AUSTRALIAN ACADEMY OF SCIENCE

NEWSLETTER

December 2005–March 2006 **www.science.org.au** Number 64

Academy President is appointed Australia's new Chief Scientist

The Australian Academy of Science congratulates Dr Jim Peacock, the Academy President, on his appointment as Australia's new Chief Scientist. The Chief Scientist provides advice to the Prime Minister and Ministers on science, technology and innovation issues, that currently include stem cell research, genetically modified food, energy and climate change. As President of the Academy of Science, Dr Peacock has been a strong advocate for the inclusion of science in policy making and his new role provides a link between government and science, engineering, innovation and industry groups, facilitating active communication and input into strategic thinking.

As Chief Scientist, Jim is a member of the Commonwealth, State and Territory Advisory Council on Innovation, the Prime Minister's Science Prizes Committee and the Cooperative Research Centres Committee. He is also Executive Officer of the Prime Minister's Science, Engineering and Innovation Council (PMSEIC), advising on Council membership and agenda items, and ensuring the quality of the Council's work.

Dr Peacock is an award-winning plant scientist, with a long record of applying basic research in plant molecular biology to agriculture. He was appointed Chief of the Division of Plant Industry, CSIRO, in 1978 and over the next quarter of a century built the Division into one of the world's foremost plant science institutes, across a number of research disciplines. Jim retired as Chief of CSIRO Plant Industry in 2003 but continues his active research programs in the induction of flowering, the molecular genetics of seed development, plant haemoglobin and the molecular biology of stress responses in plants. As the Chief Scientist position is a part-time role, Jim will continue to make significant contributions in leading key science initiatives within CSIRO.

Jim has also developed very effective relationships with Australian and international agribusiness enterprises providing landmark examples of the nexus between research discoveries and their adoption into commercial practice. For example, he played a key role in the development and adoption of biotech cotton and he has championed new approaches to wheat, barley and rice breeding. His strong international scientific links will ensure that Australia is alert to emerging technologies and new opportunities.

Science is an integral part of our everyday lives and will become increasingly important as knowledge advances. Jim has driven innovative communication efforts to extend research results and educate key decision-makers and the general public about the outcomes and value of modern science, particularly gene technology. He has successfully brought the value of biological research to a broad cross-section of the community and to a large population of Australian school students.

In December 1989 he was awarded a CSIRO Medal for his leadership of CSIRO Plant Industry and in 2005 he was recognised with the CSIRO Medal for Lifetime Achievement, honouring his unprecedented 25 year role as Plant Industry Chief. Dr Peacock is a Fellow of The Royal Society of London and the Australian Academy of Technological Sciences and Engineering. In 1990 he was elected as a Foreign Associate of the US National Academy of Sciences and a Foreign Fellow of the Indian National Science Academy.

Jim Peacock and Julie Bishop: measuring up.

In 1994 Dr Peacock was made a Companion of the Order of Australia, Australia's highest honour, for his contribution to the nation, and in 2000 he was a joint recipient of the inaugural Prime Minister's Science Prize for his research which defined one of the major controls of plant development – the switch from the vegetative to the reproductive phase of the plant's life cycle.

His four-year term as President of the Academy will conclude in early May this year.

Nobel poster and website

The Australian Academy of Science has designed a poster to celebrate the Nobel Prize-winning research of Professor Barry Marshall FAA and Professor Robin Warren FAA.

A copy of the poster will be sent to every primary and secondary school across the nation, about 10,000 in number. Other recipients of the poster include medical research institutes, CSIRO education centres, university science and education faculties, and Australian embassies and missions abroad.

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New Fellows elected (see page 2)

Academy Officers

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Dr Jim Peacock

Secretary (Physical Sciences)
Dr Bob Frater

Secretary (Biological Sciences)
Professor John Shine

Secretary (Science Policy)
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New Fellows

The Academy congratulates the following scientists who were elected to the Fellowship on 24 March. More information on our new Fellows will appear in the next *Newsletter*.

Professor David Grant Allen
Professor of Physiology, School of Medical Sciences, University of Sydney

Dr Brian John Boyle
Director, Australia Telescope National Facility, CSIRO ATNF

Professor Mark Alexander Burgman
Professor, School of Botany, University of Melbourne

Professor David Stephen Celermajer
Scandrett Professor of Cardiology, Sydney University, Department of Cardiology, Royal Prince Alfred Hospital

Professor (John) Barry Egan
Professor, School of Molecular and Biomedical Science, University of Adelaide

Professor Lorenzo Faraone
Professor, School of Electrical Engineering, University of Western Australia

Professor David John Hinde
Professor, Department of Nuclear Physics, Research School of Physical Sciences and Engineering, Australian National University

Professor Andrew Holmes, AM, FRS
ARC Federation Fellow and VESKI Inaugural Fellow, Bio21 Institute, University of Melbourne

Professor Brian Herbert Kay, AM
Deputy Director, Australian Centre for International and Tropical Health and Nutrition, Queensland Institute of Medical Research

Professor Roger Powell
Professorial Fellow, School of Earth Sciences, University of Melbourne

Dr Stephen Rich Rintoul
Senior Principal Research Scientist, Marine and Atmospheric Research, CSIRO

Professor Igor Shparlinski
Associate Professor, Department of Computing, Macquarie University

Professor Michelle Yvonne Simmons
ARC Federation Fellow, Experimental Condensed Matter Physics, Centre for Quantum Computer Technology, School of Physics, University of New South Wales

Professor Evan Rutherford Simpson
Director, Prince Henry's Institute of Medical Research

Professor Jonathan Sprent, FRS
Professor, Garvan Institute of Medical Research

Professor Susanne von Caemmerer
Professor, Molecular Plant Physiology Group, Research School of Biological Sciences, Australian National University

Professor Robin Warren, Nobel Laureate
Emeritus Professor, University of Western Australia

Dr John Zillman, AO, FTSE
President, Australian Academy of Technological Sciences and Engineering

Forthcoming events

- *Science at the Shine Dome* and AGM, 3–5 May 2006.
  See **www.science.org.au/sats2006**.
- *2006 Fenner Conference on the Environment*, 25–26 May 2006.
  See **nceph.anu.edu.au/Fenner2006**.
- *From stars to brains: pathways to consciousness in the natural world*, 20–21 June 2006.
  See **www.manningclark.org.au/events/stars**.

New topics on *Nova*

- Weeds – the real alien invaders
- Nanotechnology – taking it to the people
  www.science.org.au/nova

International exchanges

- The Academy is currently inviting applications for its next round of Scientific Visits to Europe, North America and Asia. The deadline for these applications is 14 July 2006.
  See **www.science.org.au/internat** for application forms and selection criteria.

Gifts to the Academy

If you would like to make a gift or a bequest to the Academy please contact the Executive Secretary, Professor Sue Serjeantson, on (02) 6201 9400 or **es@science.org.au**.

Professor Ian Frazer named Australian of the Year

The President and Fellows of the Australian Academy of Science congratulate Professor Ian Frazer on being named Australian of the Year for 2006.

Professor Frazer and his colleague, the late Dr Jian Zhou, made a discovery 15 years ago that has led to the development of a vaccine for cervical cancer. The vaccine, known as Gardasil™ and Cervarix™, prevents infection with the human papilloma virus (HPV) that leads to cervical cancer, and is expected to be available in the developed world by mid-2006.

Ian Frazer moved from Edinburgh to Melbourne in 1980 to work at the Walter and Eliza Hall Institute before moving to the Princess Alexandra Hospital in Brisbane in 1985. He is now Director of the Centre for Immunology and Cancer Research at the University of Queensland and Princess Alexandra Hospital.

Professor Frazer's research into HPV began when he was working with a group of gay men, most of whom were HIV positive and suffering from anogenital warts. He investigated the HPV that caused the warts, and with his colleagues discovered that the warts were associated with abnormal cells – precursors to cancerous cells.

But it was the HPV associated with cervical cancer that Ian Frazer pursued. A vaccine that prevents the initial HPV infection could save the lives of millions of women. After many months of trying, Ian Frazer, Dr Zhou and his team were able to grow an empty HPV shell that the human body could recognise and develop antibodies against. In October 2005, worldwide clinical trials of the vaccine showed it to be 100 per cent effective at preventing infection with HPV strains 16 and 18.

An estimated 30 per cent of sexually active women contract HPV strains 16 and 18, which account for 70 per cent of cervical cancer cases. Each year around the world, more than 500,000 women are diagnosed with cervical cancer and 275,000 women die from the disease. The vaccine will save thousands of lives each year, but it is women in developing countries, where Pap smears are not widely available, who will benefit the most. They currently account for 80% of deaths from cervical cancer. Professor Frazer is working with the Gates Foundation and the World Health Organisation's Expanded Vaccine Initiative to deliver the drug as cheaply as possible to developing countries and make it available to all women.

Ian Frazer and his team at the University of Queensland recently announced a clinical trial for a vaccine that will treat existing infections, as there are an estimated five million women already infected with HPV who will develop cervical cancer. Together, the preventative vaccine and the treatment vaccine, have the potential to eradicate cervical cancer within a generation.

Ian Frazer. Photo courtesy: Chris Stacey, University of Queensland.

Professor Jenny Graves receives L´Oréal-UNESCO award

The President and Fellows of the Australian Academy of Science congratulate Professor Jenny Marshall Graves on receiving a L´Oréal-UNESCO Award for Women in Science. The award celebrates her outstanding contributions to research in the evolution of mammalian genomes.

She was selected as the 2006 laureate for the Asia-Pacific region for the L´Oréal-UNESCO Awards, which are awarded annually to five exceptional women researchers from around world. She accepted the award from the Director-General of UNESCO, Koïchiro Matsuura, at a ceremony in Paris in March.

Head of the Comparative Genomics Research Group at the Research School of Biological Sciences at the Australian National University, Professor Graves has an international reputation in mammalian genetics and the evolution of sex chromosomes. Her research has increased our understanding of the molecular mechanisms of X chromosome inactivation and her group played a pivotal role in identifying *SRY*, the sex-determining gene on the mammalian Y chromosome.

In 2004, she achieved a longstanding ambition and began sequencing the genome of a marsupial, the tammar wallaby. The project will take five years and is being undertaken by an international team of scientists.

Professor Graves is Foreign Secretary-elect for the Academy.

Dr Jim Peacock, President of the Australian Academy of Science, said, 'This award is a great achievement for Jenny, and recognises the excellent research she has conducted over the past 30 years.

'She is a wonderful role model for young women thinking about a career in science.'

Professor Graves is also the 2006 recipient of the Academy's Macfarlane Burnet Medal and Lecture for research in the biological sciences. She will give the lecture at the Academy's annual *Science at the Shine Dome* event in Canberra on Wednesday 3 May.

Jenny Graves.

International news

China

Professor Guanhua Xu, Minister of Science and Technology, People's Republic of China, was a guest of the Australian Government in February 2006. While visiting Canberra he gave a public lecture entitled *China's science and technology towards the new era*, at the Shine Dome on 16 February 2006. The talk focused on China's recently released National Long and Medium Term Science and Technology Development Plan, which outlines China's strategic science and technology policy for the next 15–20 years. After the lecture the Academy hosted a lunch for Minister Xu and his delegation. A copy of the Minister's speech is at **www.science.org.au/events/16february06.htm**.

Professor Huadong Guo, Deputy Secretary General and Director General of the Bureau of International Cooperation, Chinese Academy of Sciences, travelled to Melbourne on 20 February 2006 to join Minister Xu's delegation in order to launch the Australia-China Water Centre. This is a venture between the University of Melbourne and the Institute of Geographic Sciences and Natural Resources Research at the Chinese Academy of Sciences.

While in Melbourne Dr Jim Peacock took the opportunity to meet with Prof Guo to discuss issues relating to the third Australia-China workshop being organised by the Academies of Science on the topic of energy to be held in Australia in November 2006.

From left: Her Excellency Madam Ying Fu, Professor Guanhua Xu and Professor Kurt Lambeck.

Delegation from the Korea Science and Engineering Foundation led by Dr Oh Kab Kwon. Next to Dr Kwon are Professor Bruce McKellar and Professor Sue Serjeantson.

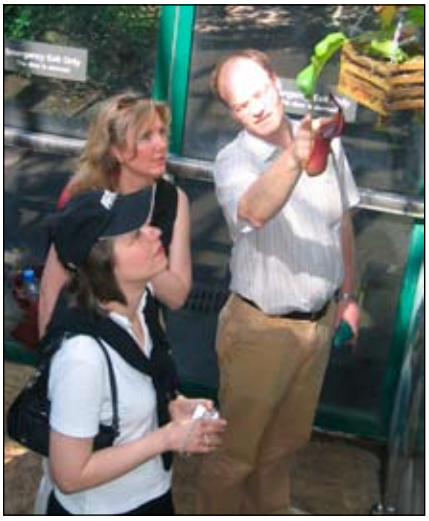
Korea

Dr Oh-Kap Kwon, CEO and Chairman of the Korea Science and Engineering Foundation (KOSEF), visited Canberra 1–2 March 2006. Dr Kwon was accompanied by Mr Bung-Hwan Ho, Director of KOSEF's International Program Division, and Mr Kil-Su Park, of the Team of International Programs.

In Canberra, the KOSEF delegation met with the Academy, ANU, ARC, CSIRO and the CRC eWater at the University of Canberra. Cultivating a society in which science and technology play a key role has been the main theme of the current Korean government. The government set up a strategic investment program for national S&T development. KOSEF's financing plan includes a budget that encompasses 25% of the government's total investment in science and technology development.

Germany

On behalf of the Department of Education, Science and Training (DEST), the Academy organised a bilateral meeting with Germany 13–17 March 2006. The meeting, held in Canberra, had two components. The first was an intergovernmental meeting attended by the German scientific administration delegation and representatives from relevant Australian government departments/government research institutions, that provided information about the respective R&D environments and discussed broader collaboration between Australia and Germany. The second component was a scientific workshop with the topic of biodiversity and plant imaging that gave Australian and German researchers the opportunity to investigate



German workshop participants at the Royal Botanic Gardens.

ways of better promoting research collaborations and identifying new and emerging areas of potential mutual interest.

Following the meeting a range of technical site visits to key research institutes and industry in Brisbane and Sydney were undertaken over two days. The site visits complemented the workshop by providing insight into existing areas of cooperation and areas for expansion.

The Sir Mark Oliphant International Frontiers of Science and Technology Conference Series

Two conferences funded by the Department of Education, Science and Training's The Sir Mark Oliphant International Frontiers of Science and Technology Conference Series, and managed by the Academies of Science, were held recently.

BioNano: the next frontier, was held at the University of Queensland, Brisbane, 4–7 December 2005. The conference was hosted by the Australian Institute for Bioengineering and Nanotechnology (AIBN), The conference program focused on five key themes: nanotechnology: enabling scientific discoveries and innovations in industries; challenges of personalised medicine; tissue regeneration and tissue replacement; cells as factories: new products, new processes; and creating and facilitating commercial opportunities.

Quantum Nanoscience, a joint initiative of the University of Queensland and the Pacific Institute for Theoretical Physics, University of British Columbia, Vancouver, Canada, took place in Noosa, 22–26 January 2006. Quantum nanoscience explains functionality and structure in natural or engineered nanoscale systems through quantum mechanisms such as discretisation, superposition and entanglement. Quantum nanoscience is directed towards breakthrough science for nanotechnologies.

The Sir Mark Oliphant Conference Series is an initiative of the Australian Government (Department of Education, Science and Training), the Australian Academy of Science and the Australian Academy of Technological Sciences and Engineering, with support from Engineers Australia.

Primary Connections

Participants of the Making Connections *workshop.*

Eighty-eight participants took part in a three day *Making Connections* workshop (18–20 January 2006) at the Australian Academy of Science, in Canberra, in preparation for their role as *Primary Connections* facilitators.

The participants represented a range of jurisdictions and organisations, including government, Catholic and independent sectors, CSIRO Education, Primary English Teachers Association and Scitech (WA). Included in the 88 participants were 16 of the 2005 trial teachers of the program.

The three day *Making Connections* workshop included sessions on a range of topics including effective professional learning, the *Primary Connections* program, cooperative learning and action planning.

It is intended that trained facilitators will support trial schools as they commence whole school uptake of *Primary Connections* in 2006 and also any new schools that may be interested in the program. Each state and territory jurisdiction will decide the way they will support schools. Some possible roles for facilitators have been discussed including:

- Work with their jurisdiction or sector to develop models of support for schools expressing interest in the uptake of *Primary Connections*
- Facilitate a one-day professional learning program for groups of school coordinators
- Facilitate a one-day whole-school professional learning program for new schools interested in *Primary Connections*
- Facilitate 90 minute after-school workshops for schools as a follow-up to the introductory one-day workshop
- Mentor school coordinators to take on a curriculum leadership role in their schools.

There are now four published *Primary Connections* units available for schools to purchase. Thanks to financial support from the Department of Education, Science and Training, the units are a very valuable yet affordable commodity for any school. The Academy is in the editing phase for four more units that were trialled in 2005 and hope to have these published and available for purchase by the middle of 2006.

More than 100 teachers from over 50 trial schools will once again trial new units and provide feedback for the refinement of these units.

Further information on the project can be found at **www.science.org.au/primaryconnections**.

New Corresponding Members

Professor Rodney Allen Brooks
Panasonic Professor of Robotics and Director, Computer Science and Artificial Intelligence Laboratory, Massachusetts Institute of Technology, Cambridge, USA.

Professor Terence Tao
Professor, Department of Mathematics, University of California, L os Angeles, USA.

National Committees

In early December the National Committee for **Plant and Animal Sciences** was host to a Sino-Australian workshop, 'Management of Grassland-Livestock Systems and Combating Land Degradation in Northern China'. Held at the Shine Dome and field sites in the region, the objectives of the workshop were to:

- enhance communication and cooperation between Chinese and Australian scientists and experts;
- provide a forum for identifying and discussing the fundamental causes of grasslands degradation in China and for sharing the lessons learned from efforts to fight it;
- identify gaps and opportunities for new research programs/partnerships seeking to address the problem.

Around 35 delegates attended, and the outcomes of the workshop can be found at **www.science.org.au/events/grasslands**. Support was provided by the Academy, AusAID and CSIRO.

Field trip to CSIRO Ginninderra Experiment Station.

Her Excellency Madam Fu Ying, Chinese Ambassador to Australia.

Discussing production and conservation at a field site near Berridale.

The **Earth System Science** Committee met in Canberra on 9 December. The development of the national program of terrestrial carbon cycle research was discussed. The Committee agreed to draft a proposal for a Special Research Initiative on Earth System Science Modelling, and a proposal for a Conference in late 2007 on 'Vulnerability and Resilience of Natural and Human Systems to Climate Change'. The proceedings of the Pan Evaporation workshop held in November 2004 at the Shine Dome have been published at **www.science.org.au/natcoms/pan-evap.pdf**. A paleo-climate workshop in June 2005 has resulted in substantial follow-up activity.

The **History and Philosophy of Science** Committee met on 5 December at the University of Otago, Dunedin, New Zealand, in conjunction with the 2005 Australasian Association for the History, Philosophy and Social Studies of Science conference. The National Museum of Australia student essay prizes, Sino-Australian Symposia in History and Philosophy of Science, the fledgling World History of Science On-line project and the possible impact of the implementation of the forthcoming Research Quality Framework exercise were discussed.

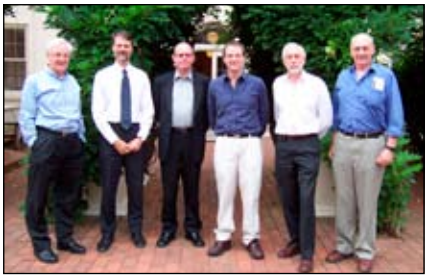
The National Committee for **Medicine** met on 15 December, including a session with the Rt Hon Mrs Helen Liddell, the UK High Commissioner in Australia, and Fiona Ratcliffe, her Science Attaché. There were many points made about possible future actions that would facilitate links between Australia and the UK. Closer links with the National Committee for Biomedical Research are being fostered. A submission has been made to the National Health and Medical Research Council, Australian Research Council, and the Australian Vice-Chancellors' Committee commenting on the Second consultation draft of the National Statement on Ethical Conduct in Human Research.

The **Chemistry** Committee met in Canberra in January. Among items discussed was the holding of another workshop along the lines of the very successful Green Chemistry Symposium.

The **Geography** Committee met in March and discussed the lead-up to and challenges beyond the upcoming International Geographical Union congress to be held in Brisbane in July. Challenges identified included:

- how to capture and communicate the range of activities undertaken by the various geography organisations;
- a strategy to advance the interests of geography;
- the boundaries of the discipline;
- the bifurcation of geography into human and physical geography;
- fragmentation of the discipline.

The National Committee for **Space Science** met in March and discussed, among other items, the continuing development of the first Australian Decadal Plan for Space Science. The Steering Committee and Chairs of the Working Groups have been appointed. Information on the Plan, including invitations to participate in its development, can be found on the Academy's website at **www.science.org.au/natcoms** and also at the Plan's site at **www.physics.usyd.edu.au/~ncss**.



From left: Bob Vincent, Alex Held, Andrew Parfitt, Iver Cairns (Chair), David Cole and Peter Dyson.

The **Muses-C** task force submitted a report for the Space Science meeting. The Hayabusa spacecraft (code named MUSES-C by JAXA) arrived at asteroid Itokawa (1998SF36) on 12 September 2005. Two touchdowns have occurred, and the Committee commented on the technologically advanced nature of the mission. A set of papers is being prepared for *Science Magazine*, and a session has been organised at the Lunar and Planetary Science Conference in Houston to present data from the asteroid landing. The Hayabusa web page **www.hayabusa.isas.jaxa.jp** has further details.

Science policy

1. Productivity Commission to review publicly funded research

On 10 March 2006 the Treasurer, Peter Costello and Minister for Education, Science and Training, Julie Bishop, announced a review of public support for science and innovation to be conducted by the Productivity Commission. The study will particularly consider:

- the economic impact of public support for science and innovation, including impacts on Australia's recent productivity performance;
- impediments to the effective functioning of Australia's innovation system;
- broader social and environmental impacts.

The Academy welcomes the study as an opportunity to articulate the importance of R&D and innovation policy frameworks.

On 22 March 2006, the Academy met with the Commissioner overseeing the study – Mike Woods, and colleague Ralph Lattermore to discuss the scope of the review. Further information on the review is available from the Commission at **www.pc.gov.au**.

2. National Collaborative Research Infrastructure Strategy (NCRIS) and Roadmap

The National Collaborative Research Infrastructure Strategy (NCRIS) is a major initiative under the Government's *Backing Australia's Ability – Building our Future through Science and Innovation* with an allocation of $542 million in funding. The main component of administered funding begins in 2006–07, at around $100 million a year continuing to 2010–11.

The objective of NCRIS is outlined as providing researchers with major research facilities, supporting infrastructure and networks necessary for world-class research. Recently, the Minister for Education, Science and Training, Julie Bishop announced details of a Roadmap outlining priority areas for the Australian Government's major research infrastructure investment. The priority investment areas identified for 2006 include among others: evolving biomolecular platforms and informatics; integrated marine observing systems; and the structure and evolution of the Australian continent. The NCRIS Roadmap is available at **www.dest.gov.au/sectors/research_sector/policies_issues_reviews/key_issues/ncris**.

The Academy acknowledges that the strategic, managed process of NCRIS will benefit Australia but cautions that in order to best enhance the total resources available and ensure that facilities are operated by leading researchers of international standing, it may well be necessary in some cases to invite competitive tenders. This can attract additional resources from State governments, international partners and Australian research institutions that might otherwise be unavailable. The Academy's submission is available at **www.science.org.au/reports/9december05.pdf**.

3. Forthcoming Annual Symposium on the 'Hydrogen Economy'

In 1766, Henry Cavendish was the first to recognise hydrogen (H_2) as a discrete substance and find that the gas produces water when burned in air. Now, 240 years later, hydrogen production is a large and growing industry with the possibility of a future economy in which it becomes the primary form of stored energy.

Sponsored by the CSIRO Energy Transformed National Research Flagship, the Academy's Annual Symposium is entitled: 'Science on the way to the hydrogen economy' and will be held at the Shine Dome in Canberra on 5 May 2006. The symposium convenor is Dr Michael Barber FAA.

A program is available at **www.science.org.au/sats2006/symposium.htm**.

Australian researchers will present new discoveries and there will be two visiting speakers from the USA. First, a plenary lecture will be delivered on the subject of 'Two hydrogen economies' by Dr George Crabtree, a senior scientist at the Argonne National Laboratory. George recently served as Associate Chair of the Workshop on Basic Research Needs for the Hydrogen Economy organised by the Department of Energy's Office of Basic Energy Sciences.

This presentation will be followed by a talk on the production of hydrogen by Dr Cathy Grégoire Padró from the Los Alamos National Laboratory. Currently, Cathy is the Laboratory lead for international partnership activities in the Hydrogen, Fuel Cells and Infrastructure Technologies Program, with a focus on the development of performance-based codes, standards, and regulations for hydrogen applications. She is also involved with a project to produce hydrogen for buses to be used during the 2008 Beijing Summer Olympics.

Royal Society Treasurer visits the Academy

Sir David Wallace, Treasurer of the Royal Society, visited Australia in March. He took time out from his holiday to take high tea with Academy President, Dr Jim Peacock, immediate past Treasurer, Professor Ian McDougall, Executive Secretary, Professor Sue Serjeantson and Academy Business Manager, Pam Ferrar. Later in the evening, Sir David hosted a supper for Australian Fellows of the Royal Society and their partners, at the Boathouse, one of Canberra's finest restaurants.

Sir David Wallace (centre) with Professor Ian McDougall (left) and Dr Jim Peacock.

Nova: Science in the news

www.science.org.au/nova

Two new topics have recently been posted on the Academy's educational website, *Nova: Science in the news*:

Weeds – the real alien invaders

Invasive weeds threaten the environment, agriculture, and people's health – and the threat is growing. Vast areas of land and nearly every kind of ecosystem – from oceans and waterways to rainforests, grasslands and deserts – are affected by introduced plants.

More than 27,000 species of alien plants have been introduced to Australia since European colonisation, for agricultural and ornamental purposes. While these plants have formed the basis of important industries and beautiful gardens, many have also become serious weeds.

By out-competing native plants, weeds threaten their survival and reduce plant diversity needed to support insects, birds and animals. Changes to the natural flora cover can lead to increased soil erosion and greater bushfire intensities, further damaging the land and the native plants and animals that rely on it.

Agriculturally, weeds can reduce or contaminate crop yields and poison or injure livestock. Weeds have been estimated to cost Australian agriculture a total of $4 billion every year.

Weeds also cause significant human health problems, with introduced species making up 20 out of the 25 major seasonal allergens in Australia. The health costs of weeds are estimated at over a billion dollars annually.

This topic is sponsored by the Australian Government Department of the Environment and Heritage (**www.deh.gov.au**).

Nanotechnology – taking it to the people

The business of working with the ultra small promises to become mega big. But what you'll actually see in the marketplace may not look all that different from what's around us today.

The nanohouse and nanocar are two examples of the use of nanotechnology research in familiar items.

A house making use of nanotech products would be extremely energy-efficient, have self-cleaning surfaces, cold lighting systems and dye-sensitised solar cells. It would be easy to assemble and take apart, cheap to run and comfortable to live in.

The nanocar would likely be made of superlight, superstrong, recyclable fibre composites. It would run on hydrogen and atmospheric oxygen, combined in fuel cells to produce electricity. The hydrogen gas may be safely stored absorbed to carbon nanotubes and released as required by mild heating.

It's easy to see how we can benefit from improved processes and products created by nanotechnology. But it's just as important that the community also explores the possible social, ethical and safety concerns connected to the widespread use of these new technologies.

This topic is sponsored by the Australian Research Council Nanotechnology Network (**www.ausnano.net**).

The principal sponsor of *Nova: Science in the news* is the Commonwealth Bank Foundation (**www.commbank.com.au/foundation**). The Australian Foundation for Science is also a supporter of *Nova*.

NSW Regional Group Meeting

The NSW Regional Group met at the Prince of Wales Medical Research Institute on 22 March to hear a range of presentations on the topic of 'Science Teaching in Schools'.

Twenty-five people, including AAS and ATSE Fellows, heard presentations from Claudette Bateup (Unit coordinator of the Academy's *Primary Connections* project); Dr Bryan Pennington (*Primary Science Matters* company science consultant), Dr Matthew McCloskey (Science teacher, Sydney Grammar) and Dr Mark Butler (Head of Science, Gosford High School; winner of the *2005 Prime Ministers Award for Excellence in Science Teaching in Secondary Schools*).

From left: Bryan Pennington, John Nutt (ATSE), Claudette Bateup, Mark Butler, Matthew McCloskey, Elspeth McLachlan and Doreen Clark (ATSE).

Eureka Moments!

Eureka moments! Highlights from 50 years of Australian science was launched at the National Museum of Australia in May 2004 to celebrate the Academy's Golden Jubilee.

Following the launch, *Eureka moments!* has had a successful 20 month tour, visiting museums, galleries and libraries around Australia, including regional towns.

Feedback from museum staff and visitors praised the exhibition for its initiative in celebrating Australian science and innovation, and for its appealing design. Many school groups took the opportunity to visit the exhibition, with teachers using the online educational resources as a basis for a unique learning experience.

www.science.org.au/eureka

InterAcademy Panel statement on biosecurity

The InterAcademy Panel (IAP), a global network of science academies that includes the Australian Academy of Science, has issued a statement on biosecurity to coincide with the Meeting of States Parties of the Biological Weapons Convention, which ran from 5–9 December. The statement followed an IAP International Forum on Biosecurity held in March 2005 in Como, Italy, where the Academy was represented by Dr Benjamin Kile, QEII fellow, Walter and Eliza Hall Institute of Medical Research.

This statement, endorsed by 68 of the world's national academies of science from all regions of the world, is to guide individual scientists in their day-to-day activities and also to act as the basis for codes of conduct developed by scientific communities or institutions.

There are five fundamental issues facing scientists working in the biosciences: awareness; safety and security; education and information; accountability; and oversight.

Professor Philip Kuchel, Secretary, Science Policy, Australian Academy of Science, said: 'The threat from biological weapons is again a live issue. Scientists need to be aware. They must always bear in mind the potential consequences of their research and should not ignore the possible misuse of their work by others. They also need to pass on this awareness. Teaching the next generation of scientists about national and international laws and regulations is important. And as part of that, the underlying principles aimed at preventing the misuse of research must also be explained.'

Kuchel continued: 'Since the Biological and Toxin Weapons Convention in 1972, scientific research has created new and unexpected knowledge and technologies which have benefited mankind in many ways. But some of this technology can be used for destructive as well as for constructive purposes and that is why getting scientists to think about these principles is so vital.'

The full text of the IAP biosecurity statement, along with the names of national science academies that have endorsed it, is available at **www4.nationalacademies.org/iap/iaphome.nsf/weblinks/WWWW-6JPDTY/$file/IAP_Biosecurity.pdf?OpenElement**.

InterAcademy Panel on inquiry-based sciences education

A meeting of the InterAcademy Panel on Inquiry-Based Sciences Education was held in Washington DC, USA on 16 and 17 March 2006. The Australian Academy of Science representative was **Professor Julie Campbell**. Professor Campbell is Secretary-elect for Education and Public Awareness of the Academy, and she was appointed co-chair of the Working Group together with **Professor Jayashree Ramadas**, a science educator from India.

At the meeting, members agreed upon a general framework of the evaluation process involved for Inquiry-Based Sciences Education and began work on a Report.

The completed Report will be circulated to all members of the panel prior to its follow-up meeting on 15 and 16 June 2006 in Paris, funded by the IAP and hosted by the French Academy of Sciences. At this meeting corrections/additions will be made to produce the Final Report.

This panel meeting is important for future development of Inquiry-based Sciences Education programs including the Academy's *Primary Connections* and *Science by Doing* projects.

Nobel poster and website

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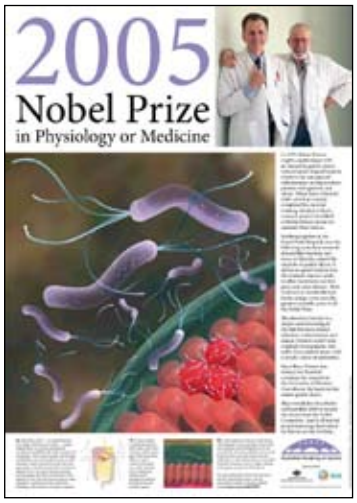
It is hoped that the poster will raise students' awareness of the discovery and underlying science that won the Nobel Prize, and inspire bright young Australians to pursue a career in research. The poster highlights the quality of education in Australia to attract overseas students to study at Australian universities.

To accompany the poster, the Academy has developed a 'Nobel Australians' website, that celebrates Australian Nobel Prize winners. The site, **www.science.org.au/nobel**, provides an interview transcript, glossary, further reading, activities for students and links to useful sites. The banner for the website incorporates images of Nobel Prize-winning scientists superimposed on the Academy Dome.

The poster is sponsored by the Western Australian Government's Department of Health (**www.health.wa.gov.au**), the National Health and Medical Research Council (**www.nhmrc.gov.au**) and the Australian Foundation for Science.

The Academy produced a similar poster in 1996 to celebrate Professor Peter Doherty FAA winning the Nobel Prize. The information presented on the 1996 poster has been modified to also appear on the website.



Nobel poster and website.

OBITUARIES

Richard Dalitz

Richard Henry Dalitz was born in Dimboola, Victoria, on 28 February 1925 and died in Oxford, UK, on 13 January 2006. He was educated at the Universities of Melbourne (BA, hons. maths, 1945; BSc, physics, 1946) and Cambridge (PhD, theoretical physics, 1950). Melbourne University awarded him an honorary DSc in 1991.

After seven years in the Mathematical Physics Department at the University of Birmingham, as a research fellow, lecturer and reader, he spent ten years as Professor of Physics at the Enrico Fermi Institute of Nuclear Studies, University of Chicago. In 1963 he was appointed a Royal Society Research Professor at the University of Oxford, retaining this post until his retirement in 1990, when he was appointed a Professor Emeritus of Oxford, as well as Emeritus Fellow of All Souls College, where he had been a Fellow since 1964.

Dalitz's name has been a byword in high energy physics for the last 50 years because of the discoveries that were named after him: the Dalitz pair, the Dalitz plot and Castillejo-Dalitz-Dyson (CDD) poles. His first seminal contribution was to demonstrate that the electrically neutral pion could decay into a photon and electron-positron pair, the Dalitz pair. He then went on to show that, in particle terms, parity (mirror symmetry) is not a property of nature, using what he called a 'phase space plot', a map-like representation known since as the Dalitz plot. Later, in analysing the data on resonances that led to his development of the quark model, he co-discovered what became known as CDD poles.

Dalitz won a number of major awards in both the UK and the USA. He was elected a Fellow of the Royal Society in 1960, a Corresponding Member of the Australian Academy of Science in 1978 and a Foreign Associate of the US National Academy of Sciences in 1991.

He is survived by his wife Valda, three daughters and a son.

Henry Taube

Henry Taube was born at Neudorf, Saskatchewan, Canada, on 30 November 1915, became a naturalised US citizen in 1942 and died at Stanford, California, on 16 November 2005, just two weeks short of his 90th birthday. He was educated at the Universities of Saskatchewan (BS 1935, MS 1937) and California, Berkeley (PhD 1940).

After a year instructing at Berkeley and five years as an instructor and assistant professor at Cornell University, he moved to the University of Chicago in 1946. He stayed there until 1961, rising from Assistant Professor to Professor. The following year he became Professor of Chemistry at Stanford University, where he also served two terms as Chairman of the Department of Chemistry. On his retirement in 1986 he was made a Professor Emeritus.

Taube maintained a lifelong interest in oxidation-reduction or 'redox' reactions, in which electrons are lost and gained during a chemical reaction. He developed the details of how these reactions occur, and in the process invented a new chemistry regarding transition metals, such as ruthenium, which is commemorated by the Creutz-Taube ruthenium ion that bears his name. He carried out groundbreaking research in the field of coordination chemistry, which involves the study of metal complexes ('coordination compounds') that consist of a metal atom surrounded by other molecules or ions. Later he conducted research bridging the interface between traditional coordination chemistry and organometallic chemistry.

Henry Taube won nearly every major award in chemistry, including the Nobel Prize in 1983 for his work on electron transfer reactions. He was also awarded the F P Dwyer Medal by the University of New South Wales in 1973. In 1991 he was elected a Corresponding Member of the Australian Academy of Science.

Taube is survived by Mary, his wife of 53 years, sons Karl and Heinrich and daughter, Linda, and five grandchildren.

Biographers

Memoirs of deceased Fellows are published in *Historical Records of Australian Science* and are also available on the Academy's website at **www.science.org.au/academy/memoirs**.

The biographers for **Professor Ren Potts** are Professor Ernie Tuck FAA and Professor Charles Pearce, Elder Professor of Applied Mathematics, University of Adelaide, and the biographical memoir for **Professor George Szekeres** will be prepared by Professor Michael Cowling FAA and Professor Alf van der Poorten, Emeritus Professor of Macquarie University.

Boden Research Conference 2005 'Cellular Signalling and Human Disease'

The Boden Research Conference 2005 was held at the Garvan Institute of Medical Research, Sydney, on 7 and 8 November. The meeting was jointly organised by the Garvan Institute and the Australian Society for Biochemistry and Molecular Biology and highlighted recent advances in our understanding of how altered cellular signalling contributes to specific disease states and how this can be exploited in the development of new therapeutic strategies. The meeting featured five international speakers, including Chris Marshall FRS (Institute for Cancer Research, London, UK), Nick Tonks FRS (Cold Spring Harbor Laboratories, USA) and John Scott FRS (Vollum Institute, Portland, USA), as well as 13 national speakers. Amongst the themes addressed were how changes in cellular signalling pathways contribute to cancer and diabetes, regulation of protein tyrosine kinases and phosphatases, cytokine signalling and haematopoetic disorders and the subcellular compartmentalisation of signalling complexes. The meeting was well attended, with 160 delegates from Australia, New Zealand, Europe, USA and Asia. In addition to enabling the presentation and discussion of cutting-edge research, the conference also provided a platform for early career scientists to present their work, with five short talks selected from submitted abstracts and 55 poster presentations.

Professor John Scott, FRS (Howard Hughes Medical Institute, Vollum Institute, Portland, USA), an international speaker at the Boden Conference.

Honours to Fellows

The Curtin Medal for 2005 has been awarded to **Professor Samuel Berkovic**, Head of the Comprehensive Epilepsy Program at the Austin Hospital and the Epilepsy Research Centre of the University of Melbourne. Professor Berkovic is a neurologist and clinical researcher who has strong collaborations with basic scientists in many Australian and international laboratories. He seeks to understand the basic neurobiology of human epilepsies, using varied approaches to gain insights that can be used for diagnosis and treatment of patients.

Professor Berkovic has also won the prestigious Zülch Prize of Germany's Max Planck Society for his groundbreaking investigations into the genetic foundations of epilepsy. The Zülch Prize is awarded annually for outstanding achievements in basic neurological research. The prize has always been shared between two scientists and Professor Berkovic shares the award with Professor Christian Elger from the University of Bonn, who was also recognised for research into epilepsy.

Professor Gavin Brown AO has been made an Officer of the Order of Australia for service to tertiary education in Australia and internationally as an advocate for excellence and through the establishment of strategic links with overseas institutions, and to mathematical research.

Professor David de Kretser has been appointed for a five year term as Governor of Victoria. He has an international reputation in the field of reproductive biology. He was the founding director of Andrology Australia — a national body which provides public education and research into men's reproductive health. He has been acknowledged by the Committee for Melbourne with an achiever award for advancing Melbourne's global connections.

Professor Frank Fenner has been named ACT Senior Australian of the Year for 2006. The Senior Australian of the Year Award recognises those Australians aged 60 and over who continue to achieve and contribute. The award commenced in the International Year of Older Persons in 1999. Frank continues to take a very active role in environmental and science ethics issues, and he remains an inspirational role model.

Professor Ian Frazer – 2006 Australian of the Year (see article on page 3).

Professor Jenny Graves received the prestigious L'OREAL-UNESCO Award for Women in Science 2006 (see article on page 3).

Professor Terry Hughes has been appointed a Member of the Board of The Beijer International Institute of Ecological Economics for a period of three years. The Beijer Institute is an international research institute under the auspices of the Royal Swedish Academy of Sciences. Its goal is to foster interdisciplinary activities among natural and social scientists, in order to deepen understanding of the interactions between humans and nature, and to inform management of our common environment.

Professor Jorg Imberger has been elected a Foreign Associate of the National Academy of Engineers (USA) for contributions to and international leadership in the environmental fluid dynamics of lakes, reservoirs, estuaries, and coastal seas.

Professor Pauline Ladiges has been awarded the Royal Society of Victoria Research Medal, Biological Sciences (Non-Human). The medal is awarded solely on the basis of research work published and/or accepted for publication in refereed international journals during the six-year period immediately preceding the year of the award. The work must be carried out in Australia (including its territories), or on Australia, with preference for work done in Victoria, or on Victoria.

Professor Harry Poulos, Senior Principal of Coffey Geosciences Pty Ltd, has won the Kevin Nash Gold Medal in Geotechnics. The Medal is awarded on a four yearly basis in memory of Professor Kevin Nash, who was Secretary General of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) from 1965 to 1981. The medal is awarded to a person who, through his distinction as an engineer, through his international contributions to engineering practice and education, through his contributions to international goodwill, and through his service to the ISSMGE has made a major contribution to fostering the ideals and goals of the ISSMGE throughout the world.
www.civil.usyd.edu.au/news/index.shtml#

Professor Poulos has also been made an Honorary Member of the Japanese Geotechnical Society (JGS).

Professor Cheryl Praeger, who is Professor of Mathematics and Statistics at UWA, has been awarded an Honorary Doctorate by the Free University of Brussels. Cheryl's research interests are: Group theory (especially permutation groups and group algorithms), graph theory, finite geometry and combinatorics.

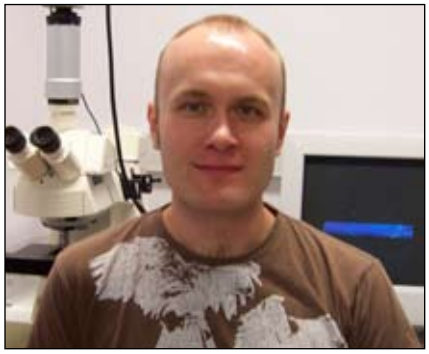
Professor Andrew Smith has been awarded an Honorary Professorship by the Research Center for Eco-Environmental Sciences (RCEES), Chinese Academy of Sciences.

Adam J Berry Memorial Fund

David Van Bockel, a PhD student at the National Centre in HIV Epidemiology and Clinical Research, is the winner of the 2006 Adam J Berry Memorial Award. The award assists an Australian researcher to travel or work in the USA at one of the institutes of the National Institutes of Health (NIH) each year. The fund is co-managed by the Academy and the Foundation for the US National Institutes of Health.

This year's award will assist David to travel to the Vaccine Research Centre, National Institutes of Health in Maryland. David will have access to technology and expertise not currently available in Australia to further his research on HIV pathogenesis.

Information about the Adam J Berry Memorial Fund can be obtained by contacting Nancy Pritchard (**nancy.prichard@science.org.au**).



David Van Bockel.

Science meets Parliament – 2006

Academy Fellows at Science meets Parliament. *From left: Professor Elspeth McLachlan, Professor Ian Frazer and Professor Graham Farquhar.*

The Academy is a long-term major sponsor of the Science meets Parliament event hosted by the Federation of Australian Scientific and Technological Societies (FASTS). The seventh *Science meets Parliament* was held on 28 February and 1 March.

The speaker at the dinner was Ian Frazer, 2006 Australian of the Year, who spoke on the lessons learned from his research on the Human Papilloma Virus and the future of medical research in Australia.

SELBY FELLOWSHIP

Scientific visit by Professor Bonnie Bassler

In February 2006, Professor Bonnie Bassler visited Sydney, Melbourne and Perth as the 2005 Australian Academy of Science's Selby Fellow. Professor Bassler is a Howard Hughes Investigator at Princeton University and the recipient of numerous awards including a MacArthur Foundation 'genius award' (2002) and the 2004 New York Intellectual Property Lawyer's Association Inventor of the Year. Professor Bassler has discovered that bacteria are capable of interspecies communication and using molecular and structural analysis has uncovered the chemical basis of their language. This type of communication, called quorum sensing, is an early form of multicellularity that allows bacteria to detect when they reach a critical mass and change their behavior to coordinate processes such as bioluminescence, sporulation, conjugation and virulence. An aim of this research is to develop new antimicrobial drugs based on inhibitors of quorum sensing pathways. Professor Bassler's seminars were very well attended at all host institutions, including the University of New South Wales, University of Western Australia, Monash University and the Bio21 Institute. Chemists at the Bio21 Institute were particularly impressed by Professor Bassler's multidisciplinary approach to biological research. A highlight of Professor Bassler's tour was meeting Mr Ben Selby, who attended her seminar at Monash University. We are indebted to Mr Selby and the Selby Scientific Foundation for making this tour possible.

Professor Bassler with her nominator, Dr Elizabeth Hartland from Monash University (and baby Laura).

Science by Doing Project

The Academy has embarked on the first stage of a collaborative national project, *Science by Doing*. In this initial phase a detailed framework and proposal will be developed for presentation to the Department of Education, Science and Training (DEST). The framework will outline a strategy for improving the quality of science learning for Australian lower secondary students. The strategy will embrace an inquiry approach to learning; hence the name, Science by Doing.

The working party for the project comprising representatives from DEST, CSIRO Education, the Academy of Science and the University of Canberra, met regularly to develop an initial draft project framework. Professor Denis Goodrum of the University of Canberra, Project Director, is conducting research in the UK, the USA and Canada to examine their procedures. Focus group meetings of Australian teachers are being held in April to discuss these findings.

The draft framework will be discussed with all State and Territory education jurisdictions at a meeting of the Reference Group on 7 June 2006 to ensure that the program being developed meets the needs of secondary science teachers across Australia.

The reference group comprises representatives from all State and Territory education jurisdictions, the National Catholic Education Commission and the Independent Schools Council of Australia and will guide development of the program.

Newsletter online

To receive email notification when new issues of the *Newsletter* become available online, register at **www.science.org.au/infolist.htm**.