



Academy takes action to support young researchers

Over 60 of Australia's brightest young scientists had a unique opportunity to access expert advice and enhance their careers at a workshop organised by the Australian Academy of Science. The workshop *Enhancing the experience of postdoctorate and early-career researchers* was held on 14 and 15 of February at the Shine Dome in Canberra.

The aim of the event was to boost the skills of talented researchers in several key areas through presentations by selected experts. Topics covered were grants-writing, international collaboration and networking, media and public speaking, finance, negotiation, and how to mentor and be mentored on issues such as life balance and maintaining a dynamic research profile.

An important component was also to gain feedback on the skills and mentoring the researchers felt were needed by scientists starting their careers. The outcomes will be used to create best-practice guidelines for research management for young high flyers in Australian research, and assist in maintaining them in science research and in Australia.

Senator the Honourable Kim Carr opened the workshop as one of his early official engagements as Minister for Innovation, Industry, Science and Research. Minister Carr said:

'The Academy of Science is one of Australia's pre-eminent scholarly institutions. Your voice is heard, and respected. That is why I am pleased to see that you are holding a conference on research careers. You are taking a practical perspective on a very important topic – especially important in the Australian context and at this time.

'We need to nurture our young researchers in all disciplines, but nowhere more so than in the sciences. We need to continue to attract the brightest minds to science, and then to keep those people actively involved in the Australian research effort.

'Over the last ten years or so, Australia has been losing some of our brightest researchers, from disciplines right across the board. With our universities strapped for the kind of funding needed to support



Photo: Richard Bray

Kim Carr addresses early-career researchers at the workshop

the best research, too many scholars and scientists have been lured abroad.

'And we have also seen bright youngsters turning away from the enabling disciplines (maths, physics and chemistry) and engineering – enticed by more lucrative careers in other fields, such as the finance sector.'

He went on to say: 'So, for all these and doubtless more reasons besides, it's good to see the Academy supporting the nurturing of early-career scholars and researchers in science and beyond.'

Professor Kurt Lambeck, the President of the Academy, welcomed the researchers and speakers. He highlighted the importance of making use of Australia's intellectual resources to create a strong science and technology base, and to ensure we are internationally competitive in how we use and exploit knowledge. 'To achieve this, where better to start than to ensure that researchers have support systems during the early years of their careers, when they are often most productive yet faced with great challenges in other areas of their lives.'

Other key speakers at the workshop included Professor Warwick Anderson, Chief Executive Officer (CEO) of the

National Health and Medical Research Council, and dinner speaker Professor Margaret Sheil, CEO of the Australian Research Council.

Many researchers commented on how refreshing it is to be consulted about this important issue, and how they hoped to become more involved over time with the Academy.

The workshop was made possible through the generous sponsorship of the Australian Research Council. The Academy plans to hold similar workshops in other cities and to invite more early-career researchers to attend. The proceedings of the workshop will be available online in the near future as a permanent resource for young researchers. The program is currently available at: www.science.org.au/events/14-15february08.htm

Minister Carr's full speech can be found at: <http://minister.industry.gov.au/SenatortheHonKimCarr/Pages/australianacademyofscienceconference.aspx>

Professor Lambeck's full speech can be found at: www.science.org.au/events/speeches.htm

A list of Academy events supporting early-career researchers is available from: www.science.org.au/events/ecr.htm

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Published by the Australian
Academy of Science
GPO Box 783
Canberra ACT 2601

www.science.org.au

Telephone: (02) 6201 9400
Fax: (02) 6201 9494

Email: aas@science.org.au

Honorary editor:
Professor Neville Fletcher FAA

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ISSN 1031-9204

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a bequest to the Academy, please
contact the Executive Secretary,
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Honours to Fellows

Professor Thomas Healy has been
elected a Foreign Associate, National
Academy of Engineering (USA).

Professor Brian Kennett was awarded
the 2008 Gold Medal for Geophysics
by The Royal Astronomical Society in
London.

Australia Day honours

Professor Michael Archer was made
a Member of the Order of Australia
(AM) for 'service to science as a
palaeontologist, to the promotion
of sustainable management of
wildlife, to scientific education and
research, and through mentoring and
administrative roles'.



Michael Archer

Dr Leo Clarebrough was made a
Medal of the Order of Australia (OAM)
for 'service to science in the area of
metal physics, and to the community

through activities supporting youth
welfare, aged care, social justice and
ecumenical dialogue'.

Professor David Kemp was
awarded a Medal of the Order of
Australia (OAM) for 'service to
medical research as a molecular
biologist, particularly in the areas of
tropical health and infectious
diseases, through contributions to
indigenous health and to professional
organisations'.

Fellow turns 90

Best wishes to **Charles Birch** (FAA
1961), who turned 90 on 8 February.
He was born and educated in
Melbourne but spent most of his
working life at the University of
Sydney, where he was Challis
Professor of Biology from 1958
to 1983. An ecologist whose early
work was concentrated on insect
populations, he later branched out
into human ecology, leading to his
book *Confronting the future*. He and
Herbert Andrewartha jointly received
the Eminent Ecologist Award of the
Ecological Society of America in
1988. Birch also developed a strong
interest in science and religion and
philosophy of science. In 1990 he
was awarded the Templeton Prize
for progress in religion, mainly for
his work with the World Council
of Churches working committee on
environment science and technology
over 20 years. His other interests
include surfing and organ music.

Forthcoming events

18 March: *Preparing for the high-resolution future of digital elevation models in Australia.* Workshop on the National Elevation Data Framework Business Plan and Science Case. The Shine Dome, Canberra.

1 April: *Plant science at the frontiers: Safeguarding Australia's primary industries.* Public lecture by Dr John Manners in the *Safeguarding Australia* series. The Shine Dome, Canberra.

9–11 April: Sir Mark Oliphant Conference – *Vaccine and immunotherapy technologies.* The Shine Dome, Canberra.

24 April: Official launch of *Primary Connections* unit *Schoolyard safari,*

by the Honourable Julia Gillard MP. Mossfiel Primary School, Melbourne.

7–9 May: Science at the Shine Dome Annual General Meeting and symposium. The Shine Dome, Canberra.

2 July: *Inquiry-based science education: A national curriculum.* Professor Julie Campbell, Academy Secretary for Education and Public Awareness. National Press Club, Canberra.

16–19 November: Sir Mark Oliphant Conference – *Medical bionics – a new paradigm for human health.* Lorne, Australia.

Young scientists cross disciplines to reach new frontiers

The third Australian Frontiers of Science symposium was held at the Shine Dome on 21 and 22 February 2008. The event was an opportunity for some of Australia's most outstanding younger scientists to showcase their research to peers and Academy Fellows.

The symposium's aim – to widen the focus of early-career researchers by cross-disciplinary discussion – was achieved through eight sessions introducing diverse fields of research. Symposium attendees were taken to the forefront of various fields of science: touring the molecular structure of cells, treading over past environments of the Earth and discovering the furthest reaches of the universe through new technologies.

One key requirement was that all speakers present their work at a level understandable across all fields – an astronomer should be able to understand a biologist and vice versa.

President of the Academy, Professor Kurt Lambeck, introduced the workshop saying:

'From the inaugural meeting in mid 2003, these symposia have aimed to open up otherwise narrow channels of research and to generate networks and collaborations across research boundaries that will live into the future.'

'...there is a growing recognition that all things are, in the end,

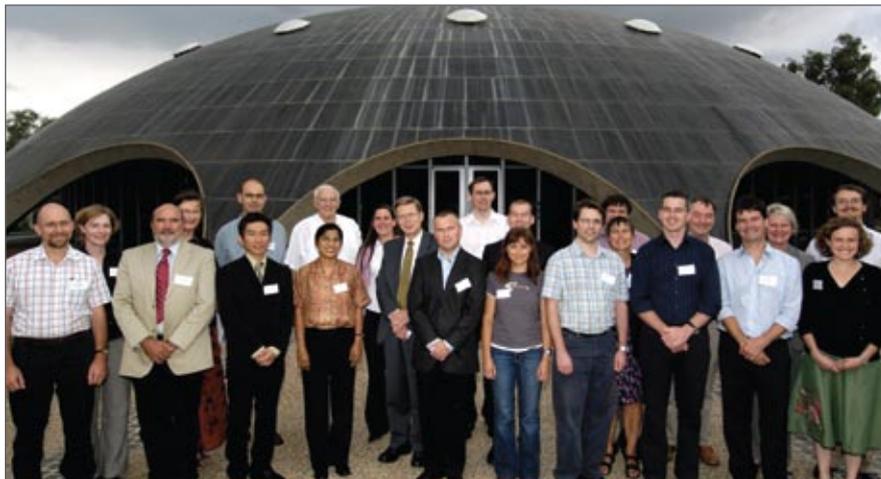


Photo: @Irene Dowdy

Speakers and chairs take a break from exploring the frontiers of science

connected. For example, physics underlies medical technology and helps to explain geological processes. The geology of the Earth informs us about other planets, and the study of other planets and the wider field of astronomy leads back to fundamental discoveries in physics.'

He went on to say: '...my own experience in more recent decades is that if I want to know something about, say, biology, I have to seek it out and this means that I already think I know what I need to know, rather than discover something entirely different and more appropriate from a chance

discussion with a biologist.'

Each session was brought together by a prize-winning younger scientist, who together formed a committee to decide on the topics, chairs and other speakers to be involved. Audience members were hand-picked by institutions throughout Australia, and contributed to the intense discussion and the new ideas that emerged.

Proceedings from the symposium will be available at: www.science.org.au/events/frontiers.htm

Professor Lambeck's full speech can be found at: www.science.org.au/events/speeches.htm

Science by Doing

From 14 to 18 January the *Science by Doing* team ran a training program for sixty five secondary science teachers from around Australia. The purpose of the training was to assist teachers to adopt the *Science by Doing* approach to science education, to enable them to form supportive networks and to introduce them to the two web-based *Science by Doing* curriculum units: *Moving together* and *Rock, paper, scissors*. *Moving together* is an inquiry-based unit suitable for students in Years 9 or 10 on how body systems interact. *Rock, paper, scissors* is a unit about classifying matter and changes of state that aligns with science topics taught in Years 7 or 8.

Together with the web-based student pages, teachers were provided with a comprehensive teacher guide and a CD-ROM



Photo: Nicola Shorling

Teachers immersed in the inquiry based activities at the workshop

containing the curriculum units and professional learning resources. All teachers who attended the January program are now teaching the units and gathering feedback from their students. Mini professional learning

communities of six teachers from neighbouring schools have been created. Community members meet regularly, sharing stories from the pilot program and providing feedback for program evaluation.

International news

InterAcademy Panel

Professor Kurt Lambeck FAA attended the Executive Committee Meeting of the InterAcademy Panel on International Issues (IAP) held in Amsterdam on 30 and 31 January 2008, which included a joint session with the InterAcademy Council. The meeting was hosted by the Royal Netherlands Academy of Arts and Sciences.

The IAP is a global network of the world's science academies that helps member academies work together to advise citizens and public officials on the scientific aspects of critical global issues. It is especially interested in assisting young and small academies achieve these goals. The Australian Academy of Science currently chairs the Publications and Public Relations Committee of IAP.

Switzerland

Professor Denis Monard, President of the Swiss Academy of Sciences, visited the Academy on 8 February and met with members of Council who hosted a lunch in his honour. Professor Monard is a professor of cell biology at the University of Basel. The Academy assisted the Swiss Embassy in Canberra to organise a program of visits for Professor Monard in Canberra and Melbourne. The Academy expects that this visit will strengthen the relationship with the Swiss Academy.



Denis Monard and Kurt Lambeck in conversation over lunch

Germany

The Embassy of Germany in Canberra, on behalf of the German Federal Foreign Office, invited the Manager – International Programs, Nancy Pritchard, to be part of a group that visited Germany from 8 to 15 December 2007. The aim of the visit was to undertake a study tour of Germany as a research and high-tech location.

The group consisted of nine delegates from seven countries: Australia, Chile, Hungary, Jordan, Morocco, New Zealand and Turkey. Participants included scientists, research managers, public servants and science journalists. The German Federal Foreign Office, together with the Goethe Institute, organised a program of visits to a wide range of research institutions based in Berlin, Potsdam, Jena and Dresden. Cultural outings were also included in the program. The program showcased Germany's first class R&D.

China

The Academy hosted a roundtable meeting for an auditing and financial management delegation from the Chinese Academy of Sciences (CAS) on 19 February. The delegation was led by Dr Tingda Wang, Audit Supervisor for CAS. The aim of the visit was for CAS to study the audit and financial management methods used in Australian institutions.

The meeting was chaired by Acting Academy Treasurer, Professor Michael Dopita FAA. Other Australian participants included representatives from the Australian National Audit Office at the Australian National University, the Institute of Internal Auditors Australia and KPMG.

Malaysia

The Academy hosted the visit of Professor Khalijah Mohd Salleh from the Department of Physics at the National University of Malaysia, and Mrs Salbiah Mohd Som from the Ministry of Education of Malaysia, from 17 to 21 February. Professor Khalijah is a Fellow of the Malaysian Academy tasked with matters related to science education, and Mrs Salbiah is



Photo: Stephanie Karkaris

Mrs Salbiah (front left) and Professor Khalijah (right front) with members of the Primary Connections team

in charge of curriculum at the Ministry. They were in Australia to attend a two-day Primary Connections workshop in Sydney and in Canberra to undertake a program of visits.

SIR MARK OLIPHANT CONFERENCES —
INTERNATIONAL FRONTIERS OF SCIENCE AND TECHNOLOGY

Vaccine and Immunotherapy Technologies

The Australian Academy of Science and the Australian Academy of Technological Sciences and Engineering are pleased to announce a landmark international conference—Vaccine and Immunotherapy Technologies.

Eminent Australian and international speakers will showcase future technologies, research and applications of vaccines and immunotherapy.

The Shine Dome, Canberra
9–11 April 2008

For further information and to register for the conference
www.oliphant.org.au/april2008.html

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Bede Morris Fellowship

Dr Jenny Stauber is the recipient of the 2008-09 Bede Morris Fellowship. She is a Stream Leader in Aquatic Contaminants at the Centre for Environmental Contaminants, CSIRO Land and Water. Dr Stauber will visit the Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER) Centre de Méditerranée in Cedex to conduct research. The project will address *Ecotoxicogenomics: Development of molecular biomarkers to assess contaminant impacts on marine biota*.

The Bede Morris Fellowship (BMF) is in honour of Professor Bede Morris' contribution to science and French–Australian relations. Professor Morris was a pioneer of immunology in Australia, establishing the first department of immunology in Australia in 1969 at the John Curtin School of Medical Research at the Australian National University. The BMF Scheme falls under the accord for scientific cooperation between the Australian Academy of Science and l'Académie des Sciences de l'Institut de France. It is supported by donations from the family, colleagues and friends of Bede Morris. The Academy acknowledges the contribution made by the French Embassy in Canberra to fund Dr Stauber's air travel to undertake this important work with her French colleagues.

Information about Professor Morris is available at: www.science.org.au/academy/memoirs/morris.htm



Jenny Stauber

Fenner conference on the environment



Photo: Richard Brody

Frank Fenner and Hugh Tyndale-Biscoe were among the audience at the conference

The Australian Academy of Science hosted the Fenner Conference on the Environment, *Wildlife population dynamics and management*, in Canberra from 2 to 5 December 2007. The conference celebrated the 20th anniversary of the Australian Wildlife Management Society and the career of Dr Graeme Caughley, whose research has provided a basis for wildlife research and management in Australia and throughout the world.

The conference was a great success with over 140 people registering from Australia, New Zealand, Canada

and the UK, featuring international invited speakers, a student symposium and prizes.

Dr Doug Armstrong from Massey University in New Zealand was announced winner of the Academy's Graeme James Caughley Travelling Fellowship. The fellowship assists Dr Armstrong to visit scientific centres and deliver public lectures outside Australia and New Zealand.

The conference was organised by Professor Jim Hone and Associate Professor Stephen Sarre from the University of Canberra.

2007 Le Févre Memorial Prize

The 2007 winner of the Le Févre Memorial Prize is Professor Thomas Maschmeyer, Federation Fellow and Professor of Chemistry at the University of Sydney. He was presented with the prize by Professor Robert Watts FAA FTSE on 23 November 2007.

Professor Thomas Maschmeyer is renowned for his ground-breaking research in materials and catalysis which led to his meteoric rise in stature within the international chemical community. His leading

role in the establishment of the combinatorial catalysis company Avantium was instrumental in the listing of the Australian Biodiesel Group on the Australian Stock Exchange.

The Le Févre Memorial Prize is an early-career award administered by the Academy that recognises basic research in chemistry.

Further information about Academy awards is available from: www.science.org.au/awards

Monitoring extinction of the northern quoll

By Meri Oakwood and Peter Foster

The northern quoll, a small marsupial carnivore, was originally distributed in a broad and almost continuous band across northern Australia from the Pilbara to near Brisbane, but by the 1990s had contracted to several disjunct populations. This decline may be related to a suite of factors such as habitat clearance, road mortality, overgrazing and human persecution, but probably the most important factor across the entire range is altered fire regimes. A range of recent ecological studies suggest the vulnerability of quolls to the extensive frequent fires now characteristic of much of the quoll's north Australian range.

Until the 1990s, one of the most secure northern quoll populations was located in the open forest and escarpment country of the 'Top End' of the Northern Territory. At Kapalga Research Station in Kakadu, before the arrival of the cane toads, after imposing four different fire regimes on landscape-scale experimental plots for two years, most small mammal species were found to be more abundant on the unburnt plots.

In addition to the above factors, northern quolls have been severely affected by cane toad colonisation throughout their range. A project was established in Kakadu National Park in 2001 to monitor the impact of colonisation by the introduced cane toad on the northern quoll. Two study sites were chosen: one in the south at Mary River Ranger Station and one in the north at East Alligator Ranger Station. Both sites had regular trapping sessions conducted from 2001 to 2004 to gather pre-invasion baseline data to monitor quoll population trends during and after invasion.

At the Mary River site, radio-tracking of northern quolls was carried out from January to June 2002. Cane toads arrived in February 2002. Of the 40 female quolls that were radio-tracked for varying periods of time, 14 were tracked to the site of their death. An additional two dead quolls were found opportunistically. Thirty one per cent of these deaths appeared to have been caused by cane toad poisoning. Between July and October quoll abundance followed the normal intra-annual pattern of slight decline, however by December 2002 a population crash had occurred



A northern quoll: Locally extinct at Mary River

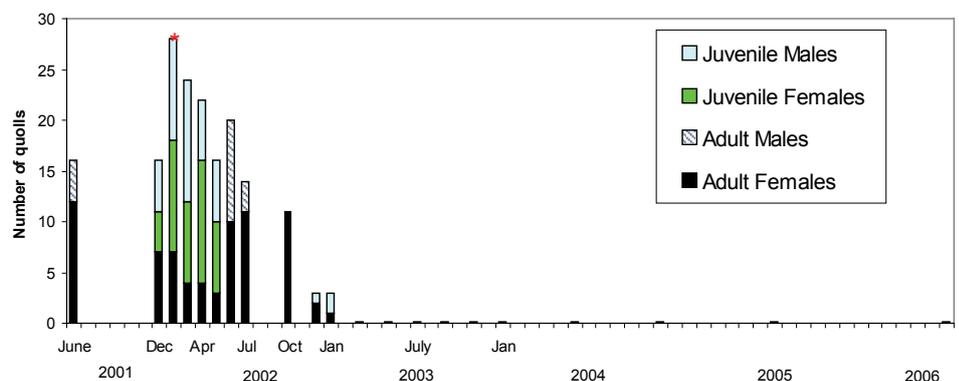
Photo: Meri Oakwood

leaving only three individuals. Local extinction occurred at the Mary River site between January and March 2003, with no quolls being caught in March 2003 or during any of the subsequent trapping sessions from 2003 to 2006.

At the East Alligator site, radio-tracking occurred from March 2003 to January 2005 with 41 quolls being radio-tracked. Prior to cane toad arrival, 13 deaths of radio-collared quolls were recorded. Cane toads were first observed at the study site in December 2003 and of the subsequent 12 quoll deaths recorded, 50 per cent died from cane toad poisoning. An additional three quoll carcasses were found opportunistically on the site: two had died of cane toad poisoning. Trapping in December 2003 and every month from January 2004 to January 2005 demonstrated that quoll abundance was much lower than that period prior to toad arrival. Radio-

tracking ceased in January 2005, so the study could not be completed as per original experimental design. Frogwatch funded a trapping session in April 2005 that detected three individuals remaining and a voluntary trip by authors in August 2005 detected five. In 2005 this species was listed as endangered under the EPBC Act 1999 and by the IUCN (World Conservation Union). In August 2006 the Academy funded another monitoring trip: four individuals were detected. Further funding will be sought to enable monitoring to determine whether extinction or re-colonisation occurs over the next few years.

Part of this research was funded by the Academy's award for research on the conservation of endangered Australian vertebrate species, generously funded by an anonymous donor.



The number of individual quolls trapped in the first three nights of each full trap session at the Mary River site between June 2001 and August 2006. Quolls are categorised as 'juvenile' if they are less than 12 months old. * Cane toads arrived at the site in January/February 2002.

Nova: Science in the news

New topics have been posted on the Academy's educational website, *Nova: Science in the news* (www.science.org.au/nova).

Bushfires spark extensive search for answers

They can start with a momentary flicker, they can burn for months, and their effects can scar landscapes and lives for years.

Bushfires are a natural and complex part of the Australian environment and have been for thousands of years. People as well as the natural environment have developed ways of coping with bushfires.

Individuals and communities living in or near bushfire prone areas have established strategies to protect themselves and their homes from fires. While in the natural environment, many plants have evolved to adapt to, and cope with fires.

Research is now underway on many fronts to determine not only how to prevent bushfires, but also gain further insight on their devastating effects. The areas being looked at include how repeated fires affect local communities, the environment and our native plants and animals, as well as the extra dangers brought about by climate change and drought.

One key area being looked at is the use of prescribed burns – how effective they are, and the effects of repeated burns on ecosystems. Australian researchers are also looking at the ecological effects of repeated fires – either prescribed burns or wildfires – on the landscape.

This topic is sponsored by the Australian Research Council Linkage Learned Academies Special Projects



Photo: Stock Xpert

Hot topic: Bushfires in Australia

Grant (www.arc.gov.au/ncgp/lasp/lasp_default.htm). The Australian Foundation for Science is also a supporter of *Nova*.

Acid test for the seas

Chemists have known for a long time that a beaker of water sitting in a lab will absorb carbon dioxide from the air and turn acidic. Would it happen at a larger scale?

For more than two hundred years, the human race has been releasing large quantities of carbon dioxide and other greenhouse gases into the atmosphere. Not all the carbon dioxide released into the atmosphere stays there; some of it – about a third of total human-induced emissions – has been absorbed by vegetation during photosynthesis and a similar amount has been soaked up by the ocean.

The oceans are naturally alkaline, or basic, with a pH of about 8.2. When carbon dioxide dissolves in sea water it forms carbonic acid, which releases hydrogen ions, lowering the pH and making it more acidic.

One of the victims of the presence of extra hydrogen ions could be a type of phytoplankton called coccolithophores. Coccolithophores use calcite, a form of calcium carbonate, to form tiny scales on their exterior. Calcium carbonate starts to dissolve as pH declines: ocean acidification could therefore have a harmful effect on the abundance of coccolithophores. Its presence could also be damaging for corals, which are constructed with the skeletons of small animals made largely from calcite.

This topic is sponsored by the Australian Government Department of Climate Change (www.greenhouse.gov.au).

Entries in the 2008 Australian Museum Eureka Prizes are now open

Presented annually by the Australian Museum, the Australian Museum Eureka Prizes reward excellence in the categories of:

- research and innovation
- science leadership
- school science

- science communication and journalism.

This year's competition offers 20 prizes worth over \$200,000 with three new categories:

- action against climate change (school science)
- taxonomic research (research and innovation)
- research in support of defence or national security (research and innovation).

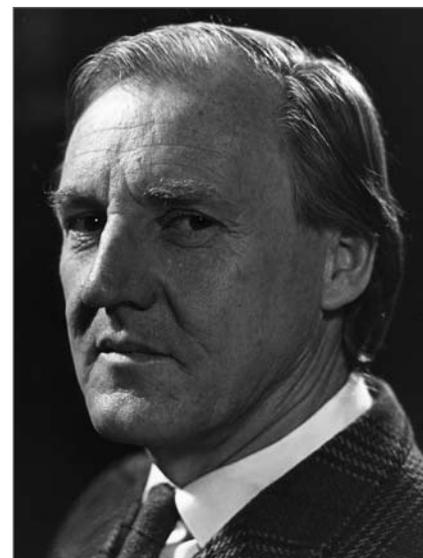
The popular Sleek Geeks Science Prize has been expanded to include primary, secondary and university students, and the *New Scientist* science photography prize is open to anyone over 17 years of age. Entries close 2 May 2008. For further information on the prizes and how to enter go to: australianmuseum.net.au/eureka or email eureka@austmus.gov.au

Interviews with Australian scientists

A number of significant interviews have been posted on the *Interviews with Australian scientists* web site recently. The interviews include: the late Professor Howard Worner FAA, a metallurgist with a passion for mineral collecting; Dr Alec Costin FAA, a land-use ecologist and environmental campaigner before the phrase was coined; and Professor Mervyn Paterson FAA, an esteemed geophysicist who has made a second career out of building instruments for rock deformation experiments. The transcript of an interview in 1981 for the University of Queensland (UQ) by Dr John R Cole with Professor Dorothy Hill FAA has also been posted. UQ gave permission for the Academy to make the interview transcript available on its *Interviews* web site, along with complementary teacher notes and

activities. It is a fascinating account of Professor Hill's early years at the University of Queensland, her time at the University of Cambridge and a glimpse of the impact of the Second World War on her career.

In other news of the *Interviews* project, the Video Histories Advisory Committee has drawn a priority list of Academy Fellows and other eminent Australian scientists to be interviewed in 2008. The project began the year with two interviews being filmed in late February in Canberra. Professor Brian Anderson FAA, past President of the Academy, was interviewed by Professor Neville Fletcher FAA on 22 February, and Professor Richard Stanton FAA was interviewed by Professor Ken Campbell FAA on 26 February.



Mervyn Paterson

A food lifeboat: Food and nutrition considerations in the event of a pandemic



By Professor Jennie Brand-Miller,
Chair of the National Committee for
Nutrition.

Historically, large catastrophes have caused the collapse of civilizations. Science and knowledge may help prevent disasters, but urbanisation and narrowly concentrated food supplies, climate change and terrorism contribute to considerable risk. The viruses responsible for SARS and bird flu are among the most immediately identifiable.

In the event of a lethal pandemic, emergency measures such as closing schools, staying home with family and friends, avoiding contact with other people (until all have been immunised) will be instrumental in avoiding infection. To achieve this type of isolation, sufficient food of adequate quality and quantity must be available. Australia has one of the most concentrated food supplies of any country, being dominated by two large supermarket chains. These organisations operate with such efficiency that their logistic chains hold only a few weeks' supplies. If the supply chain shuts down, it is estimated that supermarket stocks will be depleted within 2-4 weeks.

Home stockpiling for about three months could be done by individual households. But which foods and in what quantities should be stocked? This question was discussed in a recent article published in the *Medical Journal of Australia*¹ by Anna Haug and colleagues at the University of Sydney's Human Nutrition Unit.

A list of foods was devised based on the assumption that the items should be common staples and well accepted, easy to store, not dependent

on refrigeration, and nutrient-dense, providing the recommended macro- and micronutrients for all members of the family. Ideally, they were also edible without cooking. Cost, volume and storage space were further considerations.

The food lifeboat provides about nine megajoules per day for 10 weeks for one person, costs about \$500 and covers all known nutrient needs. It would be even cheaper and require less storage space if multivitamin tablets, rather than canned fruit and vegetables, were purchased to cover the requirements of some vitamins. A second food list that provided basic nutrient requirements was also devised (www.foodlifeboat.com.au). Other food combinations that are more culturally appropriate are also possible.

The take-home message is: BE PREPARED.

A table of the daily rations of lifeboat foods is available from: www.science.org.au/natcoms (listed under Nutrition).

1. Haug A, Brand-Miller J, Christophersen OA, McArthur J, Fayet F, Truswell S. A food 'lifeboat': food and nutrition considerations in the event of a pandemic or other catastrophe. *MJA* 2007; 11/12: 674-676.

Vital taxonomy

By Professor Pauline Ladiges FAA

Government and corporate sectors increasingly focus on the environment: climate change, biodiversity conservation, water and natural resource management and biosecurity. Our needs for sustainable solutions press on the scientific community to provide the best scientific information. Nowhere is this reflected more than in taxonomy – the discovery, description, identification and classification of organisms – a fundamental science that underpins so much of the life sciences.

In early 2004, there was a quarantine emergency, where Pakistan rejected a wheat shipment due to an alleged presence of spores of the fungus *Tilletia indica* that causes a disease called Karnal Bunt. This species of fungus is unknown in Australia, but there are other related species that are 'spore-look-alikes'. A National Diagnostic Protocol was in place, and wheat stores at Australian ports were sampled. Fungal spores (the look-alikes) were found in a percentage of these stores but none was *T. indica* when compared with herbarium reference collections. Taxonomic expertise saved the day and a \$4 billion export trade resumed.

This is just one practical example of the need for taxonomists. Yet within a decade our taxonomic workforce may be halved, to about 70 taxonomists, because more than 75 per cent of them are over 45 years of age. This

is nowhere near adequate when considering that more than 600,000 species exist in Australia, with less than 30 per cent described, and that large areas remain unexplored. This would leave each Australian taxonomist 8,500 species to consider; an impossible task within any individual career.

From 2000 to 2004, government and higher education expenditure on taxonomy has fallen from \$34 million to \$29 million, whereas the overall expenditure in biology as a whole has increased by more than 12 per cent in these sectors.

In response to this crisis, the National Forum on Australian Taxonomy was held at the Australian Museum in Sydney (4 and 5 October 2007) and attended by leading taxonomists from universities, herbaria and museums. This was initiated and coordinated by the Australian Government's taxonomic funding agency, the Australian Biological Resources Study.

Strategies identified include the development of university biodiversity training programs, research fellowships for early-career researchers, and greatly enhanced funding to target research in priority areas. One remedy proposed at the forum was the implementation of taxonomic methodology on the web, so-called cybertaxonomy. Critical to the cybertaxonomy model is the development of research

teams around the world, resulting in global biological classifications that are robust and predictive, with information and identification tools readily accessible electronically.

One of the key attributes in the US National Science Foundation's Planetary Biodiversity Inventory established in 2003 is the training of the next generation of taxonomists. This is largely absent from Australia's response to the taxonomy crisis, and is most apparent in the demise of the discipline in the tertiary sector, where few taxonomists are employed in Australian universities. The institutional mainstays for taxonomy are in Australia's museums and herbaria, but their survival is also currently at stake and their capacity for training is constrained.

As a result of the National Forum of Taxonomy, a taskforce has been established to develop policy solutions to the taxonomy crisis in Australia. Succession planning in taxonomy is critical, and it has been estimated that a \$50 million enhancement over the next four years would secure our taxonomic capacity to deliver environmental information into the future.

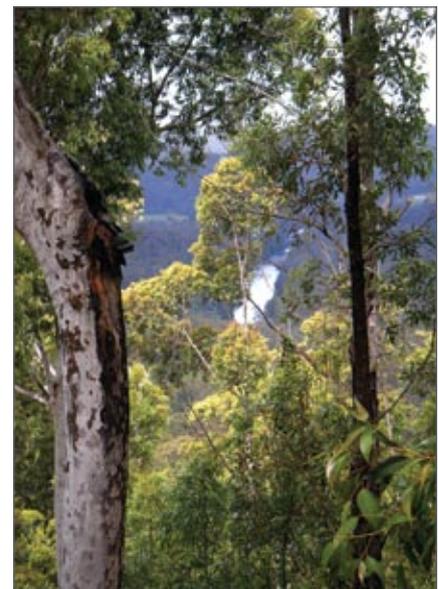
The above is based on *Classify species or face extinction*, by Professor Gerry Cassis (University of New South Wales) and Professor Pauline Ladiges (University of Melbourne), published in *The Australian*, Wednesday 31 October 2007.

World forest experts gather

Leading international forest scientists gathered in Hobart from 17 to 21 February to discuss the future of the world's old forests. The *Old forests, new management* conference was the first of the Sir Mark Oliphant Conferences for 2008. It explored issues such as:

- how old growth forests will cope with climate change
- managing forest fire risks in a hotter world
- protecting endangered species in forests
- evolving management of old-growth forests in Australia and around the world, and
- the spiritual significance of old growth forests.

The conference featured more than 160 scientific presentations and papers about advanced temperate forest management and was hosted by the Cooperative Research Centre for Forestry, Forestry Tasmania and the International Union of Forest Research Organisations. It was sponsored by the Australian Academy of Science, the Australian Academy of Technological Sciences and Engineering, the Australian Government Department of Innovation, Industry, Science and Research and the Australian Government Department of Agriculture, Fisheries and Forestry. Details are available at: www.oldforests.com.au



Focusing on the future of forests

Photo: Sharon Abrahams

News from national committees

Plant and animal sciences

On Friday 23 November, the National Committee for Plant and Animal Sciences held a meeting via teleconference. A topic of discussion was a statement, *Gene technology and GM plants*, which was presented to the Council of the Academy for endorsement (www.science.org.au/policy/gene-tech.htm).

Astronomy

The National Committee for Astronomy met at Ian Potter House on Monday 26 November. Activities for the International Year of Astronomy 2009 were discussed, as were the revision of Research Fields, Courses and Discipline (RFCD) classifications and feedback for the Research Quality Framework journal ranking exercise.

Brain and mind

The inaugural meeting of the National Committee for Brain and Mind was held at the Shine Dome on 5 December. The meeting was attended by Professor Philip Kuchel (Academy Secretary, Science Policy) who gave a background on the role and composition of the Academy's national committees and contributed to discussions on the future role of the committee. Planning for future activities was also on the agenda, such as relations with corresponding societies and information exchange between imaging facilities.

Nuclear matters and the Australian research reactor

Dr Micheal James and Dr Ian Smith from the Australian Nuclear Science and Technology Organisation were invited guests at the Task Force meeting, held on 11 December in Ian Potter House. Dr James gave a presentation entitled *World-class neutron science in our own backyard, regarding the performance of the OPAL reactor*, and Dr Smith presented an update of the OPAL reactor's operations, including future funding, education and planning. The Task Force also discussed a possible project: *The validity or non validity of linear extrapolation of high radiation dose effects to low doses and dose rates*.

Chemistry

Professor Bryan Henry, immediate Past President of the International Union for Pure and Applied Chemistry

(IUPAC), was a guest at the National Committee for Chemistry meeting, held at the Shine Dome on 31 January. Discussion during the meeting focused on the restructuring of committee membership and activities, including increased interaction with the Royal Australian Chemical Institute and IUPAC, and the possibility of future symposia, including the two topics of water and chemical security. Professor Henry also spoke on a number of IUPAC activities, and congratulated committee member Professor David Black on his re-election as Secretary General of IUPAC.

Physics

The National Committee for Physics held a meeting at the University of NSW on Friday 8 February. The meeting focused on two main items:

forward planning for the *Investing in the future of physics* document, and nominations for International Union for Pure and Applied Physics Commissions. The future of the Australian National Institute for Theoretical Physics was also discussed, as was the need for science-educated science teachers in Australia.

Radio science

The National Committee for Radio Science held a meeting on Sunday 10 February, which occurred in conjunction with the *Workshop on Applications of Radio Science* at the Gold Coast. The Chair of the committee, Dr Ray Norris, who is the incoming Chair of the new National Committee for Data for Science, resigned at the meeting, and nominated Professor Andrew Parfitt as his successor.



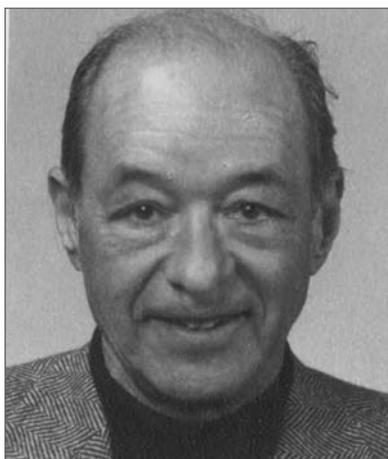
Members of the newly-formed National Committee for Brain and Mind



Members of the National Committee for Astronomy

Obituaries

Richard Meyer



Richard Meyer

Richard Ernst Meyer was born in Germany on 23 March 1919 and educated in Zurich, where he was awarded the Dr. Sc. Tech. from the Swiss Federal Institute of Technology in 1946. After a year as a Junior Scientific Officer at the British Ministry of Aircraft Production he began his academic career as an Assistant Lecturer at the University of Manchester in 1946, becoming an ICI Research Fellow the following year. In 1953 he took up a post as Senior Lecturer in Aeronautical Engineering at the University of Sydney, with a promotion to Reader in 1956. A year later he moved to the USA, where he was to spend the rest of his life. He spent several years at Brown University, Providence, Rhode Island, as Associate Professor and later Professor of Applied Mathematics, before being appointed Professor of Mathematics at the University of Wisconsin in 1964. He retired in 1990 and was named Professor Emeritus in 1994.

A few years ago Meyer summed up his research interests as follows: 'My primary interest is in the relation between physical reality and mathematical models used in the theoretical elucidation of natural phenomena and engineering processes. This has led me to research on the deeper mathematical structure of widely used models and on the connection between that structure and better methods of realistic and efficient approximation, numerical or analytical, or the predictions of the

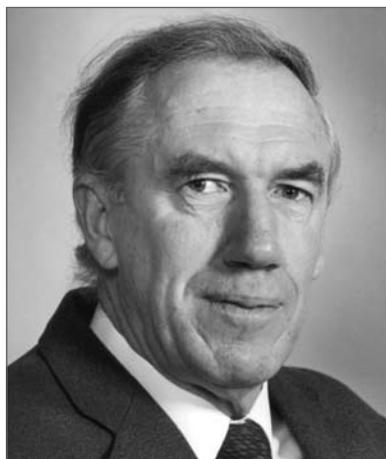
models; in some cases, it has led to drastic revision of branches of science. The bulk of this work has been focused on Gas Dynamics, Oceanography and Approximation Theory, but it has also spilled over into Meteorology, Classical Analysis, Micromechanics, Plasma Physics and other subjects.'

One of Meyer's interests was mountaineering and in 1953 he wrote an article, 'Plumb vertical', for *Climbers' Club Journal*. His knowledge of prediction and approximation theory was combined with his son Peter's expertise in management to produce an article on 'Jigsaw management', which was published in *Business Quest* in 1996.

Richard Meyer was elected to the Academy in 1956.

He and his wife Ilse died in Madison, Wisconsin, on 6 January 2008. They are survived by their children Michele, Nicole and Peter and their grandson Max.

Rod Rickards



Rod Rickards

Rodney Warren Rickards was born in Sydney on 30 June 1934. He was educated at the University of Sydney, graduating BSc (First Class Honours) in 1955, and winning a number of scholarships and a University Medal in Organic Chemistry.

After ten years at the University of Manchester, first as a student and then as an Assistant Lecturer and Lecturer in the Department of Chemistry, he returned to Australia in 1966 as a Fellow in the newly established

Research School of Chemistry at the Australian National University. The following year he was promoted to Senior Fellow, with another promotion a year later to Professorial Fellow. Later he became a Professor and on his retirement he was made an Emeritus Professor of the University.

His research was into the chemistry of biologically active natural products, including their isolation, structure determination, biosynthesis and synthesis. His research group defined the structure of nystatin, the first of the complex polyene macrolide antibiotics to be discovered, and which continues to have major application in the treatment of human fungal and yeast infections.

In 2002 Rickards and Dr Stephen Trowell, a Principal Research Scientist at CSIRO, formed Entocism, a company established to be the leading global discoverer of small molecule therapeutics from insects, initially targeting applications in antibiotics (antibacterial and antifungal areas).

In 2006 he was awarded a Visiting Fellowship in the CSIRO Food Futures Flagship, again working with Stephen Trowell to research the processes of bioluminescence, the emission of light by a living organism. It occurs in different forms in many marine organisms, and in some terrestrial organisms, the best known of which are fireflies and glowworms. The light emission has potential as a signaling system to convey machine-readable information out of a complex biological mixture, with applications in biosensor technology.

Rickards was made a Fellow of the Royal Australian Chemical Institute (RACI) in 1968 and elected a Fellow of the Academy in 1981. The next year he won RACI's H G Smith Medal.

Rod Rickards died on 17 December 2007. He is survived by his wife Anna and daughter Helen.

Did you know?

An alphabetical list of biographical memoirs published from 1966 to the present is available from: www.science.org.au/academy/memoirs

Primary Connections: linking coast to coast

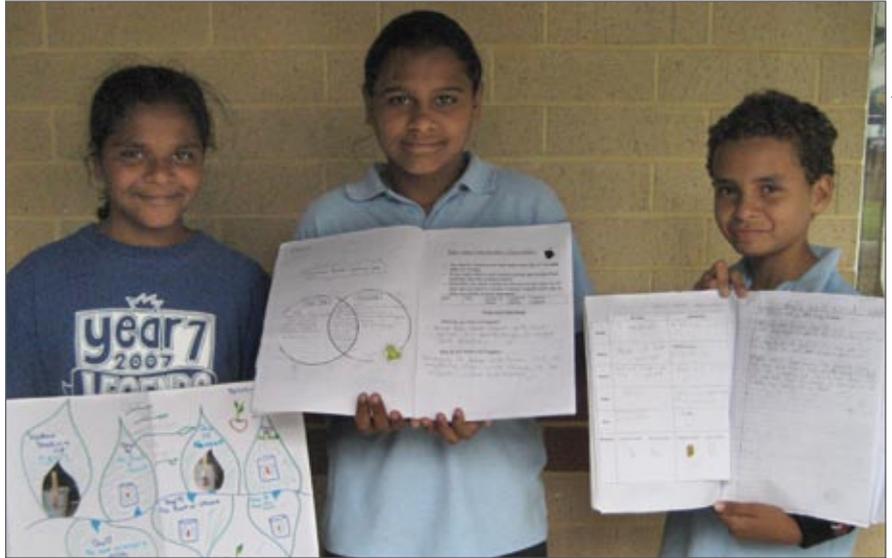
Primary Connections uptake in Queensland

Support for the implementation of *Primary Connections* in Education Queensland schools is one of five major elements of the Science Education Strategy 2006–09. This year a total of \$1.4 million has been allocated to *Primary Connections* activities, with more than 90 per cent of that provided directly to regions to meet teachers' needs.

Primary Connections indigenous perspective 'pilot' in Western Australia

Development of an indigenous perspective is central to the *Primary Connections* project and has been in progress since Stage 2 funding was provided by the Australian Government Department of Education, Employment and Workplace Relations towards the end of 2004. A draft curriculum unit *Plants in action* with indigenous perspectives was developed in 2007. A pilot was conducted in Western Australia in Term 4 of 2007 in a range of school settings including urban, rural and remote schools, and in a range of classes from years one to seven. Eight non-indigenous teachers, two Aboriginal Islander Education Officers (AIEOs), approximately 50 indigenous and 177 non-indigenous students participated in the pilot.

Outcomes are very encouraging, with pilot teachers reporting lots of science and literacy learning happening in their classrooms. The teachers spoke of students enthusiastically participating in literacy activities and contributing to the learning environment in ways they had not seen before. The teachers and students spoke about 'two-way' learning happening during the pilot,



Students from Middle Swan Primary School display their journals

Photo: Robyn Bull

with students, teachers, AIEOs, parents and community members sharing information about indigenous plant names, plant uses and management strategies. All teachers reported that the pilot had attracted plenty of attention throughout the schools and that they would all be teaching *Primary Connections* again.

After completing the unit, Middle Swan teacher Judith Pescodd and her AIEO, Betty Whalley, said: '*Primary Connections* is fantastic...we wish we could do it all the time.' They added: 'We can see so much benefit for the students...[they] are more engaged in the learning; it enables them to have a voice, they are participating more, they are putting their hands up and asking questions. Even the shyest students came forward and talked about what they knew about plants.'

More information about *Primary Connections* is available from www.science.org.au/primaryconnections



A student from East Narrogin Primary School observes and records seed germination

Photo: Robyn Bull

Did you know?

Primary Connections uptake of units

Over 74,000 *Primary Connections* units have been distributed Australia-wide. The distribution map shows the numbers delivered in each state and territory to the end of January 2008.

