



Australian Academy of Science

ANNUAL REPORT

2008–09

1 April 2008 – 31 March 2009



AUSTRALIAN ACADEMY OF SCIENCE
ANNUAL REPORT 2008–09

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REPORT OF THE COUNCIL

For the year

1 April 2008 – 31 March 2009

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President's foreword

The reporting period marks the first full year of the Rudd Government which has been characterised by an unprecedented number of reviews, many of which are related either directly or indirectly to science and technology. These included the Review of the National Innovation System by Dr Terry Cutler, the Review of the Higher Education System by Professor Denise Bradley and the Climate Change Review by Professor Ross Garnaut. In addition, there were a diverse range of inquiries initiated by Parliamentary Standing Committees. The Academy has been proactive in providing submissions, often within extremely tight timeframes, participating in consultations and appearing at public hearings.

While some reviews are still underway, many have reported. However, the world has changed so much since their initiation as a result of the global financial crisis that in most cases the government has deferred a specific response to the Budget process in May. There is cause for concern that the current focus on preserving existing jobs may compromise the capacity to make timely investments in research infrastructure and human capital that would help stimulate Australia's international competitiveness and provide jobs into the future. The government's ambitions and aspirations were recently articulated by Senator Kim Carr, Minister for Industry, Innovation, Science and Research, and they are laudable, but at the same time he was reticent about the time frame for turning them into actions.

Against this backdrop, the Academy was delighted by the government's early decision to continue to support and to increase funding for our primary and early secondary education programs. This was announced during a National Press Club address by Professor Julie Campbell, the Academy's Secretary for Education and Public Awareness, on 2 July 2008. The next stages of *Primary Connections* and *Science by Doing* will contribute to the 'education revolution' by providing a means of implementing the nationally consistent science curriculum being developed by the newly established National Curriculum Board. The positive feedback to the Board from long term collaborators in the state and territory education departments and from professional teaching organisations regarding the high quality and positive impacts of these programs has been gratifying indeed.

The national committees have maintained their strong performance and the international connections of the Academy continue to develop. This year Australia became a member of the InterAcademy Council, in addition to its ongoing membership of the Executive Committee of the InterAcademy Panel. The level of representation of Australians as members and office bearers of international scientific unions is substantial. There are currently five Presidents and eight Vice-Presidents amongst the 26 Australians known to be on the executive bodies of the 31 international unions for science to which the Academy subscribes.

Through the International Science Linkages Program 200 Australian scientists were awarded travel grants for collaborative research in Asia, Europe and North America this year. There was a very strong response to new bilateral grants with the European Commission to study and access facilities in various countries in Europe. A highlight of the year was a very successful workshop on remote sensing, the fifth in a series of reciprocal meetings on topics of mutual interest to Australia and China. The Academy was also invited by the Department of Industry, Innovation, Science and Research to participate in two Joint Science and Technology Committee meetings with the European Union and South Africa. The underpinning bilateral agreements provide an important mechanism for Australia to identify opportunities to build cooperative relationships with these countries.

The Academy places a high level of importance on outreach activities to younger researchers and the general public which have been particularly strong this year. Early- to mid-career researchers subscribing to the Academy's information network have benefited from increased levels of information, a record number participated in this year's Think Tank on preventative health that was supported for the first time by the

Theo Murphy (Australia) Fund, and five were sponsored to attend the Federation of Australian Science and Technology Societies annual *Science Meets Parliament* event. In addition we have consistently attracted close to capacity audiences to the Academy's monthly public lecture series that has renewable energy technologies as its focus.

The Academy is an organisation where long term service is a consistent and recurrent theme. Many of you will be aware that Faye Nicholas retired after 19 years working in almost all areas of the secretariat, and that Tania Turvey, who also had many roles, left after 15 years with the Academy. This year also marked: the retirement of Neil Ffrench after 10 years of valuable advice to the Finance Committee; the stepping down of David Curtis after seven years as chair of the board, and the transition to retirement of Rod Home after 25 years as editor, of *Historical Records of Australian Science*; and the completion of a second term on the CSIRO Publishing Board and as co-chair of the CSIRO Journals Board of Standards by Marilyn Renfree. I take this opportunity to express, on behalf of the Academy, my sincere thanks for their dedication and outstanding contributions. I am also very pleased to welcome Martin Waldron, John Passioura, Libby Robin and Pauline Ladiges who have agreed to succeed them.

Kurt Lambeck PresAA FRS
30 March 2009

Council and administration

The Academy's affairs are conducted by a Council of 17 fellows, elected at the Annual General Meeting, that meets five times each year. To ensure that Academy business is managed effectively between Council meetings, the Executive Committee has delegated authority.

Executive committee

Professor Kurt Lambeck¹⁰ — President

Professor Peter Hall¹² — Secretary, Physical Sciences, and Vice-President

Professor Graham Farquhar¹¹ — Secretary, Biological Sciences, and Vice-President

Professor Philip Kuchel⁹ — Secretary, Science Policy

Professor Jenny Graves¹⁰ — Foreign Secretary

Professor Julie Campbell¹⁰ — Secretary, Education and Public Awareness

Professor Mike Dopita⁹ — Treasurer

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

Council members (Physical Sciences)

Professor Ron Ekers¹⁰

Professor Tony Guttman⁹

Professor Paul Haddad¹⁰

Professor Andrew Holmes¹⁰

Professor John Ralston⁹

Council members (Biological Sciences)

Professor Ross Crozier¹⁰

Professor Robert Graham⁹

Professor Doug Hilton¹¹

Professor Pauline Ladiges⁹

Professor Oliver Mayo¹¹

(9) Retiring at AGM 2009

(10) Retiring at AGM 2010

(11) Retiring at AGM 2011

(12) Retiring at AGM 2012



Photo: Richard Bray

Council members March 2009. From left: Ron Ekers, Paul Haddad, Graham Farquhar, Philip Kuchel, Julie Campbell, Oliver Mayo, John Ralston, Doug Hilton, Pauline Ladiges, Peter Hall, Ross Crozier, Kurt Lambeck, Jenny Graves, Mike Dopita, Sue Meek (Chief Executive), Bob Graham and Andrew Holmes.

The Fellowship

The Academy Fellowship comprises 427 of Australia's leading research scientists, elected for their personal contributions to science. Fellows occupy senior positions in universities, the CSIRO and industry.

The Fellowship, 31 March 2009:

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

Harvey, RP
Hatch, MD
Head, AK
Healy, TW
Heath, WR
Higgins, TJ
Hill, DJ
Hilton, DJ
Hinde, DJ
Hirst, GDS
Hobbs, BE
Hobbs, RJ
Hoffmann, AA
Holliday, R
Holloway, BW
Holman, ME
Holmes, AB
Holt, PG
Hopwood, JJ
Horridge, GA
Hughes, TP
Hume, ID
Hunter, RJ
Hurst, CA
Hush, NS
Hutchinson, JE
Hyde, BG
Hyde, ST
Hynes, MJ
Imberger, J
Israelachvili, JN
Jacobsen, JV
Jagdish, C
James, DE
Jameson, GJ
Jeffrey, SW
Johnstone, BM
Jones, The Hon. BO
Joshi, N
Kay, BH
Kemp, BE
Kemp, DJ
Kennett, BLN
Kerr, A
Kerr, JFR
Kivshar, Y
Klein, AG
Koopman, PA
Korner, PI
Kotagiri, R
Kuchel, PW
Ladiges, PY
Lamb, TD
Lambeck, K
Lance, JW
Larkins, FP
Law, PG
Lay, PA

Le Couteur, KJ
Lehrer, GI
Letham, DS
Levick, WR
Lindenmayer, DB
Lindoy, LF
Linnane, AW
Lovering, JF
Lumbers, ER
Lyons, LE
McCloskey, DI
McComb, AJ
McCormick, PG
McCracken, KG
McCulloch, MT
McDougall, I
McDougall, TJ
McElhinny, MW
McEwan, AD
McFadden, GI
McFadden, PL
MacFarlane, DR
McIntosh, AGR
McIntosh, RA
McKay, BD
Mackay, CR
Mackay, IR
McKellar, BHJ
McKenzie, JA
McLachlan, EM
McLeod, JG
Mai, Y
Main, AR
Manchester, RN
Mander, LN
Marcelja, S
Marshall, BJ
Martin, NG
Martin, RL
Martin, TJ
Masters, CL
Mathieson, AM
Mattick, JS
Mayo, O
Melrose, DB
Mendelsohn, FAO
Metcalf, D
Milburn, GJ
Miller, JFAP
Millis, NF
Mills, BY
Mitchell, GF
Moodie, AF
Moore, JB
Moran, W
Morrison, JD
Morton, DC
Mould, JR

Mulvaney, P
Munns, RE
Myers, RH
Napper, DH
Neeman, A
Newton, JO
Nichol, LW
Nicola, NA
Ninham, BW
Norrish, K
Nossal, Sir GJV
Nugent, KA
Ogilvie, Dame BM
O'Neill, HSC
O'Reilly, SY
Orlowska, ME
Osborne, MR
Osmond, CB
Paddon-Row, M
Paltridge, GW
Parton, RG
Passioura, J
Pate, JS
Paterson, MS
Paxinos, G
Peacock, WJ
Pearman, GI
Pegg, DT
Pettigrew, JD
Phan-Thien, N
Pickett-Heaps, JD
Pittard, AJ
Porter, R
Possingham, HP
Poulos, HG
Powell, R
Praeger, CE
Quirk, JP
Radom, L
Ralph, JT
Ralston, J
Randolph, MF
Raupach, MR
Redman, SJ
Reeves, PR
Reid, AF
Renfree, MB
Rintoul, SR
Ritchie, IM
Rizzardo, E
Robinson, DW
Robson, R
Rogers, C
Rogers, GE
Rogers, LJ
Rubinstein, JH
Runnegar, BN
Sambrook, JF

Sara, VR
Schmidt, BP
Seneta, E
Shine, J
Shine, R
Short, RV
Shortman, KD
Shparlinski, I
Simmons, LW
Simmons, MY
Simon, L
Simpson, ER
Simpson, SJ
Slatyer, RO
Sloan, IH
Sloan, SW
Smith, FA
Smith, SE
Smyth, DR
Snyder, AW
Solomon, DH
Speed, TP
Sprent, J
Sprent, JFA
Sridhar, T
Srinivasan, MV
Stalker, RJ
Stanley, FJ
Stanton, RL
Stephenson, DG
Sternhell, S
Stokes, RH
Stone, J
Strasser, A
Street, R
Street, RH
Sullivan, CE
Summons, RE
Sutherland, GR
Sutherland, RL
Swan, JM
Tam, PPL
Tanner, RI
Taylor, SR

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

More information on each of the new Fellows is available at:
www.science.org.au/academy/fellows/2009.htm

Thomas, AW
Thompson, AM
Thompson, CJ
Tregear, GW
Trudinger, NS
Truswell, EM
Tucker, RS
Turner, JS
Tyerman, SD
Tyndale-Biscoe, CH
Underwood, AJ
Vaux, DL
Veevers, JJ

Vincent, RA
von Caemmerer, S
von Itzstein, M
Wake, RG
Walker, NA
Wall, GE
Wallace, GG
Wallace, HR
Walter, MR
Wand, MP
Wang, XJ
Warnaar, SO

Warren, JR
Waterhouse, PM
Watts, RO
Weigold, E
Welsh, AH
Wentrup, C
Westoby, M
White, GK
White, JW
Whitten, MJ
Whitten, WK
Wild, SB

Williams, JF
Williams, JS
Williams, R
Williamson, R
Williamson, RE
Wintour-Coghlan, EM
Wiseman, HM
Wiskich, JT
Withers, RL
Womersley, HBS
Woodall, R
Zillman, JW

Corresponding Members

Andersson, B
Atiyah, Sir M
Attenborough, Sir D
Bernard, J
Bjorkman, OE
Blackburn, EH
Boyer, JS

Brooks, RA
Buckingham, AD
Connell, JH
Cornforth, Sir JW
Feldmann, M
Gajdusek, DC
Harris, Sir H

Jones, VFR
Krebs, CJ
Lu, Y
May, Lord R
Öquist, FG
Oxburgh, Lord R
Powell, MJD

Raven, PH
Salpeter, EE
Sanger, F
Slater, EC
Tao, T
Zinkernagel, RM

New Fellows

We congratulate the following scientists who were elected to the Fellowship on 25 March 2009:

Professor Marilyn Crowl Ball FAA

Head, Ecosystem Dynamics, Research School of Biological Sciences, Australian National University, Canberra

Professor John Philip Carter AM FAA FIEAust FTSE

Pro Vice-Chancellor and Professor of Civil Engineering, Faculty of Engineering and Built Environment, University of Newcastle

Professor Frank Caruso FAA

Director, Centre for Nano Science and Nanotechnology, Department of Chemical and Biomolecular Engineering, University of Melbourne

Professor Kong-Hong Andy Choo FAA

Professor, Murdoch Childrens Research Institute, Royal Children's Hospital, Melbourne

Professor Warrick John Couch FAA

ARC Professorial Fellow, Centre for Astrophysics and Supercomputing, Swinburne University of Technology, Melbourne

Professor Hugh Francis Durrant-Whyte FAA FTSE

Professor of Mechatronic Engineering, School



Mike Raupach

of Aerospace, Mechanical and Mechatronic Engineering, University of Sydney

Professor Charles Reay Mackay FAA

Director, Immunology and Inflammation Research Program, Garvan Institute of Medical Research, Sydney

Professor Paul Mulvaney FAA FRACI

ARC Federation Fellow, Bio21 Institute, University of Melbourne

Professor Robert Glenn Parton FAA
Professor of Molecular Cell Biology, Institute for
Molecular Bioscience, University of Queensland

Professor George Paxinos AO FAA
Professor, Prince of Wales Medical Research Institute,
Sydney

Dr Michael Robin Raupach FAA FTSE
Research Scientist, CSIRO Marine and Atmospheric
Research, Canberra

Professor Leigh William Simmons FAA
ARC Federation Fellow, Centre for Evolutionary
Biology, School of Animal Biology, University of
Western Australia

Professor Xu-Jia Wang FAA
Professor of Mathematics, Centre for Mathematics
and its Applications, Mathematical Sciences
Institute, Australian National University, Canberra

Professor Peter Michael Waterhouse FAA
ARC Federation Fellow, School of Biological
Sciences, University of Sydney

Professor Mark Westoby FAA
Professor, School of Biological Studies, Macquarie
University, Sydney

Professor Raymond Leslie Withers FAA
Professor, Research School of Chemistry, Australian
National University, Canberra

Honours awarded to Fellows during the year 2008–09

Professor Jerry Adams
Elected Member of the National Academy
of Sciences (USA)

Professor Louis Charles Birch
Member of the Order of Australia (AM)

Professor Gavin Brown
2007 Royal Society of New South Wales Medal

Professor Antony Wilks Burgess
Elected as a Fellow of the Australian Academy
of Technological Sciences and Engineering

Professor Robert Clark
2008 Australian Museum Eureka Prize for
Leadership in Science

Professor Matthew Colless
2007 Walter Burfitt Prize by the Royal Society
of New South Wales

Professor Peter Colman
2008 Victoria Prize by the Victorian Government

Professor David Michael Doddrell
Member of the Order of Australia (AM)

Professor Peter Doherty
NHMRC 2010 Program Grant

Professor Michael Eastwood
Australian Research Council Federation Fellowship

Professor Lorenzo Faraone
2008 Eureka Prize for Science in Support of
Defence or National Security

Professor Ian Frazer
2008 Balzan Prize

Professor Robert Graham
NHMRC 2010 Program Grant

Professor Martin Green
Inaugural New South Wales Scientist of the Year
2008 Zayed Future Energy Prize

Professor Richard Harvey
NHMRC Australia Fellowship

Professor John Hopwood
2008 South Australian Scientist of the Year

Professor Jörg Imberger
2008 West Australian Scientist of the Year

Professor Chennupati Jagadish
Elected as a Fellow of the American Vacuum Society

Professor Philip Kuchel
2008 Australian and New Zealand Society for
Magnetic Resonance Medal

Professor Pauline Ladiges
Officer of the Order of Australia (AO)

Professor Yui-wing Mai
Elected as a Fellow of the Royal Society of London

Professor Suzanne O'Reilly
2007 Clark Medal by the Royal Society of
New South Wales

Professor John Ralston
Officer of the Order of Australia (AO)

Professor Stephen Redman
Member of the Order of Australia (AM)

Professor Hyam Rubinstein
2008 George Szekeres Medal by the Australian
Mathematical Society

Professor Brian Schmidt

Elected Member of the National Academy of Sciences (USA)
Elected Foreign Member of the Royal Spanish Academy of Science

Professor Michelle Simmons

Australian Research Council Federation Fellowship

Professor Stephen Simpson

2008 Australian Museum Eureka Prize for Scientific Research

Professor Ian Sloan

Officer of the Order of Australia (AO)

Professor David Solomon

2007 Sellafield Ltd Award for Engineering Excellence
2007 NES Award for Novel Engineering Solutions by the Institute of Chemical Engineers

Professor Terence Speed

NHMRC Australia Fellowship

Professor Raymond Stalker

2008 Lifetime Contribution Award in the ATSE Clunies Ross Awards

Dr Roger Summons

Elected as a Fellow of the Royal Society of London



Stephen Simpson

Professor Ross Taylor

Companion of the Order of Australia (AC)

Professor Gordon Wallace

2008 NSW Scientist of the Year Awards in the chemistry category

Professor Erich Weigold

Member of the Order of Australia (AM)

Deaths since 1 April 2008

We regret to record the following deaths:

Professor Ron Drayton Brown, AO, FAA, FTSE, 31 October 2008

Professor Hans Charles Freeman, AM, FAA, FRACI, FRSC, 10 November 2008

Professor Frank William Ernest Gibson, AM, FAA, FRS, 11 July 2008

Dr Sefton Davidson Hamann, FAA, 12 January 2009

Professor Alan Mcleod Sargeson, FAA, FRS, 29 December 2008

Professor Ernie Oliver Tuck, FAA, FTSE, 11 March 2009

Dr Don Eric Weiss, OBE, FAA, FTSE, 29 July 2008

Dr (John) Paul Wild, AC, CBE, FAA, FRS, 10 May 2008

Regional groups

The following reports for the period 1 April to 31 March 2009 have been received.

Australian Capital Territory

Chair: Professor John White



The Canberra Fellows Dining Club met with the combined academies at meetings and for dinner on five occasions in 2008. Professor Susanne von Caemmerer FAA and Dr John Passioura FAA are thanked for this. There was a good program of lectures and discussions at the dinner meetings and independently.

On 6 March, Professor David Lindenmayer FAA from the Fenner School of Environment and Society at the Australian National University (ANU) spoke in the Shine Dome on *The science underpinning the conservation and management of ecological communities*. On 29 May Professor John Richards from the ANU College of Engineering and Computer Science presented a talk, *What satellites should see: Towards operational remote sensing?* Dr Brian Walker, Honorary Research Fellow at CSIRO Sustainable Ecosystems, spoke on 31 July about *A resilience approach to an uncertain future*. Professor Bronya Keats, visiting fellow at the ANU College of Science, gave a talk on 25 September on *Genetic disorders in the Louisiana Cajuns: Finding genes and developing therapies*. On 26 February 2009 Dr John Finnigan FAA from CSIRO Marine and Atmospheric Research in Canberra gave a talk entitled *'The diabolical problem': Reconciling climate mitigation with global change*.

A public lecture in the National Academies Forum series was given on 14 August at the John Curtin

School of Medical Research by Professor Alan Hughes, Director of the Centre for Business Research and Margaret Thatcher Professor of Enterprise Studies at the Judge Business School on *Innovation systems, innovation policy and the future of university-industry knowledge exchange*. A second lecture on 19 August for National Science Week was given at the Shine Dome by Professor Brian Schmidt FAA, from the Research School of Astronomy and Astrophysics at the ANU *Taking measure of our universe*.

Another function of note during the year was the most successful and enjoyable Open Day of the Academy on 2 October. This featured talks by Professor Charley Lineweaver on astronomy and discovery in our universe and Professor Susanne von Caemmerer FAA on how plants influence Earth's climate and atmosphere. The day included guided tours by local architects and a display of items with an Antarctic theme from the fascinating collection of scientific artefacts held by the Academy.

New South Wales

Chair: Professor Ian Dawes



This year saw the retirement of Professor Elspeth McLachlan FAA as the chair of the NSW Regional Group and we thank her for her sterling work and commitment to the job over the previous years. She will be a hard act to follow. The Regional Group's

main function in 2008 was an Annual Dinner held for Fellows and their guests. Fellows of the NSW branch of ATSE were invited. In a departure from more traditional venues, this was held at the Trust Suite, Sydney Cricket Ground, overlooking the hallowed turf. This proved to be a successful location and provided an opportunity for an unscheduled inspection of the pitch – with committee member Professor Max Coltheart FAA doing a great impersonation of Tony Greig. The guest speaker, Professor Stephen Simpson FAA (elected Fellow in 2007) gave a brilliant and entertaining presentation on his work which spans from the transition of grasshoppers to plague locust through to its implications for human nutrition. The evening was rounded out by a short presentation from Professor Eugenie Lumbers FAA on the planning, progress and need for input into the proposal to convert Science House in Sydney back to scientific use.

In conjunction with the NSW ATSE Fellows and the University of NSW (UNSW), the group was involved in organising the lecture and dinner at UNSW by Professor Aaron Ciechanover, following his award of an Honorary DSc at UNSW in December. Professor Ciechanover is Professor of Vascular and Tumour Biology at the Technion-Israel Institute of Technology in Haifa, Israel and is the first Professor of Medicine to win the Nobel Prize in Chemistry. Together with Avram Hershko and Irwin Rose he discovered the process of ubiquitin conjugation to proteins as part of the mechanism whereby cells break down and dispose of proteins that have defects in their structure.

Queensland

Chair: Professor Perry Bartlett



A public forum and reception were held at the Queensland Brain Institute (QBI), The University of Queensland, on November 25 in honour of the five

Queensland scientists elected to the Academy in 2008: Professor Peter Koopman; Professor Nicholas Martin; Professor John Mattick; Professor Sven Ole Warnaar; Professor Howard Wiseman.

Ms Jan Jarratt MP, Parliamentary Secretary to the Minister for Tourism, Regional Development and Industry was the government representative and spoke most enthusiastically about the Queensland Government's ongoing support for science and how the election of a large number of Fellows was viewed by the government as a cogent indicator of the success of such a policy. The President, Professor Kurt Lambeck, also addressed the audience and outlined the work and objectives of the Academy and the importance of a strong regional committee to promote the benefits of science to a wide audience.

Each of the Fellows gave short presentations of their work, which was highly appreciated by an audience of approximately 80 people. The evening concluded with a dinner for the Fellows at the QBI – 18 of the 28 Queensland Fellows were in attendance, as well as the President – and a spirited discussion across a broad range of issues related to science occurred.

Tasmania

Chair: Dr Trevor McDougall



During the year the Fellows of the Academy joined with the Fellows of ATSE for a dinner. We also had a fascinating science talk by the newest Fellow in Tasmania, Professor Paul Haddad, on the topic *Divide and conquer: Developments in separation science*.

Victoria

Chair: Professor Tony Klein



The annual symposium for newly elected Fellows and medal winners was held on 26 June at the University of Melbourne. Professor Tony Bacic opened the program of brief talks and was followed by Professor William Heath, Professor Geoffrey Tregear and Dr Stuart Batten. Winner of the Gottschalk Medal, Dr Gabrielle Belz was next on the program, followed by Dr Michael McCarthy winner of the Fenner Medal. The final speaker was Dr Sandra McLaren, the recipient of the Dorothy Hill Award. The symposium was followed by a dinner for Victorian Fellows and their guests, including all the presenters.

The Joint Academies' Dinner, another annual event, was held on 27 August. The guest speaker was Professor Glyn Davis, Vice-Chancellor of The University of Melbourne, who gave a very well-received address on the perennial topic *Higher education: What is to be done?*

The biennial lecture commemorating the late Dr Lloyd Rees FAA, erstwhile Chief of the CSIRO Division of Chemical Physics, was this year given by Professor Michelle Simmons FAA on 25 September on the topic *Atomic electronics: When will scaling reach its limit?*. Further information is available from the Academy's December newsletter at www.science.org.au/newsletters/aas74.pdf.

The Christmas party for Fellows and guests held on 13 November at the Observatory Café in the Royal Botanic Gardens was very well attended. Following a fine dinner, a 5-piece band playing music from the Andes on traditional instruments entertained the guests.

Western Australia

Chair: Dr Bruce Hobbs



The President Professor Kurt Lambeck joined some of the Fellows in Western Australia on Monday 21 July at the South Perth Boatshed Restaurant. Some of the invited guests included Professors David Groves, Barry Marshall, Arthur McComb, Cheryl Praeger, Mark Randolph, Fiona Stanley and Robin Warren.

New Chief Executive



The Academy welcomed Dr Sue Meek to the position of Chief Executive in May at the Annual General Meeting. Sue has 25 years experience working in a variety of capacities at the interface of industry, academia and government. She held the position of Australia's Gene Technology Regulator from 2001 to 2008, and was responsible for administering and enforcing the national regulatory system for the development and use of gene technology. Immediately prior to that, she was Executive Director of the Science and Technology Division at the Western Australian Department of Commerce and Trade. She is a Fellow of ATSE and of the Australian Institute of Company Directors.

Science policy

The objectives of the Academy are to promote science through a range of activities, with one of its major areas of interest being the contribution of advice to assist the formulation of evidence-based policy directed at national needs and to inform international debate. The Academy brings together top Australian scientists, all of whom are seen as world figures in their fields. This provides the capability to access expertise over many scientific areas and issues.

Overview

This year has been a particularly active one for the Academy in responding to the Australian Government's initiation of a series of reviews relating to a range of science, technology and innovation issues, as well as research training and infrastructure requirements. In addition to preparing submissions to eight of these reviews, and responses to three of those that have reported, the Academy also provided input to two consultations by the Australian Research Council, and provided submissions to and/or appeared before five related parliamentary inquiries.

As part of the Academy's Annual General Meeting in early May each year, a one-day symposium on a scientific issue of broad contemporary interest is held. The 2008 annual symposium *Dangerous climate change: Is it inevitable?* brought together some of Australia's leading climate change scientists to consider what we know about climate change (the climate system, the impacts and the mitigation options) and what we still have to learn. Key conclusions were the need to develop and apply new knowledge, both within and between disciplines, while simultaneously building resilience in the face of uncertainty by managing risk through the application of the best available expert knowledge.

The seventh annual High Flyers Think Tank was held at the University of Sydney in early November, supported for the first time by the Theo Murphy (Australia) Fund which is administered by the UK Royal Society. These events provide a unique opportunity for career development and network creation for early- and mid-career researchers. They bring together participants from a broad range of disciplines to think about novel applications of existing science and technology; and to identify gaps in knowledge that might be addressed when applying science, including social science, and technology to a particular issue.

The topics are selected to culminate in reports to government that are relevant, timely and instrumental in influencing policy development. The 2008 Think Tank topic, *Preventative health: Science and technology in the prevention and early detection of disease* was selected in response to concerns in Australia and in many other countries about significant increases in illnesses such as cancer, metabolic syndrome (including diabetes and heart disease), mental health (particularly anxiety and depression), and infectious diseases.

The Academy also began the project *Nanotechnology: Ensuring the benefits and managing the risks* and is participating in an inter-academy project, under the auspices of the National Academies Forum (NAF), on *Understanding the formation of attitudes to nuclear power in Australia*. Both projects are funded under the Australian Research Council's Linkage Learned Academies Special Projects program.

In addition the Academy, in conjunction with the Australian Academy of Technological Sciences and Engineering, commenced a joint study of Australian needs for Earth observation from space over the next 10 to 15 years to complement the plan on space science being developed by the National Committee for Space Science.

Submissions by the Academy to government reviews and inquiries

The Academy's submissions, inputs and responses to a diverse range of science policy issues being considered by government are listed below. In a number of instances national committees provided significant contributions.

While most studies are still underway, three major reviews – the National Innovation System Review by Dr Terry Cutler, the Review of the Higher Education System by Professor Denise Bradley and the Climate Change Review by Professor Ross Garnaut – have reported. However, the world has changed so much since their initiation as a result of the global financial crisis that the government has deferred specific responses until at least the Budget process in May, and funding allocations that are made seem likely to be provided over longer periods.

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| 24 April | Submission to review of Questacon – the National Science and Technology Centre |
| 30 April | Submission to the National Innovation System (Cutler) Review |
| 14 May | Response to the Budget 2008–09 |
| 14 May | Submission to Review of the National Collaborative Research Infrastructure Strategy (NCRIS) Roadmap |
| 30 May | Submission to House Standing Committee on Industry, Science and Innovation <i>Inquiry into research training and research workforce issues in Australian universities</i> |
| 27 June | Submission to the Australian Research Council Future Fellowships consultation |
| 30 June | Submission to the Australian Research Council on Excellence in Research for Australia Initiative consultation |
| 18 July | National committee submissions on the NCRIS exposure draft of the 2008 Roadmap for Australian Research Infrastructure |
| 31 July | Submission to (Bradley) Review of the Australian Higher Education System |
| 7 August | Submission to Senate Education, Employment and Workplace Relations Committee <i>Inquiry into Academic Freedom</i> |
| 31 August | Response to Cooperative Research Centre (O'Kane) review |
| 30 September | Response to National Innovation System (Cutler) Review <i>Venturous Australia: Building strength in innovation</i> |
| 1 October | Submission on Department of Defence discussion paper <i>Key questions for defence in the 21st century</i> |
| 15 October | Submission to Infrastructure Australia discussion paper <i>Australia's future infrastructure requirements</i> |
| 28 November | Response to the Garnaut Climate Change Review statement on <i>Priorities for Australian climate change science research</i> |
| 15 December | Submission to Australian Broadcasting Corporation (ABC) and Special Broadcasting Service (SBS) review |
| 20 March | House Standing Committee on Primary Industries and Resources <i>Inquiry into the role of government in assisting Australian farmers adapt to climate change</i> |

Appearances before committees of government inquiries

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|--------------|--|
| 18 June | House Standing Committee on Industry, Science and Innovation Reference: <i>Research training and workforce issues in Australian universities</i> Professor Philip Kuchel FAA, Professor Kurt Lambeck FAA, Dr Sue Meek |
| 12 September | Joint Standing Committee on Foreign Affairs, Defence and Trade Subcommittee Reference: <i>Australia's relationship with ASEAN</i> Professor Michael Dopita FAA, Dr Sue Meek, Ms Nancy Pritchard |
| 16 October | House Standing Committee on Education and Training Reference: <i>Department of Education, Science and Training annual report 2006–07</i> Professor Peter Hall FAA, Professor Philip Kuchel FAA, Professor Kurt Lambeck FAA, Dr Sue Meek, Ms Shelley Peers |

Submissions and statements made by the Academy are available at www.science.org.au/reports. Hansard transcripts of public hearings are made available on the internet when authorised by the committee. The web address is www.aph.gov.au/hansard. To search the parliamentary database, go to <http://parlinfoweb.aph.gov.au>.

The much anticipated review of the National Innovation System by Dr Terry Cutler was released as a green paper in September, along with a related review of the Cooperative Research Centre Program by Professor Mary O'Kane. The Academy responded to both these reports, agreeing with the principal conclusions and emphasising that it is Australia's continuing excellence in science and technology that will underpin our ability to innovate successfully and competitively in the long term and on the international stage.

This was a central theme of the Academy's contribution to the substantial and substantive Review of Higher Education by Professor Denise Bradley. It also underpinned the input to the review of the National Collaborative Research Infrastructure Roadmap, the Defence white paper *Key questions for defence in the 21st century*, and to Infrastructure Australia's *Australia's future infrastructure requirements*. In the last case, particular emphasis was placed on the need to carefully consider renewable energy technologies and their ability to contribute to the development of a low carbon economy.

Public understanding of science and technology and the capacity to engage in meaningful discussion about their application are also central to the creation of an innovative economy. The Academy's submissions to reviews of the National Science and Technology Centre, Questacon, the Australian Broadcasting Corporation and the Special Broadcasting Service recognised the important role of these organisations in enhancing community awareness and stimulating debate.

The Academy raised a number of concerns about the sustainability of Australia's research community in submissions and appearances before House of Representatives standing committee inquiries on research training and workforce issues and the Department of Education, Science and Training 2006–07 annual report. Key points were the need to provide improved career pathways for early- to mid-career researchers and to retain women scientists. Similar feedback was also contained in the Academy's submission to the Higher Education Review and the Australian Research Council (ARC) consultation on the Future Fellowships Scheme. The response to the ARC's consultation on the Excellence in Research Assessment Initiative included the importance of ensuring that multidisciplinary research would not be impeded.

One of the most active areas of input to science policy development had been in relation to climate change science. A number of Fellows and national committee members have been amongst the hundreds of scientists on the Intergovernmental Panel on Climate Change (IPCC) and its working groups. The work of this group was recognised by the joint award, along with former US Vice-President Al Gore, of the 2007 Nobel Peace Prize 'for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change.'

Through these international connections the Academy is aware that the IPCC's initial predictions regarding the impact of greenhouse gas emissions on the global temperature of the atmosphere have been largely confirmed. The consequences of rising temperatures are well understood in general terms and include changes in rainfall

pattern, greater variability in extreme meteorological events, sea level change and ocean acidification. However, the Academy has endeavoured to emphasise in a number of forums, including the Garnaut *Climate Change Review* and the House *Inquiry into the role of government in assisting Australian farmers adapt to climate change*, that these consequences remain difficult to quantify due to complex feedback mechanisms that are still not fully understood. Hence there remains considerable uncertainty as to how global change will be manifested at regional and smaller scales.

The Academy has issued a statement *Priorities for Australian climate change science research* that identifies a range of requirements for making systematic observations, together with basic and applied research, to reduce the uncertainties in our understanding of climate change processes, particularly on how global changes impact on local conditions. They include:

- greatly enhanced climate observing capability across the region, including surface measurements and synoptic remote sensing observations across the region;
- significant strengthening of Australian capabilities in theoretical analysis and modelling of the climate system;
- an independent predictive climate modelling capability that is appropriate for Australian conditions and whose outcomes are accessible to and well understood by the Australian research and user community;
- improved supercomputing facilities;
- training for the next generation of climate scientists; and
- effective linkages with the international programs.

The statement also supports calls for the establishment of an 'Australian Climate Change Research Institute' – with real and virtual elements – that builds on Australia's research talent. It would have its own core facility with the resources to fund collaboration between the universities, CSIRO and the Bureau of Meteorology, as well as international linkages to develop an integrated national program.

Science at the Shine Dome symposium – Dangerous climate change: is it inevitable?

The symposium convener, Professor Michael Dopita FAA, and his organising committee prepared a very interesting and most timely symposium program on the important topic *Dangerous climate change: Is it inevitable?* The keynote address, *The Arctic: Is dangerous climate change upon us?*, was presented by Dr Neil Hamilton. He went on to present a very grave picture of the situation in the Arctic and argued that the Arctic is the key to the global climate system because what happens in the Arctic is a magnification of what happens in the rest of the world. He reported that feedback occurring in the melting of the sea ice in the Arctic is accelerating the rate of sea ice loss. Ice that is five years old or more was classified as 'old sea ice'. Due to huge increases in melting in recent times, most of the Arctic spring cover this year is one year ice, which is thin and melts much more rapidly than old ice. As sea ice declines, krill, fish, seals and polar bears decline. In 2007, for the first time, there was no ice in the Beaufort Sea, the north coast of Russia, and the Northwest Passage.

Other speakers at the morning session were: Dr Michael Raupach FAA from CSIRO Marine and Atmospheric Research describing the carbon cycle; Dr John Church, also from CSIRO Marine and Atmospheric Research, discussing global sea levels; Professor Neville Nicholls of Monash University speaking about water, drying and climate change; and Professor Ove Hoegh-Guldberg from the University of Queensland talking about coral reefs and their ability to adapt to stress.

The afternoon session began with Professor Will Steffen from the Fenner School of Environment and Society discussing the human-nature relationship and a new geological epoch, the Anthropocene. This was followed by Professor Amanda Lynch from Monash University speaking on the vulnerability of socio-ecological systems

to a changing climate; Mr Roger Beale from The Allen Consulting Group presenting the challenges Australia faces from changing climate; and Mr Blair Comley from the Australian Government Department of Climate Change detailing the economic perspectives of climate change. Professor Graeme Pearman FAA gave the final address in which he asked the question 'Can we avoid dangerous climate change?' He summed up the day's proceedings by saying that avoiding dangerous climate change depended on our urgency in responding. It was also dependent on how we manage our social systems, balance our markets and intervention, and integrate multiple outcomes and multiple timescales. Deciding where we wanted to be and building in resilience were also key factors.

The proceedings from the symposium are available from www.science.org.au/sats2008/symposium.



Speakers and chairs from the annual symposium on dangerous climate change

High Flyers Think Tank on preventative health

The first High Flyers Think Tank to be supported by the Theo Murphy (Australia) Fund entitled *Preventative health: Science and technology in the prevention and early detection of disease* was held at the University of Sydney on 6 November. Some of Australia's and a few of New Zealand's brightest early- and mid-career researchers met to engage in vigorous discussion on a topic of national importance. With around 90 participants, this High Flyers Think Tank was the largest gathering since the Think Tanks began in 2002.

Academy President Professor Kurt Lambeck encouraged participants to identify 'new approaches that can be brought to bear on the problem under consideration... to apply [their] rich diversity of knowledge and experience to think about novel applications of existing sciences and technology and to identify gaps in knowledge that is required to tackle the problem'. He noted that there are many diseases, injuries and illnesses that can be prevented by analysis of risk factors, early detection, lifestyle changes and other measures.

Government efforts to improve Australia's health outcomes include a range of initiatives, one of which is the National Preventative Health Taskforce set up in April 2008 to provide evidence-based advice to government on preventative health programs. Their initial focus is to develop strategies for obesity, tobacco and alcohol related disorders by June 2009.

Professor Paul Zimmet, who is on the Taskforce's obesity working group, provided an overview of the work of the Taskforce. He spoke of the 'diabesity' epidemic in Australia, noting an almost 300 per cent increase in obesity prevalence and a similar increase in diabetes in a twenty year period between the early 1980s and 2000s.

After a stimulating presentation from Professor Chris Goodnow FAA, on the topic of genes and the environment, four other expert speakers spoke on their specialist health areas: Professor Bruce Armstrong on the process of carcinogenesis; Professor Ian Hickie on mental health and the dominance of neurological and psychiatric disorders in disability; Professor Kerin O’Dea on the metabolic syndrome in the context of metabolically healthy obesity and the role of diet and lifestyle, concentrating on social disadvantage and using the indigenous Australians as a small case study; and Professor Graham Brown on some of the threats in infectious diseases, including emerging infectious diseases and what we have learned from the past, mistakes made and where technology could possibly help us to do better in the future.



Photo: Joe Hlubucek

Think Tank on preventative health in progress

Participants then divided into four breakout groups (cancer, mental health, metabolic syndrome and infectious diseases) for detailed discussions on potential applications of science in disease prevention, such as the use of bioinformatics, diagnostic screening and vaccination. Summarising the discussions following a reporting back session, Professor John Chalmers noted the commonality of risk factors across the different diseases, the need for better data linkages (for example electronic support systems and bioinformatics) and the importance of better facilitation of cross disciplinary research. These needs are also common to other diseases that have been identified as national health priorities. Some of the key recommendations to address the needs identified were:

- Undertake a national health survey every five years to enable disease and risk factor trends to be analysed and monitored.
- Following the Preventative Health Taskforce’s phase 1 report in June 2009 – which will focus on obesity, tobacco and alcohol – other areas which might be adopted for its next phase include child health, mental health and infectious disease.
- While acknowledging potential barriers such as complex IT infrastructures and privacy considerations, hospital and institutional databases should increasingly be linked and data sets integrated, to assist researchers in identifying health risks.
- Establish a national biological repository of tissue samples with prior consent of patients to enable future research applications.
- Improve linkages between funding bodies – such as the ARC and the NHMRC – to facilitate the integration of human health and relevant animal studies.

- Reduce excessive reporting and compliance requirements and multiple ethical clearances which together act as significant barriers to research.

Further information and proceedings from this and previous Think Tanks are available from www.science.org.au/events/thinktank2008.

Australian Research Council Linkage Learned Academies Special Projects

The Australian Research Council's Linkage Learned Academies Special Projects fund the learned academies to undertake projects which:

- capitalise on their unique capabilities;
- assist programs of research undertaken by institutions; and
- may be expected to have results of broad benefit for research and scholarship in the natural and applied sciences, technological development and applied technology, the social sciences and the humanities.

Australia's learned academies were awarded \$561,272 over two years for research into issues as diverse as decisions about nuclear energy, nanotechnology safety, multiculturalism, workforce needs, and new approaches to illness and wellness, under the scheme.

Applications are accepted from individual learned academies and from the National Academies Forum (NAF). NAF was established in 1995 to help overcome the difficulties that have often separated science, technology and engineering from the social sciences and the humanities. It provides a basis for cooperative activities by the four academies and a common point of access to the academies for outside organisations and individuals. In this way it can link about 2000 of Australia's most distinguished scholars across the full range of academic disciplines to inform policy makers. NAF is also committed to bringing debate to wider audiences and these activities are highlighted on page 91.

The Academy project will examine nanotechnology research trends and priorities in Australia and consider appropriate criteria for assessing the health, safety and environmental risks on a case-by-case basis for different applications.

The NAF project, *Understanding the formation of attitudes to nuclear power in Australia*, aims to use nuclear energy as a case study to bring to bear the multidisciplinary perspectives of the four academies to increase understanding of what influences various interest groups, and the community at large, in formulating their opinions on contentious issues. The study is being managed by ATSE, an expert reference group has been established with representatives from each academy, and a project director has been appointed.

National Strategy Plan for Earth Observation from Space

The Academy and ATSE have a long-standing commitment to a strong Australian role in space science, including the various aspects of space-based Earth observation. The Academy's National Committee for Space Science has been working for some time on a Decadal Plan for Space Science and, with support from a number of Australian government departments and agencies with responsibilities for various aspects of Earth observation from space, the two academies agreed in December to undertake a complementary joint study of Australian needs for Earth observation from space over the next 10 to 15 years and to prepare a National Strategic Plan for Earth Observation from Space. A working group has been established which is supported by a steering committee made up of senior representatives of the academies and the main supporting organisations. The plan is expected to be finalised at the end of July 2009.

National committees for science

The Academy's national committees foster a designated branch or theme of natural sciences in Australia and serve as a link between Australian and overseas scientists in the same field. Following advice from the committees, the Academy appoints delegates to the business meetings of the International Council for Science (ICSU) and 31 of its member unions. The 21 national committees and three task forces represent a wide range of the disciplines within the Academy's fellowship.

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

Committee reports

Reports have been received from the following committees:

Antarctic research

Chair: Professor Robert Vincent FAA

Australian scientists, including members of the National Committee for Antarctic Research (NCAR), continue to play prominent roles in the international programs of the Scientific Committee for Antarctic Research (SCAR) with good representation on a wide range of committees. Activities covered include Antarctic climate processes, biodiversity, change and ecosystem response, and the geological evolution of Antarctica. Whenever possible, new appointments to SCAR and other relevant international bodies were proposed during 2008. There was considerable revision of membership of SCAR committees after the General Assembly in July 2008.

One of the main activities of NCAR was to provide input into the Australian Antarctic Division's Strategic Plan, which was to set the science strategy for Australia's Antarctic science program in the 5-year period commencing in 2009. Committee members provided input through the chair, who is ex-officio a member of the Australian Science Advisory Committee, which is responsible to the Minister for the Environment. However, there has been a considerable delay in the implementation of the strategic plan. The office of the Minister for the Environment has not yet released the *Futures Document*, which will inform the strategic plan, and accordingly the current plan remains in operation.

The International Polar Year (IPY), which commenced in 2007, finished in March 2009. NCAR has worked with the IPY Australian Education Outreach and Communication Committee, hosted by Antarctic Tasmania, to publicise IPY activities. A number of lines of activity were pursued, including Australia-wide lecture tours involving both senior and young scientists involved in Antarctic research.

Astronomy

Chair: Professor Matthew Colless FAA

The National Committee for Astronomy (NCA) continued to oversee the implementation of the Australian Astronomy Decadal Plan 2006–15. However the management of those aspects of the decadal plan that were supported by the National Collaborative Research Infrastructure Strategy (NCRIS) funding for radio and optical astronomy is now being undertaken by Astronomy Australia Limited (AAL). The 15 members of AAL comprise all the institutions pursuing professional research in astronomy in Australia.

The other main business for the NCA in 2008 was preparations for the International Year of Astronomy (IYA) in 2009. The NCA is advised on IYA matters by the International Year of Astronomy Working Group, made up of 24 representatives from all the significant stakeholders, and chaired by the NCA chair. More than 120 IYA activities are being planned, ranging from participation in some of the international events such as the *100 Hours of*

Astronomy and *Dark Skies – Quiet Skies*, through to celebrations of the new year using a pulsar countdown, a visit by an Apollo astronaut to commemorate the 40th anniversary of the first moon landing, astronomy themes for activities ranging from science festivals to school projects, and many grassroots events organised by amateur astronomers and other interest groups.



Photo: © Peter Challis, Harvard-Smithsonian Center for Astrophysics

More than 120 activities are planned for the International Year of Astronomy

Biomedical sciences

Chair: Professor Rob Baxter FAA

A major event at the end of 2007 was the National Forum on Biomedical Sciences, held at Monash University. At the meeting of the National Committee for Biomedical Sciences (NCBMS) in June 2008 it was resolved to hold a similar forum about every three years. The location could be rotated, and it could evolve in to a two to three day meeting, with international involvement. The focus would be on research and scholarship in education in biomedical sciences.

Improved liaison with the many corresponding societies of NCBMS was pursued in 2008, and the Australia and New Zealand Society for Cell and Developmental Biology accepted an invitation to become a corresponding society.

In 2008 the committee considered two looming workforce crises: (i) an oversupply of mid-career research-only scientists on short-term appointments with insufficient positions to move to, and (ii) an impending shortage of academic biomedical scientists due to an ageing workforce approaching retirement. A submission discussing these issues and suggesting possible remedies was made to the Future Fellowships consultation.

The committee supported the 50th anniversary celebrations of one of its corresponding societies, the Endocrine Society of Australia. The Academy was a sponsor of this event, providing certificates and endorsing profiles of Fellows who are prominent in Australian endocrinology.

Brain and mind

Chair: Professor Max Coltheart FAA

2008 was the first year of existence of the National Committee for Brain and Mind and progress in its initial year was limited by the chair being overseas in Europe for three periods. However, his public debate with Professor Karl Friston FRS at the International Congress of Psychology in Berlin in July on a topic central to the interests of this committee, *Functional neuroimaging has already told us a lot about cognition: Yes or no?*, yielded a great deal of scientific interaction and media attention. This will provide valuable input into the committee's future deliberations, such as the development of media releases to address misconceptions about what functional neuroimaging can and can't reveal about mental activities.

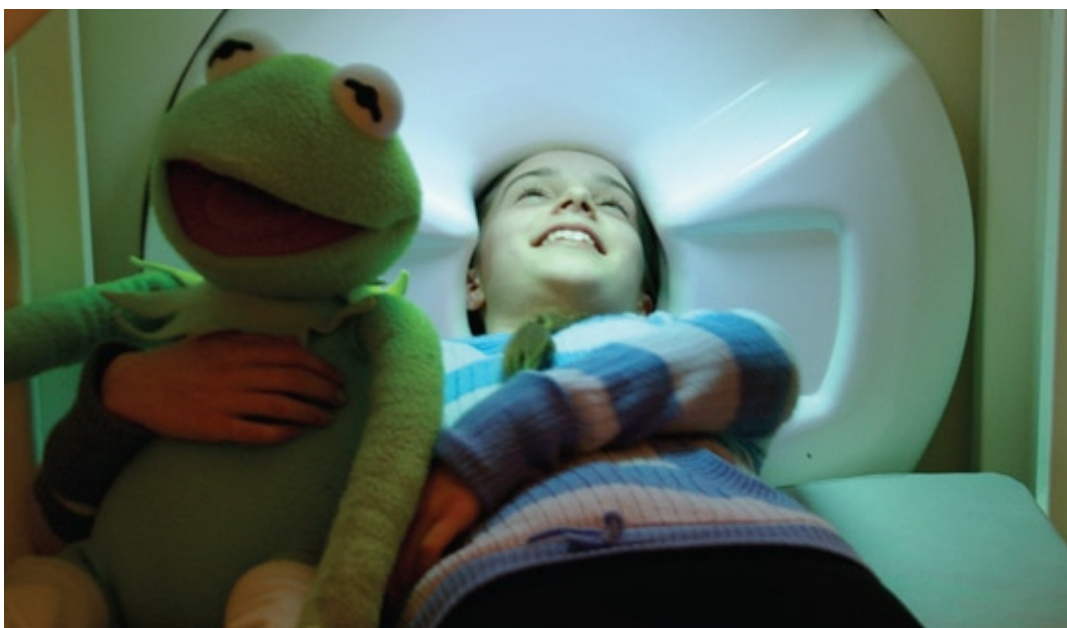


Photo: © Graciela Tesan, Macquarie Brain Research Laboratory

A child in the MEG (magnetoencephalography) waiting to start a visual experiment

Chemistry

Chair: Professor Chris Easton FAA

The National Committee for Chemistry (NCC) has continued to interact with the International Union of Pure and Applied Chemistry (IUPAC). Professor David Black, a member of the committee, is IUPAC Secretary General. The major activity in this area has been to promote 2011 as the International Year of Chemistry. It is expected that this will be formally ratified before the 2009 IUPAC General Assembly and that planning activities for the International Year of Chemistry will then be a major focus of discussion at the Assembly.

The NCC has continued to seek ways to work more effectively with the Royal Australian Chemical Institute (RACI). Nominations for the IUPAC Prize for Young Chemists are coordinated through the RACI. The President of RACI is an ex officio member of the committee.

During 2008, the committee: considered ideas for symposia based on water recycling and quality, and also chemical security; continued to provide support for conference activities in Australia; and pursued efforts to initiate IUPAC's Company Associates Program in Australia.

Crystallography

Chair: Professor Jenny Martin

Australian scientists were well represented at the International Union of Crystallography (IUCr) Congress in Japan in August this year. Professor Jill Trehwella, Federation Fellow from the University of Sydney, presented a plenary lecture at the congress. The Society for Crystallographers in Australia and New Zealand held a social get together at the congress.

At the General Assembly of the congress, the National Committee for Crystallography (NCCr) supported India's bid to hold the 2014 congress in Hyderabad. However the vote eventually went to Montreal, Canada. The crystallography community in India has indicated they will renominate at the next General Assembly for the 2017 congress, and the committee will continue to support their bid.

The 20th Australian Conference on Microscopy and Microanalysis and the 4th Congress of the International Union of Microbeam Analysis Societies were held in Perth from 10 to 15 February. The meetings were very well attended.

Professor Peter Colman FAA has been elected Vice-President of the International Union of Crystallography.

Four of the six Australian nominees approved by NCCr were elected as members of commissions of the IUCr and eligible existing members were re-elected.

The OPAL decadal plan for neutron scattering beamlines continues to be developed, with NCCr members Professors Keith Nugent FAA and Robert Robinson, and past chair of NCCr, Peter Colman FAA, participating in this process.

Members of the NCCr are planning a symposium in Adelaide in 2012 to commemorate the centenary of crystallography, a field of science established by Australian Nobel Prize winners William and Lawrence Bragg.

Replacement Research Reactor Task Force (task force of the National Committee for Crystallography)

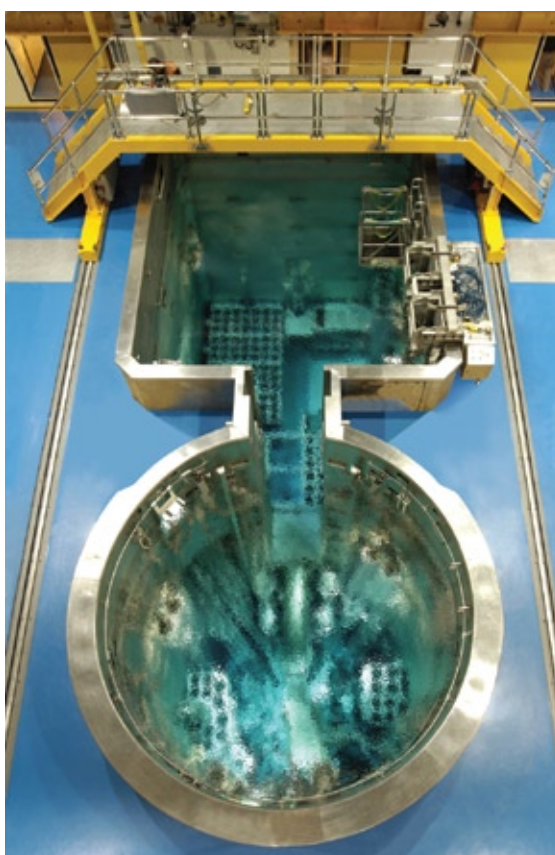
Chair: Professor John White FAA

Successful restart of the reactor

The development of a new fuel for the OPAL reactor, replacing that supplied by INVAP (Argentina) was monitored and the OPAL reactor started again successfully reaching 20 megawatt on 23 May. Whilst there is still a problem of light and heavy water mixing through a very small leak in the reflector, there is continuing work by INVAP and Australian Nuclear Science and Technology Organisation (ANSTO) to ameliorate that situation and a long term response is being prepared. There is some effect of this on the irradiation programs at the reactor. Meanwhile the reactor is producing excellent neutron beams and many instruments are beginning to function although there is some delay on the data processing and informatics side due to scarcity of staff. The initial hope that at least some of the instruments would be at world's best performance at this period looks as if it will be realised. So far it has not been possible to test or characterise any of the neutron irradiation facilities in OPAL that might be suitable for fast neutron irradiation of geological samples in relation to $^{40}\text{Ar}/^{39}\text{Ar}$ dating.

Job losses at ANSTO and new CEO appointment

Following the Australian Government's 'efficiency dividend' process after the 2007 election, a number of staff have left ANSTO. A new CEO, Dr Adrian Paterson, was appointed (formerly head of the South African high temperature reactor project) and took up his position on 1 March.



ANSTO reactor pool: Excellent neutron beams being produced by the reactor

Photo: Courtesy of ANSTO

Effects of low level radiation, appraisals of new material and discussion

Three members of the committee have been particularly active in relation to the low levels of radiation question. The SBS program *Nuclear Nightmares* has been distributed and viewed by members. The committee will continue to look at other documents related to the 'hormesis' phenomenon but is currently of the opinion that this effect has been overstated and that the recent thorough study by the US National Academies is the best evidence so far that linear extrapolation of radiation damage in biological systems to the lowest levels is the appropriate procedure.

Linkage–Learned Academies Special Project (LASP) – Australian attitudes to nuclear power

The initial meeting of the LASP project group of the joint Australian academies was held in Melbourne on 17 July 2008. The obvious importance of the social sciences and humanities in understanding Australian attitudes to nuclear power was clear from these discussions. The need to find a director who is skilled in the social science area relating to public attitudes to risk, was accepted by all. There are cogent examples given by the way in which attitudes are formed and changed. More scientific facts were only one part of the story. With the limited resources of the project, a clear focus on the report structure was adopted with the project director working in close liaison with the committee on the objectives and structure.

Professor Daniela Stehlik was appointed to the project director position. Professor Stehlik is chair of Stronger Communities and Director of the Research Centre for Stronger Communities at Curtin University of Technology, Western Australia. She has the appropriate background and proposed a process which avoided the pitfalls of protracted discourse between representatives of entrenched positions at the outset. It is expected that the report will be available in mid to late 2009 and that the committee will be able to have input on it.

Other matters

Professor John White FAA, as chairman of the International Advisory Committee for the Japan Proton Accelerator Research Complex (J-PARC) Facility represented that committee at the formal opening of J-PARC on 16 December.

Data for science

Chair: Professor Ray Norris

The National Committee for Data in Science (NCDS) was established by the Academy in February 2008, together with Australian membership of the Committee on Data for Science and Technology (CODATA) of the International Council for Science. CODATA is currently assuming an increasing role in global science data management, and Australia's membership will position Australian data scientists in a strong position internationally. The NCDS aims to promote and facilitate data science across all disciplines of science and provide a national data science voice which can represent Australia at international forums. To achieve this, the committee will hold regular workshops, promote the development of data management policies and protocols, and promote the adoption of standards for data exchange.

The NCDS held its inaugural meeting in May 2008, and another in February 2009. In the intervening period it established its role and constituency. Other activities include:

- the establishment of a website www.atnf.csiro.au/people/rnorris/NCDS;
- participation by two members (Dr Ray Norris and Ms Kim Finney) on the International Council for Science Strategic Committee on Information and Data. The recent release of its report has created a great deal of international interest and debate;
- a presentation by Professor Jane Hunter at the eResearch Australasia Conference; and
- participation by Ray Norris in the CODATA General Assembly, and his re-election to the Executive Committee of CODATA.

Because of the pressure of other work, Ray Norris stepped down as chair in early 2009, and was replaced by Dr Rhys Francis.

Earth sciences

Chair: Professor Andrew Gleadow FAA

The AuScope initiative

The AuScope program under the National Collaborative Research Infrastructure Strategy (NCRIS) is now well established and supporting major geoscience research infrastructure needs across a range of programs. The fundamental research objective of AuScope is to investigate the structure and evolution of the Australian continent. A total funding allocation of \$46 million has been awarded by NCRIS over a five year period from 2007. Progress has been made during 2008 in planning a series of national geoscience transects through a working group chaired by Professor Brian Kennett FAA. A meeting of the working group took place with interested parties during the Australian Earth Sciences Convention during July in Perth.

Collaboration between Geoscience Australia, AuScope Earth imaging and Primary Industries and Resources South Australia has seen more than 500 kilometres of reflection profiling in November and December of 2008, extending from the south of Northern Territory into South Australia following the Darwin to Adelaide railway. The quality of data is good with striking features extending through the crust. This profiling follows one of the corridors identified by the transect working group.

Major conferences

The biennial Australian Earth Sciences Convention (AESC) was held in Perth from 20 to 24 July with approximately 900 delegates. This year the convention was organised jointly by the Geological Society of Australia and the Australian Institute of Geoscientists. Planning has already commenced for the next convention to be held in Canberra in 2010. Planning is also well under way for the 25th General Assembly of the International Union of Geodesy and Geophysics, to be held in Melbourne in 2011 and the 34th International Geological Congress, to be held in Brisbane in 2012. The Brisbane congress is to be known as Australia 2012 and its theme will be 'unearthing our past and future'.

International Year of Planet Earth 2008

A number of activities in Australia have been used to focus attention on the International Year of Planet Earth (IYPE) during 2008. Some of the major events or activities have included the AESC in Perth, a series of special features in the *Australian Journal of Earth Sciences*, the Australian contribution to the One World digital geological map of the world by Geoscience Australia, and the launching of the Kanawinka Geopark in Victoria and South Australia, the first such park in Australia. The Royal Australian Mint issued a special coin set celebrating the IYPE at the end of 2007, and a number of other conferences and activities in various parts of Australia have also been used to promote the IYPE.

Earth system science

Chair: Dr Roger Gifford

The synthesis and recommendations document *Vegetation dynamics and global climate change: Research priorities for the next decade* was signed-off by the Academy's Executive Committee in December 2008. The document is a product of the National Committee for Earth System Science's (NCESS) strategic planning activities and derived from an open planning workshop in August 2007 followed by multiple steps of wide comment and modification prior to completion. Negotiations are under way with the Department of Climate Change for its publication. The document had its impact, through direct discussion and via an NCESS submission to the exposure draft of an NCRIS review, on the decision making of the facilitator for the establishment of the Terrestrial Ecosystem Research Network under NCRIS.

Funding to develop a decadal strategic research plan for Earth system science was secured from the Department of Climate Change and a proposed draft document has continued to evolve within NCESS for release as an exposure draft for general comment and input, and as a background document for a planning workshop in 2009. An 'urgency statement' on the need for balanced long-term expansion of climate change research capacity in the areas of research infrastructure, human resources, and information management was

prepared by NCESS and sent to Ministers Wong, Garrett, Carr and Gillard by the President. The statement also formed the basis of the committee's submission to the Cutler Review of the National Innovation System.

The chair of NCESS attended the Fourth International Geosphere-Biosphere Programme (IGBP) Congress in Cape Town, South Africa, as the Australian delegate. There he presented a public poster highlighting Australian Earth system science, participated in the special two day meeting there of representatives of national committees for the IGBP, and delivered to the final congress plenary the summary of conclusions from that special meeting. NCESS contributed an item to the *IGBP Bulletin* in October. NCESS also helped to contribute comment by the Academy on the July exposure draft to the Garnaut review into greenhouse gas emission trading, and responded to questions arising from discussion with Professor Garnaut.

Terrestrial Carbon Task Force (task force of the National Committee for Earth System Science)

Chair: Professor Andy Pitman

The Terrestrial Carbon Task Force met in July at Ian Potter House. The aim for the meeting was to discuss the report *Vegetation dynamics and global climate change: Research priorities for the next decade*, to take its content forward, and to produce a well structured report to be passed to decision makers.

Geography

Chair: Professor Leslie Head

Committee members Professor Nigel Tapper and Professor Margaret Robertson represented Australia at the International Geographical Union (IGU) Congress in Tunis in August. The committee nominated Professor Ruth Fincher for one of the eight vacant vice-presidential positions, and she received the highest number of votes of all the nineteen candidates; an excellent result. Thanks are due to Professor Janice Monk (USA) and members of the Gender and Geography Study Group of the IGU for their role in lobbying for Ruth.

Committee member Ms Kathryn Berg (Royal Geographical Society of Queensland) has spearheaded the involvement of a number of geographical organisations in the national curriculum review process. This was somewhat delayed as the incoming government had other priorities, but indications are that the process will accelerate in 2009, and the committee is well-placed to participate in it. The committee views this as the main means in the next few years to have a voice for geography in public policy, and in enhanced communication between secondary and tertiary sectors.

The committee increased communication with other key geographical organisations through a strategic approach to committee membership (including representatives of the Institute of Australian Geographers, state societies and teacher associations) and a contribution by the chair to the Institute of Australian Geographers newsletter.

History and philosophy of science

Chair: Professor Rachel Ankeny (Dr Rosemary Robins, acting chair, March to October 2008)

The National Museum of Australia Student Essay Prize for the History of Australian Science was offered in 2008. The judging panel was Professor Rod Home, Dr Mike Smith and Dr Rosemary Robins. No prize was awarded. The funds have been held over and may be used to award a prize for a paper on the history of Australian science from among those submitted for the environmental history prize in 2009.

The national committee continued to work with Mr Gavan McCarthy (University of Melbourne) to help achieve the aims of the World History of Science Online (WHSO) project (www.dhst-whso.org/whso). The main project objectives are:

- Online access to bibliographies and catalogues of archives sources already prepared or in preparation in the International Union of History and Philosophy of Science Division of the History of Science and Technology member countries.

- Make accessible the world's scientific and technological bibliographies and archival sources through a central website.
- Contribute to build capacity in history of science and technology in all countries.
- Make available historical information for the scientific and technological disciplines that require it.
- Disseminate scientific information.
- Stimulate the use of history of science and technology in decision making on public policies, education programs and public understanding of science as well as in the agendas of sustainable human development, among others.

Dialogue commenced between members of history and philosophy of science, and science and technology study programs around Australia about the future of the discipline and strategies. This is in light of continued reorganisation in 2006 and 2007 of the faculties of arts and sciences at a number of major universities which traditionally have strengths in the field.

Mathematical sciences

Chair: Professor Hyam Rubinstein FAA

This has been another busy year for the National Committee for Mathematical Sciences (NCMS). In February, at the annual meeting of heads of mathematical sciences departments, the NCMS heard that very little of the new money from the Australian Government budget increase for teaching undergraduate students in mathematical sciences was passed on to departments. Most universities take around 50 per cent of such money in 'overheads'; that is, costs of central administration, buildings and power, libraries and student services. The remainder is passed on to faculties, where budget decisions are devolved.

NCMS attempted to gain a hearing with the new government and also were able to generate some media interest. However, with the inquiries into research and innovation, and into the higher education sector, no real progress has been made in rectifying this serious problem.

A major campaign was organised by Professor Terry Tao FAA to protest against huge cuts to the mathematical sciences program at the University of Southern Queensland. After a lot of media attention, the university made some very modest changes and most of the cuts went ahead. Generally, the annual review of staffing of mathematical sciences departments across Australia showed around an 8 per cent decline (or 40 positions) in 2007, which was extremely disappointing.

In the middle of the year, the NCMS learned that the Australian Research Council (ARC) had commissioned someone from outside the mathematical sciences to organise mathematics journal ranking for the new research assessment exercise, ignoring the work of the committee from 2007 for the previous Research Quality Framework. Little communication took place as to why this was necessary. When the list appeared, it had a number of problems. After representations to the ARC from Professor Peter Hall FAA, on behalf of the Australian Mathematical Society and the national committee, Professor Peter Taylor and the chair were able to have a meeting with the CEO of the ARC, Professor Margaret Sheil. She was very helpful in allowing us time to organise another journal ranking exercise in Melbourne. The chair would like to particularly thank Professor Hall, Professor Phil Howlett, Dr Aleks Owczarek and Associate Professor Jim Denier, amongst a host of people, who contributed to this major task. The lists were posted on the Australian Mathematical Society website, which led to much wider consultation and discussion taking place, and have been submitted to the ARC evaluation group.

Finally, the NCMS has been involved in discussions with the Australian Association of Mathematics Teachers and the Mathematics Education Research Group of Australasia about collaboration in the area of mathematics education in schools. With the move to a national curriculum in school mathematics, it is essential that cooperation and communication occur.

Mechanical sciences

Chair: Associate Professor Jim Denier

On the invitation of the Academy, the 22nd International Union of Theoretical and Applied Mechanics (IUTAM) International Congress of Theoretical and Applied Mechanics was hosted by the Australian theoretical and applied mechanics community. The congress president, Professor Ernie Tuck FAA, welcomed over 1100 delegates, from over 62 countries, to the Adelaide Convention Centre. Chair of the National Committee for Mechanical Sciences, Associate Professor Jim Denier, played a major organisational role as secretary general of the congress.

A total of 899 papers were presented in 14 parallel sessions during the five days of the congress. In addition to the contributed papers, there were also opening and closing lectures and 15 invited (sectional) lectures covering all aspect of fluid and solid mechanics. A further highlight of the congress was the award, for the first time, of the Batchelor Prize in Fluid Mechanics (sponsored by Cambridge University Press) and the Rodney Hill Prize in Solid Mechanics (sponsored by Elsevier). These two major prizes recognise sustained outstanding contributions to the fields of fluid and solid mechanics. The recipient of the Batchelor Prize, Professor Howard Stone of Harvard University, and the recipient of the Rodney Hill Prize, Professor Michael Ortiz of Caltech, presented lectures detailing their outstanding contributions to their respective fields.

The congress was supported by the Australian Mathematical Society, Australian and New Zealand Industrial Applied Mathematics and the University of Adelaide.

Medicine

Chair: Professor Bob Williamson FAA

The National Committee for Medicine (NCM) has attempted to influence policy with the Australian Government. The committee is firmly of the opinion that research funding through the National Health and Medical Research Council (NHMRC) should continue to be channelled through the Department of Health and Ageing. We have put this point of view to government, in particular in discussions around the Cutler report, the review of Australia's National Innovation System *Venturous Australia: Building strength in innovation*. We believe that the Academy should continue to argue for increases in research allocations to medical research, through the NHMRC as well as other mechanisms as appropriate.

Although the committee put a case to the Hon Nicola Roxon MP, Minister for Health and Ageing, that there should be a dedicated funding stream for translational research, this matter was referred by government to the Cutler committee and the various committees dealing with health funding. While many of our proposals lapsed because of the financial situation, we are pleased that the government has been able to fund a large increase in the number of postdoctoral and postgraduate awards, which will solve some of the resource issues at more junior levels. However, we note there is still a lack of strategy for dealing with the expectations of those in medical research, who hope for a vision for the whole system that is sustainable and has career options.

The committee has been raising the outcomes of a mentoring and skills workshop held early last year for early-career researchers both within the Academy and with NHMRC, Australian Research Council (ARC) and the CSIRO. The argument of the committee that the Cooperative Research Centre conditions be modified so that the community benefit, has been agreed with by government.

The committee has continued to have a close relationship with the NHMRC, and with its chief executive officer, Professor Warwick Anderson, who attended the July meeting. Many of the points that were made concerning funding, mentoring, misconduct, and the relationship between NHMRC and other government agencies were acted upon by Professor Anderson.

The final revised version of the NHMRC and ARC Australian Code for the Responsible Conduct of Research that was issued in 2007 continued to be considered by the committee during 2008. Professor David Vaux FAA, on

behalf of the committee, made a series of recommendations to the NHMRC and ARC that would provide both guidance and an oversight and appeals procedure when misconduct is alleged. We still argue that a national framework is needed to deal with more serious cases of misconduct, and will continue to raise this with Professor Anderson.

The committee notes with pleasure that AusAID, through its principal medical advisor Dr Jim Tulloch, has delivered on its commitment to international medical research programs in our region.

The committee prepared notes for Academy Council to assist with submissions concerning research through the Ministry of Defence (Defence Science and Technology Organisation), concerning NCRIS mapping of strategic infrastructure, and the Senate Inquiry into Academic Freedom.

At the July meeting of the committee, Professors Bob Williamson and Judith Whitworth retired.

Nutrition

Chair: Professor Jennie Brand-Miller

The committee focused on the sharp rise in iodine deficiency in Australia with *A call to action* (www.science.org.au/natcoms/nc-nutrition-iodine.htm) published early in the year. The consequences of iodine deficiency include a fall in Australia's average IQ, a rise in learning difficulties and a fall in the number of gifted individuals. To draw attention to the problem, the committee organised a one-day symposium at the Shine Dome in May in conjunction with the Nutrition Society of Australia and the International Life Sciences Institute Australasia. Food Standards Australia New Zealand subsequently announced mandatory addition of iodised salt in bread. This move alone is unlikely to be sufficient to protect the most vulnerable section of the population: pregnant women and their children. The committee will therefore focus further efforts on the need for population-based nutrition monitoring in Australia.



Photo: Stockport

Bread is to be supplemented with iodine

The committee is also working on the formation of a leadership program in nutrition for young and middle career nutritionists in Australia and New Zealand. One member of the committee, Associate Professor Maria Makrides has liaised with Professor Ricardo Uauy, the president of the International Union of Nutritional Science (IUNS). A one-day session is being organised in Bangkok immediately prior to the IUNS Congress in October 2009.

We are grateful to outgoing committee members Professor Graeme Macintosh and Ms Nola Caffin for their valuable contributions over two terms of office. We are also very grateful to the Academy for their support, particularly to Jeanette Mill, who takes our minutes and keeps us up to date with the Academy's activities.

Physics

Chair: Professor Michelle Simmons FAA

The National Committee for Physics met in February 2009 to plan for the *Investing in the future of physics* ARC Linkage-Learned Academies Special Project (LASP) application for funding in 2009–10 to prepare a decadal plan for physics in Australia. Due to the diversity of the discipline it was agreed that it was important how information was collected for this document. As a consequence, the optical physics group underwent a trial run during 2008 to collate information based on a template sent out via the Australian Optical Society. The committee met again in October ahead of the Australian Institute of Physics biennial congress to discuss the outcomes. The US decadal plan *Physics in a new era* and the Australian ARC report *Physics: A vision for the future* from 1993, were discussed as examples of previous 'strategic plans' in physics.

In September the chair submitted a 20-page ARC LASP application outlining the aims of the decadal plan and requesting funding for a part-time researcher to collate the statistical information for the project.

The committee prepared a one hour briefing at the Australian Institute of Physics biennial congress in Adelaide in the first week of December on the strategic plan. The committee, via the Academy, sponsored 150 lunch boxes on the second day of the congress and the meeting was heavily advertised at the congress with the plans enthusiastically received. The committee outlined a list of 23 subdisciplines, and nominated chairs and sub-chairs of these committees. The meeting of the committee in February instigated the action plan for this process.

The committee has welcomed the appointment of Professor Ron Ekers FAA from Academy Council as an observer to the committee to provide an important link over the next two years.

Plant and animal sciences

Chair: Dr TJ Higgins FAA

The business of the committee in 2008 was dominated by discussion about undergraduate and early postgraduate training of science students. Many disciplines are facing a major shortage of postgraduate students especially those with appropriate training and specific skills. An equally worrying situation was identified with respect to training of students needed for multidisciplinary projects.

The committee worked on preparing a case for the Academy Executive Committee seeking support for the development of a 'Future Biological Map of Australia'.

Radio science

Chair: Professor Andrew Parfitt

National activities

The National Committee for Radio Science hosted the 2008 *Workshop on Applications of Radio Science* (WARS) from 10 to 12 February on the Gold Coast. Forty poster and five keynote presentations were made, and an industry forum held.

The website continues to be an issue for committee, acting as a repository of published material from the WARS meetings (and therefore requiring a stable URL) and needing to be hosted in a location that permits ready updating. The active list of over 800 radio scientists still needs reviewing and updating. It was decided to migrate the current website to the Academy website, mirroring the historical data, but allowing the link to be maintained for archiving and citation purposes, and to update the list of radio scientists in 2009 through the new website.

Discussion continued on the creation of the Christiansen Medal, and to establish a medal and travel award to the WARS conference as a first step towards a more substantial award.

International activities

The most significant activity for the committee in 2008 was the triennial General Assembly of the International Union of Radio Science (URSI GA), held in Chicago from 7 to 16 August. There were 19 Australian delegates to the URSI GA, two of whom, Dr JM Le Floch from the University of Western Australia and Dr MA Voronkov from CSIRO, were Young Scientist Awardees. At the assembly Dr Phil Wilkinson was re-elected to the position of Vice-President for the period 2009 to 2011. Membership of the Committee on Data for Science and Technology was presented and the council determined to form a committee to explore data issues in radio science and to evaluate the benefits of membership.

Australian radio science achievements in 2008

Radio science continues to be visible in the Square Kilometre Array (SKA) project, with progress made on the Australian SKA Pathfinder instrument reported at WARS2008 and at the URSI GA.



Image: Paul Bourke, University of Western Australia

Artist's impression of one of the Australian SKA Pathfinder antennas



Photo: CSIRO

View over part of the site being developed for the Murchison Radio-astronomy Observatory

Space science

Chair: Professor Iver Cairns

2008 was a very busy year for the National Committee for Space Science (NCSS). Seven major items are reported here, all in addition to managing Australia's participation in international societies for space science.

First, the draft of the first Decadal Plan for Australian Space Science was released on 29 February for comment. The NCSS made submissions relevant to the decadal plan and Australian space science to the Review of the National Innovation System, the Review of the NCRIS Roadmap, and the defence white paper process. Presentations to COSPAR, the Australian Government Space Forum, Australian Space Development

Conference, Australian Space Science Conference (ASSC), and elsewhere promoted the plan and Australian space science, as did various media interviews and articles.

Discussions on space-based remote sensing or Earth observation have led to agreement on how to include Earth observation in the decadal plan and an explicit joint Academy–ATSE process to do so. The decadal plan is expected to be finalised and released in 2009 in several parts.



Image: Reto Stockli, NASA Earth Observatory

Our planet from space: Ten year plan for Earth observation in progress

The NCSS jointly sponsored and organised, with the National Space Society of Australia, the 2008 ASSC in Canberra. With extensive NCSS input, Australia's new research classification system was released, resulting in multiple new codes and a clear home for space science.

The committee would like to thank its outgoing members – Dr Charlie Barton, Dr David Cole, and Professors Peter Dyson, Brian Fraser and Andrew Parfitt – for their excellent work, and welcomes new members Professor Russell Boyce, Dr Graziella Caprarelli, Dr Alex Held, Professor Fred Menk and Dr David Neudegg.

Muses-C (Task Force of the National Committee for Space Science)

Chair: Professor Trevor Ireland

The Hayabusa spacecraft continues its slow journey back to Earth. At this stage it has a relative velocity of 450 metres per second with respect to Earth and is due back in June 2010.

In early November the Hayabusa Science Team met at the Japan Aerospace Exploration Agency (JAXA) in Sagami-ono. The main issue on the agenda was to cover aspects of the preliminary examination of the returned material. The first goal following return of the capsule will be to ascertain if any material has been collected. The capsule will be opened in a new dedicated facility at JAXA. The facility is equipped to allow cleaning of the outer surfaces in a room set up with a machine shop. The clean side of the facility includes a class 100 laboratory with a large vacuum chamber or clean vessel inside in which the capsule will be opened.

The preliminary examination of any particles will be carried out in Japan. The initial inspection at JAXA will



Image: A. Ikeshita (MEF) ISAS

The Hayabusa spacecraft returns to Earth in 2010

be followed by a period of analysis by two analysis teams. The preliminary examination will cover a range of tasks including particle analysis and composition (major elements), noble gas measurements, oxygen isotope analysis and trace element analysis. As well as Japanese researchers, the science team includes Dr Mike Zolensky (National Aeronautics and Space Administration, Johnson Space Center), Dr Scott Sandford (National Aeronautics and Space Administration, Ames), and Professor Trevor Ireland (Australian National University) who are to be part of the preliminary examination in Japan.

The capsule is scheduled for re-entry on the evening of 12 June 2010, with arrival expected around midnight. Firing of the ion engines in 2009 will allow better calculation of arrival time and the error ellipse of the landing. A Japanese team will be in Australia to recover the capsule and transfer it to Japan. The science team will not be involved in the recovery of the capsule.

International Council for Science

The International Council for Science (ICSU) is a non-governmental organisation representing a global membership that includes both national scientific bodies (116 members) and international scientific unions (31 members).

Through this extensive international network, ICSU provides a forum for discussion of issues relevant to policy for international science and the importance of international science for policy issues and undertakes the following core activities:

- planning and coordinating interdisciplinary research to address major issues of relevance in both science and society;
- actively advocating for freedom in the conduct of science, promoting equitable access to scientific data and information, and facilitating science education and capacity building;
- acting as a focus for the exchange of ideas, the communication of scientific information and the development of scientific standards;
- supporting scientific conferences, congresses and symposia all around the world; and
- producing a wide range of newsletters, handbooks, learned journals and proceedings.

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

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

ICSU also helps create international and regional networks of scientists with similar interests and maintains close working relationships with a number of intergovernmental and non-governmental organisations, especially the United Nations Educational, Scientific and Cultural Organization and the Third World Academy of Sciences.

Because of its broad and diverse membership, the Council is increasingly called upon to speak on behalf of the global scientific community and to act as an advisor in matters ranging from ethics to the environment.

ICSU has also established regional offices in Africa, the Arab region, Asia and the Pacific, and Latin America and the Caribbean. Their goal is two-fold. Firstly they should enhance participation of scientists and scientific organisations from the region in ICSU's research and policy activities. Secondly, 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 hemisphere and north-south hemisphere global collaboration. Professor Jenny Graves FAA completed her term as a member of the Committee of the Asia and the Pacific Regional Office at the end of 2008. Professor Bruce McKellar FAA has been appointed a member of this committee from 2009 to 2011.

The Australian research community is well represented internationally with 26 Australian researchers on the executive committees of the 31 international scientific unions. Among these there are five Australian Presidents and nine Vice-Presidents or Vice-Chairs, as listed in the table below.

| Scientific organisation | Office holders | Office |
|---|---|---|
| International Geosphere Biosphere Programme | Dr Mark Stafford Smith | Vice-Chair |
| World Climate Research Programme | Dr David Griggs | Vice-Chair |
| ICO –optics | Professor Min Gu FAA Professor John Love | Vice-President Vice-President |
| IGU – geography | Professor Ruth Fincher | Vice-President |
| INQUA – Quaternary research | Professor Allan Chivas | President |
| IUBS – biological sciences | Professor John Buckeridge | President |
| IUCR – crystallography | Professor Peter Colman FAA | Vice-President |
| IUGG – geodesy and geophysics | Dr Tom Beer | President |
| IUIS – immunology | Professor Peter Doherty FAA | President |
| IUPAP – pure and applied physics | Professor Bruce McKellar FAA | Vice-President |
| IUPHAR – pharmacology | Professor Donald J Birkett | Vice-Chair (clinical pharmacology division) |
| SCOSTEP – solar terrestrial physics | Professor Bob Vincent FAA | President |
| URSI – radio science | Dr Phil Wilkinson | Vice-President |

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:

- International Botanical Congress, Melbourne, 2011
- International Union of Geodesy and Geophysics XXV General Assembly, Melbourne, 2011
- International Geological Congress, Brisbane, 2012

Delegates

The Academy appoints delegates to the business meetings of ICSU's bodies, after advice is sought from the national committees. Delegates for 2008 are listed here:

| Union/conference | Date | Location | Delegate names |
|--|---------------|-----------------------|------------------------------|
| International Council for Science | 13–25 October | Maputo, Mozambique | Professor Bruce McKellar FAA |
| Scientific Committee on Antarctic Research | 14–16 July | Moscow, Russia | Professor Bob Vincent FAA |

| Union/conference | Date | Location | Delegate names |
|---|--------------------|---------------------------|--|
| International Union for Pure and Applied Biophysics | 4 February | Long Beach, California | A/Professor Brett Hambly Professor Cris dos Remedios |
| International Union of Microbiological Sciences | 5–9 August | Istanbul, Turkey | A/Professor David Ellis Dr Tuck Weng Kok Professor Harold Stokes |
| IXth World Conference of Clinical Pharmacology and Therapeutics | 27 July – 1 August | Quebec, Canada | Dr Rebecca H Ritchie Professor Andrew Somogyi |
| International Union of Crystallography 21st General Assembly | 23–31 August | Osaka, Japan | Professor Mitchell Guss Professor Jenny Martin Dr Stephen Wilkins |
| Committee on Data for Science and Technology | 9–10 October | Kyiv, Ukraine | Dr Ray Norris |
| International Union of Geological Sciences | 6–14 August | Oslo, Norway | Mr Paul Kay Dr Ian Lambert Mr David Mason Professor Paulo Vasconcelos Dr Neil Williams |
| International Geosphere–Biosphere Programme Congress | 4–9 May | Cape Town, South Africa | Dr Roger Gifford |
| Scientific Committee on Oceanic Research | 22–24 October | Woods Hole, Massachusetts | Dr John Volkman |
| International Geographical Union | 12–15 August | Tunis, Tunisia | Professor Lesley Head Professor Margaret Roberston Professor Nigel Tapper |
| Eleventh International Congress on Mathematics Education | 6–13 July | Monterrey, Mexico | A/Professor Judy Mousley |
| International Congress for Theoretical and Applied Mechanics | 24–30 August | Adelaide, Australia | Professor Ernie Tuck FAA A/Professor Jim Denier |
| International Union of Pure and Applied Physics 26th General Assembly | 13–18 October | Tsukuba, Japan | Professor Michelle Simmons FAA |
| International Commission for Optics | 7–10 July | Sydney, Australia | Professor Kenneth Baldwin Professor Min Gu FAA Professor Keith Nugent FAA |
| International Union of Radio Science | 9–16 August | Chicago, USA | A/Professor Vitas Anderson Dr David de Boer Dr John O'Sullivan Professor Andrew Parfitt Professor Michael Tobar Dr Phil Wilkinson |
| COSPAR | 13–20 July | Montreal, Canada | Professor Iver Cairns |

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.

IAP programs involve interdisciplinary activities and studies on critical issues related to science and technology. IAP hopes to broaden its agenda by serving as a hub of activities for science academies interested in gaining a greater public presence within their nations and regions. IAP, to this end, organises international conferences, sponsors workshops, issues statements, and serves as a forum for the exchange of ideas and experiences among academies. The 2008 and 2009 science agenda addresses the following themes:

- capacity building for young academies;
- science education;
- water research and management;
- biosecurity;
- digital knowledge resources and infrastructure in developing countries; and
- natural disaster mitigation.

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

The Academy has been involved in the IAP Science Education Program, led by the Chilean Academy of Sciences, due to its expertise in science education. In 2008 the Academy was successful in attracting funding from IAP for the primary education project *Primary Connections: Linking science with literacy* which is expected to foster collaborations with Asian countries.

Professor Kurt Lambeck attended the IAP executive committee meeting hosted by the Academies of Arts, Humanities and Sciences of Canada, in Ottawa on 8 and 9 September, and the IAP executive committee meeting held in Amsterdam, from 22 to 25 March. Professor Lambeck is also chair of the IAP publications and public relations committee that oversaw the publishing of a special 15th anniversary celebration publication containing the eleven statements that the IAP has produced since 1993 (www.interacademies.net/Object.File/Master/8/487/IAP%20StatementsPRINT-1.pdf).

The Academy has been elected to the Board of the InterAcademy Council (IAC) for the term 2009 to 2013. The IAC produces reports on scientific, technological, and health issues related to the great global challenges of our time, providing knowledge and advice to national governments and international organisations.

The 18 member IAC is composed of the presidents of 15 academies of science and equivalent organisations and representatives of the IAP of scientific academies, the International Council of Academies of Engineering and Technological Sciences and the InterAcademy Medical Panel of medical academies.

The IAC secretariat is hosted by the Royal Netherlands Academy of Arts and Sciences in Amsterdam, The Netherlands.

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 objective.

A portion of the Academy's bilateral activities is funded as part of the Australian Government Department of Innovation, Industry, Science and Research's International Science Linkages – Science Academies Programme. The Academy organised a series of scientific symposia that were conducted in Australia and overseas and focused on current topical global issues. To facilitate a wide dissemination of the information gained from these workshops the publications and presentations have been posted on the Academy's website.

Asia

China

An international workshop, Soil–Plant Interactions and Sustainable Agriculture in Arid Environments, was held in Shihezi, Xinjiang, China from 11 to 18 July. This was an outcome of the China–Australia Symposium on Sustaining Global Ecosystems organised by the Academy, ATSE and the Chinese Academy of Sciences in Beijing in August 2007.

The workshop had strong representation from Australia, with selected delegates from other countries who have relevant arid-zone research links in China, such as Germany, Israel, Japan and Serbia. The chair of the workshop was Professor Yongchao Liang, Key Laboratory of Oasis Eco-agriculture at Shihezi University. The international organising committee was chaired by Professor Hans Lambers from the University of Western Australia, with Professor Andrew Smith FAA from the University of Adelaide as co-chair. Both were delegates in Beijing in 2007. The meeting covered:

- biochemical and microbial processes of nutrient cycling in soil–plant systems;
- water transport mechanisms and water management in arid ecosystems;
- physiological and molecular mechanisms of plant adaptation to stressful environments; and
- nutrient and metal bioavailability in agro-ecosystems.

Selected articles stemming from the workshop will be published in the international journal *Plant and Soil*.

China–Australia symposium on remote sensing technologies and sustainability

The Academy and ATSE, on behalf of the Australian Department of Innovation, Industry, Science and Research organised the China–Australia Symposium on Remote Sensing Technologies and Sustainability in Canberra, on 24 and 25 November.

This symposium is the fifth in a series of high-level annual symposia to be conducted with the Chinese Academy of Sciences (<http://english.cas.ac.cn/>). In addition to bringing together leading scientists from both economies to increase research linkages, strategic partnerships formed through participation in these symposia have provided a valuable avenue for the training and exchange of young scientists, and the sharing of expertise and facilities between the two countries.

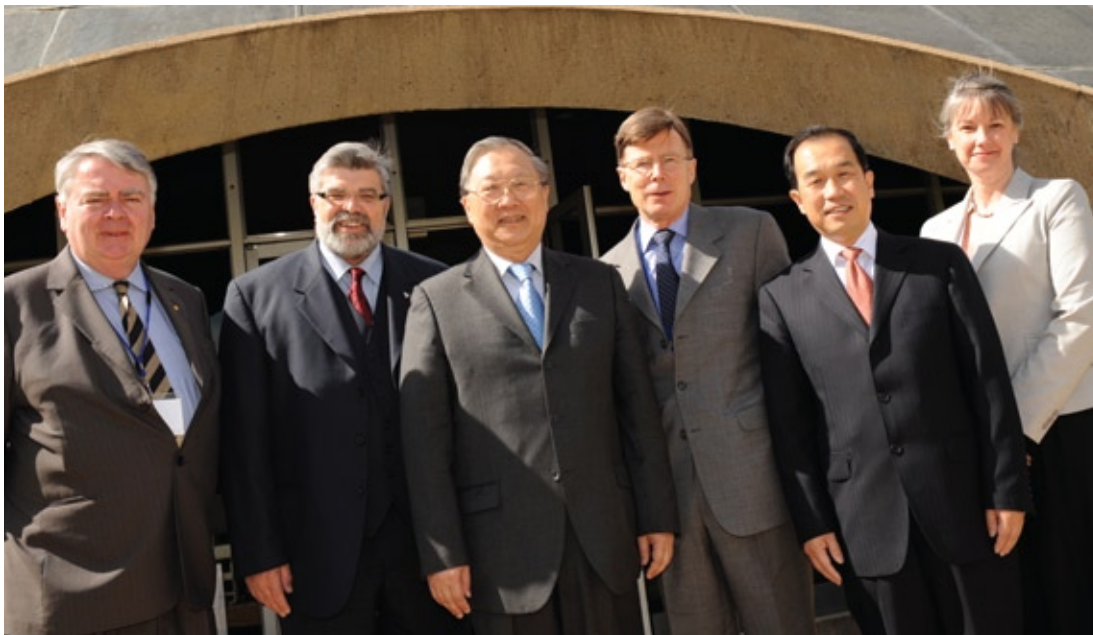


Image: © ID Photographics

Australia–China symposium conveners and guest speakers

Approximately fifty Chinese and Australian invited participants explored collaborative opportunities during plenary discussions and in four breakout workshops in the areas of energy and mineral exploration; land management and agriculture; water resources; and natural disaster and environmental change.

The Chinese delegation was led by Professor Yongxiang Lu, President of the Chinese Academy of Sciences and also Vice-Chairman of the standing committee of the National People's Congress. The Australian conveners were Professor Kurt Lambeck and the Vice-President of ATSE, Mr Peter Laver.

Senator the Hon Kim Carr, Minister for Innovation, Industry, Science and Research, spoke at the opening of the symposium and Professor Penny Sackett, Australia's Chief Scientist, was the dinner speaker on the first evening of the event. The program and abstracts are available from www.science.org.au/events/australiachina/2008.

Chinese Academy of Sciences symposium, Beijing

Professor Kurt Lambeck was invited by the Chinese Academy of Sciences to attend the Academy, Research Institution and National Innovation System symposium in Beijing from 12 to 14 November. Professor Lambeck gave a presentation, *Role of the Australian Academy of Science in development of a national innovation policy*, in which he spoke of the role that academies can play in developing and implementing a national innovation system. The speech is available from www.science.org.au/events/speeches.htm.

Indonesia

The Academy organised on behalf of the Department of Innovation, Industry, Science and Research (DIISR) the Joint Australia–Indonesia Workshop on Human Health, Including Infectious Diseases, which was held at

the Indonesian Ministry for Research and Technology (RISTEK) on 14 and 15 April 2008. The workshop was jointly sponsored by DIISR and RISTEK. The program was organised by the Academy and the Eijkman Institute for Molecular Biology with the assistance of the Australian Embassy in Jakarta and RISTEK. The workshop followed the previous successful Australian–Indonesian joint symposia in science and technology in 2006 and 2007. The joint working group agreed to enhance collaboration between Australian and Indonesian researchers initially in four priority areas, the first of which was human health.

The program for the 2008 workshop was developed to ensure that the some of the research needs and interests of both countries were covered. Topics included emerging infectious diseases and biosecurity, health issues related to asthma and smoking, hepatitis virus, human avian influenza, H5N1 in poultry and vector-borne diseases.

The convener of the Indonesian delegation was Professor Sangkot Marzuki, Director of Eijkman Institute for Molecular Biology in Jakarta, and the convener of the Australian delegation was Professor John S Mackenzie, Premier’s Fellow and Professor of Tropical Infectious Diseases at Curtin University of Technology in Perth.

The workshop aimed to promote access to and participation by Australian researchers in this strategically-focused meeting and to increase strategic alliances between researchers from Australia and Indonesia. Twenty four Australian and Indonesian researchers participated in the meeting. Close to 70 other Indonesian scientists from a number of research organisations also attended. Dr Teguh Rahardjo, Deputy Minister at the State Ministry of Research and Technology, and the Australian Ambassador, His Excellency Bill Farmer, spoke at the opening session of the workshop.

It is expected that a number of joint proposals for collaborations between Australian and Indonesian researchers will develop as an outcome of this meeting.

Japan

The 5th annual meeting of the Science and Technology in Society Forum was held in Kyoto, from 5 to 7 October and was attended by Professor Kurt Lambeck. Over 750 leading scientists, policy makers, business executives and media leaders gathered from 91 countries to discuss science and technology issues of the 21st century. The forum is an important venue for learning about and discussing the latest developments in science and technology, and how they affect human society.

Korea

The Australia–Korea Foundation provided funding to the Academy and ATSE to manage an exchange program for early-career scientists to undertake research for up to three months in Australia and Korea. Two Koreans and five Australian researchers participated in this activity in June. The program provided an opportunity for researchers to access equipment and expertise, exchange data, collaborate in joint publications, and establish long term collaborations between institutions. The visits also provided valuable cultural experiences for all involved which enhanced opportunities to conduct future research with their counterpart colleagues.

Pakistan

The Pakistani High Commissioner, His Excellency Mr Jalil Abbas Jilani, paid a courtesy call to the Academy on 25 July. He met with the Foreign Secretary, Professor Jenny Graves FAA, to discuss possible bilateral activities through the Academy and the Pakistan Academy of Sciences. Australia



Photo: Nancy Pritchard

Jenny Graves with His Excellency Mr Jalil Abbas Jilani, High Commissioner of Pakistan

already supports research and institutional linkages to boost Pakistan's agricultural productivity through the Australian Centre for International Agricultural Research related activities.

Taiwan

On 31 July Professor Jenny Graves met with Ms Alice Cawte, the Representative designate to the Australian Commerce and Industry Office in Taipei. Professor Graves discussed Academy activities with Taiwan, particularly the fruitful collaborations with the National Science Council of Taiwan for the past eighteen years.

The Academia Sinica (the National Academy of Taiwan) extended an invitation to Professor Lambeck to participate in an Academy Presidents' Forum to discuss how national science academies can drive knowledge-based development. The meeting was held in Taipei from 6 to 8 December. At the forum, Professor Lambeck gave a presentation, *How should modern science academies be structured to best drive knowledge-based development?* The speech is available from www.science.org.au/events/speeches.htm.

The Taipei Economic and Cultural Office in Australia and the National Science Council of Taiwan also put together a program of visits for Professor Lambeck which included a meeting with the Deputy Minister of the National Science Council, Dr Wen-Chang Chang, and visits to the National Center for Research on Earthquake Engineering and the Department of Geosciences of the National Taiwan University.

Federation of Asian Scientific Academies and Societies

Professor Jenny Graves attended the 2008 Federation of Asian Scientific Academies and Societies (FASAS: www.interacademies.net/?id=4273) council meeting on 15 October and the 2nd International Conference on Science Education in Asia and the Pacific on 16 October hosted in Ankara by the Turkish Academy of Sciences. Professor Graves gave a presentation on the Academy's primary science program *Primary Connections*. Representatives from seven other academies also presented on science education activities in their respective countries, ranging from pre-school to tertiary level programs.

During these events, FASAS and the Association of Academies of Sciences in Asia took the opportunity to sign a memorandum of understanding to undertake joint activities in areas such as science education and energy.

Americas

Brazil

The Australia–Brazil Workshop on Biotechnology Innovations for Agriculture was held at the Brazilian Agricultural Research Corporation (EMBRAPA: www.embrapa.br/english) in Brasilia, from 5 to 7 May. The workshop was organised by the Academy (on behalf of DIISR) and EMBRAPA with assistance from the Australian Embassy in Brazil. The aim of the workshop was to identify strategic and collaborative opportunities, especially on gene discovery, genomic, proteomic and metabolomic analysis, bioinformatics, protein structure/function and nanobiotechnology, to:

- establish joint R&D and training programs;
- facilitate bilateral exchange of germplasm and products; and
- develop new bioproducts, novel crop varieties and biofuels.

The Australian convener of the workshop was Dr Liz Dennis FAA, CSIRO Fellow at CSIRO Plant Industry. The Brazilian convener was Dr Mauro Carneiro of EMBRAPA Genetic and Biotechnology Resources. A total of 20 Australian and Brazilian researchers presented at the workshop, and an additional 50 Brazilian scientists also attended the meeting.

Dr Silvio Crestana, President of EMBRAPA, the Australian Ambassador to Brazil His Excellency Mr Neil Mules, Minister Hadil da Rocha Vianna, Director of the Department for Scientific and Technological Affairs of the Ministry of External Relations of Brazil, and Dr Jose Oswaldo Siqueira, Director of the National Council for

Scientific and Technological Development, spoke at the plenary session.

Site visits were also organised to EMBRAPA institutes as well as to the University of Sao Paulo agricultural campus in Piracicaba.

The workshop provided a strong basis for good technical cooperation projects with EMBRAPA researchers and an opportunity to establish excellent links with other Australians from the delegation.

East Asia and Pacific Summer Program for US Graduate Students

For the past five years the Academy and the US National Science Foundation have conducted a joint program that enables twenty US graduate students in science and engineering to visit Australia between June and August each year for a period of eight weeks during the American summer, to undertake research in laboratories and to initiate personal relationships with their Australian counterparts.



Image: Meaghan O'Brien

Graduate students from the USA participating in the summer program

This activity is funded by the DIISR's International Science Linkages program. The host research institutions such as universities, CSIRO and museums, provide the students with office accommodation, access to laboratory, library and computing facilities, as well as technical assistance and the time and expertise of the host researcher.

For the 2008 program, the Academy organised a series of lectures and site visits to research and cultural institutions as part of an orientation session for the US students in Canberra from 16 to 18 June 2008, after which the students travelled to their host institutions to undertake research projects.

Europe

Australian–European Commission Joint Science and Technology Cooperation Committee (JSTCC) meeting

Dr Sue Meek, the Academy's Chief Executive, was part of the Australian delegation that participated in the Australian–European Commission JSTCC meeting held in Brussels on 29 and 30 September. The Australian delegation was led by Mr Mark Paterson, Secretary of DIISR. Other delegates included the heads of the Australian Research Council and the NHMRC. Discussions focused on current Australian participation in European Commission (EC) programs such as COST Actions and the International Research Staff Exchange Scheme as well as potential future programs between the EC and Australia.

France

French Embassy Cotutelle program

On behalf of the French Embassy the Academy administers the Cotutelle postgraduate fellowships program that operates in Australia and France. Cotutelle PhD students work under the direction and responsibility of a thesis supervisor in two institutions. Each project is established under a reciprocal arrangement. A 'Cotutelle convention' binds the two partner institutions and recognises the validity of the studies undertaken. If successful, a double-badged degree is awarded to the student.

The Cotutelle program, designed to enhance two-way international research collaboration, began in Australia in 1997. The Academy has been administering the program since 2002.

Australia–Italy Award

This award was set up with the proceeds from the sale of the book *What if they Never Existed*, written by Dr Nicola Sasanelli, Science and Technology Counsellor at the Embassy of Italy in Canberra. The award also has the financial support of the Academy and is aimed at recognising excellence in research cooperation between Australia and Italy and to foster further research activity among PhD students and early postdoctoral researchers.

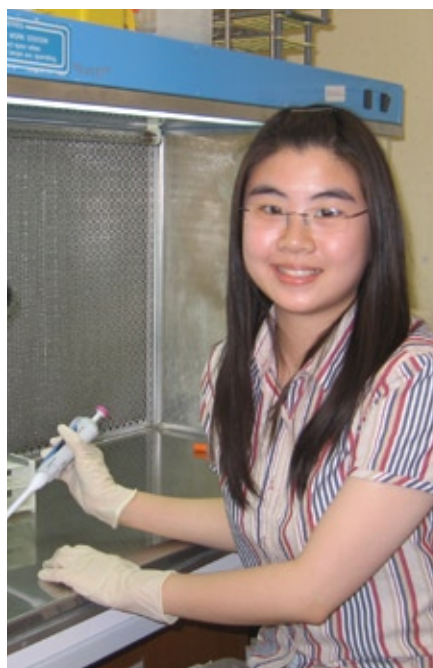
On 5 November at the State Library of South Australia, Professor Bob Vincent FAA, chair of the Academy's South Australian Regional Group announced the successful applicants of this scheme. In Australia, awards went to Dr Luka Pravica from the Department of Physics at the University of Western Australia, who will visit the Institute of Inorganic Methodologies and Plasmas, at the National Research Council in Rome, and Mr Tsung Li from the Department of Engineering at the Australian National University, who will be hosted by Dr Mario Tucci of the Photovoltaic R&D Laboratories at the ENEA Casaccia Research Centre, also in Rome.

In Italy, awards were granted to Dr Marco Martorella from the Department of Information and Engineering at the University of Pisa, who will visit Professor Bevan Bates at the School of Electrical and Electronic Engineering at the University of Adelaide, and Dr Tiziana Stomeo from the National Nanotechnology Laboratory of CNR-INFN in Lecce, who will be hosted by Professor Laurie Faraone of the Centre for Semiconductor Optoelectronics and Microsystems at the University of Western Australia.

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

The Adam J Berry Memorial Fund is managed on behalf of the Berry family by the Academy and the US National Institutes of Health Foundation. It 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 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.

Professor Jonathan Stone FAA chairs a special committee that assesses and recommends suitable candidates for this award. The 2009 recipient is Jacqueline Leung, a PhD student at the Menzies Research Institute of the University of Tasmania. Funding provided will assist Jacqueline to travel to the National Institute of Child Health and Human Development, Nervous System Development and Plasticity Section. She will learn an advanced in vitro tissue culture system to further studies on the action of the neuroprotective protein after injuries to the central nervous system.



Jacqueline Leung

Other international activities

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. Since 1997 Australians and Europeans have collaborated on more than 300 projects with an approximate value of almost €1.8 billion. 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, 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 (FEAST) cooperation.

FEAST and the French Embassy in Canberra hosted a one-day roundtable at the Academy's Shine Dome, on 12 November, for industrialists, policy-makers and academic researchers to meet and consider options to intensify French–Australian cooperation in low emission energy and water technologies. In addition to raising awareness and networking, a key output was a draft agenda for French–Australian cooperation over affordable low emission energy and water solutions.

Diplomatic missions

The Academy maintains close links with Australian mission overseas and the Science Counsellor based at the Australian Embassy in Brussels, Katharine Campbell, currently Australia's only Science Counsellor based at an Australian Embassy.

In the same way, the Academy maintains fruitful relations with many foreign embassies in Canberra, including the missions from France, Germany, Italy, United Kingdom, China, Japan and Taiwan.

Bilateral science and technology cooperation between Australia and South Africa

Australia and South Africa signed a bilateral science and technology cooperation agreement in October 2006. The first meeting of a Joint Science and Technology Coordination Committee (JSTC) to initiate the agreement was held in Cape Town in February, timed to coincide with one of a series of international fora on the Square Kilometre Array (SKA) telescope project.

The JSTC meeting was organised jointly by the Australian Government Department of Industry, Innovation, Science and Research and South Africa's Department of Science and Technology. Its purpose was to build relationships between the two countries by identifying other possible areas of mutual interest.



Sue Meek (centre front) with members of the ASSAF secretariat

Photo: Patsy Sholtz

The Chief Executive, Dr Sue Meek, was invited to be a member of the Australian delegation and, as a prelude to the JSTC meeting, met with the President of the Academy of Science South Africa (ASSAf), Professor Robin Crewe, and visited the ASSAf secretariat in Johannesburg where she received a detailed briefing on the activities of that academy.

The JSTC identified a number of possible areas of cooperation that will be further developed, including a workshop/visit program proposed jointly by ATSE and the Academy on the theme of low-carbon energy technologies.

Further information
about international
programs is available at:
[www.science.org.au/
internat](http://www.science.org.au/internat)

Support for international collaborations

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

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

There are four types of international programs: short-term visits to Europe, North America or Asia, and long-term postdoctoral fellowships. The programs support collaborative research between 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.

The programs are part of DIISR's International Science Linkages – Science Academies Programme and provide funds for living and travelling costs. The French Embassy continues to generously provide travel funds for six Australian grant recipients selected to visit France under the Academy's Europe program.

Full details of all programs are available at www.science.org.au/internat/programs.

The following researchers were supported in 2008–09:

Asia

China

| Researcher | Project | Host institution(s) |
|---|--|---|
| Dr Susan Fuller Queensland University of Technology | Russian wheat aphid invasion. | Professor Le Kang Institute of Zoology Chinese Academy of Sciences |
| Dr Weimin Gao Deakin University | Micro system and its functional formulation for direct energy conversion. | A/Professor Changfeng Yan Guangzhou Institute of Energy Conversion Chinese Academy of Sciences |
| Dr Baohong Hou Primary Industries and Resources South Australia | Development of new techniques to model and interpret data from integrated geoscientific technologies in exploration for mineral resources. | Professor Kezhang Qin Institute of Geology and Geophysics Chinese Academy of Sciences Professor Xianrong Luo Guilin University of Technology |

| Researcher | Project | Host institution(s) |
|---|---|---|
| Professor Keith Jones University of Newcastle | Beijing–Newcastle collaboration in oocyte cell and molecular biology. | Professor Qing Yuan Sun Institute of Zoology Chinese Academy of Sciences |
| Dr John Keesing CSIRO Marine Research | Study of impacts on benthic habitats of intensive use of the coastal ecosystem in north eastern China in relation to similar Australian ecosystems which are subject to increasing human usage. | Professor Dongyan Liu Yantai Institute of Coastal Zone Research for Sustainable Development Chinese Academy of Sciences Professor Xinzheng Li Institute of Oceanology Chinese Academy of Sciences |
| Dr Weihua Li University of Wollongong | Sensing and actuating capabilities of magnetorheological elastomers. | Professor Xinglong Gong University of Science and Technology of China Chinese Academy of Sciences |
| Professor David Shum Griffith University | Prospective memory in individuals with schizophrenia and schizotypal personality features: an event-related potential analysis. | Professor Raymond Chan Institute of Psychology Chinese Academy of Sciences |
| Dr Bing Zhang Department of Primary Industries and Fisheries | Develop real time PCR assays applicable for identification and differentiation of Babesia spp. | Professor Guangxiu Liu Cold and Arid Regions Environment and Engineering Research Institute Chinese Academy of Sciences Professor Hong Yin Lanzhou Veterinary Research Institute Chinese Academy of Agricultural Science |

Japan Society for the Promotion of Science bilateral programs

| Researcher | Project | Host institution(s) |
|---|---|--|
| Dr Ian Bally Queensland Department of Primary Industries and Fisheries | Developing molecular markers for mango. | Dr Chitose Honsho University of Miyazaki Dr Shinya Kanzaki Kinki University Professor Keizo Yonomori Kyoto University |

| Researcher | Project | Host institution(s) |
|---|---|--|
| Dr Zhenxiang Cheng University of Wollongong | Raman and XPS study of the modified novel multiferroic bismuth ferrite thin films. | Professor Hideo Kimura National Institute for Materials Science Dr Minoru Osada National Institute for Materials Science |
| Dr Peta Clode University of Western Australia | Skeletal growth patterns of scleractinian corals. | Dr Kotaro Shirai University of Tokyo |
| Professor Eugene Gamaly Australian National University | Interaction of ultra-short laser beam tight-focused inside a transparent dielectric: controllable moderate and extreme modification of material properties. | Professor Dmitri Goldberg National Institute for Materials Science Professor Hiroaki Misawa Hokkaido University A/Professor Saulius Juodkazis Hokkaido University |
| Dr Xiwen Guan Australian National University | Thermodynamic and magnetic properties of multi-component interacting Fermi gases of ultra-cold atoms. | Professor Atsuo Kuniba University of Tokyo Professor Masaki Oshikawa University of Tokyo |
| Dr Ralf Huuck National ICT Australia | Software bug detection in multi-core embedded devices. | Dr Cyrille Artho National Institute of Advanced Industrial Science |
| Professor Richard Keene James Cook University | Design of catalysts for multi-electron reduction of carbon dioxide. | Professor Yoshihisa Inoue Osaka University Professor Osamu Ishitani Tokyo Institute of Technology |
| Dr Mahinda Kuruppu Curtin University of Technology | Influence of water vapour pressure in fracture toughness of rock. | Professor Yuzo Obara Kumamoto University |
| A/Professor Junwei Lu Griffith University | High performance computing and visualisation technologies for electromagnetic compatibility (EMC) computer. | A/Professor Takeshi Iwashita Kyoto University Professor Sotoshi Yamada Kanazawa University |
| A/Professor Wenny Rahayu La Trobe University | Distributed ontologies reuse, contextualisation and strategic maintenance in a semantic grid environment. | A/Professor Bernady Apduhan Kyushu Sangyo University |
| Dr David Taniar Monash University | High performance parallel processing for semantic grid. | A/Professor Bernady Apduhan Kyushu Sangyo University |

| Researcher | Project | Host institution(s) |
|---|---|--|
| Dr Carden Wallace Queensland University of Technology | High latitude reef corals of Australia and Japan: comparison of species diversity, molecular biology and response to global climate change. | Dr Hironobu Fukami Kyoto University |

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

| Researcher | Project | Host institution(s) |
|---|---|---|
| Dr Timothy Baldwin University of Melbourne | Domain tuning of preprocessors for information extraction in the biomedical domain. | Professor Junichi Tsujii University of Tokyo |
| Professor Hubert Chanson University of Queensland | Turbulence and turbulent mixing in estuarine zones and shallow- water bays. | Professor Shinichi Aoki Toyohashi University of Technology |
| Professor Cristobal dos Remedios University of Sydney | A functional analysis of the ageing human heart by the spontaneously oscillatory contraction (SPOC) technique using frozen human heart myofibrils. | Professor Shinichi Ishiwata Waseda University |
| Professor Mark Humphrey Australian National University | Electroabsorption studies of multimetallic complexes with multipolar charge distributions. | Dr Takashi Isoshima RIKEN (The Institute of Physical and Chemical Research) |
| Professor David Jans Monash University | Regulation of nuclear transport in health and disease. | Professor Yoshihiro Yoneda Osaka University |
| Dr Christopher McSweeney CSIRO Livestock Industries | Microbial ecology of hydrogenotrophic rumen microorganisms in response to methane inhibitors. | Dr Makoto Mitsumori National Institute of Livestock and Grassland Science |
| Professor Michael Negnevitsky University of Tasmania | Soft computing with practical applications in power industry. | Professor Kaoru Hirota Tokyo Institute of Technology |
| Dr Steve Swain CSIRO Plant Industry | Regulation of plant hormone levels in developing fruits in response to seed set. | Dr Shinjiro Yamaguchi RIKEN (The Institute of Physical and Chemical Research) |

Japan Society for the Promotion of Science Postdoctoral Fellowships

| Researcher | Project | Host institution(s) |
|--|---|---|
| Dr Matthew Flood Department of Agriculture, Fisheries and Forestry | Improving welfare of farmed salmonid fish through behavioural investigation and use of self feeders. | Professor Mitsuo Tabata Teikyo University of Science and Technology |

| Researcher | Project | Host institution(s) |
|---|--|--|
| Dr Jillian Healy Deakin University | Investigation of the model of ion uptake in the esophagus of the euryhaline eel, <i>Anguilla japonica</i> . | Professor Yoshio Takei Ocean Research Institute |
| Mr Darryl Jones Flinders University | Molecular frame electron momentum spectroscopy. | Dr Masahiko Takahashi Tohoku University |
| Mr Santhosh Kumar Australian National University | Experimental investigations of anomalous heating during magnetic reconnection. | Professor Yasushi Ono University of Tokyo |
| Dr Elena Kupriyanova University of Adelaide | Species composition and distribution of serpulid polychaetes reported from both Australia and Japan. | A/Professor Eijiroh Nishi Yokohama National University |
| Mr Hao Wen Lin University of South Australia | Development of an intelligent manufacturing information system for Australian manufacturers using advanced Japanese manufacturing management technologies. | Dr Tomohiro Murata Waseda University |
| Mr Simon Mathew Flinders University | Improving cytotoxicity and tumour selectivity of photodynamic therapeutics through multifunctional macromolecular design. | Professor Dr Hiroshi Imahori Kyoto University |
| Mr Terry Rose University of Western Australia | Investigation into physiological mechanisms and molecular biology of P-deficiency tolerance in rice. | Dr Matthias Wissuwa Japan International Research Center for Agricultural Sciences |
| Dr Nicholas Shepherd University of Queensland | Catalytic, asymmetric synthesis of highly substituted 1,2-diaminoacetate derivatives. | Professor Masakatsu Shibasaki University of Tokyo |

Korea

| Researcher | Project | Host institution(s) |
|--|--|--|
| Dr Duk Yong Choi Australian National University | Fabrication of nanophotonic structures by e-beam lithography. | Professor Yong Hee Lee Korea Advanced Institute of Science and Technology |
| A/Professor Richard Lai La Trobe University | Developing a method for estimating the system-level size of a component-based software system. | Professor Kyo Chul Kang Department of Computer Science and Engineering |

| Researcher | Project | Host institution(s) |
|---|---|--|
| Dr Gianluca Ranzi University of Sydney | Behaviour of restrained composite steel-concrete floor beams at elevated temperatures. | Professor Sang Hyo Kim Yonsei University Dr Hyun Joon Shin Korea Institute of Construction Technology |
| Professor Richard Speare James Cook University | Providing evidence for the management of the serious amphibian disease chytridiomycosis in Korean amphibians. | Professor Se Chang Park Seoul National University |

Australia–Korea Foundation Early Korea Researchers Programme

| Researcher | Project | Host institute | Australian mentor |
|--|---|--|---|
| Dr Nathan Faggian University of Melbourne | Magnetic resonance microscopy of the human brain in vivo: a new approach using high-resolution high field magnetic resonance imaging. | Professor Zang-Hee Cho Gachon University of Medicine and Science | A/Professor Gary Egan University of Melbourne |
| Dr Peter King CSIRO Materials Science and Engineering | Mechanism of bonding of cold spray copper particles to an aluminium substrate. | Professor Changhee Lee Hanyang University | Dr Mahnaz Jahedi CSIRO Materials Science and Engineering |
| Dr Sajjad Mahmood La Trobe University | Incorporating business perspective in a component-based system development requirements analysis process. | Professor Kyo Chul Kang Pohang University of Science and Technology | A/Professor Richard Lai La Trobe University |
| Dr Gianluca Ranzi University of Sydney | Behaviour and design of innovative composite steel-concrete systems. | Professor Sang Hyo Kim Yonsei University | Professor Mark Bradford University of New South Wales |
| Dr Sihai Zhou University of Wollongong | Study of MgB ₂ superconductor. | Professor Jaimoo Yoo Korea Institute of Materials Science | Professor Shixue Dou University of Wollongong |

Taiwan

| Researcher | Project | Host institution(s) |
|---|---|--|
| Dr Timothy Payne Australian Nuclear Science and Technology Organisation | Assessment of contaminant retention properties of geologic materials: integration and optimisation of characterisation techniques to facilitate best practice in site selection. | Professor Chin Pan National Tsing Hua University |
| Dr Zhonghua Sun Curtin University of Technology | Optimisation of imaging parameters in digital chest radiography: a comparison of computed radiography and direct radiography. | Dr Cheng Sun Lin Central Taiwan University of Science and Technology |
| A/Professor Paul Taylor University of Melbourne | Molecular mechanisms of chickpea defence to pathogens. | Professor Kai Wun Yeh National Taiwan University |

Europe

Australia–Italy Award 2009

| Researcher | Project | Host institution(s) |
|--|---|---|
| Mr Tsu Tsung Li Department of Engineering Australian National University | Amorphous silicon based films for solar cell applications. | Dr Mario Tucci Photovoltaic R&D Laboratories ENEA Casaccia Research Centre |
| Dr Marco Martorella Dipartimento di Ingegneria dell'Informazione University of Pisa | Multistatic inverse synthetic aperture radar for target classification and recognition. | Professor Bevan Bates School of Electrical and Electronic Engineering University of Adelaide |
| Dr Luka Pravica Department of Physics University of Western Australia | Spectroscopy of biological molecules and resonant two- photon ionisation of atoms and molecules. | Dr Lorenzo Avaldi Institute of Inorganic Methodologies and Plasmas |
| Dr Tiziana Stomeo Distretto Tecnologico-ISUFI Università del Salento | Investigation of AlGaIn/GaN carrier properties for deep-UV sensor applications. | Professor Laurie Faraone WA Centre for Semiconductor Optoelectronics and Microsystems |

Bede Morris Fellowship

| Researcher | Project | Host institution(s) |
|--|---|--|
| Professor Arne Dahle University of Queensland | Shear behaviour of solidifying aluminium alloys. | Professor Michel Suery Science et Ingenierie des Materiaux et Procèdes France |

COST Action

| Researcher | Project | Hosts |
|--|--|--|
| Professor Marek Bialkowski School of Information Technology and Electrical Engineering University of Queensland | Antenna systems for communications and medical applications. | Professor Juan Mosig École Polytechnique Fédérale de Lausanne Switzerland Dr Ian Craddock University of Bristol UK A/Professor Pawel Kabacik Wroclaw University of Technology Poland Professor Mikael Persson Chalmers University of Technology Sweden |
| Dr Pietro Celi Faculty of Veterinary Science University of Sydney | Participation in COST Action FA0702 meeting on maternal interactions with gametes and embryos and discuss future research programs with Dr Fazeli and colleagues. | Dr Alireza Fazeli University of Sheffield UK |
| Dr Naveen Chilamkurti Department of Computer Science and Computer Engineering La Trobe University | An enhanced uplink scheduling scheme for WiMAX based metropolitan area networks. | Professor Apostolos Georgiadis Parc Mediterrani de la Tecnologia Spain |
| Dr Vincent Daria Department of Physics Australian National University | Multi-site non-linear absorption via the modified generalised phase contrast method. | Professor Jesper Gluckstad Technical University of Denmark Denmark Professor Monika Ritsch-Marte Medizinische für Physiologie und Medizinische Austria Professor Francesco Simoni Universita Politecnica delle Marche Italy |
| A/Professor Mark Dowton Department of Biology University of Wollongong | Understanding the inheritance of the mitochondrial genome in <i>Globodera pallida</i> . | Dr Vivian Blok Scottish Crop Research Institute UK |
| Ms Lesley Francis Department of Innovative Forest Products, Horticulture and Forestry Science | Evaluating plantation hardwood quality: durability and extractives. | Professor Dr Joseph Gril University Montpellier II France |

| Researcher | Project | Host institution(s) |
|---|--|---|
| Dr Alexander Fuerbach Department of Physics Macquarie University | One dimensional metallic photonic crystals. | Dr Maurizio Ferrari University of Trento Italy A/Professor Kurt Hingerl Johannes Kepler Universität Austria Dr Nigel Johnson University of Glasgow UK |
| Dr Matthew Hayes School of Agriculture and Wine University of Adelaide | Identification of key tartaric acid biosynthetic and storage genes to accelerate breeding of high acid grapevines. | Dr Charles Romieu Institut National de la Recherche Agronomique France Dr Laurent Torregrosa Institut National de la Recherche Agronomique France Professor Serge Delrot Université Bordeaux France |
| Professor Yuri Kivshar Research School of Physical Sciences and Engineering Australian National University | Nonlinear optics and localisation in periodic photonic structures and metamaterials. | Dr Bjorn Maes Ghent University Belgium Professor Marian Marciniak National Institute of Telecommunications Poland |
| Dr Marta Krasowska Ian Wark Research Institute University of South Australia | Influence of electric charge and solid surface hydrophobicity on wetting film stability under static and dynamic conditions. | Professor Kazimierz Malysa Institute of Catalysis and Surface Chemistry Poland |
| Professor Wieslaw Krolikowski Research School of Physical Sciences and Engineering Australian National University | Optical micro-manipulation by nonlinear nanophotonics. | Professor Antonio Sasso Universita di Napoli Federico II Italy |
| A/Professor Cristina Mattinez-Fernandez Urban Research Centre University of Western Sydney | Cities regrowing smaller: fostering knowledge on regeneration strategies in shrinking cities across Europe. | Dr Thorsten Wiechmann Brandenburg University of Technology Germany |
| Dr Gregory Metha Department of Chemistry University of Adelaide | Spectroscopy and chemical reactivity of size-selected metal-carbide clusters. | Professor Ulrich Heiz Technical University Munich Germany |

| Researcher | Project | Host institution(s) |
|---|--|---|
| Professor Phillip Slee Department of Education Flinders University | Cyberbullying: coping with negative and enhancing positive uses of new technologies in relationships in educational settings. | Professor Peter Smith University of London UK |
| Professor Roger Stone Office of the Pro-Vice Chancellor University of Southern Queensland | To participate in COST Action ES0601 and provide Australian input into important climate homogenisation systems developments of value to Australia and COST. | Dr Rob Allen Hadley Centre for Climate Research UK Dr Olivier Mestre Ecole Nationale de la Météorologie France |
| Dr Catherine Whitby Ian Wark Research Institute University of South Australia | Effect of water or wet particles and oil soluble surfactant on the oil–water interface. | Dr Libero Liggieri CNR, Institute for Energetics and Interphases Italy |

French Embassy

| Researcher | Project | Host institution(s) |
|---|--|---|
| Dr Ashley Buckle Monash University | High throughput analysis of autoantigen–antibody interactions using SPR imaging. | Professor Malcolm Buckle Centre National de la Recherche Scientifique France |
| Professor Arne Dahle University of Queensland | Shear behaviour of solidifying aluminium alloys. | Professor Michel Suery Science et Ingenierie des Materiaux et Procédes France |
| Dr Justin Leontini Monash University | Numerical simulation of transitions and instabilities in fluid flow. | Dr Michael le Bars Institut de Recherche sur les Phénomènes Hors Equilibre France |
| Professor Stephen Powles University of Western Australia | Unravelling herbicide resistance evolution and mechanisms in plants. | Dr Xavier Reboud Institut National De La Recherche Agronomique France |
| Dr Andrei Rode Australian National University | X-ray probing of transient state of matter excited by ultrafast laser pulses. | Dr Antoine Rousse Laboratoire d'Optique Appliquée France |

| Researcher | Project | Host institution(s) |
|---|--|--|
| Dr Hala Zreiqat University of Sydney | Engineered articular cartilage using novel composite 3D scaffolds. | Professor Veronique Miggyon Université Paris Nord France Professor Patrick Netter Laboratoire de Pharmacologie et de Physiopathologie Articulaires France |

International Research Staff Exchange Scheme

| Researcher | Project | Host institution |
|--|--|---|
| Dr Luis Mejias Alvarez School of Engineering Systems Queensland University of Technology | International cooperation program for unmanned aerial systems research and development. | Professor Pascual Campoy Cervera Universidad Politecnica de Madrid Spain |
| A/Professor Muthupandian Ashokkumar Department of Chemistry University of Melbourne | Ultrasonic synthesis of protein microcapsules for biomedical applications. | Dr Gareth Price University of Bath UK Dr Francesca Cavalieri University of Rome Tor Vergata Italy |
| Dr Damien Batstone Advanced Water Management Centre University of Queensland | ANAMIX: a two year exchange program on anaerobic mixed cultures to study and improve biological generation of chemicals and energy carriers from organic residues generated by agro-industrial activities. | Professor Jean Philippe Steyer Institut National de la Recherche Agronomique France Dr Robbert Kleerebezem Technical University of Delft The Netherlands |
| Dr Michael Battaglia CSIRO Sustainable Ecosystems | TRANZFOR: transferring research between EU and Australia–New Zealand on forestry and climate change. | Dr Jean Michel Carnus Institut National de la Recherche Agronomique France |
| Dr Shelley Brown Advanced Water Management Centre University of Queensland | ANAMIX: a two year exchange program on anaerobic mixed cultures to study and improve biological generation of chemicals and energy carriers from organic residues generated by agro-industrial activities. | Dr Robbert Kleerebezem Technical University of Delft Netherlands Professor Jean Philippe Steyer Institut National de la Recherche Agronomique France |

| Researcher | Project | Host institution(s) |
|---|--|---|
| Dr Edoardo Daly Department of Civil Engineering Monash University | Study of the impact of changes on rainfall and concomitant replenishment of usable water supplies (eg ground and stream water) given their high priority to any future water resource planning. | Professor Davide Poggi Politecnico di Torino Italy Dr Paolo Perona Eidgenössische Technische Hochschule Zürich Switzerland |
| Professor Michael Dopita Research School of Astronomy and Astrophysics Australian National University | ACCESS: a complete census of star-formation and nuclear activity in the Shapley super-cluster. | Dr Paola Merluzzi Istituto Nazionale di Astrofisica Italy |
| Mr Pillar Eng School of Engineering Systems Queensland University of Technology | Path planning and control for unmanned aircraft forced landing. | Professor Pascual Campoy Cervera Universidad Politecnica de Madrid Spain |
| Dr Biju George Department of Civil and Environmental Engineering University of Melbourne | Impacts of climate change on water security. | Dr Claps Pierluigi Politechnic of Torino Italy |
| Mr Jim Gould CSIRO Sustainable Ecosystems | Application of fire behaviour and fuel management in blue gum (<i>Eucalyptus globulus</i>) plantations. | Dr Francisco Castro Rego Instituto Superior de Agronomia Portugal |
| Professor Paul Lant Advanced Water Management Centre University of Queensland | ANAMIX: a two year exchange program on anaerobic mixed cultures to study and improve biological generation of chemicals and energy carriers from organic residues generated by agro-industrial activities. | Professor Jean Philippe Steyer Institut National de la Recherche Agronomique France |
| Professor Alex McBratney Faculty of Agriculture, Food and Natural Resources University of Sydney | ECOTOOL: improving tools for sustainability assessment in forestry, agriculture and environment technologies: the issue of measuring and monitoring soil quality. | Professor Veronique Bellon-Maurel Montpellier SupAgro France |
| Mr Steven Mills Australian Research Centre for Aerospace Automation Queensland University of Technology | Navigation, guidance and trajectory planning for unmanned aerial vehicles. | Mr Nabil Aouf Cranfield University UK |

| Researcher | Project | Host institution(s) |
|--|---|---|
| Dr Hassan Obied School of Biomedical Sciences Charles Sturt University | Use of nanomaterials for environmental and agricultural applications. | Dr Antonio de Martino University of Naples Federico II Italy |
| Dr Murray Peel Department of Civil and Environmental Engineering University of Melbourne | Basin and large scale floods and water balance modelling. | Professor Günter Blöschl Technische Universität Wien Austria |
| Dr Paul Prenzler School of Agricultural and Wine Sciences Charles Sturt University | Use of nanomaterials for environmental and agricultural applications. | Professor Juan Cornejo Instituto de Recursos Naturalesy Agrobiologia de Sevilla Spain |
| Dr Adam Rennie Department of Mathematics Australian National University | Novel geometric structures. | Professor Tomasz Brzezinski University of Wales UK Professor Piotr Hajac Polish Academy of Sciences Poland |
| Dr Danielle Ryan School of Agricultural and Wine Sciences Charles Sturt University | Use of nanomaterials for environmental and agricultural applications. | Dr Antonio de Martino University of Naples Federico II Italy |
| A/Professor Andrew Western Department of Civil and Environmental Engineering University of Melbourne | Modelling and forecasting of hydroclimatic variables in space and time. | Professor Günter Blöschl Technische Universität Wien Austria |
| Dr Harry Wu CSIRO Plant Industry | Virtual genes. | Dr Leopoldo Sanchez Institut National de la Recherche Agronomique France |

Europe participants 2009–10

| Researcher | Project | Host institution(s) |
|--|---|--|
| Dr David Abdo Department of Fisheries | Hidden diversity in the waters of the western Mediterranean sea. | Dr Mikel Becerro Centre for Advanced Studies Spain |
| Dr Lisa Alleva Australian National University | Establishing an accurate method for quantification of the inflammatory protein high mobility group box 1 (HMGB1). | Dr Reinhard Voll Universität Erlangen-Nürnberg Germany |

| Researcher | Project | Host institution(s) |
|--|---|---|
| Dr Fernando Alonso-Marroquin University of Queensland | 3D discrete element modelling of geological materials: merging molecular dynamics and computational geometry. | Professor Dr Stefan Luding University of Twente The Netherlands Professor Frederic Donze Grenoble Joseph Fourier University France |
| Dr Virginia Best University of Sydney | Auditory grouping and cochlear implants. | Dr Bernhard Laback Austrian Academy of Sciences Austria |
| Dr Helen Blanchard Griffith University | Probing carbohydrate recognition by proteins that are critical in orchestrating disease. | Professor Anne Imberty Centre de Recherches sur les Macromolécules Vegetales France |
| Dr Anna Brooks Southern Cross University | Body perception: neural correlates of gender discrimination. | Professor Olaf Blanke Brain Mind Institute Switzerland |
| A/Professor Michael Brown University of Adelaide | Novel in vivo targeting of dead tumour cells exerts potent bystander killing effects. | Professor Richard Begent Cancer Research UK Targeting and Imaging UK |
| Dr Scott Brown University of Newcastle | Integrating mathematical models of human cognition with neurophysiological data from functional magnetic resonance imaging. | A/Professor Eric-Jan Wagenmakers University van Amsterdam The Netherlands |
| Dr Ashley Buckle Monash University | High throughput analysis of autoantigen–antibody interactions using SPR imaging. | Professor Malcolm Buckle Centre National de la Recherche Scientifique France |
| Dr Conrad Burden Australian National University | Developing practical algorithms for microarray data from physico-chemical models. | Dr Hans Binder Universität Leipzig Germany Dr Enrico Carlom Institute for Theoretical Physics Belgium Professor Simon Tavare University of Cambridge UK |
| Dr Olivier Buzzi University of Newcastle | X-ray micro tomography of natural Australian expansive soils. | Professor Gioachino Viggiani University Joseph Fourier France |

| Researcher | Project | Host institution(s) |
|--|---|--|
| Professor Chris Carter University of Tasmania | Nutrition based strategies for fish meal and oil replacement in aquaculture feeds. | Professor Gro-Ingunn Hemre National Institute of Nutrition and Seafood Norway |
| Professor Arne Dahle University of Queensland | Shear behaviour of solidifying aluminium alloys. | Professor Michel Suery Science et Ingénierie des Materiaux et Procédés France |
| Dr Pierre Dilda University of New South Wales | Identification of cancer patients that will better respond to treatment with GSAO. | Professor Alfonso Pompella University of Pisa Medical School Italy |
| A/Professor Mark Downton University of Wollongong | Tracing evolutionary transitions among the Hymenoptera, using mitochondrial genome sequences. | Professor Birgit Schlick-Steiner University of Natural Resources and Applied Life Sciences Austria Dr Florian Steiner University of Natural Resources and Applied Life Sciences Austria |
| Dr Russell Drysdale University of Newcastle | Developing the capacity in Australia for measuring the isotopic composition of speleothem fluid inclusions for palaeotemperature reconstruction. | Dr Hubert Vonhof Vrije Universiteit Amsterdam The Netherlands |
| A/Professor Qipeng Guo Deakin University | Unique insights into polymer structure using spectroscopic imaging. | Professor Sergei Kazarian Imperial College London UK Dr Geoffrey Moggridge University of Cambridge UK |
| Professor Vadim Kamenetsky University of Tasmania | Application of a single-crystal x-ray and other microbeam techniques to compositions of mantle and crustal fluids included in minerals and glasses. | Professor Leonid Dubrovinsky University of Bayreuth Germany |
| Dr Sergei Kozlov University of Queensland | Recruitment of ATM kinase to the sites of DNA damage induced by heavy ions. | Dr Burkhard Jakob Gesellschaft für Schwerionenforschung Germany |

| Researcher | Project | Host institution(s) |
|---|--|---|
| Dr Kypros Kypri University of Newcastle | Investigation of performance biases in clinical trials of health behaviour interventions. | Dr Jim McCambridge Department of Public Health and Policy UK |
| Dr Bradley Ladewig ARC Centre for Functional Nanomaterials | Platform technologies for the rapid development of high performance nanocomposite membranes. | Professor Suzana Nunes GKSS Research Centre Germany Dr Wilhelm Meulenberg Forschungszentrum Juelich GmbH Germany |
| Dr Justin Leontini Monash University | Numerical simulation of transitions and instabilities in fluid flow. | Dr Michael le Bars Institut de Recherche sur les Phénomènes Hors Equilibre France |
| Dr Mike Manefield University of New South Wales | The role of redox potential in carbon flow in microbial communities. | Dr Tillman Leuders Institute of Groundwater Ecology Germany Dr David Schleheck University of Konstanz Germany |
| Dr Neilson Martin Curtin University of Technology | Educational outcomes for children with attention deficit hyperactivity disorder (ADHD). | Professor Peter Tymms University of Durham UK |
| Professor Dougal McCulloch RMIT University | Developing tools for exploring the nano-world. | Professor David Cockayne University of Oxford UK |
| Adjunct Professor Nunzio Motta Queensland University of Technology | Growth of nanotubes on patterned substrates. | Professor Maurizio de Crescenzi Università di Roma Tor Vergata Italy |
| Dr Simon Moulton ARC Centre of Excellence for Electromaterials Science | Aligned carbon nanotube biomaterial structures. | Professor Eric Anglaret Université Montpellier II France Dr Philippe Poulin Centre de Recherche Paul Pascal France |
| Professor Paul Mulvaney University of Melbourne | Plasmonic superstructures: light coupling and sensing. | Professor Javier de Abajo Instituto de Optica Spain |

| Researcher | Project | Host institution(s) |
|---|---|---|
| A/Professor John Murray University of New South Wales | Identification of mechanisms affecting stability and clearance rates of hepatitis B virions in chronically infected individuals by using the uPA chimera mouse model of infection with hepatitis B viruses. | A/Professor Jorg Petersen Universitätsklinikum Hamburg-Eppendorf Germany |
| Dr Dragomir Neshev Australian National University | Nonlinear photonics, plasmonics and metamaterials. | Professor Thomas Pertsch Friedrich Schiller University Jena Germany |
| A/Professor Graham Nicholson University of Technology Sydney | Developing peptide toxins as biopesticides and therapeutics. | Dr Pierre Escoubas Institute de Pharmacologie Moleculaire et Cellulaire France |
| Professor Stephen Powles University of Western Australia | Unravelling herbicide resistance evolution and mechanisms in plants. | Dr Xavier Reboud Institut National De La Recherche Agronomique France |
| Dr Andrei Rode Australian National University | X-ray probing of transient state of matter excited by ultrafast laser pulses. | Dr Antoine Rousse Laboratoire d'Optique Appliquée France |
| Dr Frances Separovic University of Melbourne | Synchrotron radiation circular dichroism studies of antimicrobial peptides. | Professor Bonnie Wallace University of London UK Professor Anthony Watts University of Oxford UK |
| A/Professor Sergey Shabala University of Tasmania | Revealing mechanisms of osmotic stress signalling by combining MIFE and confocal imaging microscopy techniques. | Professor Stefano Mancuso University of Florence Italy |
| Dr Jan Slapeta University of Sydney | Iron requirements of <i>Chromera velia</i> . | Professor Jean-Michel Camadro Institut Jacques Monod France |
| Dr Daniel Terno Macquarie University | Applications of non-completely positive maps to quantum tomography. | Professor Karol Zyczkowski Jageillonian University Poland |
| Dr Miriam Welgampola Royal Prince Alfred Hospital | Extra-ocular muscles mediating the sound-evoked vestibulo-ocular reflex. | Professor Krister Branterg Karolinska Hospital Sweden |

| Researcher | Project | Host institution(s) |
|--|---|--|
| Dr Duanne White Macquarie University | Novel application of in situ cosmogenic ^{14}C to assess the influence of clast recycling on our understanding of the history of the east Antarctic ice sheet. | Professor Paul Bishop University of Glasgow Scotland |
| Dr Jane Williamson Macquarie University | The impact of ocean acidification on early life history characteristics of marine invertebrates. | Dr Sam Dupont University of Gothenburg Sweden Professor Jon Havenhand University of Gothenburg Sweden |
| Dr Elaine Wong University of Melbourne | Compact VCSEL base-stations for optical-wireless integrated networks. | Professor Markus Christian Amann Technical University of Munich Germany |
| Dr Dong Yang Wu CSIRO Materials Science and Engineering | Develop fundamental understanding on fracture properties and healing mechanism of novel self-healing epoxy systems and their composite laminates for structural applications. | Professor Monika Bauer Fraunhofer Intitute Germany |
| Dr John Zaunders University of New South Wales | Identification of SIV-specific follicular helper T cells in lymph nodes during acute SIV infection in macaques. | Dr Jerome Estaquier Institut National de la Santé et de la Recherche Médicale France |
| Dr Hala Zreiqat University of Sydney | Engineered articular cartilage using novel composite 3D scaffolds. | Professor Veronique Miggony Université Paris Nord France Professor Patrick Netter Laboratoire de Pharmacologie et de Physiopathologie Articulaires France |

Adam J Berry Memorial Fund

| Researcher | Project | Host institution(s) |
|--|--|--|
| Ms Yee Kei Leung University of Tasmania | The electrophysiological study on the neuro–glia interaction after brain injury. | Professor Douglas Fields Nervous System Development and Plasticity Section National Institutes of Health |

East Asia and Pacific Summer Program for US Graduate Students

| Researcher | Project | Host institution |
|--|---|--|
| Ms Melissa Brandon University of Wisconsin-Madison | Implicit learning of auditory temporal patterns (MARCS Auditory Laboratories). | Dr Catherine Stevens University of Western Sydney |
| Mr Dylan Burge Duke University | Evolution of nickel hyper-accumulation in the plant genus <i>Stackhousia</i> (Delastaceae). | Dr Bill Barker State Herbarium of South Australia |
| Ms Kayla Calvert Purdue University | Nanomechanical and structural characterisation of hydroxyapatite coatings on ultra-fine grained titanium. | Professor Mark Hoffman University of New South Wales |
| Ms Dawn Carone University of Connecticut | The role of RNA in centromere drive within marsupial interspecific hybrids. | Professor Marilyn Renfree University of Melbourne |
| Ms Kristen Casalenuovo Virginia Commonwealth University | Optimisation of hybrid basis set for tin quantum dots. | Mr Dirk Koenig ARC Photovoltaics Centre of Excellence |
| Mr Jeffrey Case University of California Santa Barbara | Splitting theorems in Lorentzian geometry. | Professor Robert Bartnik Monash University Dr Pengzi Miao Monash University |
| Mr Christopher Drupieski University of Virginia | Representations and cohomology of algebraic and quantum groups. | A/Professor Jie Du University of New South Wales |
| Mr Steven Gray Rutgers University | Ensuring the sustainability of fisheries and marine biodiversity through effective and informed management. | Dr James Scandol NSW Department of Primary Industries |
| Mr Micah Hamady University of Colorado at Boulder | Practical chimera detection for high-throughput sequencing methods. | Dr Gavin Huttley Australian National University |
| Ms Mary la Russa University of Alabama at Birmingham | Inverse modelling of a multi-layer aquifer system in the Willunga Basin, South Australia. | Dr Michael Teubner University of Adelaide |
| Mr Stephen Levas Ohio State University | Synergistic impacts of coastal eutrophication and elevated ocean temperature on corals and overlying reef seawater chemistry. | Dr Kenneth Anthony University of Queensland |

| Researcher | Project | Host institution |
|--|--|--|
| Mr Christopher MacDonald University of California | Novel method of cell patterning to study glial signalling pathways. | Professor Marcela Bilek University of Sydney Professor Anthony Weiss University of Sydney |
| Ms Samantha Meenach University of Kentucky | Fabrication and characterisation of novel degradable magnetic hydrogel nanocomposites based on polyvinyl alcohol and iron oxide. | Dr Laura Poole-Warren University of New South Wales Dr Penny Martens University of New South Wales |
| Mr David Murphy Georgia Institute of Technology | Hydrodynamic efficiency of krill schooling. | Dr So Kawaguchi Australian Antarctic Division |
| Mr Todd Otanicar Arizona State University | Infrared thermography of a micro-solar thermal collector for methanol decomposition. | Dr Gary Rosengarten University of New South Wales |
| Ms Heidi Renninger Boston University | Embolisms in palms and the role of phloem in embolism reversal under tension. | Dr David Tissue University of Western Sydney Professor David Ellsworth University of Western Sydney |
| Ms Kimberly Sablon University of Arkansas | A new approach: nanodisks and nanorods on a semi-conductor matrix by molecular beam epitaxy. | Professor Chennupati Jagadish Australian National University |
| Ms Jennifer Sartor University of Texas at Austin | Compressing data in memory for space savings. | Dr Steve Blackburn Australian National University |
| Mr Nicholas Swanson-Hysell Princeton University | Sulphur cycling prior to the first Neoproterozoic glacial event: a field and geochemical study. | Professor Galen Halverson University of Adelaide |
| Mr David Widenski Louisiana State University | Modelling and optimisation of antisolvent cooling crystallisation processes. | Dr Ali Abbas University of Sydney |

North America

| Researcher | Project | Host institution(s) |
|---|---|---|
| Dr Stewart Allen Bureau of Meteorology | Using observations from deep ocean buoys to improve tsunami forecasts and warnings. | Dr Vasily Titov National Centre for Tsunami Research, USA |
| Dr Peter Anderson Flinders University | Activation of plant disease resistance proteins. | Professor Brian Staskawic University of California Berkeley, USA |

| Researcher | Project | Host institution(s) |
|---|--|--|
| A/Professor Muthupandian Ashokkumar University of Melbourne | Sonochemically synthesised composite nanomaterials as catalysts in fuel cells. | Professor Prashant Kamat University of Notre Dame, USA |
| Dr Mark Bayley Australian Wetlands Pty Ltd | Bayou Bienvenue Wetland Restoration Project: strategies for coastal wetland rehabilitation for multiple use and benefit. | Professor Douglas Meffert Tulane University, USA Dr Elizabeth Mossop Louisiana State University, USA |
| Dr Michael Beard University of Adelaide | Identification and characterisation of host genes that control replication of hepatitis C virus using novel cell culture models. | Professor Robert Lanford Southwest Foundation for Biomedical Research, USA Professor Dr Stanley Lemon University of Texas Medical Branch, USA |
| Dr Lee Bowling NSW Department of Water and Energy | Cyanobacterial research in Quebec. | Ms Sylvie Blais Ministère du Développement durable, de l'Environnement et des Parcs, Canada |
| Dr Jaclyn Brown CSIRO Marine Research | Understanding El Niño and drought in a warmer climate. | Dr Anand Gnanadesikan Princeton University, USA |
| Dr Sheree Cairney Charles Darwin University | Assessing sophisticated neuroscientific techniques for the assessment, treatment and education of indigenous substance abusers. | Professor Richard Goldberg Rhode Island University, USA Professor Peter Snyder Brown University, USA |
| Professor Alan Carey Mathematical Sciences Institute Australian National University | Operator algebras and noncommutative geometry. | Professor Ian Putnam University of Victoria, Canada |
| Dr Shaokoon Cheng University of New South Wales | Computational model of the upper airway to understand the pathophysiology of obstructive sleep apnoea. | A/Professor Atul Malhotra Harvard Medical School, USA |
| Dr Nicolas Cherbuin Australian National University | A study of corpus callosum shape variability in the context of handedness, cognition and healthy ageing. | Professor Arthur Toga University of California Los Angeles, USA |
| Professor Geoffrey Clarke University of Sydney | The tectonic significance of regional flat-lying rock fabrics in orogenic belts. | Professor Keith Klepeis University of Vermont, USA Dr Stuart Thompson University of Arizona, USA |

| Researcher | Project | Host institution(s) |
|--|---|---|
| Dr Belinda Ferrari University of New South Wales | Development of pathogen detection and isolation strategies through analysis at the single-cell level: a bimolecular approach. | Professor Howard Shapiro The Centre for Cytometry, USA |
| Dr Paul Gribben University of Technology Sydney | Global responses of invasive and native species to climate change. | Dr James Byres University of Georgia, USA |
| Professor Brendan Griffin University of Western Australia | Characterisation of the information content of Rutherford backscattered ions and ion-induced secondary electron imaging using the new He ion scanning microscope. | Professor David Joy Oak Ridge National Laboratory, USA |
| Dr Vanessa Hayes University of New South Wales | Genome sequencing for preservation of the Tasmanian devil. | Professor Stephan Schuster Pennsylvania State University, USA |
| Professor Yinghe He James Cook University | Production of designer particles from liquid and solid starting materials. | Professor Osman Basaran Purdue University, USA Professor James Litster Purdue University, USA |
| Dr Anita Hill CSIRO Materials Science and Engineering | Membranes as sensors. | Professor Benny Freeman University of Texas at Austin, USA Professor Allan Hoffman University of Washington, USA |
| Dr Helen Irving-Rodgers University of Adelaide | Preserving the fertility of women with cancer. | Professor Teresa Woodruff Northwestern University, USA |
| Dr Denisa Jurcakova University of Queensland | Carbon electrode materials for high-performance supercapacitors. | Professor Teresa Bandosz The City University of New York, USA Professor Yury Gogotsi Drexel University, USA |
| Dr Kourosh Kalantar-Zadeh RMIT University | Hybrid polymeric and metal oxide nanostructured fuel cells. | Professor Sossina Hailes California Institute of Technology, USA Professor Richard Kaner University of California Los Angeles, USA |

| Researcher | Project | Host institution(s) |
|--|---|---|
| Professor Anatoli Kheifets Australian National University | Multiple atomic ionisation in strong electromagnetic field. | Professor David Tannor University of California Santa Barbara, USA Professor C William McCurdy Lawrence Berkeley National Laboratory, USA Dr Thorsten Weber Lawrence Berkeley National Laboratory, USA |
| Dr Scott Kim University of New South Wales | Acquiring the knowledge and technical expertise in generating knockout mouse using bacterial artificial chromosomes. | Professor Mason Freeman Harvard Medical School, USA |
| Dr Laszlo Kiss University of Sydney | Stellar oscillations as a tool to identify planet hosting stars. | Dr Gaspar Bakos Harvard Smithsonian Centre for Astrophysics, USA |
| Dr Darby Kozak University of Queensland | Optically encoded particles as a platform for the validation of proteomic biomarkers in the early detection of ovarian cancer. | Professor Nicole Urban Fred Hutchinson Cancer Research Center, USA |
| A/Professor Sunil Kumar University of South Australia | Mechanical properties of coated bioceramics. | Dr Eduardo Saiz Lawrence Berkeley National Laboratory, USA |
| Dr Todd Lane University of Melbourne | Improved analysis and forecasting of precipitation through assimilation of Doppler radar observations with an ensemble Kalman filter. | Professor Fuqing Zhang Pennsylvania State University, USA |
| Dr Ricky Lareu University of Western Australia | Combinatorial regulation of fibrosis by small non-coding RNA molecules. | Dr Isidore Rigoutsos Deep Computing Institute, USA |
| A/Professor Simon Lewis Curtin University of Technology | Chemical characterisation and classification of automotive paint clear coats. | A/Professor Tim Menzies West Virginia University, USA Professor Jay Siegel Indiana University, USA |
| Dr Chaohong Li Australian National University | Many-body quantum dynamics of strongly correlated atomic systems. | Professor Eugene Demler Harvard University, USA |

| Researcher | Project | Host institution(s) |
|---|---|---|
| Dr Tong Lin Deakin University | Improvement of fuel cell performance via superhydrophobic treatment of cell electrodes. | Professor Liming Dai University of Dayton, USA |
| Dr Chunsheng Lu Curtin University of Technology | Fractals in bio-inspired nanomechanics of hierarchical materials. | Professor Huajian Gao Brown University, USA |
| Dr Ian Macreadie CSIRO Molecular and Health Technologies | Investigations of the roles of allyl hydroperoxidase, clioquinol and farnesol in yeast models for neurodegenerative diseases. | Dr Jaekwon Lee University of Nebraska, USA Dr Robert Spreitzer University of Nebraska, USA |
| Dr Karen Murphy University of South Australia | Cardiometabolic health effects associated with dairy consumption. | Professor Gary Fulcher University of Manitoba, Canada Dr Curtis Rempel University of Manitoba, Canada |
| Dr Michelle Power Macquarie University | Host parasite co-evolution: a tool for managing emerging diseases in Australia. | Professor John Barta University of Guelph, Canada |
| Dr Morgan Pratchett James Cook University | Predicting future effects of climate change on coral reefs. | Dr Bernhard Riegl Nova Southeastern University, USA |
| Dr Thomas Rayner University of New South Wales | Climate change and freshwater fishes of the tropical Pacific. | Professor Robert Kinzie University of Hawaii, USA Dr David Foote United States Geological Survey Pacific Island Ecosystems Research Centre, USA |
| Dr Yinlan Ruan University of Adelaide | Fabrication of chalcogenide glasses and antibody labelling using quantum dots for infrared applications. | Dr Jennifer Hollingsworth Los Alamos National Laboratory, USA Professor Kathleen Richardson Clemson University, USA |
| Dr Kallista Sears CSIRO Textile and Fibre Technology | Carbon nanotubes for flexible, high performance, organic solar cells. | Professor Ray Baughman University of Texas at Dallas, USA |
| Dr Melony Sellars CSIRO Marine and Atmospheric Research | All-female sterile prawn culture: determining how to improve the viability of prawns with an extra set of chromosomes. | Mr Steve Arce The Oceanic Institute, USA Dr Shaun Moss The Oceanic Institute, USA |

| Researcher | Project | Host institution(s) |
|---|---|---|
| Dr Marcus Sheaves James Cook University | Developing a global view of wetland-estuary linkages. | Dr Thomas Minello National Oceanic and Atmospheric Administration, USA |
| Dr Petra Souter Australian Institute of Marine Science | Use of next generation gene analysis to predict corals' capacity to cope with climate change. | Dr Iliana Baums Pennsylvania State University, USA Professor Jim Marden Pennsylvania State University, USA |
| Dr Jeremy Sumner University of Tasmania | Markov and phylogenetic invariants: resolving the mathematical connections between related phylogenetic methods. | Professor Elizabeth Allamn University of Alaska at Fairbanks, USA Professor John Rhodes University of Alaska at Fairbanks, USA |
| Dr Anita van den Biggelaar University of Western Australia | Innate immune pathways to microbial pathogens in newborns in settings with high versus low to moderate exposure. | A/Professor Ofer Levy Harvard Medical School, USA A/Professor Richard Malley Harvard Medical School, USA |
| Dr David Williams Curtin University of Technology | Testing new technologies for the detection and discovery of emerging microbial pathogens relevant to the Australasian region. | Professor Ian Lipkin Columbia University, USA |
| A/Professor David Young Griffith University | Extending the life-time of inexpensive antimonial chemotherapy for leishmaniasis. | Professor Edward Tiekink University of Texas at San Antonio, USA |

Academy medals and lectures

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

The 2009 Academy awards for scientific excellence were awarded to the following researchers:

Career awards

Matthew Flinders Medal and Lecture

Professor Bruce McKellar FAA, University of Melbourne, for research in particle physics, including weak interactions in the nucleus.

David Craig Medal

Emeritus Professor Leonard Lindoy FAA, University of Sydney, for research on the chemistry of molecular recognition and the extraction of metal ions from mixtures.

Hannan Medal

Professor (Edward) Norman Dancer FAA, University of Sydney, for research in nonlinear analysis and nonlinear differential equations.

Jaeger Medal for research in Earth sciences

Professor Malcolm McCulloch FAA, Australian National University, for the study of the solid Earth and environmental issues.

Thomas Ranken Lyle Medal

Professor Victor Flambaum FAA, University of New South Wales, for research on the violation of fundamental symmetries and unification theories of elementary particles.



Bruce McKellar, the Matthew Flinders Medallist for 2009

Early-career awards

Fenner Medal for research in biology

Associate Professor Sean Connolly, James Cook University, for research on the processes influencing population dynamics, ecological interactions and biodiversity.

Ruth Stephens Gani Medal

Dr Marnie Blewitt, Walter and Eliza Hall Institute of Medical Research, for research on the epigenetics of X-inactivation, and the control of stem cell function.

Gottschalk Medal

Dr Carola Vinuesa, Australian National University, for research on the regulation of the immune system and the causes of autoimmune diseases.

Inaugural Anton Hales Medal

Associate Professor Jeffrey Walker, University of Melbourne, for research on the remote sensing of soil moisture and data assimilation.

Dorothy Hill Award

Dr Daniela Rubatto, Australian National University, for research on metamorphic petrology, growth of the Earth's crust and mountain building.

Le Fèvre Memorial Prize

Dr Stephen Blanksby, University of Wollongong, for research on gas phase ion chemistry and mass spectrometry and its application to lipidomics.

Moran Medal

Dr Melanie Bahlo, Walter and Eliza Hall Institute of Medical Research, for research in theoretical population genetics, genetic epidemiology and gene mapping.

Pawsey Medal

Dr Stuart Wyithe, University of Melbourne, for research on cosmology and the understanding of the likely structure of the early universe.

Academy Medal

The Academy's Council awarded the Academy Medal to the outgoing Executive Secretary, Professor Sue Serjeantson. The 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. The Academy Medal was established in 1990 and has been awarded on only five other occasions.



Photo: Terri Shine

Sue Serjeantson being presented with the Academy Medal

Lindau awardees

Seven young Australian researchers attended the Meeting of Nobel Laureates in Lindau, Germany, from 29 June to 4 July. The topic for the meeting in 2008 was physics, with the delegation being led by Professor Ron Ekers FAA. The Academy provided funding support for travel, and the Lindau committee provided accommodation and registration. The delegates attended *Science at the Shine Dome* from 7 to 9 May, where they attended a briefing session about the Lindau meeting and had the opportunity to meet each other, Professor Ekers, past delegation leaders and other senior scientists.

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

Research support and lectureships

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

Conservation of endangered Australian vertebrate species awards for 2009

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

Dr Diana Fisher, University of Queensland

Conservation ecology of a declining arid zone carnivorous marsupial, the kultarr (*Antechinomys laniger*)

Ms Felicia Pereoglou, Australian National University

Relationship of fire, genetics and the eastern chestnut mouse (*Pseudomys gracilicaudatus*) and the conservation of fire-adapted native fauna

Ms Anja Skroblin and Dr Sarah Legge, Australian Wildlife Conservancy

Distribution, phylogeography and dispersal behaviour of the vulnerable purple-crowned fairy-wren (*Malurus coronatus*)

Dr Jan Slapeta, University of Sydney

Study of a recently discovered parasite threatening the endangered green and golden bell frog (*Litoria aurea*)

Ms Yiwei Wang, University of Queensland

Evaluating the interactions and impact of predators on the highly endangered bridled nailtail wallaby (*Onychogalea fraenata*)

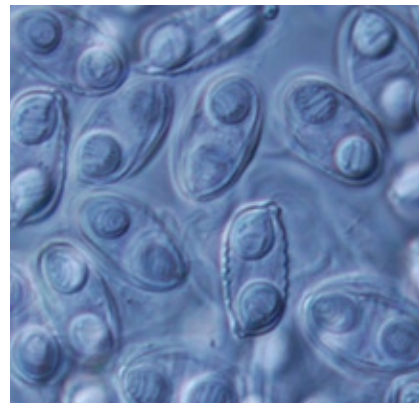


Photo: Jan Slapeta, University of Sydney

A recently discovered parasite threatening the endangered green and golden bell frog



Photo: Anja Skroblin and Sarah Legge, Australian Wildlife Conservancy

Where are the purple-crowned fairy-wrens?



Photo: Sydney Wildlife World

Predator impact on the highly endangered bridled nailtail wallaby is under investigation

J G Russell Awards

The J G Russell Award is aimed at financially helping talented younger researchers in the basic sciences as a token of the community's regard for them. It recognises the infrastructure cost involved in experimental research, and can be used towards equipment, maintenance, travel and other assistance. Nominations are not sought for this award: they are chosen from the recipients of the Queen Elizabeth II Fellowships.

The following young researchers will receive support in 2009:

Dr Amanda Barnard, University of Melbourne

Development of computational tools to predict the behaviour of nanoparticles to investigate the use of nanodiamonds to deliver chemotherapy drugs.

Dr Michael Breadmore, University of Tasmania

Development of an integrated device for the direct analysis of drugs and metabolites in fluids for testing in therapeutic drug monitoring to improve medical treatment and patient quality of life.

Dr Hugh Harris, University of Adelaide

Investigation into the effects of the use of dietary selenium supplementation as a preventative treatment for a range of health conditions.

Dr Angela Moles, University of New South Wales

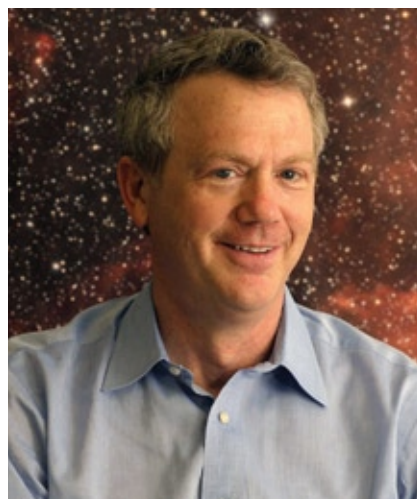
Study of how weeds are adapting to life in Australia by quantifying the rate and direction of evolution in introduced plants and gain a better understanding of how to develop appropriate control programs to protect our future biodiversity.

Travelling fellowships for 2009

Selby Travelling Fellowship 2009

Professor Robert P Kirshner, Harvard College Professor of Astronomy, Clowes Professor of Science, Harvard-Smithsonian Center for Astrophysics, USA

The Fellowship is financed through the generosity of the trustees of the Selby Scientific Foundation. It is awarded to distinguished overseas scientists to visit Australian scientific centres and deliver public lectures. Fellows are expected to increase public awareness of science and scientific issues and accordingly will be outstanding lecturers to the general lay public.



Robert Kirshner, Selby Travelling Fellow for 2009

Photo: © Rick Friedman

Research conferences

The Academy supports research conferences that are organised by scientific societies to bring together researchers at the forefront of particular subjects to discuss the future directions of their field. In 2008 there were two Boden Research Conferences and a Fenner Conference on the Environment.

The Academy also administers funds provided by the Australian Government Department of Innovation, Industry, Science and Research for the Sir Mark Oliphant International Frontiers of Science and Technology Conference series.

Boden Research Conferences for 2008

With the generous support of the late Dr Alex Boden FAA, the Academy conducts a series of small specialist conferences in the biological sciences to enable active research workers in rapidly advancing fields to discuss current advances and problems.

Plant energy and water productivity

18–20 September, Australian National University, Canberra

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

Under the overarching aim of improving plant productivity, a diverse group of scientists met in Canberra to consider current research and future possibilities. The conference brought together many of the world's leading researchers in the field of photosynthesis and plant energy production. This multi-disciplinary forum looked at how to develop improved plants for agriculture and biofuel production and how to assess and manage plants in natural environments.



Photo: Stockxpert

Photosynthesis and plant productivity discussed at the Boden Conference

The conference was unique in its range of disciplines and breadth of topics whilst still focusing on the three themes: water productivity; plant energy; and plant products and biofuels. Half of the speakers were from overseas and many productive collaborations were formed.

Over 140 attended the conference with delegates coming from universities, government institutions and business. The conference's focus on plant productivity is a timely and relevant subject with the impacts of global change and world food supplies under threat. The outcome of bringing scientists together to improve plant productivity could lead to benefits for future generations.

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

In addition to funding from the Academy, financial support was provided by CSIRO, the ARC Centre of Excellence in Plant Energy Biology, the Grains Research and Development Corporation, and the Australian Society of Plant Scientists. Proceedings of the conference are available online at www.plantenergy.uwa.edu.au/conferences.

Beyond the platypus genome

23–26 November, Victor Harbor, South Australia

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

Australia's unique monotremes the platypus and echidna are our most distant relative amongst living mammals. Comparative studies allow unique insights into early mammal evolution. The conference aimed to capture the momentum gained from the announcement of the completion of the platypus genome sequence. Existing collaborations were consolidated and new ones were fostered by bringing together researchers and students working in comparative genomics and monotreme biology. Sixty researchers, including high profile national and international speakers from England, USA, Germany and New Zealand attended the conference.



Photo: Ian Epton, Healesville Sanctuary

The 'furry bird' of the animal world, the platypus

The meeting started with talks on the composition of the platypus genome, moving to genetic and biochemical aspects of monotreme immunity, milk and venom. Presentations on population genetics, sex chromosomes and reproductive biology were followed by updates on disease and captive breeding efforts.

Professor Roger Short FAA chaired a panel discussion that sought to compose a new 4-word telegram to alert the world to amazing new discoveries that came from the genome sequence. 'Platypuses are furry birds' was

the outcome. Professor Stephen O'Brien (USA) highlighted the unique value of Australian native animals, in particular monotremes, in his inspiring after-dinner lecture.

The meeting closed with a round table discussion about funding opportunities and ways to foster interaction and communication between the diverse groups of researchers that share enthusiasm for this fascinating group of mammals.

Further information about the conference is available from www.adelaide.edu.au/monotreme-conference/.

Fenner Conference on the Environment 2008

With the generous support of Professor Frank Fenner FAA and the late Mrs Fenner, the Academy conducts a series of environmental conferences on the environment and conservation issues in Australia and its environs. The purpose of these conferences is to bring together those with relevant scientific, administrative and policy expertise to consider current environmental and conservation problems in Australia, thereby contributing to the formation of policies that can alleviate some of these problems.

The art and science of good environmental decision making

10–12 March 2009, Shine Dome, Canberra

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

The 2008 Fenner Conference on the Environment focused on the basics of good environmental decision making with an emphasis on science and policy, prioritisation, adaptive management and cost-effective monitoring.

It brought together environmental scientists from Australia and around the world to meet with senior environmental managers from regional, state and government agencies to discuss ways to improve decision making on environmental investments and priorities. This is significant because these groups usually meet to talk amongst themselves, and don't necessarily understand the different worlds of science, policy development and environmental management. Many bridges were built that will serve as an enduring legacy of the event.

The organisers were delighted with the make up of the audience and the lively discussions happening around sessions. Two outstanding features were the level of interest and quality of questions. Initial feedback suggests it was well received, with many opportunities created for follow-up collaborations. And the theme of good environmental decision making has been given an important boost – not before time according to many delegates.

Further information about the conference is available from www.conferenceplus.com.au/fennerconf/2009/. For a copy of the conference book, contact Liam Gash (Liam.Gash@utas.edu.au) or David Salt (David.Salt@anu.edu.au).



Photo: David Salt

Delegates at the Fenner Conference take a break from decision making

Sir Mark Oliphant Conferences

The Sir Mark Oliphant International Frontiers of Science and Technology Conference series was launched in October 2001. The announcement was made on the centenary of the birth of Sir Mark Oliphant, a Foundation Fellow of the Australian Academy of Science and the Australian Academy of Technological Sciences and Engineering (ATSE), and the first President of the Academy of Science.

The objective of the scheme is to support the goal of the Government's International Science Linkages Programme – Science Academies Programme, by providing financial support to stage strategically significant international conferences in Australia on high priority, cutting edge, multi-disciplinary themes. More specifically, to:

- promote Australian science and technology, but cutting across conventional science and technology 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 on behalf of the Department of Innovation, Industry, Science and Research by the Academy and ATSE.

Sir Mark Oliphant conferences in 2008

Vaccine and immunotherapy technologies, organised by the Academy, was held from 9 to 11 April. The conference provided a balanced and diverse insight into the rapidly evolving scientific area of vaccines and immunotherapy. It showcased the most recent high-tech basic science concepts in vaccine and immunotherapy research, and highlighted the challenges of deployment and delivery of vaccines in the real world.



Photo: © Irene Dowdy

Researchers at the front line of the war against diseases

Speakers from Australia, Asia, Europe and the US discussed the research and applied challenges that remain in the fields of vaccines and immunotherapy, but also presented current success stories such as the introduction of the first vaccine against cervical cancer. The program and proceedings are available from www.oliphant.org.au/april2008.html.

Other Oliphant conferences held in the reporting period were:

Australian Geothermal Energy Conference

20–22 August, Melbourne

Medical bionics – a new paradigm for human health

16–19 November, Lorne, Victoria

Asia-Pacific Congress on Electron Tomography

31 January–4 February, Brisbane

Further information about the Sir Mark Oliphant Conferences is available from www.oliphant.org.au.

Conferences for 2009–10

The Elizabeth and Frederick White Research Conference 2009

Nuclear astrophysics in Australia

Organised by: Professor John Lattanzio, Monash University

Dr Maria Lugaro, Monash University

The Fenner Conference on the Environment 2009

Healthy climate, planet and people: 'Co-benefits' for health of action on climate change

Organised by: Professor Anthony Capon, Australian National University

Professor Janette Lindesay, Australian National University

Sir Mark Oliphant Conferences 2009

Sharks international

7–11 June 2010, Cairns

Organised by: Dr Michelle Heupel, James Cook University

Administered by the Academy

Clean, green and lean – from carbon to cleantech

May 2010, Melbourne

Organised by: CSIRO Future Manufacturing Flagship

Administered by ATSE

Science education

The Academy is committed to promoting science education, both as a contribution to informed citizenship and to encourage young people to prepare themselves for careers based on science and technology. To this end, the Academy has 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 current activities.

Primary Connections: Linking science with literacy

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 sophisticated professional learning program complemented by rich curriculum resources designed to increase teacher confidence and competence in the teaching of both science and the literacies of science.

Following provision of over \$5 million in funding for Stages 2 and 3 of the project from 2004 to 2008, the Deputy Prime Minister and Minister for Education, the Hon Julia Gillard, advised the Academy that an additional funding of \$4.4 million had been allocated to incorporate indigenous perspectives and to implement Stage 4 of the project in 2009 and 2010. The funding announcement coincided with a National Press Club address by the Secretary for

Education and Public Awareness, Professor Julie Campbell FAA on 2 July. Professor Campbell's address focused on the Academy's role in inquiry-based science education and the national curriculum.

In addition to the approximately 400 professional learning facilitators (PLFs) and 124 tertiary facilitators trained during Stages 2 and 3, the project's professional learning officers have trained 900 teachers Australia-wide in a two-day curriculum leader program. The two-day program includes comprehensive training in the principles that underpin the project as well as a leadership module, and is designed to support school-wide implementation of *Primary Connections*. The PLFs have subsequently conducted approximately 2400 workshops.



Julia Gillard focuses on primary science education at the launch of *Schoolyard safari*

Photo: © Irene Dowdy

The review and rewrite of the professional learning resource, *Making Connections: A guide for facilitators*, was completed in October and was distributed to PLFs and tertiary facilitators at a series of PLF recall days conducted in most capital cities prior to the end of the 2008 school year. The resource comprises a twelve chapter professional learning folder, a CD of electronic resources and the *Questioning Minds* DVD.

Nineteen curriculum units have now been published. A set of three units was submitted and again short-listed (as in 2007) in the Primary Teaching and Learning Category of the Australian Awards for Excellence in Educational Publishing. To date more than 143,000 units have been distributed in Australia and overseas, with highest distribution in Western Australia and Queensland. During 2008, Victoria and South Australia conducted programs that enhanced interest in *Primary Connections* which increased distribution in these states. Over 40 per cent of Australian primary schools have ordered at least one unit.

In April the Deputy Prime Minister and Minister for Education, The Hon Julia Gillard, launched the unit *Schoolyard safari* at Mossfiel Primary School in her Lalor electorate in Victoria. The launch was attended by the Academy President, Professor Kurt Lambeck, and Academy Fellows Professors Julie Campbell, John McKenzie and Gustav Nossal.

Following the successful pilot of indigenous perspectives in Western Australia in Term 4 of 2007, indigenous perspectives have now been developed across the suite of *Primary Connections* units. A research report, *Small study: Big success story*, outlines the findings from the pilot and is available on the website. An indigenous perspectives professional learning module has also been developed and a DVD, *Connecting Minds: Primary Connections Incorporating Indigenous Perspectives*, was produced to complement the professional learning resources.

There are 17 interim evaluation research reports for Stage 3 (available on the website) as well as a summary evaluation of the project outcomes. A major research program, conducted by Edith Cowan and La Trobe Universities in late 2007 is reported on in the *Stage 3 interim evaluation research report 15* which was released in August. The evaluation, conducted in 26 schools in Queensland and Western Australia with 1467 students, reports on the impact of *Primary Connections* on students' development of science processes, literacies of science and interest in science.

Overseas interest in the project has increased following presentations to the InterAcademy Panel (IAP) and the Federation of Asian Scientific Academies and Societies (FASAS) by Professor Kurt Lambeck and Professor Jenny Graves. The *Primary Connections* project was successful in gaining IAP seed funding to conduct a workshop in partnership with FASAS in Singapore in 2010. The Managing Director of *Primary Connections*, Ms Shelley Peers, made a presentation on the outreach of the project at an IAP meeting in Trieste, Italy, on 12 and 13 February.

Professor Julie Campbell, Dr Sue Meek and Ms Shelley Peers met with the National Curriculum Board in mid 2008 to discuss the proposed national curriculum for science, and to provide information about the work done to date on the project. Ongoing liaison with the Board continues through Ms Peers' membership of the Science Advisory Group and the Consultation Working Group for the Science Curriculum Framing paper.



Small study: Big success story report on the indigenous perspectives pilot study

Available units:

Questioning Minds DVD

Early Stage 1 (Year 1)

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

Stage 1 (Years 2 and 3)

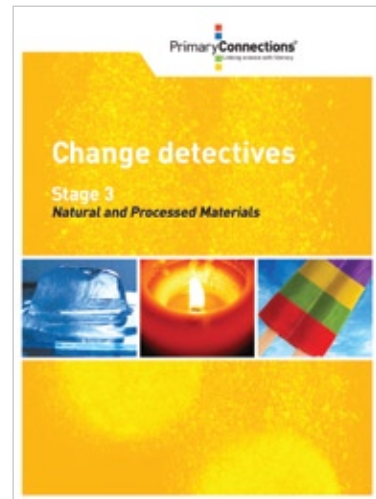
- Earth and Beyond: *Water works*
- Energy and Change: *Push-pull, Sounds sensational*
- Life and Living: *Schoolyard safari*

Stage 2 (Years 4 and 5)

- Earth and Beyond: *Spinning in space*
- Energy and Change: *Light fantastic*
- Life and Living: *Plants in action: Incorporating indigenous perspectives*
- Natural and Processed Materials: *Material world*

Stage 3 (Years 6 and 7)

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



Science by Doing pilot project

www.sciencebydoing.edu.au

Science by Doing is an inquiry-based project for lower secondary science. There are three core development components to the project: professional learning approach for secondary science teachers; professional learning resources and curriculum resources. The curriculum and professional learning resources will have a digital focus. The purpose of the project is to assist teachers engage students in an activity-oriented manner that will activate their interest in science: hence the name *Science by Doing*.

During January 2008, 65 teachers from 35 schools across Australia attended a five day workshop program at the Shine Dome as part of the pilot phase of the project. Two curriculum units, *Moving together* and *Rock, paper, scissors*,

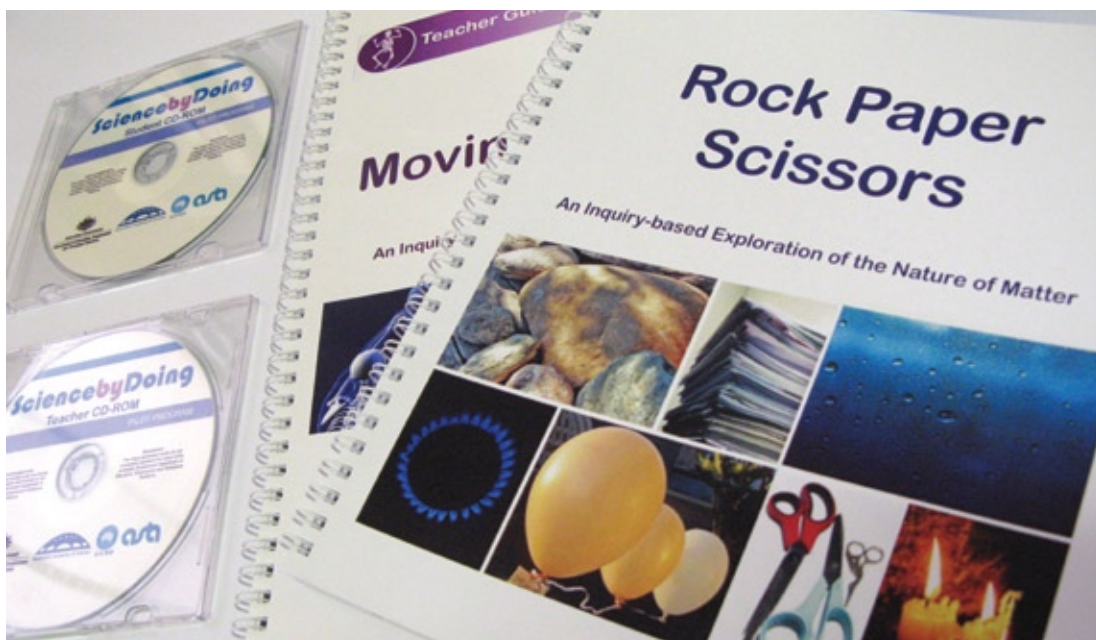


Photo: Stephanie Kafkaris

Two curriculum units developed for the *Science by Doing* pilot phase

scissors, were developed, together with a website that contained professional learning resources for teachers. The pilot phase of *Science by Doing* was led by Associate Professor Richard John from Griffith University.

After the workshop, the teachers trialled the curriculum units in their schools and utilised inquiry-based pedagogical skills highlighted in the sessions conducted during the initial January workshop. School clusters were established and further workshops were held in the regional cluster areas during the trialling period.

Based on data gathered during trialling, the curriculum units were extensively revised. The revised materials were given to each participating teacher and education system.

An independent and extensive evaluation of the pilot phase was conducted by Professor Mark Hackling of Edith Cowan University. This evaluation found that the teachers involved in the workshop and subsequent trialling benefited significantly in confidence and competency with respect to the implementation of inquiry-based science lessons. The research also found that the *Science by Doing* units provided an engaging experience of science for many students. Other data from the research highlighted the challenges teachers and students face in using more sophisticated digital tools of learning. The technological infrastructure required for these digital forms of learning is still being developed in many schools.

In the latter part of the year the Australian Government announced that a further \$2 million would fund Stage One of *Science by Doing* during 2009 and 2010. Professor Denis Goodrum from the University of Canberra had been appointed to act as Project Director for this phase of the project and was released to undertake the drafting of a framing paper for the National Curriculum Board on the national science curriculum.

Nova: Science in the news

www.science.org.au/nova

Nova: Science in the news is designed as a web-based educational resource for secondary school students, teachers and the general public covering science-related issues that appear in the news. There are currently 110 topics on the *Nova* site. Each *Nova* topic is reviewed externally by an expert in the relevant field before posting on the web, ensuring an accurate and reliable source of information for users.

Existing topics have been updated throughout the year to keep them relevant and in line with current research. Eight new topics have been posted in the past year, covering a range of areas including astrobiology, catalyst chemistry, smart sensors and medical technology.

New *Nova* topics:

A sense of things to come – smart sensors and the environment

Monitoring reef systems or catchments for environmental change can be a big job; sometimes too big for humans to handle without a bit of technological assistance. Now that assistance is increasingly available in the form of smart sensors.

Sponsored by the Australian Research Council Research Network on Intelligent Sensors, Sensor Networks and Information Processing

Making our mark – ecological footprints

Humans have been changing the face of the planet for thousands of years. Our numbers have multiplied many times over and the living standards of many have increased beyond



Photo: Shutterstock

Smart sensors are being used to monitor the Great Barrier Reef

recognition. To make that happen, we have drawn upon the Earth's natural resources. Ecological footprints are being used to measure our impact on Earth and the results aren't good.

Sponsored by the Australian Government
Department of Climate Change

Clean speed ahead with catalysts

In the face of declining fossil fuel resources, degradation of our environment and the growing risk of climate change, the world's industries need to become more efficient and less polluting. Catalysts can help by reducing energy needs, solvent use and waste production.

Sponsored by the bequest of J R Anderson FAA

Life on Mars?

In August 1996, scientists from the National Aeronautics and Space Administration (NASA) announced they had detected possible signs of life on Mars; the announcement caused heated discussions within the scientific community. A series of more recent discoveries has caused scientists to once again consider the possibility of life on Mars.

Sponsored by the Kanagawa Prefectural Museum of Natural History

Cancer immunotherapy – redefining vaccines

Vaccines are no longer a simple injection of inactive bacteria or viruses to prevent disease. Unlike traditional vaccines, cancer immunotherapy treats existing disease by targeting cancerous body cells.

Sponsored by the Sir Mark Oliphant International Frontiers of Science and Technology conference series

The quest to make hydrogen the fuel of the future

Australia and many other countries around the world are preparing for the possibility of converting to a 'hydrogen economy'. But to make this happen, scientists need to improve the technology for hydrogen production, storage and supply.

Sponsored by the Australian Research Council Linkage–Learned Academies Special Project Grant

Capturing the greenhouse gang

With increasing atmospheric concentrations of greenhouse gases causing climate change, governments and industry are investigating ways to capture greenhouse gases and store them out of harm's way.

Sponsored by the Australian Government Department of Climate Change

Stormwater – helping to tackle Australia's water crisis

Water is a big issue in Australia. There are water restrictions in most major cities, and climate change affects



Photo: Stockpart

Vaccines are now being developed to treat pre-existing diseases like cancer



Photo: Courtesy of the Water Research Laboratory, UWS

Biofiltration: Using nature to clean up stormwater

our agriculture industry. With reduced water supplies and a growing population, should Australians be letting stormwater go down the drain?

Sponsored by the Australian Research Council Linkage–Learned Academies Special Projects Grant

Flying beyond our means – aviation and the environment

With aviation emissions growing faster than any other transport sector our impacts on the environment are heading sky high. But research is underway to reduce the effects of flying.

This topic is sponsored by Dr Margaret Middleton



Photo: Stockport

An increasing environmental impact is prompting 'greener' ways of flying

Interviews with Australian scientists

www.science.org.au/scientists

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

The interviews program continues to show consistently high levels of popularity in 2008, with an increase in DVD orders to complement the visitors to the program's website to view transcripts, teacher notes and activities. During 2008, twenty interviews of Australian scientists were filmed, taking the total number of interviews recorded to 116 (81 Fellows and 35 non-Fellows). The interviews conducted in 2008 were: Professor Brian Anderson FAA; Professor Charles Birch FAA; Professor Ron Brown FAA; Professor David de Kretser FAA; Dr Bruce Fraser FAA; Professor Ian Frazer FAA; Professor Joe Gani FAA; Professor Bruce Holloway FAA; Professor



Photo: Maggie Percival

Norman Swan interviewed Robin Warren, Fiona Wood and Barry Marshall in Perth

Paul Korner FAA; Professor Lawrie Lyons FAA; Professor Barry Marshall FAA; Professor Ray Martin FAA; Dr Jim Peacock FAA; Professor George Rogers FAA; Professor John Sprent FAA; Professor Richard Stanton FAA; Professor John Swan FAA; Professor Robin Warren FAA; Dr Fiona Wood; and Mr Roy Woodall FAA.

Recent interviews posted on the website include Professors Anderson, Frazer, Gani, Lyons, Sprent, Stanton and Street.

The Video Histories Advisory Committee, which advises Council on candidates for the project, has recently appointed Professor Stewart Turner FAA to chair the committee. He succeeds Professor Julie Campbell FAA, whose extensive work commitments prevent her continuing in the role. Professor Turner has been a committee member for several years and through his knowledge of and enthusiasm for the work of the *Interviews* program it will continue flourishing under his chairmanship. New members of the committee are Academy Fellows Professors Adrienne Hardham and Suzanne O'Reilly who are both sincerely welcomed.

Interviews were generously sponsored by: Monash University; CSIRO Mathematical and Information Sciences; Australian National University; University of Queensland; University of Melbourne; University of New England; Baker IDI Heart and Diabetes Institute; University of Western Australia; University of Sydney; and University of Adelaide.



Photo: Maggie Percival



Photo: Maggie Percival

Top: David de Kretser and Gus Nossal at Government House in Victoria. Above: Robyn Williams interviewed Ian Frazer in Brisbane

Public awareness and outreach

The Academy's activities, policy recommendations and positions on scientific issues are regularly promoted through a variety of outlets. This promotion serves to foster a greater awareness of science issues and science-related activities to government, industry, the media, academics and various publics.

National Press Club address by Academy Secretary for Education and Public Awareness

Professor Julie Campbell, the Academy's Secretary for Education and Public Awareness, addressed the National Press Club on 2 July on inquiry-based science education in Australia in the context of the government's initiative to develop a national curriculum. She also outlined the role that *Primary Connections* and *Science by Doing* programs could play in developing quality national curricula.

Professor Campbell highlighted the importance of science for Australia's future saying: 'The technological world is changing at an incredible rate, and Australia's economy demands high quality science education to cope with this change. Not only do we need specialist scientists who will keep us at the forefront of scientific development, many emerging jobs will demand high level skills in scientific thinking.'

She cited the *2006 Science, Engineering, and Technology Skills Audit* showing that Australia will have a huge shortfall of scientists, engineers and engineering tradespeople by 2013. Australia is already importing more scientists, engineers and doctors. She said: 'We need to invest seriously in science education. There is a major decline in the number of students electing to study science, technology and mathematics both in senior secondary years of school and at university. In order for Australian students to be motivated to train in these professions, research indicates that they need to have a solid background in science education before age 14 and, most importantly, they have to be excited by science.'



Photo: © Irene Dowdy

Julie Campbell addresses the National Press Club

Professor Campbell also emphasised the importance of enthusing would-be teachers. To address these issues Professor Campbell proposed firstly to make the teaching and learning of science more appealing, both for students and teachers, and secondly to take a national approach to science teaching. Professor Campbell then went on to demonstrate how *Primary Connections* and *Science by Doing* programs can do both of these things: 'The Australian Academy of Science has already developed a successful model for an inquiry-based national science curriculum for primary schools and is in the process of developing a follow-up program for junior and middle high schools...both programs move away from teacher delivery of knowledge and pay more attention to a hands-on approach and discussion, open questioning and higher order thinking.'

On behalf of the Academy she applauded the government's decision to extend the funding for these programs. A full transcript of the address is available at www.science.org.au/events/npc2008.

Public lectures

Public lecture series

This year the Academy commenced a new public lecture series titled *Australia's renewable energy future*. The series examines a range of renewable energy technologies that are currently being developed, and aims to provide a realistic assessment of their ability to supply Australia's energy needs into the future. Each lecture focuses on a different renewable energy source providing an explanation of the technology and its implementation and a discussion of its current utilisation. The lectures in the series so far have been:



Photo: Richard Bray

Anthony Budd talks about geothermal energy at a public lecture

A low carbon economy based on renewable energy: The only way to go

2 September

Dr Barney Foran, Fenner Centre for Research and Environmental Studies, Australian National University

Solar photovoltaics: Power source for the future?

7 October

Professor Martin Green FAA, ARC Federation Fellow, Scientia Professor and Research Director of the Photovoltaic Centre of Excellence, University of New South Wales

Wave energy: The industry now and in the future

5 November

Dr Tom Denniss, Executive Director and Chief Technology Officer, Oceanlinx

Geothermal energy in Australia: The who, what, where, when and how

2 December

Dr Anthony Budd, Project Leader, Geothermal Energy Project, Onshore Energy and Minerals Division, Geoscience Australia

Fuel cells: A real option for base load electricity

3 February

Dr Karl Föger, Chief Technology Officer, Ceramic Fuel Cells Limited

Bioenergy options for Australia

3 March

Dr Steve Schuck, Manager, Bioenergy Australia



Photo: Courtesy of Geodynamics Limited

Dawn breaks over a geothermal drilling rig near Innamincka, South Australia

Non-series lectures

Taking measure of our universe

As part of National Science Week the Academy hosted a public lecture on 19 August by newly-elected Fellow Professor Brian Schmidt from the Research School of Astronomy and Astrophysics at the Australian National University.

Professor Schmidt's lecture *Taking measure of our universe* took the audience through a tour of the cosmos, discussing the universe's age, scale and composition, and how these vital statistics are determined.

He described the expansion of the universe, how this is measured and how the rate of expansion, the Hubble constant, has been used to roughly determine the age of the universe – around 14 billions years old.

He discussed the possibility that the universe will continue to expand, defying the forces of gravity, as it has in the past – an infinite universe without end. He also discussed the possibility that this expansion will slow down due to the force of gravity and eventually stop and collapse on itself in a 'reverse Big Bang' or the gnaB giB as it is known. Data has been collected showing that the gnaB giB hypothesis is unlikely to be the fate of the universe. He went on to discuss dark energy and dark matter, which make up 72 and 24 per cent of the universe respectively, with only 4 per cent being the more familiar atomic matter. Astronomers suspect dark matter is a particle remaining to be discovered, perhaps in the Large Hadron Collider project.

Professor Schmidt said dark energy and dark matter are in a constant battle with each other which will affect the fate of the universe. He presented three theories for the universe's fate: the Big Chill, the Big Rip and the Big Rip Off.

He summed up saying: 'It is probably going to end not with a gnaB giB but with a whimper – but just possibly it will end in a scream during the big rip.'

Transcripts of all the lectures are at:
www.science.org.au/events/publiclectures



Photo: Richard Bray

Karl Föger talks about fuel cells at a public lecture



Photo: Richard Bray

Brian Schmidt



Photo: Richard Bray

Public lectures drew near capacity audiences at the Shine Dome

National Academies Forum events

Public lecture tour: Darwin's ape and the progress trap

To coincide with the anniversary of the publication of Charles Darwin's *The origin of species*, the National Academies Forum (NAF) organised a free public lecture series by international author, historian and essayist Dr Ronald Wright. The tour from 22 to 30 March included venues in Melbourne, Darwin, Canberra, Hobart and Sydney, and was hosted by state (or national) libraries in each city.

The lecture *Darwin's ape and the progress trap* focused on reading the human record from the Old Stone Age, through the early civilisations, to the industrial civilisation of today. Mr Wright took a hard look at where we have been and what that can tell us about where we may be going.

Events in conjunction with the Universities Australia Inaugural Higher Education Conference

NAF organised two public events to coincide with Universities Australia's Inaugural Higher Education Conference. The first event, a multimedia homage to Galileo and his times, took place on the first evening of the conference. The final morning of the conference provided an opportunity for conference goers and panellists to join in a debate about their vision of the future for Australian universities.

Harmonious revolutions

Harmonious Revolutions was an evening of music, photography and recitals in celebration of the work of Galileo Galilei and his contemporaries, and their role in the Scientific Revolution. It was held at the National Press Club on 4 March.

Sopranos and recitants were accompanied by musicians playing instruments from the period, including the Baroque violin, viola da gamba and violoncello, the chitarrone and lutes. They presented compositions written by, or in celebration of, the pioneering renaissance thinkers from around the turn of the 17th century, and their extraordinary contributions to astronomy, physics, mathematics, natural science, philosophy, musicology, and many other fields of knowledge. The program for the



Photo: Richard Bray

Ron Wright looks to the past to consider our future

evening included excerpts from the intermezzo *La Pelligrina* (1589), and popular compositions by Galileo's father Vincenzo and brother Michelangelo.

What will be the most exciting opportunity for Australian universities in the next five-ten years?

This is the question asked of the audience and a panel of experts who engaged in a lively debate at the Realm Hotel on 6 March. Following the Bradley Review, and closing the Universities Australia conference, NAF hosted a session to provide conference goers with the opportunity to air their thoughts on the 'most exciting opportunity'.

The Master of Ceremonies was Dr Gael Jennings – an award-winning journalist and TV presenter with a keen interest in education. Panellists invited to stimulate discussion included:

- Professor Ian Donaldson, President of NAF and the Australian Academy of the Humanities;
- Dr Glenn Withers, Chief Executive Officer of Universities Australia;
- Dr Alan Finkel, ATSE Board Member and Chancellor of Monash University;
- Mr Angus McFarland, former President of the National Union of Students; and
- Dr Carola Vinuesa, Senior Research Fellow at the John Curtin School of Medical Research.

Further information about NAF activities is available from www.naf.org.au.

Publications

Publications produced by the Academy are available in hard copy and most are also available online.

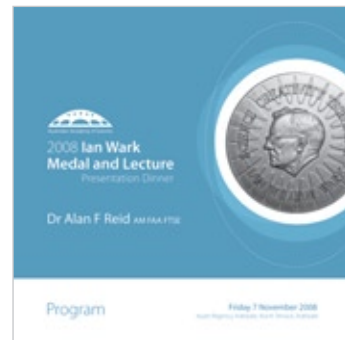
Printed and online publications for 2008–09

| | |
|--|----------------|
| President's Note 60 www.science.org.au/presnotes/pres60.htm | April 2008 |
| <i>Vaccines and immunotherapy technologies proceedings</i> Sir Mark Oliphant Conference www.oliphant.org.au/april2008.html | May 2008 |
| Science at the Shine Dome 2008 program www.science.org.au/sats2008/index.htm | April 2008 |
| Newsletter 72 www.science.org.au/newsletters/aas72.pdf | June 2008 |
| <i>Dangerous climate change: Is it inevitable?</i> Science at the Shine Dome symposium proceedings www.science.org.au/sats2008/symposium.htm | June 2008 |
| President's Note 61 www.science.org.au/presnotes/pres61.htm | July 2008 |
| Newsletter 73 www.science.org.au/newsletters/aas73.pdf | September 2008 |
| Open day booklet | September 2008 |
| Population and Environment Fund brochure | September 2008 |
| President's Note 62 www.science.org.au/presnotes/pres62.htm | October 2008 |
| Directory 2008–09 | October 2008 |
| <i>Preventative health: Science and technology in the prevention and early detection of disease</i> High Flyers Think Tank program www.science.org.au/events/thinktank2008/program.pdf | October 2008 |
| Ian Wark Medal and Lecture program | October 2008 |
| Remote sensing technologies and sustainability China–Australia symposium program www.science.org.au/events/australiachina/2008/program.pdf | November 2008 |
| Newsletter 74 www.science.org.au/newsletters/aas74.pdf | December 2008 |
| President's Note 63 www.science.org.au/presnotes/pres63.htm | February 2009 |
| East Asia and Pacific summer institutes for US graduate students | February 2009 |
| Newsletter 75 www.science.org.au/newsletters/aas75.pdf | March 2009 |

High Flyers Think Tank proceedings

www.science.org.au/events/thinktank2008/index.htm

www.science.org.au/reports/2009anrep.htm



A selection of printed material from 2008

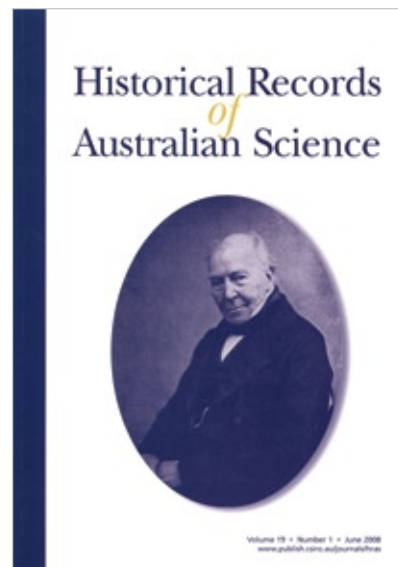
The publications team also produced printed and electronic flyers, banners for conferences, advertising material, public lecture transcripts, posters, PowerPoint presentations, cards, DVDs of new Fellows' presentations and other design material.

Historical Records of Australian Science

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

The journal has an editorial board chaired by Professor David Curtis FAA, which sets and maintains the editorial standards for the journal and advises Council on matters of policy. Professor Curtis has decided to step down after many years as the chair and Professor John Passioura FAA has agreed to assume the role. The editor, Professor Rod Home, has also decided to retire and will be gradually replaced by Dr Libby Robin.

Two issues were published in 2008 with four historical articles, two biographical memoirs, two series of book reviews and the annual bibliography



of the history of Australian science. CSIRO Publishing has published the journal on behalf of the Academy since 2002.

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

Australian journals of scientific research

The Academy of Science and CSIRO Publishing jointly publish 11 Australian journals of scientific research. The current agreement commenced on 1 January 2008 and will conclude on 31 December 2012. The Academy and CSIRO both recognise the importance of international scientific research in expanding human knowledge and delivering:

- innovative solutions to society, industry and the environment;
- peer review in the process of scientific research; and
- the publication of scientific research findings.

The Academy and CSIRO have agreed to cooperate to champion Australia's contribution to the international science research effort by supporting publication of the following journals of scientific research:

- Australian Journal of Botany

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

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 2008 was Professor Marilyn Renfree FAA. She has reached the end of her term and will be replaced by Professor Pauline Ladiges FAA.

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

Communications and media

www.science.org.au/media/index.htm

There were 23 media releases issued from April to March. Media enquiries in 2008 covered various science policy and funding issues including the suite of government reviews, the new Excellence in Research Australia framework, as well as higher education topics.

Highlights include Professor Julie Campbell FAA, Secretary for Education and Public Awareness, speaking at the National Press Club on 2 July. She discussed inquiry-based science education in Australia in the context of the government's initiative to develop a national curriculum.

Science at the Shine Dome speakers attracted excellent media interest particularly some of the new Fellows, Academy award winners, and symposium speakers, who were profiled in the media campaign. The work of Professor Ian Hume FAA on the effects of climate change on koalas attracted particular attention. The media response was very strong and included overseas journalists as well as many interviews by national media outlets.



Photo: Richard Bray

Interview in progress: A familiar site at the Shine Dome

A film crew from the Australian Broadcasting Corporation's (ABC) *Catalyst* program, including Robyn Williams FAA, attended the event and recorded a segment on the Academy, with the event and the Dome providing a backdrop. The program

aired on 21 August during the Eureka Awards special, and provided a snapshot of the Academy, its work and its people.

President of the Academy, Professor Kurt Lambeck, featured on ABC radio's *Ockham's Razor* program in November, speaking on the topic *Innovation today, not tomorrow*. Professor Lambeck provided

an assessment of the green paper on innovation which came out of the Cutler Review of the National Innovation System, and he suggested ways in which Australia could increase its investment in science and technology. The transcript from the program is available from www.abc.net.au/rn/ockhamsrazor/stories/2008/2431308.htm.

Website

The Academy's website (www.science.org.au) provides an important public portal to its activities and resources. Submissions, reports, newsletters, proceedings from conferences and lectures, media releases and a wide variety of other documents are placed on the web to assist in the dissemination of information about Academy activities.

In 2008 a graphic design agency was contracted with a brief to redesign, improve navigation and enhance the visual appeal of the site. To profile the

increasing number and variety of Academy activities, a new section of the website dedicated to news from the Academy will be included. The existing content will be moved to the new-look site in a step-wise fashion over a number of months, with the minimum disruption to users.

The Academy also has responsibility for the maintenance of the Sir Mark Oliphant Conferences (www.oliphant.org.au) and the National Academies Forum websites (www.naf.org.au).

Support for Academy activities

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

Special-purpose funds

| | |
|---|-----------|
| Adam J Berry Memorial Fund | |
| Family and friends of the late Adam Berry | \$2,030 |
| Adolph Basser Library | |
| FJ Fenner FAA | \$5,000 |
| Anton Hales Medal Fund | |
| I and P McDougall | \$100,000 |
| Fund for the Conservation of Endangered Native Animals | |
| Anonymous donor | \$60,000 |
| JG Russell Fund | |
| JG Russell | \$16,000 |
| Population and Environment Fund | |
| Anonymous | \$5,000 |
| Selby Fellowship Fund | |
| The Selby Scientific Foundation | \$9,200 |

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

| | |
|--|-------------|
| Fifty years of the dome book | |
| FJ Fenner FAA | \$2,000 |
| RL Stanton FAA | \$3,000 |
| Primary Connections – further professional learning | |
| Department of Education, Employment and Workplace Relations | \$226,077 |
| Primary Connections Indigenous Perspectives – Phase 2 | |
| Department of Education, Employment and Workplace Relations | \$198,550 |
| Science at the Shine Dome – sponsorship for early-career researchers 2009 | |
| Australian Research Council | \$6000 |
| National Health and Medical Research Council | \$6000 |
| Science by Doing – Stage 1 | |
| Department of Education, Employment and Workplace Relations | \$2,000,000 |

Special project grants

| | |
|---|-----------|
| Australia–Italy Award | |
| Australian Italian Scholarship Fund – South Australia | \$10,000 |
| Australia–Korea Early Career Researchers Program | |
| Department of Foreign Affairs and Trade | \$38,000 |
| Australian Education International Higher Education Seminar in Brazil | |
| Department of Education, Employment and Workplace Relations | \$1,464 |
| Digital Elevation Model – National Elevation Data Framework | |
| Department of Climate Change | \$52,313 |
| Geoscience Australia | \$19,500 |
| French–Australian Scientific Visits to Europe Program | |
| French Embassy | \$15,000 |
| French Embassy Cotutelle Program | |
| French Embassy | \$10,424 |
| International Science Linkages Strategic Policy | |
| – Department of Education, Employment and Workplace Relations | |
| Australia–Brazil Workshop | \$29,500 |
| Australia–China Symposium (Year 1) | \$60,000 |
| Australia–Korea Symposia (Year 2) | \$54,545 |
| Australian participation in the International Research Staff Exchange Scheme (Europe) | \$100,000 |
| Science Academies Programme (Year 3): International scientific exchanges | \$864,500 |
| Nanotechnology: Ensuring the benefits and managing the risks | |
| Australian Research Council | \$78,800 |
| National Strategic Plan for Earth Observation from Space | |
| CSIRO | \$10,000 |
| Department of Climate Change | \$10,000 |
| Department of Innovation, Industry, Science and Research | \$10,000 |
| Geoscience Australia | \$10,000 |
| Sir Mark Oliphant Frontiers of Science and Technology conferences (Year 3) | |
| Department of Innovation, Industry, Science and Research | \$100,000 |
| Theo Murphy (Australia) High Flyers Think Tank | |
| The Royal Society of London | \$113,636 |

The Shine Dome and Ian Potter House

The year 2008 marked the 50th anniversary since construction of the Academy's dome-shaped building commenced in March 1958. The foundation stone was laid by Prime Minister Robert Menzies on 2 May 1958, coinciding with the Academy's Annual General Meeting and symposium. The dome, previously called Becker House but now known as the Shine Dome, has been a Canberra landmark since then.

A variety of functions and events were held at the Shine Dome throughout the year. The Department of Agriculture, Fisheries and Forestry held divisional briefing sessions, the Australian Competition and Consumer Commission held a four day workshop on investigation skills and the Embassy of France held a conference on affordable low-emission energy and water. We welcomed back the Catholic Education Office who held their in-service days through the year. The Royal Australian Institute of Architects held the launch of their Biennale Travelling Student Exhibition. Events were held by Australian and New Zealand Systems of Government (ANZSOG) with their regular public lectures, and the Academy of the Social Sciences in Australia held their Annual General Meeting, Cunningham Lecture and symposium at the dome. Many one-day events were held, by the Australian Corporate Lawyers Association, the Australian Phenomics Facility, Australian Associated Press and the Conservation Council among others.

The Academy's public lecture series *Australia's renewable energy future* has been one of the major attractions at the Shine Dome this year attracting near capacity audiences. The Open Day held on 2 October also proved popular with a number of local and interstate visitors. The Open Day gave people a chance to explore the architecture of the building, with the help of local architects Pip Giovanelli and Eric Martin, and to learn more about the Academy.

The Australian Government Department of the Environment, Water, Heritage and the Arts (DEWHA) placed a plaque on the exterior of the Shine Dome, citing the values for which the dome was included in the National Heritage List. DEWHA also provided brochures that explain the heritage values of the Shine Dome for distribution to the public.



Photo: Stephanie Karkaris

Tour groups gather to discover architectural merits of the dome



Photo: Richard Bray

Plaque citing values for which the dome was placed on the National Heritage List

The gardens between the Shine Dome and Ian Potter House have been planted with a variety of hardy native plants and installed with a drip watering system as the best option for water efficient irrigation.

Part of the first floor of Ian Potter House is now used by the Academy secretariat as the number of staff continues to increase.



Wisteria clad arches frame Ian Potter House at dusk



Energy efficient lighting options are being considered

Photo: Jacinta Legg

Photo: Irene Dowdy

Lighting within the Ian Wark theatre is being investigated by a specialist lighting engineering firm to see what can be done to retrofit the theatre with modern versions of the existing fittings and to make the lighting more energy efficient.

Events held at the Dome

| Date | Function | Organisation |
|-----------|--|--|
| 16 May | <i>End child slavery: A forum on child labour</i> | The Oaktree Foundation |
| 20–23 May | Workshop <i>Basic investigation skills training</i> | Australian Competition and Consumer Commission |
| 26 May | Symposium on iodine deficiency | National Committee for Nutrition |
| 29 May | Dining Club | The four learned academies |
| 2 June | Management Services divisional presentation | Department of Agriculture, Fisheries and Forestry |
| 5 June | International Year of Astronomy stakeholders launch | CSIRO Australia Telescope National Facility |
| 11 June | Audit Advisory Council meeting | National Land and Water Resources |
| 20 June | Symposium | Research School of Earth Sciences |
| 21 June | Dr Paul Wild memorial | Private |
| 24 June | Public lecture by Dr Norman Abjorensen <i>Divided we stand: Political reflections on the federal experiment</i> | Australian National University Marketing and Communications |
| 26 June | Council meeting | Australian Academy of Science |
| 4 July | Awards night | Urban Contractors |
| 9 July | Book launch | Info Focus Australia Pty Ltd |
| 14 July | Student induction | Crawford School of Government |

| Date | Function | Organisation |
|--------------|--|---|
| 16 July | Public lecture by Dr David Bennett <i>The Commonwealth, the courts and the constitution</i> | Australian and New Zealand Systems of Governance |
| 24–25 July | 2008 Royal Australian Institute of Architects and Colorbond Steel Student Biennale launch | Royal Australian Institute of Architects |
| 25 July | SONA National Meeting | Royal Australian Institute of Architects and Student Organised Network for Architecture |
| 28–29 July | Trade Practices Act forum conference | Australian Competition and Consumer Commission |
| 1 August | Round table discussion on university policy futures | Academy of the Social Sciences in Australia |
| 2 August | Public lecture by Professor David Moss <i>Risk, responsibility and the state</i> | Academy of the Social Sciences in Australia |
| 8 August | MediaNet training seminar | Australian Associated Press |
| 12 August | Australian Science Festival Launch | Australian Science Festival |
| 14 August | Australian Science Week event <i>Physics students uncovered</i> | Australian National University College of Science |
| 21 August | Launch of the Australian Phenomics Network | Australian Phenomics Facility |
| 22 August | Divisional meeting <i>Land and coasts</i> | Department of the Environment, Water, Heritage and the Arts |
| 29 August | Government Lawyers Conference | Australian Corporate Lawyers Association |
| 2 September | Public lecture series: Dr Barney Foran <i>A low carbon economy based on renewable energy: The only way to go</i> | Australian Academy of Science |
| 8 September | Inservice day | Catholic Education Office |
| 16 September | Public forum | Conservation Council |
| 17 September | Management Services divisional presentation | Department of Agriculture, Fisheries and Forestry |
| 17 September | Public lecture by Ian Gill <i>Achieving a 'conservation economy' in indigenous communities: A Canadian model for greening and growing local economies</i> | Australian and New Zealand Systems of Governance |
| 25 September | Council meeting | Australian Academy of Science |
| 25 September | Dining Club | The four learned academies |
| 7 October | Public lecture series: Professor Martin Green FAA <i>Solar photovoltaics: Power source for the future?</i> | Australian Academy of Science |

| Date | Function | Organisation |
|----------------|---|---|
| 17 October | National opening | Australian National Fabrication Facility |
| 23 October | Management Services divisional presentation <i>Land and coasts</i> | Department of Agriculture, Fisheries and Forestry |
| 29–30 October | Emergency Management Australia | Attorney-General's Department |
| 5 November | Public lecture series: Dr Tom Denniss <i>Wave energy: The industry now and in the future</i> | Australian Academy of Science |
| 6–7 November | SIA Biennial Conference | Submarine Institute of Australia |
| 12 November | Affordable low-emission energy and water round table | Embassy of France and FEAST |
| 14 November | New DAFF collective agreement information session | Department of Agriculture, Fisheries and Forestry |
| 17 November | New DAFF collective agreement information session | Department of Agriculture, Fisheries and Forestry |
| 18–19 November | Annual symposium, Cunningham Lecture and Annual General Meeting | Academy of the Social Sciences in Australia |
| 20 November | Investment seminar | ORD Minett Stockbrokers |
| 26 November | Public lecture by Graeme Samuel <i>Consumers and small business: At the heart of the Trade Practices Act</i> | Australian and New Zealand Systems of Governance |
| 28 November | Retirement function | Centre for International Economics |
| 2 December | Public lecture series: Dr Anthony Budd <i>Geothermal energy in Australia: The who, what, where, when and how</i> | Australian Academy of Science |
| 4 December | Council meeting | Australian Academy of Science |
| 4 December | Dining Club | The four learned academies |
| 8 December | Retirement symposium | ANU Research School of Physics and Engineering |
| 12 January | National Youth Science Forum | National Youth Science Forum |
| 12 January | Blakers lecture Summer School of Mathematics | Australian National University and the Australian Association of Mathematics Teachers |
| 22 January | Australia Day Achievement Awards | Department of Agriculture, Fisheries and Forestry |
| 26 January | National Youth Science Forum | National Youth Science Forum |
| 27 January | Earth observation steering committee and working group | Australian Academy of Science and Australian Academy of Technological Sciences and Engineering |
| 29 January | Divisional meeting | Department of the Environment, Water, Heritage and the Arts and the Department of Agriculture, Fisheries and Forestry |

| Date | Function | Organisation |
|-------------|--|---|
| 31 January | Australian Neuroscience Society 2009 satellite meeting <i>From photoreceptors to behaviour</i> | ARC Centre of Excellence in Vision Science |
| 3 February | Public lecture series: Dr Karl Föger <i>Fuel cells: A real option for base load electricity</i> | Australian Academy of Science |
| 4 February | Public lecture by Mr Gary Banks <i>Evidenced-based policy: What is it? How do we get it?</i> | Australian and New Zealand Systems of Governance |
| 5 February | Council and Sectional Committee meeting | Australian Academy of Science |
| 10 February | House Committee meeting | Australian Academy of Science |
| 18 February | Luncheon with Dame Bridget Ogilvie FAA | Australian Academy of Science |
| 18 February | Jigsaw Theatre Company's season launch and 35th birthday | Jigsaw Theatre Company |
| 26 February | Dining Club | The four learned academies |
| 3 March | Public lecture series: Dr Steve Schuck <i>Bioenergy options for Australia</i> | Australian Academy of Science |
| 5 March | Council meeting | Australian Academy of Science |
| 10–12 March | Fenner Conference on the Environment <i>The art and science of good environmental decision making</i> | Applied Environmental Decision Analysis and Landscape Logic |
| 30 March | Canberra and Region Heritage Festival launch | ACT Department of Territory and Municipal Services, Special Events Unit |



The launch of the Canberra and Region Heritage Festival was held at the Shine Dome

Photo: Richard Bray



Image: Stephanie Kafkaris

Promotional flyer produced for the Heritage Festival

Adolph Basser Library

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

New library cataloguing software, *DB/Text Works*, has been purchased and installed this year. As many records as possible were imported into it from the old, corrupted catalogue; the remainder are currently being transferred individually or re-catalogued.

Manuscript collection

The manuscript collection (www.science.org.au/academy/basser/melist.htm) contains 225 sets of papers, ranging in quantity from a few sheets of correspondence to many hundreds of items. Individual scientists represented in the collection include significant figures in CSIRO such as Sir David Rivett, Sir Ian Wark and Dr Lloyd Rees, academics such as Professor Frank Fenner and Sir Ernest Titterton and more than 60 other Fellows of the Academy. The collection is not limited to Fellows. The papers of Sir Neil Hamilton Fairley, for example, are heavily used by people interested in malarial research. A number of scientific societies have also chosen the Basser Library as the repository for their archives with the Australian Institute of Physics and the Geological Society of Australia providing the largest collections.

Listings of the Library's manuscript collections are on the Academy's website, where they generate a large number of hits and significant email enquiries.



Photo: Jacinta Legg

Part of the Basser Library's impressive collection of books and manuscripts

Books and journals

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

Staffing and use

The library is currently staffed 4 days a week (Tuesdays to Fridays) by a qualified librarian with training in archives work. Opening hours are 9.30am to 5.30pm. It is open to all bona fide researchers. Queries are received from a variety of sources ranging from family historians to scholars. Our biographical resources, in particular the biographies of Australian botanists compiled for the Hunt Institute, are regularly used, particularly by family historians. In the past year researchers have included two PhD candidates from the University of Canberra, a postdoctoral student from the University of Auckland and a London television producer.

Thanks to the continuing generosity of Professor Frank Fenner FAA we were able to employ an assistant in the library for two days a week over several months.

Moran Award for History of Science Research

Each year the Library offers an award of \$2,500 to encourage use of the collections by postgraduate students and other independent researchers. This award is advertised in June. The current Moran scholar is Kate Rogers, from the University of Melbourne.

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



Photo: Stephanie Kafkaris

A variety of researchers consult the Basser Library's resources



Photo: Richard Bray

Current Moran scholar Kate Rogers at work

Obituary notices

Ronald Drayton Brown

Died 31 October 2008, elected to Fellowship 1965

Ronald Drayton (Ron) Brown was born in Melbourne on 14 October 1927. He grew up as an only child in modest suburban circumstances in Prahran and did not come from a scientific or academic background. His father had achieved some distinction in amateur athletics. His secondary education was at Wesley College, to which he had won a scholarship. He excelled in mathematics and physics and was an interested reader of astronomy books. He was dux of the school in his final year and was awarded an exhibition in physics in the Victorian matriculation examinations. In his first undergraduate year at the University of Melbourne, he majored in physics and chemistry. In second year he dropped physics, despite scoring better results than in chemistry. While completing a chemistry major he also informally attended the lectures in third year physics and mathematics, without completing the examinations, ending up with an effective triple major for his BSc in 1946.



Ron Brown

In the days before it was possible to do a PhD anywhere in Australia, Ron began his research career as an MSc student in the Department of Chemistry at the University of Melbourne with Dr Francis Lahey as supervisor. His thesis topic was alkaloid products from Australian plants, particularly *Acronychia baueri*. He had chosen this project because it would involve some organic chemistry and some spectroscopy. He was attracted by the relationships between the structure of organic compounds and their spectra, and the use of these ideas in deducing the structure of newly isolated compounds. He measured numerous uv-visible absorption spectra of the highly coloured alkaloids (structurally related to acridone) employing labour-intensive photographic methods. He attempted to introduce some novelty into the analysis by conducting simple molecular orbital calculations on the π -electron system of acridone in an attempt to account for the shifts in the two main absorption bands in the spectra as the substituents changed. The idea of using π -electron theory had been kindled by his browsing of an article in *Transactions of the Faraday Society* by Coulson and Longuet-Higgins who used Hückel MO (molecular orbital) theory to predict the structure of aromatic hydrocarbons. As there were no staff in Melbourne (physics or chemistry) at that time who knew anything about molecular quantum mechanics, Ron taught himself by importing and slogging through the texts by Pauling and Wilson and Eyring, Water and Kimball.

By the end of his MSc studies he had completed some unrelated work involving MO calculations on non-benzenoid hydrocarbons, including azulene, which, from his calculations, he predicted would have significant electrical polarity. This was ultimately confirmed experimentally by others. Following the completion of his MSc, Ron was appointed senior demonstrator in physical chemistry at Melbourne and continued with π -electron calculations during 1949–50 (using electromechanical desk calculators) on a variety of hydrocarbons and heterocyclic systems. In 1950 Ron won a National University Travelling Fellowship which he used to undertake a PhD with Charles Coulson in the Physics Department at Kings College, London, where he continued his π -electron work. Upon completion of his PhD in 1952 he was appointed to an assistant lectureship in chemistry at University College, London. For family reasons he decided to return to Australia in late 1952, when he was invited to a senior lectureship in chemistry at Melbourne. At Melbourne Ron continued investigating more sophisticated π -electron calculations with a series of PhD students. Calculations were almost exclusively performed with desk calculators. A significant theoretical advance developed with

PhD student Michael Heffernan was the VESCF π -MO method. This proved to be the most reliable π -only method for the prediction of electric dipole moments in conjugated hydrocarbons and heterocycles. In 1959 Ron was promoted to reader and later that year he was appointed as the foundation professor of chemistry at the newly created Monash University, where he remained head of the Chemistry Department until 1992. He retired and was appointed emeritus professor in 1993.

As head of chemistry at Monash, Ron was able to conduct a coordinated research program involving theoretical prediction and experimental measurement of the structural and electronic charge distribution of pivotal compounds. Microwave spectroscopy was selected as the most versatile experimental tool. In parallel with a tour of the USA and Canada as a Carnegie Fellow in 1964, including an extended visit to Costain's microwave spectroscopy laboratory at the National Research Council in Ottawa, a microwave spectrometer was constructed at Monash. Challenging projects were attempted, beginning with the highly reactive benzene isomers dimethylene cyclobutene and fulvene and, over the following years, the extremely reactive compounds hydrogen isocyanide, propadienone, C_3O and benzyne. Other target compounds involved theoretically challenging molecules with multiple quadrupolar nuclei and/or unpaired electrons (including NCN_3 and NF_2).

In 1971 Ron's interest in astronomy led to the study of interstellar molecules via laboratory microwave spectroscopy coupled with the direct use of radio telescopes. Ron, with his own research group and radio astronomy collaborators, had considerable success in the interstellar discovery of thioformaldehyde (1971); methanimine (1972); methyl formate (1975); $HN^{13}C$ (1976); vibrationally excited cyanoacetylene (1976); DNC (1977); $H^{15}NC$ (1977); vibrationally excited acetonitrile (1983); C_3O (1984); NH_3 maser; propynal (1988); and C_2O (1991).

Initially spurred by the prospect of discovering compounds of biological significance in space, Ron developed a parallel interest in the microwave spectroscopy of biological molecules. Even measuring the microwave spectrum of the simplest amino acid, glycine, presented immensely challenging experimental problems that had defeated earlier workers. Success was achieved in 1975, although its presence in interstellar clouds remains to be demonstrated conclusively. With the development by Ron's research group of a new style of instrument, the Stark-modulated free-jet microwave spectrometer, it became possible to measure the spectra of other amino acids (alanine), a vitamin (nicotinamide), neurohormones (phenylethylamine, amphetamine and histamine) and nucleic acid bases (uracil, cytosine, thymine and adenine).

Ron enjoyed an active and wide-ranging recreational sporting life generally and achieved significant success in state-level competition in badminton. He was president of the Victorian Badminton Association in 1960–61. In 1965 he was elected a Fellow of the Australian Academy of Science and served as a member of Council 1971–74 and 1976–80, Secretary (Physical Sciences) 1976–80 and Vice-President 1972–74. In 1973 he was a member of the Australian delegation that visited China at the invitation of the Chinese Academy of Sciences. Ron Brown's extramural activities included chairmanship of the National Committee for Chemistry and of the Committee on Science Policy. He also served as a member of the sub-committee on chemical education, and of UNESCO's Australian National Advisory Committee's specialist committee. In 1963 he was president of the Victorian Branch of the Royal Australian Chemical Institute (RACI). In 1982 he was appointed by the International Astronomical Union to an international panel of consultants to advise on the desirability of creating a new commission on bioastronomy. He subsequently served as a member of the organising committee of the commission (1982–97), serving as president for Commission 51 (bioastronomy) from 1991–93. He also served in various capacities for the International Union of Pure and Applied Chemistry between 1987 and 1997.

Ron received many honours and awards for his work including: the Masson Medal from RACI in 1948; the Rennie Medal from RACI in 1951; the HG Smith Medal from RACI and the David Syme Research Prize from the University of Melbourne in 1959; the Edgeworth-David Medal (1961) and the Liversidge Research Lecture (1969) from the Royal Society of NSW; the Royal Society of Victoria Medal in 1977; and the Matthew Flinders Medal and Lecture from the Academy in 1988. In 2002 he was made a Member of the Order of Australia, and in 2008 he received the Monash University 50th Anniversary Research Award.

Ron leaves his wife Mary, children Ron, David and Penny and seven grandchildren.

Peter Godfrey

Peter William Gage

Died 13 August 2005, Elected to Fellowship 1977

Peter Gage was born in Auckland, New Zealand, on 21 October 1937 to John Gage, an accountant, and Kathleen Mary Gage. He was the third child with two brothers (John and Michael) and a sister (Janice). Peter was educated at the Sacred Heart College in Auckland and studied medicine at the University of Otago, his MB ChB being awarded from the University of New Zealand (the only degree-awarding university in New Zealand from 1870 to 1961). In 1966, he obtained a PhD from the Australian National University (ANU) and in 1976 a DSc from the University of New South Wales (UNSW).



Peter Gage

Peter did his internship as a house surgeon in Auckland Hospital in 1961 and was a research fellow in Green Lane

Hospital, Auckland in 1962. He started his PhD in 1963 under Professor John Hubbard, a member of Sir John Eccles' department in the John Curtin School of Medical Research (JCSMR) at the ANU in Canberra. He was trained in microelectrode techniques and synaptic physiology and his studies on the neurotransmission of signals from nerves to muscle were extraordinarily productive and highly cited, including six *Nature* papers and two *Journal of Physiology* papers.

Peter then went to Professor Paul Horowitz's department at Duke University, North Carolina, from 1965–68, starting on a prestigious National Institutes of Health International Postdoctoral Fellowship, and finishing as an assistant professor. There he gained excellent training in biophysics, muscle electrophysiology, ion fluxes and synaptic transmission. This period was also highly productive producing more *Nature* and *Science* papers and some very highly cited *Journal of General Physiology* papers.

In 1968, Peter returned to Australia on a senior lectureship in the School of Physiology and Pharmacology, in the Faculty of Medicine at UNSW, with Professor WE (Darty) Glover as head of school during most of his time there. Peter taught both medical and science students, being passionate about medical students needing a strong grounding in basic science and knowledge of current research. Being a gifted and dynamic undergraduate lecturer helped to attract many students to his laboratory. In the school, he developed a very active research group of PhD students, and subsequently attracted many national and international postdoctoral researchers and senior scientists to spend their study leave working with him. He was promoted to associate professor in 1971. Following publication of his substantial invited review on the *Generation of end-plate potentials* for *Physiological Reviews*, and the award of his DSc, he was promoted to professor (personal chair) in 1976. The following year, he was elected as a Fellow of the Australian Academy of Science, later serving on its Council from 1983–86 and as a Vice-President from 1985–86.

In 1982, Peter was awarded one of the first ARC Centres of Excellence – the Nerve Muscle Research Centre – to investigate the normal and abnormal function of nerve and muscle and signal transmission between them. Peter served as director of this centre, with Dr Peter Barry as assistant director and Dr Angela Dulhunty, with the opportunity to recruit more PhD students, postdoctoral fellows and other staff, to enhance research output.

In 1984, Peter accepted a position as professor of physiology in the JCSMR at the ANU, under the directorship of Professor Robert (Bob) Porter, and moved there with Dr Dulhunty who was offered an academic appointment, almost all his PhD students, and some of his new postdoctoral fellows. At ANU, he created a vibrant research environment attracting not only many PhD students and postdoctoral fellows, but numerous distinguished senior scientists from around the world, who visited and collaborated with his group at JCSMR. In December 2002, Peter was awarded an NHMRC Senior Principal Research Fellowship at the JCSMR, which lasted until his untimely death in 2005. At the ANU, he built up an extremely strong research group of PhD students, postdoctoral researchers and senior research colleagues, and his research continued to have major

impact on membrane physiology and neuroscience. In 2001, Peter was a founder of the biotechnology company, Biotron, listed on the Australian Stock Exchange, and a member of the Biotron board. The company charter was to commercialise basic research discoveries in Australia and Peter was a co-inventor on two patents related to ion channel activity. In 2004, Peter was awarded the prestigious Bob Robertson Medal of the Australian Society for Biophysics (named in honour of Sir Rutherford (Bob) Robertson), in recognition of his outstanding contributions to the field of biophysics, the society and to Australian science in general. Peter was also elected an honorary member of the Australian Physiological Society in 2005; he had been a member since 1964, treasurer 1973–75 and president 2000–04.

Peter introduced many new cutting-edge techniques to Australia, establishing his laboratory as a central resource for training others, with his organisation of annual Curtin Conferences in Canberra on ion channels from 1995 reinforcing this role. These techniques included: voltage-clamping with operational amplifiers; with Angela Dulhunty, the three-electrode voltage clamp for measuring asymmetric charge movement in muscle; with Peter Barry and PhD student Nino Quartararo at UNSW, the patch-clamp technique for directly studying ion channels; and with members of his group at the ANU, the hippocampal slice technique to study synaptic currents. Throughout his research career, Peter's work on neurotransmission, muscle and the structure and function of ion channels, some even formed by virus proteins, was highly productive. It resulted in more than 200 publications, mostly in high-to-very-high impact journals (including 16 in *Nature* and 3 in *Science*), with his work being cited well over 7,000 times. He held numerous research grants, mainly from the NHMRC and ARC. He had more than 30 successful PhD students, many of whom went on to distinguished careers, and at least 22 postdoctoral fellows. Peter was an excellent speaker with innumerable invitations to speak at national and international conferences.

On a personal and family note, Peter married Jillian (Jill) Christine Shewan in 1960. They had two daughters, Michelle and Jennifer, two sons, Peter and David, and eleven grandchildren. From the early 1980s till his death in 2005, Peter's partner and research colleague was Dr Angela Fay Dulhunty. In addition to his enthusiasm for research, Peter was also an engaging person with a keen sense of humour, who was very supportive of his colleagues and staff, and he loved, and was proud of, his children and grandchildren. He was also keenly interested in music, in native vegetation regeneration on his hobby farm, and activities like tennis, skiing, horse riding and camping.

David Adams
Peter Barry

Christopher Charles Heyde

Died 6 March 2008, elected to Fellowship 1977

Chris Heyde was born in Sydney on 20 April 1939, the son of Gilbert Christoph von der Heyde and Alice Danne Wessing. When he was young, his parents separated and he was brought up essentially by his mother. He went to school at Barker College, Hornsby and was dux in 1956. He initially excelled at sports, but later became interested in mathematics, rapidly developing his talent for it.

In 1957, he enrolled at the University of Sydney and graduated with first class honours in mathematical statistics and the University Medal in 1961. He continued his studies for an MSc under Professor Oliver Lancaster in 1962. In his first paper in the *Journal of the Royal Statistical Society B25* (1963), 392-393, which became a classic, he showed that the lognormal distribution is not determined by its moments.

Having won a Commonwealth Postgraduate Scholarship, he joined Pat Moran's Department of Statistics at the Australian National University (ANU), and was awarded his PhD in 1965. Later that year he married Elizabeth James. They had two boys, Neil and Eric, each of whom now has two children.

Chris's first job was at Michigan State University, from which he moved to Sheffield at the end of 1965, and later to Manchester in 1967. In 1968, Chris returned to Australia to take up a readership in Ted Hannan's Department of Statistics at the ANU's School of General Studies. He had already produced some 30 papers on classical themes in probability theory. He now began to explore branching processes, population genetic models and martingale methods, collaborating in several papers with Eugene Seneta and Ted Hannan.

In 1973, the ANU awarded him a DSc for his work on mathematical statistics and probability. Together with Seneta, he wrote the book *IJ Bienaymé: Statistical Theory Anticipated* (1977), a history of probability and statistics in the 19th century.

In 1975, Chris joined Joe Gani in the CSIRO Division of Mathematics and Statistics, where he rapidly rose to become chief research scientist and assistant chief. In 1981, when Joe resigned as chief, he took over as acting chief until his appointment as professor and chairman of the Department of Statistics at the University of Melbourne. He helped to create the Key Centre for Statistical Science, a joint enterprise of La Trobe, Monash and Melbourne Universities and RMIT, of which he became the foundation director.

In 1986, Chris returned to the ANU, as professor and head of the ANU Department of Statistics in the Institute of Advanced Studies. In 1992, he became the foundation dean of the ANU School of Mathematical Sciences (now the Mathematical Sciences Institute), which brought together both undergraduate and graduate mathematical groups at ANU. From 1993, while continuing at ANU, he was also professor of statistics at Columbia University, New York, teaching there every Fall semester and directing the Columbia Center for Applied Probability.

Chris took a serious interest in the development of mathematics and statistics in Australia and internationally. Having been elected to the fellowship of the Academy in 1977, he served as a member of Sectional Committee 1 for mathematics from 1978–82 (chairman 1980–82), as Council member from 1986–93, as vice-president from 1988–89, and as treasurer from 1989–93. He was chairman of the Executive Committee of the Australian Foundation for Science from 1990–92, and a director of the Foundation from 1992–99. He was a member of the Council of the Australian Mathematical Society from 1980–83, and its vice-president in 1981. He was vice-president of the International Statistical Institute (ISI) from 1985–87, and again from 1993–95; he was also a member of the Council of the ISI's Bernoulli Society from 1979–87, its president-elect from 1983–85 and its president from 1985–87. He was a member of the Council of the Canberra Branch of the Statistical Society of Australia (SSA) from 1973–83 and its president from 1987–89. While at Melbourne, he was



Chris Heyde

a member of the Victorian Branch Council of the SSA from 1984–86, and its branch president from 1985–86. He was a member of the SSA's Central Council from 1973–86, and the SSA's federal president from 1985–86. He was a member of the Australian Mathematics Competition Board from 1981–92, and of its successor the Australian Mathematics Trust from 1992 until his death.

Chris was a prized editor and associate editor of many journals, among them the *Journal of the Australian Mathematical Society* (associate editor 1972–74), the *Australian Journal of Statistics* (editor 1973–78), the *Annals of Probability* (associate editor 1974–81), the *Mathematics of Operations Research* (1976–90), the *International Statistical Review* (associate editor 1980–87), the *Advances in Applied Probability* (associate editor 1972–82), and *Stochastic Processes and their Applications* (associate editor 1972–82, editor 1983–89). He was also one of the editors of the Springer series in *Probability and Its Applications* from 1985 until his death.

He had a close association with the Applied Probability Trust (APT): he was one of the editors of *The Mathematical Scientist* from 1982–2007, and was editor-in-chief of the *Journal of Applied Probability* and *Advances in Applied Probability* from 1990–2008, jointly with Soren Asmussen from May 2005. He was a valued APT Trustee for 24 years from 1984–2008, and was largely instrumental in the production of the electronic versions of the *Applied Probability journals*, currently stored with EUCLID and JSTOR.

Chris's papers and books cover a wide range of topics in probability and statistics, among them the moment problem, random walks, the iterated logarithm law, enzyme reactions, branching processes, martingale theory, genetic models, the Hawkins random sieve, clutch sizes of birds, random trees, long range dependence, fractals, quasi-likelihood methods, inference for time series, risk assessment for catastrophes, and generalisations of the Black–Scholes model in financial mathematics.

Chris was well recognised for his achievements. He was elected a member of the ISI in 1972, a Fellow of the Institute of Mathematical Statistics in 1973, serving on its Council from 1982–85 and again from 1991–94. He became an honorary life member of the SSA in 1981. He was awarded the SSA's Pitman Medal in 1988, the Hannan Medal of the Academy in 1994, and its Lyle Medal in 1995. The University of Sydney conferred a DSc (honoris causa) upon him in 1998, and he was appointed a Member of the Order of Australia (AM) in 2003. He was also elected Fellow of the Academy of Social Sciences in Australia in 2003.

Chris was diagnosed with hairy-cell leukemia in 1997, and underwent periods of treatment followed by remissions. In early 2008, metastatic melanoma was diagnosed, and he died on 6 March 2008. He will be sorely missed by his family, friends and colleagues; our heartfelt sympathy is extended to his wife and family.

Joe Gani

Richard Ernst Meyer

Died 6 January 2008, elected to Fellowship 1956

Richard Meyer was born in 1919 in Berlin, Germany, and received his basic education there, at the French College. He went on to tertiary study at the Swiss Federal Institute of Technology, Zurich, from 1937 to 1941, earning a diploma of mechanical engineering. From 1942 to 1944 he held appointments as an assistant at the Institute for Aerodynamics, and to the chair of descriptive geometry, at the Swiss Federal Institute of Technology. During this period he studied mathematical physics and worked on turbine theory. In 1946, on publication of his thesis, he was awarded the degree of DrScTech.



Richard Meyer

He went to England at the beginning of 1945, undertaking a journey which passed through occupied France. He spent a little over 12 months at the Ministry of Aircraft Production, and in July of 1946, took up a position as assistant lecturer in mathematics and engineering at the University of Manchester. In 1947 he became an ICI research fellow at the same university.

At that time the University of Manchester was becoming renowned for work in fluid mechanics, and he became a part of that activity by his research into mathematical aspects of supersonic flow. He made extensive use of the method of characteristics in treating a number of problems in gas dynamics and supersonic aerodynamics. He was particularly interested in focusing effects, as expressed through characteristics analysis, and the way they could sometimes alter the nature of a compressible flow field. He contributed a chapter on the method of characteristics to an important book on high speed flows.

In 1953, he came to Australia to take up a senior lectureship in aeronautics at the University of Sydney. He already enjoyed a substantial reputation as a theoretical aerodynamicist and applied mathematician, and was elected to the Academy in 1956. In Sydney, he broadened his activities to become the leader of a research group in supersonic aerodynamics. He expanded on previous work on the accuracy of the flow field produced by a supersonic wind tunnel to apply it to the supersonic wind tunnel in the Sydney laboratory. He also developed a simple theory which described the way a large thermal mass could be used to regulate the temperature of the air supplied to a supersonic wind tunnel. As well as pursuing these practical matters he supervised the work of postgraduate students and continued his theoretical research.

He left Sydney in 1957 and took up a professorship of mathematics at Brown University, Rhode Island, USA, moving to the University of Wisconsin in 1964. On leaving Sydney, he began the development of a major research interest in the fluid dynamics of water waves.

He has summed up his research interests as follows: 'My primary interest is in the relation between physical reality and mathematical models used in the theoretical elucidation of natural phenomena and engineering processes. This has led me to research on the deeper mathematical structure of widely used models and on the connection between that structure and better methods of realistic and efficient approximation, numerical or analytical, or the predictions of the models. In some cases, it has led to drastic revision of branches of science.'

An example of this is his treatment of the undular jump, a water wave causing a small rise in water level. By conducting an analysis for small wave height, he was able to resolve historical uncertainty concerning the structure of the jump, showing that it was a dispersive effect.

His work on the fluid dynamics of water waves was initially concerned with the processes of waves breaking on a beach, and led to the patterns of wave reflection, transmission and refraction in passage over a seabed of varying depth. The manner in which various shoreline contours, particularly islands, acted to generate

complex wave patterns, which sometimes bore little relation to the oncoming sea, was also explored intensively.

His subsequent work did not involve the development of a major area of fluid dynamics, though he continued to contribute in a number of different areas of fluid physics, and to develop mathematical aspects uncovered in his earlier work.

He enjoyed a reputation as an invited speaker, delivering more than 50 lectures in nine countries. He was fluent in German, French and English, and passable in Italian and Spanish. He regarded teaching as an important part of his career, and took pleasure in doing it well. His undergraduate lectures were stimulating and well prepared. As a postgraduate supervisor he was thorough, his response to a verbal presentation being 'write it down'. But having written it down, the student would find him generous with his time and ideas. He successfully conveyed a sense of excitement with the research.

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

Ray Stalker

Rodney Warren Rickards

Died 17 December 2007, elected to Fellowship 1981

Rod Rickards was one of the most important contributors to Australian science through his outstanding achievements in the chemistry of compounds of medical, biological, agricultural and veterinary importance. His sudden and unexpected death came as a shock to his family and a wide circle of friends and colleagues.

He was born at Manly on 30 June 1934 and lived there with his parents and elder brother Alan for most of his early life, although mother and children moved to Inverell in northern NSW for a year in 1942 to escape a feared Japanese attack on Sydney. He attended North Sydney Boys High School and received honours in physics and chemistry. He entered Sydney University as an undergraduate in 1952 and, after

a brief flirtation with chemical engineering, settled on chemistry. Because of his interest in the chemistry of living systems, he undertook an honours degree in organic chemistry with Professor Arthur Birch FAA, one of the great masters of the subject.

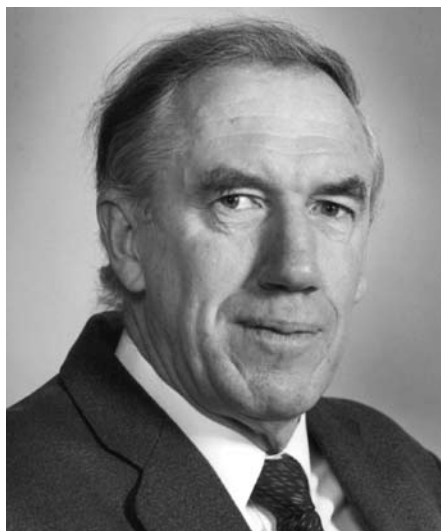
Rod graduated in 1955 with first class honours and the University Medal in organic chemistry and began a long-lasting research collaboration with Birch in biosynthesis. In 1956 Birch moved to the University of Manchester, UK, where the facilities and resources at that time were better than in Sydney, and Rod joined him to continue biosynthetic work on mould metabolites. In 1953, Birch had postulated that many phenolic natural products are derived by head-to-tail coupling of acetate units. In Manchester, following earlier experiments in Sydney, Rod helped to establish the correctness of this hypothesis by use of a then new method in which acetic acid, labelled with carbon-14, was fed to a microorganism. The label was then detected and located quantitatively in the resulting natural product.

In 1958 Rod was appointed as assistant lecturer at Manchester and in 1961 promoted to lecturer. During the 10-year Manchester period, he developed what was to become his trademark strategy in which organic synthesis, biomimetic synthesis and biosynthesis were integrated with structural and stereochemical deduction.

Probably the most spectacular example of his approach was the correct determination of the highly complex structure of the polyene antibiotic nystatin, which was the first antifungal agent to be introduced into human chemotherapy and is still widely used. This feat was accomplished without the use of high-field proton and carbon-13 magnetic resonance spectroscopy, techniques that were not available in those days but now are regarded as indispensable for that type of work.

In 1963 the Australian National University decided to establish a world-class Research School of Chemistry as part of the Institute of Advanced Studies. Together with Professor Birch at Manchester and Professor David Craig FAA at University College London, Rod was intimately involved in the planning, design and, later, construction of the new building and its laboratories, which were equipped to the highest levels then available. In 1966 Rod came to Canberra, with Birch and Craig, as a foundation appointee in the school. He was promoted to professorial fellow in 1968 and became professor in 1992. It is a tribute to these three chemists that, 40 years on, the Research School of Chemistry is still one of the most attractive and functional chemistry buildings in Australia.

From 1966 to his formal retirement in 1999, Rod and his group of students and postdoctoral fellows produced numerous papers and patents on the chemistry of important bioactive compounds, including more than 20 different families of antibiotics. A highlight was the discovery in Canberra of the ansamycin antibiotics, which he named actamycin, after the Australian Capital Territory. This led him to predict the existence of a new natural amino acid, 3-amino-5-hydroxybenzoic acid, which he demonstrated by extensive labelling studies to



Rod Rickards

be the basis of a new, fundamental pathway in aromatic biosynthesis.

He also developed an elegant and flexible synthesis, from the cheap, readily available precursor phenol, of mammalian hormones of the prostaglandin group and established a commercial biomimetic synthesis of tetrahydrocannabinol, the principal psychoactive component of cannabis resin, a compound that may prove to be of therapeutic value.

On the basis of his outstanding research, Rod was elected Fellow of the Royal Australian Chemical Institute in 1968 and Fellow of the Academy in 1981. In the following year he received the HG Smith Medal, the premier research award of the RACI, and, ten years later, the Adrien Albert Award of the Medical and Agricultural Division of the RACI. He also received an Australian Centenary Medal in 2003. He gave numerous plenary lectures at national and international conferences, especially in the Pacific region, and presented the ANZAAS Liversidge Memorial Lecture in 1975, the inaugural Sir Robert Price Lecture (CSIRO) in 1990, and the Royal Society of Chemistry lectures in 1994–95. His lectures were notable for their lucidity and logical presentation.

Rod was chairman of the RACI's Division of Organic Chemistry between 1980–82, and was a member of the Executive Council of the RACI during 1982. He also chaired the National Committee for Chemistry of the Academy in the period 1986–89. He served on the Occupational Health and Safety Committee of the ANU for many years, including a period as its chair.

Rod also used his expertise to serve the wider community. From 1993 to 2007 he represented the Academy on the Council of the National Science Summer School (the National Youth Science Forum) and helped to develop the program that enables promising Year 12 students who are interested in pursuing a career in science to participate in research projects in various institutions in Canberra over a two-week period in January. He also served on the Academy's Europe Committee as a member between 1994 and 2002 and as the chair from 2003 to 2006. During this time Rod made important contributions to the day-to-day workings of this committee and also to strengthening the links between the Academy and the office of the Science Counsellor at the French Embassy in Canberra.

He greatly assisted the ACT Department of Health in the careful wording of the Territory's Act governing prohibited substances and drugs of dependence so as to remove possible loopholes.

After his retirement in 1999 Rod was appointed emeritus professor at the ANU and a visiting scientist at CSIRO Entomology, thus enabling him to continue several productive research collaborations. These included studies of the juvenile hormone of the Australian sheep blowfly, work on novel antibiotics called calothrixins that are active against malarial parasites and human cancers, and an investigation of possible insect sources, such as termites and sawflies, for novel antibiotics.

Rod's good humour, good sense and approachability were recognised and appreciated by colleagues at all levels. He was always generous with his time, ever ready to discuss and modestly offer advice based on his extensive knowledge and experience. He gave the members of his research group considerable independence in setting up and solving their particular scientific problem and impressed on them the necessary critical, rigorous attitude to the interpretation of results. He had an uncanny eye for detail, and was careful and thorough in all that he did. He was a very private person who was devoted to his family.

Rod's last completed task was a detailed biography of his mentor, Arthur Birch, written with Sir John Cornforth (Nobel laureate, 1975), which appeared about a year ago, simultaneously in *Historical Records of Australian Science* and *Biographical Memoirs of Fellows of the Royal Society*.

He is survived by his wife, Anna, who had been one of his PhD students, and his daughter, Helen, of whose promise and achievements he was intensely, though never openly, proud.

Martin A Bennett
Lewis N Mander

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