Australian Academy of Science

ANNUAL REPORT

2007–2008

THE AUSTRALIAN ACADEMY OF SCIENCE

The Australian Academy of Science is a private organisation of Australia's leading scientists. It recognises research excellence, advises government, organises scientific conferences, publishes scientific books and journals, conducts international scientific relations, and fosters science education and public awareness of science and technology.

ISSN 1448-2037

GPO Box 783
Canberra ACT 2601
Telephone: +61 (0)2 6201 9400
Fax: +61 (0)2 6201 9494
Email: eb@science.org.au
www.science.org.au

This report is also available at: www.science.org.au/reports/2008anrep.pdf

REPORT OF THE COUNCIL

For the year

1 April 2007 – 31 March 2008

Contents

PRESIDENT'S FOREWORD 2

COUNCIL AND ADMINISTRATION 3

THE FELLOWSHIP 4

SCIENCE POLICY 12

NATIONAL COMMITTEES FOR SCIENCE 19

INTERNATIONAL COUNCIL FOR SCIENCE 33

INTERACADEMY PANEL ON INTERNATIONAL ISSUES 35

BILATERAL ACTIVITIES 37

SUPPORT FOR INTERNATIONAL COLLABORATIONS 43

ACADEMY MEDALS AND LECTURES 57

RESEARCH SUPPORT AND LECTURESHIPS 59

RESEARCH CONFERENCES 61

SCIENCE EDUCATION AND PUBLIC AWARENESS 64

PUBLIC AWARENESS AND OUTREACH 69

RECENT BENEFACTORS OF THE ACADEMY 75

THE SHINE DOME AND IAN POTTER HOUSE 77

ADOLPH BASSER LIBRARY 82

OBITUARY NOTICES 84

- JOHN ROBERT ANDERSON 84
- WILBUR NORMAN (CHRIS) CHRISTIANSEN 85
- GREGORY MAXWELL KELLY 87

SECRETARIAT INSIDE BACK COVER

President's foreword

This Annual Reporting period includes the first days of a new Federal Labor Government with its plans for extensive reviews of Australia's Innovation System and commitments to strengthening Australian science and mathematics education. The Australian Academy of Science is well-placed to contribute to these considerations from its record of promoting science and technology as the key drivers of socioeconomic development, and from its activities as outlined in this report. The Academy's broad spectrum of activities as outlined in this report demonstrates how the Academy continues to act as an authoritative source of independent scientific advice on national issues, and on maintaining and strengthening the resources and capabilities of the research community.

A cornerstone of the Academy's activities is the work of the 21 National Committees and the three task forces. This has included the formation of two new committees: the National Committee for Brain and Mind and the National Committee for Data for Science. A symposium on *The value of mathematical sciences* at the Shine Dome discussed the importance of a strong base in mathematics and statistics for research and applications in industry, and a major project nearing completion is a decadal strategic review in space science research. The Committees were also involved with a number of major national and international meetings during the year, such as *The International Union for Quaternary Research Congress*, and forthcoming events such as the *21st International Congress of Theoretical and Applied Mechanics* in August 2008.

The Academy's 2007 policy document on *Research and innovation in Australia: A policy statement* was launched at the National Press Club in September 2007 with ten recommendations aimed at increasing the opportunities for the nation to realise its potential as a major contributor to a global, knowledge-based economy. This was part of a number of science policy activities for the year as detailed in this report, and included the workshop on *Future directions for Australian climate change science* hosted by the Academy in association with the Department of Climate Change, the Bureau of Meteorology and CSIRO in March 2008, and opened by Senator Penny Wong, Minister for Climate Change and Water.

Fostering the opportunities for the development of early career researchers continues as an important activity at the Academy and is well-supported by our Fellows. Key events have included a workshop on *Enhancing the quality of the experience of postdocs and early-career researchers* in February 2008, which was opened by Senator Kim Carr, Australian Minister for Innovation, Industry, Science and Research. In addition, the Annual Symposium included once again a Career Development Workshop addressing communications skills and the impact of cognitive illusions on scientific judgement. These events, focusing on young researchers, are supported by scientific programs such as the symposium on *Australian Frontiers of Science* in February 2008 that bring together the best young Australian scientists to discuss emerging technologies, new opportunities and cutting-edge advances in their fields.

The Academy manages and supports a number of active bilateral and international programs. Through the International Science Linkages – Science Academies Programme, 91 leading Australian scientists have been awarded travel grants to undertake collaborative research in Asia, Europe and North America. In addition, there was the fourth annual joint China-Australia symposium on *Sustaining global ecosystems*, organised in collaboration with the Chinese Academy of Sciences and the Australian Academy of Technological Sciences and Engineering, in Beijing in August 2007.

I am pleased to report on the continuing success of the Academy's science education programs. *Primary Connections* has now published ten curriculum units for incorporating the teaching of science with literacy in Australian primary schools. To date more than 80,000 units have been distributed in Australia and overseas and about 400 professional learning facilitators have been trained. In addition, Julia Gillard, Deputy Prime Minister, will launch a new *Primary Connections* unit at Mossfiel Primary School in Victoria. The Academy also received funding from the Department of Education, Employment and Workplace Relations for a *Science by Doing* pilot program for a new approach to improve secondary students' engagement with science.

The Academy is grateful for the generous time and valuable contributions provided by its elected Council members. In that connection I thank outgoing Councillors Sally Smith and Bob Williamson for their significant contributions to Academy activities over the years. Bob Frater, as Secretary (Physical Sciences) and Vice-President, has also come to the end of his term and has provided much valuable time, advice and support. I would also like to thank the Secretariat for their professionalism and commitment to the work and ideals of the Academy.

The Academy relies on sponsorship from a number of sources to undertake many of its activities. I express my unreserved thanks to them and to the Australian Foundation for Science for their support.

Kurt Lambeck PresAA FRS
28 March 2008

Council and administration

The Academy's affairs are conducted by an elected Council of 17 Fellows. To ensure that Academy business is managed effectively between Council meetings, the Executive Committee has delegated authority. The Committee consists of the President, Secretary (Physical Sciences), Secretary (Biological Sciences), Secretary (Science Policy), Secretary (Education and Public Awareness), Foreign Secretary and Treasurer.

More information on Council members is available at: www.science.org.au/academy/council/officers.htm

Council members

Professor Kurt Lambeck[10] — President

Dr Bob Frater[8] — Secretary, Physical Sciences, and Vice-President

Professor Graham Farquhar[11] — Secretary, Biological Sciences, and Vice-President

Professor Philip Kuchel[9] — Secretary, Science Policy

Professor Jenny Graves[10] — Foreign Secretary

Dr Phil McFadden[9] — Treasurer

Professor Mike Dopita[8] — Acting Treasurer

Professor Julie Campbell[10] — Secretary, Education and Public Awareness

Ordinary members (Physical Sciences)

Professor Ron Ekers[10]

Professor Paul Haddad[10]

Professor Andrew Holmes[10]

Professor Tony Guttmann[9]

Professor John Ralston[9]

Ordinary members (Biological Sciences)

Professor Ross Crozier[10]

Professor Bob Graham[9]

Professor Pauline Ladiges[9]

Professor Sally Smith[8]

Professor Bob Williamson[8]

(8) Retiring at AGM 2008
(9) Retiring at AGM 2009
(10) Retiring at AGM 2010
(11) Retiring at AGM 2011

Council members March 2008. Back row (from left): Bob Graham, Sally Smith, Ross Crozier, Ron Ekers, Michael Dopita, Philip Kuchel, Andrew Holmes, Bob Williamson, Tony Guttmann. Front row (from left): Pauline Ladiges, Bob Frater, Kurt Lambeck, Graham Farquhar, Julie Campbell. Absent: Paul Haddad, John Ralston.

The Fellowship

The Academy Fellowship comprises 420 of Australia's leading research scientists, elected for their personal contributions to science. Fellows occupy senior positions in universities, the CSIRO and industry.

The Fellowship, 31 March 2008:

Ada, GL
Adams, JM
Allen, DG
Anderson, JM
Anderson, JR
Anderson, BDO
Andrews, TJ
Angus, JA
Angyal, SJ
Antonia, RA
Appleby, CA
Archer, M
Armstrong, BK
Bacic, A
Baddeley, AJ
Badger, MR
Banwell, MG
Barber, MN
Bartlett, PF
Bartnik, RA
Basten, A
Batterham, RJ
Baxter, RC
Baxter, RJ
Beckwith, ALJ
Bedding, RA
Bennett, MA
Bennett, MR
Bergersen, FJ
Berkovic, SF
Bilger, RW
Birch, LC
Bishop, PO
Blanden, RV
Blevin, WR
Boardman, NK
Boger, DV
Bond, AM
Boswell, RW
Boyden, SV
Boyle, BJ
Brennan, MH
Brent, RP
Brown, G
Brown, RD
Bruce, MI
Buchdahl, HA
Budd, WF
Burdon, JJ
Burger, HG
Burgess, AW
Burgman, MA
Burke, DJ
Burnstock, G
Campbell, JH
Campbell, KSW
Canty, AJ
Cavill, GWK
Celermajer, DS
Chalmers, JP
Chappell, BW
Chappell, JMA
Clarebrough, LM
Clark, GM
Clark, RG
Clarke, AE
Cockburn, A
Cole, ARH
Cole, KD
Colless, MM
Colman, PM
Coltheart, M
Compston, W
Cook, DI
Cooper, DA
Cory, S
Costa, M
Costin, AB
Cowan, IR
Cowling, MG
Cowman, AF
Cox, GB
Craig, DP
Crompton, RW
Crossley, MJ
Crozier, RH
Curtis, DR
Dance, IG
Dancer, EN
Dawes, IW
Day, MFC
Day, RH
de Kretser, DM
Delbourgo, R
Dennis, ES
Denton, DA
Dewar, RL
Doddrell, DM
Doherty, PC
Dopita, MA
Dracoulis, GD
Drummond, PD
Dunn, AR
Easton, CJ
Eastwood, MG
Egan, JB
Ekers, RD
Elliott, WH
Ellis, GRA
Ellis, JG
Esler, MD
Evans, DJ
Evans, LT
Evans, RJ
Ewens, WJ
Faraone, L
Farquhar, GD
Fenner, FJ
Field, LD
Figgis, BN
Finnigan, JJ
Flambaum, VV
Fletcher, NH
Forrester, PJ
Fraser, RDB
Frater, RH
Frazer, IH
Frederiksen, JS
Freeman, HC
Freeman, KC
Furness, JB
Gandevia, SC
Gani, JM
Gascoigne, SCB
Gibbs, AJ
Gibson, FWE
Gilbert, RG
Gleadow, AJW
Goodnow, CC
Goodwin, GC
Graham, RM
Graves, JAM
Green, DH
Green, MA
Grieser, F
Griffiths, RW
Grimshaw, RHJ
Groves, DI
Gu, M
Gunning, BES
Guttmann, AJ
Haddad, PR
Hall, PG
Hall, RM
Hamann, SD
Hannaford, P
Hardham, AR
Harrison, TM
Hartley, RI
Harvey, RP

Hatch, MD
Head, AK
Healy, TW
Heath, WR
Higgins, TJ
Hill, DJ
Hilton, DJ
Hinde, DJ
Hirst, GDS
Hobbs, BE
Hobbs, RJ
Hoffmann, AA
Holliday, R
Holloway, BW
Holman, ME
Holmes, AB
Holt, PG
Hopwood, JJ
Horridge, GA
Hughes, TP
Hume, ID
Hunter, RJ
Hurst, CA
Hush, NS
Hutchinson, JE
Hyde, BG
Hyde, ST
Hynes, MJ
Imberger, J
Israelachvili, JN
Jacobsen, JV
Jagadish, C
James, DE
Jameson, GJ
Jeffrey, SW
Johnstone, BM
Jones, The Hon. BO
Joshi, N
Kay, BH
Kemp, BE
Kemp, DJ
Kennett, BLN
Kerr, A
Kerr, JFR
Kivshar, Y
Klein, AG
Koopman, PA
Korner, PI
Kotagiri, R
Kuchel, PW
Ladiges, PY
Lamb, TD
Lambeck, K
Lance, JW
Larkins, FP
Law, PG
Lay, PA
Le Couteur, KJ
Lehrer, GI
Letham, DS
Levick, WR
Lindenmayer, DB
Lindoy, LF
Linnane, AW
Lovering, JF
Lumbers, ER
Lyons, LE
McCloskey, DI
McComb, AJ
McCormick, PG
McCracken, KG
McCulloch, MT
McDougall, I
McDougall, TJ
McElhinny, MW
McEwan, AD
McFadden, GI
McFadden, PL
MacFarlane, DR
McIntosh, AGR
McIntosh, RA
McKay, BD
MacKay, IR
McKellar, BHJ
McKenzie, JA
McLachlan, EM
McLeod, JG
Mai, Y
Main, AR
Manchester, RN
Mander, LN
Marcelja, S
Marshall, BJ
Martin, N
Martin, RL
Martin, TJ
Masters, CL
Mathieson, AM
Mattick, JS
Mayo, O
Melrose, DB
Mendelsohn, FAO
Metcalf, D
Milburn, GJ
Miller, JFAP
Millis, NF
Mills, BY
Mitchell, GF
Moodie, AF
Moore, JB
Moran, W
Morrison, JD
Morton, DC
Mould, JR
Munns, RE
Myers, RH
Napper, DH
Neeman, A
Newton, JO
Nichol, LW
Nicola, NA
Ninham, BW
Norrish, K
Nossal, Sir GJV
Nugent, KA
Ogilvie, Dame B
O'Neill, H
O'Reilly, SY
Orlowska, ME
Osborne, MR
Osmond, CB
Paddon-Row, M
Paltridge, GW
Passioura, J
Pate, JS
Paterson, MS
Peacock, WJ
Pearman, GI
Pegg, DT
Pettigrew, JD
Phan-Thien, N
Pickett-Heaps, JD
Pittard, AJ
Porter, R
Possingham, HP
Poulos, HG
Powell, R
Praeger, CE
Quirk, JP
Radom, L
Ralph, JT
Ralston, J
Randolph, MF
Redman, SJ
Reeves, PR
Reid, AF
Renfree, MB
Rintoul, SR
Ritchie, IM
Rizzardo, E
Robinson, DW
Robson, R
Rogers, C
Rogers, GE
Rogers, LJ
Rubinstein, JH
Runnegar, BN
Sambrook, JF
Sara, VR
Sargeson, AM
Schmidt, BP
Seneta, E
Sharman, GB
Shine, J
Shine, R
Short, RV
Shortman, KD
Shparlinski, I
Simmons, MY
Simon, L
Simpson, ER
Simpson, SJ
Slatyer, RO
Sloan, IH
Sloan, SW
Smith, FA
Smith, SE
Smyth, DR
Snyder, AW
Solomon, DH
Speed, TP
Sprent, J
Sprent, JFA
Sridhar, T
Srinivasan, MV
Stalker, RJ
Stanley, FJ
Stanton, RL
Stephenson, DG
Sternhell, S
Stokes, RH
Stone, J
Strasser, A
Street, R
Street, RH
Sullivan, CE
Summons, RE
Sutherland, GR
Sutherland, RL
Swan, JM
Tam, PPL
Tanner, RI
Taylor, SR
Thomas, AW
Thompson, AM
Thompson, CJ
Tregear, G

The Fellowship is listed at: www.science.org.au/academy/fellows/fellow.htm

More information on each of the new Fellows is available at: www.science.org.au/academy/fellows/2008.htm

Trudinger, NS
Truswell, EM
Tuck, EO
Tucker, RS
Turner, JS
Tyerman, SD
Tyndale-Biscoe, CH
Underwood, AJ
Vaux, DL
Veevers, JJ
Vincent, RA
von Caemmerer, S
von Itzstein, M
Wake, RG
Walker, NA
Wall, GE
Wallace, GG
Wallace, HR
Walter, MR
Wand, MP
Warnaar, SO
Warren, JR
Watts, RO
Weigold, E
Weiss, DE
Welsh, AH
Wentrup, C
White, GK
White, JW
Whitten, MJ
Whitten, WK
Wild, JP
Wild, SB
Williams, JF
Williams, JS
Williams, R
Williamson, R
Williamson, RE
Wintour-Coghlan, EM
Wiseman, HM
Wiskich, JT
Womersley, HBS
Woodall, R
Zillman, JW

Corresponding Members

Andersson, B
Atiyah, Sir M
Attenborough, Sir D
Bernard, J
Bjorkman, OE
Blackburn, E
Boyer, JS
Brooks, RA
Buckingham, D
Connell, JH
Cornforth, Sir JW
Feldmann, M
Gajdusek, DC
Harris, Sir H
Jones, VFR
Krebs, CJ
Lu, Y
May, Lord R
Öquist, FG
Oxburgh, Lord R
Powell, MJD
Raven, PH
Salpeter, EE
Sanger, F
Slater, EC
Tao, T
Zinkernagel, RM

New Fellows

We congratulate the following scientists who were elected to the Fellowship on 19 March 2008:

Professor Antony Bacic
Personal Chair, School of Botany, University of Melbourne.

Professor Murray Ronald Badger
Professor, Research School of Biological Sciences, Australian National University.

Professor Roderick William Boswell
Professor, Research School of Physical Sciences and Engineering, Australian National University.

Professor William Ross Heath
Deputy Head, Immunology Division, Walter and Eliza Hall Institute of Medical Research.

Professor Nalini Joshi
Chair of Applied Mathematics, School of Mathematics and Statistics, University of Sydney.

Professor Peter Anthony Koopman
Professorial Research Fellow, Institute for Molecular Bioscience, University of Queensland.

Professor David Bruce Lindenmayer
Research Professor, Fenner School of Environment and Society, Australian National University.

Professor Nicholas Martin
Senior Principal Research Scientist, Queensland Institute of Medical Research.


Dame Bridget Ogilvie

Professor John Stanley Mattick
Professor of Molecular Biology, Institute for Molecular Bioscience, University of Queensland.

Dame Bridget Ogilvie
University College London, UK.

Professor Hugh O'Neill
Associate Director, Research School of Earth Sciences, Australian National University.

Professor Brian Paul Schmidt
ARC Federation Fellow, Research School of Astronomy and Astrophysics, Mount Stromlo Observatory, Australian National University.

Professor Patrick Ping Leung Tam
Head, Embryology Unit, Children's Medical Research Institute, Sydney.

Professor Geoffrey Tregear
Deputy Director, Howard Florey Institute, University of Melbourne.

Professor Matthew Paul Wand
Research Professor in Statistics, School of Mathematics and Applied Statistics, University of Wollongong.

Professor Sven Ole Warnaar
Senior Research Fellow, Department of Mathematics and Statistics, University of Melbourne.

Professor Howard Mark Wiseman
Director, Centre for Quantum Dynamics, Griffith University.

New Corresponding Members

Sir David Attenborough
Richmond, Surrey, UK.

Professor David Buckingham
Emeritus Professor of Chemistry, Department of Chemistry, University of Cambridge.


Professor David Buckingham

Honours awarded to Fellows during the year 2007–08

Professor Michael Archer
Member of the Order of Australia (AM)

Professor Sam Berkovic
Elected as a Fellow of the Royal Society of London
NHMRC Australian Fellowship

Professor Elizabeth Blackburn
2008 Laureate of the 10th annual LÓreal-Unesco Awards for Women in Science

Professor David Boger
Elected as a Fellow of the Royal Society of London

Professor Gavin Brown
Elected as a Corresponding Fellow of the Royal Society of Edinburgh

Dr Leo Clarebrough
Medal of the Order of Australia (OAM)

Professor Robert Clark
Australian Research Council Federation Fellowship

Professor Max Coltheart
2007 Australian Museum Eureka Prize for Leadership in Science

Professor Alan Cowman
NHMRC Australian Fellowship

Professor Ian Frazer
2007 Australian Academy of Technological Sciences and Engineering Clunies Ross Award

Professor Bob Graham
2007 Heart Foundation Research Medal for Lifetime Contribution to Cardiovascular Research

Professor Martin Green
2007 SolarWorld Einstein Award

Professor Min Gu
Elected as a Fellow of the Australian Academy of Technological Sciences and Engineering

Professor Anthony Guttmann
Elected as a Fellow of the Australian Academy of Technological Sciences and Engineering

Professor Tom Healy
Nature's Inaugural Lifetime Mentoring Award
Elected as a Foreign Associate of the National Academy of Engineering, USA
2008 Antoine M Gaudin Award by the Society for Mining, Metallurgy and Exploration, USA

Professor Doug Hilton
NHMRC Australian Fellowship

Dr Bruce Hobbs
Elected as a Fellow of the Australian Academy of Technological Sciences and Engineering

Professor Terry Hughes
2007 Australian Museum Eureka Prizes in Environmental Research
International Society for Reef Studies Darwin Medal

Professor Noel Hush
Welch Prize in Chemistry (Welch Foundation of Texas) 2007

Professor Chennupati Jagadish
Elected to the Institution of Engineering and Technology

Professor David Kemp
Medal of the Order of Australia (OAM)

Professor Brian Kennett
2008 Gold Medal for Geophysics by The Royal Astronomical Society in London

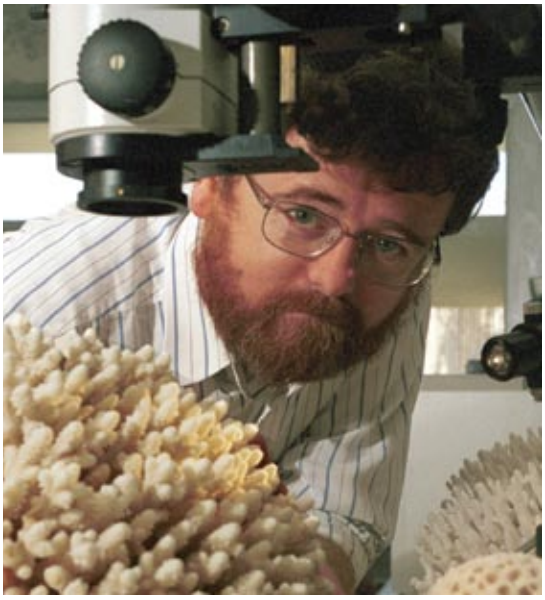
Professor Colin Masters
Elected as a Fellow of the Australian Academy of Technological Sciences and Engineering
2007 Victoria Prize

Professor Don Metcalf
American Association for Cancer Research Lifetime Achievement Award

Professor Douglas MacFarlane
Australian Research Council Federation Fellowship

Professor Gerard Milburn
Australian Research Council Federation Fellowship

Professor Nancy Millis
2007 Australian Academy of Technological Sciences and Engineering Clunies Ross Lifetime Achievement Award



Professor Terry Hughes

Professor Harry Poulos
American Society of Civil Engineers 2007 Thomas A Middlebrooks Award

Professor Cheryl Praeger AM
Australian Research Council Federation Fellowship

Professor John Ralston
South Australian Scientist of the Year 2007

Professor Terry Speed
NHMRC Achievement Award

Dr Andreas Strasser
NHMRC Australian Fellowship

Professor Terence Tao
Elected as a Fellow of the Royal Society of London

Professor David Vaux
NHMRC Australian Fellowship

Deaths since 1 April 2007

We regret to record the following deaths:

Professor Chris (WN) Christiansen, 26 April 2007

Professor Pierre-Gilles de Gennes, Nobel Laureate, 23 May 2007

Professor Rod Rickards, FRACI, 17 December 2007

Professor Richard E Meyer, 6 January 2008

Professor Chris C Heyde, AM, FASSA, 6 March 2008

Regional groups

The following reports for the period 1 April 2007 to 31 March 2008 have been received.

Australian Capital Territory

Chair: Professor John White

The Canberra Fellows Dining Club met with the combined Academies at meetings and for dinner on five occasions in 2007 and there was an extensive program of lectures and discussions. Dr John Passioura FAA and Professor Susan von Caemmerer FAA are thanked for this.

A talk was given by Emeritus Professor Henry Nix from the Centre for Resource and Environmental Studies at the Australian National University on 22 February called *Ludwig Leichhardt – landscape ecologist and explorer*. A lecture entitled *Good wine, good health?* was given by Emeritus Scientia Professor Eugenie Lumbers, MBBS, MD, DSc, FAA in the Common Room at University House on 30 March. Dr John Magee, from the Department of Earth and Marine Sciences at the ANU, spoke on *Extinction of giant flightless birds in Australia and Madagascar: Unravelling the role of humans and climate* on 31 May; and Professor Will Steffen, Director of The Fenner School of Environment and Society at the ANU, spoke on *The Anthropocene: From hunter-gatherers to a global geophysical force* on 26 July.

Thursday 27 September was the occasion when Professor Harvey Marchant, Visiting Fellow at the Department of Earth and Marine Science of the ANU, talked on *The other problem of increasing atmospheric CO_2 concentration – acidification of the oceans*. On 7 November Professor Gunnar Öquist from the Department of Plant Physiology at Umeå Plant Science Center at Umeå University in Sweden spoke in the Shine Dome on *Linnaeus as a role model for today's science*. He spoke again on Thursday 8 November about *The Nobel Prize as a benchmark for research quality*. The annual Combined Academies dinner was held on Friday 7 December.

A Talkback Science event was held at CSIRO Discovery on Thursday 9 August, the participants being Dr Andy Sheppard (Theme Leader, Biological Threats and Invasive Species at CSIRO Entomology), Dr Simon McKirdy (Chief Executive Officer at CRC Plant Biosecurity) and Dr Tony Peacock (Chief Executive Officer at Invasive Animals CRC).

How do scientists influence policy? The interplay of scientists, science and policy was the second Talkback forum of 2007 at CSIRO Discovery on 13 September. The panel members were Dr Les Rymer (General Manager, Government Relations at CSIRO), Dr Daniel Connell (Crawford School of Economics and Government at the ANU) and Mr Bradley Smith (Executive Director of the Federation of Australian Scientific and Technological Societies).

New South Wales

Chair: Professor Elspeth McLachlan

The NSW Fellows were again invited to attend a number of events organised by the NSW Fellows of the Academy of Technological Sciences and Engineering (ATSE), including a dinner on 28 March at which Sir Gregory Winter from the MRC Laboratory of Molecular Biology, Cambridge, UK, spoke about his work on antibody engineering and development for therapeutic purposes.

The NSW Fellows met on 17 October to hear the story behind the publicity about stem cells. Associate Professor David Haylock, Director of the Major National Research Facility at the Australian Stem Cell Centre, introduced the therapeutic applications of stem cells, Reverend Dr Ivan Head, Warden of St Paul's College at

the University of Sydney, discussed the ethical dilemma in the use of embryonic stem cells, and Professor Peter Schofield, Director of the Prince of Wales Medical Research Institute and a member of the Lockhart Committee, described the political events leading up to the amendments to the legislation.

The annual dinner was held at Women's College at the University of Sydney on 22 November and was a most enjoyable event at which we met several of the new Fellows. Professor Gavin Brown FAA presented the toast to the Academy and spoke eloquently about universities and the future.

Queensland

Chair: Professor Peter Drummond

The year 2007 was an extremely busy year, with much public activity related to the work of many Academy Fellows.

In January, Townsville Fellow Professor Ross Crozier attended meetings to help extend the *Primary Connections* program in central Queensland. The program is a partnership between the Academy and the Australian Government Department of Education, Employment and Workplace Relations, to develop science literacy in primary schools. The reference group of the program is ably chaired by Queensland Fellow Professor Julie Campbell.

There were numerous public talks and lectures on medical science across the country in 2007 by Australian of the Year Professor Ian Frazer FAA as Australia commenced its national cervical cancer vaccination program – an outgrowth of Ian Frazer's work. Talks were given in Queensland locations ranging from the Gold Coast to Port Douglas. A typical example of these outreach talks which helped present the outstanding research of an Academy Fellow, was the talk presented on 23 May to the Queensland Medical Women's Society: *Research and development of the Gardasil vaccine*. As an outgrowth of the research, the Queensland government will fund a new research institute focusing on the translation of medical research into practical therapies.

Ongoing mobility of Queensland Fellows is indicated by the return of Professor Maria Orlowska to Poland in 2007, where she has accepted the position of Secretary of State in The Ministry of Science and Higher Education, in the Polish government.

At the University of Queensland, the magnificent new 7-storey building of the Queensland Brain Institute (QBI) opened in September 2007. Directed by Professor Perry Bartlett FAA, QBI now has a modern and aesthetic facility to pursue its research. QBI will address not just the fundamental questions of how memory and learning work, but also the issue of how to deal with the overwhelming tide of neurological disease and mental ill health in the community.

Also in September, there were presentations by Professor Hugh Possingham FAA and Professor Graeme Turner, President of the Australian Academy of the Humanities. The occasion was the inaugural UQ Federation Fellows Public Lecture at the Brisbane Customs House.

South Australia

Chair: Professor Robert Vincent

The South Australian Fellows continued to make active contributions to the work of the Academy. Professors Sally Smith and John Ralston served on Council, Professor Bob Vincent chaired the National Committee for Antarctic Research and served on the National Committee for Space Science, Professor Andrew Smith represented the Academy at the opening of the Australian Garden at the South China Botanical Garden, and a number of Fellows served on Academy committees. Professor Michael Barber has taken up the position of Vice-Chancellor at Flinder's University and Professor Max Brennan is Chief Scientist of South Australia.

The South Australian Regional Group has continued its collaboration with the South Australian branch of ATSE

and join them in their Christmas function. This ongoing collaboration contributes to the promotion of science in South Australia.

Tasmania

Chair: Dr Trevor McDougall

The Tasmanian chapter of Fellows, together with the Royal Society of Tasmania, arranged a series of three public lectures during the winter of 2007. We had a total of eight speakers, addressing the general topic of climate change and its implications for agriculture, water supply and economics.

Victoria

Chair: Professor Tony Klein

The annual symposium for newly elected Fellows and Medal winners was held on 14 June at the University of Melbourne. Newly elected Corresponding Member, Professor Elizabeth Blackburn, opened the program with an overview of her work. This was followed by brief talks presented by Professors Min Gu and Douglas MacFarlane, newly elected Fellows, and by Professors Peter Hall, Robyn Hyndman and Jamie Rossjohn, recipients of the Matthew Flinders, Moran and Gottschalk Medals, respectively. The symposium was followed by a dinner for Victorian Fellows and their guests, including all the presenters.

A very well attended Joint Academies' Dinner was held on 21 August. It featured the Chairman of the Australian Nuclear Science and Technology Organisation Dr Ziggy Switkowski as the guest speaker, who gave a very stimulating outline of the likely future of energy supply in Australia. Organised this year by ATSE, it was once again held in the Bio21 Institute Building.

On 30 October the High Flyers Think Tank was held at the University of Melbourne, organised and hosted by the Academy Secretariat in Canberra. This highly successful event had as its theme extreme natural hazards and is reported in more detail elsewhere. The President, Professor Kurt Lambeck, introduced and chaired the day's program.

It was with great pleasure that the Victorian Fellows welcomed the informal visit by the President and Mrs Lambeck to this year's Christmas party for Fellows and guests, on 22 November. It was by all accounts a rollicking affair, helped along by a three-piece gypsy band and a fine dinner at the Observatory Café in the Royal Botanic Gardens – the usual venue.

Western Australia

Chair: Dr Bruce Hobbs

The Western Australian Fellows met with the President of the Academy on 16 May at a dinner held at the Weld Club to award Professor David Groves the Haddon Forrester King Medal sponsored by Rio Tinto. The meeting date was set to coincide with the annual conference of the Cooperative Research Centres Association. Several west Australian Fellows were able to join with ATSE Fellows at their Annual Symposium held in Perth on 19 and 20 November, *Resources boom: Opportunities and consequences*.

Science policy

As an independent body of Australia's leading research scientists, the Academy can bring together experts from universities, research agencies and institutes, industry and government to consider and report on scientific issues. The Academy has had an active year publicising science-related issues such as the use of gene technologies to produce genetically modified plants, response to climate change, water stewardship, sustainable ecosystems, and research and innovation priorities.

Overview

In September, the Academy released a policy statement that was launched at the National Press Club in an address by the Academy President, Professor Kurt Lambeck. The 2007 policy statement *Research and innovation in Australia* identified ten actions that Australia can take to maintain a strategic economic position in a world where many other nations have a competitive advantage. The recommendations aim to increase the chances of the nation realising its potential as a major contributor to a global, knowledge-based economy.

Once again, the Academy held a number of symposia. Each year as part of the Annual General Meeting in early May, a one-day symposium on a scientific issue of broad contemporary interest is held. The 2007 annual symposium was *Development and evolution of higher cognition in animals*. Speakers challenged ideas about animal behaviour as they discussed the ability of animals to learn complex tasks, make and use tools, and plan for the future: aspects of behaviour that were previously considered to be unique to humans.

In other events, the Academy held the sixth annual High Flyers Think Tank, *Extreme natural hazards*, in late October. This Think Tank was designed to bring together early- and mid-career researchers from a broad range of disciplines to:

- engage in thinking about novel applications of existing science and technology
- identify gaps in knowledge that might be addressed when applying science, including social science, and technology to a particular issue.

Held in an independent setting, the Think Tanks are seen by the Academy as a unique opportunity for career development and network creation – to be particularly encouraged among the nation's next generation of researchers and their institutions. Furthermore, it is well recognised that interdisciplinary and transdisciplinary approaches to problem-solving enable more diverse and lateral thinking and so achieve fuller outcomes.

Previous Think Tanks have culminated in reports to government that have been timely, well received and instrumental in influencing policy development. Past Think Tank topics include:

- *2006 Innovative technical solutions for water management in Australia*
- *2005 Biotechnology and the future of Australian agriculture*
- *2004 Emerging diseases – ready and waiting?*
- *2003 Safeguarding the nation*
- *2002 Australia's national research priorities*

Reports and submissions issued by the Academy are available at:
www.science.org.au/reports

Media releases are available at:
www.science.org.au/media

Think Tank proceedings are available at: www.science.org.au/events/thinktanks

Two Academy projects were funded under the Australian Research Council's Linkage Learned Academies Special Projects scheme. The first is a project on the hydrogen economy, and the second a project designed to enhance the quality of the experience of postdoctoral and early-career researchers.

Research and innovation in Australia: A policy statement

Academy President Professor Kurt Lambeck launched the 2007 policy document *Research and innovation in Australia: A policy statement* at his National Press Club address on 26 September. The document puts forward ten actions that Australia must take to maintain a strategic economic position in a world where many other nations have a competitive advantage.

The Academy's 2007 policy statement

The recommendations aim to increase the chances of the nation realising its potential as a major contributor to a global, knowledge-based economy. In a world where information is only a click away, the competitiveness of nations such as Australia will be tested increasingly by a new world order. The Academy contends that Australia's future socioeconomic and environmental prosperity will be underpinned by science, technology and innovation.

Without urgent attention to education, research and innovation policies, Australia may find its current advantages in the international market-place rapidly eroded. Alternatively, strategic investment in science, technology and innovation will open up new and exciting opportunities to strengthen the quality of life for all Australians. The policy statement is available at: www.science.org.au/reports/aas-policy-2007.pdf

Ten recommendations

1. That Australia increases its support for the national R&D effort to ensure that it retains an internationally competitive science capability to underpin the nation's industrial, commercial, environmental and economic position among leading world economies.
2. That Australia examines the implications of the continuing relatively low level of private sector investment in R&D and creates policy settings that encourage greater innovation.
3. That Australia further addresses the critical lack of suitably qualified science and mathematics teachers, and expands programs to encourage high school students to study science and mathematics.
4. That Australia maintains a long-term commitment to basic research funding in universities, and ensures that the Research Quality Framework (RQF) results in additional funds for high-quality research.
5. That Australia continues to invest in the future by building on the Higher Education Endowment Fund (HEEF) for capital works and research infrastructure in universities.
6. That Australia provides support for publicly-funded research organisations sufficient to maintain their core capabilities, on which their competitiveness as world-class research providers depends.
7. That Australia increases its level of support for existing research centre schemes and develops new 'International Research Centres', and that the research fellowship awards be substantially expanded, particularly for early- and mid-career researchers.

8. That Australia makes a long-term commitment to maintaining first class national research infrastructure facilities and promotes Australian access to international facilities.
9. That Australia gives urgent attention to nurturing rewarding and secure career paths for talented early-career researchers.
10. That Australia recognises the importance of engagement with the international scientific community and uses science more effectively as a tool in foreign policy.

High Flyers Think Tank on extreme natural hazards

Growing community awareness about climate change and a perceived increase in the frequency and severity of natural disasters prompted the Australian Academy of Science to investigate extreme natural hazards as the topic of a 2007 High Flyers Think Tank. The Academy was aware that international events such as the tsunami of 2004, Hurricane Katrina of 2005, outbreak of SARS, and bushfires in California appeared to have increased the public perception that more attention is required to ensure sufficient understanding, early warning, response and recovery from such catastrophic natural disasters.

Natural hazards were defined as geophysical, atmospheric or hydrological events – earthquake, landslide, tsunami, windstorm, wave or surge, flood or drought – that have the potential to cause harm or loss to human health and safety, the economy, the environment, or the fabric of society at large. Extreme natural hazards were seen to refer particularly to disastrous events, as distinct from less extreme natural hazards such as seasonal bushfires which occur more frequently. In Australia, these less disastrous types of events usually have well established response and recovery practices as compared with extreme hazards.

The Think Tank was held in Melbourne at the invitation of the chair of the Regional Group of Victorian Fellows, Professor Tony Klein. It was opened by Academy President, Professor Kurt Lambeck and the keynote address was given by Mr Michael Tarrant of Emergency Management Australia who outlined the evolution of Australian emergency management theory and post-war practice with some examples from Australia and overseas.

After hearing presentations from other invited speakers, 65 Think Tank participants divided into four breakout groups to identify trends in extreme natural hazards as they relate to the framework of PPRR – prevention, preparedness, response, and recovery. Participants discussed scientific, social and technological options for investigation and implementation to deal better with extreme natural hazards in Australia. A number of possibilities and recommendations were identified and participants noted that most of the options would need to be implemented in close consultation with the community.

Photo: NASA Earth Observatory

Cyclone Beryl: An extreme natural hazard

The Think Tank participants concluded that to improve the national preparedness and response for extreme natural disasters, Australia should consider the need to:

- scope the capacity – that is, determine whether Australia as a nation can budget for the long-term and short-term recovery of a community from a disaster
- explicitly include extreme events and natural disasters when considering research priorities
- allow a greater shift from single hazard assessments to multi-hazard approaches
- ensure better interdisciplinary, interregional, and intergovernmental cooperation in order to obtain multidimensional views
- undertake more research on how natural systems actually recover from extreme events
- consider the role of diversification as a response, to spread risk and build resilience
- better recognise the importance of the long-term perspective
- ensure better integration of vulnerability assessments.

Further information and proceedings are available at: www.science.org.au/events/thinktank2007

Science at the Shine Dome symposium – *Development and evolution of higher cognition in animals*

At this year's annual symposium *Development and evolution of higher cognition in animals* held in May, Sir Patrick Bateson, FRS, Professor of Ethology at Cambridge University – known for his interest in the ethics of using animals in research and hunting red deer with hounds in England – presented the Rutherford Lecture. In his plenary address he used examples from birds, rodents, chimps and invertebrates to show how the adaptability of an animal can drive the evolution of behaviour.

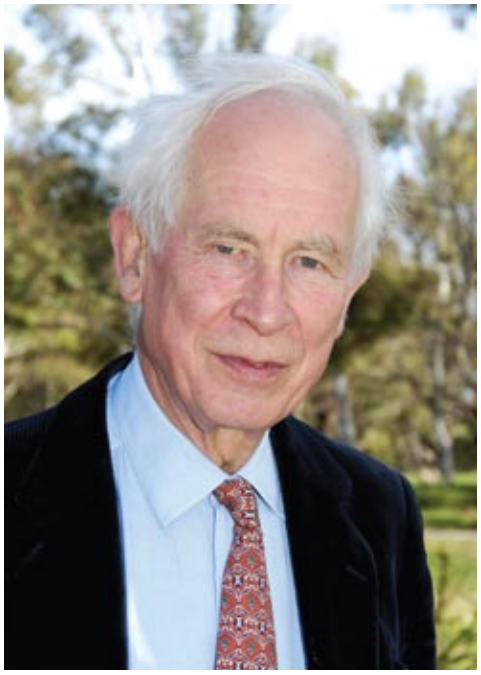


Photo: © Irene Dowdy

Rutherford lecturer: Professor Sir Patrick Bateson

Other expert speakers at the symposium showed how animals may be much more consciously aware than previously thought. Professor Mandyam Srinivasan FAA from the University of Queensland outlined how honeybees use prior knowledge as they learn to detect poorly visible or camouflaged objects and how they are capable of associative recall triggered by familiar scents. Professor Giorgio Vallortigara from the University of Trieste in Italy showcased predispositions and core knowledge in chickens and Professor Russell Gray from the University of Auckland demonstrated how New Caledonian crows show remarkable tool manufacturing skills with fine honing and cumulative crafting in their design. This cutting-edge research has immediate ramifications for ethics and strategies for sensitively managing animal welfare. Transcripts from the symposium are available from: www.science.org.au/sats2007/symposium

A paper has since been published by these authors which highlights some of their findings: Vallortigara G, Snyder A, Kaplan G, Bateson PPG, Clayton NS and Rogers LJ (2008). *Are animals autistic savants?* Public Library of Science, 6(2), e42. The January/February 2008 issue of *Australasian Science* also contained three articles from the speakers on the theme of intelligence.

RQF journal ranking exercise

At the request of the then Department of Education, Science and Training, the National Academies Forum coordinated much of the draft ranking of research outlets for any forthcoming Research Quality Framework (RQF) process. The Academy of Science and the Academy of Technological Sciences and Engineering (ATSE) coordinated rankings of science and engineering journals within the RFCD (Research Fields, Courses and Disciplines) divisions as provided by the Australian Bureau of Statistics. Wherever possible, journal lists were constructed at the four-digit RFCD code level.

For the majority of science disciplines, the Academy relied on its discipline-specific National Committees to advise on journal rankings. The main determinant of the ranking was the quality of the articles that each research outlet contains, rather than the publication quantity. Journals were assigned one of four prestige bands – A1, A, B or C – depending on their assessed current quality.

Only those journals containing the highest quality papers from the world's leading researchers, the top 5 per cent of journals, were rated as A1. Journals ranked A belong to the next 15 per cent, and represent those journals also publishing very high quality papers with a significant proportion coming from the world's leading researchers. This group includes the leading journals in a number of sub-disciplines. The next 30 per cent of journals were rated B, and the final 50 per cent of peer reviewed journals were rated C.

The Academy was swamped with responses and interest in the RQF journal ranking exercise. It is presently unclear how the journal rankings will be used in the assessment of quality outputs by research groups.

Sir Mark Oliphant Conferences

Expressions of interest in the Sir Mark Oliphant Conferences: International Frontiers of Science and Technology series funded by the Department of Industry, Innovation, Science and Research under the International Science Linkages – Science Academies Programme were sought in May 2007. The Academy received 32 applications: from this pool, a number of applicants were selected for the short list and two applicants were successful. One successful application was for a conference entitled *Old forests, new management: Conservation and use of old-growth forests in the 21st century* by the University of Tasmania. This event was overseen by ATSE and held on 17 to 21 February 2008. The other successful application was from The Bionic Ear Institute on the theme of *Medical bionics – a new paradigm for human health*. The Australian Academy of Science is responsible for overseeing the management of this conference which is scheduled for 16 to 19 November 2008.

Another call for applications under the Sir Mark Oliphant Conference scheme was released for the 2008–09 financial year and closed on 18 February 2008. Further information on the scheme is available from: www.oliphant.org.au A new logo for the conference series has since been developed and the website has been revamped to convey a more contemporary image. The website is at: www.oliphant.org.au

Development of an Australian scientific roadmap for the hydrogen economy

The Academy's report on *Development of an Australian scientific roadmap for the hydrogen economy* was released in March. It examines Australia's contribution to research into hydrogen as a future energy carrier and use in fuel cells through a bibliometric analysis of the published research literature. It was funded by an Australian Research Council Learned Academies Special Projects grant. The heightened interest in hydrogen is because of its potential use in fuel cells for electric power generation in motor vehicles and other applications with zero emissions of carbon greenhouse gases. However, there are a number of significant research challenges to be addressed before there is widespread use of hydrogen fuel cells.

The report notes that the Australian Research Council has already announced funding for hydrogen energy research in 2001–07 of over $22 million for the period 2002–11. In this fast moving field, Australia is a minor contributor as the 16th largest producer of hydrogen energy publications with 1.78 per cent of the world's hydrogen publications in 1998–2006. This is lower than for science as a whole, for which Australia produced 2.89 per cent of the world's science publications in 2004. However, the report does identify a number of key areas in which Australian research can make significant contributions, such as hydrogen storage materials, carbon capture and storage, and solar-thermal reforming of natural gas, and the report makes a number of recommendations for increased government support for hydrogen energy research and coordination.

The report follows on from the Academy's annual symposium on *Science on the way to the hydrogen economy*, which was held on 5 May 2006. It was convened by Professor Michael Barber FAA, as part of the Academy's annual *Science at the Shine Dome* event.

Dr John Wright, Director of the CSIRO *Energy Transformed Flagship Program* set the scene for the symposium with a brief history of hydrogen and a description of one possible future scenario. The distinguished keynote speaker, Dr George Crabtree, Senior Scientist at the Argonne National Laboratory, USA, spoke of the research challenges for creating a mature hydrogen economy. Other researchers from the CSIRO and Australian universities outlined their research in relation to global research priorities for hydrogen as a future energy carrier. The symposium proceedings are available at: www.science.org.au/sats2006/symposium

Early-career researchers workshop

The Academy held a workshop, *Enhancing the quality of the experience of postdocs and early-career researchers*, from 14 to 15 February 2008 with support from the Australian Research Council (ARC) under the Learned Academies Special Projects scheme. About 60 researchers came together from many different disciplines to discuss this timely topic. Minister Kim Carr opened the event following a welcome from the President of the Academy, Professor Kurt Lambeck. The dinner speaker was Professor Margaret Sheil, Chief Executive Officer (CEO) of the ARC and another keynote speaker was Professor Warwick Anderson, CEO of the National Health and Medical Research Council. A series of expert presentations were delivered by some of the Academy's most eminent members, Australia's best scientists, and science communicators. Topics ranged from mentoring to writing great grant proposals, networking and international collaborations, addressing specialised audiences, dealing with the media, setting up scientific teams, recruitment, negotiation skills, project management and administration. There were regular breakout groups for discussion between sessions, and participants were

Minister Kim Carr speaking at the early-career researchers workshop

also asked to address two questions: what program is needed to provide mentoring and necessary skills to early career researchers in Australia, and how best can early career researchers engage with the Australian Academy of Science? Further information about the workshop is available from: www.science.org.au/events/14-15february08

National Elevation Data Framework – DEM project

ANZLIC, the Spatial Information Council – with the support of the Department of Climate Change, Geoscience Australia and the Cooperative Research Centre for Spatial Information – is sponsoring the development of a National Elevation Data Framework, to produce a digital representation of the landform and seabed of Australia.

The Australian Academy of Science and the Australian Academy of Technological Sciences and Engineering have been engaged to undertake an independent review of the science case and, in the process, review the business plan and the analysis of user needs. The Academies will receive comments, and publicise the documents and comments to support the National Elevation Data Framework. To accomplish these aims, a public workshop was held on 18 March 2008.

Once the framework has been endorsed by the Academies, it is expected that it will be accepted by the relevant science, spatial, user, vendor, and funding provider communities. This should lead to the endorsed documents being used to produce an implementation plan, and the acceptance of the plan by the relevant bodies, resulting in appropriate funding and implementation.

Australian Department of Climate Change activities

The National Committee for Earth System Science co-sponsored with the Department of Climate Change a workshop entitled *Vegetation dynamics and climate change* at the Shine Dome on 14 and15 August 2007. The workshop was held to prioritise research on processes that influence the nature and distribution of plant communities in response to climate change. The proceedings can be found at: www.globalcarbonproject.org/meetings/VegetationDynamics.htm

Australian Frontiers of Science

The third Australian Frontiers of Science symposium was held at the Shine Dome on 21 and 22 February 2008. The event was a successful 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 immersed in the forefront of various fields of science, from touring through the molecular structure of cells and treading over past environments of the Earth, to discovering the furthest reaches of the universe through new technologies.

Each session was brought together by a prize-winning younger scientist, who formed the symposium Organising Committee to decide on the topics, chairs and other speakers to be involved. Audience members were selected young researchers from throughout Australia, who contributed to the intense discussion and the new ideas that emerged from a meeting in which some of Australia's brightest young minds came together. Australian Frontiers of Science symposium proceedings will be available at: www.science.org.au/events/frontiers.htm

National committees for science

The Academy's national committees foster a designated branch or theme of natural sciences in Australia and serve as a link between Australian and overseas scientists in the same field. Following advice from the committees, the Academy appoints delegates to the business meetings of the International Council for Science (ICSU). There are 21 national committees and three Task Forces, which represent a wide range of the disciplines within the Academy's Fellowship.

In 2007, the National Committee for Psychology was disbanded, and two new committees, the National Committee for Brain and Mind and the National Committee for Data for Science, were formed. The Council of the Academy ceded to the Australian Psychological Society, at its request, responsibility for adherence to the International Union for Psychological Science. The Academy renewed, from January 2008, its adherence to the International Union, CODATA.

Nominations for committee members are sought by the Academy from committee chairs and from the relevant corresponding scientific societies. The nominations are then considered by the Academy's Executive Committee, responsible for appointing committee chairs and members. Guidelines for national committees are available at: www.science.org.au/natcoms/guidelines

Biennial meeting of chairs of national committees and task forces

A meeting of the chairs of the national committees and task forces was held at the Shine Dome on 22 March 2007. The meeting focused on two key issues: the erosion of the disciplines in regards to vocation, and the state of careers of early-career researchers after the postdoctoral fellowship. The chair of the Committee for Mathematical Sciences and a member of the Committee for Medicine gave presentations on relevant activities of their committees, and were followed by breakout discussion groups. Common issues arising from the breakout groups were identified, and the opportunities to act on these issues through the national committee structures were discussed.

A summary of the proceedings of the 2007 meeting is at: www.science.org.au/natcoms

Chairs of the national committees focus on vocation and early-career researchers

Committee reports

Reports have been received from the following committees.

Antarctic research

Chair: Professor Robert Vincent FAA

Australian scientists, including members of the National Committee for Antarctic Research (NCAR), continue to play prominent roles in the international programs of the Scientific Committee for Antarctic Research (SCAR) with good representation on a wide range of committees. Activities covered include Antarctic climate processes, biodiversity, change and ecosystem response, and the geological evolution of Antarctica. Whenever possible, new appointments to various SCAR and other relevant international bodies were proposed during 2007.

The reverse side of the 2008 International Polar Year $5 silver proof coin. Reproduced with the permission of the Royal Australian Mint.

In 2007 the main activity centred on contributing to the development of the next Australian Antarctic Division's Strategic Plan, which will set the science strategy for Australia's Antarctic science program in the five year period commencing in 2009. NCAR members provided input through the chair, who is ex-officio a member of the Australian Science Advisory Committee, responsible to the Minister for the Environment. The planning process will continue through the first part of 2008.

The International Polar Year (IPY) commenced in 2007, with about 100 projects taking place worldwide. Australian scientists are playing leading roles in several projects. NCAR is working with the IPY Australian Education Outreach and Communication Committee, hosted by Antarctic Tasmania, to publicise IPY activities. NCAR has also started planning for the end of IPY in March 2009. A number of lines of activity are being pursued, including Australia-wide lecture tours involving both senior and young scientists involved in Antarctic research.

Astronomy

Chair: Professor Matthew Colless FAA

The National Committee for Astronomy (NCA) focused on implementing the *Australian Astronomy Decadal Plan 2006–15* that was launched at the end of 2005, in particular the implementation of those aspects of the plan that were supported by the National Collaborative Research Infrastructure Strategy (NCRIS) funding for radio and optical astronomy infrastructure. The most important step forward was the formation of Astronomy Australia Limited (AAL) as the organisation to manage the NCRIS funding and oversee many aspects of national astronomy infrastructure. The members of AAL comprise almost all the institutions pursuing professional research in astronomy.

One consequence of the formation of AAL was that the advisory structures for astronomy in Australia have been reformed and rationalised, with most now reporting to AAL rather than other, diverse bodies. In particular, this has meant that two NCA working groups have been disbanded: the Extremely Large Telescope (ELT) Working Group has been replaced by the Australian Giant Magellan Telescope (GMT) Advisory Committee, and the Australian Square Kilometre Array (SKA) Consortium has been replaced by the SKA Coordinating Committee. The NCA was pleased to support this reorganisation. The NCA now only has one working group – the International Year of Astronomy Advisory Group, which was formed in 2007 to

lead Australian preparations for the International Year of Astronomy in 2009. That year will also see the next International Astronomical Union General Assembly, which will be held in Rio de Janeiro, Brazil.

Biomedical sciences

Chair: Professor Rob Baxter FAA

The 2007 National Committee for Biomedical Sciences (NCBMS) meeting on 7 March included a joint sitting with the National Committee for Medicine to discuss matters of mutual interest. The NCBMS covers a broad range of biomedical sciences, with 13 current corresponding national societies. In 2007, an effort was made to strengthen links with these societies, resulting in greatly improved communications. The Australian and New Zealand Society for Cell and Developmental Biology has been approached about becoming a corresponding member. A proposal by the NCBMS to prepare a paper on early-career workforce issues in the biomedical sciences, presented as an early draft, was not taken forward in 2007, as the broader issue of early-career options in science was taken up by the meeting of chairs of national committees held on 22 March (*Is there life after the postdoctoral fellowship?*).

A highlight of the year was the National Forum on Education in Biomedical Sciences, organised by Professor Phillip Nagley and colleagues, and held on 11 December at the School of Biomedical Sciences, Monash University. Discussion themes included graduate attributes and employability, and the shape of biomedical science education in the future.

Brain and mind

Chair: Professor Max Coltheart FAA

This new national committee was formed in late 2007 to replace the National Committee for Psychology. The first meeting was held in December at the Shine Dome, with Professor Philip Kuchel FAA, Secretary, Science Policy, in attendance.

Chemistry

Chair: Professor Chris Easton FAA

The committee has continued to interact with the International Union of Pure and Applied Chemistry (IUPAC), nominating Australians for IUPAC executive, division and standing positions as they become available. The committee chair and Professors Brynn Hibbert and Mary Garson attended the IUPAC General Assembly in

Members of the National Committee for Chemistry with immediate past-president of IUPAC, Professor Bryan Henry (second left), and Mr Peter Russo (centre front) of the Australian Science Teachers Association

Turin in August, where Professor David Black was re-elected IUPAC Secretary General, Professor Garson was elected Secretary of IUPAC Division 3 (Organic) and Dr Deanna D'Alessandro was awarded a 2007 IUPAC Prize for Young Chemists for her PhD thesis.

Nominations for the IUPAC Prize for Young Chemists are coordinated through the Royal Australian Chemical Institute (RACI) as part of the interactions between the institute and the committee. The president of RACI is an *ex officio* member of the committee.

The committee is cooperating with IUPAC and RACI to promote 2011 as the International Year of Chemistry. During 2007 it also assisted with the Research Quality Framework journal ranking exercise, considered ideas for symposia based on water recycling, quality, and chemical security, as well as continued to provide support for conference activities in Australia and pursued efforts to initiate IUPAC's Company Associates Program in Australia.

Crystallography

Chair: Professor Peter Colman FAA

The Society for Crystallographers in Australia and New Zealand (SCANZ) met in the Hunter Valley in April. Australian scientists were well represented at the Asian Crystallographic Association (AsCA) meeting in Taiwan in November.

The National Committee for Crystallography (NCCr) remained engaged with events surrounding the opening of the new Research Reactor (OPAL) and the Australian Synchrotron. The openings of these two major facilities in 2007 are landmark achievements for our community.

In 2006 NCCr member Professor Keith Nugent FAA chaired the preparation of a Strategic (Decadal) Plan for the

Photo: Courtesy of the Australian Synchrotron

A ray of light for Australian science: The Synchrotron in Melbourne

Australian Synchrotron, which the NCCr and the wider community subsequently endorsed. A similar planning document is now in preparation for neutron scattering beam lines at OPAL, and NCCr chair Professor Peter Colman FAA and Professor Keith Nugent FAA are participating in this process.

Over the past two years, consideration has been given to hosting the 2014 International Union of Crystallography (IUCr) meeting in Australia. Mindful of our role in the region, the NCCr held back until India's plans to submit a bid for this meeting were resolved. NCCr is giving its support to the Indian proposal to host the 2014 meeting in Hyderabad.

NCCr approved nominations for six new Australian members of commissions of the IUCr and continued support for seven existing members. These nominations are screened by the existing commissions and by the IUCr Executive Committee before being put to the General Assembly.

Professor Mitchell Guss has been elected President of the Asian Crystallographic Association (AsCA).

Data for science

Chair: Professor Ray Norris

The National Committee for Data for Science was formed in 2007 and Council resolved to renew Australia's membership of the Committee on Data for Science and Technology (CODATA) from 2008.

Image: Stockxpert

Focus on data management

Earth sciences

Chair: Professor Andrew Gleadow FAA

The National Committee for Earth Sciences (NCES) was directly involved in, or closely monitored, a number of important activities in 2007.

The geoscience infrastructure program 'AuScope' began operations during 2007 with an NCRIS allocation of $46m over five years from 2007. A key component of work plans under AuScope will be a program of national geoscience transects as recommended in the *National Strategic Plan for the Earth Sciences* produced by the NCES in 2003. Through the NCES a Geotransect Working Group has been established, chaired by Professor Brian Kennett FAA, to facilitate planning of integrated research programs along a series of major corridors across the continent.

Planning for the 34th International Geological Congress (IGC) in Brisbane, 2–10 August 2012 is now well under way and communication with the NCES has been maintained through the membership of Dr Ian Lambert, who is also Secretary General of the Australian IGC Committee. The Brisbane IGC is to be known as 'Australia 2012' and its theme will be 'unearthing our past and future'. It will be held at the Brisbane Convention and Exhibition Centre and the process of selecting a professional conference organiser has commenced.

Planning for the International Year of Planet Earth (IYPE) 2008 is proceeding under the auspices of the NCES in conjunction with several other geoscientific agencies and societies in Australia. A number of major geophysical and geochemical programs in 2007–09 will be linked to IYPE and several public addresses by eminent geoscientists are planned. In late 2007 a new coin set celebrating the IYPE was released by the Royal Australian Mint. In addition, at least three national or international conferences in 2008, Earth Science Week, and the *Australian Journal of Earth Sciences* will bear the IYPE logo. Numerous other activities of a more local nature are planned for the coming year.

Australia mounted a successful bid to host the 25th General Assembly of the International Union of Geodesy and Geophysics (IUGG) in Melbourne in 2011. The bid was organised by a committee chaired by Professor Ray Cas and presented to the 24th IUGG General Assembly in Perugia in July 2007. The organisation of two major international geoscience events in Australia in consecutive years in 2011 and 2012 will require broad involvement by the geoscientific community across Australia.

Australian Dr Tom Beer, previously IUGG Vice-President, was unanimously elected to succeed Dr Uri Shamir as President of IUGG.

The Australian Geoscience Council, the peak organisation for the various geoscience organisations in Australia, has been active during the past year in investigating the condition of geoscience education in Australian universities. The NCES has been involved in this process, which is currently formulating a unified national approach to address a number of serious difficulties that currently face this sector.

The NCES spent a significant amount of its meeting time in 2007 considering the ranking of geoscientific journals on a range of quality criteria as part of the Research Quality Framework process. The ensuing debate across the wider geoscience community was still underway when the change of government led this activity to be suspended.

Earth system science

Chair: Dr Roger Gifford

Succinct summaries of the Intergovernmental Panel on Climate Change (IPCC) Working Group 1 Report and the final overall Synthesis Report were prepared for Academy use to coincide with the release of those reports during 2007. The committee also prepared a rebuttal to the high profile but seriously flawed TV documentary called the *Great global warming swindle*. The proceedings of the workshop on the *Science of seasonal climate prediction* held in August 2006 were prepared. All these documents are available on the Academy's website.

A document was written explaining the scope and concerns of Earth systems science. It was used in an application for an Australian Research Council Learned Academies Special Project grant to facilitate the development over the coming year of a decadal strategic plan for Earth systems science. A first contributory workshop to the strategic planning process was held with support from the Department of Climate Change. The workshop was on vegetation dynamics in relation to climate change aspects of the Earth system considering the research needs beyond the five year *Blueprint for terrestrial carbon cycle research*. A report of the conclusions of this workshop will contribute input to the strategic planning.

To assist the Research Quality Framework evaluation process being undertaken by the Department of Industry, Innovation, Science and Research the committee ranked the significance to Earth system science of over 300 international peer reviewed journals.

Image: Reto Stockli, NASA Earth Observatory

Our planet from space

Geography

Chair: Professor Leslie Head

The committee joined other sections of the geographical community in submissions to the former Federal Minister for Education, Science and Training over the place of geography in schools. Committee member Ms Kathryn Berg spearheaded the development of a position paper, *Australians need geography*.

The International Geographical Union (IGU) publication *Sustainable futures*, edited by committee member Professor Margaret Robertson, was released. The publication was funded by ICSU. Royalties will go to the Commission for Geographical Education of IGU. The Academy wrote a letter of support for the project.

The committee nominated Professor Ruth Fincher as Vice-President of the International Geographical Union. Elections will be held at the IGU Congress in Tunis in August 2008.

We enhanced communication with other key geographical organisations through a strategic approach to membership and a regular contribution by the chair to the Institute of Australian Geographers newsletter.

History and philosophy of science

Chair: Professor Rachel Ankeny

The National Museum of Australia (NMA) student essay prize, offered in alternative years in the history of Australian science and Australian environmental history and worth $2,500 each, was awarded in 2007 on Australian environmental history. The winner was Dr Coral Dow for her essay *A 'sportsman's paradise': The effects of hunting on the avifauna of the Gippsland Lakes*. Because of the high standard of entries, many of the essays are to be published in the international journal *Environment and History* as a special issue on Australian environmental history, under the guest editorship of Dr Libby Robin of the National Committee for History and Philosophy of Science (NCHPS) and Dr Mike Smith of the NMA. The prizes are administered by the NCHPS on behalf of the Academy, with the chair of the national committee (or nominee) chairing the judging panel. The 2008 prize on the history of Australian science will be announced in May.

The NCHPS provided detailed feedback to the Academy on rankings of journals and publishers as part of the Research Quality Framework preparation in mid to late 2007. In addition, a dialogue was begun between members of all existing history and philosophy of science or science and technology studies (HPS/STS) programs around Australia about the future of the discipline and strategies in light of continued re-organisation in 2006–07 in both faculties of arts and sciences at a number of major universities which traditionally had strengths in HPS/STS.

Mathematical sciences

Chair: Professor Hyam Rubinstein FAA

2007 was a historic year for the mathematical sciences. The national strategic review was launched in December 2006 and as a follow-up, there were numerous activities in 2007. The National Committee for Mathematical Sciences (NCMS) met twice; in February to discuss the outcomes of the review, and in September, coinciding with the annual conference of the Australian Mathematical Society meeting in Melbourne.

Also in February, a symposium on the value of the mathematical sciences was held in the Academy's Shine Dome. Senator the Honourable Kim Carr, (then Shadow) Minister for Industry, Innovation, Science and Research, and Federal MP Pat Farmer, opened the symposium. Speakers from diverse areas of business, science and technology talked about the importance of a strong base of mathematics and statistics for research and applications in industry.

Partly in response to these initiatives, in its May budget, the Howard Government raised the level of support for teaching costs in the mathematical sciences to bring it into line with computer science. The strategic review had found substantial declines over the last decade in the number of students studying high-level

mathematics in schools across Australia and in academic staff positions in mathematics and statistics departments in universities.

Many challenges remain. We cannot lift the number and level of mathematics students in Australian universities unless larger numbers of trained mathematics teachers are available for our schools. The NCMS and professional societies in the mathematical sciences, are working to achieve this goal, directing our efforts through the Australian Mathematical Sciences Institute (AMSI). However, even AMSI is living on borrowed time, and finding a secure source of funding to support its activities is also a major objective for the future.

Mechanical sciences

Chair: Associate Professor Jim Denier

A major focus this year for both the National Committee for Mechanical Sciences and the community it serves is on the organisation of the 22nd International Congress of Theoretical and Applied Mechanics, to be held in Adelaide from 24–30 August 2008. This meeting is shaping up to be a major meeting of minds in the fields of fluid and solid mechanics and will provide an excellent forum for Australian researchers, in particular post-graduate students and early-career researchers, to present their work at the leading congress in the field. Major support for the congress has come from both the engineering community, through Engineers Australia, and the mathematical sciences community, through the Australian Mathematical Society, Australian and New Zealand Industrial and Applied Mathematics, and the Australian Mathematical Sciences Institute.

In 2007, the committee provided input into the revision of the Fields of Research codes as well as into the Research Quality Framework journal ranking exercise in applied mathematics. Professor Ross McAree represented Australia at the General Assembly of the International Federation of Mechanism and Machine Theory, held in France. Professor Ernie Tuck and Associate Professor Jim Denier represented Australia in a meeting hosted by the National Committee of Theoretical and Applied Mechanics of the Chinese Academy of Sciences concerning the establishment of an international centre for theoretical and applied mechanics. Delegates from Japan, India, Singapore, Israel, as well as representatives in the International Union of Theoretical and Applied Mechanics met to discuss the establishment of such a centre in Beijing, and its role in promoting research and education in the mechanical sciences.

Medicine

Chair: Professor Bob Williamson FAA

The chair of the National Committee for Medicine (NCM) represented the committee and the Academy at the meeting of the InterAcademy Medical Panel (IAMP). The report to the Academy's Executive Committee, which was accepted, recommended that the Academy should be involved in the IAMP priority area dealing with rheumatic fever, as this is a major health problem for indigenous Australians.

The NCM was very active in the lead-up to the 2007 budget, which continued to offer good levels of funding for Australian medical research. The national committee participated in discussions with the Department of Health in relation to the Research Quality Framework exercise, pointing out that the present structure of the assessment operated particularly poorly in relation to medical research.

The committee met in September with the Honourable Nicola Roxon and Senator the Honourable Kim Carr, at that time the spokespersons for the federal opposition prior to the election. A strong case was put to them for continuing to support and grow medical and health research, and the committee will continue this involvement now they are in government. Nicola Roxon, now Minister for Health and Ageing, and Senator Kim Carr, now Minister for Innovation, Industry, Science and Research, accepted that there is a need for basic as well as translational research, and a need to strengthen science teaching in schools. They also accept the need for a better coordination of approaches between the states and the Commonwealth, and that Cooperative Research Centres should include a dimension that allows inclusion of aims that aid community health and

Ministers Nicola Roxon and Kim Carr (centre) with Professors Graham Farquhar (left) and Bob Williamson (right)

benefits as well as strictly commercial considerations. Arising from this meeting, the NCM prepared a list of dot points offering policy in relation to medical and health research to Council, for use during the election.

The NCM has established a close relationship with the National Health and Medical Research Council (NHMRC), and met with the Chief Executive Officer (CEO), Professor Warwick Anderson, at its March meeting. Many of the points that were made concerning funding, mentoring, and the relationship between NHMRC and other government agencies were followed through by Professor Anderson, and the committee has been very impressed by this attention to outcome.

The final revised version of the NHMRC and ARC *Australian Code for the Responsible Conduct of Research* was released, and the NCM issued a public statement welcoming it in general terms, as a great improvement on the previous code. It makes it clear that responsibility for the ethical conduct of research lies with each university or institute, and that they must have an appropriate code of conduct in place. The major reservation that the NCM still has is the absence of a national framework to deal with more serious cases of misconduct, and this matter has been raised with the CEO of the NHMRC.

The NCM has continued to urge AusAID, through its principal medical advisor, Dr Jim Tulloch, to increase commitment from AusAID to international medical research programs in our region, and we have evidence that this is beginning to occur.

Although the debate on the Acts relating to embryo research no longer divides parliament, there are still issues that come up from time to time, and the NCM, through its chair, has advised Council and the Executive Committee of the Academy on the scientific matters involved.

The committee was not able to win any further concessions for charitable donations to medical and health research, and was advised by officials to discuss this again after the November 2007 election.

Council agreed to a request from the NCM that its membership remain unchanged for 2008, in view of the excellent relationship that has been established with government and NHMRC, and the fact that many of the issues the committee is dealing with are in a state of flux.

Muses-C

Chair: Dr Trevor Ireland

The Muses-C Task Force has been watching the progress of the Hayabusa Mission. The Hayabusa spacecraft visited asteroid Itokawa in late 2005 to collect samples. On the final ascent leg the spacecraft experienced an inadvertent propellant firing causing it to spiral out of control. This necessitated the delay in the return to Earth from 2007 until 2010. Hayabusa began its return to Earth in May 2007. This involved the successful refiring of the main ion engine with only one active gyroscopic stabiliser and a change in velocity of 1700 m/s with 31,000 hours of operational time. Currently the delta-v to Earth is only 400 m/s and the engines will not be refired again until 2009. The sample chamber is scheduled to return to Earth at Woomera in June 2010.

Image: © A.Ikeshita (MEF) ISAS

Delayed in space: Hayabusa spacecraft now to return in 2010

Nutrition

Chair: Professor Jennie Brand-Miller

The National Nutrition Committee (NNC) met in Sydney in April 2007 and corresponded by email over the remainder of the year. The focus of activities has been the accreditation of nutritionists and the rise in iodine deficiency in Australia. The NNC has fostered a dialogue with the Nutrition Society of Australia in their efforts to see a system of accreditation of nutritionists, similar to that operating in the United Kingdom.

The process is now complete and official registration of nutritionists was offered for the first time in June 2007. Associate Professor Neil Mann was the force behind the scenes. Unfortunately, the Dietitians Association of Australia was not happy with the process and has instigated its own accreditation system for nutritionists.

During the latter part of the year, the committee chair Professor Jennie Brand-Miller, was made aware of the seriousness of the rising incidence of mild-to-moderate iodine deficiency in eastern Australia and New Zealand. Iodine deficiency during development results in irreversible effects on brain function including mental retardation. Regretfully, a relatively easy solution, the compulsory use of iodised salt in bread, was rejected by the Australian Food and Grocery Council (although it was accepted by the New Zealand Food Authority). To foster further dialogue and help raise the issue at the highest levels, the NNC is organising a symposium on the subject under the auspices of the Academy and the International Life Sciences Institute Australia, in early 2008.

Photo: Stockxpert

Iodised salt: A simple solution to iodine deficiency

The NNC has also supported the need for population-based nutrition monitoring in Australia. The National Children's Nutrition and Physical Activity Survey was officially announced in late 2005 with $3 million in funding from the Australian government and the Australian Food and Grocery Council. Professor Jennie Brand-Miller was appointed by the former Federal Minister for Health, Tony Abbott, to serve on the Technical Reference Group for the survey. The survey of

4000 children is now nearly complete and early results should be available in the first part of 2008.

The NNC is also working towards the formation of a leadership program in nutrition for young nutritionists in Australia and New Zealand. Over the past 6 to 12 months, NNC member Associate Professor Maria Makrides has liaised with Professor Ricardo Uauy, the President of the International Union of Nutritional Science. Ricardo is keen to see it happen under 'his watch' because all other continents apart from Australasia have one. The committee is drawing inspiration from the well-established European program as a start and will seek assistance from the food industry in the first instance.

Professor Jennie Brand-Miller attended the Asian Congress of Nutrition in Taipei in September 2007 and gave an invited presentation on carbohydrate and weight control. Many other Australian nutritionists and health professionals were also invited speakers, including Professor Manny Noakes and Professor Mark Wahlqvist.

Physics

Chair: Professor Michelle Simmons FAA

The National Committee for Physics welcomed five new members to the committee this year, all with a known active role in the physics community. The committee were keen to pursue two major objectives during their term: (i) to address the declining number of science teachers at high school with a physics background and (ii) to instigate a strategic plan for physics. The committee met in October 2006 to discuss these issues and has agreed to instigate a major project over the next three years: to assemble a nationally co-ordinated strategic document entitled *Investing in the future of physics*.

The aim is to make this report comprehensive and inclusive, providing a strategic document to lobby for increased funding for all fundamental science. This document will provide a snapshot on where physics-related research is currently at in Australia, and the opportunities available in the future given both current and increased levels of funding. The committee has outlined a list of approximately 20 sub-disciplines and a template is being prepared. The meeting of the committee in February 2008 discussed an action plan for this process.

The other major issue discussed was how to address or lobby for increasing numbers of secondary school teachers with a background in physics. The committee would like to invite the Executive Secretary of the Academy to attend future meetings to provide guidance and input on what the committee can do in this respect and to increase interaction between the committee and Council.

Plant and animal sciences

Chair: Dr TJ Higgins FAA

The National Committee for Plant and Animal Sciences (NCPAS) met twice during 2007. The committee welcomed the news that Professor John Buckeridge was elected President of the International Union of Biological Sciences (IUBS) for 2007–10. The next General Assembly of IUBS will be held in Cape Town, South Africa in 2009.

Two major topics of discussion occupied the committee during 2007. They were:

- Awareness of the science and regulation behind genetically modified (GM) plants. The discussion paper went through several drafts and incorporated the opinions of several Fellows as well as those of the committee. The final draft was approved by Council in December 2007.

Photo: Stockxpert

Fields of modified gold

- Training in biological science at university level. The topic has been canvassed widely by the committee and it is proposed to consider convening one or more workshops during 2008. Areas of study at particular risk include entomology, systematics, phylogeny, plant science and animal science.

NCPAS also worked with the National Committee for Earth System Science on potential projects in the Galapagos Islands.

Quaternary research

Chair: Professor John Chappell FAA

Members of the National Committee for Quaternary Research (NCQR) were involved with the organisation of the XXVII International Union for Quaternary Research Congress, the largest gathering of its kind for Quaternary researchers. The event was held in Cairns from 28 July to 3 August 2007 and addressed the increasing need for Quaternary science to provide better preparation for the future through understanding of the history of climate, the biosphere and humankind.

The NCQR chair, Professor John Chappell FAA, was conference president for the congress organising committee, and NCQR members Dr Tim Barrows, Professor Allan Chivas, and Dr Simon Haberle formed part of the organising committee.

Radio science

Chair: Dr Ray Norris

The National Committee for Radio Science continued to develop the committee's website. A web-based directory of Australian radio science is maintained on www.ncrs.org.au/directory

The committee is still striving to develop a greater level of communication within the broader radio science community.

A Workshop on Applications of Radio Science (WARS) Conference, held at the Gold Coast from 10 to 12 February 2008, was a successful meeting for which published proceedings will be available online. Papers

Photo: Shaun Amy

Sending out a message: Communicate with each other

based on invited WARS talks have been solicited for the International Union of Radio Science bulletin. Three review papers by Australian radio scientists have either appeared or will shortly appear in the bulletin.

The committee is in the process of establishing a 'Christiansen Medal' to commemorate the life and achievements of W N Christiansen FAA, a distinguished Australian radio scientist who died in 2007. This medal will give greater external visibility to successful young Australian radio scientists.

Australian participation in the Square Kilometre Array (SKA) project has continued to develop, with the Australian Square Kilometre Array Pathfinder project, which is an SKA pathfinder, now fully funded by a combination of state and federal funding. Funding includes significant CSIRO and National Collaborative Research Infrastructure Strategy funds, with additional funding allocated in the 2007 budget.

Space science

Chair: Professor Iver Cairns

2007 was a busy year for the National Committee for Space Science (NCSS). The main items are reported here, in addition to managing Australia's participation in international societies for space science – the Committee on Space Research, the International Association of Geomagnetism and Aeronomy, the International Union of Geodesy and Geophysics, and the Scientific Committee on Solar-Terrestrial Physics (SCOSTEP).

Major progress was made in developing and writing the first Decadal Plan for Australian Space Science, supported by a new ARC Learned Academies Special Project grant. Related talks at the Future Summit of the Australian Davos Connection, a meeting with the Australian Government Department of Innovation, Industry, Science and Research, a European Space Agency team, and other meetings promoted the plan and Australian space science, as did several media interviews and articles. NCSS and an associated Academy of Technological Sciences and Engineering group released the new national Space Weather Policy. The NCSS:

- Became the joint sponsor and organiser, with the National Space Society of Australia, of the Australian Space Science Conference (ASSC). The 2007 ASSC was the largest to date and included a decadal plan workshop.
- Made multiple inputs to the taskforce revising Australia's research classification system (the RFCD codes), resulting in multiple new codes and a clear home for space science in the draft revised system.
- Provided multiple inputs to the Research Quality Framework process and the review of the Bureau of Meteorology.
- Sponsored the Victorian Space Science Education Centre (VSSEC)-NASA Australian Space Prize and also the ASSC and Workshop on the Interrelationship between Plasma Experiments in Laboratory and Space. NCSS additionally provided a letter of support for continued funding of Japan's Geotail spacecraft.

Committee member Professor Robert Vincent FAA was elected President of SCOSTEP.

Spectroscopy

Chair: Professor Gerard Milburn FAA

In 2007, the National Committee for Spectroscopy began a discussion with interested parties regarding the future of the Frew Fellowship, awarded by the Academy to distinguished overseas scientists to participate in the Australian spectroscopy conferences and to visit scientific centres in Australia. In particular, the committee received a request from the Royal Australian Chemical Institute for co-sponsorship of the Frew Fellowship in years when the Australasian Conference on Optics, Lasers and Spectroscopy is not held. The committee supported this proposal, which is likely to take effect at the 2009 Physical Chemical Divisional meeting.

The committee responded to the Academy's request for journal rankings in respect of the Australian Government's Research Quality Framework process.

Nuclear matters and Australian Research Reactor

Chair: Professor John White FAA

The Taskforce met in December 2007 at Ian Potter House, Canberra. The chair, Professor John White FAA, invited Dr Ian Smith and other representatives of the Australian Nuclear Science and Technology Organisation to attend to update the committee on matters relating to the Lucas Heights Nuclear Reactor, OPAL. The following points were discussed:

- update on the instrument program and the Bragg Institute
- update on general nuclear matters and nuclear medicine
- the future of nuclear energy in Australia
- the danger of low radiation levels
- other matters related to nuclear power.

During the meeting, a possible project on the biological effects of low level radiation, mooted in 2007, was also discussed. Professor White has produced an extensive set of web-based references in this area and the extent to which the committee alone can carry out the work, or else requires a consultant, is under consideration.

The Replacement Research Reactor Project Taskforce

International Council for Science

The International Council for Science (ICSU) is a non-government organisation with a global membership that provides a forum for discussing policy and international science issues. Its membership includes 113 national scientific bodies and 29 international scientific unions.

The core activities of this extensive network are:

- planning and coordinating interdisciplinary research to address major issues of relevance in science and society
- actively advocating for freedom in the conduct of science, promoting equitable access to scientific data and information and facilitating science education and capacity building
- acting as a focus for the exchange of ideas, the communication of scientific information and the development of scientific standards
- supporting more than 600 scientific conferences, congresses and symposia worldwide each year as well as the production of a wide range of newsletters, handbooks, learned journals and proceedings.

The Council also helps create international and regional networks of scientists with similar interests and maintains close working relationships with a number of inter- and non-government organisations, especially the United Nations Educational, Scientific and Cultural Organisation and the Academy of Sciences for the Developing World. Because of its broad and diverse membership, the Council increasingly is called upon to speak on behalf of the global scientific community and to act as an adviser on matters ranging from ethics to the environment.

International scientific meetings held in Australia at the invitation of the Academy

The Academy, as the adhering body on behalf of Australia to the Council, often is asked to endorse bids to host international scientific meetings in Australia. The Academy has issued a set of guidelines on bids for international conferences. These are available at: www.science.org.au/internat/guidelines.htm

At the initiative of the Academy and on behalf of the Australian research community, the following international meetings will be held in Australia:

International Union for Theoretical and Applied Mechanics General Assembly
Adelaide, 24–30 August 2008

International Union of Psychological Science General Assembly
Melbourne, 11–16 July 2010

25th General Assembly of the International Union of Geodesy and Geophysics
Melbourne, 27 June–8 July 2011

International Botanical Congress
Melbourne, 24–30 July 2011

International Geological Congress
Brisbane, 5–15 August 2012

International Union for Pure and Applied Biophysics Congress
Brisbane, 2014

Further information about ICSU is available at: www.icsu.org

Delegates

The Academy appoints delegates to the business meetings of ICSU's bodies, after advice from the National Committees. Delegates for 2007 are listed here.

Global Scientific Challenges: Perspectives from Young Scientists 4–6 April, Lindau, Germany	Dr Andrew Hill Dr Cath Suter
International Union of Biological Sciences 9–13 May, Washington DC, USA	Professor Alan Bittles Professor John Buckridge
The International Federation of Mechanism and Machine Theory 17–21 June, Besançon, France	Associate Professor Ross McAree
International Union of Geodesy and Geophysics 2–13 July, Pergugia, Italy	Dr Tom Beer
International Association of Seismology and Physics of the Earth's Interior	Professor Ian Jackson
International Association of Geomagnetism and Aeronomy	Professor Iver Cairns
International Association of Volcanology and Chemistry of the Earth's Interior	Professor Jocelyn McPhie
International Association of Meteorology and Atmospheric Sciences	Professor Robert Vincent FAA
International Association of Hydrological Sciences	Associate Professor Steward Franks
International Association for the Physical Sciences of the Oceans	Dr John Middleton
International Association of Geodesy	Professor Will Featherstone
Scientific Committee on Solar Terrestrial Physics General Council meeting	Professor Brian Fraser
International Congress of Toxicology 15–19 July, Montreal, Canada	Professor Michael Moore Associate Professor Paul Wright
International Union of Pure and Applied Chemistry 4–12 August, Turin, Italy	Professor Chris Easton FAA Professor Mary Garson Dr Brynn Hibbert
International Union of Immunological Societies August 21–25, Rio de Janeiro, Brazil	Professor Nick King Professor Christopher Parish
International Union of History and Philosophy of Science Division of Logic, Methodology and Philosophy of Science 9–15 August, Beijing, China	Professor Huw Price Dr Kevin Korb
International Union for Pure and Applied Biophysics General Assembly 4 February, Long Beach, California	Professor Cris dos Remedios Associate Professor Brett Hambly

Other international meetings

InterAcademy Panel 25–26 September, Canberra, Australia	Professor Kurt Lambeck FAA Professor Jenny Graves FAA
ICSU Regional Office for Asia and Pacific Consultation on science plans 21–22 November, Chiang Mai, Thailand	Professor Jenny Graves FAA
Federation of Asian Scientific Academies and Societies Council Meeting 27–29 November, Bangkok, Thailand	Professor Kurt Lambeck FAA
InterAcademy Panel 30–31 January, Netherlands	Professor Kurt Lambeck FAA

InterAcademy Panel on International Issues

The InterAcademy Panel on International Issues (IAP), a global network of the world's science academies, was launched in 1993. The Panel's goal is to help 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.

IAP programs involve interdisciplinary activities and studies on critical issues related to science and technology. The IAP hopes to broaden its agenda by serving as a hub of activities for science academies interested in gaining a greater public presence within their nation and region. To this end, IAP organises international conferences, sponsors workshops, issues statements and serves as a forum for the exchange of ideas and experiences among academies. The 2004–07 agenda addressed:

- capacity building for young academies
- health education for women
- science education
- water research and management.

The IAP also has several initiatives focusing on genetically modified organisms, biosecurity, access to scientific information and natural disaster mitigation. The Australian Academy of Science is a member of the IAP Executive Committee.

The InterAcademy Panel in 2007

The InterAcademy Panel established a number of committees in the areas of fundraising and finance, evaluation, programs and strategic planning, publications and public relations, and membership. The President of the Australian Academy of Science, Professor Kurt Lambeck, is Chair of the IAP Publications and Public Relations Committee. Other members of this committee are the Chinese Academy of Sciences, the Union of German Academies of Sciences and Humanities, the Académie des Sciences et Techniques du Sénégal and the United National Academy of Sciences. This group of Academies has recently put together terms of reference for the Committee.

The Academy was pleased to host the IAP Executive Committee Meeting in Canberra on 25 and 26 September 2007. The meeting was attended by representatives from eleven academies and scientific societies as well as a number of observers and guests, including the International Council for Science and the Federation of Asian Scientific Academies and Societies (FASAS).

Under the direction of the IAP Co-Chairs, Professor Chen Zhu, Minister for Health in China and Professor Howard Alper, Past-President and Foreign Secretary of the Royal Society of Canada, delegates discussed the implementation of the IAP strategic plan, membership issues and reports by a number of sub-committees.

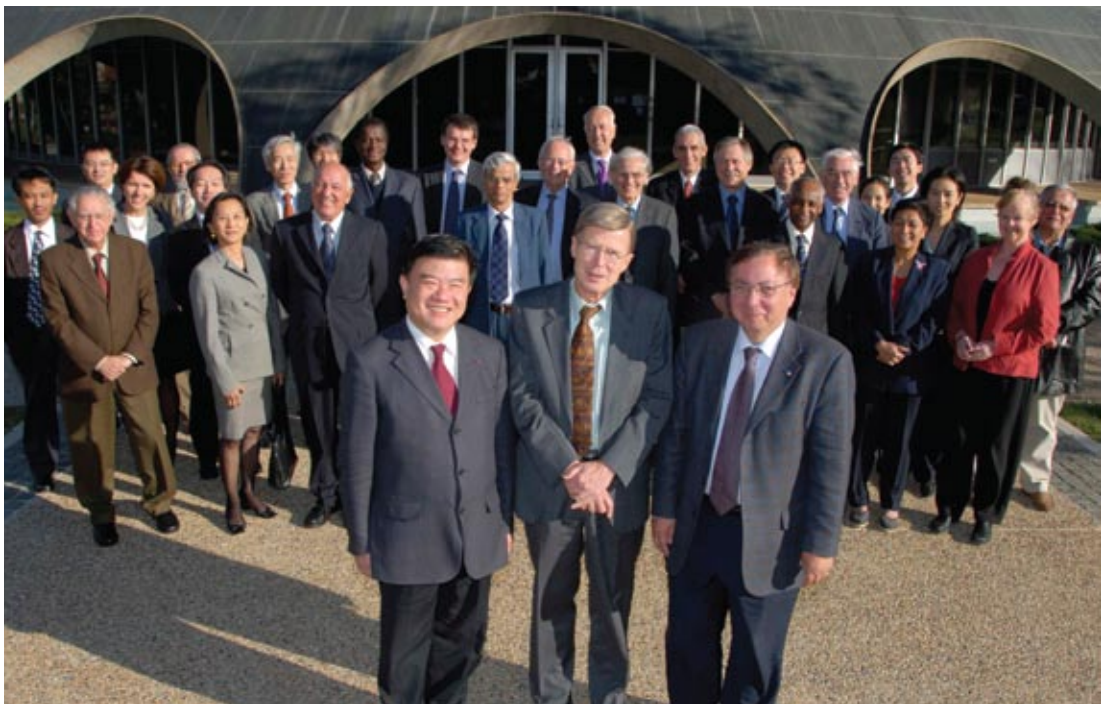


Photo: © Irene Dowdy

A meeting of the IAP Executive Committee: Professor Kurt Lambeck with IAP co-chairs, Professors Chen Zhu and Howard Alper

IAP in 2008

Professor Kurt Lambeck attended the Executive Committee Meeting 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 meeting dealt with issues related to membership, financial reports and budgets for 2008 and 2009. Australia chairs the publications and public relations committee. A new IAP brochure was presented. The committee agreed to collect past statements made by IAP and will publish them in a booklet form as part of the record of its 15th anniversary, in September 2008. Statements on GMOs and biofuels were discussed as was an IAP Young Scientists Conference proposed for late 2008.

IAP enjoys some financial support from the Italian Government. This has enabled IAP to provide greater support for regional groupings in the developing world, such as support for FASAS and its education program.

Further information about IAP is available at: www.interacademies.net

Bilateral activities

Bilateral activities provide opportunities for Academy and government officials to meet high-level international researchers and funders of research to discuss international science and technology policy and practices, and to promote Australian research and technology. These opportunities also help to promote and strengthen long-term relationships and increase Australia's presence and influence at the international level.

Meetings between Academy representatives and their international counterparts provide opportunities to discuss the operation of individual programs and make necessary modifications to ensure they are meeting their objectives. A large part of the Academy's bilateral activities is funded as part of the Australian Government Department of Innovation, Industry, Science and Research's International Science Linkages – Science Academies Programme.

The Academy organised a series of scientific symposia and workshops on global issues, conducted in Australia and overseas. To enable wide dissemination of information from the workshops the publications and presentations have been posted on the Academy's website.

Asia

China

China-Australia symposium on global ecosystems

Over 40 Australian delegates attended the *Sustaining global ecosystems* symposium in Beijing from 8 to 10 August, the fourth annual joint symposium with the Chinese Academy of Sciences (CAS). The symposium, organised by the Academy of Science and the Academy of Technical Sciences and Engineering (ATSE) on behalf of the Australian Government Department of Innovation, Industry, Science and Research, included five specialised workshops: health and the environment, and sustainable water, land, air and energy.

Approximately 100 Chinese and Australian researchers participated in the event. The Australian delegation was led by Academy

Photo: Stockxpert

New opportunities: China-Australia Clean Coal Technology Centre proposed

President, Professor Kurt Lambeck and ATSE Vice-President, Mr Peter Laver. Professor Bai Chunli, Executive Vice-President of CAS, led the Chinese delegation.

Professor Ian Frazer FAA presented a plenary address, *Sustainable health in the twenty-first century*. The Australian delegation also attended site visits to the CAS Institute of Biophysics and the CAS Institute of Geographic Sciences and Natural Resources Research. The aim of the symposium was to bring together senior research scientists from both countries to gain an appreciation of what the other is doing. A range of potential joint research programs were identified, including the opportunity to establish a China-Australia Clean Coal Technology Centre. A joint statement issued by the three academies is available at: www.science.org.au/reports/14august07.htm

Australian Garden at the South Chinese Botanical Garden, Guangzhou.

Following a visit to the Australian National Botanic Gardens in November 2003, Professor Lu Yongxiang, President of CAS, decided to establish an Australian garden in the 300 hectare South China Botanical Garden in Guangzhou. Professor Lu engaged Australian garden curator Dr Ben Wallace, to create a garden that included not only Australian native flora but aboriginal cultural elements as well.

Professor Andrew Smith FAA and Professor Sue Serjeantson, the Academy's Executive Secretary, attended the Australian Garden opening ceremony on 18 January. The ceremony was attended by about 100 secondary school students. Following the ceremony, Professor Smith gave a one hour lecture to the secondary school students on the flora and fauna of Australia and its geography.

The new garden showcases a Southern Cross fountain at the entrance, an obelisk surrounded by a growing strangler fig, mounds of grass in the shape of boomerangs, and representation of a midden, gunyas and a bora ring. A major feature of the garden is the extensive educational signage, on rocks, plaques, theme signs and plant labels.

BHP Billiton made a generous donation towards the establishment of the Australian Garden and the Academy contributed to its establishment by the administration of the donation and by coordinating donations of planting materials from Australian botanic gardens and herbaria.

Opening celebrations for the Australian Garden in the South China Botanical Garden

Nobel Laureates Beijing Forum 2007

Professor Kurt Lambeck and Professor Martin Green FAA were invited to the Nobel Laureates Beijing Forum 2007, hosted by CAS and the Beijing Municipality on 11 and 12 September 2007. The Forum was established in 2005 to examine issues around a permanent theme of harmony and development of human beings. Each forum has a distinct topic: the 2007 meeting focused on energy and the environment.

The forum invited Nobel laureates and renowned Chinese scientists, government officials and industry insiders to examine in-depth the issues on scientific and technological development, institutional arrangement and social management around the chosen themes.

Professor Lambeck gave two speeches whilst attending the forum in Beijing. The first was on the utilisation and promotion of new energy sources in Australia, and the second was entitled *Climate-energy nexus: The transition from vicious circle to virtuous circle*.

Whilst in Beijing Professor Lambeck met with the President of CAS, Professor Yongxiang Lu, to discuss issues of mutual interest including the 2008 Australia-China symposium.

Indonesia

Australia-Indonesia workshop on emerging diseases

Ten Australian delegates participated in the Human Health – Infectious Diseases workshop held in Jakarta, 14 and 15 April. This bilateral workshop was organised by the Academy on behalf of the Australian Government Department of Innovation, Industry, Science and Research.

Approximately 50 Indonesian researchers participated in the event. The Australian delegation was led by Professor John Mackenzie, Professor of Tropical Infectious Diseases, Australian Biosecurity Cooperative Research Centre, Curtin University of Technology. The Australian delegation also attended site visits.

The aim of the symposium was to bring together research scientists from both countries to gain an appreciation of what the other is doing in the area of human health and to enhance collaboration between Australian and Indonesian researchers.

Korea

Visit to Korean academies

On 31 May 2007 the Academy's Foreign Secretary, Professor Jenny Graves FAA, met with President Hyun Ku Rhee, President of the Korean Academy of Science and Technology (KAST), at the KAST headquarters in Bundang. Professor Rhee commenced his term of office as President of KAST earlier in 2007 and Professor Graves took the opportunity to discuss ways in which both countries could strengthen the bilateral research collaboration.

The Foreign Secretary was also hosted by the Korea Science and Engineering Foundation (KOSEF) in the city of Taejon. Professor Graves met with Mr Byung Whan Ho, Director, Division of International Cooperation, and discussed joint ongoing and new programs between the Academy and KOSEF. She also visited a number of research organisations in Taejon.

Professor Graves took the opportunity to congratulate KOSEF on the occasion of its 30th anniversary in 2007. Since its establishment, KOSEF has made important contributions towards the promotion of science and technology activities in Korea.

Early Career Scientist Research Program

To enhance links between Australia and Korea in science and technology, the Australia–Korea Foundation, the Academy of Science, the Academy of Technological Sciences and Engineering and KOSEF developed an Early Career Scientist Research Program. Under this program, with funding from the Australia–Korea Foundation and KOSEF, two young Korean scientists – Dr Je-Hoon Lee from Chungbuk University and Dr Jong-Ho Shinn from Seoul National University – conducted research for a period of three months between September and December at Murdoch University and the University of New South Wales (UNSW). They were hosted by Professor Mike Myoung-Ok Lee of the School of Electrical, Energy and Process Engineering at Murdoch University, and Professor Michael Burton of the School of Physics at UNSW.

The 2008 program will see young Australian researchers travel to Korea to undertake research with colleagues at Korean institutes.

Taiwan

Visit to Taiwan

The Academy's counterpart in Taiwan, The National Science Council, hosted a visit by Nancy Pritchard, Manager of International Programs, from 13 to 16 August. The Council organised a program of visits in Taipei, Hsinchu and Tainan, including the National Synchrotron Radiation Research Centre, the National Centre for High-Performance Computing, the National Health Research Institutes and the National Digital Archives Program of the Academia Sinica.

Meetings were also held with the Australian Commerce and Industry Office in Taipei. The Academy has a program of exchange visits to Taiwan, and it is hoped that the visit will raise the profile of the program.

Europe

Switzerland

Visit of the President of the Swiss Academy of Sciences

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.

France

French Embassy Cotutelle fellowship program

The French Embassy Cotutelle fellowship program, operating in Australia and in France, allows PhD students to work under the direction and responsibility of a thesis supervisor in each country. The program, designed to enhance two-way international research collaboration, began in Australia in 1997 and the Academy assumed its administration in 2002. Each project is established under a reciprocal arrangement with a 'Cotutelle convention' binding the two partner institutions and recognising the validity of the studies undertaken. On completion of the program successful students are awarded a double-badged degree – a PhD from Australia and a PhD from France.

Germany

Meetings of the Nobel laureates in Lindau

The Academy of Science sponsored six young Australian scientists to attend the Meeting of Nobel Laureates in Lindau, Germany, from 1 to 6 July 2007. The topic for the meeting was physiology or medicine. Professor Bob Williamson FAA led the delegation, and arranged for the students to meet with some of the Nobel laureates.

Around 600 young scientists from around the world attended, giving them the opportunity to meet with about 20 Nobel laureates, both in formal and informal situations.

The Academy has signed a Memorandum of Understanding with the Council for the Lindau Nobel Laureate Meetings and support for attendance is shared between the two organisations.

North America

United States of America

East Asia and Pacific Summer Program for US Graduate Students

The Academy and the United States (US) National Science Foundation conduct a joint program that enables twenty US graduate students in science and engineering to visit Australia between June and August each year for a period of eight weeks during the American summer. The purpose of the visit is to conduct research in laboratories and to initiate personal relationships with Australian counterparts.

The host research institutions – such as universities, CSIRO and museums – provide the students with office accommodation, access to laboratory, library and computing facilities, as well as technical assistance and the time and expertise of the host researcher.

For the fourth year the Academy organised a series of lectures and site visits as part of an orientation session in Canberra from 13 to 15 June. Professor Jenny Graves FAA, Foreign Secretary, welcomed the students to the Academy during the orientation session. This activity is funded by the Australian Government Department of Innovation, Industry, Science and Research's International Science Linkages – Science Academies Programme.

Participants of the 2007 East Asia and Pacific Summer Program for US Graduate Students

Other international activities

Federation of Asian Scientific Academies and Societies

Academy President Professor Kurt Lambeck attended the Council Meeting of the Federation of Asian Scientific Academies and Societies (FASAS) in Bangkok from 27 to 29 November. The Meeting was held at the same time as the First International Conference on Science Education in the Asia Pacific initiated by FASAS, the Association of Academies of Science in Asia (AASA) and the InterAcademy Panel (IAP). Following plenary lectures, the conference divided into three parallel sessions: best practice, innovation, and role of science academies in science education.

Professor Lambeck gave a presentation about four of the Academy's major science education programs: *Primary Connections*, *Nova: Science in the news*, *Interviews with Australian scientists* and *Science by Doing*.

The Academy will assume the Presidency of FASAS for three years, beginning in 2009.

Further information about international programs is available at: www.science.org.au/internat

Support for international collaborations

The objectives of the Academy's program of international scientific and technological collaborations are to improve Australian access to science and technology and to increase awareness of Australian research.

The Academy's program gives Australian researchers the opportunity to collaborate with foreign colleagues, to widen research perspectives and experience, to exchange ideas, to be recognised in the international arena, to gain information and knowledge of techniques that will stimulate and advance Australian research and to be involved in large international projects.

The Academy's international programs are structured into four sections: short-term visits to Europe, North America and Asia, and long-term postdoctoral fellowships. The programs support collaborative research between professional Australian scientists and technologists and their colleagues in Europe, Korea, Japan, China, Taiwan, the US, Canada and Mexico. The Academy also administers postdoctoral fellowships with Japan.

The programs, which provide funds for living and travelling costs, are funded as part of the Australian Government Department of Innovation, Industry, Science and Research's International Science Linkages – Science Academies Programme. The French Embassy continues to generously provide travel funds for the top six grant recipients selected to visit France under the Europe program. Full details of all programs are available at: www.science.org.au/internat/programs

The following researchers were supported in 2007.

Asia

China

Researcher	Project	Host institution
Dr Sai Tsang Boris Choy University of Technology Sydney	Bayesian statistical methods for estimating loss reserving in insurance.	Professor Taizhong Hu University of Science and Technology of China
Dr Yue Huang University of New South Wales	Characterising the phenotypes of a novel causative dementia gene (PD9).	Professor Sheng Di Chen Chinese Academy of Sciences Institute of Health Science
Dr Wei Liu University of Western Australia	Semantically enriched communication between robots.	Professor Xiaoping Chen University of Science and Technology of China
Dr Shirley Zhiqi Shen CSIRO Manufacturing and Materials Technology	Development of nanoparticles/ polymer composites for optimised tribological properties.	Professor Fengyuan Yan Chinese Academy of Sciences Lanzhou Institute of Chemical Physics

Researcher	Project	Host institution
Dr Tara Walker University of Queensland	Characterisation of a hippocampal stem cell population.	Professor Zhi-Qi Xiong Chinese Academy of Sciences Laboratory of Neurobiology of Disease

Japan Society for the Promotion of Science bilateral programs

Researcher	Project	Host institution
Dr Alecia Bellgrove Deakin University	Developing a protein probe to differentiate marine algal dispersal potential.	Dr Masakazu Aoki University of Tsukuba
Associate Professor Michael Burton University of New South Wales	Millimetre wave astronomy with the NANTEN2 and Mopra telescopes.	Professor Yasuo Fukui University of Nagoya
Associate Professor Eric Hu Deakin University	Photocatalytic reduction of carbon dioxide with water into methane and hydrogen.	Professor Seizo Kate Mie University
Dr Mohan Jacob James Cook University	Investigations on the ultra thin film organic polymers.	Professor Mitsumasa Iwamoto Tokyo Institute of Technology
Professor Alan Jeary University of Western Sydney	High-amplitude non-linear damping estimation for tall buildings.	Professor Yukio Tamura Tokyo Polytechnic University
Dr Jonathan Peake University of Queensland	Roles of Toll-like receptors in impaired inflammation of aging skeletal muscle.	Dr Shuichi Machida Tokai University
Dr Anh Vo University of Melbourne	Improved retrieval effectiveness through the use of metabolic pathways.	Professor Hiroshi Mamitsuka Kyoto University

Korea

Researcher	Project	Host institution
Dr Sammy Chan University of New South Wales	Mechanical properties of nanometric-particulate-reinforced aluminium matrix composites fabricated by squeeze casting.	Professor Ik-Min Park Pusan National University
Dr Kyla Finlay Primary Industries Research Victoria	A phylogenetic and biogeographical study of the genera of Leptophlebiidae (Ephemeroptera) within and between the Australian, Oriental and East Palaearctic regions.	Professor Yeon Jae Bae Seoul Women's University

Researcher	Project	Host institution
Professor Richard Hartley Australian National University	Verifiable optimality conditions for geometric problems in computer vision.	Dr Yongduek Seo Sogang University

Australia–Korea Early Career S&T Researchers Programme

Researcher	Project	Host institution
Dr Nathan Faggian University of Melbourne	Magnetic resonance microscopy of the human brain in vivo: A new approach using high-resolution high field magnetic resonance imaging.	Professor Zang-Hee Cho Gachon University of Medicine and Science
Dr Peter King CSIRO Materials Science and Engineering	Mechanism of bonding of cold spray copper particles to an aluminium substrate.	Professor Changhee Lee Hanyang University
Mr Sajjad Mahmood La Trobe University	Incorporating business perspective in a component-based system development requirements analysis process.	Professor Kyo-Chul Kang Pohang University of Science and Technology
Dr Gianluca Ranzi University of Sydney	Behaviour and design of innovative composite steel-concrete systems.	Professor Sang-Hyo Kim Yonsei University
Dr Sihai Zhou University of Wollongong	Study of MgB2 superconductor.	Professor Jaimoo Yoo Korea Institute of Materials Science

Taiwan

Researcher	Project	Host institution
Professor Marek Bialkowski University of Queensland	Miniaturisation of antenna using metamaterials for notebook application.	Dr Eddie Tsai Wistron NeWeb Corporation
Associate Professor Yi-Ping Phoebe Chen Deakin University	Advances in knowledge discovery for complex biomedical data, structural and functional analysis.	Professor Ping-Chiang Lyu National Tsing Hua University
Dr Naveen Chilamkurti La Trobe University	Video streaming over wireless networks using cross-layer techniques.	Professor Ce-kuen Shieh National Cheng-kung University
Associate Professor Richard Lai La Trobe University	Improving software quality using software reliability models.	Associate Professor Sun Jen Huang National Taiwan University of Science and Technology
Dr Stephen Moore University of New South Wales	Developing a metric system for pursuing a recycling oriented society.	Dr Hong-wen Ma National Taiwan University
Dr Barry Russell Department of Natural Resources, Environment and Arts Northern Territory	Taxonomy and evolution of the lizardfish genus Saurida.	Dr Shao Kwang-Tsao Academia Sinica
Dr Chanh Tran La Trobe University	Image formation in partially coherent imaging.	Professor Fu-rong Chen National Tsing Hua University

Europe

Researcher	Project	Host institution
Associate Professor Kenneth Amos University of Melbourne	Predicting scattering and capture cross sections for nucleons and alpha particles by nuclei.	Professor Luciano Canton University of Padova Italy
Dr Gunther Andersson Flinders University	Electrostatic forces in free-standing foam films.	Dr Cosima Stubenrauch University College Dublin Ireland
Dr Fiona Blyth University of Sydney	Early life pain experiences and chronic pain in adolescents.	Professor Gary MacFarlane University of Aberdeen UK
Professor Neil Bose Australian Maritime College	Preparation of Explorer AUV for polar missions.	Dr Vincent Rigaud Institut français de Recherche pour l'Expoitation de la Mer France

Researcher	Project	Host institution
Associate Professor Abdelmalek Bouazza Monash University	Biogas (greenhouse gas) migration through cover systems of waste containment facilities.	Professor Hywel Thomas Cardiff University UK
Dr Anna Brooks Southern Cross University	Neural correlates of self/other processing: A multisensory neuroscientific approach.	Professor Olaf Blanke Ecole Polytechnique Fédérale de Lausanne Switzerland
Associate Professor Mark Buntine University of Adelaide	Liquid microdroplet technologies for the investigation of molecular conformation and solute-solvent binding energies.	Professor Bernd Brutschy Frankfurt University Germany
Professor Hubert Chanson University of Queensland	Turbulence generated by air entrainment in two-phase flows.	Dr Pierre Lubin Ecole Nationale Supérieure de Chimie et de Physique de Bordeaux France
Dr Jun Chen University of Wollongong	Well-defined nanoporous polymer scaffolds for tissue engineering.	Associate Professor Martin Vigild Technical University of Denmark Denmark
Dr Andre Chiaradia Phillip Island Nature Park	Changes in foraging behaviour of little penguins in face of global warming.	Dr Yan Ropert-Coudert Institut Pluridisciplinaire Hubert Curien France
Dr Joshua Cinner James Cook University	Measuring resilience in coastal communities dependent on coral reefs.	Dr Carl Folke Stockholm Resilience Centre Sweden
Dr Ian Colditz CSIRO Livestock Industries	Regulation of neutrophil migration into inflamed skin.	Dr Antal Rot Novartis Institutes for BioMedical Research Austria
Dr David Coward University of Western Australia	New signal processing algorithms with applications to gravitational wave detectors on Earth and in space.	Dr Catherine Man Observatoire de la Côte d'Azur France
Dr Anton Desyatnikov Australian National University	Self-trapped optical vortices in continuous and discrete periodic photonic structures.	Professor Dr Albert Ferrando Universidad De Valencia Spain
Dr Andrew Dicks University of Queensland	Fast-ion conducting ceramics for fuel cells and gas separation.	Professor Kevin Kendall University of Birmingham UK

Researcher	Project	Host institution
Dr Heath Ecroyd University of Adelaide	Unravelling the role of molecular chaperones in protein misfolding diseases.	Professor Carol Robinson University of Cambridge UK
Associate Professor Michael Ferry University of New South Wales	Understanding grain boundary mobility during recrystallisation of Al alloys using in situ annealing experiments.	Professor Julian Driver École Nationale Supérieure des Mines de Saint-Étienne France
Dr Daniel Franklin University of Western Australia	New approaches to identifying human remains: 3D morphometrics in forensic science.	Professor Paul O'Higgins University of York UK
Dr Alister Graham Swinburne University of Technology	Hubble space telescope imaging of the Coma galaxy cluster - spiral galaxies.	Professor Marc Balcells Instituto de Astrofisica de Canarias Spain
Dr Andrea Griffin University of Newcastle	Are big-brained species less vulnerable to habitat alterations? A comparative analysis of extinction risk in Australian birds.	Dr Daniel Sol Autonomous University of Barcelona Spain
Dr Rainer Haberberger Flinders University	Determination of the function of sphingosine kinase 1 in the development of pulmonary hypertension in COPD.	Dr Martin Witzenrath Charite Medical University Germany
Dr Emily Hilder University of Tasmania	Polymer nanoparticles and their assembled supracolloidal monolithic structures for applications in separation science.	Associate Professor Stefan Bon University of Warwick UK
Dr Marc in het Panhuis University of Wollongong	NANO-INKS: Electroactive composite materials for inkjet printing.	Dr Wolfgang Maser Instituto De Carboquimica Spain
Dr David Hurwood Queensland University of Technology	Documenting genetic variation within and between edible flat oysters, *Ostrea angasi* and *O. edulis*: One species or two?	Dr Sylvie Lepague Institut francais de Recherche pour l'Expoitation de la Mer France
Dr Patrick Johnston Swinburne University of Technology	Assessing dynamic cortical interactions during face processing using steady state probe topography in conjunction with magnetoencephalography.	Dr Jason Tipples University of Hull UK
Dr Dianne Jolley University of Wollongong	Development of a passive in-situ sampling device to quantify biologically available selenium and arsenic contamination in aquatic sediments.	Dr Hao Zhang University of Lancaster UK

Researcher	Project	Host institution
Dr Timothy Jones CSIRO Plant Industry	Genetic improvement of wine grapevine rootstocks for environmentally and economically sustainable viticulture.	Dr Nathalie Ollat Institut des Sciences de la Vigne et du Vin France
Dr George Koutsantonis University of Western Australia	Functional nanomaterials.	Associate Professor Jack Harrowfield Université Louis Pasteur France
Associate Professor Warrick Lawson University of New South Wales	Surveys of proto-planetary disks in the nearest young star clusters using the Spitzer space telescope.	Dr Jeroen Bouwman Max-Planck-Institut für Astronomie Germany
Professor Peter Majewski University of South Australia	Surface engineered particles.	Professor Siegfried Weber University of Applied Science Germany
Dr Brad Marsh University of Queensland	Towards next generation 3D imaging of cells and molecules: Defining new instrument.	Professor Wolfgang Baumeister Max-Planck-Institut für Biochemie Germany
Dr Andrey Miroshnichenko Australian National University	Dynamical tunability of photonic structures with liquid crystals.	Dr Etienne Brasselet Université Bordeaux 1 France
Dr Joshua Mylne University of Queensland	Structural studies of proteins involved in the epigenetic regulation of FLC.	Professor Caroline Dean Institute for Molecular Bioscience Norwich
Dr Eugene Nalivaiko Flinders University	Prevention of stress-induced cardiac arrhythmias by serotonin-1A agonists.	Associate Professor Andrea Sgoifo University of Parma Italy
Dr Julie Nigro CSIRO Molecular and Health Technologies	The development and analysis of advanced biological scaffolds to support the growth of adult bone marrow derived mesenchymal stem cells.	Professor Alberto Passi University of Insubria Italy
Associate Professor David Phillips Monash University	Activin in the sheep pituitary gland: Relevance to reproductive hormone control.	Dr Catherine Taragnat Institut National De Le Recherche Agronomique France
Dr Gianluca Ranzi University of Sydney	Dynamic behaviour of innovative composite steel-concrete flooring systems.	Professor Andrea Dall'Asta Universita di Camerino Italy

Researcher	Project	Host institution
Dr Daniel Real Ferreiro University of Western Australia	Cultivation of *Bituminaria bituminosa* var. *albomarginata* under low-rainfall Mediterranean climatic conditions as a pasture and forage legume for grazing or hay production.	Mr Enrique Correal Instituto Murciano de Investigacion y Desarrollo Agrario y Alimentario Spain
Dr Gary Rosengarten University of New South Wales	Interaction of nanofluids with surfaces: Reducing pumping power while increasing heat transfer.	Professor Dimos Poulikakos Eidgenossische Technische Hochschule Zurich Switzerland
Dr Anna Smith University of Tasmania	Investigating the repelling properties of tannins in the bark of plantation grown *Pinus radiata* to browsing mammals.	Dr Steve Woodward University of Aberdeen Scotland
Dr Janette Smith University of Newcastle	A comparison of methods to remove the CNV from post-S2 electrical potentials of the brain.	Professor Rolf Verleger Universität Luebeck Germany
Professor Julio Soria Monash University	Investigation into the structure of near-wall turbulence of turbulent boundary layer flow using time-resolved 3C-3D Tomographic Particle Image Velocimetry.	Professor Michel Stanislas Ecole Centrale de Lille France
Dr Nigel Tomkins CSIRO Livestock Industries	The development of audio capture technologies for determining grazing behaviour in free ranging cattle.	Dr Ian Hulbert BlueSky Telemetry Ltd Scotland
Dr Ryan Wilkinson University of Tasmania	Investigating growth and welfare benefits of sustained exercise in farmed Atlantic salmon.	Professor Felicity Huntingford University of Glasgow UK
Professor Mark Wilson University of Wollongong	Cellular trafficking of clusterin and its potential roles in apoptosis, phagocytosis and vaccine delivery.	Professor Pascale Jeannin Université de Angers France
Dr Mike Wong CSIRO Land and Water	Linkage to advance the development of a rapid and cost-effective method to map soil properties at high-spatial resolution using multiple sensor technologies.	Dr Annamaria Castrignano Agriculture Research Council – Agronomic Research Institute Italy
Dr Guangyong Zhou Swinburne University of Technology	Rare-earth ion doped lithium niobate crystal for active nonlinear photonic devices.	Professor Daniel Jaque Universidad Autonoma De Madrid Spain

Cooperation in the field Of Scientific and Technical research (COST) 2007–08

Researcher	Project	Host institution
Associate Professor Tomaso Aste Australian National University	Econophysics and complex systems.	Professor Rosario Mantegna Universita di Palermo, Italy
Dr Naveen Chilamkurti La Trobe University	A new cross-layer optimisation framework for multimedia transmission over wireless networks.	Dr Yevgeni Koucheryavy Tampere University of Technology, Finland
Dr Tiziana Di Matteo Australian National University	Econophysics and complex systems.	Professor Rosario Mantegna Universita di Palermo, Italy
Dr Con Doolan University of Adelaide	Large eddy simulation for complex geometries.	Professor Lars Davidson Chalmers University of Technology, Sweden
Dr Marc in het Panhuis University of Wollongong	Determining relations between preparation-structure-properties in polymer composite materials: Establishing an alliance with COST P12 action.	Dr Joachim Loos Eindhoven University of Technology, Netherlands
Professor Michael Jones Murdoch University	Exploiting *C. elegans* genomics to define the parasitome of plant parasitic nemotodes.	Dr John Jones Scottish Crop Research Institute, UK
Professor Wieslaw Krolikowski Australian National University	Disorder creates order: Managing light in non-linear disordered media.	Professor Cornelia Denz Westfälische Wilhelms-Universität Münster, Germany
Associate Professor Sam Reisenfeld University of Technology, Sydney	Cognitive radio networks.	Professor Roberto Verdone Universita Degli Studi di Bologna, Italy
Professor Halina Rubinsztein-Dunlop University of Queensland	Photoporation of cells and probing of viscoelastic properties of cells using rotating optical tweezers.	Professor Kishan Dholakia University of St Andrews, UK
Professor Peter Timms Queensland University of Technology	Relationships between chlamydial strains in animals and humans: A genomic sequencing approach.	Professor Konrad Sachse Institute of Molecular Pathogenesis, Germany

North America

Researcher	Project	Host institution
Dr Anthony Ashton University of Sydney	Exploring the role of the human specific isoform of the thromboxane receptor (TP beta) in breast cancer.	Associate Professor Rachel Hazan Albert Einstein College of Medicine, USA
Associate Professor Dale Bailey University of Sydney	Measuring tumour uptake and therapeutic dose from radionuclides using SPECT/CT.	Dr John Humm Memorial Sloan Kettering Cancer Center, USA
Dr Lindsay Bell CSIRO Sustainable Ecosystems	Soil carbon sequestration in pasture/cropping systems.	Professor Martin Entz University of Manitoba, Canada
Dr Kathy Belov University of Sydney	From marsupials and monotremes to big cats and lizards: Tracing the evolutionary history and genetic diversity of the vertebrate Major Histocompatibility Complex.	Professor Scott Edwards Harvard University, USA
Associate Professor Christopher Bertram University of New South Wales	Collaboration on investigation of microlymphatic function.	Professor James Moore Jr. Texas A&M University, USA
Dr Matias Braccini Department of Primary Industries, Victoria	Characterisation of shark nursery areas: Concepts and methodologies.	Dr John Carlson National Marine Fisheries Service, USA
Dr Ralf Dietzgen Department of Primary Industries and Fisheries, Queensland	Advanced fluorescence microscopy to study host-microbe interactions in living plant cells.	Associate Professor Michael Goodin University of Kentucky, USA
Professor Robin Gasser University of Melbourne	The genomics of parasitic nematodes: Toward new intervention strategies.	Dr Adam Felsenfeld National Institutes of Health, USA
Dr Neil Gribble James Cook University	Expansion and validation of a linked ecosystem trophic model of the Great Barrier Reef, World Heritage Area.	Professor Villi Christensen University of British Columbia, Canada
Professor Jim Hone University of Canberra	Evaluation of wildlife monitoring.	Professor Charles Krebs University of British Columbia, Canada
Dr Gavin Huttley Australian National University	Estimating genic interactions from the extent of evolutionary dependence.	Dr Robin Knight University of Colorado, Boulder, USA
Dr Gunasegaran Karupiah Australian National University	In vivo imaging to visualise cell-cell interaction and viral antigen presentation to T cells.	Dr Jonathan Yewdell National Institutes of Health, USA

Researcher	Project	Host institution
Dr Kamaljit Kaur James Cook University	Developing techniques to assess the role of ecosystem services from tropical rainforests in human well-being.	Professor Robert Costanza The Gund Institute for Ecological Economics, USA
Dr Jian Li Monash University	Investigation of adaptive resistance to colistin in multi-drug-resistant *Pseudomonas aeruginosa*.	Professor Robert Hancock University of British Columbia, Canada
Dr David Lupton Monash University	Electochemically assisted palladium catalysed chemistry.	Professor Kevin Moeller Washington University in St Louis, USA
Dr Peter Pivonka University of Melbourne	Mathematical modelling of signalling networks describing metastasis formation in bone.	Professor Gregory Mundy Vanderbilt University, USA
Dr Kim Plummer La Trobe University	Enhanced genetic manipulation techniques for molecular dissection of Sclerotinia, the cause of devastating, white rot disease.	Dr Jeffrey Rollins University of Florida, USA
Dr Ahmed Regina CSIRO Plant Industry	Investigate starch biosynthetic machinery in wheat endosperm through characterisation of enzyme complexes in starch biosynthetic enzyme mutants.	Dr Michael Emes University of Guelph, Canada
Dr Simon Ruffel Australian National University	Study of the kinetics of nano-void formation in silicon using positron annihilation spectroscopy.	Professor Peter Simpson University of Western Ontario, Canada
Dr Abd-Krim Seghouane Australian National University	Computer colonic polyps detection based on spherical wavelet descriptors.	Associate Professor Hiro Yoshida Harvard Medical School and Massachusetts General Hospital, USA
Dr Devanshi Seth University of Sydney	To investigate the direct effect of alcohol on molecular and cellular interactions in normal human hepatocyte-stellate cell co-culture system.	Associate Professor Manuela Neuman In Vitro Drug Safety, Toxicology and Biotechnology Laboratory, Canada
Dr Paul Smith Australian Wine Research Institute	The role of polysaccharide – polyphenol interactions in influencing the polyphenol concentrations of Australian red wines.	Dr James Kennedy Oregon State University, USA

Researcher	Project	Host institution
Dr Milton Speer University of New South Wales	Declining twentieth century coastal rainfall over New South Wales and southeast Queensland: The role of significant changes in the variability of the larger scale atmospheric circulation.	Professor Peter Lamb Co-operative Institute for Mesoscale Meteorology Studies, USA
Dr Matthew Taylor University of New South Wales	Establishing an ecological basis for stocking density of carangid species.	Dr David Zeimann The Oceanic Institute, USA
Dr Glen Ulett University of Queensland	Genetic analysis of anti-streptococcal immunity.	Professor David Briles University of Alabama at Birmingham, USA
Dr Rongping Wang Australian National University	Probe bonding structure of Ge-As-Se glasses by high resolution x-ray photoelectron spectroscopy.	Professor Himanshu Jain Lehigh University, USA
Dr Adam Wittek University of Western Australia	Mesh-free method for neurosurgery simulation.	Associate Professor Simon Warfield Children's Hospital & Harvard Medical School, USA
Dr Trent Woodruff University of Queensland	Protective actions of novel anti-inflammatory agents in neurotoxin-damaged neuronal cultures mimicking Parkinson's disease.	Dr Thiruma Arumugam Texas Tech University Health Sciences Center, Canada
Dr Andrew Zalesky University of Melbourne	Precise charting of neural fibre trajectories in the human brain.	Associate Professor Carl-Fredrik Westin Harvard Medical School, USA
Dr Xi Zhang CSIRO Petroleum	Modelling of the effects of structural heterogeneities on fluid flow for maximising gas production.	Professor David Pollard Stanford University, USA

East Asia and Pacific Summer Program for US Graduate Students

Researcher	Project	Host institution
Ms Theresa Andrejack Drexel University	Geosynthetic-reinforced stone columns.	Professor Abdelmalek Bouazza Monash University
Ms Emilie Bess University of Illinois	Mitochondrial genomics of bark lice (*Psocoptera*).	Dr Stephen Cameron CSIRO Entomology
Mr Robert Cramer University of Alabama	Personality functioning in criminal defendants and civil litigants.	Dr Jack White University of South Australia

Researcher	Project	Host institution
Mr Gregory Crosswhite University of Washington	Applying variational techniques to find translationally invariant matrix product representations of ground states for infinite one-dimensional quantum spin systems.	Dr Andrew Doherty University of Queensland
Mr Steven Dow Georgia Institute of Technology	Simulating complex computing applications using human hidden wizards.	Dr Bruce Thomas University of South Australia, Mawson Lakes Campus
Mr William Dowd University of California, Davis	Proteomic analysis of mechanisms of hypoxia and anoxia tolerance in epaulette sharks.	Dr Gillian Renshaw Griffith University, Gold Coast Campus
Ms Larisa Grawe DeSantis University of Florida	Effects of climate change on Australian megafauna from the Late Quaternary to the Present: Evidence from stable isotopes of herbivorous mammals at Cuddie Springs.	Dr Stephen Wroe and Dr Judith Field University of New South Wales, and The Electron Microscope Unit, University of Sydney
Ms Gwyndolen Harburg University of Texas Southwestern Medical Centre	Involvement of pro-proliferative pathways in mouse mammary stem cell proliferation and self-renewal.	Dr Jane Visvader Walter and Eliza Hall Institute of Medical Research
Mr Joshua Harrell University of Colorado Health Sciences Center	Role of hormones on lymphatic vessel development and breast cancer lymphatic metastasis.	Professor Darryl Russell University of Adelaide
Mr Nikolas Hrabe University of Washington	X-ray computed tomography characterisation of porous titanium for biomedical applications.	Professor Mark Hoffman University of New South Wales
Mr Ying Hu Rice University	Development of a depth sensitive reflectance spectroscopy using nanoshells as contrast agents.	Professor Halina Rubinsztein-Dunlop and Dr Timo Nieminen University of Queensland
Ms Claudia Jones University of California, Berkeley	Relating lipids to biomarkers: A study of the timescale and mechanisms of lipid diagenesis.	Dr Jochen Brocks Australian National University
Mr Jason Ladner Stanford University	Examining the genetic basis of coral morphospecies: A microarray-based approach.	Dr Madeleine van Oppen Institute of Marine Science, Townsville
Mr Christopher Lew University of California, Riverside	Pure-silica-zeolite LTA nanoparticles for low-dielectric constant films.	Dr Huanting Wang Monash University

Researcher	Project	Host institution
Ms Laura Lunsford North Carolina State University	Linkages and social networks of knowledge producers and innovators: In the case of Australia.	Professor Tim Turpin and Dr Richard Woolley University of Western Sydney
Ms Carla Ng Northwestern University	Anthropogenic impacts of drill spoil deposition on deep-sea benthic communities.	Dr Adele Pile and Dr Murray Thomson University of Sydney
Ms Erika Nyhus University of Colorado, Boulder	The role of item and context information in episodic recognition memory.	Dr Simon Dennis, Dr John Dunn and Dr Daniel Navarro University of Adelaide
Mr Paul Supawanich University of California, Berkeley	Investigation of transportation modes and their effects on land use.	Professor Phil Charles University of Queensland
Mr Jason Wither University of California, Santa Barbara	Far-field annotation in outdoor augmented reality.	Professor Bruce Thomas University of South Australia
Mr Brian Yates University of California, Berkeley	Microbiological aspects of foaming in anaerobic wastewater digesters.	Dr Robert Seviour and Dr Elizabeth Seviour La Trobe University, Bendigo

Academy medals and lectures

Central to the purpose of the Academy is the encouragement of excellence in science. Awards for distinguished research are made to early-career researchers, under the age of 40, and to career researchers for contributions made during their working lives.

Career awards

Macfarlane Burnet Medal and Lecture for research in the biological sciences

Professor Richard Shine FAA, University of Sydney, for research in ecology, evolution and conservation.

David Craig Medal for research in chemistry

Professor Leo Radom FAA, University of Sydney, for research in theoretical and computational chemistry.

Mawson Medal and Lecture

Professor Peter Cawood, University of Western Australia, for research into the Earth's structure.

Ian Wark Medal and Lecture

Dr Alan Reid FAA, formerly CSIRO Institute of Minerals, Energy and Construction, for research relating to the mineral processing industry.

The Macfarlane Burnet Medal

Photo: Peter Cawood

Winner of the Mawson Medal and Lecture, Professor Peter Cawood

Early-career awards

Dorothy Hill Award for research by a female in the Earth sciences, reef sciences, marine geology or taxonomy

Dr Sandra McLaren, University of Melbourne, for research into the thermal and tectonic processes in the Proterozoic era.

Fenner Medal for research in biology, excluding the biomedical sciences

Dr Michael McCarthy, University of Melbourne, for research in theoretical ecology.

Frederick White Prize for research in the physical, terrestrial and planetary sciences

Dr Ronald Smernik, University of Adelaide, for research into soil processes in sustainable agriculture and global carbon cycling.

Gottschalk Medal for research in the medical sciences

Dr Gabrielle Belz, The Walter and Eliza Hall Medical Research Institute, for research into the response of the immune system to viruses.

Le Fèvre Memorial Prize for research in chemistry

Dr Stuart Batten, Monash University, for research into crystal engineering.

Pawsey Medal for research in physics

Dr Kostya (Ken) Ostrikov, University of Sydney, for research into plasma nanoscience.

The inaugural Ruth Stephens Gani Medal for research in human genetics

Dr Vanessa Hayes, Garvan Institute of Medical Research, for research into the identification of genetic risk factors in specific cancers.

More information on awards is available at: www.science.org.au/awards.htm

New medal: The Ruth Stephens Gani Medal

Research support and lectureships

The Academy provides funding for the support of individual research projects and for lectureships. The purpose of the lectureships is to enable distinguished researchers to communicate with Australian researchers and, through public lectures, to a broader audience.

Fund for the Conservation of Endangered Vertebrate Species

The following researchers will receive research support for their research on endangered Australian vertebrate species.

Mr Aaron Fenner, Flinders University
Long term conservation of the endangered pygmy bluetongue lizard, *Tiliqua adelaidensis*.

Dr Gerhard Kortner, University of New England
Habitat use of the endangered spotted-tailed quoll, *Dasyurus maculatus*, and its interactions with wild dogs.

Dr Ivan Lawler, James Cook University
Locating and protecting nesting sites of Irwin's turtle, *Elseya irwini*.

Dr Peter Gill, Australocetus Research
Fine-scale foraging and feeding behaviour of endangered blue whales in the Bonney Upwelling, southern Australia.

Ms Arian Wallach, University of Adelaide
Disruption of stable social structure in a top order predator triggers the extinction crisis across Australia.

Photo: Gerhard Kortner

Photo: Ivan Lawler

Photo: Aaron Fenner

Endangered: The spotted-tailed quoll (top), Irwin's turtle (centre) and pygmy bluetongue lizard (bottom)

JG Russell Awards

The following young researchers will receive support in 2008.

Dr Ben McNeil, University of New South Wales
An investigation into oceanic CO_2 variability and its influence on atmospheric CO_2 concentrations.

Dr Marcel Cardillo, Australian National University
Anatomy of a biodiversity hotspot: Investigating the evolutionary and ecological basis of high plant diversity in south-western Australia.

Dr Jenny Pringle, Monash University
Advanced ionic materials for organic photovoltaics.

Travelling fellowships awarded for 2008

Graeme James Caughley Travelling Fellowship 2008

Dr Doug Armstrong, Massey University, New Zealand
The Caughley Fellowship is awarded to Australian and New Zealand ecologists to visit scientific centres and to deliver public lectures outside Australia and New Zealand.

Selby Fellowship 2008

Professor Robert B Gennis, University of Illinois, Urbana-Champaign, USA
The Selby Fellowship is awarded to distinguished overseas scientists to visit Australian scientific centres and deliver public lectures.

Rudi Lemberg Travelling Fellowship 2008

Professor John Allen, Queen Mary, University of London, UK
The Rudi Lemberg Fellowship is awarded to overseas or Australian scientists of standing to visit Australian scientific centres and deliver public lectures.

Dr Doug Armstrong, winner of the Graeme James Caughley Travelling Fellowship 2008

Research conferences

The Academy supports research conferences that are organised by scientific societies to bring together researchers at the forefront of particular subjects to discuss the future directions of their field.

The Boden Research Conference 2007

The Boden conference series supports research in the biological sciences. The role of disulfide bonds in protein folding and function was the focus of discussion at the 2007 conference, held from 29 July to 2 August at Heron Island on the Great Barrier Reef. The conference attracted world leaders in disulfide bond research, including invited speakers from Japan, the USA, Switzerland, Germany and Australia. Conference sessions covered a range of topics, including the role of disulfide bonds in structural biology, diseases, proteins and peptides, and new innovations in disulfide redox biology and chemistry.

The large international representation provided a novel opportunity for Australian research leaders and early-career researchers to meet and network with international leaders in the fast-growing field of disulfide bonds. A number of new international and national collaborations are expected as an outcome of the meeting. Early-career researchers and Australian-based PhD students were given an additional opportunity to highlight their research in a Young Investigator session, which was included in the conference program along with a number of lively discussion sessions on specific controversies in the field.

Feedback from delegates has been overwhelmingly positive, with a particular emphasis on the effective cocktail mixture of tropical atmosphere, formal and informal discussion opportunities and contribution of research leaders from around the world. The conference was organised by Professor Jenny Martin and Dr Begoña Heras, University of Queensland, and Dr Martin Scanlon, Monash University. The conference and speakers were sponsored by the Australian Academy of Science, the University of Queensland, New England BioLabs, Australian Society for Biochemistry and Molecular Biology, the Institute for Molecular Bioscience, and the Queensland Protein Group.

Participants at the 2007 Boden Research Conference take a break

The Elizabeth and Frederick White Conference 2007

The Elizabeth and Frederick White conference series supports research in the physical and mathematical sciences. The 2007 conference, *The Magellanic System*, was held at the Australia Telescope National Facility (ATNF) headquarters in Sydney on 16 and 17 July. The Magellanic System, consisting of the Large and Small Magellanic Clouds orbiting each other, a bridge of dust and gas between them and various tidal stream components, is a system near our own galaxy which represents one of the best places to study the formation and evolution of galaxies. Sixty delegates from around the world, including six international keynote speakers funded by the Academy, met for the two-day conference to discuss recently discovered and updated properties of the Magellanic System.

The conference, organised by Dr Erik Muller, ATNF CSIRO, provoked both intense interest and scepticism. Presentations featuring latest theories as well as radio, optical, mm and sub-mm results were discussed. Controversial topics, such as the formation and evolution of the Magellanic Stream and the motion measurements of the Magellanic Clouds, were vigorously debated by the Australian and international experts. The Elizabeth and Frederick White Conference 2007 proved to be an extremely productive and interesting event that, by drawing together scientists with diverse expertise, contributed greatly to the development of a comprehensive understanding of the complex Magellanic System.

The Fenner Conference on the Environment 2007

The Fenner conference series supports researchers and policy advisers in the areas of environment and conservation affecting Australia and its environs. The 2007 conference, *Wildlife population dynamics and management*, was held in Canberra on 2 and 5 December to honour the late Dr Graeme Caughley's contribution to wildlife research and management. Dr Caughley's research has provided a basis for kangaroo management in Australia, ungulate management in New Zealand, and aspects of elephant management in parts of southern Africa.

The conference was a great success with over 140 people registering from Australia, New Zealand, Canada and the UK. Presentations dedicated to addressing topics of wildlife research by Dr Caughley were highlights of the conference. Speakers contemporised the research topics and examined the implications for future environmental management and conservation.

At the conference, Dr Doug Armstrong from Massey University, New Zealand, was announced winner of the Australian Academy of Science *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, University of Canberra. Selected papers from the conference will be published in a special issue of the scientific journal *Wildlife Research* with publication anticipated in early 2009.

Professor Frank Fenner FAA browsing the literature on offer at the conference

Professor Richard Shine FAA speaks to Sarina Locke from ABC radio at the Fenner Conference

Conferences for 2008–09

The Boden Research Conference 2008

In 2008 there will be two Boden Research Conferences.

Beyond the platypus genome

Organised by: Professor Jenny Graves FAA, Australian National University
Professor Frank Grutzner, University of Adelaide
Dr Russell Jones, University of Newcastle.

Plant energy and water use efficiency: From genes to environment

Organised by: Associate Professor Barry Pogson, Australian National University
Dr Rudy Dolferus, CSIRO Plant Industry.

The Fenner Conference on the Environment 2008

The art and science of good environmental decision making

Organised by: Professor Hugh Possingham FAA, University of Queensland
Professor Ted Lefroy, University of Tasmania.

More information on research conferences is available at: www.science.org.au/events/index.htm

Science education

The Academy is committed to promoting science education, both as a contribution to informed citizenship and to encourage young people to prepare themselves for careers based on science and technology. To this end, we have contributed to the formulation of policy for science education and prepared teaching resources for all levels of school science. The following is an overview of our current activities.

Primary Connections

www.science.org.au/primaryconnections

Primary Connections is an innovative national initiative of the Academy that links the teaching of science with the teaching of literacy in Australian primary schools. It comprises a sophisticated professional learning program complemented by rich curriculum resources designed to increase teacher confidence and competence in the teaching of both science and literacy.

The Australian Government Department of Education, Employment and Workplace Relations (DEEWR) provided $4.8 million for Stages 2 and 3 of the project (2004–08). In 2007, DEEWR provided a further $500,000 for extended professional learning activities and expansion of indigenous perspectives for the program.

Education Queensland has committed $1.4 million to the uptake of *Primary Connections* in 2007–08 and the Western Australian Department of Education and Training has spent over $250,000 on *Primary Connections* professional learning and curriculum resources in 2007.

Approximately 400 professional learning facilitators have been trained to work within their state or territory to support schools interested in implementing the program. Following advice from the project's Steering Committee and National Reference Group, facilitators are no longer trained centrally at the Shine Dome in Canberra. Rather, state-specific training workshops have been developed in conjunction with the relevant local education authorities, to tailor the workshops to the individual needs and priorities of each jurisdiction. It also allows larger numbers of teachers to be trained in order to cope with the demand for professional learning. The project's professional learning officers have also trained over 500 curriculum leaders to work as leaders within their school or community.

Photo: © Irene Dowdy

Discovery: Young 'scientists' report on their schoolyard safari

In 2007, DEEWR granted 500 final-year trainee teachers Awards for Excellence in the teaching of primary science. Each awardee received $2000 and a resource pack of

Primary Connections materials, including curriculum units and the *Questioning Minds* training DVD. Universities were required to incorporate elements of *Primary Connections* into their pre-service courses and assessment to determine the awardees.

To support the awards, two *Primary Connections* two-day workshops for 124 pre-service educators were conducted in February and July of 2007, highlighting the key points and underpinning principles of *Primary Connections*. Every university that offers a primary or early childhood pre-service education course was represented at these workshops.

The draft professional learning resources have been reviewed by trained facilitators, in preparation for revision and publication in 2008.

Ten curriculum units have now been published. A set of three units was short listed in the Primary Teaching and Learning Category of the Australian Awards for Excellence in Educational Publishing in 2007, and was recognised as being among the best of all publications nominated for these awards over the past 14 years. To date more than 75,000 units have been distributed in Australia and overseas. Nineteen units will be published by the end of 2008.

Photo: © Irene Dowdy

Students 'explore' and record observations in their journal

An indigenous perspective in both professional learning and curriculum units was piloted in Western Australia in the second half of 2007; findings from the consultation will be incorporated into the project.

A research component continues to inform the project, conducted by researchers from Edith Cowan and LaTrobe universities. To date, 11 interim research reports have been prepared on the trialling processes, professional learning, principals' perceptions of the program and the indigenous perspectives pilot.

A range of journal articles and conference presentations promoted the project during the year, and international interest was received following presentations by the President of the Academy Professor Kurt Lambeck at the November 2007 meeting in Bangkok of the Federation of Asian Scientific Academies and Societies. As a result, delegates from Malaysia and Thailand attended professional learning events in Sydney in February and March 2008.

Available units:

Early Stage 1 (Year 1)

Earth and Beyond: *Weather in my world*
Energy and Change: *On the move*
Natural and Processed Materials: *What's it made of?*

Stage 1 (Years 2 and 3)

Earth and Beyond: *Water works*
Energy and Change: *Push-pull*
Life and Living: *Schoolyard safari*

Stage 2 (Years 4 and 5)

Earth and Beyond: *Spinning in space*
Life and Living: *Plants in action*

Stage 3 (Years 6 and 7)

Energy and Change: *It's electrifying*
Life and Living: *Marvellous micro-organisms*
Natural and Processed Materials: *Package it better*

Science by Doing pilot project

www.sciencebydoing.edu.au

In July 2007 the Academy welcomed the news that the *Science by Doing* pilot program had received funding from the Australian Government Department of Education, Employment and Workplace Relations.

Declining student participation rates in science and an increasing demand from the Australian and international economies for a scientifically literate workforce indicate the need for a new approach to the teaching and learning of science in secondary schools. The *Science by Doing* project seeks to address

the reasons for student disengagement and to improve student understanding of and participation in science.

The Academy has identified three essential elements necessary to improve secondary students' engagement with science. The elements are: a professional learning approach for teachers; professional learning resources for teachers; and enquiry-based instructional units.

The Academy is conducting a pilot of *Science by Doing* until August 2008. A range of resources has been developed to assist teachers to adopt the *Science by Doing* approach, including two units: *Rock, paper, scissors*, an introductory unit for years 7 and 8 on matter, and *Moving together*, a unit for years 8 and 9 on human body systems. The units are student-centred and hands-on, and based on an enquiry-based approach to learning and teaching with a specific emphasis on 'exploring before explaining'.

A major feature of the *Science by Doing* pilot is its web portal: it has both student- and teacher-accessed pages. Students can navigate the curriculum units, download worksheets and access on-line learning objects, simulations, external web-pages and on-line assessment items. Teachers can access student pages, resources and an on-line forum to share ideas, concerns and experiences with other teachers.

The Academy hosted 65 teachers from 34 schools across Australia for a workshop from 13 to 18 January 2008. Also in attendance were Science Policy Officers from all states and territories, and a representative from each of the Catholic Education Commission, the Middle Years of Schooling Association and the Independent Schools Association. Participants were welcomed to the Shine Dome by Vice-President Professor Graham Farquhar FAA who presented the history of science education programs developed by the Academy. Throughout the week, teachers were immersed in the *Science by Doing* approach to enquiry-based science education, introduced to the web-portal and curriculum units, and obtained professional development in a range of pedagogies that underpin the *Science by Doing* approach. The workshop was a resounding success with teachers enthusiastically embracing the pilot and looking forward to trialling the units and web-based resources in the first and second terms of 2008. Feedback from teachers and students will be critical to determine how to implement *Science by Doing* in schools.

Teachers immersed in the inquiry-based activities at the *Science by Doing* workshop

Nova: Science in the news

www.science.org.au/nova

Nova: Science in the news is designed as a web-based educational resource for secondary school students, teachers and the general public covering science-related issues that appear in the news.

There are currently 101 live topics on the *Nova* site. The website has received over 15 million hits since the first topic was published in 1997, with nearly 3 million hits received in the last 12 months. Each topic is reviewed by an expert in the relevant field before posting on the web, providing an accurate and reliable source of information for users.

Six new topics covering areas from wireless technology and quantum computers to ocean acidification and bushfires were posted during the last year. Existing topics were also updated throughout the year to keep them relevant and in line with current research.

New *Nova* topics:

Acid test for the seas

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; about a third of total human-induced emissions has been absorbed by vegetation and a similar amount has been soaked up by the ocean.

This topic is sponsored by the Australian Government Department of Climate Change.

Bushfires spark extensive search for answers

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.

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

Discovering Australia's evolutionary past

Traditionally, relationships between organisms are established by studying the morphology or the physical form and structure of the living organisms.

One of the more recently developed techniques used to establish relationships between organisms is molecular phylogenetics. Scientists determine the evolutionary relationships between groups of organisms by studying their DNA sequences.

This topic is sponsored by the Australian Academy of Science Flora Fund.

Sounding out the secrets of the sea

The increasing use of sound by humans to explore the seas has raised questions about its potential impact on marine life. Sound under water is very important for animals. It allows them to navigate, to communicate and to detect approaching predators and prey.

This topic is sponsored by the Australian Acoustical Society.

Quantum computers – why would you want one?

The computers we have already go at blinding speed and can do pretty much whatever we want. Yet we have always been able to find ways to use each step-up in computer power as it has been presented.

This topic is sponsored by the Sir Mark Oliphant International Frontiers of Science and Technology Conference series.

Wireless but not clueless

WiFi and other wireless technologies are already part of our lives, and soon they will be almost everywhere. The number of uses to which WiFi could be put is almost limitless: in the home, in businesses and even in environmental science.

This topic is sponsored by the Australian Research Council Communications Research Network.

Photo: Stockxpert

Learning to live with fire

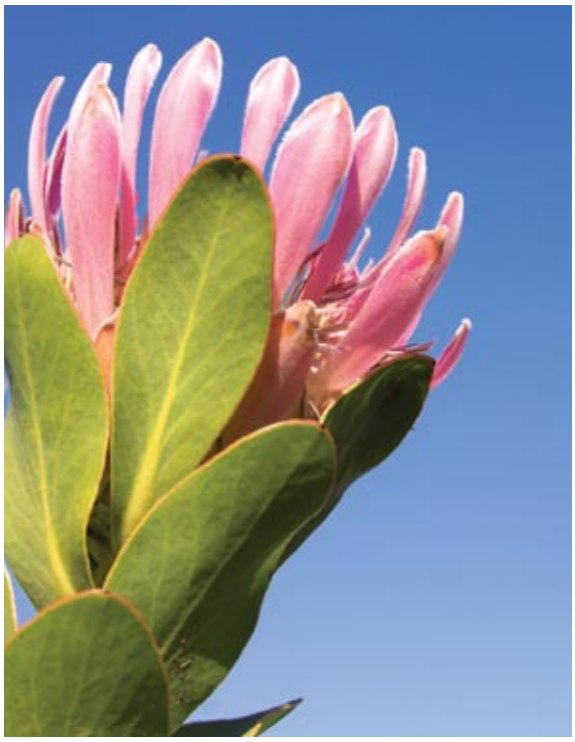


Photo: Stockxpert

Family tree: DNA used to study relationships between organisms

Photo: Stockxpert

Sounds like the sea: Noise pollution from human studies may impact on marine life

Comments from *Nova* users

A recent survey of *Nova* subscribers identified several other groups of users in addition to the main target audience of secondary school students and teachers. These included government employees, researchers and librarians.

The feedback and comments received from the survey were very positive. *Nova* users wrote:

> *Nova enables students and teachers to access the latest developments in science. They are able to see science as relevant and meaningful, to share the excitement of new findings and to stimulate discussion about the implications of these findings. All contribute towards developing a more scientifically literate community as well as encouraging students to consider science as a career.*

Nova has become an important part of science education in Australia. There is plenty of information on the web on almost every topic but Nova is extremely valuable because it provides a summary of relevant information, gives links for further information and, most importantly, is a trusted and reliable source – the main shortcoming of so much material on the web.

Interviews with Australian scientists

www.science.org.au/scientists

The Academy established the *Interviews with Australian scientists* program in 1993 to record interviews with outstanding Australian scientists. The scientists talk about their early life, development of interest in science, mentors, research work, and other aspects of their careers.

The *Interviews* project continues to grow, both in the number of interviews available and in public interest. In 2007 there were 310,000 visitors to the project's website to view transcripts, teacher notes and activities of the 59 Fellows and 34 non-Fellows who have been interviewed. Recent additions include transcripts, teacher notes and activities to accompany interviews of Professor Howard Worner FAA, Dr Alec Costin FAA, Professor Mervyn Paterson FAA and Professor Dorothy Hill FAA (courtesy of the University of Queensland).

In 2007 the interviews also became available on DVD and as a result the project has enjoyed a surge in both viewing popularity and DVD orders.

Interviews are now available on DVD

Professor Brian Anderson FAA, Professor Richard Stanton FAA and Professor Joe Gani FAA were interviewed earlier in 2008. Other interviews being negotiated for 2008 include Professor Ian Frazer FAA, Dr Fiona Wood and the Nobel laureates, Professor Robyn Warren FAA and Professor Barry Marshall FAA.

The Video Histories Advisory Committee, which advises Council on candidates for the project, will observe some 'changing of the guard' in 2008 with the ending of terms of Professor Robert Crompton FAA and Professor Cheryl Praeger FAA. Both have been long-standing members and their service and commitment to the committee are gratefully acknowledged. Professor Gordon Ada FAA stood down from the committee in 2007 and his contribution is also acknowledged. Professor Graeme Cox FAA joined the committee at the beginning of 2008.

Public awareness and outreach

The Academy's projects, activities, policy recommendations and positions on scientific issues are regularly promoted through a variety of outlets. This promotion serves to foster a greater awareness of science issues and science-related activities to government, industry, the media, academics and various publics. Public awareness and outreach is pursued through a range of strategies, including hosting conferences and meetings, printed and on-line publications and in the distribution of media releases.

National Press Club address

Professor Kurt Lambeck gave the Academy's annual address to the National Press Club on 26 September with the title *Roadmap for a prosperous Australia in a competitive world*. He used the opportunity to launch *Research and innovation in Australia: A policy statement* which was the focus of his address.

He discussed how the ongoing pursuit of knowledge, supported by a robust science policy, is critical for the socioeconomic and environmental well-being of Australian society. He also outlined the need for Australia to maintain a long-term public commitment to the funding of science education at every level and to high quality basic research in universities. Support for Australia's talented early and mid-career researchers to fuel strategic and applied research was also emphasised in his speech.

The President highlighted the need for strong strategic international alliances, not only with Australia's traditional partners but also with the developing countries. He warned that: 'Our competitiveness will be increasingly tested by the new world order, with a consequence that our past cosy science relationships will change unless we are equal and paying partners in future developments.'

He acknowledged that significant increased expenditure in research and development would be needed for Australia to remain globally competitive in this area. He urged whichever party that succeeded at the federal election to take advantage of the current

Photo: © Sandy Spear, NPC

Professor Kurt Lambeck gives a voice to science at the National Press Club

healthy economic conditions and strengthen Australia's science base. He stated: 'Investing in the intellectual and scientific capacity of the country and building on our enviable reputation in science and technology will prepare us for the challenges ahead.'

Professor Lambeck summed up saying: 'It is an investment that will repay. As noted recently by the Productivity Commission; "The benefits of public spending on science and innovation far exceed the costs".'

The policy statement restates the Academy's view on

the importance of scientific research and its applications, particularly for Australia in an increasingly competitive world. Copies of the document and the speech notes are available from: www.science.org.au/reports/aas-policy-2007.pdf and www.science.org.au/events/npc2007.htm

Public lectures

Public lecture series

In 2007–08, the Academy held two new public lecture series: *Safeguarding Australia* and *Physics for the future*.

The *Safeguarding Australia* series emerged from the success of the Think Tanks held at the Shine Dome: *Emerging diseases – ready and waiting?* in October 2004 and *Safeguarding Australia* in April 2003. The series looks at emerging diseases and Australia's preparedness to deal with these sudden and unpredictable threats to human, animal, plant and aquatic health. The lectures in the series so far have been:

Emerging viral diseases: What are the threats and how should we respond?

4 September 2007
Professor John Mackenzie, Professor of Tropical Infectious Diseases, Curtin University

From mad cows to disappearing bees: Safeguarding Australia from emerging diseases of animals

7 August 2007
Dr Mike Nunn, Principal Scientist (Animal Biosecurity), Biosecurity Australia, Department of Agriculture, Fisheries and Forestry

Being prepared – from a diagnostic laboratory perspective

4 March 2008
Dr Martyn Jeggo, Director of CSIRO's Australian Animal Health Laboratory

The *Physics for the future* lecture series provides examples of current research and future ideas that cover almost all parts of physics by Australian and international physicists. The series aims to present exciting new physics to teachers and schools in Australia with material from these public talks to be posted on the *Physics for the future* website and made available on DVD as teaching resources for school teachers. The public talks will be compiled into a book as a resource for science teaching in schools around Australia.

Physics for the future was initiated and is coordinated by Professor Hans Bachor of the Australian National University. It is supported by the Academy, the Australian Research Council Centre of Excellence for Quantum Atom-Optics Research and the Australian Institute of Physics. Lectures in the series so far have been:

Public lectures well-supported in 2007

Photons – quantum ideas that could influence your life

6 June 2007
Professor Hans Bachor, Director of the ARC Centre of Excellence for Quantum-Atom Optics, ARC Federation Fellow, Department of Physics, Australian National University

The (not so secret) lives of galaxies

23 August 2007
Professor Mike Dopita FAA

ARC Federation Fellow, Research School of Astronomy and Astrophysics, Australian National University

From Einstein intuitions to quantum bits: A new quantum age

27 November 2007
Professor Alain Aspect, Director of Research CNRS, Institut d'Optique, Paris

The *Origin of species* lecture series that ran through 2006–07 came to an end with the final lecture in May by Professor John Pearn from the University of Queensland. His lecture was titled *A doctor in the Australian garden – Linnaeus, his tercentenary and Australian flora.*

Non-series lectures

Medical and molecular image analysis

Professor Sir Michael Brady from the University of Oxford, UK gave a public lecture at the Shine Dome on 11 December. He discussed his team's work on image analysis and its application to cancer research. With large variation in the clarity of medical images, Professor Brady outlined how his team have been combining work on image analysis, together with work done on molecular biology over the last 50 years, to help understand and image disease as well as normal processes at the cellular and molecular level.

Professor Brady showed examples of his work imaging a range of cancers and highlighted the difficulties cancer research presents: '…cancer provides a very challenging application for image analysis, because it really pushes us way to the limits of what we understand.'

He also discussed the importance of information technology in clinical practice saying that: '…image analysis and IT can very, very substantially impact upon the diagnosis, the monitoring, the therapy options, and also…provide theoretical insights into the biochemical basis of cancer and the way in which this awful disease can grow and develop.'

Linnaeus as a role model for today's science

Professor Gunnar Öquist, corresponding member of the Academy and Permanent Secretary of the Royal Swedish Academy of Sciences, presented a public lecture at the Shine Dome on 7 November, *Linnaeus as a role model for today's science*. He gave the lecture as part of the 300th anniversary celebrations of the birth of Carl Linnaeus.

Professor Öquist presented prizes to Andrew Koolhof, the winner of the Linnaeus Tercentenary 2007 Secondary Schools Competition, before his lecture. During his lecture he emphasised four characteristics of Linnaeus which are important today: the ability to teach and inspire, the ability to form international networks, good micro and macro observational skills, and the ability to lead others.

Professor Öquist highlighted pressing global issues such as climate change and poverty referring to Linnaeus: 'It is the kind of vision, curiosity, ingenuity and leadership that Linnaeus showed that we need more of today, in order to come up with new ideas and new discoveries, to open up for new, unforseen opportunities and solutions to today's and tomorrow's problems.'

He hoped the anniversary would 'inspire the young generation to address the pressing global issues with a vitalised rationality based on research in the natural and social sciences, and in the technologies, and with a commitment that goes beyond what their parents and grandparents have mustered.' The transcript is available from: www.science.org.au/events/7november07

Professor Alain Aspect spoke of a new quantum age in his public lecture


Professor Gunnar Öquist discussed the legacy of Linnaeus at his public lecture

The dark side of the universe

Professor Joseph Silk presented a public lecture at the Shine Dome on 21 August as part of his 2007 Selby Fellowship lecture tour. Professor Silk, Savilian Professor of Astronomy at the University of Oxford, is a world leader in the field of theoretical cosmology, seeking insights about dark matter, galaxy formation, and the relic glow from the Big Bang. In his talk he discussed 'dark energy' and 'dark matter' and reviewed the status of ongoing searches for the dark components of the universe.

Professor Silk's lecture tour also took in Perth, Melbourne, Brisbane and Sydney. Selby Fellowships are awarded to distinguished overseas scientists to allow them to visit Australia to present public lectures and visit scientific centres.

Ozone depletion and climate change: A tale of two environmental issues

Dr Susan Solomon, senior scientist at the NOAA Earth System Research Laboratory in the US, gave a public lecture at the Shine Dome on 24 May 2007. Her talk explored the environmental concerns of both ozone depletion and climate change. She outlined both of the issues, their similarities and differences and the ways in which they are linked.

Dr Solomon made some of the first measurements in the Antarctic which showed that chlorofluorocarbons were responsible for the spectacular ozone hole, and she pioneered the theoretical understanding of the surface chemistry that causes it. Dr Solomon's visit was sponsored by the Department of Climate Change.

Publications

Publications form an essential part of the output of the Academy, disseminating information to the scientific community, professional groups, universities and the general public. Publications include conference programs and proceedings, transcripts of public lectures, newsletters, President's notes and project reports. Educational publications include *Nova: Science in the news*, *Interviews with Australian scientists*, *Primary Investigations* and *Primary Connections*. The Academy's journal, *Historical Records of Australian Science*, is produced by CSIRO Publishing. The Academy also shares editorial responsibility with CSIRO for the thirteen Australian Journals of Scientific Research.

Printed and online publications for 2007–08

Development and evolution of higher cognition in animals Science at the Shine Dome program www.science.org.au/sats2007	April 2007
Newsletter 68 www.science.org.au/newsletters	June 2007
Development and evolution of higher cognition in animals Science at the Shine Dome proceedings www.science.org.au/sats2007/symposium	July 2007
President's note 57 www.science.org.au/presnotes/pres57.rtf	July 2007
Directory 2007–08	September 2007
Newsletter 69 www.science.org.au/newsletters	September 2007
Research and innovation in Australia: a policy statement Policy document www.science.org.au/reports/aas-policy-2007.pdf	September 2007
President's note 58 www.science.org.au/presnotes/pres58.doc	October 2007

Extreme natural hazards High Flyers Think Tank program www.science.org.au/events/thinktank2007/2007-thinktank-program.pdf	October 2007
East Asia and Pacific Summer Institutes for US Graduate Students report	November 2007
Newsletter 70 www.science.org.au/newsletters	December 2007
***Vaccine and immunotherapy technologies* program** Sir Mark Oliphant Conferences www.oliphant.org.au/april2008.html	December 2007
President's note 59 www.science.org.au/presnotes/pres59.doc	January 2008
Australian Frontiers of Science program www.science.org.au/events/frontiers2008	January 2008
Enhancing the quality of the experience of postdocs and early career researchers Workshop program www.science.org.au/events/14-15february08	January 2008
Extreme natural hazards High Flyers Think Tank proceedings www.science.org.au/events/thinktank2007	February 2008
Towards development of an Australian scientific roadmap for the hydrogen economy www.science.org.au/reports/hydrogen.pdf	March 2008
Newsletter 71 www.science.org.au/newsletters/aas71.pdf	March 2008
Annual Report 2007–08 www.science.org.au/reports/2008anrep.htm	March 2008

Historical Records of Australian Science

Historical Records of Australian Science is the journal of record for the history of science, pure and applied, in Australia and the southwest Pacific. It is a key resource for anyone studying the history of science. The journal publishes high-quality articles and reviews, biographical memoirs of deceased Fellows of the Academy commissioned by the Council of the Academy and an annual bibliography of the history of Australian science.

The journal has an editorial board chaired by Professor David Curtis FAA, which sets and maintains the editorial standards for the journal and advises Council on matters of policy. The editor is Professor Rod Home.

Two issues were published in 2007 with seven historical articles, four biographical memoirs, two series of book reviews and the annual bibliography of the history of Australian science. CSIRO Publishing has published the journal on behalf of the Academy since 2002.

All issues of the journal, from its inception in 1966 as *Records of the Australian Academy of Science*, are available on CSIRO Publishing's website at:
www.publish.csiro.au/?nid=108

Australian journals of scientific research

The Academy of Science and CSIRO Publishing have renewed the agreement to jointly publish 13 Australian journals of scientific research. The new agreement commenced on 1 January 2008 and will conclude on 31 December 2012. The Academy and CSIRO both recognise the importance of international scientific research in expanding human knowledge and delivering:

- innovative solutions to society, industry and the environment

- peer review in the process of scientific research
- the publication of scientific research findings.

The Academy and CSIRO have agreed to co-operate to champion Australia's contribution to the international science research effort by supporting publication of the journals.

Editorial policy for the series is developed by a Board of Standards appointed jointly by CSIRO and the Academy with a chair from each organisation. The Academy's chair for 2007 was Professor Marilyn Renfree FAA.

Details of these and other journals published by CSIRO are available at: www.publish.csiro.au/nid/50.htm?nid=17

Journals of scientific research

Australian Journal of Agricultural Research
Australian Journal of Botany
Australian Journal of Chemistry
Australian Journal of Experimental Agriculture
Australian Journal of Soil Research
Australian Journal of Zoology
Australian Systematic Botany
Environmental Chemistry
Functional Plant Biology
Marine and Freshwater Research
Reproduction, Fertility and Development
Invertebrate Systematics
Wildlife Research

Communications and media

Conferences, think tanks, public lectures and workshops organised and sponsored by the Academy are promoted through paid advertising in specific press, as well as through media alerts and media releases targeted to specific audiences and locations. The quantity of media releases distributed by the Academy increased during 2007 and this trend is continuing in 2008. The Academy's website is also used to promote events and activities.

The Academy continues to foster a good reputation with journalists, both in and outside the scientific domain as a reliable source of information. They often approach the Academy looking for comment on topical policy issues, and this was particularly prevalent prior to the 2007 election. Journalists also approach the Academy looking for experts to speak on specific science topics and are regularly referred to Fellows.

Most of the media coverage for the reporting period surrounded comments on science policy and funding issues with most attention on career structures for researchers, particularly young and early- to mid-career researchers. The positions of the Academy and Professor Lambeck on these issues were highlighted in the media, as were reports prepared by the Academy.

Other areas of coverage included Professor Lambeck's National Press Club address and corresponding launch of the policy statement, the Academy's statement on genetically modified organisms, the annual awards, individual Fellows and Shine Dome events.

Minister Kim Carr speaks to media outside the early-career researcher workshop at the Shine Dome

Website

The Academy's website provides an important public portal to its activities and resources. The website has been undergoing a progressive overhaul to improve usability and modernise its appearance. The Academy also has responsibility for the maintenance of the Sir Mark Oliphant Conferences and National Academies Forum websites. The Oliphant Conferences website recently underwent a renewal. Both sites can be accessed from the Academy's home page: www.science.org.au

Recent benefactors of the Academy

(Donations of $1,000 and above are acknowledged)

Special-purpose funds

Adam J Berry Memorial Fund	
Family and friends of the late Adam Berry	$1,995
Adolph Basser Library	
FJ Fenner FAA	$5,000
Australian Foundation for Science	
Pearce Webster Dugdales	$10,000
Dorothy Hill Award	
RL Stanton FAA	$900
Fund for the Conservation of Endangered Native Animals	
Anonymous donor	$65,500
Haddon Forrester King Medal	
Rio Tinto	$40,000
JG Russell Fund	
JG Russell	$12,000
Population and Environment Fund	
Anonymous donor	$25,000
RL Stanton Archive Fund	
RL Stanton FAA	$2,100
Ruth Stephens Gani Medal	
JM Gani FAA	$8,000

Science education and public awareness funds (subset of special-purpose funds)

National Museum of Australia Student Prize 2008	
National Museum of Australia	$3,000
Primary Connections **– Stage 3**	
Department of Education, Employment and Workplace Relations	$600,000
Primary Connections **– Additional Learning Opportunities**	
Linking Science for Pre-service Teacher Educators, Teachers and Facilitators	
Department of Education, Employment and Workplace Relations	$326,000
Science at the Shine Dome **– Sponsorship for early-career researchers 2008**	
Australian Research Council	$6,000
Bureau of Meteorology	$6,000
National Health and Medical Research Council	$6,000

***Science at the Shine Dome* – Symposium 2008**	
Department of the Environment, Water, Heritage and the Arts	$10,000
***Science by Doing* – Pilot**	
Department of Education, Employment and Workplace Relations	$1,500,000

Special project grants

Australia Climate Change Science Programme	
Department of Climate Change	$145,000
French-Australian Scientific Visits to Europe Program	
French Embassy	$14,796
French Embassy Cotutelle Program	
French Embassy	$24,510
Sir Mark Oliphant Frontiers of Science and Technology Conferences	
Department of Education, Employment and Workplace Relations	$100,000
International Science Linkages Strategic Policy	
- Department of Education, Employment and Workplace Relations	
2007 Academies Symposium–China Symposium	$67,000
Australia–Brazil Workshop	$50,000
Australia–Indonesia Workshop 2007	$50,000
Australia–Korea Early Career Researchers Program	$52,000
Australia–Korea Symposia 2007-08 (Year 1)	$50,000
Science Academies Programme: International Scientific Exchanges	$864,500
Summer program in Australia for US graduate students in science and engineering	$80,000
Trial of Australian Participation in European Cooperation in the Field of Scientific and Technical Research	$110,000

The Shine Dome and Ian Potter House

The Australian Academy of Science's Dome has been a Canberra landmark since its construction in 1959. An image of the Shine Dome – along with Melbourne's former ICI House, Perth's Council House and the Sydney Opera House – featured on a stamp release by Australia Post, *Landmarks: Australian modernist architecture*. These buildings are classical examples of 20th century iconic Australian buildings.

There were many requests throughout the year to hold a variety of functions and events at the Shine Dome. Some of the new organisations holding events this year were the Department of Defence Industries with the Defence and Industry Regional Briefing and a three day workshop by the Australian Society of Fish Biology. The Australian National University School of Music hosted the 8th Annual Piano Pedagogy and there was also a return to the Shine Dome by the Catholic Education Office for teachers' professional development days, as well as the Australian Science Festival holding events throughout Science Week in August. On 5 May the European Commission sponsored a live broadcast by the Australian Broadcasting Corporation's Radio National. This was hosted by James O'Loghlin on his evening program to celebrate Europe Day.

Image: © Australia Post

The Shine Dome features in an Australian landmarks stamp series

An upgrade of audiovisual equipment in the Ian Wark Theatre is underway with the addition of a new projector, a web camera, the linkup of a Mac computer to the system, and facilities to record audio and visual input directly onto computer.

The Shine Dome opened its doors to the masses on 11 October. This was a chance for members of the public to see and hear a little about the Academy, its function and role in society, and to learn about the architecture and history of the building itself. There were guided tours, a display of Academy artefacts in the Jaeger Room and *Primary Connections* educational information in the Becker Room, amongst other things. It was a big success with over two hundred people attending throughout the day. Visitors ranged from ambassadors to tourists to residents of Canberra.

Photo: © Irene Dowdy

Professors Kurt Lambeck and Jenny Graves accompany the French ambassador at the Shine Dome open day

Major repairs to the Ian Potter House drainage system were undertaken in the early part of 2008 by engineering contractors Urban Constructions, after a complete hydraulic survey was done of the site by hydraulic engineer Ramsey Howard.

Victoria Grounds (daughter of Roy Grounds of Grounds, Romberg and Boyd), of Grounds and Griffiths, has been commissioned to develop a landscape concept for the grounds of the Academy. This will encompass both Ian Potter House and the Shine Dome and will leave room for future developments that may be proposed for the site.

Events held at the Dome

Date	Function	Organisation
2–4 May 2007	*Science at the Shine Dome*	Australian Academy of Science
5 May	Annual General Meeting	Canberra Units Plan
9 May	ABC James O'Loghlin Evening Show Live Broadcast – Europe Day	European Commission Delegation
14 May	Professional Development Day	Catholic Education Office
16 May	Public lecture by Professor Patrick Weller *Is cabinet necessary?*	Australia and New Zealand School of Government
22 May	Public lecture by Professor John Pearn *A doctor in the Australian garden – Linnaeus, his tercentenary and Australian flora*	Australian Academy of Science
24 May	Public lecture by Dr Susan Solomon *Ozone depletion and climate change: A tale of two environmental issues*	Australian Academy of Science; Department of Climate Change
25 May	ANU construction students tour	Australian National University
31 May	Dining Club Dr John Magee *Extinction of giant flightless birds in Australia and Madagascar: Unravelling the role of humans and climate*	The four learned Academies
1 June	*Primary Connections* Reference Group meeting	Australian Academy of Science
6 June	Public lecture by Professor Hans Bachor *Photons – quantum ideas that could influence your life*	Australian Academy of Science; ARC Centre of Excellence for Quantum-Atom Optics; Australian Institute of Physics
7 June	CIT design students tour	Canberra Institute of Technology
7 June	Public lecture by Professor Tim Bonyhady *Climate controls: The new Australian law of global warming*	Australian National University; Blake Dawson Waldron
8 June	Off site conference	Department of Defence
14 June	US Summer program	National Science Foundation; Australian Academy of Science
16 June	50th Anniversary Celebration	FJ Car Club of Canberra
18–19 June	Climate change symposium	World Wildlife Fund
26 June	Farewell cocktail party for Professor Barry Hindess	ANU Research School of Social Sciences
28 June	Council meeting	Australian Academy of Science
6 July	8th Australasian Pedagogy Conference 2007	ANU School of Music
10 July	Australia Post stamp launch	Australian Academy of Science
11–12 July	China Update 2007 Conference	ANU School of Economics and Government

Date	Function	Organisation
16 July	Academic policy seminar *Improving access to Australian publicly-funded research*	National Scholarly Communications Forum
17–19 July	Advanced Technology and Research Symposium	CSIRO Petroleum
20–21 July	*Primary Connections* Tertiary Facilitators Conference	Australian Academy of Science
26 July	Combined Academies dinner Professor Will Steffen *The Anthropocene: From hunter-gatherers to a global geophysical force*	The four learned Academies
27 July	Student tour	Student Organised Network for Architecture
2–3 August	Government and Community seminar *National security for a diverse community*	Attorney-General's Department
7 August	Public lecture by Dr Mike Nunn *From mad cows to disappearing bees: Safeguarding Australia from emerging diseases of animals*	Australian Academy of Science
8 August	*Science by Doing* Steering Committee meeting	Australian Academy of Science
9 August	Save our Senate Panel Discussion	Get Up
14–15 August	Vegetation Dynamics Workshop	Australian Academy of Science
20 August	Work and you: Happy together	Australian Science Festival
21 August	Public debate *The population debate: Just how big should Australia be?*	Canberra Skeptics
22 August	*Treasure or torture: Science in the deep*	Australian Science Festival
23 August	Public lecture by Professor Mike Dopita FAA *The (not so secret) lives of galaxies*	Australian Academy of Science; ARC Centre of Excellence for Quantum-Atom Optics, Australian Institute of Physics
25 August	*Managing Australia's water challenges and opportunities*	Australian Science Festival
26 August	Grand Final of the National Debating Tournament	ANU Debating Society
3 September	Professional Development Day	Catholic Education Office
4 September	Public lecture by Professor John Mackenzie *Emerging viral diseases: What are the threats and how should we respond?*	Australian Academy of Science
10–12 September	Workshop	Australian Society for Fish Biology
13 September	National Committee for Medicine meeting	Australian Academy of Science
18 September	Conference	Department of the Environment, Water, Heritage and the Arts

Date	Function	Organisation
20 September	Defence and Industry Regional Briefing 2007	Department of Defence Industries
21 September	*Science by Doing* Steering Committee meeting	Australian Academy of Science
25–26 September	InterAcademy Panel meeting	Australian Academy of Science
26 September	Ovation	Australasian College of Midwives
27 September	Combined Academies dinner Professor Harvey Marchant *The other problem of increasing atmospheric CO_2 concentration – acidification of the oceans*	The four learned Academies
27 September	Council meeting	Australian Academy of Science
28 September	Rural Issues Workshop	Australasian College of Midwives
4 October	Australian Foundation for Science	Australian Academy of Science
11 October	Shine Dome Open Day	Australian Academy of Science
18–19 October	Annual public symposium and forum *Coral reef futures 07*	ARC Centre of Excellence for Coral Reef Studies
30 October	Australian College of Road Safety and Australian Transport Safety Bureau seminar	Australasian College of Road Safety
31 October	National Committee for Physics meeting	Australian Academy of Science
5–7 November	10th Annual Meeting of the Earth Systems Dynamics Network	Research School of Earth Sciences
16–17 November	2050 National Forum 2007	Liz Baldwin and Associates
20–21 November	Annual General Meeting and Symposium *Power, people, water: Urban water services and human behaviour in Australia*	Academy of the Social Sciences in Australia
27 November	Public lecture by Professor Alain Aspect *From Einstein intuitions to quantum bits: A new quantum age*	Australian Academy of Science; ARC Centre of Excellence for Quantum-Atom Optics; Australian Institute of Physics
28 November	Public lecture by Air Chief Marshal Angus Houston, AO, AFC *Leading the Australian Defence Force*	Australia and New Zealand School of Government
29 November	Meeting	Australian Quarantine and Inspection Service
30 November	National Committee for Radio Science meeting	Australian Academy of Science
2–5 December	Fenner Conference on the Environment *Wildlife population dynamics and management*	Australasian Wildlife Management Society
6 December	Council meeting	Australian Academy of Science
7 December	Digital Elevation Model Project meeting	Australian Academy of Science
8 December	Combined Academies Christmas meeting	The four learned Academies

Date	Function	Organisation
10 December	Tomography Workshop	Applied Maths, RSPhysSE, Australian National University
11 December	Public lecture by Professor Sir Michael Brady *Medical and molecular image analysis*	Australian Academy of Science
2 January	Opening session	National Youth Science Forum
13 January	*Science by Doing* training workshop welcome	Australian Academy of Science
14 January	Blakers Lecture, Summer School of Mathematics	ANU, Australian Association of Mathematical Teachers
16 January	Opening session	National Youth Science Forum
18 January	*Science by Doing* training workshop	Australian Academy of Science
24 January	Australia Day Awards	Department of Agriculture
31 January	National Committee for Chemistry meeting	Australian Academy of Science
7 February	Council and Sectional Committee meetings	Australian Academy of Science
8 February	President, Swiss Academy of Science	Australian Academy of Science
14–15 February	Workshop *Enhancing the quality of the experience of postdocs and early career researchers*	Australian Academy of Science
19 February	Chinese Academy of Sciences delegation	Australian Academy of Science
20 February	Public lecture by Professor Ian Chubb AC *Higher education – its time to change the framework*	Australia and New Zealand School of Government
21–22 February	Australian Frontiers of Science symposium	Australian Academy of Science
25 February	Special general meeting	Capital Towers Canberra Units Plan
28–29 February	National Indigenous Health Summit	Human Rights and Equal Opportunity Commission
3 March	Comined Academies dinner Professor David Lindenmayer FAA *The science underpinning the conservation and management of ecological communities*	The four learned Academies
4 March	Industry briefing	Department of Agriculture, Fisheries and Forestry
4 March	Public lecture by Dr Martyn Jeggo *Being prepared – from a diagnostic laboratory perspective*	Australian Academy of Science
5 March	*Primary Connections* education staff development	Australian Academy of Science
6 March	Council meeting	Australian Academy of Science
12–13 March	Future directions for Australian climate change science	CSIRO Department of Climate Change Bureau of Meteorology
18 March	Digital Elevation Model workshop	Department of Climate Change Australian Academy of Science Australian Academy of Technological Sciences and Engineering

Adolph Basser Library

The Library is named after the philanthropist Sir Adolph Basser (1887-1965) whose gift of £25,000 ($50,000) in 1960 enabled it to be established. It collects both published and unpublished material documenting the history of science in Australia, and promotes related historical research. There is particular emphasis on collecting biographical material about prominent scientists.

Manuscript collection

The manuscript collection contains 219 sets of papers, ranging in quantity from a few sheets of correspondence to many hundreds of items. Individual scientists represented in the collection include significant figures in CSIRO such as Sir David Rivett FAA, Sir Ian Wark FAA and Dr Lloyd Rees FAA, academics such as Professor Frank Fenner FAA and Sir Ernest Titterton FAA and more than 60 other Fellows of the Academy. The collection is not limited to Fellows, however; the papers of Sir Neil Hamilton Fairley, for example, are heavily used by people interested in malarial research. A number of scientific societies have also chosen the Basser Library as the repository for their archives, with the Australian Institute of Physics and the Geological Society of Australia providing the largest collections.

The Library's manuscript collections are publicised throughout the archival community. In addition to being listed on the Academy's website, they are accessible through RAAM, the National Library's Register of Australian Archives and Manuscripts.

Photo: © Irene Dowdy

Visitors inspect the library's collection during open day

Books and journals

The collection of printed material also contains much of value to research workers. Of particular interest are the back sets of Australian scientific periodicals including those produced by the early colonial Royal Societies and the other voluntary scientific associations that flourished in Australia in the 19th century, such as the Linnean Society of New South Wales.

Staffing and use

The library is currently staffed four days a week (Tuesdays to Fridays) by a qualified librarian with training in archives work. Opening hours are 9.30am to 5.30pm. It is open to all bona fide researchers. Queries are received from a variety of sources ranging from family historians to scholars. Our biographical resources, in particular the biographies of Australian botanists compiled for the Hunt Institute, are regularly used, for example by the staff of the Australian Dictionary of Biography. In the past year researchers have come from as close as the Australian National University to as far as the USA and Scotland.

Moran Award for History of Science Research

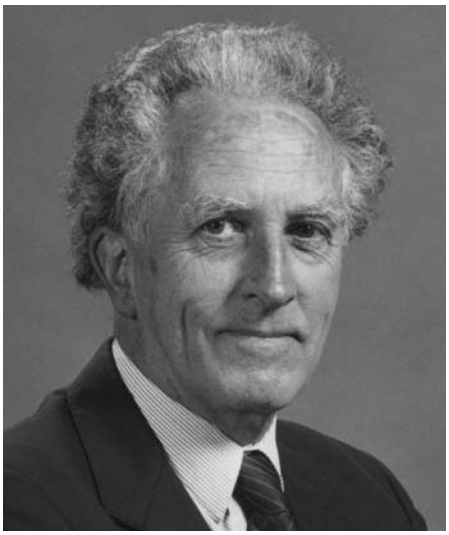
Each year the Library offers an award of $2,500 to encourage use of the collections by postgraduate students and other independent researchers. This award is advertised in June.

More information about the Basser Library is available at:
www.science.org.au/academy/basser.htm

Obituary notices

John Robert Anderson

Died 26 February 2007, elected to Fellowship 1972



John Robert Anderson

John Anderson was born in Sydney, NSW on 5 March 1928. He was an only child and his father died before John finished primary school. He and his mother were living in a small flat in Darlinghurst when he gained admission to Sydney High School, a competitive entry High School, in 1940. There he met Arthur Pulford who has kindly provided much of this information regarding John's early life. On leaving school it was not financially possible for him to go to university, and he took a job as a research assistant to Dr Pip Lipson at the CSIRO Division of Wool Technology then based in Railway Square Sydney before its move to Geelong. The situation of the laboratory was excellent for it allowed John to study for a Diploma in Chemistry in the evenings at the nearby Sydney Technical College, commencing in 1945. Before John gained his Diploma the Technical College became the NSW University of Technology and A.E Alexander arrived as Professor of Chemistry. This was highly fortunate for John in that Alexander took him under his wing, persuaded him to convert from a Diploma to a Degree, and on graduation in 1950 to successfully apply for the newly created Shell Scholarship. John was a strong candidate for he already had several publications either published or in preparation arising from his studies at the Technical College/University, and a communication to Nature, *Twist in Wool*, in 1946 with Freney and Deane arising from his work in the wool area. The award of the scholarship allowed him to study for a PhD in Cambridge. His supervisor in Cambridge was Charles Kemball who was establishing himself as an expert in the field of heterogeneous catalysis. John enthusiastically participated in this work and papers describing catalysis on evaporated metal films were published in the *Proceedings of the Royal Society* and the *Transactions of the Faraday Society*. Charles Kemball was appointed to the Chair of Chemistry in the Queens University of Belfast in 1955 and John spent some time working in Queens on completion of his PhD having been awarded a highly competitive Ramsay Memorial Fellowship.

John returned to Australia in 1956 to a Senior Lectureship in the University of Melbourne which already had a strong solid state-surface chemistry activity under the influence of Prof. J.S. Anderson, no relative of John's. John soon built up a research group with some excellent PhD students including Bruce Baker, Neville Clark and Neil Avery. The group studied reactions of hydrocarbons and later organic amines over metal films. They discovered that skeletal rearrangements occurred over platinum films, and established a mechanism for this reaction which became known as the 'Anderson and Avery Reaction'. The catalyst specificity of some of these reactions was shown to be based on the trigonal geometric arrangement of the metal surface atoms and this triggered a large amount of international interest. This type of chemistry needed expensive and sophisticated instrumentation in order to flourish. John developed a strong rapport with ICI Research Laboratories at Deer Park, and obtained large grants from them to purchase instruments such as a MS 10 mass spectrometer and a Keithley 610 solid state electrometer. In 1964 the group coupled a gas chromatograph with a mass spectrometer, probably the first use of GCMS in Australia.

In 1965 John was appointed to a Chair of Physical Sciences at the newly created Flinders University, Adelaide's second university. He threw himself into the large task of helping to set up an exciting new School integrating the disciplines of physics and chemistry and took on the chairmanship of the School from1967 to 1969. He

soon re-established his research group benefiting from strong financial support from the ARC and technical support from the university, and continued to produce high quality work in surface chemistry and catalysis. He was the inaugural Chair of the RACI Solid State Division and oversaw its first meeting in Adelaide in 1968.

In 1970 he was appointed Chief of the CSIRO Division of Tribophysics which later became the Division of Material Science. As Chief he oversaw the Division's move from laboratories at Fishermans Bend and the University of Melbourne to a well planned facility on the CSIRO Clayton site. He recruited several bright young chemists and enhanced his international reputation in catalysis by helping establish the correlation between surface structure and reaction specificity. John acted as Director of the newly created Institute of Physical Sciences from 1979 to 1980 but found that this administrative position made it very difficult to carry out research and resigned.

On his retirement John was appointed to an Honorary Professorship in the School of Chemistry at Monash University. John shared an interest with Professor Roy Jackson in the ways in which homogeneous catalysts could be immobilised on or in solid supports, thus making them recoverable and reusable heterogeneous catalysts with greater commercial potential. Attention focused on enantioselective homogeneous catalysts, which not only usually contain expensive metals but also expensive chiral ligands making their recovery and reuse even more of commercial interest. It was also thought that constraining the catalyst within the pores of a meso-porous material may well lead to a restricted number of geometries in the transition states of these reactions, hopefully leading to higher enantioselectivity. The project was dependent on the availability of chiral catalysts and the expertise of Professor Ron Dickson was sought and a joint ARC grant obtained. The results obtained were as good as or better than those obtained by other groups, but the lack of reproducibility removed all chance of commercial exploitation although several papers were accepted for publication by international journals.

John maintained his interest in chemistry and his enthusiasm for research until the time came when he could no longer come to Monash. He still asked how research was going when visited in his nursing home.

We thank John's sons, Matthew and Charles together with their partners Janice and Tiziana for helping with this notice.

Roy Jackson

Neil Avery

Wilbur Norman Christiansen

Died 26 April 2007, elected to Fellowship 1959

Wilbur Norman (Chris) Christiansen

WN (Chris) Christiansen was an innovative and influential pioneer in world radioastronomy.

Born in Melbourne Australia on 9 August 1913, Chris graduated BSc in 1934 and MSc with First Class Honours in 1935 from the University of Melbourne. He was awarded the Dwight Prize in Physics in 1931 and the Kernot Prize in 1934. He graduated Doctor of Science at Melbourne University in 1953.

While a graduate student at Melbourne in 1935 he discovered, with Raymond Crabtree and Tom Laby, that 'light' and 'heavy' water could be separated by fractional distillation, indicating that special measures must be taken in purifying water prior to analysing its isotopic content.

In 1937, after a two year appointment with the Commonwealth X-ray and Radium Laboratory, he joined Geoffrey Builder and Alfred Green, pioneers in ionospheric research, at the AWA Ltd Research Laboratory in Sydney, where his major work was concentrated on the design of stacked rhombic antennas for overseas

short-wave communications. Published in the AWA Technical Review, this work appeared subsequently in the CCIR High Frequency Directional Antennae Handbook and was widely referenced. The Overseas Telecommunications Commission, AWA's successor in operating the short wave services, made extensive use of the designs.

In 1948 Christiansen joined Joe Pawsey's Radioastronomy group at the Radiophysics Division of CSIRO. He became involved in solar radio astronomy and organised observations of two partial solar eclipses at a wavelength of 50 cm. These observations showed that regions of the Sun of high radio emission (associated with sunspots) had dimensions about one-tenth of the solar diameter. The discovery led to the development of the 'grating array' which achieved high resolution from its length and produced multiple responses on the sky separated by a number of solar diameters. The first grating telescope (1951) at Potts Hill allowed the distribution of radio brightness across the Sun to be studied as the Sun drifted through the responses during the day. It was found that the enhanced emissions came from regions in the lower corona of the Sun. Their dimensions and height above the photosphere could be determined for the first time.

A second investigation concerned the background or 'quiet sun' radiation. Christiansen with Joe Warburton made use of two gratings, one in an east-west and one in a north-south direction to observe the Sun from dawn until dusk and obtained the two-dimensional brightness distribution from these observations. This approach was an early application of earth-rotational synthesis to produce for the first time a radio map with a resolution as fine as four minutes of arc.

A new instrument which combined the grating with the Mills Cross principle was subsequently built at the Fleurs field station near Badgery's Creek. Known as the 'Chris Cross', the telescope provided daily two-dimensional maps of the Sun with a resolution of 3 arc minutes from 1957 onwards. It was the first of a number of similar instruments built around the world.

In 1952, Christiansen and Jim Hindman confirmed the discovery, by Harold Ewen, of 21 cm line radiation from ground-state hydrogen in space, and went on to make the first survey of H-line emission from space, obtaining the first radio evidence of the existence of spiral arms in our Galaxy.

During this period at CSIRO (1948-59) Chris was awarded the Syme Prize for Research by the University of Melbourne, and a paper describing the design of the Grating Cross received the Fleming Premium of the Institution of Electrical Engineers in 1961.

In 1960 Chris was appointed to the Chair of Electrical Engineering at the University of Sydney. He did not take up his post immediately but spent 15 months at Leiden University as the leader of an international design team for the 'Benelux Cross Project'. This project was abandoned but Chris maintained an active collaboration with the Dutch group developing the Westerbork Telescope.

Back in Sydney, he attempted, unsuccessfully, to gain financial support to build a 30m diameter 'hole-in-the-ground' spherical reflecting telescope for use at millimetre wavelengths. He then requested that CSIRO donate its field station at Fleurs, where his grating cross was situated, to the University of Sydney. This was agreed to and he set about changing this instrument from a low sensitivity, 3 arc min resolving power instrument, designed for solar observations, into a high resolution rotational synthesis telescope. As the Fleurs Synthesis Telescope, it would be used for galactic and extra-galactic astronomical observations. Over a period of more than 15 years, it was to be an important test-bed for Electrical Engineering PhDs and a critical training ground for the next generation of engineers in Australian Radioastronomy. These engineers played key roles in the design of the Australia Telescope and the SKA as well as a number of overseas instruments. Chris had a strong belief in the benefit for students of working on large complex projects in a team environment.

In addition to the work in radioastronomy, Chris established a research group to tackle problems in the radio navigation of civil aircraft. This group earned a considerable reputation internationally.

From the mid sixties, Chris was involved with the design and construction of a large grating telescope (later to become a rotational synthesis instrument) in Peking. He spent many months with the young radio astronomy group of the Peking Observatory and also, at various stages, had groups of Chinese radio astronomers working with him in Sydney.

In 1969, Chris published a book called *Radiotelescopes* with Swedish astronomer Jan Högbom, who had worked with him in Leiden. It was published by Cambridge University Press. A Russian translation appeared in 1971.

He was awarded the Peter Nicol Russell Medal, the premium award of the Institution of Engineers Australia, in 1970, and the medal of ADION from the Nice Observatory in France, in 1976.

He took on significant roles with the international scientific unions. He served as a Vice-President of the International Astronomical Union (IAU) 1964-70, President of the Radioastronomy Commission of the International Union for Radio Science (URSI) 1963-66, Vice-President of URSI 1972-78 and then President 1978-81. He was a member of the General Committee of the International Council of Scientific Unions 1978-81.

In Australia he served on a number of Committees. In the Academy of Science he was Foreign Secretary (1981-85), served on the Council for two terms, and was Chairman of several committees of the Academy, including the National Committee for Radio Science 1962-70. He was President of the Astronomical Society of Australia 1977-79.

He was the Independent Technical Advisor to the Committee of Inquiry into Radio Australia and was a member of the Australia-China Council of the Department of Foreign Affairs. He was a UNESCO Consultant in India on the Project for the construction of a 'Giant Equatorial Radiotelescope'.

Chris was an Honorary Fellow of the Institution of Engineers, Australia, and a Fellow of the Institution of Electrical Engineers (UK), the Institution of Radio and Electronic Engineers (Aust), the Institute of Physics (UK), the Australian Institute of Physics, and the Royal Astronomical Society (UK).

On retirement in 1979 from the Chair of Electrical Engineering at the University of Sydney, Chris was given the title of Professor Emeritus and later awarded the degree of Doctor of Science in Engineering, honoris causa. He was a visiting Fellow at the Mount Stromlo Observatory of the Australian National University from 1980 to 1985. He also received honorary degrees from the University of Melbourne (1982) and University of Western Sydney (1994) and was elected a Fellow of the Chinese Academy of Sciences in 1996.

Chris Christiansen is survived by his sons, Steve and Tim. His wife, Elspeth, died in 2001. Their son Peter died in 1992.

Bob Frater

Gregory Maxwell Kelly

Died 26 January 2007, elected to Fellowship 1972

Gregory Maxwell (Max) Kelly was born in Annandale, NSW, on 5 June 1930. His father, Owen Kelly, was a radio operator on merchant ships plying the Pacific region before he married Rita McCauley, who came from a farming family in Nelligen. After their marriage they together bought a business which collapsed during the Depression. Owen became a telegraphist with the Post Office and in his later years had a variety of jobs, the last of which was taxi-driving. Max's only sibling, Michael, was born some seven years later.

Gregory Maxwell (Max) Kelly

Max received all his schooling at Bondi Beach where he was a student of the Marist Brothers throughout his primary and secondary education. He topped the NSW High School Leaving Certificate Examination overall. He went on to win in 1951 the University Medal for Mathematics at the University of Sydney and to gain the James King of Irrawang Travelling Scholarship to study at Cambridge. There he obtained a BA with First Class Honours and two Wright's Prizes in 1953, a Rayleigh Prize in 1955, and a PhD in 1957; the doctorate was in algebraic topology under the supervision of Shaun Wylie. Max returned to the University of Sydney in early 1957 as a Lecturer in Pure Mathematics, and was promoted to Senior Lecturer in 1961 and to Reader in 1965. He served the NSW Department of Education as Assessor for the Mathematics Leaving Certificate Examinations. In November 1960 Max married Imogen Datson.

Max was solely responsible for introducing category theory into Australia at a time when the subject was in its infancy. The Eilenberg-Kelly monograph 'Closed Categories' of 1966 set the stage for two more generations of Australian category theorists. This research stream reached maturity with Max's book Basic *Concepts of Enriched Category Theory* (CUP 1982), and now finds application in many areas of mathematics, theoretical physics, computer architecture, software design, and information management.

Although Max heard the basic definitions of category theory at Cambridge, the power of the subject was impressed on him when, while visiting MIT in late 1962, he attended some of Michael Atiyah's lectures. Soon Max had himself developed lasting ideas in the area. While visiting Tulane University in 1963/64, he met Samuel Eilenberg at Las Cruces who insisted that Max remain in the USA for another year. Indeed Eilenberg, on the spot with one phone call, arranged a job at the University of Illinois for 1964/65.

Max was a spontaneous lecturer, often referring to having decided on the content that morning while in the shower or crossing the Bridge. When Max had made a topic his own, he was able to provide a thorough account of it, without notes, at the drop of a hat.

In 1967, Max moved to the University of NSW as Professor. After visits to Columbia University (January-May 1968) with Eilenberg and the University of Chicago (1970-71) with Saunders Mac Lane, Max returned to UNSW and arranged a sabbatical at UNSW for Peter Freyd (University of Pennsylvania). During Freyd's stay Max organised, with the strong support of Bernhard Neumann, the first conference in Australia on category theory.

Max was elected a Fellow of the Australian Academy of Science in 1972 and moved back to the University of Sydney as Professor in 1973. He was a true academic: erudite in the classics, prolific researcher and publisher, editor for several journals, successful department head, traveller, linguist, raconteur, and bon-vivant. He supervised five PhD students to completion; other supervisions include the MSc of Amnon Neeman in 1979.

Max was one of the first mathematicians to attract research funding from the Australian Government through the ARC contributing to recognition of the legitimacy of funding for research fellows, visiting researchers, and travel. Another way in which Max broke down the tyranny of distance for Australian category theory was to establish and maintain a Category Mailing List in those email-free days. Preprints and that List were typed using an IBM electric golf ball typewriter. The List was photocopied onto address labels.

All of Max's 90 or so scientific publications exhibit his obsession for completeness, beauty and accuracy. Michael Makkai (McGill) claims Max as a logician in his passionate insistence on precision and clarity in mathematics and his belief in, and search for, the grand order at the heart of the world. Much of Max's work could be called higher order universal algebra.

Max was very aware of how fortunate his life had been, and felt an obligation to give something back to the community. He gave freely of his time to aspiring young mathematicians and to all those keen to learn. For example, frustrated by bureaucracies, he enlisted the power of the media and was able to borrow for a blind girl in the Catholic school system a mathematics textbook in Braille which had been gathering dust in a State Department of Education office. This commitment to social justice was further evidenced by his involvement with Action for World Development and his efforts to help the Aboriginal community in Redfern. He befriended Fr Ted Kennedy, Mum Shirl and others active in these movements. He also questioned the morality of the Vietnam War, making himself quite unpopular with some of the clergy of the day.

Many were moved by the words of encouragement Max offered young category theorists in his speech at the 2006 Category Theory Conference dinner in White Point, Nova Scotia. Max had an active and analytical mind to the very end. He attended the Category Seminar at Macquarie two weeks before he died, excusing himself the next week because of an appointment. He started learning ancient Greek recently, and in his last months was engaged in complex research on coherence theory, which he was typing despite failing eyesight. This research will be completed and published by colleagues in Canada and Italy.

Max Kelly is survived by Imogen, their children, Dominic, Martin, Catherine and Simon, and 10 grandchildren.

Ross Street

SECRETARIAT

The Secretariat is based at Ian Potter House, Gordon Street, Canberra.

General enquiries
Phone: + 61 2 6201 9400
Email: eb@science.org.au

Chief Executive – Professor Sue Meek, BSc(Hons), MSc, PhD, FTSE
Phone: + 61 2 6201 9401
Email: sue.meek@science.org.au

Adolph Basser Library – Rosanne Walker, BSc, DipLib
Phone: + 61 2 6201 9431
Email: rosanne.walker@science.org.au

Awards – Faye Nicholas, BA, GradDipLegStud
Phone: + 61 2 6201 9407
Email: faye.nicholas@science.org.au

Business and finance and human resources – Phil Greenwood
Phone: + 61 2 6201 9420
Email: phil.greenwood@science.org.au

Education and public awareness – Shelley Peers, BSc, GradDipTeach(Prim), MEd(Research)
Phone: + 61 2 6201 9424
Email: shelley.peers@science.org.au

Facilities, events and OH&S – Leah Moncrieff
Phone: + 61 2 6201 9430
Email: leah.moncrieff@science.org.au

Fellowship and elections – Caroline Giddings, BSc, BA (Visual)(Hons)
Phone: + 61 2 6201 9406
Email: caroline.giddings@science.org.au

International programs – Nancy Pritchard, BCom
Phone: +61 2 6201 9412
Email: nancy.pritchard@science.org.au

Media enquiries – Richard Bray, BSc
Phone: + 61 2 6201 9452
Email: richard.bray@science.org.au

National Committees – Jeanette Mill, BSc(Hons)
Phone: + 61 2 6201 9413
Email: jeanette.mill@science.org.au

Nova: Science in the news – Dr Rosalind Johnston, BSc(Hons), PhD, GradDipEd
Phone: + 61 2 6201 9444
Email: roz.johnston@science.org.au

Primary Connections – Shannon Newham
Phone: +61 2 6201 9403
Email: shannon.newham@science.org.au

Publication and media enquires – Sharon Abrahams, BSc(Hons), PhD, MSc(SciComm)
Phone: +61 2 6201 9415
Email: sharon.abrahams@science.org.au

Science by Doing – Associate Professor Richard John, BSc(Hons), PhD
Phone: +61 2 6201 9408
Email: richard.john@science.org.au

Science policy – Dr Sophia Lindeyer, BSc(Hons), PhD
Phone: + 61 2 6201 9409
Email: sophia.lindeyer@science.org.au

Web Administrator – Tania Turvey
Phone: + 61 2 6201 9449
Email: tania.turvey@science.org.au

www.science.org.au