



*The Australian
Academy of Science*

Annual Report
2005 – 2006

THE AUSTRALIAN ACADEMY OF SCIENCE

The Australian Academy of Science is an independent, not-for-profit organisation of Australia's leading scientists. It recognises research excellence, advises government, organises scientific conferences, publishes school textbooks and scientific journals, conducts international scientific relations, and fosters science education and the public awareness of science and technology.

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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

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Cover: A selection of the Academy's medals, awarded for distinguished research.

Report of the Council

For the year

1 May 2005 – 30 April 2006

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President's foreword

For more than 50 years the Australian Academy of Science has provided independent scientific advice to the nation and promoted a scientific culture and a long-term scientific vision within Australian society. As you will see in this year's Annual Report, the Academy has continued to fulfil this mission, as articulated by the 2005 committee of review of the learned Academies. The Academy was pleased to receive a most professional and considered review report that recommends adequate measures for the work of the learned Academies. It is my opinion that the Australian Government, and the Australian community more broadly, recognises the Academy as a resource of high-level expertise on scientific matters, as an authoritative source of advice on national issues involving science and its applications, and as a body that provides evidence-based leadership in protection and management of the national estate.

You will see in the Report that we have made a special effort to develop a nationwide commitment to science education of the children and youth of Australia. This, in my view, is one of the most effective means of bringing an understanding of science to the broader community.

We have maintained a continuing commitment to the high quality, secondary school science resource, *Nova*, our website that has now had more than ten million visits. *Nova*, where the main sponsor is the Commonwealth Bank Foundation, is now being incorporated into the communications strategy of many organisations, ranging from the NRMA Road Safety Trust to Australian Government Departments, Cooperative Research Centres and Australian Research Council Research Networks.

I am pleased to report to you the Academy's continuing initiative in introducing science into literacy education for primary school children. For the Academy, partnerships with government departments are an efficient way to do business. An excellent example is the way the Academy and the Department of Education, Science and Training are working together to progress the Academy's initiative known as *Primary Connections*. This program has attracted substantial Australian Government funding. *Primary Connections* is a new approach to teaching science and literacy in primary schools, where science units are incorporated into the literacy program. It is likely to provide major improvements in the quality of science teaching and the engagement of our primary school children in understanding that science underpins their everyday lives.

We have worked closely with the scientific community, the other learned Academies (through NAF, the National Academies Forum) and government policy makers in tackling some of the big challenges facing the nation, on issues ranging from stem cell research to National Research Infrastructure. We have been assisted in this work by some of our 20 National Committees. Science policy activities have involved contributions to several government enquiries, such as the Research Quality Framework and the National Collaborative Research Infrastructure Strategy, and more proactive contributions such as the Academy's November 2005 document on *Research and innovation in Australia: a policy statement*.

Underpinning all of our activities is the awareness that we need to engage and encourage our early to mid-career researchers, not only for their own career development, but also because they have so much to contribute. This year the Academy held its fourth annual think tank for young researchers, on this occasion to discuss 'Biotechnology and the future of Australian agriculture'. The resulting report was widely commended. The Academy seeks to nurture future generations of scientists by exposing them to scientific issues of national and international importance, to ensure a long-term scientific vision for Australian society.

I would like to thank outgoing Councillors Peter Hall, Dave Kemp and Bob Watts for their many contributions to Academy activities over the years. Two of our Officers have come to the end of their terms: Bruce McKellar as Foreign Secretary, and John McKenzie as Secretary, Education and Science Awareness. These two Officers have given generously and graciously of their time and have provided much valued assistance to the Academy. On behalf of the Fellowship I thank them and also the Secretariat for their commitment to the work and ideals of the Academy.

Many of the initiatives undertaken by the Academy have been made possible only through the generosity of our donors. I express my unreserved thanks to them and to the Australian Foundation for Science.

Jim Peacock AC PresAA FRS FTSE
April 2006

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.

Council members

Dr Jim Peacock⁶ – President
Dr Bob Frater⁸ – Secretary (Physical Sciences) and Vice-President
Professor John Shine⁷ – Secretary (Biological Sciences) and Vice-President
Professor Philip Kuchel⁹ – Secretary (Science Policy)
Professor Bruce McKellar⁶ – Foreign Secretary
Dr Phil McFadden⁹ – Treasurer
Professor John McKenzie⁶ – Secretary (Education and Public Awareness)

Ordinary members (Physical Sciences)

Professor Michael Dopita⁷
Professor Leslie Field⁷
Professor Peter Hall⁶
Dr Trevor McDougall⁷
Dr Bob Watts⁶

Ordinary members (Biological Sciences)

Professor Julie Campbell⁶
Professor David Kemp⁶
Professor Lesley Rogers⁷
Professor Sally Smith⁸
Professor Bob Williamson⁸

6 Retiring at AGM 2006

7 Retiring at AGM 2007

8 Retiring at AGM 2008

9 Retiring at AGM 2009



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

Council members, February 2006.
Back row (from left): Philip Kuchel, Bob Watts, Peter Hall.
Centre (from left): Leslie Field, John McKenzie, Phil McFadden, Bob Frater, Bob Williamson, Bruce McKellar.
Front row (from left): Trevor McDougall, Michael Dopita, Sally Smith, Jim Peacock, John Shine, David Kemp, Lesley Rogers.
Absent: Julie Campbell.

The Fellowship

The Academy Fellowship is currently made up of 397 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, 30 April 2006:

Ada, G L
Adams, J M
Allen, D G
Anderson, B D O
Anderson, J M
Anderson, J R
Andrews, T J
Angus, J A
Angyal, S J
Antonia, R A
Appleby, C A
Archer, M
Armstrong, B K
Baddeley, A J
Banwell, M G
Barber, M N
Bartlett, P F
Bartnik, R A
Basten, A
Batterham, R J
Baxter, R C
Baxter, R J
Beckwith, A L J
Bedding, R A
Bennett, M A
Bennett, M R
Bergersen, F J
Berkovic, S F
Bilger, R W
Birch, L C
Bishop, P O
Blanden, R V
Blevin, W R
Boardman, N K
Boger, D V
Bond, A M
Boyden, S V
Boyle, B J
Brennan, M H
Brent, R P
Brown, G
Brown, R D
Bruce, M I
Buchdahl, H A
Budd, W F
Burdon, J J
Burger, H G

Burgess, A W
Burgman, M A
Burke, D J
Burnstock, G
Campbell, J H
Campbell, K S W
Canty, A J
Cavill, G W K
Celermajer, D S
Chalmers, J P
Chappell, B W
Chappell, J M A
Christiansen, W N
Clarebrough, L M
Clark, G M
Clark, R G
Clarke, A E
Cockburn, A
Cole, A R H
Cole, K D
Colless, M M
Colman, P M
Coltheart, M
Compston, W
Cook, D I
Cory, S
Costa, M
Costin, A B
Cowan, I R
Cowling, M G
Cowman, A F
Cox, G B
Craig, D P
Crompton, R W
Crossley, M J
Crozier, R H
Curtis, D R
Dance, I G
Dancer, E N
Day, M F C
Day, R H
de Kretser, D M
Delbourgo, R
Dennis, E S
Denton, D A
Dewar, R L
Doddrell, D M

Doherty, P C
Dopita, M A
Dracoulis, G D
Drummond, P D
Dunn, A R
Easton, C J
Eastwood, M G
Egan, J B
Ekers, R D
Elliott, W H
Ellis, G R A
Ellis, J G
Esler, M D
Evans, D J
Evans, L T
Evans, R J
Ewens, W J
Faraone, L
Farquhar, G D
Fenner, F J
Field, L D
Figgis, B N
Flambaum, V V
Fletcher, N H
Forrester, P J
Fraser, R D B
Frater, R H
Frazer, I H
Frederiksen, J S
Freeman, H C
Freeman, K C
Furness, J B
Gandevia, S C
Gani, J M
Gascoigne, S C B
Gibbs, A J
Gibson, F W E
Gilbert, R G
Gleadow, A J W
Goodnow, C C
Goodwin, G C
Graham, R M
Graves, J A M
Green, D H
Green, M A
Grieser, F
Griffiths, R W

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

Grimshaw, R H J
Groves, D I
Gunning, B E S
Guttman, A J
Haddad, P R
Hales, A L
Hall, P G
Hall, R M
Hamann, S D
Hannaford, P
Hardham, A R
Harrison, T M
Hartley, R I
Hatch, M D
Head, A K
Healy, T W
Heyde, C C
Higgins, T J
Hilton, D J
Hinde, D J
Hirst, G D S
Hobbs, B E
Hobbs, R J
Hoffmann, A A
Holliday, R
Holloway, B W
Holman, M E
Holmes, A B
Holt, P G
Horridge, G A
Hughes, T P
Hunter, R J
Hurst, C A
Hush, N S
Hutchinson, J E
Hyde, B G
Hyde, S T
Hynes, M J
Imberger, J
Israelachvili, J N
Jacobsen, J V
Jagadish, C
Jameson, G J
Jeffrey, S W
Johnstone, B M
Jones, The Hon. B O
Kay, B H
Kelly, G M
Kemp, B E
Kemp, D J
Kennett, B L N
Kerr, A
Kerr, J F R
Kivshar, Y
Klein, A G
Korner, P I
Kotagiri, R

Kuchel, P W
Ladiges, P Y
Lamb, T D
Lambeck, K
Lance, J W
Larkins, F P
Law, P G
Le Couteur, K J
Lehrer, G I
Letham, D S
Levick, W R
Lindoy, L F
Linnane, A W
Lovering, J F
Lumbers, E R
Lyons, L E
McCloskey, D I
McComb, A J
McCormick, P G
McCracken, K G
McCulloch, M T
McDougall, I
McDougall, T J
McElhinny, M W
McEwan, A D
McFadden, G I
McFadden, P L
McIntosh, A G R
McIntosh, R A
McKay, B D
McKellar, B H J
McKenzie, J A
McLachlan, E M
McLeod, J G
Mackay, I R
Mai, Y
Main, A R
Manchester, R N
Mander, L N
Marcelja, S
Marshall, B J
Martin, R L
Martin, T J
Masters, C L
Mathieson, A M
Mayo, O
Melrose, D B
Mendelsohn, F A O
Metcalf, D
Meyer, R E
Milburn, G J
Miller, J F A P
Millis, N F
Mills, B Y
Mitchell, G F
Moodie, A F
Moore, J B

Moran, W
Morrison, J D
Morton, D C
Mould, J R
Myers, R H
Napper, D H
Neeman, A
Newton, J O
Nichol, L W
Nicola, N A
Ninham, B W
Norrish, K
Nossal, Sir G J V
Nugent, K A
O'Reilly, S Y
Orlowska, M E
Osborne, M R
Osmond, C B
Paddon-Row, M N
Paltridge, G W
Passioura, J
Pate, J S
Paterson, M S
Peacock, W J
Pearman, G I
Pegg, D T
Pettigrew, J D
Phan-Thien, N
Pickett-Heaps, J D
Pittard, A J
Porter, R
Possingham, H P
Poulos, H G
Powell, R
Praeger, C E
Quirk, J P
Radom, L W
Ralph, J T
Ralston, J
Randolph, M F
Redman, S J
Reeves, P R
Reid, A F
Renfree, M B
Rickards, R W
Rintoul, S R
Ritchie, I M
Rizzardo, E
Robinson, D W
Robson, R
Rogers, C
Rogers, G E
Rogers, L J
Ross, I G
Rubinstein, J H
Runnegar, B N
Sambrook, J F

More information on each of the new Fellows is available at www.science.org.au/academy/fellows/2006.htm.

Sara, V R	Stokes, R H	Wake, R G
Sargeson, A M	Stone, J	Walker, N A
Seneta, E	Strasser, A	Wall, G E
Sharman, G B	Street, R	Wallace, H R
Shine, J	Street, R H	Walter, M R
Shine, R	Sullivan, C E	Warren, J R
Short, R V	Summons, R E	Watts, R O
Shortman, K D	Sutherland, G R	Weigold, E
Shparlinski, I	Sutherland, R L	Weiss, D E
Simmons, M Y	Swan, J M	Wentrup, C
Simon, L	Symons, R H	White, G K
Simpson, E R	Tanner, R I	White, J W
Slatyer, R O	Taylor, S R	Whitten, M J
Sloan, I H	Thomas, A W	Whitten, W K
Smith, F A	Thompson, A M	Wild, J P
Smith, S E	Thompson, C J	Wild, S B
Smyth, D R	Trudinger, N S	Williams, J F
Snyder, A W	Truswell, E M	Williams, J S
Solomon, D H	Tuck, E O	Williams, R
Speed, T P	Tucker, R S	Williamson, R E
Sprent, J	Turner, J S	Williamson, R
Sprent, J F A	Tyerman, S D	Wintour-Coghlan, E M
Sridhar, T	Tyndale-Biscoe, C H	Wiskich, J T
Srinivasan, M V	Underwood, A J	Womersley, H B S
Stalker, R J	Vaux, D L	Woodall, R
Stanley, F J	Veevers, J J	Worner, H K
Stanton, R L	Vincent, R A	Zillman, J W
Stephenson, D G	von Caemmerer, S	
Sternhell, S	von Itzstein, M	

Corresponding Members

Andersson, B	de Gennes, P-G	Öquist, F G
Atiyah, Sir M	Feldmann, M	Oxburgh, Lord R
Bernard, J	Gajdusek, D C	Raven, P H
Bjorkman, O E	Harris, Sir H	Salpeter, E E
Boyer, J S	Jones, V F R	Sanger, F
Brooks, R A	Krebs, C J	Slater, E C
Connell, J H	Lu, Y	Tao, T
Cornforth, Sir J W	May, Lord R	Zinkernagel, R M

New Fellows

We congratulate the following scientists who were elected to Fellowship on 24 March 2006.

Professor David Grant Allen

- Professor of Physiology, School of Medical Sciences, University of Sydney

Dr Brian John Boyle

- Director, CSIRO Australia Telescope National Facility, Sydney

Professor Mark Alexander Burgman

- Professor, School of Botany, University of Melbourne

Professor David Stephen Celermajer

- Scandrett Professor of Cardiology, University of Sydney, and Department of Cardiology, Royal Prince Alfred Hospital

Professor (John) Barry Egan

- Professor, School of Molecular and Biomedical Science, University of Adelaide

Professor Lorenzo Faraone

- Professor, School of Electrical Engineering, University of Western Australia

Professor David John Hinde

- Professor, Department of Nuclear Physics, Research School of Physical Sciences and Engineering, Australian National University, Canberra

Professor Andrew Bruce Holmes

- ARC Federation Fellowship and VESKI Inaugural Fellow, Bio21 Institute, University of Melbourne

Professor Brian Herbert Kay

- Deputy Director, Australian Centre for International and Tropical Health and Nutrition, Queensland Institute of Medical Research

Professor Roger Powell

- Professorial Fellow, School of Earth Sciences, University of Melbourne

Dr Stephen Rich Rintoul

- Senior Principal Research Scientist, CSIRO Marine and Atmospheric Research, Hobart

Professor Igor Shparlinski

- Professor, Department of Computing, Macquarie University, Sydney

Professor Michelle Yvonne Simmons

- ARC Federation Fellow, Experimental Condensed Matter Physics, Centre for Quantum Computer Technology, School of Physics, University of New South Wales

Professor Evan Rutherford Simpson

- Director, Prince Henry's Institute of Medical Research, Monash University, Melbourne

Professor Jonathan Sprent

- Professor, Garvan Institute of Medical Research, Sydney

Professor Susanne von Caemmerer

- Professor, Molecular Plant Physiology Group, Research School of Biological Sciences, Australian National University, Canberra

Special Elections

Professor Robin Warren

- Emeritus Professor, University of Western Australia

Dr John Zillman

- President, Australian Academy of Technological Sciences and Engineering, Melbourne

New Corresponding Members

Professor Rodney Allen Brooks

- Panasonic Professor of Robotics and Director, Computer Science and Artificial Intelligence Laboratory, Massachusetts Institute of Technology, Cambridge, USA

Professor Terence Tao

- Professor, Department of Mathematics, University of California, Los Angeles, USA

Deaths since 20 April 2005

We regret to record the following deaths:

Professor Peter Gage, 13 August 2005

Professor Ian McCarthy, 23 April 2005

Professor Ren Potts, AO, FTSE, 9 August 2005

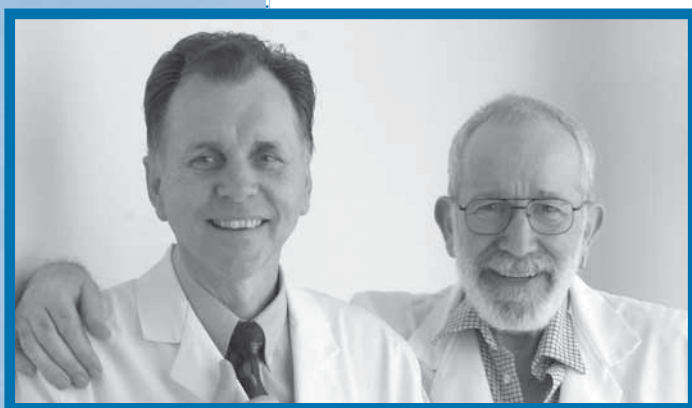
Professor George Szekeres, AM, 28 August 2005

Corresponding Members

Professor Richard Dalitz, FRS, 13 January 2006

Professor Henry Taube, Nobel Laureate, 16 November 2005

Honours awarded to Fellows during the year



Barry Marshall and Robin Warren. (Photo courtesy of Frances Andrijich Photographer www.andrijich.com.au)

2005 Nobel Prize in Physiology or Medicine

The Nobel Assembly at the Karolinska Institute awarded the 2005 Nobel Prize in Physiology or Medicine to Professor Barry Marshall and Professor Robin Warren for their discovery of 'the bacterium *Helicobacter pylori* and its role in gastritis and peptic ulcer disease'.

Other honours awarded

Professor Rodney Baxter

- American Physical Society 2006 Onsager Prize
- Norwegian University of Science and Technology Onsager Lectureship and Medal

Professor Sam Berkovic

- Order of Australia: Member in the General Division (AM)
- John Curtin School of Medical Research, Curtin Medal 2005
- Zülch Prize, Max Planck Society

Professor David Boger

- Prime Minister's Prize for Science 2005

Professor Alan Bond

- Australian Research Council Federation Fellowship

Professor Gavin Brown

- Order of Australia: Officer in the General Division (AO)

Professor David de Kretser

- Governor of Victoria

Professor Ron Ekers

- Elected to the Royal Society of London Fellowship

Professor Frank Fenner

- ACT Senior Australian of the Year for 2006

Professor Ian Frazer

- Australian of the Year 2006
- CSIRO Eureka Prize for Leadership in Science

Professor Hans Freeman

- Order of Australia: Member in the General Division (AM)

Professor Chris Goodnow

- Commonwealth Health Minister's Award for Excellence in Health and Medical Research

Professor Jenny Graves

- L'Oréal-UNESCO Award for Women in Science 2006

Professor Tom Healy

- Order of Australia: Officer in the General Division (AO)

Professor Terry Hughes

- Australian Research Council Centre of Excellence in Innovative Science for Sustainable Management of Coral Reef Biodiversity

Professor Jorg Imberger

- Elected to the National Academy of Engineering (USA)

Professor Graeme Jameson

- Order of Australia: Officer in the General Division (AO)

Professor Brian Kennett

- Elected to the Royal Society of London Fellowship

Professor Pauline Ladiges

- Royal Society of Victoria Research Medal

Professor Trevor Lamb

- Australian Research Council Centre of Excellence in Vision Science

Professor Kurt Lambeck

- Elected Foreign Associate of the French Academy of Sciences

Sir Gus Nossal

- University of Melbourne created the Nossal Institute for Global Health

Professor Keith Nugent

- Australian Research Council Centre of Excellence in Coherent X-Ray Science

Dr Jim Peacock

- CSIRO Lifetime Achievement Medal

Professor Harry Poulos

- Australian Geomechanics Society, Kevin Nash Gold Medal 2005
- Elected Honorary Member of the Japanese Geotechnical Society

Professor Cheryl Praeger

- Honorary Doctorate, Free University of Brussels

Professor Rick Shine

- Order of Australia: Member in the General Division (AM)
- Australian Research Council Federation Fellowship

Professor Andrew Smith

- Honorary Professorship, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences



David Boger, winner of the Prime Minister's Prize for Science 2005.



Ian Frazer, Australian of the Year 2006.



Jenny Graves, winner of L'Oréal-UNESCO Award for Women in Science 2006.

Dr Hugh Tyndale-Biscoe

- Royal Zoological Society of NSW Whitley Medal

Professor Mark von Itzstein

- Royal Australian Chemical Institute Adrien Albert Award in the Division of Biomolecular Chemistry 2005

President appointed Chief Scientist

Dr Jim Peacock took up his appointment as Australia's new Chief Scientist on 1 March.

As President of the Academy of Science, Dr Peacock has been a strong advocate for the inclusion of science in policy making. He will play a critical role in advising the Government on science and technology issues that are important to Australia, including stem cell research, genetically modified food, energy and climate change. His strong international scientific links will ensure that Australia is alert to emerging technologies and new opportunities.

Dr Peacock's four-year term as President of the Academy comes to an end on 5 May 2006 when the Presidency passes to Professor Kurt Lambeck.



Julie Bishop, Minister for Education, Science and Training, congratulates Jim Peacock on his appointment as Chief Scientist.

Regional groups

The following reports for the period 1 May 2005 to 30 April 2006 have been received:

Representatives of Regional Groups were welcome participants in the teacher workshops that took place in five capital cities in June. Teachers participating in the trial of the Academy's *Primary Connections* attended the workshops as part of an ongoing professional development program. A highlight of each of the workshops was the lunchtime visit by Academy Fellows that added a special dimension to the day.

Australian Capital Territory

Chair: Professor John White

There were four meetings of the Canberra Fellows Dining Club and lecture series at the Shine Dome in 2005, as well as an end of year Christmas dinner. The Academies of the Social Sciences (ASSA), the Humanities (AAH), and Technological Sciences and Engineering (ATSE) also participated in this arrangement. The meetings and dinners, organised by Dr John Passioura, have had an average attendance of about 50 Fellows and guests. There were lectures from Professor Mandyam Srinivasan, 'Small brains, smart mind'; Dr Richard Grove, 'Jumping the garden fence: invasive garden plants in Australia'; and Dr Phil McFadden, 'Australian tsunami warning system: why we need it'.



John White.

In addition, this year the President held soirées in June, August and November entitled 'Global dimming, global warming, what's going on?' (lead speakers: Graham Farquhar, Roger Gifford, and Mike Roderick), 'Recent advances in nuclear energy research' (lead speakers: Ian Smith, Aidan Byrne, and George Dracoulis), and 'Integrative climate science, economics and sociology' (lead speakers: Graham Farquhar and Graeme Pearman) respectively. These soirées have been very popular and informative to Fellows and others in the Canberra region. All hope that these functions will be continued in 2006 and beyond.

In May 2005 a two-day symposium at the Shine Dome on 'Science and Ethics' was held in honour of Professor Frank Fenner. It was well attended by many Fellows and a lively and informed discussion occurred. The summary and thanks to participants was given by John White. John also spoke at a meeting arranged by ATSE, subsequent to a dinner at University House in November on the subject of 'Stem-cell ethics'.

New South Wales

Chair: Professor Elspeth McLachlan

During 2005, the NSW Fellows met twice at the Prince of Wales Medical Research Institute. At the first meeting on 14 March, the winners of the Pawsey and Fenner Medals for 2005, Professor Michelle Simmons and Associate Professor Brett Neilan (respectively), both from the University of New South Wales, presented talks about their research activities. On 3 August, a lecture on current NSW Government policy on support for science was presented by Professor Mick Reid, Director of the NSW Ministry of Science and Medical Research, and attended by some NSW Fellows of ATSE. On 1 November, Fellows and their partners dined at the Sky Phoenix restaurant where Professor Paul Davies of Macquarie University spoke after dinner.

Professor Elspeth McLachlan represented the Academy at the Business/Higher Education Round Table annual dinner on 18 November and attended a meeting of the NSW Committee of ATSE on 6 December, where possible joint activities during 2006 were discussed.

Queensland

Chair: Professor Julie Campbell

The highlight of the year for Queensland Fellows was the announcement that one of their members, Professor Ian Frazer, was declared 'Australian of the Year' for his discovery of a vaccine for cervical cancer. The vaccine, known as 'Gardasil' and 'Cervarix', is expected to become available in the developed world in mid-2006.

Professor Frazer and Professor Julie Campbell were on the Conference Organising Committee of the 2005 Sir Mark Oliphant Conference Series entitled 'BioNano: The Next Frontier' on 4–7 December 2005. The conference, hosted by the Australian Institute for Bioengineering and Nanotechnology (AIBN), brought together world leaders to discuss nanotechnology: enabling scientific discoveries and innovations in industry; the challenge of personalised medicine; tissue regeneration and tissue replacement; cells as factories: new products, new processes; and creating and facilitating commercial opportunities. Professor Sue Serjeantson was the Academy representative.

On 28 April 2005 eight Queensland Fellows held a dinner to plan future activities of the Group.

South Australia

Chair: Professor Andrew Smith

South Australian Fellows Professor Andrew Smith, Professor Sally Smith and Professor Stephen Tyerman were actively involved in hosting two delegations from China whose visits to Adelaide were outcomes of the first Australia-China Symposium 'Living Sustainably—What does this mean for you?', held in 2004. These activities are helping bring together the three universities and other research institutes in South Australia in international research initiatives in the environmental and agricultural sciences.



Elspeth McLachlan.



Julie Campbell.



Andrew Smith.



Tony Klein.

Victoria

Chair: Professor Tony Klein

The new Victorian Fellows' welcome symposium was held on 22 June in the form of a very well attended public lecture, intended to be of special interest to students and younger scientists as well as to the general public. Presentations were given by Professor Sam Berkovic, Professor Franz Grieser, Professor Geoff McFadden, Dr Jorgen Frederiksen and Dr Doug Hilton. In addition, Dr Ricky Johnstone, winner of the 2005 Gottschalk Medal, repeated the excellent talk that he gave at the Academy AGM in Canberra. Cocktails and dinner for Fellows and their guests followed the symposium.

The annual combined Academies' dinner was organised by ATSE and was held on 18 August at the Woodward Centre of the University of Melbourne. The after-dinner speaker was Dr Alan Finkel, Senior Vice-President of Axon Instruments and the recipient of a Clunies-Ross Award in 2005, who gave an illuminating talk about 'Defining moments in the life of an engineer cum neuroscientist'.

The Observatory Café in the Royal Botanic Gardens, original site of the Great Melbourne Telescope, was the venue for the Victorian Fellows' annual Christmas dinner on 24 November. A beautiful balmy night and a location steeped in Australian science history was enjoyed by 70 Fellows and guests who were treated to an excellent dinner and a recital by the Taillem Quartet—a brilliant young string ensemble of the Melbourne University Conservatorium of Music.

Academy review

The Department of Education, Science and Training (DEST) provides a grant-in-aid to each of the four learned Academies and to the National Academies Forum. The grant-in-aid guidelines call for a review of the scheme every five years. For the 2005 review, Minister Brendan Nelson appointed a three-person committee comprising Professor Bruce Alberts (outgoing President of the US National Academy of Sciences), Mr John Ralph, AC, FAA (Chair of the Australian Foundation for Science) and Professor John Hay, AC (Vice-Chancellor and President, University of Queensland). The committee met in Canberra on 17–18 September and interviewed representatives from the four academies.

The submission from the Australian Academy of Science is available at www.science.org.au/academy/5-year-review.pdf.

The Minister received the review report and in December wrote to say: 'I was pleased by the Review's positive report of the performance of the Australian Academy of Science as well as of the Academies more generally. The Government is considering the Review's recommendations for additional funding in the context of the 2006–2007 Budget.'

In recommending an increase in the annual grant-in-aid to the Academy of Science, the committee of review said: 'The main purpose of this increase is to allow the Academy of Science to continue and expand its programmes for outstanding early-career scientists.'

Of course, any review will find areas for improvement and the committee commented that the Academies should raise the media profile of their work, policies and outcomes. The committee went on to say: 'Despite a high volume of work in the public interest, the existence of the learned Academies is relatively little known in the general community.'

The Academy was pleased to receive a very professional, thoughtful and thorough review report that recommends that the learned Academies be adequately resourced.

The 2005 Review Report will be available at www.dest.gov.au.

Science policy

Overview

The Academy released its policy statement on *Research and innovation in Australia* in November 2005. The President of the Academy, Dr Jim Peacock, in launching the statement, drew particular attention to the long-term nature of research and the need for sustained support for it. Dr Peacock pointed out that Australian recipients of the 2005 Nobel Prize in Physiology or Medicine, Professor Barry Marshall and Dr Robin Warren, identified *Helicobacter pylori* as a major cause for gastritis and peptic ulcers more than 20 years ago, but it took ten years before antibiotic treatment became mainstream clinical practice. 'We need to have a clear, long-term vision for the nation,' said Dr Peacock, 'and attend to the areas of weakness in the national science engineering and technology (SET) environment. These weaknesses include serious and growing shortages of skills in the science and engineering fields and the low level of SET personnel in the private sector'.

The policy statement drew attention to the deteriorating situation regarding the lack of graduates in the science and engineering fields. The latest OECD data (Education at a glance 2004, Table A4.1; OECD) show that Australia is very near the bottom in the percentage of university students in engineering, physics and mathematics. A large turn-around is necessary if Australia is to compete internationally in knowledge-based industries, as well as maintain an internationally competitive research capability, both in universities and in publicly funded research organisations. While the figures vary somewhat in successive data sets, OECD data show that Australia ranks about seventh with 7.2 researchers per thousand in the labour force, but the number employed in industry is only 1.7 per thousand of the overall labour force, which ranks Australia at about 19th. This situation reflects the situation in terms of the disparity between public and private expenditure on R&D. It highlights the weakness of the private sector in advancing knowledge-intensive industry in Australia.

The weakness in R&D employment in the private sector, in engineering particularly, is compounded by the process of privatisation of public enterprises that had previously provided a large employment base for graduates, and served an important role as part of the supply chain of experienced engineers for industry. The conclusion is inescapable that the Australian university system is struggling to provide the throughput of numbers, and the quality of graduates required to service our public sector research capability, or a growing knowledge-based industry, and that current measures are not providing a solution to the problem.

The Academy welcomed the establishment by the Australian Government in April 2005 of an Audit of Science, Engineering and Technological Skills, and is a member of the steering committee for that audit. It is hoped that this audit will provide some definitive answers to the key questions about the demand and supply of skills in these areas that in turn provide the basis for concrete steps in the management of the issue into the future.

The policy statement makes suggestions on:

- building a knowledge economy
- the higher education system
- science and mathematics education
- national research infrastructure facilities
- Cooperative Research Centres
- international scientific links

Research and innovation in Australia: a policy statement is available at: www.science.org.au/reports/10november05.pdf.

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.

A Research Quality Framework

Flaws in the formulaic approach used to allocate research funding to universities have prompted scientists, scholars and policy makers to discuss alternative ways of measuring excellence in research and research training. As is broadly acknowledged, the current formula-driven funding works against cooperation and specialisation; formula funding is a recipe for homogeneity and duplication.

The National Academies Forum (NAF), a joint initiative of the four learned Academies, held a symposium at the Shine Dome in June 2004 to discuss measuring excellence in research and research training. The proceedings, available at www.naf.org.au/researchexcellence, and published in hard-copy format, provided an invaluable starting point for the Research Quality Framework (RQF) process run by the Department of Education, Science and Training (DEST) in 2005–06.

The Academy responded in October 2005 to the DEST paper 'Research quality framework: the preferred model' to point out that the Academy has consistently argued that block funding schemes should reward research quality, research outcomes (including long-term outcomes) and impact. The Academy welcomed the commitment to redistribute all the Institutional Grants Scheme (IGS) funds and at least half of the Research Training Scheme (RTS) funds under a framework that recognises research quality. The Academy supported the Expert Advisory Group's resolve that the RQF will be underpinned by transparency, acceptability, effectiveness and encouragement of positive behaviours. The Academy suggested eight important principles that should be given due consideration in refining the details of the RQF. These principles, and the submission, are provided at www.science.org.au/reports/4october05.htm.

National Collaborative Research Infrastructure Strategy

Dr Phil McFadden represented NAF on the National Collaborative Research Infrastructure Strategy (NCRIS) Committee. NCRIS is the process that continues to develop a strategic framework for investment in national research infrastructure. Early in 2005, the Academy's National Committees provided specific input into the public consultation process undertaken by DEST, in a submission available at www.science.org.au/reports/25february05.pdf. Following the public consultation phase, DEST released in November a Strategic Roadmap Exposure Draft for NCRIS. Further comment was invited.

The Academy took the opportunity to welcome the latest milestone in the development of a national research infrastructure strategy and commended the NCRIS Committee on its work in scoping national capabilities. The Academy was pleased that its earlier recommendations to establish an ongoing commitment to maintaining the national research infrastructure has been given effect, with an ongoing commitment of around \$100 million per year, effectively replacing the previous level of funding for the Major National Research Facilities (MNRF) program and the Systemic Infrastructure Initiative. The certainty of longer-term funding provides a sound basis for NCRIS's work.

The current five-year commitment of funding, together with a well crafted implementation strategy, should remove much of the uncertainty created by the ad hoc nature of the former MNRF program, that was characterised by tight time frames for the preparation of proposals, and the limited potential to properly engage the states and territories, or overseas organisations, in the process. The Exposure Draft has identified key strategic infrastructure and support requirements that have much value and warrant full support; the Academy would find it difficult to choose among these priorities. The Academy is concerned that the available funding falls short of supporting even half the priorities identified by the NCRIS Committee, let alone the operating costs of research facilities that include the employment of first-rate technical and professional staff.

The Academy acknowledged that the strategic, managed process of NCRIS will serve the country well, but in order to enhance the total resources available and to ensure that the facilities are operated by leading researchers of international standing, it may well be necessary from time to time to invite competitive tenders. That is, at times contestability has a place and indeed,

contestability may attract additional resources, from State governments, international partners and Australian research institutions, that might otherwise be unavailable under the managed process. The Academy's submission is available at www.science.org.au/reports/9december05.pdf.

Australian Frontiers of Science

In 2003 the Academy initiated an innovative event to showcase Australia's rising research science talent, *Australian Frontiers of Science*. Another in this series was held at the Walter and Eliza Hall Institute in Melbourne on 12–13 April 2005. The symposium brought together some of Australia's best young scientists to present and discuss emerging science and technology, highlight and discover new opportunities, and share cutting edge advances in their fields. It involved participants from universities, government and industry, and the topics covered a diverse range of biological and physical sciences. Over the course of the event some 16 young scientists presented their latest research, explaining what they do and why, in an interactive format. The process enabled much cross-disciplinary bridging and forged new associations. Proceedings of the event are available at www.science.org.au/events/frontiers2005.

Among the speakers were winners of the Academy's junior awards for 2005. Fellows attending *Science at the Shine Dome* in May were able to hear the presentations from Dr Madeleine von Oppen (Dorothy Hill Award), Associate Professor Brett Neilan (Fenner Medal), Dr Ricky Johnstone (Gottschalk Medal), Associate Professor Mark Blows (Moran Medal) and Professor Michelle Simmons (Pawsey Medal).

High Flyers Think Tank on Agricultural Biotechnology

The 2005 High Flyers Think Tank on agricultural biotechnology was held at the Shine Dome on 26 July. The Think Tank, 'Biotechnology and the future of Australian agriculture', was supported by Biotechnology Australia and the Department of Agriculture, Fisheries and Forestry. The event brought together 75 of Australia's brightest young minds, including early- to mid-career researchers and 30 senior experts representing horticulture, crops, livestock, aquaculture and 'biopharming' sectors of the agriculture industry.

The Think Tank included some excellent presentations from experts in the respective areas of biotechnology: Dr Alan Finkel, Axon Instruments; Craig Cormick, Biotechnology Australia; Dr Ian Edwards, Chair, AgBio Advisory Group, AusBiotech Ltd; Dr Steve Swain, Senior Research Scientist, CSIRO Plant Industry, Victoria; Dr Jeff Ellis, Program Leader, CSIRO Plant Industry, Canberra; Dr Allan Green, Senior Principal Research Scientist, CSIRO Plant Industry, Canberra; Dr Peter Willadsen, Chief Scientist, CSIRO Livestock Industries, Brisbane; and Professor Bernard Degnan, School of Integrative Biology, University of Queensland.

Think Tank participants from each sector discussed four topics: productivity, environment, value chain and social aspects. Summaries of group discussions highlighted current issues, strengths and weaknesses in the areas of productivity, the environment and social aspects of biotechnology.

The focus groups and discussion sessions were chaired by: Professor Snow Barlow, Biotechnology and Horticulture, University of Melbourne; Dr Steve Tyerman, School of Agriculture and Wine, University of Adelaide Waite Campus, South Australia; Dr Paul Donnelly, CRC for Innovative Dairy Products; Dr Andy Barnes, School of Integrative Biology, University of Queensland; and Dr Sue Forrest, Australian Genome Research Facility. The general discussion groups were chaired by Academy President, Dr Jim Peacock.

Proceedings from the 2005 High Flyers Think Tank, including workshop discussions, a final report and case studies are available at www.science.org.au/events/biotechnology.



Participants at the High Flyers Think Tank.

President's National Australia Bank National Press Club Address



Jim Peacock's address to the National Press Club.

The Academy's President, Dr Jim Peacock, delivered the Academy of Science's fifth annual address to the National Press Club on 27 July.

In his speech, 'Tomorrow's agriculture—we need to work things out!', Dr Peacock cited the success of the introduction of genetically modified cotton in Australia, and called on grain industries, researchers and government regulatory bodies to work together to implement new varieties into Australian agriculture, including conventional varieties and those made by genetic modification.

He said that conventional breeding methods alone would be unable to meet demands for crops that can withstand various environmental stresses and emerging pathogens currently affecting agriculture. Dr Peacock also mentioned food as an increasingly important component of a preventative health system, citing examples of the treatment of diet-related diseases, such as diabetes, using low glycaemic index cereals and the introduction of omega-3 fatty acids into grains to prevent cardiovascular disease.

The complete address is available at www.science.org.au/events/npc2005.htm.

Human cloning and embryo research

The Academy, led by the Chair of the National Committee for Medicine, Professor Bob Williamson, provided written and personal presentations to the Legislation Review of Australia's *Prohibition of Human Cloning Act 2002* and *Research Involving Human Embryos Act 2002*.

The submission was informed in part by the Academy's 2005 AGM Symposium on 'Recent advances in stem cell science and therapies'. The presentations are available at www.science.org.au/sats2005/symposium.htm.

Since February 1999, the Academy has adopted as policy the following:

Human cells, whether derived from cloning techniques, from embryonic stem (ES) cell lines, or from primordial germ cells, should not be precluded from use in approved research activities in cellular and developmental biology.

Reproductive cloning to produce human fetuses is unethical and unsafe and should be prohibited.

The Academy supported a continuation of the 2002 legislation authorising forms of stem cell research that include derivation and studies of embryonic stem cells (*The Prohibition of Human Cloning Act 2002* and *Research Involving Human Embryos Act 2002*). The Academy's 2005 submission is available at www.science.org.au/reports/25july05.pdf.

Intelligent design is not science

Over the last 10–20 years, the fundamentalist rejection of the theory of evolution has gained momentum in the United States, and the same thrust has been evident in parts of Australia. In October, the Academy, concerned at the apparent uptake of the concept of intelligent design, or creationism, reissued its standing on this matter:

All scientific ideas are theories, imperfect and subject to test. That the theory of evolution is imperfect, and still the subject of study and modification, affirms that the theory is part of science. Many attempts to modify and expand the theory have been successful, showing (since Darwin's day) the gene-basis of inheritance, the basis of gene-reproduction

in the double helix structure of DNA, the 'genetic drift' basis of the origin of breeds, and so on. Many challenges to the fundamentals of the theory have failed empirical test. The theory has attracted enormous empirical testing and remains one of the most powerful of scientific ideas.

The creationist/intelligent design account of the origin of life has been and remains an important idea in human culture. However it is not a scientific idea. That is, it is not open to empirical test. It is an article of religious faith.

The creationist account of the origin of life is not therefore appropriate to a course in the science of biology, and the claim that it is a viable scientific explanation of the diversity of life does not warrant support.

The Academy sees no objection to the teaching of creationism in schools as part of a course in dogmatic or comparative religion, or in some other non-scientific context. There are no grounds, however, for requiring that creationism/intelligent design be taught as part of a science course.

The Academy's statement on creationism/intelligent design is available at www.science.org.au/reports/creation.htm.

An Australian policy framework for systemic assessment of emerging risks

The Academy, as lead for NAF, was funded under the Australian Research Council's Learned Academies Special Projects Scheme to undertake a study in 2005–06 entitled 'An Australian policy framework for systemic assessment of emerging risks'. Global changes are increasing vulnerability to disasters on a grand scale, and the emerging risks need new methods of risk assessment. The project has identified, in the Australian context, the main driving forces that are increasing risks for natural disasters, technological accidents, infectious diseases, terrorism-related risks, and food safety. The project has also noted and prioritised gaps in knowledge regarding risk assessment that require more research. The project is guided by a steering group chaired by Professor Philip Kuchel.

The study analyses the current situation with risks of various types facing Australia, and concludes that climate change and security (especially terrorism) are two of the most rapidly changing areas of risk. The final report will note that Australia is responding well with adaptive changes in many ways, and it will identify some areas in which further change and investment are needed. The report will be available in July 2006 on the Academy's website at www.science.org.au.

National Committees for Science

The Academy has 20 National Committees which are widely representative of its disciplines. The broad aims of the committees are to foster a designated branch or theme of natural science in Australia and to serve as a link between Australian scientists and overseas scientists in the same field.

The process of appointment to a Committee is as follows. 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, which is responsible for appointing Committee chairs and members. Guidelines for National Committees are available at www.science.org.au/natcoms/guidelines.htm.

Following advice from the Committees, the Academy appoints delegations to the business meetings of the International Council for Science's (ICSU) bodies.

Further information about the National Committees is available at www.science.org.au/natcoms.

Committee reports

Reports have been received from the following Committees:

Antarctic Research

Chair: Professor Robert Vincent

Australian scientists, including members of the Committee, 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.

Preparation for the commencement in 2007 of the International Polar Year (IPY), which celebrates the 50th anniversary of the International Geophysical Year, was a major activity for the Committee in 2005. Committee members helped to review and rank a large number of Australian expressions of interest for IPY projects. Four of the projects (Census of Antarctic Marine Life, Role of Antarctica in the Southern Ocean, Antarctic Aliens, International Antarctic Institute) were endorsed by the IPY Planning Group to operate under Australian leadership, with Australians also participating in many other projects. The National Committee will constitute the Australian IPY committee, with lead scientists of Australian IPY core-projects invited to serve.

The Academy and the Committee are official hosts of the SCAR XXIX General Assembly in Hobart in July 2006. The meeting will consist of two parts. Following the precedent set at the last Assembly held in Bremen, Germany, in 2004, an open science conference will take place from 12–14 July with the theme of 'Antarctica in the Earth System'. It will be followed by a three-day meeting of SCAR National Delegates. Committee involvement includes participation in the local and scientific organising committees and encouragement of the widest possible Australian participation.

Astronomy

Chair: Dr Brian Boyle

As identified in the 2005 work plan, the major activity for 2005 was overseeing the Decadal Planning process. This culminated with the launch at the Shine Dome of *New Horizons: A Decadal Plan for Australian Astronomy 2006–2015* on 24 November 2005. The Decadal Plan received the unanimous endorsement of the Committee and the broad support of the community by acclamation at the Astronomical Society of Australia meeting in July 2005.

The Committee has two subcommittees, the Australian Square Kilometre Array Consortium (ASKAC) and the Extremely Large Telescope Working Group (ELTWG). During the year ASKAC made good progress on issues of governance, establishing an Executive group and an Australian SKA Planning Office to implement ASKAC policy. ASKAC submitted a response to the request for proposals issued by the International SKA Steering Committee for siting the SKA in December 2005. The ELTWG made significant advances in developing opportunities for strategic

From left: Dr Chris Tinney, Professor John Storey, Dr Brian Boyle, Dr Charles Jenkins and Dr Elaine Sadler, members of the editorial board at the launch of *New Horizons: A Decadal Plan for Australian Astronomy 2006–2015*.



collaboration between the Giant Magellan Telescope consortium and Australia. Both sub-committees also made significant progress in building links with industry related to design study/prototype work associated with SKA and ELTs.

In his capacity as Chair of the Committee, Brian Boyle was invited to serve on the National Collaborative Research Infrastructure Strategy (NCRIS) expert Subcommittee on Frontier Technologies, providing input to the Exposure Draft of the NCRIS strategic roadmap based on the priorities identified in the Decadal Plan.

Biomedical Sciences

Chair: Professor Philip Kuchel

The cognate Australian scientific societies of the Committee all had a very active year entailing major national scientific meetings, and in several cases a general assembly meeting of their corresponding International Union. At the meeting of the Committee in August the principal agreed points were that:

1. the next new member to serve on the Committee should be an immunologist. This will enable more direct input of information regarding both national and international societies in this area of great scientific activity.
2. the Lindau Nobel Conference recipients (of whom there were 10 in this inaugural year for Australians) should be called the 'Australian Lindau Scholars', and that nominations should be limited to students in the last year of their PhD. The call for nominations will occur as soon as the Lindau guidelines are made available and selection of candidates is to be completed by March each year.
3. the Committee should be more proactive in suggesting topics for the Oliphant, Fenner and Boden conferences; and the Committee will forward suggestions for conference themes to the Academy.
4. societies should have an overt and explicit reference to ethics somewhere in their constitution and should supply a web link to an endorsed statement on ethics and bioterrorism. A statement—endorsed by relevant Academies—was released in late 2005, and information is available at www.science.org.au/media/9december05.htm.

Chemistry

Chair: Professor Allan Canty

The Committee has nominated Australians for roles in the International Union of Pure and Applied Chemistry (IUPAC), strengthened links and cooperation with the Royal Australian Chemical Institute (RACI), and facilitated the award of IUPAC Poster Prizes at the RACI National Conference *Connect 2005*.

The Committee played an important role in assisting the RACI study *The Future of Chemistry*, initially proposed by the Committee at the January 2004 meeting of the Professors and Heads of Chemistry Departments. The Steering Committee for the RACI Review contained three members of the National Committee.

The Committee arranged for the ARC Centre for Green Chemistry to present a symposium entitled *Green Chemistry—an Australian Imperative* at the Shine Dome on 20 April 2005, attended by 125 delegates. The Symposium fostered links between industry, government and research institutes, providing an opportunity to review green chemistry impacts on business profitability, regulatory compliance, and new opportunities in research and manufacturing.

Crystallography

Chair: Professor Peter Colman

The Society for Crystallographers in Australia and New Zealand met in Marysville, Victoria in March 2005 and all members of the National Committee who were in attendance met on that occasion. Issues concerning the two major research facilities, the Reactor and the Synchrotron, were discussed. As a result, the Chair unsuccessfully requested the Chief Scientist to consider putting the Australian Synchrotron on the agenda of the Prime Minister's Science Engineering and Innovation Council as one approach to securing Commonwealth support for this project.

In December, the Committee endorsed the NCRIS Strategic Roadmap (Exposure Draft) which identified the importance of the Reactor and the Synchrotron in the National Science Infrastructure.

Earth Sciences

Chair: Professor Andrew Gleadow

During 2005 the Committee did not meet in full, but, through its members, was involved in various activities. Through both incoming and outgoing Chairs, the Committee was represented on the Environment Subcommittee (Chaired by Dr Phil McFadden) of the recently established NCRIS, charged with advising the Australian Government on the implementation of this vital new component of the national research support system. The recommendations of the Environment Subcommittee in relation to the Earth sciences were significantly informed by the 'National Strategic Plan for the Earth Sciences' produced by the Committee in 2003. Implementation of this Strategic Plan remains an ongoing core priority for the Committee.

In 2004, Australia successfully bid to host the International Geological Congress (IGC) in Brisbane in 2012. Planning for the IGC has begun under the Organising Committee with Dr Neil Williams as President and Dr Ian Lambert as Secretary General (both of Geoscience Australia). The IGC has only once before been held in our region, in Sydney in 1976. Advanced planning is essential to ensure that this major international event is successful both for the international geoscientific community and for the Earth sciences within Australia.

The Committee was also represented through its Chair on the organising committee of the 16th Goldschmidt Conference to be held in Melbourne from 27 August – 1 September 2006. The Organising Committee, chaired by Professor Simon Turner of Macquarie University, has met regularly through the year and organisation for this major international conference on geochemistry is now well advanced. This will be the first time that the Goldschmidt Conference has been held in Australia.

Earth System Science

Chair: Dr Michael Manton

As a follow-on from the 'Pan Evaporation' workshop held in 2004, a report was prepared synthesizing the contributions to the workshop, in the context of the broader literature, into an agreed statement. It was concluded that there is no evidence anywhere in the world that the evaporative potential expressed in measurement of standard 'pan evaporation' has increased over the past 30–40 years despite the observed atmospheric warming. In Australia and many places elsewhere in the world, the overall trend in annual pan evaporation has in fact been downwards between 1975 and 2004. The cause and significance of this overall decline is still not clear. The full synthesis report and summary statement is available at www.science.org.au/natcoms/pan-evap.pdf.

On 27-28 June 2005 a two-day workshop, sponsored by the Committee and the Australian Greenhouse Office, was held at the Academy to discuss how reconstructions of past climate

change might be better applied to modelling future potential climate change. Recommendations included: construct a record of temperature and precipitation changes for the last 500-2000 years in the Australian region; improve reconstruction by the development of quantified climate proxies; develop a national capacity for high-precision dating; develop a national capacity for palaeoclimate modelling; develop a land use and vegetation database for Australia for key time periods; and create a metadatabase of palaeo data, hosted in a permanent repository.

Geography

Chair: Professor Iain Hay

The Committee has continued organisation for the July 2006 International Geographical Union (IGU) Regional Congress in Brisbane (details at www.igu2006.org). A steering group is co-chaired by Professor John Holmes of the University of Queensland and includes senior academics from Australia and New Zealand. The venue will be the Queensland University of Technology, Gardens Point campus, and the conference organiser is EventCorp. The IGU 2006 Brisbane Conference will focus on regional responses in a changing world with emphasis on tropical and arid zones, particularly in Australia, New Zealand, South-East Asia and the South-West Pacific. We anticipate that 800–1000 delegates will attend. IGU Commissions are being encouraged to hold showcase symposia during the congress, and business meetings before and after it. Field excursions will enable delegates to visit sites in Queensland, the Northern Territory and northern New South Wales. The conference program is approaching finalisation, thanks to the active engagement of IGU Commissions, Study Groups and membership of the two national host societies (Institute of Australian Geographers and New Zealand Geographical Society) and the South-East Asian Geography Association, Australian Collaborative Research Centres, and related government agencies.



Back row, from left:
Committee members
Professor Bob Fagan,
Associate Professor
Nigel Tapper, Professor
Margaret Robertson,
Dr Marcus Lane and
Professor Iain Hay
(Chair).

Front row, from left:
Ex-Officio, Ms Kath Berg,
Mr Nick Hutchinson, Ms
Julie Kesby and Dr Mel
Neave.

History and Philosophy of Science

Chair: Professor Rod Home

In February 2005 the Committee convened a meeting of Heads of all academic programs in History and Philosophy of Science/Science and Technology Studies with the aim of sharing information and ideas and promoting cooperation and mutual support between the different programs. Fourteen people attended and a number of proposals were explored in what was generally agreed by those attending to have been a valuable exercise. One immediate outcome was the establishment of an Australian research network in the history and philosophy of biology.

Following this meeting, a proposal was developed for student essay prizes in the history of Australian science and Australian environmental history, to be awarded in alternate years. The National Museum of Australia has agreed to fund these prizes, of \$2,500 each, which will be administered by the Committee on behalf of the Academy. The initial prize, on the history of Australian science, will be awarded in 2006, the closing date for receipt of entries being 30 April. Details are available at www.science.org.au/natcoms/award-hps.htm.

The Committee continued its engagement with Chinese scholars through the Sino-Australian Symposia on History and Philosophy of Science, a three-way collaboration between scholars in Australia, China and Taiwan. Australia is due to host the next symposium in the series, in 2007.

Mathematical Sciences

Chair: Professor Hyam Rubinstein

The major activity of the National Committee for Mathematical Sciences in 2005 has been organising a National Review of Mathematical Sciences to be held in the first half of 2006.

Following work done in 2004 by Professor Peter Hall, the outgoing Chair of the Committee, an application was made to the ARC for financial support for such a review in early 2005. To quote from the preamble:

The review foreshadowed in the present proposal will complement the ARC review of the mathematical sciences undertaken a decade ago, and provide further opportunities for trend analysis and performance assessment. In view of the increasing demand from industry and business for trained mathematicians and statisticians, and the significant shrinking of mathematical-science departments in Australian universities over the last ten years, not to mention the concurrent decline in secondary and tertiary enrolments in the mathematical sciences, this is an opportune time to review the discipline again.

The review is being supported by the four professional societies in the mathematical sciences – namely the Australian Mathematical Society, the Statistical Society of Australia Inc, the Australian Society for Operations Research and Australia and New Zealand Industrial and Applied Mathematics Society. An advisory group was formed, with a wide representation of mathematical scientists from academia, research organisations and business. A smaller working party was also established to deal with the detailed organisation of the review. The latter consists of Professor Peter Hall; Professor Michael Cowling, President of the Australian Mathematical Society; Associate Professor Barry Hughes, Executive Director of the Review; Professor Hyam Rubinstein, Chair of the National Committee for Mathematical Sciences; Dr Edwin van Leeuwen, BHP Billiton; and Dr Jan Thomas, Executive Officer of the Australian Mathematical Society.

We were very fortunate to enlist three eminent international mathematical scientists to tour Australia in February 2006 to gather information for the review. They are Professor Jean-Pierre Bourguignon, Director of the Institut des Hautes Études Scientifiques; Dr Brenda Dietrich, Director of Mathematical Sciences Research Division, IBM; and Professor Iain Johnstone, Stanford University. The final report is due 30 June 2006 and the website for the review is www.review.ms.unimelb.edu.au.

Mechanical Sciences

Chair: Dr Francis Rose

Two teleconferences were held in 2005 to discuss the charter for this newly formed Committee, resulting from a merger of the National Committees for Theoretical and Applied Mechanics, and for the Theory of Machines and Mechanisms. The conferences highlighted a high level of concern regarding the current poor visibility of the mechanical sciences within the Academy and within the Australian science arena more generally, as well as a perceived decline in the availability and impact of mechanics education in Australian universities. The Committee intends to explore several initiatives in an attempt to address these concerns. In particular, it is proposed to examine examples of successful programs at certain universities with a view to identifying recommendations that could be implemented more broadly at a national level. Those programs include linkages to local industry, as well as summer schools that are designed to stimulate and attract bright students.

Face-to-face meetings are planned for 2006 with the aim of articulating a ten-year Vision and Strategic Plan for the Committee.

A particular highlight for the Committee is that Australia has been selected to host the 2008 International Congress on Theoretical and Applied Mechanics. This quadrennial conference is

the flagship of the International Union of Theoretical and Applied Mechanics, and it will provide a rare opportunity to showcase Australian mechanics to an international audience.

Medicine

Chair: Professor Bob Williamson

During 2005, the National Committee for Medicine met twice in Canberra.

The Committee was responsible for many aspects of the organisation of the AGM Symposium on stem cell research, which was very successful. It also helped to prepare the Academy submission to the Lockhart Committee that reviewed Australia's stem cell and embryo research legislation. The Chair of the Committee gave evidence to the Lockhart Committee, together with Professor Suzanne Cory, the Director of the Walter and Eliza Hall Institute. The final report of the Lockhart Committee closely reflected the views of the Academy; the President of the Academy and the Chair of the Committee welcomed the report.

The Committee presented written evidence to the Australian Health Ethics Committee (AHEC) review of national policy on organ donation, with a recommendation that consideration be given to moving from an 'opt-in' to an 'opt-out' system to increase the number of organs available for this important set of medical procedures.

The Committee has had informal consultations with members of AHEC concerning the Review of the National Statement on Ethical Conduct in Research Involving Humans, and also with the National Health and Medical Research Council (NHMRC) and the Australian Research Council on ethical behaviour and codes of conduct in research more generally. The Committee will be discussing whether a response from the Academy to the Review is warranted, when the Review is published in 2006, and will communicate with EXCOM and Council at that time. The general view of the Committee is that Human Research Ethics Committees (HRECs) should consider ethical aspects of research, and are not primarily agencies to consider either legal aspects of institutional risk or the scientific merit of proposals, other than in exceptional cases.

The Committee, at its December 2005 meeting, had lunch with Ms Helen Liddell (the recently appointed High Commissioner for the UK) and her Science Officer, Fiona Ratcliff. Major issues discussed included possible joint actions in areas of biomedical research between Australia and the UK, and ways to reduce any visa problems for scientists between the two countries.

The Committee discussed with the Executive Secretary of the Academy ways in which the Academy could be more proactive in arguing for appropriate Australian Government strategic planning for medical research. The Committee believes that the Academy can play a unique and independent role in arguing for the importance of medical research to Australian science, particularly in a year when two Australians have won the Nobel Prize for medicine.

In particular, the Committee urged the Academy to be proactive in arguing for implementation of the recommendations of the Grant Committee, which reported late in 2004 and argued for continuing the Wills reforms and allocations. The Committee noted that there are major changes proposed for NHMRC, and asked that the Academy be ready to defend the interests of medical research in Australia in a vigorous way over the coming period. The Committee approves of the first steps that have been taken by the President of the Academy to meet with policy makers to discuss these issues.

National Committee for Medicine.
From left: Professor Bob Williamson, Dr Claire Wainwright, Professor Judith Whitworth, Associate Professor Matthew Gillespie, Associate Professor Bronwyn Kingwell, Dr David Vaux.



Nutrition

Chair: Professor Jennie Brand-Miller

At the end of April 2005, the Committee farewelled the outgoing Chair, Professor Mark Wahlqvist. Professor Wahlqvist continues as the President of the International Union of Nutritional Sciences (IUNS).

During the year our discussions have focused on the best way for the Committee to serve the science of nutrition in Australia as well as the broader community. What should be our mission? One topic has been the need to ensure that *intensive* lifestyle modification is given the attention it deserves in addressing the rise of obesity and chronic disease. The cost-effectiveness of lifestyle intervention versus drugs (such as the statins) needs to be documented and made known. We discussed the possibility that the Therapeutic Goods Administration (TGA) and Pharmaceutical Benefits Scheme might regulate comparisons of the effectiveness of certain drugs for chronic disease with intensive lifestyle intervention rather than 'usual care'. The Committee considers this issue worthwhile pursuing and agreed that a Boden Conference on the subject should be planned for 2007. Speakers have been approached and a formal application for funding will be made to the Academy in early 2006.

The Committee also supported the need for population-based nutrition monitoring in Australia and was pleased that the National Children's Nutrition and Physical Activity Survey was officially announced in October. Professor Jennie Brand-Miller was appointed by the Federal Minister for Health, Tony Abbott, to serve on the Technical Reference Group for the survey.

The Committee believes another useful role is to use the credibility of the Academy to regularly (annually or biannually) publish position statements on matters of current interest and importance. Our television channels are replete with programs on food and diet, much of which is presented in a sensational and superficial manner. Workshops sponsored by the Academy could produce position/information papers for release to the press in which we present an independent view on issues such as dieting and diets, food composition (eg trans fatty acids), food labelling (eg health claims), nutrition and the obesity pandemic. We could take this further and liaise with professional groups such as the Nutrition Society of Australia, the Dietitians Association of Australia and the Royal Australian College of General Practitioners, to facilitate the development of learning materials on issues of current interest in nutrition for schools.

The Committee has plans to work more interactively with the Academy's National Committee for Medicine in order to achieve its mission.

Physics

Chair: Professor Gerard J Milburn

The Committee met on 1 February 2005 in Canberra, during the Australian Institute of Physics (AIP) Congress. The discussion centred on what support the Committee could give to the AIP for the International Year of Physics. It was agreed that a public lecture be held at the Shine Dome.

The Committee discussed its possible role in high school physics in Australia. Recent developments suggested that teachers of high school physics need more support and the Committee, together with the AIP should be active in this area. This will be a major task for 2006.

The Committee discussed input into the Academy's submission to the NCRIS Advisory Committee.

The future of the National Institute for Theoretical Physics (NITP) was discussed at some length. This was an initiative of the Committee but is currently in something of a moribund state, largely

due to lack of funding. Some activities have been undertaken with the support of the Australian National University. It was agreed that Professor Bruce McKellar solicit ideas for reactivating the NITP.

A number of international centres for theoretical physics are interested in collaborating with Australian theoretical physicists at large. These include, the Asia Pacific Center for Theoretical Physics (APCTP), the Perimeter Institute for Theoretical Physics (PI) and the Pacific Institute for Theoretical Physics (PiTP), both in Canada. The NITP would provide a good mechanism to facilitate such international links. However there are funding implications that need to be resolved.

The APCTP requires a subscription, which was paid by the ARC in 2005. However we have no mechanism for funding ongoing non-specific collaborations between Australian researchers and PI and PiTP. The ARC Linkage international scheme, while useful, is primarily for specific researcher to researcher links, and there are limitations on how many an individual can apply for. Links to APCTP, PI and PiTP would bring enormous benefit to a wide range of theoretical physicists in Australia, in areas ranging from string theory to condensed matter theory, and give us a clear international presence.

In November 2005, Dr Howard Burton, Director of the Perimeter Institute, visited Australia and, together with Professor Milburn toured a number of Australian Centres for Theoretical Physics (Australian National University, University of Queensland, University of NSW and University of Melbourne). Dr Burton and Professor Milburn also spoke to Professor Hoj and Professor Weigold at the ARC and Dr Jade Sharple in the Minister for Education, Science and Training's office. While no clear ideas emerged to facilitate the funding of a National Institute for Theoretical Physics, the possibility of an ARC International Centre of Excellence scheme looks promising.

Discussions on the future of NITP will be pursued further in 2006.

Plant and Animal Sciences

Chair: Dr TJ Higgins

The Committee met twice during 2005 to discuss issues relating to the following:

1. training of research biologists especially entomologists. The Committee made a submission to the Department of Education, Science and Training's (DEST) audit on skills in science, engineering and technology.
2. preparing a draft statement on genetically modified organisms for the Academy to consider developing a policy position.
3. support for the request that the Minister for Heritage and Environment consider heritage listing for the north-east peninsula of Recherche Bay.
4. support Australia's participation in DIVERSITAS, an international program in biodiversity science.
5. evaluation of the role of the European Plant Science Organisation (EPSO) in promoting research, development and innovation in Europe. Dr Karin Metzloff from EPSO gave a presentation to the Committee and travelled extensively in eastern Australia to talk to politicians, bureaucrats and industry. Their model seems effective and worth investigating for application in Australia.



National Committee for Plant and Animal Sciences meeting. From left: Dr James Ridsdill-Smith, Dr Hugh Dove, Dr Karin Metzloff (EPSO) and Dr TJ Higgins.

The Committee sponsored a very successful workshop supported by AusAID entitled 'Sino-Australian Workshop on the Management of Grassland-Livestock Systems and Combating Land Degradation in Northern China', 6–7 December 2005 at the Shine Dome. Nearly 50 people attended and a set of proposals for further work was identified.

The Research Grants Program of the New South Wales Environmental Trust was reviewed by the Committee.

Radio Science

Chair: Dr Phil Wilkinson

Over 25 Australian scientists attended the International Union for Radio Science (URSI) General Assembly, in New Delhi, October 2005. The Committee encouraged young Australian scientists to apply for the URSI Young Scientist Awards and five applicants (Dr James Anstie, Dr Danial Mitchell, Dr Nasimuddin Nasimuddin, Dr Ilya Shadrivov, and Dr Bobby Yau) were successful. There were four Australian session conveners, and 46 Australian scientists were authors for one or more oral and poster presentations representing almost all the disciplines covered by URSI. Dr Phil Wilkinson was elected to one of the four URSI Vice-President positions, further evidence of the strong Australian representation within URSI. Most of those present attended a successful Australian delegates meeting.

Australia has been invited, through the Committee, to host the next Asia-Pacific Radio Science Conference (AP-RASC) in 2007. The Western Australian Government offered to assist in this process and the meeting is currently scheduled for spring 2007, in Perth. This is an important regional meeting valued highly by radio scientists both in South-East Asia, and in the URSI community, where the meeting has already received wide support. Preliminary advertising for the meeting took place during the URSI Assembly and the first major planning meeting will take place during the Workshop on the Application of Radio Science (WARS), in Leura, New South Wales, February 2006. The AP-RASC meeting will be an excellent opportunity to showcase Australian radio science to the world. During the meeting, there will be a special focus on the Square Kilometre Array (SKA).

Space Science

Chair: Professor Iver Cairns

Space Weather Plan

The draft Australian Space Weather Plan has been referred to a joint committee of the Academy and ATSE for comment and endorsement.

Decadal Plan for Space Science

The Committee agreed to develop the first Australian Decadal Plan for Space Science. Initial ideas and feedback are available at www.physics.usyd.edu.au/~ncss. The draft Plan is expected to be available in late 2006.

Opportunities for international collaboration

As a member of the Hayabusa Science Team, Dr Trevor Ireland participated in two meetings in Tokyo during 2005: in March for updates largely concerning mission operations, and in September for discussions concerning the sample site selection. The Hayabusa spacecraft (code named MUSES-C) made two touchdowns on the asteroid Itokawa during November. However, because of technical problems it will not begin the return to Earth until 2007, with a Woomera landing in June 2010.

Other international activities

Professor Cairns attended the July 2005 International Association of Geomagnetism and Aeronomy (IAGA) Scientific Assembly in Toulouse, France, and was Australia's voting delegate. The Committee encourages Australian scientists to take leading roles in international organisations such as the Committee on Space Research, IAGA, International Union of

Geodesy and Geophysics, Scientific Committee on Solar-Terrestrial Physics, and Asia Oceania Geosciences Society. The first four of these organisations sponsor international scientific studies such as the Climate and Weather of the Sun-Earth System (CAWSES) program, and the International Heliophysical Year (IHY–2007) and other I*Y programs that involve the 50th anniversary of the 1957 International Geophysical Year (IGY). Australian space scientists are playing leading roles in international planning teams for many aspects of CAWSES, IHY, and I*Y research. In particular, Professor Brian Fraser is Australia's representative on the International Steering Committee for the International Heliophysical Year.

Spectroscopy

Chair: Professor Gerard J Milburn

The primary activity was to appoint a Frew Lecturer for the Australasian Conference on Optics, Lasers and Spectroscopy and arrange the lecture tour. Dr David Wineland from the National Institute for Standards and Technology, Boulder, Colorado, was selected. He gave the Frew Lecture at the Australasian Conference on Optics, Lasers and Spectroscopy in Rotorua on 7 December 2005. Prior to the conference he visited the research groups of Professor Robert Clark at the University of New South Wales and Professor Gerard Milburn at the University of Queensland, giving a seminar to each group. Both visits were supported by the Centre for Quantum Computer Technology, University of New South Wales.

International Council for Science

Founded in 1931, the International Council for Science (ICSU) is a non-government organisation representing a global membership that includes both national scientific bodies (104 members) and international scientific unions (29 members).

Through this international network, ICSU coordinates interdisciplinary research to address major issues of relevance to both science and society. In addition, the Council actively upholds freedom in the conduct of science, promotes equitable access to scientific data and information, and facilitates science education and capacity building.

The Council acts as a focus for the exchange of ideas, the communication of scientific information and the development of scientific standards. ICSU's members organise scientific conferences, congresses and symposia all around the world—in excess of 600 per year—and also produce a wide range of newsletters, handbooks, learned journals and proceedings.

ICSU helps create international and regional networks of scientists with similar interests and maintains close working relationships with a number of intergovernmental and non-government organisations, especially UNESCO and the Academy of Sciences for the Developing World (TWAS).

Because of its broad contact with thousands of scientists worldwide, ICSU is increasingly called upon to speak on behalf of the global scientific community and to act as an adviser in matters ranging from ethics to the environment.

ICSU is establishing Regional Offices in Africa, the Arab Region, Asia and the Pacific, and Latin America and the Caribbean. Their goal is two-fold. First, they should enhance participation of scientists and scientific organisations from the region in ICSU's research and policy activities. Second, they should enable ICSU to play a more effective role in strengthening science within the context of regional priorities and building capacity through South-South and North-South collaboration. The Asia and the Pacific Regional Office will be hosted by the Malaysian Academy of Sciences. Professor Jenny Graves is a member of the Committee of the Regional Office and attended the first meeting of the Committee on 15 January in Kuala Lumpur.

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

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

The Academy, as the adhering body on behalf of Australia to ICSU, is often asked to endorse bids to host international scientific meetings in Australia. The Academy has issued a set of guidelines with respect to 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:

Scientific Committee for Antarctic Research (SCAR) General Assembly,
Hobart, July–August, 2006

International Geographical Union (IGU) Regional Conference,
Brisbane, 3–7 August, 2006

International Union of Theoretical and Applied Mechanics (IUTAM) Congress and
General Assembly,
Adelaide, 2008

International Union of Psychological Science (IUPsyS) General Assembly,
Melbourne, 2010

International Botanical Congress (IBC),
Melbourne, 2011

International Geological Congress (IGC),
Brisbane, 2012.

Delegates

The Academy appoints delegates to the business meetings of ICSU's bodies, after advice from the National Committees. Delegates for 2005 are listed here:

International Association of Geomagnetism and Aeronomy (IAGA) Scientific Assembly 18–29 July, Toulouse, France	Professor Iver Cairns
International Union of Microbiological Societies (IUMS) Congress 23–28 July, San Francisco, USA	Dr Wieland Meyer Professor Julian Rood Dr Paul Young
International Union of the History and Philosophy of Science (IUHPS) General Assembly 27 and 29 July, Beijing, China	Dr Henry Chan Professor Rod Home Professor John Schuster
International Union of Pure and Applied Chemistry (IUPAC) General Assembly 13–21 August, Beijing, China	Professor Mary Garson Professor Bob Gilbert Professor Brynn Hibbert Professor Robert Lamb
International Union of Crystallography (IUCr) Congress and General Assembly 23–31 August, Florence, Italy	Professor Peter Colman Dr Mitchell Guss Associate Professor Jenny Martin
International Union for Pure and Applied Biophysics (IUPAB) Congress 27 August–1 September, Montpellier, France	Professor Cris dos Remedios Professor Frances Separovic

International Union of Nutritional Sciences (IUNS)
Congress
19–23 September, Durban, South Africa

Professor Jennie Brand-Miller
Dr Jonathan Hodgson
Dr Graeme McIntosh
Professor Mark Wahlqvist

International Union of Radio Science (URSI) General
Assembly
23–29 October, New Delhi, India

Professor Peter Dyson
Professor Brian Fraser
Dr Geoffrey James
Dr Ken Joyner
Dr Le Nguyen Binh
Dr David Noon
Professor Ray Norris
Associate Professor Michael Tobar
Dr Phil Wilkinson

InterAcademy Panel on International Issues

The InterAcademy Panel on International Issues (IAP) is a global network of the world's science academies, launched in 1993. Its goal is to help member academies work together to advise citizens and public officials on the scientific aspects of critical global issues. IAP is particularly interested in assisting young and small academies achieve these goals and, through the communication links and networks created by IAP activities, all academies will be able to raise both their public profile among citizens and their influence among policy makers.

The IAP programs encompass capacity building for young academies, health education of women, science education and water. The IAP initiatives include access to scientific information/digital divide, biosecurity and genetically modified organisms. The Academy, because of its expertise in science education, has been involved in the Science Education Program. This is being led by the Chilean Academy of Sciences. The Academy has been asked to co-chair an IAP Working Group established to put together a proposal to generate an international platform to assist in the evaluation of Inquiry Based Science Education projects. Other IAP members co-chairing this project are India and Sweden. Professor Julie Campbell will be the Academy's representative at the meetings related to this working group.

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

InterAcademy Medical Panel

The Academy has nominated Professor Bob Williamson for the Executive Committee of the InterAcademy Medical Panel (IAMP). The IAMP is a voluntary association of the world's medical academies or the medical divisions of science academies. The IAMP is committed to improving health around the world. This includes collaboration to strengthen the role of all academies to alleviate the burden of the poorest, to build scientific capacity for health, and to provide independent scientific advice on promoting health science and health care policy to national governments and global organisations.

Bilateral activities

Bilateral activities provide opportunities for Academy officials and government officials to meet with high-level international researchers and research funders, to discuss international science and technology policy and practices, and to promote Australian research and technology. They 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 an opportunity to discuss the operation of a particular program and make necessary modifications to ensure a program is meeting its objectives.

A large portion of the Academy's bilateral activities is funded as part of the Australian Government Department of Education, Science and Training's (DEST) International Science and Technology Networks, a component of the International Science Linkages Programme.

Australasia

Federation of Asian Scientific Academies and Societies

The Academy hosted the 2005 Council meeting of the Federation of Asian Scientific Academies and Societies (FASAS) 7–9 September 2005. FASAS is a non-government scientific organisation of the Asian region. Its principal objectives are the advancement of science and technology, and the organisation of national and regional programs for the development of the member countries.

A total of nine Academies attended the meeting, including the Presidents of Academies from Bangladesh, Nepal and Singapore. The delegation was led by Dr Omar Abdul Rahman, President of FASAS and Fellow of the Academy of Sciences Malaysia.

The meeting discussed the Indian Ocean tsunami of December 2004, issues in physics and mathematics education and other areas of science education. As an outcome of the meeting, the Academy has been asked to participate in two FASAS science education projects, including a web-based site for science education on natural disasters.

China

With support from DEST, the second Australia-China symposium between the Australian Academy of Science, the Australian Academy of Technological Sciences and Engineering (ATSE) and the Chinese Academy of Sciences (CAS) was held at the Beijing Botanic Gardens 9–13 October 2005. A delegation of 22 Australian researchers, led by the President of the Academy, Dr Jim Peacock, participated in the meeting. The symposium was structured around four workshops in the areas of plant and animal biotechnology, biomedical devices and nanostructures. The Chinese delegation was made up of scientists from CAS Institutes and universities and was led by Professor Chen Zhu, Vice-President of CAS.

There was common interest between China and Australia in modern plant biology as it relates to crops such as rice, cotton and wheat. In animal biotechnology there were discussions about advanced reproduction, transgenics and stem cell research. In the area of nanotechnology there were considerations about collaborative projects to study the effects of nanoparticles on humans and the environment as well as developing novel nanobiosensors. The Chinese Academy also organised a program of site visits to several of its Institutes and to research universities.

During the opening of the symposium a Memorandum of Understanding was also signed between the Chinese Academy of Sciences (Institute of Geographic Sciences and Natural Resources Research) and the University of Melbourne (Melbourne Water Research Centre),

by Professors Frank Larkins and Fu Bojie and witnessed by Professor Chen Zhu and Dr Jim Peacock, to establish the China Australia Centre on Water Resources Research.

Discussions are underway in relation to the third symposium to be held in Australia in 2006.

The Academy together with the University of Sydney co-hosted the Australian-Chinese Ocean Science and Technology meeting on 15–18 November 2005, designed to promote collaboration and closer links between Australian and Chinese researchers in ocean science and technology. The meeting commenced at the University of Sydney and proceeded to the Academy on 16–17 November. Approximately ten scientists from each country attended the gathering.

This activity was an outcome of the collaboration that resulted from the participation of Professor Shuying Zhang, Institute of Acoustics, Chinese Academy of Sciences and Professor Ian S F Jones, Ocean Technology Group, University of Sydney, in the exchange program between the Academy and the Chinese Academy of Sciences.

The Academy and the Australian Academy of Technological Sciences and Engineering made joint submissions to the Senate Foreign Affairs, Defence and Trade Committee, and the Foreign Affairs Sub-Committee Joint Standing Committee on Foreign Affairs, Defence and Trade respectively in relation to Australia's relationship with China. Professor Andrew Smith, on behalf of the Academies appeared before a hearing in relation to Australia's relationship with China on 20 June, together with representatives from the ARC and CSIRO.

The Academy, on behalf of AusAID, organised the Sino-Australian Workshop on the *Management of grassland-livestock systems and combating land degradation in Northern China*, in Canberra, on 6–8 December 2005. Dr TJ Higgins, Chair of the Academy's National Committee for Plant and Animal Sciences, and Deputy Chief, CSIRO Plant Industry, was the convener.

The aims of the meeting were to enhance communication and cooperation between Chinese and Australian scientists and experts, provide a forum for identifying the fundamental causes of grasslands degradation in China and sharing the lessons learned from efforts to fight it, and identify opportunities for new research seeking to address the problem. Close to 50 researchers and science policy officials from Australia and China participated in the event.

A framework was negotiated to highlight the key issues for an effective grasslands management strategy which would help to place research priorities in the context of government policy, societal needs and research opportunities. Five research/development modules were identified for further work. Proceedings of the workshop are available at www.science.org.au/events/grasslands.

Professor Xu Guanhua, Chinese Minister of Science, was a Guest of Government 15–21 February 2006. He visited Cairns, Sydney, Canberra and Melbourne, and Professor Kurt Lambeck hosted a lunch for him at the Academy, attended by the Ambassador to Australia for the People's Republic of China, Madam Fu Ying, Fellows, researchers and senior public servants.

Korea

The Academy and the Korea Science and Engineering Foundation (KOSEF) hold bilateral talks every two years in order to discuss the status of their activities. The 2002 and 2004 meetings were held in Canberra. KOSEF invited Professor Bruce McKellar, the Academy's Foreign Secretary, and Ms Nancy Pritchard, Manager, International Programs, to attend the biennial meeting in Daejeon, Korea, from 30 November–2 December 2005.



From left: Professor Tang Huajun, Chinese Academy of Agricultural Science; Mr Liu Liangui, Ministry of Agriculture, China; Her Excellency Madam Fu Ying, Chinese Ambassador to Australia; Dr Jim Peacock and Dr T J Higgins, Australian Academy of Science; Mr Xu Hai, Science and Technology Counsellor, Chinese Embassy.

Information about the Academy's international programs is available at www.science.org.au/internat.

Participants in the East Asia and Pacific Summer Institutes Program.

New Zealand

Dr Steve Thompson, Executive Director, Royal Society of New Zealand (RSNZ) met with Dr Hugh Tyndale-Biscoe and Ms Nancy Pritchard, Manager International Programs, on 6 June 2005. Dr Thompson was in Australia to meet with counterparts at the Australian Research Council, FASTS, CSIRO and the Academy, to be updated on Australia's international collaborations. Dr Tyndale-Biscoe, who is a Fellow of both the Academy and the RSNZ, discussed ways in which the Academy and the RSNZ could work together in projects of common interest.

Taiwan

Professor Bruce McKellar travelled to Taiwan on 9–20 May, at the invitation of the National Science Council of Taiwan (NSC), to gain an insight into scientific research in Taiwan, with the aim of improving Australia-Taiwan scientific cooperation. The Taipei Economic and Cultural Office (TECO) in Canberra and NSC put together a program of visits for the Foreign Secretary, which included the Industrial Technological Research Institute (ITRI), the Academia Sinica and the Science Parks at Hsinchu and Tainan. Professor McKellar took the opportunity to give two lectures while in Taiwan: 'Physics in Australia—an overview' at the National Central University and 'Ethics and scientific research' at NSC.

Thailand

A delegation from the National Center for Genetic Engineering and Biotechnology (BIOTEC), visited Australia 11–15 September 2005 to explore bilateral cooperation in the areas of plant biotechnology, stem cell research and other matters of mutual interest. The Academy assisted the Australian Academy of Technological Sciences and Engineering with a program of visits in Canberra for the delegation, which included visits to CSIRO and the Australian Phenomics Facility at the Australian National University. Professor Neville Fletcher hosted a working lunch for the delegation at the Academy on 14 September 2005.

Europe

Germany

The Academy, on behalf of DEST, organised a bilateral workshop with Germany, 13–17 March 2006, on the topics of biodiversity and related science issues. Approximately 40 leading researchers and policy experts from both countries participated in the meeting. Australia and Germany are interested in enhancing their collaboration, and discussions were held to investigate ways of better promoting opportunities including fellowships for young researchers; and identify new and emerging areas of potential mutual interest.

United States

East Asia and Pacific Summer Program for US Graduate Students

The National Science Foundation and the Academy have a joint program which enables 20 US graduate students in science and engineering to visit Australia for a period of eight weeks during



the American summer, to conduct research in laboratories and to initiate personal relationships with their Australian counterparts.

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

As part of the program, the Academy organised an orientation session in Canberra 15–17 June for the students. On the first day, Dr Hugh Tyndale-Biscoe gave a talk about his research on marsupials. The students visited the National Botanic Gardens, Tidbinbilla Tracking Station, Mt Stromlo and attended Question Time at Parliament House. They also took the opportunity to visit the US Embassy to meet with Mr William Stanton, Chargé d'Affaires.

Reports from the participants indicate that the visits enabled them to enhance their research experience and to promote collaborative opportunities. Proposals for potential future collaborative activities between home laboratories and the host researchers are being discussed.

The Adam J Berry Memorial Fund for visits to the National Institutes of Health

The Adam J Berry Memorial Fund is co-managed by the Academy and the US National Institutes of Health Foundation, and aims to assist one early-career Australian researcher to travel or work in the USA at one of the institutes of the National Institutes of Health (NIH) each year. In addition to gaining valuable experience for themselves, scientists are expected to make a contribution to the research program of the institute to which they are temporarily attached.



Cathryn Hogarth, winner of the 2005 Adam J Berry Memorial Fund award.

A special committee chaired by Professor Jonathan Stone assessed applications under this program. The latest successful applicant was Cathryn Hogarth of the Australian Research Council Centre of Excellence in Biotechnology and Development, Monash Institute of Medical Research. In the first half of 2006 Ms Hogarth will visit the National Institute of Environmental Health Sciences, North Carolina, USA.

Israel

The Foreign Secretary, Professor Bruce McKellar, met with the Ambassador of Israel, HE Mr Naftali Tamir, at the Embassy on 25 August 2005. They discussed the Academy's MOU with the Israel Academy of Sciences and Humanities and other international activities undertaken by the Academy, including ways in which Australia and Israel could strengthen links between researchers. Ambassador Naftali visited the University of Melbourne on 21 November and Professor McKellar hosted a lunch.

Other international activities

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

The Department of Education, Science and Training (DEST) supports the goals of the Government's International Science Linkages Programme through The Sir Mark Oliphant Conferences—International Frontiers of Science and Technology. The aim of the scheme is to provide support to stage strategically significant international conferences in Australia on high-priority, cutting-edge, multi-disciplinary themes. More specifically, they aim to:

- promote Australian science and technology, cutting across conventional S&T boundaries;
- mobilise R&D on emerging technologies, providing a linkage between research providers and users;
- establish and nurture international cooperation and partnerships;
- enhance the understanding of science and technology in the Australian community;
- aim for world best practice; and
- access overseas expertise.

The Conference Series is managed by the Academy, ATSE and Engineers Australia in consultation with DEST. The following conferences took place during the year:

Threshold and Pattern Dynamics—A new paradigm for predicting climate driven processes for sustainable land and water management, was organised by the University of Western Australia, Perth 4–7 July 2005. (www.thresholds.segs.uwa.edu.au)

Epigenetic Regulation and Development in Disease, was organised by the Walter and Eliza Hall Institute of Medical Research, CSIRO, Australian National University and the Garvan Institute, and held at the Discovery Centre, CSIRO Plant Industry in Canberra 29 November–2 December 2005. (www.pi.csiro.au/markoliphant-conf)

The Australian Institute for Bioengineering and Nanotechnology hosted the conference entitled *BioNano: The next frontier*, which was held in Brisbane 5–7 December 2005. (www.bionano2005.eventplanners.com.au)

Quantum NanoScience organised by the University of Queensland was held in Noosa 21–26 January 2006. (www.physics.uq.edu.au/people/milburn/qnsresearch/QNSConference.htm)

Meetings of Nobel Laureates in Lindau



The Academy was invited to select ten young Australian researchers to attend the Lindau Foundation Nobel Laureate meeting at Lake Constance in Germany. The group travelled to Lindau 26 June–1 July, to meet with some 50 Nobel Laureates and 600 students from around the globe. The group participated in plenary sessions, round table debates and small group discussions within and beyond their respective disciplines. Professor Philip Kuchel, the Academy's Secretary, Science Policy, participated in the meeting as an observer. Since the meeting, the Academy and the Lindau Foundation have signed a Memorandum of Understanding that will enable young Australian researchers to participate in these meetings on an annual basis.

From left: Dr Benjamin Kile, Mr Sandor Kazi, Ms Kate Jeffrey, Ms Rosanna Cazzolli, Mr Tim Newsom (UK contingent), Ms Jaclyn Brown, Mr James McCaw, Dr Beth Fulton, Professor Philip Kuchel, Miss Sandra Oliver (absent Dr Ming Chen and Dr Jason Kovacic).

Forum for European-Australian Science and Technology Cooperation

The European Union is Australia's largest scientific partner, mainly through bilateral collaboration, but also through multilateral projects. The diplomatic missions representing the member states of the European Union and the European Commission in Australia, in association with major Australian S&T organisations, including the Academy, have embarked on a common action to highlight and improve this cooperation. This initiative is known as the Forum for European-Australian Science and Technology cooperation, or 'FEAST'.

The Australian National University (ANU) has received funding from the European Commission and DEST to continue the work started under FEAST. The new project, FEAST II will be led by the Europe Centre, ANU. Professor Sue Serjeantson, the Academy's Executive Secretary, is a member of the FEAST Board chaired by Professor Lawrence Cram.

Diplomatic missions

The Academy continues to maintain regular links with a number of Counsellors and Scientific Attaches in Australia's embassies. In the same way it maintains fruitful relations with many foreign Embassies in Canberra, including the Embassies of France, Italy, China, Japan, Korea, and Taiwan in relation to its exchange programs of scientists. For example, the French Embassy has for many years supported the visits of Australian researchers to France, and last year it was able to extend this support to five additional Australian researchers to undertake research in France.

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, China, Japan, Taiwan, USA, Canada and Mexico. The Academy also administers postdoctoral fellowships with Japan and Korea. The programs provide funds for living and travelling costs.

The programs are funded as part of the Commonwealth Department of Education, Science and Training's International Science and Technology Networks (ISTN), a component of the International Science Linkages programme.

The following researchers were supported in 2005:

Europe

Researcher	Project	Host institution
Dr Geoffrey Bicknell Australian National University	Modelling of high energy emission from active galactic nuclei.	Professor Stefan Wagner University of Heidelberg, Germany
Dr Corey Bradshaw Charles Darwin University	Foraging ecology of diving reptiles: global implications of temperature-dependent life history for threatened and endangered marine turtles.	Professor Graeme Hays University of Wales, UK
Dr Graziella Caprarelli University of Technology Sydney	Flood basalts and volcanic landforms on Mars.	Professor Gian Gabriele Ori Università 'D'Annunzio' di Chieti e Pescara, Italy
Professor Edward Dancer University of Sydney	The study of equations arising in chemotaxis and population models.	Professor Henri Berestycki Centre d'Analyse et Mathématique Sociales, France
Dr Kevin Downard University of Sydney	Evaluation of 'Top Down' Sequencing on a MALDI-TOF/TOF mass spectrometer for characterisation of influenza antigens.	Professor Alain Van Dorsselaer Université Louis Pasteur, France

Researcher	Project	Host institution
Professor Calum Drummond CSIRO Molecular and Health Technologies	Novel amphiphile self-assembly materials.	Professor John Seddon Imperial College London, UK
Professor Richard Harvey University of New South Wales	Genetic pathways regulating cardiac embryonic and adult stem cells.	Professor Margaret Buckingham Université Louis Pasteur, France
Associate Professor Mark Hindell University of Tasmania	Using stable isotopes to characterise the structure of Polar marine communities.	Dr Kit Kovacs Norwegian Polar Institute, Norway
Dr Matthew John Hole Australian National University	Investigation of compressional Alfvénic eigenmodes in spherical tokamak plasmas.	Dr Lynton C. Appel United Kingdom Atomic Energy Authority, UK
Professor Buddhima Indraratna University of Wollongong	Modernisation of Australian ballasted tracks for faster and heavier trains.	Professor Felix Darve Institut National Polytechnique de Grenoble, France
Dr Heinrich Korner James Cook University	Role of chemokines in migration of dendritic precursor cells.	Dr Michael Sixt Max-Planck-Institut für Biochemie, Germany
Dr Zdenka Kuncic University of Sydney	Formation and evolution of the first supermassive black holes in the universe.	Associate Professor Kinwah Wu University College London, UK
Dr Jie Lu University of Technology Sydney	Dynamic decision making with uncertain information processing in emergency management.	Professor Dr Da Ruan Belgian Nuclear Research Centre, Belgium
Professor Kenneth McNamara Western Australian Museum	Extinctions and survivorship of Canning Basin trilobites at the global mid late Devonian Kellwasser biocrisis.	Dr Raimund Feist Université Montpellier II, France
Dr Barry Pogson Australian National University	Elucidating the interactions between drought tolerance and photoprotection in plants.	Professor Philip Mullineaux University of Essex, UK
Professor Hugh Possingham University of Queensland	Prioritising the allocation of conservation resources between biodiversity hotspots.	Professor Luigi Boitani Università di Roma La Sapienza, Italy
Dr Shaun Sandow University of New South Wales	Development of selective methods for examining concomitant arterial anatomy and function.	Professor Chris Garland University of Bath, UK
Dr Ian Turner University of New South Wales	Development of innovative instrumentation to support Australian researchers' participation in an international collaborative field study of hydrodynamics and sediment processes in the swash zone of sandy beaches.	Dr Paul Russell University of Plymouth, UK

Asia

Japan Society for the Promotion of Science bilateral programs

Researcher	Project	Host institution
Associate Professor Michael Burton University of New South Wales	Star formation in molecular clouds: the role of NANTEN2 and Mopra.	Professor Yasuo Fukui Nagoya University

Researcher	Project	Host institution
Dr Shaik Hakeem Bureau of Meteorology	Development of prospective impact indices of IOD, ENSO etc on Australian climate.	Dr Toshio Yamagata Frontier Research Center for Global Change
Dr Dunant Halim University of Adelaide	Regulating acoustic beam pattern from flat panel radiators.	Professor Nobuo Tanaka Tokyo Metropolitan Institute of Technology
Dr Maria Nataatmadja University of Queensland	The role of circulating stem cells in the development of aortic aneurysm.	Associate Professor Masataka Sata University of Tokyo
Dr Guiying Nie Prince Henry's Institute of Medical Research	A new enzyme important for the placenta: its production using the leading-edge technology of wheat germ cell-free system of Japan.	Professor Yaeta Endo Ehime University
Dr Bernard Wong University of Technology Sydney	A study of the organisational and cultural factors which affect successful software inspections and reviews.	Professor Shinji Kusumoto Osaka University

Japan Society for the Promotion of Science Invitation Fellowships (short-term)

Researcher	Project	Host institution
Associate Professor Alan Chaffee Monash University	Improvement to technologies for clean coal utilisation.	Professor Dr Kouichi Miura Kyoto University
Dr Andrew Greentree University of Melbourne	Diamond implementations of quasi-deterministic gates and bus architectures.	Associate Professor Kae Nemoto National Institute for Informatics
Dr Waheed Hugrass University of Tasmania	Current drive in the Kansai Rotamak device.	Professor Masami Onishi Kansai University
Dr Katharine Irvine University of Queensland	CAGE-based analysis of transcription sites in human macrophages.	Dr Harukazu Suzuki RIKEN
Professor Peter Koopman University of Queensland	Understanding sexual development: genetics and pathology.	Professor Ken-ichirou Morohashi National Institutes of Natural Sciences
Dr Konstantin Momot University of Sydney	Application of solid-state nuclear magnetic resonance to biomaterials.	Professor Kiyonori Takegoshi Kyoto University
Dr Kate Schroder University of Queensland	Analysis of human/mouse conservation of gene regulation in macrophages.	Dr Harukazu Suzuki RIKEN
Dr Neal Williams Monash University	Eukaryotic cell-free protein expression of tyrosine kinases.	Associate Professor Eugene Morita Ehime University

Japan Society for the Promotion of Science Invitation Fellowships (long-term)

Researcher	Project	Host institution
Dr Hong Zhang University of Queensland	Quantum dynamics investigations: from small atmospheric molecules to nano-scale materials.	Associate Professor Shinkoh Nanbu Kyushu University

Japan Society for the Promotion of Science Postdoctoral Fellowships

Researcher	Project	Host institution
Mr David Brander Technical University Munich	Application of loop group methods to special submanifolds.	Associate Professor Wayne Rossman Kobe University
Dr David Chapman University of South Australia	Creating a new Japanese identity: Migrant discourses and the dawn of multiculturalism.	Professor Ikuo Kawakami Waseda University
Dr Richard Chenhall Charles Darwin University	A study of Danshukai and self-help groups in Japan.	Professor Tomofumi Oka Sophia University
Dr Andrew Davies Northern Territory Government	The impact of symbiotic bacterial (Wolbachia) infection on biological control potential of Trichogramma parasitoids targeting Diamondback Moth (<i>Plutella xylostella</i>).	Dr Kazuki Miura National Agricultural Research Center for Western Region.
Dr Xinhua He University of California	Linking diversity and function: do abundant and rare mycorrhizae have similar roles in nitrogen and carbon cycling in eucalyptus plantations in Japan?	Professor Dr Taizo Hogetsu University of Tokyo
Dr Chamini Mendis Monash University	Development of new wrought magnesium alloys for automotive applications.	Professor Kazuhiro Hono University of Tsukuba
Dr John O'Dea Monash University	Understanding the sense modalities through the perceptual experience of exploratory agency.	Associate Professor Yokihiro Nobuhara University of Tokyo
Mr Stuart Pearse University of Western Australia	Genetic exploitation of NI (nitrification inhibitory) activity from the roots of <i>Leymus</i> sp. and wheat: determination of the physiological mechanisms and regulating factors for the release of NI activity in <i>Leymus</i> sp.	Dr G V Subbarao Japan International Research Centre for Agricultural Sciences
Dr Simon Truscott Queensland University of Technology	A hybrid control-volume finite-element and wavelet/spline discretisation technique for solving three-dimensional nonlinear partial differential equations.	Professor Masami Okada Graduate School of Science and Engineering

China

Researcher	Project	Host institution
Professor Eryk Dutkiewicz University of Wollongong	Development of interference mitigation techniques for ultrawideband communications networks.	Associate Professor Jinglin Shi Institute of Computing Technology, Chinese Academy of Sciences
Professor Richard Huggins Australian National University	Varying coefficient models for disease onset with application to onset of ataxia in patients with fragile X.	Dr Yong Zhou Institute of Applied Mathematics, Academy of Mathematics and System Science
Dr Weihua Li University of Wollongong	Development and characterisation of isotropic magnetorheological elastomers.	Professor Peiqiang Zhang University of Science and Technology of China

Researcher	Project	Host institution
Professor Philip Marriott RMIT University	New technologies for complex sample analysis – food safety, environment and traditional medicines.	Professor Jin-Ming Lin Tsinghua University
Dr Shaowen Qin Flinders University	Activity-based cost analysis for software production cost management.	Dr Qing Wang Institute of Software, Chinese Academy of Sciences
Dr Haihui Wang CSIRO Manufacture and Infrastructure Technology	Impact of wind on the geometries and temperature profiles of flame plumes formed in bushfires.	Associate Professor Naian Liu University of Science and Technology of China

Taiwan

Researcher	Project	Host institution
Dr Gilles Guillemin University of New South Wales	Effects of kynurenine pathway metabolites on gamma-secretase activity.	Dr Yung-Feng Liao Institute of Cellular and Organismic Biology
Dr Helmut Thissen CSIRO Molecular Science	Novel biomimetic coatings.	Assistant Professor Wei-Bor Tsai National Taiwan University
Dr Zonghan Xie University of New South Wales	The transition of mild to severe wear of amorphous carbon films.	Professor Jia-Hong Huang National Tsing Hua University
Dr Wen Xu Australian National University	Optoelectronic properties of spintronic systems.	Professor Chi-Shung Tang National Center for Theoretical Sciences

Korea

Researcher	Project	Host institution
Associate Professor Richard Lai La Trobe University	Component specification measurement and improvement.	Professor Yong Soo Kim Kyungwon University
Associate Professor Brett Neilan University of New South Wales	Biotechnology research collaboration for improved microorganisms for fuel ethanol and fermentation chemicals.	Professor Kye Joon Lee Seoul National University

North America

Researcher	Project	Host institution
Dr Laurie Chisholm University of Wollongong	Modelling vegetation mosaics: extrapolating from patches to the landscape.	Professor Carol Wessman University of Colorado, USA
Professor David Crewther Swinburne University of Technology	The functional anatomy of electrical evoked potentials, with particular relation to colour and form processing.	Associate Professor Anna Roe Vanderbilt University, USA
Dr Bassam Dally University of Adelaide	Measurement of reactive scalars using advance laser diagnostic techniques.	Dr Robert Barlow Sandia National Laboratories, USA

Researcher	Project	Host institution
Dr Susan Ferguson Australian Antarctic Division	Remediation endpoint-targets for bioremediation strategies in polar-regions determined by soil microbial activity.	Dr Steven Siciliano University of Saskatchewan, Canada
Dr Joern Fischer Australian National University	Biodiversity conservation outside reserves: a synthesis of work from Australia and the Americas.	Professor Gretchen Daily Stanford University, USA
Dr Emanuela Handman Walter and Eliza Hall Institute of Medical Research	Functional role in virulence of a Leishmania vaccine.	Dr Jeffrey Beetham Iowa State University, USA
Associate Professor Scott Kable University of Sydney	Spectroscopy, dynamics and reactivity of small carbene molecules.	Professor Scott Reid Marquette University, USA
Dr Ivan Kempson University of South Australia	Development of non-destructive isotopic measurement applications with Time-of-Flight Secondary Ion Mass.	Professor Stewart McIntyre University of Western Ontario, Canada
Dr Linda Porter Royal Brisbane and Women's Hospital	Calculating the radiation dose to a human wearing an extravehicular activity space suit on the surface of Mars.	Associate Professor Premkumar Saganti Texas A&M University, USA
Dr Glenn Shea University of Sydney	Biogeography and species diversity of skinks of the genus Sphenomorphus of the Papuan Peninsula, Papua New Guinea.	Dr Allen Allison Bishop Museum, USA
Dr Leone Spiccia Monash University	Modelling metal speciation and mineral formation in geochemical systems.	Professor William H Casey University of California, USA
Dr Andrey Sukhorukov Australian National University	All-optical switching in nonlinear lattices.	Professor Roberto Morandotti University of Quebec, Canada
Dr Gerhard Swiegers CSIRO Molecular Science	Bio-inspired water oxidation catalysts.	Professor Charles Dismukes Princeton University, USA
Associate Professor Thomas Trull University of Tasmania	Nitrogen isotope based assessment of metabolism in marine phytoplankton.	Dr Ken Buesseler Woods Hole Oceanographic Institution, USA
Dr Nagarajan Valanoor University of New South Wales	Dislocations in ferroelectric nanostructures.	Assistant Professor Pamir Alpay University of Connecticut, USA
Dr Madeleine Van Oppen Australian Institute of Marine Science	Isolation and characterisation of viruses and/or virus-like particles from coral-inhabiting algal endosymbionts.	Dr Ruth Gates University of Hawaii, USA
Associate Professor David Young Griffith University	New antimony and bismuth compounds for the treatment of leishmaniasis.	Associate Professor Edward Tiekink University of Texas, USA

East Asia and Pacific Summer Program for US Graduate Students

Researcher	Project	Host institution
Ms Susan Cameron University of California	Designing nature reserves in Melanesia: community based conservation in a biodiversity hotspot.	Dr Chris Margules CSIRO Sustainable Ecosystems

Researcher	Project	Host institution
Ms Christina Crecca University of Florida	Substitute effects on the isomerisation pathways of azobenzene derivatives.	Professor Jill Gready John Curtin School of Medical Research
Mr Scott DuFrane University of New Mexico	Elemental and isotopic characterisation of young lavas from the Philippine archipelago.	Professor Simon Turner Macquarie University
Mr Matthew Fujita University of California	Sequencing mitochondrial genomes from 3N1 clones to investigate the molecular evolution of large duplications that exist in these genomes.	Dr Stephen Donnellan South Australian Museum
Mr Rene Gabbai Rutgers University	Development of a more refined model for the motion of a tethered cylinder system.	Professor John Sheridan Monash University
Ms Melissa Green Princeton University	Oscillating and pitching motion of airfoils.	Professor Julio Soria Monash University
Ms Gwendolen Haley University of Wyoming	Neuronal viral vector tracing using green fluorescent protein.	Dr Michael McKinley Howard Florey Institute of Experimental Physiology and Medicine
Ms Valentine Hemingway University of California	Disease dynamics in amphibian populations.	Dr Lee Berger James Cook University
Mr William Holland University of Utah	The molecular basis through which cells sense exogenous lipids and then translate their presence to induce changes in cell behaviour.	Professor Edward Kraegen Garvan Institute of Medical Research
Mr Shaun Howard University of Cincinnati	Novel membranes and specific ion effects.	Dr Vince Craig Australian National University
Mr Phillip Johnson Texas A&M University	Progressive geochemical analysis of Tutuilan basalt adze quarries.	Dr Ian Johnson University of Sydney
Mr Matt Kraybill University of Utah	Neuropsychological testing of executive function in older adults.	Dr Nancy Pachana University of Queensland
Mr Keith Marsolo Ohio State University	Characterisation of protein structure for SCOP fold recognition.	Professor Rao Kotagiri University of Melbourne
Mr Timothy Meehan University of North Carolina	Magnetic manipulation of biological structures.	Professor Matt Trau University of Queensland
Mr Aaron Rundus University of California	The functional significance of signal structure and communicative behaviour in the evolution and diversity of communicative skills.	Dr Chris Evans Macquarie University
Ms April Smith Rice University	Bioactive hydrogels to control differentiation of vascular progenitor cells.	Dr Laura Poole-Warren University of New South Wales
Mr Joseph Smith University of Massachusetts	Using short to medium lived radionuclides to trace sediment, carbon and contaminant cycling in coastal and estuarine systems.	Dr Gregg Brunskill Australian Institute of Marine Science
Ms Amy Thomas University of Hawaii	The behaviour and properties of seabed sediments.	Professor John Carter University of Sydney

Lectures and medals—2006

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

Academy Medal

The Academy's Council has awarded the Academy Medal to Professor Mike Gore for his dedication to science education and the promotion of science. Through the establishment of Questacon, his vision has brought the excitement and wonder of science to countless children and adults, particularly through Questacon's outreach programs that have taken interactive science exhibits to millions of people across Australia.

The Academy Medal recognises outstanding contributions to science by a person outside the Fellowship who has, by sustained efforts in the public domain, significantly advanced the cause of science and technology in Australia or who has made a substantial contribution to the Academy.

Senior award recipients

Macfarlane Burnet Medal and Lecture for research in the biological sciences

Professor Jennifer Graves, Australian National University, for research in mammalian genetics and comparative genomics.

David Craig Medal for research in chemistry

Professor Barry Ninham, Australian National University, for research in theoretical colloid chemistry.

Mawson Medal and Lecture for research in the Earth sciences

Dr Kenneth McNamara, Western Australian Museum, for research in palaeontology and evolutionary heterochrony.

Ian William Wark Medal and Lecture for research which contributes to the prosperity of Australia

Professor Graeme Clark AC, The Bionic Ear Institute, for inventing the multiple channel cochlear implant.

Junior award recipients

Dorothy Hill Award for research by a female in the Earth sciences

Dr Adriana Dutkiewicz, University of Sydney, for research in Archaean and Proterozoic petroleum geology.

Fenner Medal for research in biology, excluding the biomedical sciences

Dr Barry Brook, Charles Darwin University, for research integrating population and tropical ecology, conservation biology and palaeobiology.

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

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

Dr James Tickner, CSIRO Minerals, Sydney, for research and development of nuclear instrumentation.

Gottschalk Medal for research in the medical sciences

Dr Joel Mackay, University of Sydney, for research in characterising biomolecular structures and interactions.

LeFèvre Memorial Prize for research in chemistry

Dr Michael Sherburn, Australian National University, for research in chemical synthesis.

Pawsey Medal for research in physics

Dr Mahananda Dasgupta, Australian National University, for research in nuclear fusion.

Research support and lectureships

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

The Fund for the Conservation of Endangered Vertebrate Species supports research on endangered Australian vertebrate species

- Dr Peter Banks, University of New South Wales
Project: *Wildlife general—protecting prey with chemical camouflage.*
- Dr Meri Oakwood, Envirotek, New South Wales
Project: *Monitoring extinction of the Northern quoll.*
- Dr Andrea Phillott, Central Queensland University
Project: *Dispersal patterns and swimming behaviour of hatchling flatback turtles.*
- Ms Jessica van der Waag, University of Western Australia
Project: *How to support malleefowl recruitment in a fragmented landscape.*

The Maxwell Ralph Jacobs Awards support projects in forestry research

- Mr Vic Jurskis, Forests NSW, for travel to Victoria, New South Wales, South Australia and the Northern Territory to inspect fire management and forest decline.
- Dr David Forrester, University of Melbourne, for research in water use of mixed species plantations of eucalyptus and acacia.

The Selby Fellowships are awarded to overseas scientists to visit scientific centres in Australia and to deliver public lectures

- Professor Godfrey Hewitt, University of East Anglia, UK, who will visit Canberra, Melbourne and Adelaide in September 2006.

The Graeme Caughley Travelling Fellowship supports ecologists resident in Australia or New Zealand to share their expertise by visiting scientific centres and giving public lectures in countries other than Australia or New Zealand

- Dr David Forsyth, Arthur Rylah Institute for Environmental Research, Melbourne, to visit North America and Europe.

The Rudi Lemberg Travelling Fellowships are awarded to overseas and Australian scientists to visit scientific centres in Australia and to deliver public lectures

- Professor Jan Vymazal, ENKI o.p.s., Czech Republic, who will visit Lismore, Brisbane, Sydney, Newcastle and Cairns in June and July 2006.

The Douglas and Lola Douglas Scholarship in Medical Science supports young researchers who hold an NHMRC Training Scholarship in indigenous or primary health care, with preference given to the area of indigenous health research

- Kerry-Ann O'Grady, a PhD candidate in the School of Population Health and the Department of Paediatrics at the University of Melbourne.

Research conferences

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

The Boden Research Conferences support researchers in the biological sciences

- Australasian Society for Dermatological Research, for a conference on *Epithelial stem cells and cutaneous regeneration*, to be held on North Stradbroke Island, Queensland, 22–25 September 2006.
- Australasian Gene Therapy Society, for a conference on *Gene therapy: delivery and control*, to be held 18–20 April 2007, location to be advised.

The Fenner Conferences on the Environment support researchers and policy advisers in the areas of environment and conservation affecting Australia and its environs

- CSIRO Plant Industry for a conference on *Integrating agricultural and environmental imperatives for a profitable and sustainable future*, to be held in Canberra in September 2006.
- Australian Academy of Science, for a conference on *Sustainability science: new perspectives on the population and environment nexus in Australia*, to be held in Canberra in March 2007.

Science education and public awareness

The Academy is committed to promoting science education, both as a contribution to informed citizenship and to encourage our 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 which links the teaching of science with the teaching of literacy in Australian primary schools. It comprises a rich curriculum resource integrated with a sophisticated professional learning program designed to increase teacher confidence and competence in the teaching of both science and the literacies of science.

Stage 2 of the project (August 2004–December 2005) involved a partnership between the Academy and the Australian Government Department of Education, Science and Training (DEST). DEST provided \$1.8 million to develop and trial curriculum resource units and a professional learning program.

The Stage 2 trial involved 56 schools and 106 teachers from all states and territories who participated in a total of eight days of professional learning workshops; trialled and provided feedback on eight curriculum resource units; developed their own curriculum resource unit using the *Primary Connections* model; and participated in the research component through completing questionnaires and providing feedback. This information was used to evaluate the trial and inform full scale development of the program.

The findings of the research were very positive. Significant gains were made, particularly in the areas of student learning and teacher confidence and practice. The findings were an affirmation of the vision, strategic direction and collaborative approach adopted in developing the program. The *Primary Connections Stage 2 Trial: Research Report* is available at www.science.org.au/reports/pcreport1.htm.

The Stage 2 Research Report was reviewed by DEST, resulting in approval for funding for a further two and a half years to develop the program and support widespread implementation throughout Australia.



More information on science education is available at www.science.org.au/scied.

2006 *Primary Connections* facilitators and Professional Learning Team at the professional learning workshop in January.

Stage 3 of the *Primary Connections* project began in January 2006 with a three day workshop at the Shine Dome to train the first cohort of 88 professional learning facilitators. *Primary Connections* facilitators will work within their State/Territory jurisdiction to support schools expressing interest in implementing the program. The next stage of the project will also see the continued development, trialling and refinement of further curriculum resource units for use in the program.

Science by Doing Project

The Academy has embarked on the first stage of a collaborative national project—*Science by Doing*—that aims to engage junior secondary students in learning science through greater emphasis on investigation.

The project is a direct response to the recommendation made by the Science Engagement and Education Working Group reporting to the Prime Minister's Science, Engineering and Innovation Council (PMSEIC) on 28 November 2003. The Working Group comprised representatives from the Academy, Scitech, Engineers Australia, the Australian Science Teachers Association, Questacon, the Australian Museum, CSIRO Education, the Australian Broadcasting Corporation, the University of Melbourne and the University of Newcastle.

In this initial phase a detailed framework and proposal is being developed for presentation to the Australian Government Department of Education, Science and Training. The framework will outline a strategy for improving the quality of science learning for Australian lower secondary students. The strategy will embrace an inquiry approach to learning hence the name, *Science by Doing*.

Nova: Science in the news

www.science.org.au/nova

Nova: Science in the news covers contemporary science issues. There are currently 88 topics on the *Nova* site, which has had over 10 million visitors since it was established in 1997. Each *Nova* topic is reviewed before posting on the web, providing an accurate and reliable source of information for users.

New topics include global warming and biodiversity; predicting natural events; bird flu; insect robotics; population and the environment; weeds; and nanotechnology. These were funded by the Australian Government Department of Environment and Heritage, the Sir Mark Oliphant International Frontiers of Science and Technology Conference Series, the Academy's Population and Environment Fund, and the Australian Research Council Nanotechnology Network. *Nova* continues to be supported by its principal sponsor, the Commonwealth Bank Foundation.

Interviews with Australian scientists

www.science.org.au/scientists

The *Interviews with Australian Scientists* project (previously known as *Video Histories of Australian Scientists*) is well regarded and becoming increasingly popular. Each year feedback from teachers and education organisations is very positive and the number of visitors to the website grows steadily, with the one millionth visitor achieved in January 2006.

The Academy established this ongoing project 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 current focus is on interviewing Academy Fellows.

To date 93 scientists have been interviewed. Edited transcripts of the interviews, together with accompanying teachers notes are being added progressively to the Academy's website.

Interviews that have recently been completed or are near completion include geophysicist Professor Bill Compston, evolutionary biologist Professor Derek Denton, physicist Professor Robert Street, and mineralogist Professor Howard Worner.

Fellows to be interviewed in 2006 include plant biochemist Professor Jan Anderson, ecologist Professor Alec Costin, geophysicist Professor Mervyn Paterson, and parasitologist Professor John Sprent.

Each interview adds to the fascinating story that is Australian science and we express our appreciation to all the Fellows for their participation in this program.

All interviews in the series are available for loan or purchase from the Academy.



Robyn Williams
interviewing Derek
Denton.

Support for young researchers and science teachers

Teachers and early-career researchers from around Australia attended special programs during the Academy's *Science at the Shine Dome* conference from 4–6 May. They joined Academy Fellows at the New Fellows Seminar, awards presentation, annual dinner and the annual symposium, 'Recent advances in stem cell science and therapies'.

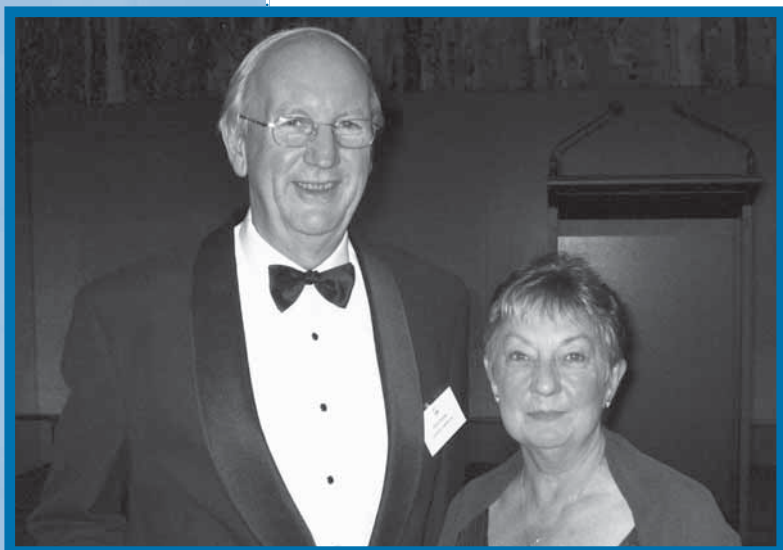
The Academy sponsored awards for a teacher from each state and territory to attend and, for the eighth year, the government, Catholic and independent school systems in the states and territories sponsored classroom science teachers and curriculum officers to attend. The teachers' program included explaining cutting-edge gene technology and the issues surrounding stem cell science. Ahead of the symposium, teachers visited the CSIRO Discovery Centre for an education workshop at which Dr Sharon Abrahams was the guest speaker. The hands-on workshop explored cutting-edge gene technology and the issues surrounding stem cell research.

The Australian Research Council and the National Health and Medical Research Council each sponsored three awards enabling researchers aged 35 and under to attend *Science at the Shine Dome*. Research organisations, including universities, the Walter and Eliza Hall Institute of Medical Research, CSIRO and the Australian Nuclear Science and Technology Organisation, also sponsored one or two of their best young researchers to attend. The early-career researchers' program included a workshop on career development which discussed media and communication skills and writing grant proposals.

The early-career researchers, including many who had been selected to attend the Lindau Foundation Nobel Laureate meeting at Lake Constance in Germany from 26 June–1 July, responded enthusiastically to the opportunity to interact informally with Academy Fellows.

Public events

Science at the Shine Dome



Rod and Marjorie Home.

The Academy held the annual *Science at the Shine Dome* event, from 4–6 May. Academy Fellows were joined by newly elected Fellows, Academy award winners, early-career researchers and award-winning science teachers.

Recipients of the Academy's awards for 2005 were presented with their medals and invited to make a presentation on their research. Professor Ron Ekers, from the CSIRO Australia Telescope National Facility, delivered the Matthew Flinders Lecture, taking the audience on a voyage of discovery from the birth of radio astronomy to pulsars and the mysteries of dark matter. Newly elected Fellows also gave a seminar about their research before being officially admitted to the Academy.

The final day of *Science at the Shine Dome* is set aside for the Academy's annual symposium. This year the symposium, 'Recent advances in stem cell science and therapies', brought together leading stem cell researchers from Australia, Germany, the UK and USA. It was attended by more than 220 people, the majority of whom were outside the Fellowship of the Academy. In his opening address Academy President, Dr Jim Peacock, highlighted the importance of the symposium and the need to ensure the very best international science and the latest discoveries are available to policy makers. He pointed out that in this topic, especially, the government must be soundly informed about the scientific evidence. Professor Bob Williamson chaired the symposium program committee. Proceedings are available at www.science.org.au/sats2005/symposium.htm.

The social highlight for Fellows and guests was the annual black tie dinner in Parliament House, Canberra, where Professor Gunner Öquist, Corresponding Member of the Academy, Secretary General of the Royal Swedish Academy of Science and Professor of Plant Physiology, Umeå Plant Science Center, Sweden, was the after-dinner speaker. At the dinner Professor Rod Home, Emeritus Professor in the Department of History and Philosophy of Science, University of Melbourne, was presented with the Academy Medal for his tireless work in editing *Historical Records of Australian Science*.

The Academy Medal recognises outstanding contributions to science by a person outside the Fellowship who has, by sustained efforts in the public domain, significantly advanced the cause of science and technology in Australia or who has made a substantial contribution to the Academy.

Nobel Prize winner addresses the National Press Club

Professor Peter Doherty, Academy Fellow and winner of the 1996 Nobel Prize for Physiology or Medicine, delivered an address at the National Press Club on 9 November.

In his role as an advocate for science and innovation, Professor Doherty took the opportunity to publicise his book *The Beginner's Guide to Winning the Nobel Prize*, published by Melbourne University Press (www.mup.unimelb.edu.au/catalogue/0-522-85120-7.html). He acknowledged the Russell and Mab Grimwade Bequests for supporting the book.

Professor Doherty said that the advances made from scientific discovery are profound and have enormous effects on how we live and work. He felt that it was important for everyone to have an appreciation of how science works, where scientists come from, how they train, what they do and what sort of people they are.

He said the book attempts to provide an interesting, comprehensive and readable account of modern science and its practitioners. It contains some personal stories and comments on issues such as bird flu, vaccination, genomics, neurobiology and cancer therapy. In his speech, Professor Doherty cited the challenges and importance of communicating science to a broad audience, and also emphasised the importance of the development of a knowledge-based economy in Australia and the promotion of excellence in universities.

The complete transcript is available at www.science.org.au/events/npc-doherty.htm.

Public lecture on atmospheric carbon dioxide

More than 80 people enjoyed a double-billed public lecture at the Shine Dome on 7 July. The lectures were given under the general title 'Carbon dioxide: acidic oceans and geosequestration', and explored two important issues emerging from the increasing levels of carbon dioxide in the atmosphere.

Dr Steve Widdicombe, from the Plymouth Marine Laboratories, UK, introduced the process of ocean acidification in his lecture entitled 'Ocean uptake of carbon dioxide: are the oceans acidifying?' He highlighted the key environmental concerns and discussed some of the mitigation strategies that have been suggested.

Dr John Bradshaw, from Geoscience Australia, introduced geosequestration and the geological properties needed for suitable locations in his lecture entitled 'Geological storage of carbon dioxide: How long can we keep it out of the atmosphere?' He discussed the problem of increasing carbon dioxide emissions, possible alternative energy sources, and the safety and permanence of sequestering carbon dioxide below the ground.

The transcripts of both lectures are available at www.science.org.au/events/#transcripts.



Dr John Bradshaw and Dr Steve Widdicombe.

National Science Week

Professor Mark Harrison presented a public lecture, entitled 'From hell to the Himalayas', at the Shine Dome on 18 August as part of National Science Week and the Australian Science Festival. Professor Harrison is Director of the Research School of Earth Sciences at the Australian National University and was elected a Fellow of the Academy in 2005.

More than 120 people joined Professor Harrison as he explored the first 500 million years of the Earth's history, known as the Hadean Eon ('hellish time'). He revealed a world dominated by continents and oceans, contrary to long-held theories of a violent and ever changing world. He also discussed the emerging field of thermochronometry, which has given new insights into what happens when continents collide and is unravelling the long-standing puzzle of the origin and evolution of the Tibet-Himalayan mountain system.

Eureka moments!

www.science.org.au/eureka

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

Following the launch, *Eureka moments!* began a successful 20 month tour, visiting museums, galleries and libraries around Australia.

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

The Academy would like to thank the following organisations for supporting the exhibition:

- National Museum of Australia (Canberra)
- Parliamentary Library, Parliament House (Canberra)
- Australian Museum (Sydney)
- South Australian Museum (Adelaide)
- Western Australian Museum (Perth, Geraldton, Albany and Kalgoorlie)
- Queen Victoria Museum and Art Gallery (Launceston)
- Melbourne Museum (Melbourne)
- Queensland Museum, Southbank (Brisbane)
- Gin Gin Courthouse Gallery (Gin Gin)
- Museum of Tropical Queensland (Townsville)
- Australian Sugar Industry Museum (Mourilyan)

Eureka moments!
travelling exhibition at
the Melbourne Museum.



Historical Records of Australian Science

Historical Records of Australian Science has an editorial board, chaired by Professor David Curtis, 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 2005, with five 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 on a three year contract, which was signed for a further three years late in 2005. During the year all back issues of the journal from its inception in 1966 as *Records of the Australian Academy of Science* were placed on CSIRO Publishing's website at www.publish.csiro.au/?nid=108.

Australian Journals of Scientific Research

There are currently 11 Australian Journals of Scientific Research, published by CSIRO Publishing in cooperation with CSIRO and the Australian Academy of Science. 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 2005 was Professor Marilyn Renfree.

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

ABC Australian Academy of Science Media Fellowships

In August, ABC Radio National announced the inaugural ABC Australian Academy of Science Media Fellowships, a new partnership between the ABC Radio National Science Unit and the Australian Academy of Science. The Fellowships aim to improve scientists' communication skills and understanding of the media by spending six weeks with ABC Science in radio, TV and online.

The three Science Media Fellows for 2005 were:

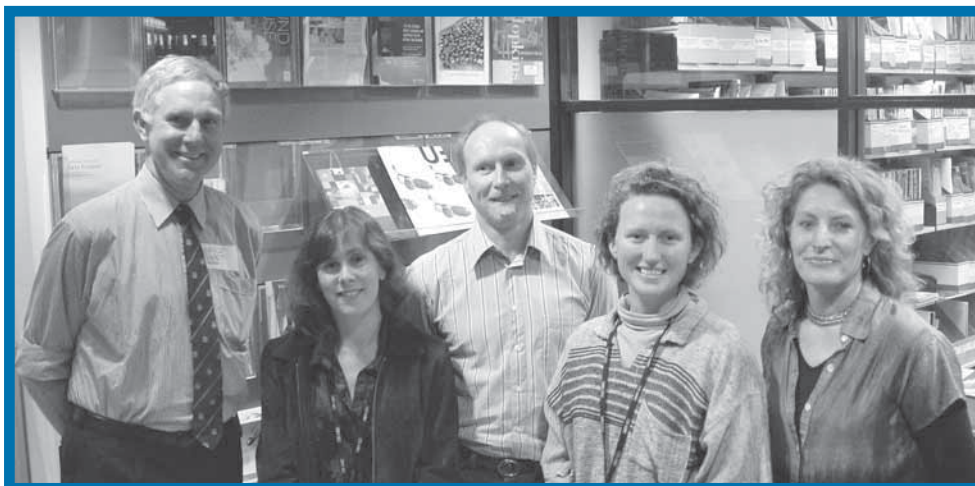
Dr Sheree Cairney, Menzies School of Health Research at Charles Darwin University, a cognitive neuroscientist working in Aboriginal health.

Dr Ian Goodwin, School of Environmental and Life Sciences, University of Newcastle, an Earth scientist with specialisations in climatology, paleoclimatology and coastal geoscience.

Dr Debbie Richards, Department of Computing, Macquarie University, a senior lecturer and the department's director of industry and external relations.

The fellows undertook a five-day science media training course then over five weeks worked alongside producers and journalists to complete a project, such as a radio program or website, as well as offering their expertise to ABC staff.

This new partnership with the ABC has allowed the continuation of the Media Fellowships program for 2005. It was previously co-funded by the Department of Education, Science and Training.



From left: Professor Philip Kuchel, Secretary (Science Policy) with Debbie Richards, Ian Goodwin, Sheree Cairney, and Lynne Malcolm, Executive Producer, ABC's Radio National Science Unit.

Recent benefactors

Donations of \$1,000 and above are acknowledged

Special purpose funds

Adam Berry Memorial Fund	
Family and friends of the late Adam Berry	\$3,705
Adolph Basser Library	
F J Fenner FAA	\$10,000
Dorothy Hill Award	
University of Queensland	\$20,000
R L Stanton FAA	\$3,000
Fund for the Conservation of Endangered Native Animals	
Anonymous donor	\$20,000
J G Russell Fund	
J G Russell	\$12,000
Population and Environment Fund	
Anonymous donor	\$5,000

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

2005 Nobel Prize Poster	
Australian Foundation for Science	\$40,000
National Health and Medical Research Council	\$10,000
Western Australian Government, Department of Health	\$10,000
AGM Symposia – Funds for Teachers and Young Researchers	
Australian Research Council	\$6,000
National Health and Medical Research Council	\$6,000
D P Craig FAA	\$20,000
National Museum of Australia Student Prize 2006	
National Museum of Australia	\$3,000
<i>Nova: Science in the news</i>	
Commonwealth Bank Foundation	\$50,000
Complex Open Systems Network	\$5,000
Primary Science and Literacy (<i>Primary Connections</i> – Stage 2)	
Department of Education, Science and Training (final payment)	\$100,000
<i>Science by Doing</i> – Review of Stage 1 Proposal	
Department of Education, Science and Training	\$4,320
Video Histories Fund	
University of Wollongong	\$2,500

Special project grants

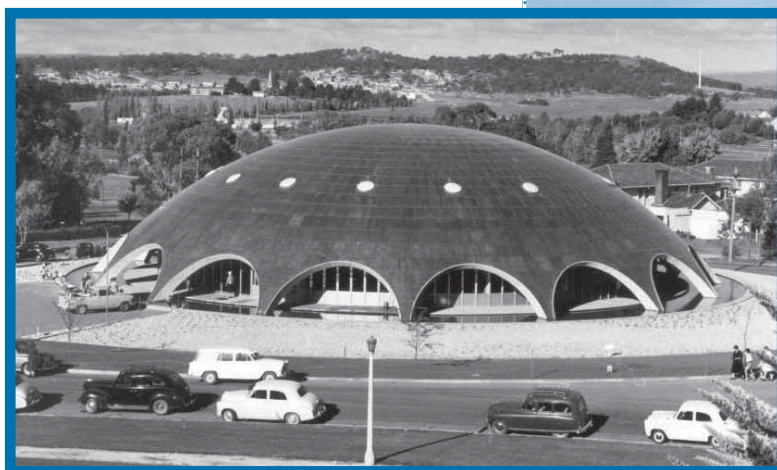
Australian Agency for International Development (AusAID)	
Sino-Australian Grasslands Workshop	\$29,852
Australian Research Council – Learned Academies Special Research Projects	
An Australian policy framework for systematic assessment of emerging risks (NAF)	\$110,000
A strategic framework for the population and environment nexus in Australia: A whole of knowledge approach	\$110,000
Australian Research Council – 2005 Special Research Initiatives	
Decadal Plan for Australian Astronomy and Astrophysics	\$50,000
National Strategic Review of Mathematical Sciences Research	\$77,100
Department of Education, Science and Training – Innovations Access Programme	
Symposium with the Chinese Academy of Sciences:	
2004 funding	\$78,100
2005 funding	\$68,734
Department of Education, Science and Training – International Science Linkages Strategic Policy	
Australia/Germany Science and Technology Collaboration: Australian Workshop with Biodiversity Theme	\$40,000

Department of the Environment and Heritage National Committee for Earth Systems Science workshop – Pan evaporation: an example of the detection and attribution of trends in climate variables	\$19,500
Department of Industry, Tourism and Resources – Biotechnology Australia High Flyers Think Tank: Biotechnology and the future of Australian agriculture	\$62,363
NSW Department of Environment and Conservation Evaluation of the Environmental Trust Research Grant Program	\$29,500
National Library of Australia – Community Heritage Grant Preservation of audio and audiovisual material	\$2,600

The Shine Dome and Ian Potter House

The Heritage Listing

The Shine Dome was honoured as the first building in Canberra to be included on the National Heritage List. The National Heritage List recognises places with outstanding heritage value to our nation and provides protection under the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999*. Twenty-two places have been included on the National Heritage List. The Dome is one of five 20th century buildings on the List; the other buildings are the Sidney Myer Music Bowl, ICI Building, and Newman College, all of which are in Melbourne, and the Sydney Opera House.



The Shine Dome, soon after its opening in 1959.

Ian Potter House

The air conditioning units and telephones in Ian Potter House have been replaced and work has started on the rejuvenation of the lawn area between Ian Potter House and the Shine Dome parking area. The plans include lawn and garden areas that will be planted with drought tolerant species and pathways to minimise damage from pedestrians.

Events at the Dome

The Academy's program included *Science at the Shine Dome*; a High Flyers Think Tank; 'Making Connections' a three-day workshop for *Primary Connections*; and hosting the Council Meeting of the Federation of Asian Scientific Academies and Societies. The introduction of an evening function, the President's Soirée, was initiated by the President of the Academy. The purpose of this series of meetings is to discuss scientific topics of contemporary interest in an informal 'fireside chat' led by experts in the field.

The facilities and unique architecture of the Dome continued to attract organisations to hold their events there. There are a number of regular hirers such as the Australian Greenhouse Office, the Australian-New Zealand School of Government and the Transplantation Society of Australia and New Zealand. We also welcomed new hiring organisations during the year, among them the Department of the Prime Minister and Cabinet and the Department of Agriculture, Fisheries and Forestry.

Events held at the Dome

Date	Function	Organisation
4–6 May 2005	<i>Science at the Shine Dome</i>	Australian Academy of Science
11–13 May	Annual Scientific Meeting of TSANZ	Transplantation Society of Australia and New Zealand
17–18 May	Conference—Science and Ethics: Can <i>Homo Sapiens</i> survive?	Manning Clark House
19 May	Spanish Film Festival	Embassy of Spain
21 May	Annual General Meeting of Capital Towers	Canberra Units Plan Services
26 May	Dining Club. Professor Mandyam Srinivasan, Research School of Biological Sciences, Australian National University—Small brains, smart minds: vision, navigation and ‘cognition’ in honeybees, and applications to robotics	The four learned Academies
28 May	2005 Law Competition Grand Finals	Australian National University Law Society
2 June	National Stakeholder Forum for a Research Quality Framework	Department of Education, Science and Training
2 June	President’s Soirée—Global dimming, global warming: what’s going on?	Australian Academy of Science
16 June	Dinner	US Graduates Exchange Program, Australian Academy of Science
16 June	Retirement Conference	Research School of Social Sciences, Australian National University
24 June	<i>Primary Connections</i> Reference Group meeting	Australian Academy of Science
27–28 June	Workshop—Reconstructing past climates for future prediction: integrating high-resolution palaeo-data for meaningful prediction in the Australasian region	National Committee for Earth System Science
29 June	Public Lecture. Ms Lynelle Briggs, Public Service Commissioner—Passion for policy	Australian-New Zealand School of Government
30 June	Council Meeting	Australian Academy of Science
7 July	Public Lecture—Carbon dioxide: acidic oceans and geosequestration	Australian Academy of Science
11 July	Fenner Conference on the Environment—Wildlife Health Workshop	Wildlife Disease Association, Australasian Section
12–13 July	Joint ARC/ANZSOG Symposium	Australian-New Zealand School of Government
22 July	Forum—Biotechnology in agriculture	Biotechnology Australia
26–27 July	High Flyers Think Tank—Biotechnology and the future of Australian agriculture	Australian Academy of Science
28 July	Dining Club. Dr Richard Grove, CSIRO Plant Industry—Jumping the garden fence: invasive garden plants in Australia	The four learned Academies
2 August	Eighth Geoffrey Sawer Lecture. Professor Richard Falk—Toward global democracy: a plea for moral globalisation	Centre for International and Public Law, Australian National University

Date	Function	Organisation
4 August	Conference—Sustaining Our Future	Cement Industry Federation
4 August	President's Soirée—Recent advances in nuclear energy research	Australian Academy of Science
11 August	Conference—Indigenous Socioeconomic Outcomes: Assessing Recent Evidence	Centre for Aboriginal Economic Policy Research
17 August	Public Forum—Take a Jog Around the Mental Block	ABC Life Matters/Australian Science Festival
18 August	National Science Week Lecture. Professor Mark Harrison, Research School of Earth Sciences, Australian National University—From hell to the Himalayas	Australian Academy of Science/Australian Science Festival
31 August	Public Lecture. Mr Jon Stanhope, ACT Chief Minister—Shaping opportunities, creating public value: Government and community collaborating in the ACT	Australian-New Zealand School of Government
6–9 September	FASAS Council Meeting	Federation of Asian Scientific Academies and Societies
14–15 September	Greenhouse Challenges Plus Conference 2005	Australian Greenhouse Office
23 September	Workshop	ARC Asia Pacific Futures Network
28 September	<i>Forests and Free Speech</i> National Tour	Wilderness Society
29 September	Council Meeting	Australian Academy of Science
4 October	Annual General Meeting	Australian Foundation for Science
6 October	Dining Club. Dr Phil McFadden, Geoscience Australia—The Australian tsunami warning system: why we need it	The four learned Academies
8 October	Beginning Experience Conference Dinner	Beginning Experience Canberra Inc
12 October	Third Stream Funding Forum	Federation of Australian Scientific and Technological Societies
18–19 October	Workshop—Research Data Collections	Australian Partnership for Advanced Computing
25 October	Lecture. Mr Christopher Vernon, School of Architecture, Landscape and Visual Arts University of Western Australia—Marion Mahoney Griffin	Walter Burley Griffin Society
26 October	Public Lecture. Dr Mark Prebble, State Services Commissioner, New Zealand—Public servants in New Zealand and Australia: mates or rivals?	Australian-New Zealand School of Government
27 October	CIT Design students excursion	Canberra Institute of Technology
27 October	Public Lecture. Dr Paul Frijters, Research School of Social Sciences, Australian National University—Does happiness research have a future in the dismal science?	National Institute of Economics and Business, Australian National University
6–7 November	Annual Symposium and Cunningham Lecture	Academy of the Social Sciences in Australia
8–10 November	Workshop—Antimatter Matters	Research School of Physical Sciences, Australian National University
23–24 November	PACCT Science and Technology and Counter Terrorism conference	Department of the Prime Minister and Cabinet

Date	Function	Organisation
24 November	Astronomy Decadal Plan Launch	National Committee for Astronomy
24 November	President's Soirée—Integrative climate science, economics and sociology	Australian Academy of Science
29 November	National Symposium and Oration—Salinity Economics and Policy	Department of Agriculture, Fisheries and Forestry
2 December	Dining Club—Christmas Dinner	The four learned Academies
5–7 December	Sino-Australian Workshop—Management of grassland-livestock systems and combating land degradation in Northern China	Australian Academy of Science
6 December	Public Lecture. Senator Amanda Vanstone, Minister for Immigration and Multicultural and Indigenous Affairs—Beyond conspicuous compassion: indigenous Australians deserve more than good intentions	Australian-New Zealand School of Government
8 December	Council Meeting	Australian Academy of Science
14 December	Forum—Endocrine Disruptor Chemicals	Office of Chemical Safety, Department of Health and Ageing
15 December	Committee meeting and lunch with British High Commissioner	National Committee for Medicine
2 January 2006	Opening Session	National Youth Science Forum
16 January	Opening Session	National Youth Science Forum
18–20 January	<i>Primary Connections</i> Professional Learning Facilitators Workshop	Australian Academy of Science
9 February	Council and Sectional Committee meetings	Australian Academy of Science
16 February	Public Lecture. Professor Xu Guanhua, China's Minister for Science and Technology—China's future direction for science and technology investment and the potential impact on Australia's science and technology collaboration with China	Australian Academy of Science
21 February	Public Lecture. Professor John Schellnhuber, UK—Avoiding dangerous climate change	Institute for the Environment, Australian National University
23 February	Dining Club	The four learned Academies
24 February	Course information system working group	Department of Education, Science and Training
9 March	Council Meeting	Australian Academy of Science
10 March	Novartis Foundation/APF Joint Symposium	Australian Phenomics Facility, Australian National University
13–15 March	Australian-German Research Policy and Biodiversity workshop	Australian Academy of Science
28–31 March	Annual Scientific Meeting of TSANZ	Transplantation Society of Australian and New Zealand
19–21 April	Elizabeth and Frederick White conference—Mastering the data explosion in the Earth and Environmental sciences	Research School of Earth Sciences, Australian National University

Adolph Basser Library

The inaugural Basser Library awardee, Bernadette Hince, spent two weeks in the library examining the Antarctic diaries of Frank Stillwell. As well as reporting on this to the Library Committee she wrote an article about them for the Academy Newsletter.

The Stillwell papers were also consulted by Dr Beau Riffenburgh, who was writing a history of polar exploration. Other researchers included retired academics, a person working for the Australian Dictionary of Biography, a public servant looking at the constitution of the Royal Society of Canberra, a person writing a history of the Australian Institute of Physics and an independent researcher writing a book on Joe Moyal.

Other collections have also been consulted in response to both phone and email requests, including Australian botanists, L G M Baas-Becking, W G Duffield, H I Jensen and I W Wark.

The Library Committee held a meeting on 16 November, at which Professor Frank Fenner announced his retirement from the Chairmanship of the Committee after 11 years. Committee members thanked Frank warmly for all the support he had given the library during this time. The new Chair is Dr Hugh Tyndale-Biscoe.

Manuscript material was received from two previous presidents, Professor David Curtis and Dr Lloyd Evans, and from a scientist involved with the International Geological Correlation Program (IGCP) and there have been additions to the Kurt Mahler collection. The number of collections now stands at 215.

The Basser Library was one of five ACT organisations to be awarded a 2005 Federal Community Heritage Grant, receiving \$2,600 to assist in preserving audio and audiovisual material significant to the early history of the Academy and making transcripts of the audio material available on the Academy website. All award recipients attended a three-day intensive preservation and collection management workshop held at the National Library of Australia, the National Archives, the National Museum of Australia and the National Film and Sound Archive in Canberra.

The National Museum of Australia has joined forces with the Australian Academy of Science and its National Committee for History and Philosophy of Science to establish two essay prizes, each worth \$2,500, to be known respectively as The National Museum of Australia Student Prize for the History of Australian Science and The National Museum of Australia Student Prize for Australian Environmental History. The Librarian is the point of contact for further information on these prizes.



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

Adolph Basser Library.

Obituary notices

John Henry Carver

Died 25 December 2004, elected to Fellowship 1986



John Carver was born in Sydney on 5 September 1926 to John Fawdington Carver and his second wife Flora. From Fort Street Boys' High School he entered the University of Sydney where he graduated with an MSc degree in 1948 and won one of the newly established Australian National University Scholarships. He elected to take up his scholarship at the Cavendish Laboratory and to continue his study of nuclear physics which was the subject of his MSc thesis.

Having obtained his PhD degree, Carver returned to Australia in 1953 to take up an appointment as a Research Fellow in the new Department of Nuclear Physics at the ANU. With others, he established a program of photodisintegration measurements to study both the properties of the residual nuclei that were the product of the disintegrations as well as the properties of the original target nuclei. He developed a wide variety of techniques for the detection of low- and high-energy gamma-rays and beta-particles including, unusually for the time, gamma-gamma coincidences.

The principal interest of Carver's group lay in understanding the photodisintegration process itself, which was pursued through comprehensive studies aimed at defining the competition between single and multiple emission of nucleons. However, their work also contributed to the main field of interest at the time, namely the study of the Giant Dipole Resonance in heavy nuclei, and the search for evidence of the effects of nuclear deformation.

Carver was appointed to the Elder Chair of Physics at the University of Adelaide in 1961. There he redirected his research interests to the emerging field of space research, exploiting the proximity of the nearby Weapons Research Establishment (WRE) (now DSTO). Ahead of his time, he initiated a comprehensive research program on radiative effects in planetary atmospheres comprising both rocket-based observations and laboratory studies.

Using his prior experience in photoeffects in nuclei, Carver and his students developed compact UV detection systems to install in the small, solid fuel rockets developed by WRE, and used them to study the composition of the terrestrial atmosphere. This work was the precursor to the pivotal role Carver played in Australia's entry into space science in 1967, when he and his collaborators provided the scientific payload for WRESAT, the first satellite developed and built in Australia.

As with all satellites of that era, WRESAT involved a great deal of risk and uncertainty. This was pioneering science of the highest order, and its success underlines the quality of the research behind it.

In parallel with these observational studies, related laboratory studies were initiated on the interaction of UV and vacuum-ultraviolet (VUV) radiation with planetary gases. Through part of this work, Carver became known as a pioneer in the field of atomic and molecular photoionisation. He and his collaborators continued the work on quantitative VUV spectroscopy when he later returned to Canberra, providing valuable data to underpin the analysis of current and planned NASA planetary missions.

Carver's ongoing involvement in space research led to his appointment to the UN Scientific and Technical Sub-Committee on the Peaceful Uses of Outer Space and later to its Chair, a position he held for an unprecedented 26 years. In recognition of that quarter-of-a-century service to international science, he was awarded the COSPAR International Cooperation Medal in 2000 for 'significant contributions towards the promotion of cooperative international scientific endeavours'.

1978 saw another change in direction for John Carver with his appointment as Director of the Research School of Physical Sciences at the ANU. From the beginning of his directorship, Carver focused and moulded the School's future research directions, using the same skilful diplomacy he had already demonstrated in the international sphere. He established two entirely new departments—Systems Engineering and Electronic Materials Engineering—while two existing areas of the School, astronomy and astrophysics, and mathematics, were established as new entities across campus—the Mount Stromlo and Siding Spring Observatories and the School of Mathematical Sciences. This strategy, with engineering thrusts added to the School, led to its renaming as the Research School of Physical Sciences and Engineering. The emphasis on communications in both these engineering initiatives came almost a decade before the so-called Information and Communications Technology (ICT) revolution. His belief that more should be done to exploit the commercial benefits of research was the motivation for his lead role in 1986 in the founding of ANU's commercial arm, ANUTech.

Carver's record tenure of 15 years was in itself testimony to his directorship. He left a lasting legacy, fittingly marked by the naming of a major part of the School in his honour.

Carver's time in Canberra from 1978 saw him playing an increasingly influential role nationally, while continuing his UN commitments. He was *inter alia* a member of the Prime Minister's Science & Technology Council from 1979 to 1986, serving as Deputy Chair from 1981; Chair of both the Anglo-Australian Telescope Board and the Radio Research Board; Chairman of the Academy's National Committee on Space Research; and a member of the Australian Space Board.

Carver was a Fellow of the Academy of Technological Sciences and Engineering and of the British and Australian Institutes of Physics as well as of this Academy. In 1986 Membership of the Order of Australia was conferred on him in recognition of his achievements and his service to science nationally and internationally.

John Carver's family of two sons and two daughters and 16 grandchildren meant much to him. Faced with a serious illness over the last years of his life, he and his wife Mary together coped with it with courage and patience. He never lost his sense of humour or his mental acuity, continuing his research on the evolution of the earth's atmosphere right up to his death. He will be remembered as an able leader with a warm and friendly personality; with a smile that could be easily kindled; and with a knack of getting what he wanted through logic, patience and tact. As a distinguished scientist and academic administrator, and as an extremely able international scientific diplomat, he made an outstanding contribution to his country.

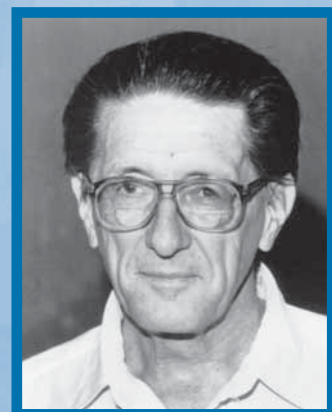
Robert Crompton
George Dracoulis
Brenton Lewis
Ken McCracken
Jim Williams

John Maxwell Cowley

Died 18 May 2004, elected to Fellowship 1961

John Cowley, son of Rev. A E Cowley, was born in Peterborough, South Australia on 18 February 1923. He was educated at Prince Alfred College, Adelaide, and then at the University of Adelaide (DSc), and Massachusetts Institute of Technology (PhD). In addition he was awarded an Hon. DSc by Northwestern University, USA.

On the completion of his MSc at the University of Adelaide he was appointed as a Research Officer in the Division of Industrial Chemistry, CSIR (later CSIRO) in 1945, and rose to the position of a Chief Research Officer in the Division of Chemical Physics in 1961. In 1962 he resigned from CSIRO to accept the Chamber of Manufacturer's Chair in the University of Melbourne, a position that he occupied until 1969, when he became Galvin Professor of



Physics and Regents' Professor in Arizona State University. In addition to his standard academic responsibilities he subsequently founded and directed the Facility for High Resolution Electron Microscopy associated with the University. In 1994 he was appointed Regents' Professor Emeritus.

John gave of his time unsparingly to the international organisation of science and, in particular, to the work of the International Union of Crystallography (IUCr). His work in this organisation can be briefly summarised as follows: member of the Commission on Electron Diffraction 1957–66, 1984, chairman of the Commission on Electron Diffraction 1987–93, member of the executive committee 1963–69, co-editor of *Acta Crystallographica* 1963–69, Representative of the IUCr on the Commission for Solid State of the International Union of Pure and Applied Physics 1969–78. In addition he served on the US National Committee for Crystallography from 1973–78 and again from 1984–86, and was Director of the Electron Microscopy Society of America from 1972–74.

John received many honours during his lifetime. These include the Edgeworth David Medal, the Research Medal of the Royal Society of Victoria, the Warren award (with S Iijima) of the American Crystallographic Association, the Distinguished Scientist Award of the Microscopy Society of America, Fellowship of the Royal Society of London and the Ewald Prize (with A Moodie) of the International Union of Crystallography. In 1991 he was the Australian Academy of Science Lloyd Rees Lecturer and in 2003 the Center for High Resolution Electron Microscopy was renamed the John M Cowley Center for High Resolution Electron Microscopy.

John Cowley contributed extensively, more than three hundred and thirty papers in all, to a wide range of subjects which includes scattering theory, imaging theory, solid state physics, metallurgy, and materials science. He was equally at home as an experimentalist, as a theorist and as a designer. At the same time he held senior positions both nationally and internationally, lectured with distinction, wrote a definitive textbook on the physics of diffraction, and is remembered with gratitude by two generations of postgraduate students and by colleagues from many countries.

Among his many contributions three might be selected as being particularly influential, though this choice must remain somewhat subjective. The first concerns short range order and relates to work, both theoretical and experimental, undertaken in the course of postgraduate studies in Professor Warren's department in MIT. The analysis and methodology which John developed, starting from the foundations established by Bragg and Williams, remains definitive to the present day and has become part of the metallurgist's stock in trade. The second, in collaboration with Moodie, relates to the development of the theory of many beam electron scattering, and, in application, is associated with the absolute determination of crystal symmetry, the refinement of potential within crystals, and the interpretation of images at atomic resolution. The third concerns the scanning transmission electron microscope. Much of the current practice and interpretation is due to John, and indeed there is scarcely any aspect of the theory, design and use of this instrument to which he did not contribute significantly.

John is survived by his devoted wife Robbie, whom he married on 15 December 1951, and by his two daughters Jillian and Deborah.

Alex Moodie

Dan Haneman

Died 13 December 2002, elected to Fellowship 1990

Dan Haneman was born in Berlin, Germany on 20 March 1931 and arrived in Sydney in 1934 with his parents who emigrated to Australia to escape the Nazi regime. Dan attended Sydney Boys' High School and won an Exhibition Scholarship to study physics at Sydney University. He graduated with First Class Honours in Theoretical Physics in 1952 in a class which included three others who were to become Fellows of the Academy (Neville Fletcher, Brian Robinson and Stewart Turner).



After completing his MSc, also at Sydney University with the assistance of a scholarship, he was appointed to a Research Officer position in the Council for Scientific and Industrial Research (CSIR) Radiophysics Division where he was directly responsible to Lou Davies in the newly established transistor section, led by Brian Cooper. In 1955, he was awarded an Admiralty Scholarship to enrol in a PhD at Reading University, UK under the supervision of E W J Mitchell. His thesis topic was to measure photoelectron emission from semiconductor surfaces, and the study of semiconductor surfaces remained his lifelong research interest.

At the end of three years at Reading, Dan met H E Farnsworth at a conference in Brussels and was offered a postdoctoral position at Brown University in Providence, Rhode Island, USA. From 1958 to 1960, he performed experiments on the surfaces of clean and gas-exposed semiconductor surfaces using state of the art equipment constructed in Farnsworth's laboratory for the new technique of low energy electron diffraction (LEED), which later became one of the main techniques in surface science. The experimental results of his postdoctoral work were published in a long and widely cited paper in *Physical Review* in which he also proposed the first detailed model of the reconstruction of semiconductor surfaces.

Dan was offered a Senior Lectureship in Physics at the University of New South Wales (UNSW) which he took up in 1961. Dan relished the opportunity to establish his own laboratory and he built up significant research facilities in surface physics with limited funds. He compensated for the lack of funds and facilities, compared with overseas laboratories in the rapidly developing field of surface physics, by embarking on innovative methods for the study of clean and gas-exposed semiconductor surfaces (as well as pursuing conventional experimental techniques like LEED). The use of completely novel experimental techniques was a hallmark of Dan's career. One was the 'surface mating technique', which showed that atom-on-atom closure occurred at the bases of partial cleavages in germanium and silicon made in ultra-high vacuum. Another technique he pioneered was to prepare extremely thin semiconductor samples and measure, using laser interferometry, the change in bending of the samples as the upper surface was cleaned in ultra-high vacuum by ion bombardment and annealing. He began a successful and innovative research program in spin resonance from clean surfaces when he was awarded funds in 1965 to purchase an electron paramagnetic resonance (EPR) spectrometer in the first round of grants from the newly established Australian Research Grants Committee. This research involved the first EPR measurements of surfaces prepared and measured while continuously under ultra-high vacuum. In 1970–71 his expertise in this area was recognised when he was one of relatively few scientists outside the USA to be appointed a NASA Lunar Sample Principal Investigator, in his case to perform EPR and mass spectrometry measurements on rock samples brought back from the NASA lunar expedition.

Another key to success was his ability to inspire and enthuse the many postgraduate students who studied under his guidance over the years. He usually had several PhD students working in his laboratory at any one time. On most days, he would spend time with each student sequentially, turning his mind to the problems of their particular project somewhat like a grand master playing multiple boards at a chess exhibition.

Dan was promoted to Associate Professor in 1964 (later with a special salary). Awarded a DSc by Sydney University in 1973, he was appointed to a Personal Chair in Physics in 1983, immediately after a change in policy at UNSW provided for such appointments.

Dan used his regular sabbatical leaves to embark on new lines of research. In 1967 he took his first sabbatical leave at Brown University, with H E Farnsworth, followed by two months at the Hebrew University in Jerusalem with A Many who had co-authored the first major textbook on the developing field of surface physics. He spent his next sabbatical in 1974 at the University of California at Berkeley as Visiting Professor in the Laboratory for Chemical Biodynamics of Nobel Laureate Melvin Calvin. It was during that year that he began a completely new research interest, namely solar energy, which had come to the forefront as a result of the sudden increase in the price of oil. He concentrated on photoelectrochemical cells, reasoning that the lower cost would compensate for the much lower efficiency than single crystal silicon.

On his next sabbatical year in 1981, Dan began yet another new avenue of research. The year was spent at the Xerox Palo Alto Research Center in the USA working with R Street, D Biegelsen and R Nemanich on amorphous hydrogenated silicon and related matters, an area that he pursued for many years, along with the program on photoelectrochemical cells and clean semiconductor surfaces.

He was a member of the International Advisory Committees of several conferences related to surface physics, including the International Conference on Solid Films and Surfaces (ICSFS) from its inception. He organised ICSFS3 in Sydney in 1984. He was the Australian Representative on the Surface Science Division of the International Union of Vacuum Science Techniques and Applications (IUVSTA) and elected member of IUVSTA Solid State Division Committee in 1984 and 1986. He served as a member of the Australian Academy of Science's National Committee for Physics from 1987 to 1993. For his contributions to surface physics Dan received a number of awards, including Fellow of the Australian Academy of Science (1990); Official Guest of USSR Academy of Sciences (1983); Official Guest of Chinese Academy of Sciences (1986); Fellow of the Australian Institute of Physics; and Fellow of the Royal Australian Chemical Institute.

Dan continued work as a physicist until his illness with Parkinson's Disease prevented him from continuing. He is survived by his first wife Rosie and daughter Daphne, twin sons Andrew and Neil and son Jeremy and his second wife Tamara and daughter Alice and son Bernard.

Marlene Read
David Miller

Ian Ellery McCarthy

Died 23 April 2005, elected to Fellowship 1982

Ian Ellery McCarthy died on 23 April 2005 in Adelaide, South Australia, the city where he was born on 19 June 1930. During his life he made major impacts in two key areas of modern physics, as well as to physics in South Australia. In nuclear physics he was a pioneer in direct reaction theory, making major advances in the interpretation of the $(p,2p)$ reaction, in which a proton is knocked out of a nucleus, yielding information on its energy and momentum in the bound system. Later in his career, in collaboration with Weigold and others at Flinders University, Ian led the application of direct electron knockout to the investigation of atoms, molecules and solids.

Ian's childhood was spent in Kadina, South Australia, where his father served as Mayor for several terms. He was dux of Kadina Primary in 1942, winning a scholarship to St. Peter's College. In his last year at school he learnt to play the clarinet, eventually becoming one of Australia's leading exponents of New Orleans jazz. In 1947 Ian gained first place in the Leaving Honours examination, with first places in German, Physics and Chemistry, and second in Mathematics. Taking an additional year at school, because he was considered too young to attend university, Ian won the Young Exhibition as dux of the school in 1948 and received a St. Peter's Collegians' scholarship to St. Mark's College.

Ian entered the University of Adelaide in 1949 as a medical student but soon switched to science. Having received first-class honours in 1952, he enrolled for a PhD with Bert Green, who had just arrived to form the Department of Mathematical Physics. Before heading to Dublin for a year of study leave, Bert suggested he calculate the effect of generalised statistics on Feynman scattering amplitudes. By the time Bert returned, Ian had produced a derivation which was published in the *Proceedings of the Cambridge Philosophical Society*. On the basis of his thesis, Ian was awarded the William Culross Prize and a Shell Scholarship to the University of Cambridge in 1955.

Ian married an Adelaide girl, Janet Furze, an undergraduate at Adelaide University with whom he shared interests in mathematics and sport. They were a very well matched couple, blessed with five highly talented children in whom they took great pride. All have pursued successful careers in science and engineering.



At Cambridge Ian was associated with Jesus College. He was led in this choice by its rowing fame, and rowed for the College in his first year. At Cambridge Ian came into contact with Denys Wilkinson, whose stimulating questions led to considerable insight into the mechanism of direct reactions.

At the suggestion of Robert Eisberg, Ian moved to a postdoctoral position at the University of Minnesota. Together they initiated an attack on the problem of proton-induced direct reactions. The results were presented as three-dimensional drawings of flux patterns at a conference in Tallahassee in 1958, where Ian was disconcerted by the loud laughter which greeted them! However, he discovered that this arose from the surprise of the audience to see that a direct nuclear reaction really looked like what one would expect from a light wave in a cloudy crystal ball.

After a short time at UCLA, Ian accepted a lectureship in the Department of Mathematical Physics at the University of Adelaide. There he first met Erich Weigold, who had just completed his PhD in nuclear physics at ANU. Erich believed that one could set up the same types of experiments in atomic physics as Ian had proposed for nuclear physics and obtain a similar complete understanding of atomic structure. Together they decided that the $(e,2e)$ experiment, which had first been proposed in Ian's 1960 paper with Baker and Porter on the Wigner phase-space distribution in the independent-particle model, should provide the same basis for the understanding of atomic structure as the $(p,2p)$ experiment promised to do in nuclear physics.

In 1962 Ian decided that the only way to continue a competitive level of involvement in nuclear physics was to return to the USA, working at the University of California, Davis, and the University of Oregon. However, in 1967 Kenneth Le Couteur at the ANU and Max Brennan at Flinders University persuaded him to take the second position of Professor of Physics at The Flinders University of South Australia. Ian was responsible for hiring a number of new staff and believed he could form the basis of a first-rate group.

As the founding professor of theoretical physics at Flinders University, Ian led the creation of a world-class theory group. The people he attracted to Flinders, notably Iraj Afnan and Reg Cahill, are internationally known and respected for their work in few-body systems and quantum field theory. Through their work and that of a number of outstanding students whom they mentored, Flinders University developed an international reputation far beyond its size and financial resources. Under Ian's leadership, Flinders Physics was widely recognised as one of the top research departments in the country and when allowance was made for its size it had no equal. In speaking of his experience at Flinders, Ian reported that he had found it extremely satisfying. He had achieved his lifelong dream of being a member of an experimental-theoretical collaboration that worked in the best possible way.

In reflecting upon Ian's contributions to science it is hard not to be amazed by just how modest and unassuming he was. He was a man of the highest integrity, who demonstrated an appreciation of the need for interplay between theory and experiment. It is characteristic of his career that he strove to build the very best experimental facilities to enable novel experiments and then dedicated himself tirelessly to their interpretation. In his interactions with colleagues and students, Ian was generous and encouraging. No-one working within his sphere of influence felt unappreciated. He actively promoted the achievements of those around him, without the slightest thought of personal gain. He was an inspirational leader.

Anthony W Thomas

James Robert Price

Died 8 March 1999, elected to Fellowship 1959

James Robert Price was born on 25 March 1912 at Kadina, South Australia. His secondary education was at St Peter's College in Adelaide, where he acquired the nickname 'Jerry', which came to be used generally for the rest of his life. However, he remained 'Bob' to his family—hence his choice, in due course, to be known as 'Sir Robert' rather than 'Sir James'.



In 1929 Jerry was appointed by Professor A K Macbeth to a cadetship in the Chemistry Department of the University of Adelaide. This position gave him the right to enrol in such courses as Macbeth approved, without payment of fees. He graduated BSc (Hons, first class) in December 1934 and MSc in July 1935 and was awarded a DSc in 1954. He was one of two Australians awarded an 1851 Exhibition Science Research Scholarship for 1935.

He accepted this to work as a DPhil student under Professor Sir Robert Robinson at Oxford, where he worked on the anthocyanidins in *Bougainvillea glabra* and graduated DPhil in 1937 with a thesis entitled 'Colouring Matter of *Bougainvillea glabra*'.

Jerry was then appointed as Head of the Chemistry Section at the John Innes Horticultural Institution in London. The research he carried out there was on plant pigments—mainly on isolating the anthocyanins and investigating their role in the genetic variation of flower colour. Some of this work was done in collaboration with Sir Robert Robinson.

In 1939 Jerry was awarded a Rockefeller Scholarship, and with this he planned to go to the USA, after travelling first to Australia so that he and Joyce Brooke, whom he had met in 1933 when she was a first year science undergraduate, could get married. The outbreak of the Second World War in September 1939, however, enforced drastic changes, both professional and personal. Because of the war, Rockefeller (Travelling) Scholarships were cancelled, and Jerry decided to stay in the United Kingdom to help in whatever professional wartime service might be required. He asked Joyce to come to England and they were married on 23 March 1940.

While awaiting professional assignment in war service, Jerry served in the Home Guard ('Dad's Army') and Joyce worked in first aid stations. In September 1941 Jerry was directed into the Chemical Inspection Department, Ministry of Supply, to supervise work in a group of five ICI factories in southwest Scotland in the manufacture of explosives and munitions.

In September 1945 Jerry began work as a Research Officer at CSIR in Melbourne, working in the Division of Industrial Chemistry on a survey of Australian native plants for sources of potentially useful alkaloids. To maximise the impact of this work, he collaborated closely with chemists from the Universities of Sydney and Melbourne. In 1948 they published a note in *Nature* entitled 'Alkaloids of the Australian Rutaceae'. This first communication heralded what became a very large and very successful survey of Australian plants for alkaloids and other constituents of chemical and/or biological interest.

Jerry was elected a Fellow of the Australian Academy of Science in 1959. He was subsequently active on Academy business. He was a member of the National Committee for Chemistry from 1960 until 1966 and then Chairman of that committee until 1969. From 1962 to 1968 he was a member of the Sectional Committee for Chemistry and Applied Chemistry (Chairman 1965–1966); a member of the Editorial Board of *Records of the Australian Academy of Science* 1965–1970; Chairman of the Publications Committee 1966–1970; and in 1969 a member of the Science and Industry Forum.

In 1960 the International Union of Pure and Applied Chemistry (IUPAC) held a symposium on the Chemistry of Natural Products in Australia. This symposium, for which Jerry was responsible for the scientific program, put Australian chemistry, particularly the Phytochemical Survey, firmly on the international stage.

Jerry was promoted through the CSIRO research officer ranks until in March 1960 he became Officer-in-Charge of the Organic Chemistry Section on the resignation of Dr Harold H Hatt. The Organic Chemistry Section was raised to Divisional status on 14 March 1961 and Jerry was appointed as the first Chief of the new Division, overseeing a time when the nature of organic chemistry changed significantly away from bench chemical towards spectroscopic techniques.

Jerry felt strongly about the importance of professional relations between chemists in Australia, seeing effective interactions as critical to the success of the discipline. He was President of the Victorian Branch of the Royal Australian Chemical Institute (RACI) in 1959 and Federal President from 1962 to 1964. He was Associate Editor of Institute publications (1949–53), a member of

the Editorial Board (1954–55) and Editor of both *Proceedings of the Royal Australian Chemical Institute* and *Reviews of Pure and Applied Chemistry* (1956–58). The RACI awarded Jerry the HG Smith Medal (awarded in recognition of contribution to the field of organic chemistry) in 1956 and the Leighton Medal (its highest honour) in 1969.

Jerry was appointed as a member of the CSIRO Executive from 27 January 1966 and was largely responsible for the Executive becoming increasingly involved in what went on inside Divisions, especially in setting priorities and allocating resources at program level.

He became Chairman of the CSIRO Executive from 26 May 1970 and retired on his 65th birthday, 24 March 1977. Although he struggled with a management structure that did not separate the role of the Chairman from that of Chief Executive and had the most turbulent time of his career during the Whitlam years, he received a letter from the Prime Minister, Malcolm Fraser, at the time of his retirement, which said

I believe it is fair to say that your period as Chairman has occurred at a time when contemporary circumstances have never been more challenging. Throughout your service, your sense of dedication and loyalty, and your integrity, have been manifest for all to witness.

Jerry was awarded KBE in 1976 in recognition of his services to science and government. He was made an honorary member of the Royal Society of New South Wales in 1977.

Retirement afforded Jerry the opportunity to spend much more time with his grandchildren and to enjoy his garden. Jerry was also a great support to Lady Price in her many activities (she had been the Chief Commissioner of the Girl Guides Association of Australia, 1968–73, and was the Chairman (for two terms) of the World Committee of the World Association of Girl Guides and Girl Scouts (1975–81)), as Lady Price was to him.

In retirement Jerry served as a director of Humes for seven years. He was also a member of the Monash University Council and on the Clunies Ross Foundation, but withdrew from active public life after a car accident in 1986.

In 1990 the CSIRO Division of Chemicals and Polymers (later CSIRO Molecular Science) instituted a named lecture series in tribute to Jerry's influence on organic chemistry in CSIRO. These lectures bring industry, CSIRO and university scientists together in a way that Jerry would have approved.

Jerry is survived by his wife, Joyce, and his three children, Margaret, Donald and Janet.

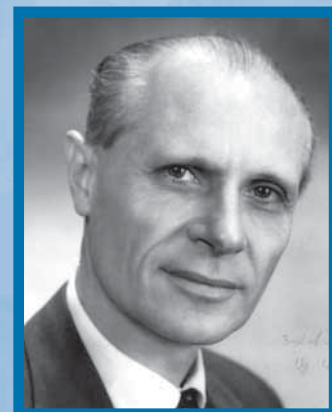
David J Collins
Gregory W Simpson
David H Solomon
Thomas H Spurling

George Szekeres

Died 28 August 2005, elected to Fellowship 1963

George and Esther Szekeres passed away on Sunday 28 August 2005 within an hour of each other, after nearly seventy years of marriage. George (born 29 May 1911) was ninety-four years old, and Esther (born 20 February 1910) ninety-five.

George came from a wealthy Hungarian family, and trained as a chemical engineer to enter the family leather business, but he was also part of a group of brilliant young mathematicians in Budapest. This group included Paul Erdős, who became the most prolific mathematician of all time and was elected as a Corresponding Member of the Australian Academy of Science in 1985, Paul Turán, who also became a famous mathematician, and Esther Klein. One of the problems the group considered was proposed by Esther and solved by George to declare his suit. Erdős called it the 'Happy Ending Problem', as it led to George and Esther marrying in 1936.



After six years working in Budapest as an analytical chemist, George took a post as a leather chemist in Shanghai to escape the threat of Nazi persecution. The factory closed a year later, and the Szekeres family were part of the community of 15,000 Jewish refugees from Central Europe in Shanghai. There they lived through the rigours of WWII, the Japanese occupation, and the beginnings of the Chinese Communist revolution. These were desperate times and they were lucky to survive.

Offered a post as Lecturer at the University of Adelaide, George arrived in Australia in June 1948 with Esther and Peter, who was born in Shanghai. Judith was born some years after their arrival. Adelaide in the 1950s was very different from Budapest, or Shanghai, but they quickly fell in love with the Australian bush and were happy to make their home here. In Australia, George flourished as a professional mathematician, free of the troubles of the war and pre-war years.

George Szekeres published mathematical papers of great originality and impact, starting as an undergraduate in Budapest, through the Shanghai years, and until quite recently. His work broke new ground in an unusually broad range of fields of mathematics, from algebra, combinatorics and number theory, to mathematical analysis, numerical analysis, relativity and cosmology. One of his most famous and far-sighted papers provided a key mathematical tool for understanding 'black holes' in cosmology theory. An idea of the importance of the so-called 'Kruskal-Szekeres coordinate system' (the technique was independently discovered by Kruskal) can be gleaned from Carl Sagan's book *Contact*, where it is featured. George is also very well known for his deep work in combinatorics, where he laid the foundations of what is now known as Ramsey Theory. He went on to become the leading Australian mathematician of his day. This is all the more remarkable because he had studied at the Technical University of Budapest, which specialised in engineering, and he had attended only one undergraduate mathematics course in his life, on calculus. This turned out to be an impediment later when his employers wanted him to take out a Doctorate of Philosophy in mathematics.

In 1964, the Szekeres family moved to Sydney, when George took up the post of Foundation Professor of Pure Mathematics at the University of NSW. Under George's leadership, the new Department of Pure Mathematics at the University of New South Wales earned national and international recognition. In large measure through his example and influence, the School of Mathematics there became one of the top mathematics schools in Australia. After he retired in 1975, Emeritus Professor George Szekeres continued to work at the University most of the week well into his nineties. He published over twenty scientific papers in his 'retirement', and was seen regularly around the corridors and in the Common Room talking about the latest problems of mutual interest to young students and academic staff.

He was a foundation member of the Australian Mathematical Society in 1956, served on its Council for many years, and was President from 1972–74. As a mark of respect, the Australian Mathematical Society devoted a volume of its Journal to papers written in honour of his sixty-fifth birthday, and later named its most prestigious award, the George Szekeres Medal, in his honour. George was elected a Fellow of the Australian Academy of Science in 1963 and was awarded the Academy's Thomas Ranken Lyle Medal in 1968. Other recognition of his career included an Honorary Doctorate from the University of New South Wales in 1977, and membership of the Order of Australia in 2002, but perhaps he was proudest of being one of the very few foreign members of the Hungarian Academy of Sciences.

George Szekeres was an inspiring leader for generations of talented young Australians. At the University of NSW he established the high school journal *Parabola*, and he was the source of many problems for both the University of NSW Schools Mathematics Competition and SUMS, the Sydney University Mathematics Society competition, which continue to challenge able high school and undergraduate students. He helped establish a training program for the first Australian team to compete in the International Mathematical Olympiad and was a key member of the Australian Mathematical Olympiad program during the 1980s. Australia is now one of the Western world's strongest performers in the Mathematical Olympiads, especially relative to size.

George Szekeres was a lifelong, passionate, active and very able musician. He played the violin and the viola in the Ku-ring-gai Philharmonic Orchestra and the North Sydney Symphony Orchestra. Many visitors to Sydney, and to the University of New South Wales, carried away happy memories of playing chamber music with George and his friends during their time here.

George was a very keen bushwalker who undertook long and demanding walks with his family in both Europe and Australia throughout his life. Even well into his eighties, he and his daughter Judith managed to walk substantial sections, one each week, of the Great North Walk from Sydney to Newcastle.

George and Esther are survived by their children Peter and Judith, Peter's wife Angela and his step-daughter Jorji from a previous marriage.

Michael G Cowling

With much help from Garth I Gaudry, Terry Gagen and David Tacon

Ian Walter Boothroyd Thornton

Died 1 October 2002, elected to Fellowship 1995

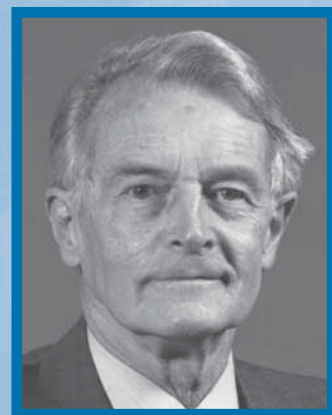
Ian Walter Boothroyd Thornton, a proud Yorkshireman, was born in Halifax on 14 July 1926. He was educated at Hipperholme Grammar School and Crossley and Porter's Orphan Home and School. Ian excelled at school, both scholastically and in sports.

After four years in the British army Ian commenced his studies in Zoology at Leeds University in 1948, having married Jean (née Jean Frances Brown) in August of that year. He graduated as a University Research Scholar in 1951 with first class honours in Zoology and Botany. For his PhD Ian was one of the first people to study in detail the ecology of Psocoptera, small insects that graze on algae and other microflora on the surfaces of bark and foliage. This work initiated his life-long interest in the twin strands of psocopteran systematics and ecology that would lead eventually to much wider considerations of evolution and biogeography. In 1984 the University awarded him a DSc.

Ian's first appointment on leaving Leeds was as Lecturer in Zoology at the then Gordon Memorial College of Khartoum for a three-year period, 1953–56. This resulted in short papers on a variety of taxa and topics (scorpions, sea urchins, moths, succession in papyrus communities), so diversifying his broad zoological interests and expertise.

Thornton's interests in Psocoptera re-established firmly when he moved to the University of Hong Kong as Senior Lecturer in Zoology in 1956. Here he was to remain for the next eleven years, playing a full part in the corporate life of the university. He was Acting Head or Head of the Department of Zoology on several occasions and Dean of the Faculty of Science, 1960–63. He served on many boards and committees, including the University Senate, 1961–65. In 1966 he was promoted to Reader.

His major initial research thrust was to collect and describe the local psocid fauna and to attempt to place them properly in the wider perspective of the fauna of south-east Asia and the western Pacific. This period also saw development of Ian's interests in psocid dispersal and distribution. These studies laid a solid grounding for his interests, eventually to become predominant, in island ecosystems and the processes of island biogeography. A year at the University of Hawaii's Institute for Advanced Studies led to seminal changes in his thinking and his approach to research. Psocoptera became more firmly tools for exploration of wider evolutionary processes, rather than simply things to be described and enumerated in their own right. In 1967 he spent three months on the Galapagos Archipelago. His studies there revealed intriguing parallels with Hawaii, and also some significant differences, and this was important in the evolution of his thinking. He regarded the Galapagos fauna as at a much earlier stage of evolution than that of Hawaii. Perhaps the greatest intellectual outcome from the Hong Kong years was his widely read book *Darwin's Islands*, for a decade or more the standard account of the natural history of the Galapagos.



Ian arrived in Australia with his wife Jean and their children, Angus and Jane, on 6 January 1968, to take up the Foundation Chair of Zoology at La Trobe University, Melbourne. He established his Department on the basis of his belief that 'Zoology is the study of animals, not just of books about animals'. He also believed that the Professor should be the Head of Department, as both academic leader and mentor, and he fulfilled both roles until his retirement in 1991.

In Australia his psocid studies continued, but became conceptually expanded and geographically concentrated on the biogeography of the Melanesian arcs of islands. Over a period of some twenty years from the mid-1960s, Ian visited and collected psocids in Sri Lanka, the Himalayan foothills, Malaysia, Japan, many parts of Indonesia, Papua New Guinea, the Solomon islands, Palawan, many parts of the Melanesian arcs including Norfolk Island, New Zealand, the New Hebrides, Fiji, Tonga, the Society Islands, the Galapagos, Mexico, Colombia, Ecuador, Peru, Chile (including the Juan Fernandez Archipelago), Argentina and Hawaii. These studies gave him a unique personal perspective on an insect order and its evolution over a substantial part of the world.

Altogether, Ian (alone or with his co-authors) described almost 750 new species of Psocoptera, a significant proportion of the documented world fauna. His work on psocids was recognised by having three genera (*Ianthorntonia*, *Thorntonodes* and *Thorntoniella*) and 12 species named after him. However, this basic taxonomic work was simply a template for Ian's increasing interests in island biogeography and patterns of distribution and speciation. He was among the forefront of modern Pacific-region biogeographers.

In 1982 Ian visited the Krakatau islands. His perspective now broadened further to consider and study the initiation and development of tropical communities. Over the next decade he organised and led six expeditions to the Krakataus. They culminated in 1996 in Ian's award winning magnum opus *Krakatau: the destruction and reassembly of an island ecosystem*, a book widely regarded as his finest academic achievement. The major importance of the 'Krakatau study' was recognised by Ian being awarded the John Lewis Gold Medal by the Royal Geographical Society of Australasia (1992) and his election to the Fellowship of the Australian Academy of Science (1995).

Ian's zest for life and for his science was infectious. He revelled in academic discourse and was a natural leader who inspired loyalty in his staff. Ian served three periods as Dean of Biological Sciences (1970–72, 1979–81, 1985–87) and was Acting Vice-Chancellor on two occasions. He sat on most of the University's major boards and committees, where his determination, humour and abilities to think rapidly and laterally about many complex issues gained him the respect of colleagues throughout the institution. The University recognised his contributions, in conjunction with his scientific stature, by the posthumous award of a DSc, *honoris causa*.

Post-retirement, Ian lectured for many years in Natural Resource Management to Applied Sciences students at the Holmesglen College of TAFE, inspiring several of them to move on to related university studies. He also had a strong interest and involvement in fostering Australian/Indonesian academic cooperation and educational development and was an academic adviser or guest lecturer at several Indonesian universities. He died in Bangkok while returning from Laos, where he was advising the National University on the implementation of basic science courses. He is survived by his second wife Ann and three stepchildren, two adopted children from his earlier marriage to Jean, and six grandchildren.

T R New
C N Smithers
A T Marshall

Alan Buchanan Wardrop

Died 20 May 2003, elected to Fellowship 1976

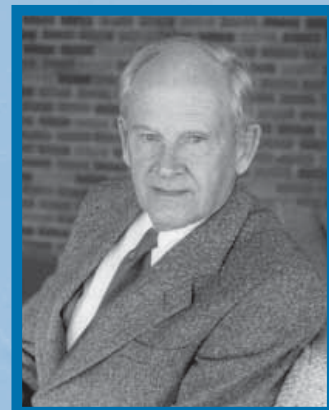
Emeritus Professor Alan Wardrop, who died in Melbourne, made distinguished contributions to our understanding of the structure of the plant cell wall. Coming to the subject at the start of the electron microscopy era, his work offered new insights into many fundamental aspects of the secondary walls of wood fibres and the properties that affect their use in pulping. He also conducted important experiments into the primary walls laid down in growing cells before secondary wall thickening occurs and on how growth modified their structure. His career spanned almost two decades at CSIRO Forest Products Division and two as Foundation Professor of Botany at La Trobe University.

Wardrop was born in Sandy Bay, Hobart on 28 July 1921 to James and Ethel May Wardrop (née Buchanan). He was educated at Hobart State High School before entering the University of Tasmania in 1939 where he won the Florence Sprent Prize for Zoology and the University Prize in Physics in 1940. Graduating in 1942, he conducted research in the Chemistry Department for a MSc degree that involved hydrolysing wood cellulose to monomer sugars which were then fermented to alcohol, a potential wartime fuel substitute. The project involved an interesting study of cellulose hydrolysis kinetics, a subject to which he returned several times during his career. After training as a Royal Australian Air Force navigator, he joined the CSIR Division of Forest Products in 1945 as an Assistant Research Officer in the Wood Structure Section. In 1947, Wardrop went to the University of Leeds on a CSIR Research Studentship to investigate the fine structure of the cell wall of the conifer tracheid and to work for a PhD with Professor R D Preston FRS. Wardrop came to regard Preston as his mentor and they remained in contact for many years. Returning to CSIR, Wardrop clearly expounded the nature of the primary and secondary cell walls, relating his studies to earlier work. The 'barber's pole' illustration showing the microfibrillar arrangement of the various layers became quite famous, and was widely reproduced. The Wood Structure Section was subsequently renamed 'Wood and Fibre Structure' to reflect the importance of Wardrop's work, and in 1961, on H E Dadswell's accession as Chief of the Division of Forest Products, Wardrop was appointed Section Head.

In his research, Wardrop employed a variety of techniques but was particularly skilled in microscopy. In the beginning he used optical microscopy to great effect and was one of the first to exploit the electron microscope in the study of plants. Later he made excellent use of the scanning electron microscope.

In addition to the fundamental work on cell wall structure, Wardrop pursued a number of other interests, such as cell growth and the process of lignification in woody plants. In collaboration with D E Bland he showed that lignification begins in the primary wall at the cell corners and then extends to the middle lamella and secondary walls. Another topic which received considerable attention was the morphology and chemistry of reaction wood. In association with Dadswell and A J Watson, Wardrop described the variations in cell wall organisation between the compression wood of softwoods and the tension wood of hardwoods. Staining techniques and ultra-violet microscopy revealed that the cell wall of compression wood fibres was highly lignified, while that of tension wood was virtually unligified.

Leaving CSIRO in 1964, Wardrop was briefly Professor of Botany at the University of Tasmania before becoming Foundation Professor of Botany and first Dean of the School of Biological Sciences at La Trobe University where he remained until retirement in 1986. He continued his work on plant cell walls with emphasis on the complex primary walls of collenchyma and undertook broader studies in plant ultrastructure, supplementing light and transmission electron microscopy with emerging techniques such as freeze etching and scanning electron microscopy. He served La Trobe in many capacities including Acting Vice-Chancellor, Member of Council, and Member and Deputy Chair of the Academic Board. He was Acting Vice-Chancellor during a particularly difficult period in 1973 when the jailing of several La Trobe students for damaging the US Consulate led to angry scenes on campus. His skilled handling of a tense open meeting with the protesting students has entered campus folklore.



For the Academy, he was a member of Council (1988–91), was involved with production of the *Web of life* textbook through membership of the School Biology Committee between 1976 and 1986, and was Member (1979–81) and Chair (1987–88) of the Academy's Plant Sciences Sectional Committee. He was also a member of the Council of the Royal Society of Victoria from 1972–82 and of the Victorian Institute of Marine Science from 1977–82.

He is survived by his wife Beulah, children Martin, Allison, Anne and Simon and by six grandchildren.

R E Williamson
H G Higgins
B A Stone

Secretariat

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

General enquiries

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

Executive Secretary – Professor Sue Serjeantson, AO, PhD

Phone: + 61 2 6201 9401
Email: sue.serjeantson@science.org.au

Adolph Basser Library – Rosanne Walker, BSc, Dipl.Lib

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 – Pamela Ferrar, MSc

Phone: + 61 2 6201 9420
Email: pam.ferrar@science.org.au

Education and public awareness – Shelley Peers, BSc, GradDipTeach(Prim), MEd(Research)

Phone: + 61 2 6201 9424
Email: shelly.peers@science.org.au

Events and building hire – Susie Barratt

Phone: + 61 2 6201 9429
Email: susie.barratt@science.org.au

Facilities maintenance and OH&S – Nerida Dunn

Phone: + 61 2 6201 9430
Email: nerida.dunn@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 – Jacinta Legg, BSc(Hons), GradDipEd

Phone: + 61 2 6201 9417
Email: jacinta.legg@science.org.au

National Committees – Jeanette Mill, BSc(Hons)

Phone: + 61 2 6201 9413
Email: jeanette.mill@science.org.au

Publications – Maureen Swanage

Phone: +61 2 6201 9414
Email: maureen.swanage@science.org.au

Science policy – Dr Sophia Dimitriadis, BSc(Hons), PhD

Phone: + 61 2 6201 9409
Email: sophia.dimitriadis@science.org.au

Webmistress – Tania Turvey

Phone: + 61 2 6201 9414
Email: tania.turvey@science.org.au

