has been a research director and manager of public investment in strategic R&D. He has also been a member of the Industry Research & Development Board and was Chairman of its Tax Concession Committee from 2000 to 2005.

Seed informer

Veteran grains research communicator **Jon Lamb** has won the Grains Research and Development Corporation (GRDC) Seed of Light Award. He is recognised across the south-eastern Australian grain belt by growers, farming groups, industry and the research sector for his efforts in bringing the latest research information to grain producers.



William Erskine



Julius van der Werf



Dennis Blight



Jim Hill



Brian Kennett



Alfred Tan

Solar power plant

Australia's largest off-grid solar power station is set to be built at Coober Pedy in South Australia's far north. Australian Environment Minister **Peter Garrett** and South Australian Premier **Mike Rann** announced the \$7.1 million project at the 3rd International Solar Cities Congress in Adelaide.

There will be 26 dishes, each one 14 metres high. When it is completed at the end of 2009, it will generate about 1860 megawatt hours a year – 13% of Coober Pedy's total electricity requirements.

The **Australian Government** is providing \$3.55 million under its Renewable Remote Power Generation program, which helps Australians who live outside major cities and towns and who are not connected to the main grid, to gain access to renewable power supplies. The **State Government** is providing funding of \$635,000 for the project, which has been developed in partnership with **Solar Systems Pty Ltd**, the **District Council of Coober Pedy** and **Wesfarmers** subsidiary **Energy Generation Pty Ltd** (enGen).

► **More information:** Margot Marshall 0418 624 847, Lachlan Parker 0417 810 890

Wanted alive

A new report on the live animal trade has been released by the **Australian Bureau of Agricultural and Resource Economics** (ABARE). According to the report *Live Animal Exports: A Profile of the Australian Industry* overseas demand for Australian live cattle and sheep is likely to increase.

Live cattle and sheep exports were valued at more than \$620 million in 2006/07 and continued increases in population and income in south east Asia and the Middle East should see the market grow further, says ABARE executive director, **Phillip Glyde**.

Part of Australia's advantage comes from its reputation for delivering animals that are free of diseases such as foot and mouth disease, he says. However the report warns that future challenges to the industry include potential competition from lower cost suppliers in South America and increasing concern in the community about the welfare of animals exported live. Trade in meat as opposed to live animals is not seen as a viable replacement due to the lack of refrigeration in large parts of Asia together with religious and cultural practices which require the delivery of live animals.

► **More information:** www.abareconomics.com/publications_html/news/news.html

Frozen future

In a major international effort, 100 million food crop seeds from 100 countries have been placed in an Arctic seed vault deep within a frozen

mountain on a remote island in Norway. The **Svalbard Global Seed Vault** is designed to store duplicates of seeds from seed collections around the globe. If seeds are lost as a result of natural disasters, war or lack of resources, food crops can be reestablished using seeds from Svalbard.

Seeds deposited so far include unique varieties of African and Asian food staples such as maize, rice, wheat, cowpea, and sorghum, and European and South American varieties of eggplant, lettuce, barley, and potato. According to the vault's developers, the **Norwegian Government** and the **Global Crop Diversity Trust**, the seed deposits represent the most comprehensive and diverse collection of food crop seeds being held anywhere in the world.

"With climate change and other forces threatening the diversity of life that sustains our planet, Norway is proud to be playing a central role in ... protecting... the fundamental building blocks of human civilization," says Prime Minister of Norway, **Jens Stoltenberg**.

The vault stays cool with a single 10-kilowatt compressor powered locally. The seeds are stored at minus 18 degrees Celsius within sealed foil packages and the vault is surrounded by frozen arctic permafrost, ensuring the continued viability of the seeds if the electricity supply fails.

Some seeds within the vault may remain viable for a millennium or more. Under such conditions, barley can last 2000 years, wheat 1700 years, and sorghum almost 20,000 years.

► **More information:** Cathy Reade, 0413 575 934; www.croptrust.org/main/seedvault.php

Drilling suspended

Minerals exploration company, **Marathon Resources Ltd**, has been forced to suspend its drilling operations at Mt Gee in the Arkoola Wilderness Sanctuary in South Australia (SA) after it was revealed by the **SA Government** that the company had dumped waste without authorisation. Mt Gee is one of Australia's largest undeveloped uranium deposits. "Mining companies must respect the environment and the view of local stakeholders if they are going to explore in the area and we will be watching to make sure they do so," says SA Premier **Mike Rann**.

The dumping was acknowledged by Marathon Resources as an "error of judgment", though the company maintained that there was no significant environmental or health risk to visitors or wildlife.

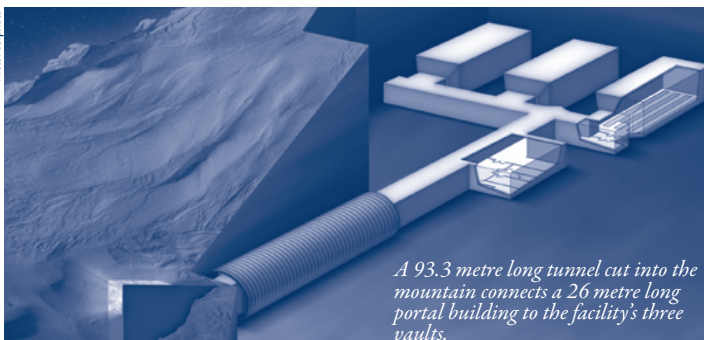
The company has agreed to remove the unauthorised material and rehabilitate the site. Marathon also announced that it would commission an independent report into the Company's environmental practices.

► **More information:** www.marathonresources.com.au/news.asp; www.ministers.sa.gov.au/news.php?id=2756

Clinton Initiative

Minister for Climate Change and Water, **Senator Penny Wong**, has announced a new partnership with the **Clinton Climate Initiative** to develop a global carbon monitoring system that can assist in recognising sustainable forest management and reforestation within global carbon markets. "I am very pleased that following a global search of forest carbon measurement systems, the Clinton Climate Initiative selected Australia's **National Carbon Accounting System** (NCAS) as the platform for a global roll-out in developing countries," says Senator Wong. "A key part of the UN climate conference in Bali last December was an agreement to help developing countries reduce deforestation and achieve sustainable forest management."

Australia's international activities in this area include support for



A 93.3 metre long tunnel cut into the mountain connects a 26 metre long portal building to the facility's three vaults.

Indonesia in the development of their forest monitoring system and a pilot project in provincial China. The NCAS uses a sophisticated system involving remote sensing, information from thousands of satellite images, greenhouse gas accounting methods, and modelling of changes in our environment to monitor and account for emissions from land-based sectors. The remote sensing interpretation methods were largely developed by **CSIRO**.

The Clinton Climate Initiative was formed in 2006 by the **William J. Clinton Foundation**, which aims to strengthen the capacity of people throughout the world to meet the challenges of global interdependence.

► **More information: Geraldine Capp, 02 6277 7920**

Petronising

Research into oil and gas exploration and production and wider energy technologies has received a funding boost following the signing of a Strategic Alliance Agreement between **CSIRO** and **Petronas**, the national petroleum company of Malaysia. The agreement further formalises collaborative activities, including petroleum exploration and production, advanced materials, clean coal technology and renewable energy.

“There is alignment between Petronas’ research and CSIRO’s National Research Flagships and it is positive to see that their aspirations are closely linked to ours,” says **Dr Bev Ronalds**, CSIRO group executive for energy. Petronas is also interested in exploring new opportunities in clean energy, particularly solar and clean coal technologies.

CSIRO’s capabilities in advanced materials is also of interest to Petronas, with technology in nanocomposites, biodegradable polymers and reinforced plastics being applied to their current business practices to repair pipelines and improve durability of infrastructure.

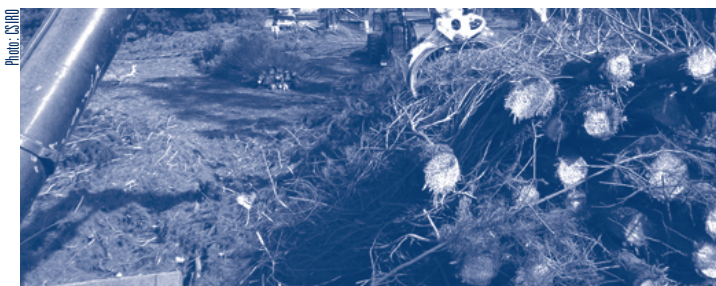
The agreement also identifies a number of areas of potential collaboration with the **Petronas University of Technology**, including training and development, co-supervision of post-graduate students, sharing of facilities and research.

A number of the collaborative projects form part of the new **Australian Gas Centre** (AusGas) initiative developed by CSIRO with the **WA Energy Research Alliance**. The AusGas proposal was met with a positive response by Petronas and discussions will continue on areas of partnership in gas research.

► **More information: Dr Beverley Ronalds 08 6436 8700, Beverley.Ronalds@csiro.au**

Crude fuel

CSIRO and **Monash University** have developed a chemical process that turns green waste into a stable bio-crude oil that can be used to produce high value chemicals and biofuels, including both petrol and diesel replacement fuels. The Furafuel technology uses low value waste such as forest thinnings, crop residues, waste paper and garden waste, significant amounts of which are currently dumped in landfill or burned.



Forest thinnings can be used to produce high value chemicals and biofuels

“This makes it practical and economical to produce bio-crude in local areas for transport to a central refinery, overcoming the high costs and greenhouse gas emissions otherwise involved in transporting bulky green wastes over long distances,” says **Dr Loffler** of **CSIRO Forest Biosciences**.

The plant wastes being targeted for conversion into biofuels contain chemicals known as lignocellulose, a raw material for the next generation of bio-ethanol. Lignocellulose is both renewable and potentially greenhouse gas neutral. It is predominantly found in trees and is made up of cellulose, lignin, a natural plastic, and hemicellulose.

CSIRO and Monash University will apply to patent the chemical processes underpinning the conversion of green wastes to bio-crude oil once final laboratory trials are completed.

The research to date is supported by funding from CSIRO’s Energy Transformed Flagship program, **Monash University**, **Circa Group** and **Forest Wood Products Australia**.

► **More information: Dr Steven Loffler, 03 9545 2268, Steven.Loffler@csiro.au**

Water to riches

Scientists with **CSIRO’s** Minerals Down Under National Research Flagship are analysing groundwater samples to help pinpoint promising areas for further mineral exploration.

Known as hydrogeochemical exploration, groundwater sampling is a new technique for detecting metals such as gold, nickel, copper, zinc and uranium. The project is being conducted for the **Minerals and Energy Research Institute of Western Australia** and has 27 industry sponsors. It will take place over a vast area of the northern Yilgarn Craton in Western Australia.

“The northern Yilgarn is an arid area with potable groundwater, so it is dotted with windmills and bores used for agriculture. This gives us direct access to groundwater without the need for drilling,” says **David Gray** of CSIRO.

Hydrogeochemical exploration has the potential for mapping, environmental background establishment and mineral exploration across many other areas of Western Australia, especially outside recognised mineralisation belts.

► **More information: www.scienceimage.csiro.au/mediarelease/mr08-19.html**

Monitoring movement

New research released by **Animal Health Australia** shows that many Australian livestock producers do not fully appreciate the risk of diseases entering their farms via visitors, vehicles and farm equipment. The majority of livestock producers do not document the movement of people and equipment on their farms, despite the fact that almost three in four felt that they had an adequate understanding of biosecurity risk.

Says manager of disease risk mitigation **Duncan Rowland**: “In the last year we’ve seen people, vehicles and equipment implicated in the spread of serious livestock diseases, both in Australia and overseas, such as equine influenza in Australia and foot and mouth disease and avian influenza in the UK.”

According to Mr Rowland, information about who has visited a farm in recent days is the first question asked when there is a disease outbreak in a region. “This information is absolutely vital for tracking where a disease might be spreading so as to restrict it as quickly as possible. This becomes even more important if it is a disease that can be transmitted to humans.”

AHA has since created a visitor log that can be downloaded from its website, www.farmbiosecurity.com.au.

► **More information: Margaret Stuart, 0407 411 174**

AUSTRALIAN JOBS	INSTITUTION	CLOSING DATE
Associate Professor – Science and Mathematics Education	Curtin University of Technology WA	17 Mar
Lecturer/Senior Lecturer/Associate Professor in Software Engineering	Curtin University of Technology WA	24 Mar
Post Doctoral Fellow/Senior Lecturer/Associate Professor in Reservoir Engineering	Curtin University of Technology WA	24 Mar
Research Fellow	Monash University – Engineering	14 Mar
Research Assistant – Science Communication	Australian National University - College of Science ACT	14 Mar
Research Nurse - Diabetes & Obesity Research Program	Garvan Institute NSW	14 Mar
Lecturer/senior Lecturer – Mechatronics	University of New South Wales - Engineering NSW	22 Mar
Postdoctoral Research Associate – Visual Cognition	University of Sydney - Psychology NSW	24 Mar
Research Associate in Theoretical Physics	University of New South Wales - Science NSW	07 Apr
Postdoctoral Fellows in Molecular and Cell Biology	University of New South Wales - Medicine NSW	17 Mar
Lecturer in Statistics	University of New South Wales - Science NSW	14 Mar
Research Officer - Nursing and Midwifery	Curtin University of Technology WA	17 Mar
Research Assistant – Behavioural and Brain mechanisms	University of New South Wales - Science NSW	14 Mar
Research Assistant – Epilepsy Research Centre	University of Melbourne - Epilepsy Research Centre VIC	09 Mar
Research Assistant – Neurology	University of Sydney - Neurology Laboratory NSW	13 Mar
Senior Lecturer/Staff Specialist in Psychiatry	University of Adelaide - Psychiatry SA	14 Mar
Research Fellow/Fellow – Socio-economic/Policy Research on Sustainable Farms	Australian National University - College of Science ACT	20 Mar
Post-Doctoral Research Scientist - Supercapacitors	CSIRO Energy Technology VIC	16 Mar
Alexander Rubinov Professor of Mathematics	University of Ballarat - Mt Helen Campus VIC	30 Apr
ACES MQRES Reconceptualising Maths Learning Phd Scholarship	Macquarie University NSW	25 Mar
Senior Research Fellow - Social Policy and Care Service Improvement	Griffith University - Nursing and Midwifery QLD	26 Mar
Research Fellow - Hearing Preservation	University of Melbourne – Otolaryngology, Medicine VIC	16 Mar
Technical Assistant - Diabetes & Obesity Research	University of Melbourne – Diab & Obes Research Group VIC	16 Mar
Experimental Scientist - Biomedical Materials	CSIRO Molecular and Health Technologies VIC	15 Mar
Oceanographic Research Assistant	CSIRO Marine and Atmospheric Research TAS	2 May
Research Fellow - Australian Mathematical Sciences Institute	University of Melbourne - Mathematics and Statistics VIC	14 Mar
Research Fellow in Astrophysics	University of Melbourne - Physics, Faculty of Science VIC	01 Apr
Senior Lecturer / Associate Professor in Periodontology	Griffith University QLD	18 Apr
Lecturer - Medicine	University of New South Wales - Medicine NSW	20 Mar
Lecturers in Chemical Synthesis and Organic/Biological Chemistry	University of Adelaide - Chemistry & Physics SA	17 Mar
Research Associate - Radio Astronomy Group	University of Tasmania - Science, Engineering & Technology TAS	01 Apr
Postdoctoral/Research Fellow – Nonlinear Optics in Photonic Nanowires	University of Sydney – CUDOS NSW	31 Mar
Geotechnical Engineer	CSIRO Exploration and Mining QLD	24 Mar
Research Associate/Research Fellow: Analytical Services	UniSA – Mawson Institute of Advanced Manufacturing SA	28 Mar
NEW ZEALAND JOBS	INSTITUTION	CLOSING DATE
Residency in Equine Surgery	Massey University - Veterinary, Animal & Biomedical Sciences NZ	16 Mar
Lecturer/Senior Lecturer in Small Animal Surgery	Massey University - Vet, Animal & Biom Sciences NZ	30 Mar
Director - Agricultural Services	Massey University - Office of the Deputy Vice-Chancellor NZ	20 Mar

More information on these positions: www.sciencealert.com.au/jobs

By Gerd Winter

The Nano in art

As anyone who has experienced the emotional barriers of visitors from abroad passing the Vegemite hurdle knows, it's not just about understanding that it's safe and contains B vitamins. It is repeated experience with it that tempers the unease.

This may also hold true for how new technologies are absorbed into society's consciousness.

Kristin Alford, director of the communication consultancy Bridge8, believes that engaging the public with new technologies, not just talking about it but facilitating experiences with it, is an important step in closing the gap between scientific enthusiasm and public mistrust. In the case of nanotechnology, Bridge8 is working together with Nanotechnology Victoria Ltd (Nanovic) on a series of activities to familiarise the public with new developments. One important focus is the arts.

Nano and art is a complex relationship, though. Nanomaterials can be used as tools that are part of an artistic expression and, very much reflecting the nature of the technology, often are a contributing part of a process or product. Targeting young people in particular, Bridge8 and Nanovic are involved with artists who are interested in experimenting with new materials. They are going to provide, for example, electroluminescent strips, fluorescing textiles, and infra-red sensitive paint for an upcoming graffiti masterclass presented by Adelaide based Carclew Youth Arts, the Australian Network for Art and Technology (ANAT), and the Adelaide Festival of Arts. The US artists involved are from the 'Graffiti Research Lab' and though not 'nanoartists' per se, Alford appreciates their openness to the use of new technology in creating art. In the process they become role models for engaging with new tools. The benefit for Bridge8 results in having a contact zone where people can engage with the technology used. "We will not leave them entirely ignorant of the technology", says Alford, and experiences with similar projects in the past have been positive. At a reSkin wearable technology masterclass held by ANAT in Feb 2007, participants were keenly interested in where the material came from, how it was made and what it did.

However, these experiments are not what Alford would define as 'nanoart': "Nanoart is about using nano-science principles to create

Leah Heiss: This 'Carrying Wellness Vessel' is a necklace that carries mesoporous iron oxide to remove arsenic from water. Designed for people in transit in countries such as Bangladesh, India and the US.

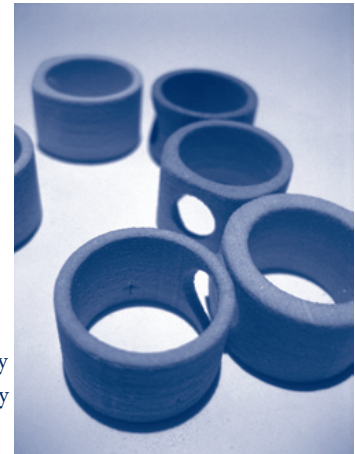


something expressed in an artistic way, and where the technology is intrinsic to the art and not just a side product of it." To illustrate, she refers to the nanoart created by the Victorian Artist-in-Residence, Leah Heiss. A collaboration between Nanovic, Arts Innovation Victoria and ANAT, the program has enabled Heiss to experiment with jewellery design based on technology. One example are patch rings (see pic below) for 12-18 year old girls suffering from illnesses such as diabetes. These rings house transdermal patches which, when loaded with medically relevant substances such as insulin, could replace the need for injections. "We had some success in talking to people about these patches, and they do

understand it. But the minute you show them Leah's brightly coloured and unusual rings and explain how you could wear a ring rather than injecting yourself with a needle four times a day, people want to know more..." describes Alford. The art behind the application is important to arouse interest and personal engagement with the technology.

Heiss says that her 'nanoart' has had positive responses from the public and from scientists. Her projects are largely based on humanising nanotechnologies which directly address

Leah Heiss: These 'Patch Rings' are to house transdermal patches to deliver medically relevant substances such as insulin, avoiding the need for daily injections. The rings make the wearing of patches acceptable and even desirable for teenage girls



the gap between technology and public perception. "Scientists are generally very busy developing technologies and don't necessarily have the time to consider the emotional impact of their creations or ways to improve their user accessibility," she says. "I am interested in augmenting the value of these technologies through artistic practice to challenge their social and emotional potential. The humanising of therapeutic technologies allows people to engage with them more directly, on an emotional level, and thus potentially demystify the technologies behind them."

But could arts be used as a marketing tool to lull the public into uncritical comfort? Alford says that Bridge8 and Nanovic do believe nanotechnology should be implemented, but not at the expense of safety or critical engagement. "You do not get public engagement," she says, "when you are not engaging with both the risks and the benefits."

Other forms of nanoart may involve the interpretation or explanation of nanotechnology by artists (see Murray Robertson 'Nanotechnology' on p. 5), or art that is created in the process of scientific commercialisation or research. As Alford says, nanoscience and its processes are inherently fascinating. "If you view something on a small scale there are images you don't see anywhere else."

There are more serious art endeavours which utilise nanotools as a means to create entirely novel artistic expressions. Alford refers to a recent project at the UCLA that used atomic force microscopy to measure the vibrations of a butterfly leaving its cocoon; these vibrations were then represented in a soundscape.

According to Alford, there is a desire by governments and scientists that the public understands nanotechnology sufficiently to make more informed decisions. She believes art is a good way of enabling the necessary conversation process. "Do we know how many people engage? No we don't. But we do know that when we talk to people about the art-science collaboration, they are really interested."



Mark Seggie (Resin Design, Victoria): Utility fog

More information on events: www.sciencealert.com.au/events

Australian & New Zealand

2008

World Congress of Health Professions
26 to 29 March, Perth, WA

2nd International Salinity Forum: Salinity, Water and Society
31 March to 3 April, Adelaide, SA

Chronic Disease Management Australia 2008
1 to 3 April 2008, Sydney, NSW

Australasian Society for Infectious Diseases

2 to 5 April 2008, Sunshine Coast, QLD

NZ Wind Energy Association Conference
8 to 9 April 2008, Wellington, NZ

Water Down Under
15 to 17 April 2008, Adelaide, SA

7th Annual Australian Network for Plant Conservation Conference

21 to 24 April 2008, Mulgoa NSW

2008 e-Health Research Colloquium
23 April 2008, Brisbane, QLD

Safety in Action 2008
29 April to 1 May 2008, Melbourne, VIC

4th Annual Australian Water Summit
29 April to 1 May 2008, Sydney, NSW

10th International Paediatric and Child Health Nursing Conference
30 April to 2 May, Darwin, NT

Health Outcomes 2008
30 April to 1 May 2008, Canberra, ACT

31st Annual Brain Impairment Conference: Brain Impairment and Ageing
1 to 3 May 2008, Melbourne, VIC

38th Annual Scientific Meeting of the Aus and NZ Society of Nuclear Medicine
1 to 6 May 2008, Gold Coast, QLD

The Art and Science of Impact Assessment
4 to 10 May 2008, Perth, WA

Sustainable Energy Conference: Enviro 08
5 to 7 May 2008, Melbourne, VIC

3rd Asia Pacific Nutrigenomics Conference
6 to 9 May 2008, Melbourne, VIC

Challenges in Cardiology VIII
9 to 10 May 2008, Brisbane, QLD

16th Australian Weeds Conference
18 to 22 May 2008, Cairns, QLD

Generic Medicines Australia 2008
20 to 22 May 2008, Sydney, NSW

2nd Australian International Green Build & Renewable
1 to 3 June 2008, Sydney, NSW

Rail Infrastructure 2008
3 to 5 June 2008, Sydney, NSW

Going Green Expo
5 to 8 June 2008, Melbourne, VIC

14th Australian Vertebrate Pests Conference
10 to 13 June 2008, Darwin, NT

17th World Hydrogen Energy Conference
15 to 19 June 2008, Brisbane, QLD

Clean Energy Australia 2008
17 to 19 June 2008, Sydney, NSW

5th International Conference on Information Technology and Applications (ICITA 2008)
23 to 26 June 2008, Cairns, QLD

Population Health Congress
6 to 9 July 2008, Brisbane, QLD

21st Congress of the International Commission for Optics
7 to 10 July 2008, Sydney, NSW

Vision, Memory, Spectacle
9 to 12 July 2008, Perth, WA

2nd ASIAMiner Investing in Mining Conference
15 to 16 July 2008, Brisbane, QLD

Australian Earth Sciences Convention 2008
20 to 24 Jul 2008, Perth, WA

International Conference on Photochemical Conversion and Storage of Solar Energy
27 July to 1 Aug 2008, Sydney, NSW

2008 Western Pacific Geophysics Meeting
29 July to 1 Aug 2008, Cairns, QLD

From Babies to Blokes - The Making of Men
3 to 6 August 2008, Perth, WA

5th World Congress of Society of Environmental Toxicology and Chemistry
3 to 7 August 2008, Sydney, NSW

3rd Australian International Green Build, Design & Technology Show
15 to 17 August 2008, Sydney, NSW

Coast to Coast 2008
18 to 22 August 2008, Darwin, NT

12th Sustainable Economic Growth for Regional Australia Conference
18 to 20 August 2008, Albury, NSW

2nd Australian Lung Cancer Conference 2008
21 to 24 August 2008, Gold Coast, QLD

5th World Conference on Promotion of Mental Health and the Prevention of Mental and Behavioral Disorders
10 to 12 September 2008, Melbourne, VIC

12th International Lupin Conference
14 to 18 September 2008, Perth, WA

2008 World Congress of WATOC (theoretical and computational chemists)
14 to 19 September 2008, Sydney, NSW

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

11th International Conference on Principles of Knowledge Representation and Reasoning (KR 2008)
16 to 19 September 2008, Sydney, NSW

Leura VI International Breast Cancer Conference 2008
18 to 21 September 2008, Sydney, NSW

World Sustainable Building Conference
21 to 25 September 2008, Melbourne, VIC

Open Access and Research Conference 2008
24 to 25 September 2008, Brisbane, QLD

3rd Annual Conference of the Aus and NZ Chapter of the Society for Risk Analysis
30 September to 1 October 2008, Canberra, ACT

RANZCR 59th Annual Scientific Meeting (radiology and radiation oncology)
16 to 19 October 2008, Adelaide, SA

6th Australasian Viral Hepatitis Conference
20 to 22 October 2008, Brisbane, QLD

Nurse Practitioners: A Solution for the Future
26 to 28 October 2008, Melbourne, VIC

Horizons in livestock management
28 to October 2008, Christchurch, NZ

Australian Association for Infant Mental Health Conference
5 to 8 November 2008, Adelaide, SA

SOIL - The living skin of Planet Earth
1 to 5 December 2008, Palmerston North, NZ

4th International Symposium on Deep Sea Corals
1 to 5 December 2008, Wellington, NZ

Inorganic Chemistry Conference 2008
14 to 18 December 2008, Christchurch, NZ

Evison Symposium on Seismogenesis and Earthquake Forecasting
18 to 22 December 2008, Wellington, NZ

2009

10th International Congress of Ecology
16 to 21 Aug 2009, Brisbane, QLD

12th International Dental Congress on

Modern Pain Control
14 to 17 Oct 2009, Gold Coast, QLD

2009 Asia Pacific Conference on Child Abuse and Neglect
15 to 18 November 2009, Perth, WA

Overseas conferences 2008

European Climate conference
2 to 4 April 2008, Rovigo, Italy

8th World Biomaterials Congress
3 to 5 June 2008, Amsterdam, Netherlands

BioEnergy 2008 Conference and Exhibition
3 to 5 June 2008, British Columbia, Canada

The 4th IET International Conference on Intelligent Environments
21 to 22 July 2008, Washington, United States

33rd International Geological Conference
5 to 14 Aug 2008, Vancouver, Canada

BA Festival of Science
8 to 12 September 2008, London, UK, Europe

European Meteorological Society Annual meeting
29 September to 3 October 2008, Amsterdam, Netherlands

13th International Conference on Biomedical Engineering
3 to 6 December 2008, Singapore, Asia

2009

AAAS Annual Meeting 2009
12 to 16 February 2009, Chicago, Illinois, United States

5th World Water Forum
16 to 22 April 2009, Istanbul, Turkey, Europe

6th World Conference of Science Journalists
29 June to 1 July 2009, London, UK

Face THE Facts



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