Australian Academy of Science

AUSTRALIAN ACADEMY OF SCIENCE

ANNUAL REPORT

1 April 2009 – 31 March 2010

2009–10

AUSTRALIAN ACADEMY OF SCIENCE
ANNUAL REPORT 2009–10

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REPORT OF THE COUNCIL

For the year
1 April 2009 – 31 March 2010

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President's foreword

The Academy's mission is 'to champion Australian scientific excellence, to promote and disseminate scientific knowledge, and to provide independent scientific advice for the benefit of Australia and the world.' From the beginning, its objectives have included the promotion of excellence in scientific research nationally and internationally; to develop and sustain a national scientific culture through science awareness and education programs; and to provide independent scientific advice to assist policy development and program delivery.

The promotion of excellence is done through the Academy elections, its awards, its support of young researchers, the provision of research support and lectureships, and through its international activities. Each year we elect up to 16 new members, each of whom will have made fundamental contributions in their own discipline and who have collectively contributed to the high international reputation of Australian science. Also each year a number of special awards are made that recognise particularly significant achievements in science, both for sustained career efforts and by outstanding early-career researchers.

The Academy is committed to promoting science through its public awareness and education programs. It does so not only to ensure that Australia has future generations of outstanding scientists but also in recognition of the importance of having a scientifically literate society: a society that understands how science works; that can contribute constructively to the debate on how science and technology can be used to make creative use of new technologies; and one that can make informed decisions about how science should be used to address many of the complex issues and challenges that Australia faces.

Our two principal science education programs, developed in partnership with the Australian Government Department of Employment, Education and Workplace Relations, are *Primary Connections* and *Science by Doing*.

Primary Connections, with its focus on linking science with literacy, has now reached out to 53 per cent of all Australian primary schools. An important component of the program is the training of professional learning facilitators to instruct teachers in the effective use of the inquiry-based curriculum resources. In the last four years the Academy has trained over 500 facilitators who have conducted over 6000 teacher training workshops. One hundred of these facilitators were trained at the request of the Government of South Australia in preparation for the statewide rollout of *Primary Connections* over the next three years.

The Academy's junior secondary school program, *Science by Doing*, began later but has advanced considerably this year. Trials have commenced with a range of innovative DVD and CD-ROM-based professional learning and curriculum resources.

Both programs have been developed in close consultation with the education departments of all states and territories and care has been taken to ensure that their use will enable the implementation of the national science curriculum being developed by the Australian Curriculum Assessment and Reporting Authority.

One of the Academy's roles is to provide science-based evidence to underpin policy development directed at national needs. Comprising Australia's top research scientists and linked to a broader scientific community through its national committees, the Academy can access expertise in many areas of science and technology and direct this to the development of evidence-based policy. An important feature of the Academy is its independence of government and of institutions: members participate by virtue of the personal contributions they can make to science and technology and not because of the institutions to which they belong.

This year's report indicates the range of issues that have been addressed, sometimes in response to specific actions of government, such as a call for submissions to governmental or parliamentary enquiries, and sometimes the result of recognition that it is timely to address a particular issue. Examples this year of the

latter have included *An Australian Strategic Plan for Earth Observations from Space*, prepared jointly with the Academy of Technological Sciences and Engineering, *Nanotechnology in Australia, Australia's Renewable Energy Future* and *Agricultural Productivity and Climate Change*. This last report is an outcome of the High Flyers Think Tank, one of the Academy's initiatives to engage early- and mid-career researchers from diverse backgrounds in identifying gaps in knowledge in, as well as novel solutions to, issues of national importance.

The Academy has long recognised the need for quality careers for the next generation of scientists in universities, research laboratories and industry, and to ensure that there is an adequate support system during their early years. What the Academy can actually do is limited by resources, but some of the activities reported here include the above-mentioned Think Tanks, workshops for early-career researchers at Science at the Shine Dome, a new newsletter entitled *Early Days*, and directing funding for research awards and travelling fellowships preferentially at young and early-career researchers.

International collaboration in science permeates much of the Academy's activities and this led to the launch this year of a position paper, *Internationalisation of Australian Science*, which outlined the benefits and proposed ways of improving our integration with the global scientific community. The Academy, through its national committees, provides links with many non-government international scientific organisations, including the International Council for Science and its scientific unions, and this year Professor Bruce McKellar FAA was elected to chair its regional Asia-Pacific Committee. In addition, the Academy was elected for a further term on the Executive Committee of the InterAcademy Panel, served on the Board of the InterAcademy Council, and took up the presidency of the Federation of Asian Scientific Academies and Societies.

The management of bilateral cooperation programs continues to be an important activity. With support from the Department of Innovation, Industry, Science and Research (DIISR) through their International Science Linkages (ISL) scheme, a number of important workshops and meetings took place, including the sixth Australia–China Symposium and the National Science Foundation's East-Asia and Pacific Summer Institutes program for US graduate students. An important component of the Academy's international program is the provision of support for short-term international research visits in both emerging and strategic areas of science and technology. This program is substantially funded through DIISR-ISL but it has also been able to derive funding from other sources, including the new Rod Rickards Fellowship for research in biology and chemistry within Europe. The importance of these programs is that they are open to scientists from any research laboratory, they are not restricted to specific research priorities, and applications from early- and mid-career researchers are encouraged. Thus they provide opportunities for building long-term research networks and to contribute not only to today's science but also to the science of tomorrow.

I would like to thank not only the outgoing but all councillors who have served the Academy well as office bearers and ordinary members during my presidency. For this year I particularly thank Professor Julie Campbell FAA, outgoing Secretary for Education and Public Awareness, and Professor Jenny Graves FAA, outgoing Foreign Secretary. Both have served with distinction. I also thank all members of the Secretariat for their commitment to the work and ideals of the Academy. They have made my term as President possible and pleasurable.

Kurt Lambeck AO PresAA FRS
31 March 2010

Chief Executive's foreword

The appointment of additional staff approved by Council last year has contributed significantly to improving the Secretariat's capacity to conduct science policy work, support the national committees for science, increase international activities, and improve events and project management.

The enjoyment associated with working in heritage buildings brings with it a responsibility for their upkeep which has included drainage and guttering replacements at Ian Potter House, repairs to the car park, and finding a novel solution to replacing the ceiling lights in the Shine Dome at a fraction of the previous cost and time. The replanting of the gardens is showing the benefit of recent rains and careful maintenance and, judging by the number of ducklings that have been taught to swim in the Dome moat, the water treatment is now working well.

As 2009 was the 50th anniversary of the opening of the Dome we made a special effort for the Open Day in October which attracted over 400 visitors.

The response to the Academy's monthly public lectures has been very pleasing with the high levels of attendance achieved for the Australia's Renewable Energy Future series being maintained for the subsequent Water Management Options for Urban and Rural Australia program. We also had capacity crowds for a National Science Week lecture by Dr Mike Raupach FAA, *Climate change, human aspiration and the finite capacity of planet Earth*, and for a presentation by the President of the Royal Society, Lord Martin Rees FRS, *Challenges for the next 50 years*.

Arguably the biggest project of the year was a comprehensive upgrade of the Dome's audiovisual systems, including an additional screen in the Jaeger Room and videoconferencing facilities in the auditorium and Becker Room.

All of the public lectures are posted on the Academy's website as audio or video broadcasts within a few days and replaced by the presentation slides and transcripts as soon as they can be prepared. An upgraded website incorporating accordion style menus was launched in March and accessing talks should be easier than ever under 'Events'. In addition to a major structural overhaul of the presentation of content, a 'Fellows only' area has been added which includes a forum.

In short, much has been achieved over and above the usual workload and I thank all staff for their high level of professionalism as well as their unfailing enthusiasm and good humour.

Sue Meek FTSE

Council and administration

The Australian Academy of Science's affairs are conducted by a Council of 17 Fellows that met six times between 1 April 2009 and 31 March 2010. To ensure that Academy business was managed effectively between Council meetings the Executive Committee, which has delegated authority, met 10 times in the reporting period.

Executive committee

Professor Kurt Lambeck AO FAA FRS — President
Distinguished Professor of Geophysics, Australian National University

Professor Peter Hall FAA FRS CorrFRSE — Secretary for Physical Sciences and Vice-President
ARC Federation Fellow and Professor, Department of Mathematics and Statistics, University of Melbourne

Professor Graham Farquhar FAA FRS — Secretary for Biological Sciences and Vice-President
Professor of Environmental Biology and Associate Director of the Research School of Biological Sciences, Australian National University

Professor Bob Williamson AO FAA FRS — Secretary for Science Policy
Honorary Senior Principal Fellow and Professor, University of Melbourne

Professor Jenny Graves AO FAA — Foreign Secretary
Director, Australian Research Council Centre for Kangaroo Genomics
Head, Comparative Genomics Research Group, Research School of Biological Sciences, Australian National University

Professor Julie Campbell AO FAA — Secretary for Education and Public Awareness
Director and NHMRC Senior Principal Research Fellow, Centre for Research in Vascular Biology, University of Queensland
Director, Wesley Research Institute, Wesley Hospital, Brisbane

Professor Mike Dopita FAA — Treasurer
Emeritus Professor, Research School of Astronomy and Astrophysics, Australian National University

Council members

Physical sciences

Professor Ron Ekers FAA FRS
ARC Federation Fellow, CSIRO Australia Telescope National Facility, Sydney

Professor Andy Gleadow FAA FGSAust
Professor of Earth Sciences, School of Earth Sciences, University of Melbourne

Professor Paul Haddad FAA FRACI FRSC FTSE
ARC Federation Fellow and Director, Australian Centre for Research on Separation Science, University of Tasmania

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

Professor Michelle Simmons FAA
ARC Federation Fellow and Professor, Centre for Quantum Computer Technology,
University of New South Wales

Biological sciences

Professor Chris Goodnow FAA FRS
ARC Federation Fellow and Chief Scientific Officer, Australian Phenomics Facility,
John Curtin School of Medical Research, Australian National University

Professor Doug Hilton FAA
Director, Walter and Eliza Hall Institute of Medical Research, Melbourne

Professor Richard Hobbs FAA
Australian Professorial Fellow, School of Plant Biology, University of Western Australia

Dr Oliver Mayo FAA FTSE
Honorary Research Fellow, CSIRO Livestock Industries, South Australia

Professor Hugh Possingham FAA
ARC Federation Fellow, Professor and Director, The Ecology Centre, University of Queensland

Photo: Mona Akbari

Executive Committee: (back, L to R) Mike Dopita, Graham Farquhar, Peter Hall, Bob Williamson; (front, L to R) Julie Campbell, Kurt Lambeck, Jenny Graves

More information on Council members is available at: www.science.org.au/fellows/

Strategic Plan 2010–15

A key activity of the Council in 2009 was to conduct a review of the 2004–09 Strategic Plan. The Academy's 2010–15 Strategic Plan is provided below.

Vision

The vision of the Australian Academy of Science, as Australia's primary representative of natural and applied science, is:

> Excellence in Australian science

Mission

The Academy's mission is:

> To champion Australian scientific excellence, to promote and disseminate scientific knowledge, and to provide independent scientific advice, for the benefit of Australia and the world.

Objectives of the Academy

Promote excellence in scientific research nationally and internationally

1. To identify priority areas of research, training and infrastructure support for discipline development in conjunction with the national committees for science.
2. To provide career development and network building opportunities for young researchers.
3. To promote support for the best Australian scientific research, including facilitating access to international scientific organisations and programs.
4. To support the promotion of Australian science capabilities internationally and contribute expertise and leadership in regional and global collaborative networks.

Develop and sustain a national scientific culture

5. To ensure that the Academy and the Fellowship are fully representative of the best scientists in Australia and, through competitive awards, promote community recognition of the contributions of high quality science to health, well-being and national prosperity.
6. To support the teaching of science at all levels (primary, secondary and tertiary), elevate national standards, enhance teacher competencies and encourage students' consideration of science and technology based careers.

7. To provide forums for discussion and debate, publications, and balanced, expert information on scientific issues of national significance and/or community concern.

Provide valued independent scientific advice to assist policy development and program delivery

8. To develop networks and alliances with relevant stakeholders to provide conduits for input of insights and expertise on scientific matters.
9. To provide authoritative advice on matters of research support, education and training, and science application to inform policy development and decision-making.
10. To monitor scientific developments in Australia and overseas to anticipate and communicate potential impediments and opportunities.

This Annual Report describes the activities of the Academy from 1 April 2009 to 31 March 2010 to meet the objectives outlined in the 2010–15 Strategic Plan.

The Fellowship

The Academy Fellowship comprises 438 of Australia's leading research scientists, elected for their personal contributions to science. Fellows occupy senior positions in universities, government research agencies, industry, business and media.

The Fellowship, 31 March 2010:

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

Harvey, RP
Hatch, MD
Healy, TW
Heath, WR
Higgins, TJ
Hill, DJ
Hilton, DJ
Hinde, DJ
Hirst, GDS
Hobbs, BE
Hobbs, RJ
Hoffmann, AA
Holliday, R
Holloway, BW
Holman, ME
Holmes, AB
Holt, PG
Hopwood, JJ
Horridge, GA
Hughes, TP
Hume, ID
Hunter, RJ
Hurst, CA
Hush, NS
Hutchinson, JE
Hyde, BG
Hyde, ST
Hynes, MJ
Imberger, J
Israelachvili, JN
Jacobsen, JV
Jagadish, C
James, DE
Jameson, GJ
Jeffrey, SW
Johnstone, BM
Jones, 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
Lay, PA
LeCouteur, KJ
Lehrer, GI
Letham, DS
Levick, WR
Lindenmayer, DB
Lindoy, LF
Linnane, AW
Lovering, JF
Lumbers, ER
Lyons, LE
MacFarlane, DR
Mackay, CR
Mackay, IR
Mai, Y
Manchester, RN
Mander, LN
Marcelja, S
Marshall, BJ
Martin, NG
Martin, RL
Martin, TJ
Masters, CL
Mathieson, AM
Mattick, JS
Mayo, O
McCloskey, DI
McComb, AJ
McCormick, PG
McCracken, KG
McCulloch, MT
McDougall, I
McDougall, TJ
McElhinny, MW
McEwan, AD
McFadden, GI
McFadden, PL
McIntosh, AGR
McIntosh, RA
McKay, BD
McKellar, BHJ
McKenzie, JA
McLachlan, EM
McLeod, JG
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, GJV
Nugent, KA
Ogilvie, 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, JFA
Sprent, J
Sridhar, T
Srinivasan, MV
Stalker, RJ
Stanley, FJ
Stanton, RL
Stephenson, DG
Sternhell, S
Stokes, RH
Stone, J
Strasser, A
Street, R
Street, RH
Sullivan, CE
Summons, RE
Sutherland, GR
Sutherland, RL
Swan, JM
Tam, PPL
Tanner, RI
Taylor, SR
Thomas, AW
Thompson, CJ
Tregear, GW
Trudinger, NS
Truswell, EM
Tucker, RS
Turner, JS
Tyerman, SD

The Fellowship is listed at: www.science.org.au/academy/fellowship-list.html

Tyndale-Biscoe, CH
Underwood, AJ
Vaux, DL
Veevers, JJ
Vincent, RA
vonCaemmerer, S
vonItzstein, M
Wake, RG
Walker, NA
Wall, GE
Wallace, GG
Wallace, HR
Walter, MR
Wand, MP
Wang, X
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, RE
Williamson, R
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
Bjorkman, OE
Blackburn, EH
Boyer, JS
Brooks, RA
Buckingham, AD
Connell, JH
Cornforth, Sir JW
Feldmann, M
Harris, Sir H
Jones, VFR
Krebs, CJ
Lu, Y
May, Lord R
Öquist, FG
Oxburgh, Lord R
Powell, MJD
Raven, PH
Sanger, F
Slater, EC
Tao, T
Zinkernagel, RM

2010 New Fellows

The following scientists were elected to the fellowship on 23 March 2010:

Professor Vladimir Victorovich Bazhanov FAA
Professor, Department of Theoretical Physics, Australian National University, Canberra

Professor Jonathan Michael Borwein FAA
Professor Laureate in Mathematics, School of Mathematical and Physical Sciences, Faculty of Science and Information Technology, University of Newcastle

Professor Francis Robert Carbone FAA
Professor, Department of Microbiology and Immunology, University of Melbourne

Professor Allan Ross Chivas FAA
Professor of Geosciences, School of Earth and Environmental Sciences, University of Wollongong

Dr Marianne Frommer FAA
Honorary Researcher, School of Biological Sciences, University of Sydney

Professor Trevor James Lithgow FAA
ARC Federation Fellow and Professor, Department of Biochemistry and Molecular Biology, Medicine Health and Nursing Services, Monash University

Dr John Graham Oakeshott FAA FTSE
Chief Scientist, CSIRO Entomology, Canberra


Professor Jeffrey Reimers

Professor Scott Leslie O'Neill FAA
Professor and Head, School of Biological Sciences, University of Queensland

Dr John David O'Sullivan FAA
Digital Systems Engineer, Australian Telescope National Facility, CSIRO Astronomy and Space Science, Sydney

Professor Michael William Parker FAA
ARC Federation Fellow and Associate Director, Biota Structural Biology Laboratory, St Vincent's Institute, Melbourne

Professor Steven Prawer FAA
Professor of Physics, School of Physics, University of Melbourne

Professor Robert Leslie Pressey FAA
Professor, ARC Centre of Excellence for Coral Reef Studies, James Cook University, Townsville

Professor Roger Robert Reddel FAA
Sir Lorimer Dods Professor and Director, Children's Medical Research Institute, University of Sydney

Professor Jeffrey Robert Reimers FAA FRACI
ARC Professorial Fellow, School of Chemistry, University of Sydney

Professor Elaine Margaret Sadler FAA
ARC Professorial Fellow, School of Physics, University of Sydney

Professor Peter Martin Visscher FAA
Professor and Head, Queensland Statistical Genetics, Genetics and Population Health, Queensland Institute of Medical Research, Brisbane

Professor Raymond Robert Volkas FAA
Professor of Physics, School of Physics, University of Melbourne

Honours awarded to Fellows during the year 2009–10

Professor Michael Archer
Elected as a Fellow of the Royal Society of New South Wales

Professor Michael Barber
Elected as a Fellow of the Australian Academy of Technological Sciences and Engineering

Professor Elizabeth Blackburn
Nobel Prize for Physiology or Medicine
Companion of the Order of Australia (AC)

Professor Gavin Brown
Elected as a Fellow of the Royal Society of New South Wales

Professor Jeremy Burdon
Elected as a Fellow of the Australian Academy of Technological Sciences and Engineering

Professor Geoffrey Burnstock
Outstanding Contribution to British Neuroscience Award by the British Neuroscience Association
Copernicus Gold Medal by the Universita Degli Studi di Ferrara

Professor Robert Clark
Elected as a Fellow of the Royal Society of New South Wales

Professor Max Coltheart
Member of the Order of Australia (AM)

Professor Suzanne Cory
Conferred Knight of the Legion of Honour

Professor David Craig
Elected as a Fellow of the Royal Society of New South Wales

Professor Hugh Durrant-Whyte
2009 Clunies Ross Award by the Australian Academy of Technological Sciences and Engineering

Dr Jeff Ellis
Elected as a Fellow of the Royal Society of London

Professor Chris Goodnow
Elected as a Fellow of the Royal Society of London
NHMRC Australia Fellowship

Professor Robert Graham
Officer of the Order of Australia (AO)

Professor Jenny Graves
Officer of the Order of Australia (AO)

Professor David Groves
2010 Penrose Gold Medal by the Society of Economic Geologists USA

Dr Bruce Hobbs
Officer of the Order of Australia (AO)

Professor Richard Hobbs
ARC Australian Laureate Fellowship

Professor John Hopwood
2009 CSL Florey Medal
2009 Clunies Ross Award by the Australian Academy of Technological Sciences and Engineering

Professor Chennupati Jagadish
ARC Australian Laureate Fellowship
Elected as a Fellow of the Mechanical Research Society

Professor Kurt Lambeck
Officer of the Order of Australia (AO)
Elected as Foreign Associate of the US National Academy of Sciences

Professor Douglas MacFarlane
Elected as a Fellow of the Australian Academy of Technological Sciences and Engineering

Professor Charles Mackay
NHMRC Australia Fellowship

Professor John Mattick
NHMRC Australia Fellowship

Professor Robert McIntosh
Officer of the Order of Australia (AO)

Dr Jeremy Mould
2009 Gruber Prize for Cosmology

Professor Hugh Possingham
2009 Sherman Eureka Prize for Environmental Research (Marxan Development Team)

Professor Cheryl Praeger
2009 West Australian Scientist of the Year

Professor John Ralston
2009 Clunies Ross Lifetime Achievement Award by the Australian Academy of Technological Sciences and Engineering

Dr Brian Schmidt
ARC Australian Laureate Fellowship
Elected as a Foreign Member of the Royal Spanish Academy of Science

Margaret Hartley, Elizabeth Blackburn, Laura Beaton, John Beaton

Professor Steve Simpson
ARC Australian Laureate Fellowship
2009 New South Wales Scientist of the Year

Professor Scott Sloan
ARC Australian Laureate Fellowship

Professor Fiona Stanley
NHMRC 2010 Program Grant

Professor Richard Stanton
Elected as a Fellow of the Royal Society of New South Wales

Professor Anthony Thomas
ARC Australian Laureate Fellowship

Professor Jim S Williams
Member of the Order of Australia (AM)

Deaths since 1 April 2009

We regret to record the following deaths:

Professor Louis Charles (Charles) Birch AM, FAA, 19 December 2009

Professor Hans Adolf Buchdahl FAA, 7 January 2010

Professor Rossiter Henry (Ross) Crozier FAA, FAAAS, 12 November 2009

Professor Sidney Charles Bartholomew (Ben) Gascoigne AO, FAA, 25 March 2010

Dr Alan Kenneth Head AO, FAA, FRS, 9 January 2010

Professor Phillip Garth Law AC, CBE, FAA, FAIP, FTSE, 28 February 2010

Professor Albert Russell (Bert) Main CBE, FAA, 3 December 2009

Dr Arthur Melville (Mel) Thompson FAA, 8 August 2009

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. The Academy is actively involved in contributing to the formulation of policy for science education, preparing teaching resources for all levels of school science, and providing information to promote understanding of science in the community. The following is an overview of current activities.

School science programs

The Academy currently has two programs to support the effective teaching of science in primary and early secondary schools, known as *Primary Connections: Linking science with literacy* and *Science by Doing*, respectively. State and territory education departments have been integrally involved since the commencement of the former in 2006 to ensure the programs are consistent with the curriculum requirements of all jurisdictions.

More recently, the Australian Government established the Australian Curriculum Assessment and Reporting Authority (ACARA) to develop a national curriculum from Kindergarten to Year 12 in specified learning areas. The Academy has been directly involved in the development of the draft *Australian Curriculum: Science* through drafting of the initial framing paper, participating in advisory groups and contributing to consultation processes.

When the draft science curriculum was released for community consultation by the Prime Minister, the Hon Kevin Rudd MP, and the Minister for Employment Education and Workplace Relations, the Hon Julia Gillard MP, on 1 March 2010, the Chief Executive Officer of ACARA, Professor Barry McGaw, acknowledged the suitability of the Academy's education programs to support its implementation.

Primary Connections: Linking science with literacy

www.science.org.au/primaryconnections

Primary Connections is an innovative 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 literacy.

A partnership between the Academy and the Australian Government has resulted in total funding of $9.7 million over 2005–11 to develop the project and support its uptake. The education sectors in several

states and territories have now committed significant funds to support quality implementation of the *Primary Connections* approach in their schools.

Primary Connections uses an inquiry-based approach because research has shown that this delivers results for students. However, appropriate training in the use of *Primary Connections* materials is essential to obtain the best learning outcomes.

The Academy currently provides two main professional learning training programs:

- a two-day curriculum leader program, which includes comprehensive training in the project's underpinning principles and in leadership styles, designed to prepare teachers to be the science leader in their school; and
- a three-day professional learning facilitator (PLF) training program which is designed to prepare facilitators to train teachers for multiple school sites (eg for a cluster, region or district). These trained facilitators are invited to recall days each year.

A draft program has been developed for a further level of training that will be conducted in 2010 in consultation with state and territory employing authorities. The *Primary Connections* master facilitator leadership training course will offer training for a small cohort of strategic leaders who can assist education sectors to implement programs in *Primary Connections*, and to train the PLFs and curriculum leaders that they require.

The professional learning workshops have continued to be well attended during 2009–10. Recall days for approximately 200 Academy-trained PLFs were held in four capital cities in November 2009. The topics included new workshops on indigenous perspectives and 'argumentation'. The latter workshop explored strategies to assist students to debate scientific claims and evidence in the classroom.

The South Australian Department of Education and Children's Services funded the training of a further 84 PLFs in November 2009 and January 2010 to support the rollout of their initiative to implement *Primary Connections* in every government primary school in the state over the next three years. While the Academy has trained a total cohort of over 500 facilitators, there has been some decline in the number who remain active in the role due to teachers being promoted, taking leave, and/or relocating.

The *Primary Connections* team also provides a half-day training program for the Questacon Science Circus presenters each year. This is to build their awareness of the program so they can promote the inquiry-based approach to teaching and learning, and distribute information flyers to schools when they conduct workshops in rural and remote locations.

A collection of the latest *Primary Connections* units

A further nine curriculum units will be developed over the next 18 months, adding to the 19 developed to date, to make a suite of 28 published units covering the Australian science curriculum from Year K to Year 6. The nine new units will be trialled in schools Australia-wide commencing in April 2010.
Over 500 applications were received for 75 places as trial teachers.

The units and resources published in 2008–09 were again submitted and were successful in being short-listed in the Primary Teaching and Learning Category of the Australian Awards for Excellence in Educational Publishing. More than 278,000 units were distributed in Australia and overseas between January 2006 and the end of March 2010, with highest distribution in South Australia, Queensland and Western Australia. Over 53 per cent of Australian primary schools have now ordered at least one unit.

Unit map for Primary Connections, March 2010

Year	Biology	Earth and Space Science	Chemistry	Physics
	Curriculum focus: Awareness of self and the local world			
K	***Staying alive*** Needs for survival of people and familiar animals; the senses	***Weather in my world*** Weather, its features and how it affects my daily life	***What's it made of?*** Properties and uses of materials in the school environment	***On the move*** Movement of humans and toys
1	***Schoolyard safari*** Features, habitats and behaviour of small invertebrates	**Sky and land** Features of the local environment	***Spot the difference*** Changes to observable properties of materials (eg when solids melt)	***Sounds sensational*** Properties, transmission and use of sound energy
2	***Growing and changing*** Life stages of living things	***Water works*** Water as a natural resource: using water responsibly	**Recycling** Properties of everyday materials help determine their re-use	***Push pull*** Pushes and pulls in everyday situations
	Curriculum focus: Recognising questions that can be investigated scientifically and investigating them			
3	***Plants in action*** Needs and life cycle of flowering plants	***Spinning in space*** Size and relative movement of Earth, Sun and Moon; day and night	***Runny or not*** Liquids and solids and how they can change under different conditions	***Light fantastic*** Transmission and use of light energy
4	**Characteristics of animals** Grouping animals based on characteristics	**Weathering and erosion** Some characteristics of the Earth's surface are due to weathering and erosion	***Material world*** Properties of materials determine their use i.e. flexibility, strength and biodegradability	***Smooth moves*** Effect on motion of different sized forces acting directly and indirectly
5	***Marvellous micro-organisms*** Characteristics, needs and uses of micro-organisms (eg, yeast and mould)	**Space** Human exploration and understanding of space and our solar system	***Package it better*** Design and make a package to meet the criteria of a design brief	***It's electrifying*** Electrical energy is stored, transferred and transformed into other forms of energy; electric circuits
6	***Life in the balance*** Relationships between living things	***Earthquake explorers*** Sudden changes to the Earth's surface caused by tectonic plate movement (eg, earthquakes)	***Change detectives*** Physical and chemical changes to materials	**Sustainable energy** Sustainable sources of energy, including water, solar and wind

Shaded boxes indicate published units. Unshaded boxes indicate units to be trialled in 2010.

includes indigenous perspectives

A document outlining the alignment of *Primary Connections* units with the draft *Australian Curriculum: Science* is available on the Academy website from www.science.org.au/primaryconnections/images/PrimaryConnections%20alignment%20with%20the%20draft%20Australian%20Curriculum%20Science%20(March%202010).pdf

Four teaching resources which describe the frameworks that underpin the development of *Primary Connections* curriculum resources have been published. They are:

- *Literacy focuses across Primary Connections curriculum units*
- *Investigating outcomes across Primary Connections curriculum units*
- *Conceptual outcomes across Primary Connections curriculum units*
- *Scope and sequence overview Primary Connections curriculum units.*

An information booklet *Primary Connections – an introduction* has also been developed and published. Its major purpose is to inform school principals about the program. Five thousand copies have been distributed, including copies sent to the national executive of the Australian Primary Principals Association. The latter resulted in several invitations to make presentations at state-based principals' forums.

The Aboriginal High Achievers Program, which focuses on implementing *Primary Connections* curriculum resources to support indigenous students' literacy and numeracy achievements, has completed a two-year trial phase. Teachers involved in the trial are reporting that many of the students are not only maintaining their high achievement levels, but also exceeding expectations. Further information on impact will be available following completion of the trial report.

Presentations on *Primary Connections* were made at over 10 national and state conferences and meetings during the reporting period, including the National Indigenous Education Consultative Body meeting in Canberra in July 2009.

In November 2009, the Australian Minister for Education, the Hon Julia Gillard, released two research and evaluation reports that demonstrate the impact of *Primary Connections*. The reports are available from www.science.org.au/primaryconnections/research-and-evaluation/. There is also a link to the reports from the Australian Government Department of Education website. The evaluation findings show *Primary Connections* has increased student learning and interest in science and made it easier for more time to be devoted to science in primary schools. Students have not only enjoyed learning science but have a better understanding of science processes and concepts. Students' attitudes to science are more positive as a result of their experiences with *Primary Connections*, and the program has increased the amount of science taught in schools. The professional development and curriculum resources have also increased primary school teachers' confidence in teaching science.

Preliminary research findings indicate that indigenous students in particular have benefited from teaching based on *Primary Connections* with its integration of science and literacy. Indigenous students showed a proportionally far greater improvement compared with their counterparts than was seen with other groups. The reports indicate that *Primary Connections* is a potential mechanism for bridging the gap between the science achievement of indigenous and non-indigenous students.

The project director, Ms Shelley Peers, was awarded a Nancy Fairfax Churchill Fellowship to undertake a study tour of inquiry-based primary school science education programs in the US, UK and Europe in May and June of 2009. This included attending the National Coalition Meeting and the National Advisory Board Meeting of the National Science Resources Centre (NSRC) as an international guest. The NSRC is a joint venture of the National Academies and the Smithsonian Institution which develops and implements research-based science education programs.

In addition, Ms Peers attended the Pollen Project conference, New Milestones for Inquiry-Based Science Education in Primary Schools in Europe, hosted by the Berlin-Brandenburg Academy of Sciences and Humanities and co-sponsored by the French Academy. Approximately 170 participants from 25 countries participated. She also visited the La Main a la Pate program of the French Academy of Sciences in Paris and the Royal Society of Edinburgh.

Science by Doing

www.science.org.au/sciencebydoing/

Science by Doing aims to improve science learning in our secondary schools by engaging students through an inquiry-based approach that acknowledges and builds upon teacher expertise in the context of school science departments. To accomplish these goals the *Science by Doing* project team is developing:

- a professional learning approach that includes establishing communities of school teachers working collaboratively with an emphasis on shared leadership;
- professional learning resources that use digital technology in innovative and effective ways; and
- curriculum resources that are inquiry-based and also use innovative digital technology.

The *Science by Doing* team believe the most effective and self sustaining approach to professional learning is undertaken by the science department in a high school. Research suggests leadership is vital, so the approach is built around the head of department.

However, with the evolution of the Australian curriculum for science still occurring, the emphasis on curriculum resources has been limited and activity has focused on development of a series of innovative professional learning resources. Five key resources were constructed for Stage One of the project. The titles of the modules are:

- *Inquiry-based teaching*
- *Effective questioning*
- *Assessment*
- *Student learning*
- *Leading for change.*

The modules have a strong visual appeal requiring user interaction, and have generated very positive responses from users in tests. The modules consist of three parts:

- a booklet that explains the ideas and research;
- a DVD which demonstrates the ideas and skills; and
- an interactive CD for the user to practise the skills shown in the DVD.

Science by Doing project director Professor Denis Goodrum, with the agreement of the Academy, was commissioned by ACARA to prepare the *National Science Curriculum: Framing Paper* and provided leadership to the extensive writing team that prepared the draft curriculum. As a result of this close relationship, the curriculum resources developed by *Science by Doing* will meet the future needs of secondary students and teachers in implementing the final version.

To date three curriculum resources have been created: *Enough water fit for drinking, DSI: Doing Science Investigations* and *Inquiry: DIY Guide. Enough water fit for drinking* will provide the template for all future

curriculum units by integrating the three strands of the Australian curriculum for science, which are:

- science inquiry skills;
- science as a human endeavour; and
- science understanding.

Enough water fit for drinking consists of a student booklet, and a teacher booklet with two CDs. One CD contains digital learning activities, interviews with scientists and related film clips. The second CD consists of assessment tasks and other materials for the teacher. The *Science by Doing* team has worked with the Australian Broadcasting Corporation (ABC) and has had access to all their film archives for the production of the resource. A working partnership with CSIRO has also provided access to scientists and the latest water information.

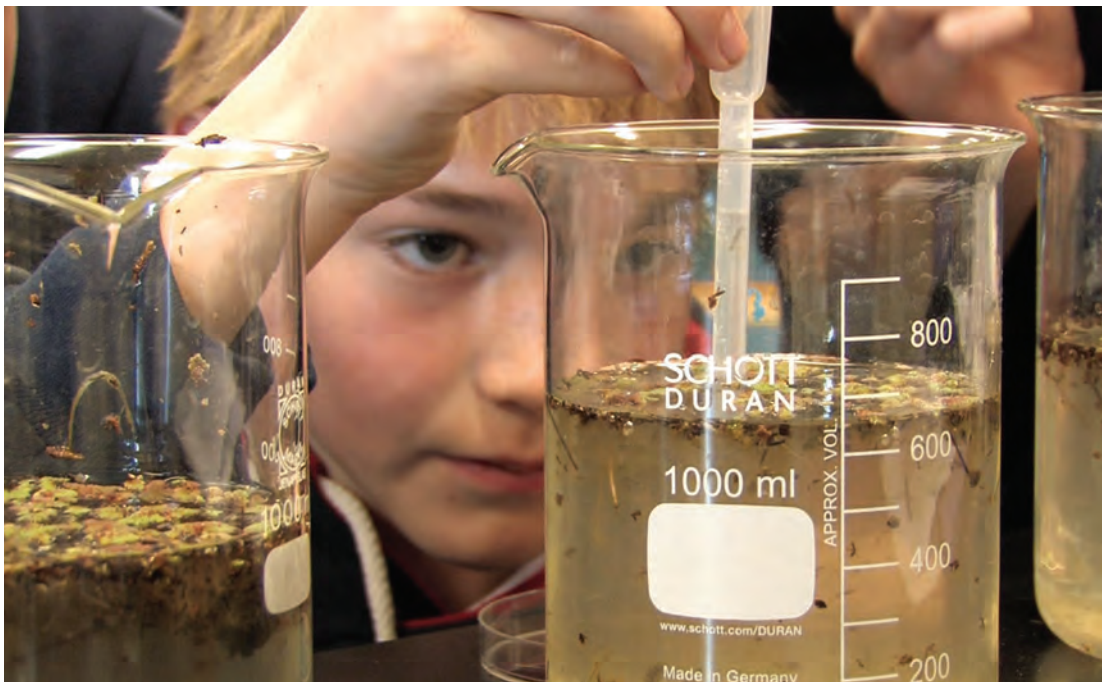


Photo: Hartbeat Multimedia

Science by Doing **uses an inquiry-based approach to teaching and learning science**

One of the expectations of the Australian science curriculum is that students will undertake their own investigations with an emphasis on making evidence-based conclusions. To this end the curriculum resource titled *DSI: Doing Science Investigations*, consisting of a student booklet and an accompanying teacher guide, leads students through a series of activities, refining their inquiry skills so they can carry out their own investigations.

The *Inquiry: DIY Guide* provides a manual that will assist teachers to adapt existing curriculum resources to a more inquiry-based approach.

The curriculum resources and professional learning resources developed to date will be extensively trialled and tested during 2010. In October 2009, selected schools from each state and territory were invited to submit an expression of interest to participate in a trial. Twice the number of applications was received as positions available in the trial. Twenty-eight schools were selected to participate in the trial, representing the range of demographic profiles of schools across Australia.

In January Professor Denis Goodrum attended the InterAcademy Panel Science Education Workshop, The Transition from Primary into Secondary Education Using Inquiry-Based Science Education, in Santiago, Chile, on behalf of the Academy. The interest generated about *Science by Doing* led to an invitation to participate in an international conference on this topic in the UK during October 2010. At this conference he will present the results of the trialling process.

Other educational resources

The Academy has two long-standing programs: *Interviews with Australian scientists* and *Nova: Science in the news* that were established in 1994 and 1997, respectively, to meet the growing demand for web-based resources. Although not specifically aligned with the curriculum, these programs provide valuable educational resources for use in schools, as well as accessible information on science for interested members of the public.

Nova focuses on issues making headline news in the media where confusion about the underlying science can cause misconceptions to arise. This emphasis on the science behind topical issues, rather than a prescribed curriculum, necessitates bringing together and discussing sometimes widely divergent fields of science, providing examples from 'real-life' of the way to use scientific information to make informed decisions. The *Interviews* project profiles the lives of scientists, their inspirations and goals, bringing a human face to science. It also serves to document the history of scientific discoveries for future generations. Both projects draw on existing online educational resources developed by other organisations and, being web-based, can promote Australian science and scientists to a world wide audience.

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 119 topics on the *Nova* site. The website has received over 20 million hits since it was first published in 1997, with around 190 000 hits each month. 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. Seven new topics have been posted in the 2009–10 period covering a range of areas including materials science, reef sustainability, medical technology and energy.

Hunting for dark energy with the WiggleZ

According to an increasingly popular theory, around 72 percent of the universe is made up of mysterious stuff called dark energy. Australian astronomers were at the forefront in producing evidence that dark energy exists. Now, using advanced equipment attached to the Anglo-Australian Telescope in New South Wales, they are in the midst of a project to measure it.

This topic is sponsored by The University of Queensland School of Mathematics and Physics and Swinburne University of Technology Centre for Astrophysics and Supercomputing under an ARC Discovery Project grant.

Rocking on with hot rocks geothermal energy

If the energy stored in hot rocks inside the Earth could be tapped and used instead of fossil fuels, it could help to reduce the threat of climate change. Hot rocks hold promise as a major contributor to Australia's future energy supplies; but our geothermal resources are only now starting to be understood. Despite the need for more data, it is clear that Australia has massive geothermal resources. The challenge is tapping into it in a cost-effective way.

This topic is sponsored by the Australian Geothermal Energy Association and the Australian Government Department of Resources, Energy and Tourism.

Science for sustainable reefs

Approximately 500 million people depend on coral reefs for food, coastal protection, building materials and income from tourism. But this precious resource is under growing pressure and in serious decline.

Scientists investigating how coral reefs bounce back after major disturbances are discovering that healthy coral reefs can have enormous resilience. Possibly our best preparation in the face of climate change is to focus on keeping our reef systems healthy and help them to sustain themselves.

This topic is sponsored by the Australian Research Council Centre of Excellence for Coral Reef Studies.

Photo: istockphoto

How do we sustain reefs faced with competing interests?

Making light of metals

Through advances in production and processing, the light metals aluminium, titanium and magnesium are becoming cheaper and more versatile. We are starting to see them in everyday items: in cars, aircraft, the cases for laptops, mobile phones and even iPods. And Australian scientists are helping in their transformation.

Industry is excited by light metals because they combine many of the traditional advantages of metals with the virtue of being much lighter than the iron and steel we have used for so long. By replacing steel in things like cars and aircraft with lighter metals, they become more efficient, consuming less fuel and producing fewer greenhouse gases – big pluses in today's world.

This topic is sponsored by the Australian Research Council Centre of Excellence for Design in Light Metals.

Excuse me! The problem with methane gas

When you ask people about greenhouse gases, chances are they'll focus on carbon dioxide. But there's another more potent gas contributing to global warming. Meet methane, the forgotten greenhouse gas.

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

Photo: istockphoto

Livestock are one source of methane, the forgotten greenhouse gas

Australia's low emission energy future

The Australian Government wants to reduce greenhouse gas emissions by up to 25 per cent by the year 2020. But with a growing population, increasing energy requirements, and past reliance on cheap energy sources how could this be achieved?

There is no simple way of achieving Australia's goal of reducing carbon pollution. Like other countries, we are likely to continue using coal, to some degree, into the future. The development of low emission fossil fuel technologies, increasing the use of gas and alternative energy sources, and adopting more energy efficiency measures, are all expected to play an important role in reducing Australia's emissions from energy.

This topic is sponsored by the Queensland Resources Council.

Dirty, rotten swine flu – and how to beat it

On 11 June 2009 the World Health Organisation declared that the 2009 influenza A (H1N1) virus, better known as swine flu, had become a pandemic. A new virus was stalking the globe, with huge potential consequences for the world's population. Fortunately, development of a vaccine was already well underway.

This topic is sponsored by CSL Limited.

Interviews with Australian scientists

www.science.org.au/scientists

The *Interviews with Australian scientists* project aims not only to record the oral histories of Australia's outstanding scientists but to act as inspiration to the next generation of researchers. To date 120 interviews have been recorded, 84 with Academy Fellows. The scientists speak about their inspiration to study science, their frustrations and triumphs in the lab and their achievements and pleasures outside research.

The interviews conducted in 2009 were with Professor Robin Stokes FAA and Professor Kenneth Le Couteur FAA. These interviews were generously sponsored by the University of New England and the Australian National University, respectively.

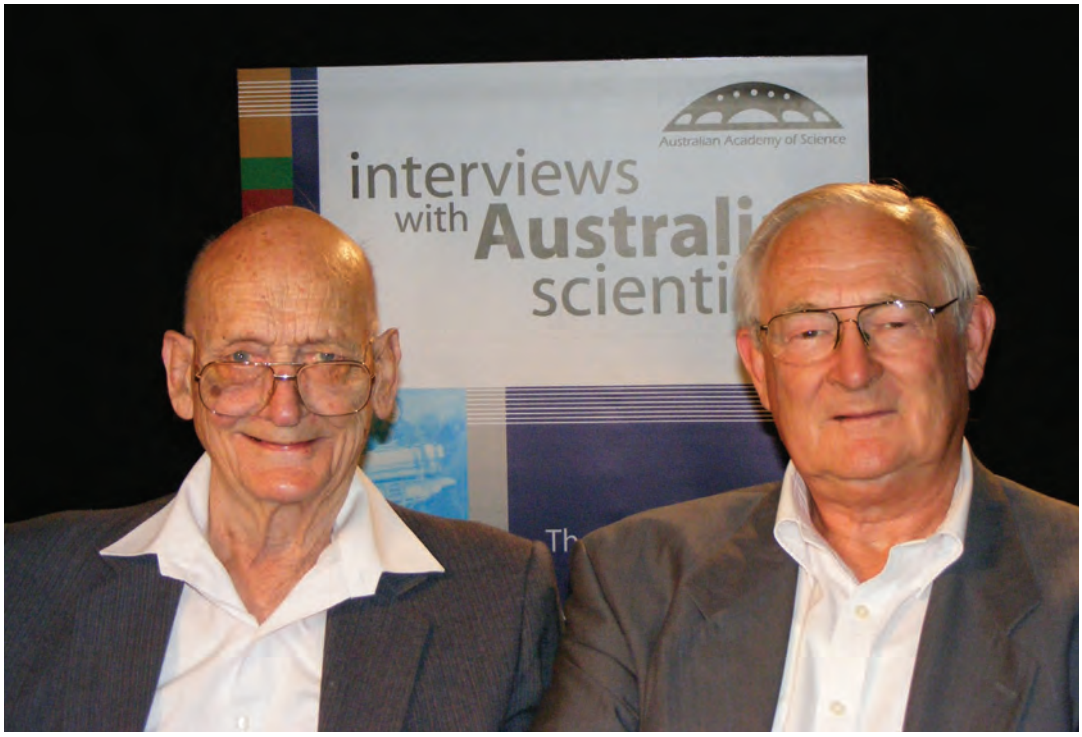


Photo: Maggie Percival

Robin Stokes (left) was interviewed by Ken Marsh in Armidale

In the interview with Professor Robert 'Robin' Stokes we learn that he is descended from a long line of scientists; so it was perhaps not surprising that he chose to study chemistry. From his early education in New Zealand, Stokes moved to Australia to pursue his academic calling, firstly at the University of Western Australia and then at the University of New England (with a brief sojourn to Cambridge University). His attention to detail and careful contemplation of data led to an illustrious and productive career centred on solution thermodynamics and electrolytes. This interview was conducted by Professor Ken Marsh (University of Canterbury) in Stokes' home in Armidale.

Professor Kenneth Le Couteur, during his interview, spoke about the troubled times of World War II when he worked as a code-breaker and was separted from his family who were living on the Channel Islands. We also hear about his study of nuclear physics for his PhD at Cambridge where, when looking for a topic, he was told to 'go away and think of something'. He spent the majority of his career as professor of theoretical physics at the Australian National University. Professor Le Couteur was interviewed by Professor Robert Crompton FAA at the Academy in Canberra in June.

In 2009, four interviews were posted on the *Interviews with Australian scientists* section of the Academy's website (www.science.org.au/scientists). Interview transcripts, teacher's notes and DVDs are now available for Academy Fellows Professors Ray Martin, Bruce Holloway, John Swan and Ron Brown.

Science policy

One of the Academy's key objectives in promoting excellence in Australian science is to provide valued independent scientific advice to assist policy development and program delivery. As an independent body of Australia's top research scientists, the Academy can access authoritative expertise in many areas of science and technology. This has the capacity to inform the development of evidence-based policy directed at national needs both by government and by non-governmental sectors, and to contribute to international debate.

Overview

At his National Press Club address on 9 September, Academy President Professor Kurt Lambeck argued the case for maintaining Australia's strong involvement in the international scientific arena. He also called for the development of an integrated national strategy to focus support for strategic scientific relationships. The discussion paper *Internationalisation of Australian Science* was developed from the talk, and forms the basis of the Academy's submission to the House of Representatives Standing Committee on Industry, Science and Innovation *Inquiry into Australia's international research collaboration*.

Photo: Sandy Spiers

Kurt Lambeck addressed the National Press Club

The Academy released a statement, *Innovation: Time for Action Now*, in response to the Cutler Review of the National Innovation System and the Bradley Review of Higher Education. The President stressed that inaction on developing our national research and infrastructure capability is not an option, despite the pressing economic and financial problems precipitated by the global financial crisis, if we are to achieve growth in wealth and health while maintaining the environment in the years ahead. The Secretary for Science Policy, Professor Bob Williamson, was able to participate in the debate on government response to these reports, and on behalf of the Academy welcomed the government's commitment to increase the budget for research infrastructure and investigator-initiated research.

The Academy remains involved in the debate on climate change science. In addition to providing a submission to the Senate *Inquiry into Climate Policy*, a statement was released on Australia's research priorities, and work has begun on the preparation of a document to provide accurate but accessible answers

to the key scientific questions that the Australian public is asking about climate change. Furthermore, the eighth annual High Flyers Think Tank examined the challenge of sustainably maintaining agricultural productivity in conditions of climate variability. The report from the event highlighted the importance of current policy initiatives that aim to improve the effectiveness of research investment. It contained a number of recommendations regarding future priorities, and led to an invitation to the President to present at the Australian Bureau of Agriculture and Resource Economics' 2010 Outlook Conference.

Two research reports, on Australia's nanotechnology networks and a strategic plan for Earth observations from space, were completed and launched by Parliamentary Secretary for Industry and Innovation, the Hon Richard Marles MP. In addition, the highly successful public lecture series on the topic Australia's Renewable Energy Future provided the basis for a position paper aimed at facilitating national discussion on the role renewable energy technologies may play in a transition to a low carbon economy.

The Academy has actively engaged in several policy initiatives aiming to improve the quality and sustainability of Australia's research workforce. While arguing for improvements in a number of areas including remuneration, skills acquisition and mentoring to increase overall participation and retention, the Academy has advocated a more pro-active approach to gender equity so that many highly talented women are not lost to research mid-career. In addition, the National Academies Forum, the body that brings together Australia's four learned academies, organised a seminar on the Excellence in Research for Australia (ERA) scheme being developed by the Australian Research Council (ARC).

The President represents the Academy on the Prime Minister's Science Engineering and Innovation Council, and a number of Fellows are members of its Expert Working Groups, established to inform the council's new emphasis on foresighting.

Internationalisation of Australian science

Academy President Professor Kurt Lambeck addressed the National Press Club on 9 September on Australian involvement in the international scientific arena. In the address he said that if Australia is to prosper in the areas of science, technology and innovation an integrated long-term action plan to foster and maintain international scientific engagement is needed. The plan would need to include long- and short-term objectives, a diversity of scales of operation, and a range of overseas partnering through bilateral and multilateral linkages.

Participation in global initiatives like the Large Hadron Collider, the Square Kilometre Array or the Integrated Ocean Drilling Program provides Australian researchers with major intellectual challenges. They also provide early access to the latest technological developments that have potential applications in other areas of science. Professor Lambeck emphasised that any decrease in funding or Australian presence in the overseas research environment risked losing the momentum of current efforts, with long-term effects on the credibility of Australian participants in networks that have been painstakingly built up over many years.

He urged an overhaul of the piecemeal process of supporting access to international science, to establish a coordinated process, across government, that will increase our global engagement at all stages, directed to the short- and long-term national benefit.

The themes developed in the President's address were further elaborated in a position paper that formed the basis for the Academy's submission to the House of Representatives Standing Committee on Industry,

Science and Innovation *Inquiry into Australia's international research collaboration*. This included a series of recommendations to provide continuity in strategic scientific relationships and a competitive basis for Australia's long-term scientific engagement.

The position paper, titled *Internationalisation of Australian Science*, was distributed to a wide audience. Recipients included a selection of foreign ambassadors and heads of missions in Canberra, their Australian counterparts in their country of origin, various think tanks, and members of the Joint Standing Committee on Foreign Affairs, Defence and Trade.

The speech notes for Professor Lambeck's National Press Club address are available from www.science.org.au/events/lectures-and-speeches/npc2009.htm, and the position paper, which provides more detail on the Academy proposals, is available from www.science.org.au/reports/documents/InternationalisationAustralianScience.pdf

Submissions by the Academy to government reviews and inquiries

The Academy's submissions, input and responses to various science policy issues being considered by government and its agencies, are listed below.

2009

9 April	Submission to the Senate Select Committee on Climate Policy
9 April	Statement: *Priorities for Australian climate change science research*
24 April	Statement: *Innovation: Time for action now*
29 April	Submission to House of Representatives Standing Committee on Industry, Science and Innovation *Inquiry into long-term meteorological forecasting in Australia*
25 May	Comments on National Health and Medical Research Council (NHMRC) consultation paper: *NHMRC's Research Fellowships Scheme*
21 July	Response to the Australian Research Council (ARC) consultation paper: *ARC Centres of Excellence for funding commencing in 2011*
28 August	Response to Department of Industry, Innovation, Science and Research (DIISR) consultation on a *Commonwealth Commercialisation Institute*
28 August	Comments on the NHMRC's Draft national *Strategy for Medical Research and Public Health*
19 October	Submission on the ARC Consultation Paper: *ARC peer review processes*

2010

12 February	Submission to House of Representatives Standing Committee on Industry, Science and Innovation *Inquiry into Australia's international research collaboration*
29 March	Appearance before a hearing of the Senate Select Committee on Fuel and Energy *Inquiry into the impact of higher petroleum, diesel and gas prices and several related matters*

The above submissions are available from www.science.org.au/reports

Prime Minister's Science, Engineering and Innovation Council (PMSEIC)

PMSEIC is Australia's highest level body advising on important issues of science, engineering and innovation that impact upon economics, public good, education, employment, security and sustainable development. The President of the Academy is an ex officio member of the Council and its Standing Committee.

Since June 2009, following on from the release of the Australian Government's policy paper *Powering Ideas: An Innovation Agenda for the 21st Century*, PMSEIC has adopted a stronger focus on using strategic foresight to support long-term, whole-of-government policy development, and a broader definition of science to include the social sciences.

The new approach is intended to generate long-range advice, 10 to 15 years ahead, on issues of national importance, highlighting areas of research where an early and timely response can really make a difference. Four themes for exploration have been agreed:

- climate change, energy, water and environment;
- science as an engine for innovation in commerce, industry and the arts;
- national health, well-being and security; and
- knowledge generation, skills and perception in a global world.

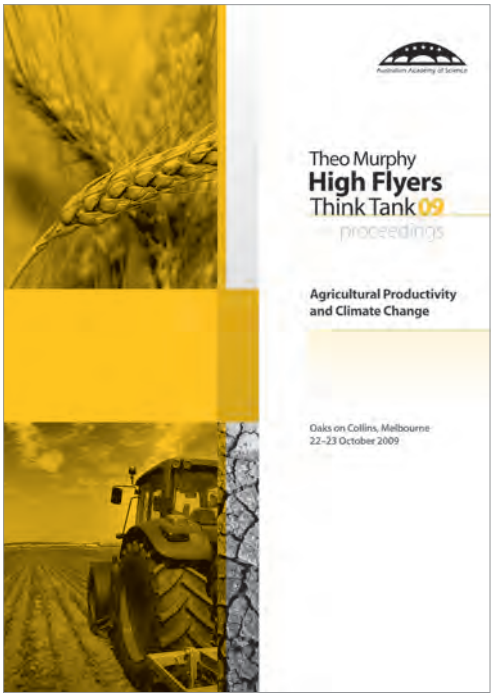
To date, two reports have been released and a third is in preparation. Academy Fellows were included in the Expert Working Groups that prepared them. The group responsible for the report *Epidemics in a Changing World*, chaired by Professor Brian McKay FAA, Deputy Director, Australian Centre for International and Tropical Health and Queensland Institute of Medical Research, advised on the scientific challenges faced by Australia in the event of a global epidemic affecting humans or animals. The report was tabled at the PMSEIC meeting of 5 June 2009 and is available from www.innovation.gov.au/Section/pmseic/documents/EpidemicsWGReport.pdf

The Expert Working Group that prepared the report *Transforming Learning and the Transmission of Knowledge: Preparing a Learning Society for the Future* included Professor Perry Bartlett FAA, Director of the University of Queensland's Brain Institute. The group comprised neuroscientists, cognitive scientists, psychologists and a range of education specialists who considered fundamental questions that influence our ability to learn. Their central recommendation is to establish a 'Science of Learning Program', delivered through a number of interdisciplinary and interprofessional 'Science of Learning Centres'. The report was tabled at the PMSEIC meeting of 18 March 2010 and is available from www.innovation.gov.au/Section/pmseic/Documents/TransformingLearningEWGreportFINAL.pdf

The current Expert Working Group on Challenges at the Energy-Carbon Water Intersection is chaired by Dr Michael Raupach FAA, with Professor Kurt Lambeck FAA as Deputy Chair.

High Flyers Think Tank

The 2009 High Flyers Think Tank, Agricultural Productivity and Climate Change, was held in Melbourne on 22 and 23 October. The two-day workshop was the second to be supported by the Royal Society of London through the Theo Murphy (Australia) Fund. This funding made it possible to bring together recognised experts in agricultural productivity, food security, climate change and social science with 63 early- and mid-career researchers from a diverse range of disciplines including soil ecology, genetics, environmental science, agronomy, engineering and economics.



The selection of the Think Tank topic reflected growing recognition that changes in climate will lead to significant biophysical, environmental, social and economic impacts across a variety of sectors, including major effects on agriculture. These will affect not only Australia, but the rest of the world.

However, the emphasis was not on climate change itself, but on the challenge of maintaining sustainable agricultural productivity in the context of climate variability. It was about using the insight and expertise of the various participants to identify and examine potential mitigation and adaptation strategies in the context of other environmental, social and development pressures.

The keynote address was given by Professor Peter Gregory, Director and Chief Executive of the Scottish Crop Research Institute, whose participation was enabled by a special Selby Fellowship awarded to celebrate the 50th anniversary of the program. His address, *Food systems and future environmental change*, demonstrated how global, environmental and social changes are affecting food systems, and suggested some of the technological and policy responses that might be applied.

The keynote address was followed by expert presentations on the themes of productivity growth, resilience, sustainability and global climate. Each speaker, assisted by a rapporteur, also chaired a discussion group of participants with expertise in the tools of policy, knowledge management, technologies and planning to consider how they may be used to address challenges and achieve outcomes.

While it was accepted that climate change will impose new and more challenging demands on agricultural productivity, the issues remain complex. In the course of the two-day workshop a number of recommendations were made to:

- develop a national policy on food security, linked to other current and future government policies and initiatives;
- support national research and knowledge management strategies through full implementation of the National Research, Development and Extension framework to support food security policy;
- provide continued research capacity support for the unique Australian soils, climate and vegetation, as well as for pest and disease reduction in plants, such as emerging new rust viruses;
- develop a long-term, ongoing and permanent national natural resources and environment monitoring system for the whole landscape, incorporating soil, water, vegetation and biodiversity; and
- engage with Australian communities in the planning and implementation of social and structural adjustment, such as water-use habits.

The Think Tank proceedings were distributed to relevant members of parliament, federal and state government agriculture departments and farmers federations across Australia and are available from www.science.org.au/events/thinktank2009/index.html

The President was subsequently asked to address the Australian Bureau of Agriculture and Resource Economics' 40th anniversary 2010 Outlook Conference on 3 March 2010. His speech and presentation are available from www.abare.gov.au/outlook/_download/rd_lambeck.pdf and www.abare.gov.au/outlook/_download/rd_lambeck.ppt respectively.

Nanotechnology in Australia: Trends, Applications and Collaborative Opportunities

The Academy has completed a study of Australian nanotechnology research funded by the Australian Research Council (ARC) Linkage Learned Academies Special Projects (LASP) scheme. Under the leadership of an advisory group of Academy Fellows comprising Professors Frank Caruso, Chennupati Jagadish and Gordon Wallace, a survey was developed and distributed to nanotechnology researchers in universities, government science organisations and industry. Its aim was to establish in which fields researchers were carrying out their work and to identify the different types of collaborations and linkages in which the researchers were involved. Over 300 responses were received.

Photo: Fiona Leves

Participants at the Nanotechnology Stakeholder Day

On 25 September the Academy hosted a Nanotechnology Stakeholder Day, which brought together around 40 members of Australia's nanotechnology research community to consider the survey findings. Professor Jackie Ying, Director of the Singapore Institute for Bioengineering and Nanotechnology, provided an informative keynote address on her institute's experiences in developing nanotechnology into commercial outcomes. Subsequent discussion sessions focused upon identifying the impediments and opportunities for Australian nanotechnology research and collaborations.

The results of bibliometric analysis, survey data and input from the Stakeholder Day were drawn together in a final report entitled *Nanotechnology in Australia: Trends, Applications and Collaborative Opportunities*. The report concludes that collaborations between researchers, with international and industrial partners, as well as access to state of the art facilities, will be critical if Australia is to exploit the full potential of nanotechnology. A range of recommendations was made regarding strategic planning for nanotechnology research to realise the significant opportunities and prosperity that nanotechnology may provide.

The report was launched at the Shine Dome on 22 February by the Parliamentary Secretary for Industry and Innovation, the Hon Richard Marles MP, along with the Australian Government's National Enabling Technology Strategy, which includes nanotechnology as one of its focus areas. The report is available from www.science.org.au/reports/documents/nanotechnology09.pdf

An Australian Strategic Plan for Earth Observations from Space

Earth observations from space are the single richest source of environmental information for Australia, providing data on the state of the atmosphere, oceans, coast, rivers, soil, forests and ecosystems, and their change over time. Such observations provide a primary rationale for the world's trillion dollar annual investment in space science and technology. They also promise to transform Australia's capacity to address such critical national challenges as climate change, water availability, natural disaster mitigation and national security.

A report, *An Australian Strategic Plan for Earth Observations from Space*, was prepared by a working group of 16 Academy of Science and ATSE Fellows chaired by Dr John Zillman FAA, FTSE. Other space science and Earth observation experts with strong links to the international satellite community, and a wide cross-section of

providers and users of space-based Earth observations in Australia were also members of the committee.The terms of reference were assigned to the working group by the presidents of the two academies in December 2008, and following wide consultation both nationally and internationally the report was finalised in September 2009.

The main conclusion of the report is that Australia can no longer meet its growing national needs for Earth observations through reliance on the generosity and good will of other countries. It recommends that Australia commit to a much stronger national role in Earth observations from space, and sets out an overall strategy for ensuring that Australia plays its part in the international Earth observations effort in ways that will optimally meet our national needs over the next 10 to 15 years and beyond. The report offers nine recommendations for implementation of the proposed strategy. These include the development of a national policy on Earth observations from space, and the establishment of a national office and a cross-portfolio advisory council.

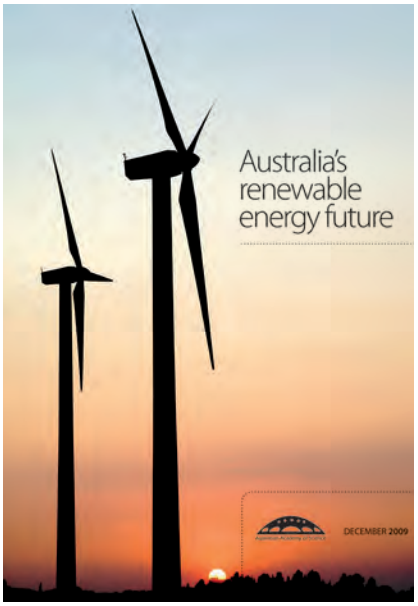
The report was launched in October by Parliamentary Secretary for Innovation and Industry, the Hon Richard Marles MP, and is available from www.science.org.au/reports/documents/EOSfinal.pdf

Photo: NASA

Earth observations from space were the topic of a joint Academy-ATSE report

Australia's Renewable Energy Future

In January the Academy released a report, *Australia's Renewable Energy Future*, based on the the 2008–09 public lecture series. The report was coedited by Professors Mike Dopita FAA and Bob Williamson FAA who summarised existing and emerging renewable energy technologies and examined strategies that can be used to replace power generation based on the use of coal and oil. The costs, advantages and problems associated with solar power, wind power, biomass, fuel cells, geothermal energy and wave energy were compared and analysed.



The deployment of currently available technologies can decrease Australia's carbon dioxide emissions and contribute to meeting the target of 20 per cent of Australia's energy being from renewable energy sources by 2020. However, the report identifies a lack of feasible deployment paths and supportive

policies to speed and smooth the deployment of renewable energy technologies that are already known to be effective.

The report provides a list of 25 policy options for the implementation of renewable technologies. Options include not only alternative energy sources but also development of a 'smart' electricity grid, alternative transport systems and reductions in domestic energy consumption. The report aims to facilitate national discussion on the role renewable energy may play in a transition to a low carbon economy.

Copies were distributed to renewable energy non-government organisations and environmental groups, various think tanks, state and territory energy and environment ministers, all non-government members of the House of Representatives, members of Cabinet and Shadow Cabinet, and members of several parliamentary committees, such as the Standing Committees on Primary Industries and Resources, and Industry, Science and Innovation.

The circulation of the report led to the Academy being invited to appear before the Senate Select Committee on Fuel and Energy appointed to conduct an *Inquiry into the impact of higher petroleum, diesel and gas prices*. The report is available from www.science.org.au/reports

Clarifying the debate on climate change

Given public interest in climate change science and the polarised nature of media coverage, the Academy is concerned that common misconceptions could adversely influence policy outcomes. In an effort to clarify the science behind some of these issues, the Academy has obtained sponsorship from the Department of Climate Change to develop a document that identifies the key scientific questions that the Australian public is asking about climate change and provides accurate responses in a form that would be understood by the non-specialist.

An eight-person working group of leading Australian scientists in the field has been appointed to draft the document. These scientists have a proven and recent track record of personally advancing climate science, as well as demonstrating success in disseminating their knowledge and understanding to the wider community. An oversight committee comprising Academy Fellows and chairs of relevant national committees for science will review the draft which is to expected to be provided to the department for publication in May 2010.

National Academies Forum Seminar on Excellence in Research Evaluation

The Australian Research Council (ARC) received $35.8 million under the Australian government's *Powering Ideas* innovation strategy to develop and implement the Excellence in Research for Australia (ERA) scheme to measure Australia's research performance against international benchmarks. The Sustainable Research Excellence (SRE) in Universities program anticipates that the performance targets for two-thirds of SRE funding ($200 million per annum) 'will eventually be based on ERA data'. The government will also use ERA assessments when constructing and assessing the compacts that they will enter into with each university, to define roles, strengths and ambitions in the future.

The National Academies Forum, the peak body of Australia's four learned academies, convened a two-day seminar in Canberra on 8 and 9 September 2009 to examine a range of issues and concerns in the research community regarding the introduction of ERA. The program included speakers with experience of research assessment models being implemented in Europe and members of the ARC's ERA team. Concerns regarding the accuracy and impact of bibliometrics were met with assurances that there would be no formulaic application of metrics, and the need for flexibility and consultation were acknowledged.

A report from the seminar is available from www.naf.org.au/excellence-in-research-evaluation.htm

Activities for young researchers

The Academy has long recognised the need to ensure that there are quality careers for the next generation of scientists in universities, research laboratories and industry, and that there is an adequate support system for them during their early years.

Developing collaborative networks with peers and more senior researchers, both in Australia and overseas, is considered essential to the establishment of a career in science. Similarly, skills development beyond a comprehensive training in the scientific method contributes to enhanced effectiveness and increased competitiveness in career progression. Many Academy events incorporate networking opportunities and skills training for young science researchers. Some of these activities are described here.

High Flyer Think Tanks

The purpose of the Academy's Theo Murphy (Australia) High Flyers Think Tanks is to bring together around 60 outstanding early- to mid-career researchers (E-MCRs) from a broad range of disciplines to identify gaps in knowledge and suggest novel applications of science and technology to address issues of national importance. The Think Tanks are considered a unique opportunity for career development and network creation as their focused structure provides for intensive interaction with established leaders in particular fields as well as with peers from different disciplines. The report on the scientific outcomes of the 2009 Think Tank were described on page 26.

Australian Frontiers of Science

The Australian Frontiers of Science events, by focusing on generating understanding between disciplines rather than their application to specific issues, aim to enhance the capability of young researchers to participate in multi- and inter-disciplinary research.

Preparations have begun for a special joint Australia–UK event that will be held in Perth in October 2010 as part of the Royal Society of London's 350th anniversary celebrations. With a focus on marine science, the event will bring together E-MCRs from a diverse range of fields relevant to the understanding and management of marine environments.

Workshops for early-career researchers at Science at the Shine Dome

The Academy welcomed over 60 enthusiastic early-career researchers (ECRs) to the 2009 Science at the Shine Dome event. From a diverse range of disciplines, they attended all the seminars at the event as well as some specific career development workshops. Adjunct Professor Julian Cribb from the University of Technology Sydney presented a workshop, *Scientists and the media*. He shared his experience about what journalists

Photo: Irene Dowdy

ARC and NHMRC awardee researchers attended Science at the Shine Dome

want from scientists, how to communicate effectively with the media, some dos and don'ts, writing media releases and other tips. A workshop was run by Professor Simon Gandevia FAA from the Prince of Wales Medical Research Institute, which challenged researchers' thinking by pointing out the cognitive errors that humans make unconsciously. The ARC and NHMRC generously sponsored nine ECRs to attend the event.

Science Meets Parliament

The Academy nominated five E-MCRs to participate in the annual Science Meets Parliament event, held on 9 and 10 March and organised by the Federation of Australian Scientific and Technological Societies. The nominees were: Professor Vanessa Hayes from the Children's Cancer Institute Australia; Associate Professor Sally Gras from the Bio21 Institute; Ms Tegan Kelly and Dr Emma-Kate Potter from the Australian National University; and Dr Ros Gleadow from Monash University.

The first day was a briefing session on the process of policy making, the competing interests of different groups, and how to make the science message relevant to journalists, politicians and their advisers. The second day included a breakfast forum, question time, scheduled meetings with parliamentarians and attendance at a National Press Club address by Chris Murray, science author and senior correspondent for *The American Prospect* magazine. Participants viewed the experience as beneficial to their personal and professional development opportunity and would recommend it to other early- to mid-career scientists.

Lindau Nobel laureates meeting

Each year a small group of doctoral students are selected to travel to the German town of Lindau to attend the annual Meeting of Nobel Laureates. For many young researchers, meeting and discussing science with the Nobel laureates inspires them to excel in their own careers.

This year seven young Australian researchers attended the 59th Meeting of Nobel Laureates, held from 28 June to 3 July, which was dedicated to chemistry. The Academy provided funding support for travel, and the council for the Lindau Nobel Laureate Meetings provided accommodation and registration costs. The program is structured to provide a range of opportunities for laureates to interact with attendees through formal lectures, panels, discussion sessions, social events and small informal gatherings over meals.

The Australian Lindau delegates were also supported to attend Science at the Shine Dome from 6 to 8 May. In addition to participating in the ECR workshops mentioned above, and meeting other young researchers, they attended a briefing session to optimise the benefit obtained from attending Lindau with the 2009 delegation leader, Professor Andrew Holmes FAA, and previous delegation leaders.

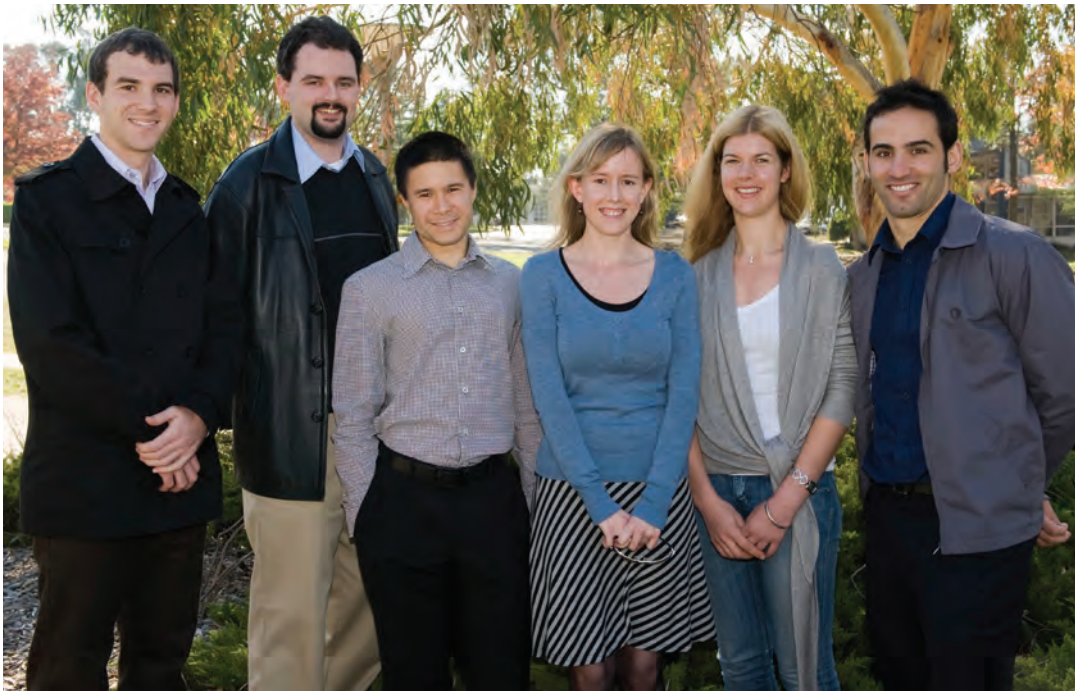


Photo: Irene Dowdy

Postgraduate students who attended the Meeting of the Nobel Laureates in Lindau

Funding for international collaborations

The Academy provides a range of awards and administers government-funded programs to support early- and mid-career Australian researchers to participate in international research exchanges and overseas conferences. Visits by young overseas researchers to Australia are also administered by the Academy.

The international exchanges described in the section on pages 54 to 70 provide the opportunity for young researchers to exchange ideas and information and form networks at a formative stage of their career. Some of these have resulted in significant long-term international collaborations in emerging areas of science.

Email distribution list and *Early Days* newsletter

The Academy workshop Enhancing the Quality of the Experience of Postdocs and Early-Career Researchers held in February 2008 highlighted that some young researchers experience difficulties accessing information on funding support and career advice. An email subscriber list was established to distribute such information. Participants in Academy events such as Australian Frontiers of Science, High Flyer Think Tanks and Science at the Shine Dome have been invited to subscribe to the list, which has steadily increased to over 370 in number.

Information on various topics has been distributed, including overseas exchange programs, fellowships, honorific awards and research funding opportunities. The list also provides a mechanism for the Academy to alert subscribers to activities by other organisations. An example was the opportunity to take part in the consultation process of DIISR's Research Workforce Strategy committee. A request to self-nominate was sent via the email list, and many of those who did were selected to attend one of three round table discussions held on research career pathways in Melbourne, Sydney and Brisbane in January 2010.

The first three editions of an ECR newsletter, *Early Days*, produced by the Secretary for Science Policy Professor Bob Williamson FAA, were also distributed via the mailing list. Copies of the newsletter and a link to subscribe to receive information from the Academy are available from www.science.org.au/events/ecr/

National committees for science

The Academy's national committees for science 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 30 of its member unions. The 21 national committees and three task forces are widely representative of the Academy's disciplines. The members of each committee and documents related to their activities are available from www.science.org.au/natcoms/. Nominations for committee members are sought from committee chairs and from the relevant corresponding scientific societies. The nominations are then considered by the Academy's Executive Committee which is responsible for such appointments. Guidelines for national committees are available from www.science.org.au/natcoms/guidelines

Biennial meeting of chairs of national committees and task forces

The Secretaries for Physical and Biological Sciences, Professors Peter Hall FAA and Graham Farquhar FAA, convened a meeting of the chairs of the national committees at Ian Potter House on 19 November. The morning agenda included updates regarding ICSU activities and discussions to streamline and maximise the benefits from international linkages. President Professor Kurt Lambeck welcomed the Hon Lindsay Tanner MP, federal Minister for Finance and Deregulation, to the Academy. Minister Tanner met with the chairs and members of Council present, and talked on *Research and funding – the government's perspective*. This was followed by presentations from chairs of several national committees.

Photo: Jeanette Mill

Members of the Executive Committee (seated and standing far right) met with the chairs of the national commitees for science

In the afternoon presentations and discussions focused on science policy and outcomes from a survey of national committee priorities. This led to agreement to extend the annual reporting cycle to include applications for support of specific initiatives. A summary of the proceedings is available on the Academy's website from www.science.org.au/natcoms/

Committee reports

Reports have been received from the following committees:

Antarctic research

Chair: Professor Robert Vincent FAA

Australian scientists, including members of the National Committee for Antarctic Research (NCAR), continue to play prominent roles in the international programs of the Scientific Committee for Antarctic Research (SCAR), with good representation on a wide range of committees. Activities covered include Antarctic climate processes, biodiversity, change and ecosystem response, and the geological evolution of Antarctica. Whenever possible, new appointments to various SCAR and other relevant international bodies were proposed during 2009. Further members will be proposed during the 2010 XXXI SCAR Open Science Conference in Argentina.

One of the main activities of the committee was to provide input into the Australian Antarctic Division's five-year strategic plan, which is to set the science strategy for Australia's Antarctic science program. However, there was a considerable delay in the development of the plan, which has been reviewed before ratification and implementation in mid 2010. NCAR members provided input through the chair, who is ex-officio a member of the Antarctic Science Advisory Committee, which is responsible to the Minister for the Environment.

The International Polar Year (IPY) came to an end in March 2009. NCAR worked with the IPY Australian Education Outreach and Communication Committee, hosted by Antarctic Tasmania, to publicise IPY activities. To celebrate the end of a very successful program a series of Australia-wide lectures by both senior and young scientists involved in Antarctic research commenced in late 2009. The first lectures were given by Professor Ian Allison (Australian Antarctic Division) and Dr Mark Stevens (South Australia Museum) in November at the newly opened Royal Institution of Australia, and proved very popular.

Astronomy

Chair: Professor Matthew Colless FAA (until end 2009), succeeded by Professor Elaine Sadler FAA

During 2009 the National Committee for Astronomy (NCA) oversaw substantial progress towards the goals of the *New Horizons: A Decadal Plan for Australian Astronomy 2006–15*. The NCA worked on the implementation of the plan in conjunction with Astronomy Australia Limited, which manages those aspects supported by National Collaborative Research Infrastructure Strategy funding for radio and optical astronomy. Astronomy was very strongly supported in the 2009 Australian Government budget, which provided $88 million for Australian participation in the Giant Magellan Telescope, $80 million for a Square Kilometre Array Science and Supercomputing Centre in Perth, and $40 million to support the Anglo-Australian Observatory's transition into the Australian Astronomical Observatory (which occurs on 1 July 2010). In the coming year the NCA will be conducting a mid-term review of the decadal plan in order to review progress and update the implementation plans.

The 2009 International Year of Astronomy (IYA) was coordinated in Australia by the NCA under the auspices of the International Astronomical Union. The Anglo-Australian Observatory and the Australia Telescope National Facility were the joint 'national node' for IYA activities. There were more than 500 IYA activities around Australia, including international events such as the 100 Hours of Astronomy and Dark Skies, celebrations of

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. These activities were funded in part by a $255,000 grant from DIISR, although a greater investment of time and effort came from the large number of organisations and individuals who organised, performed and participated in the various activities.

Biomedical sciences

Chair: Professor Rob Baxter FAA (until end 2009), succeeded by Professor Ian Dawes FAA

The National Committee for Biomedical Science (NCBMS) meeting in October 2009 included new members representing the Australasian Society of Clinical and Experimental Pharmacologists and Toxicologists, the Australian Neuroscience Society and the Australian Society for Biochemistry and Molecular Biology.

Professor Warwick Anderson, CEO of the NHMRC, attended the October committee meeting to discuss the NHMRC's thinking on changes to funding policy, and career structure and workforce issues. Given substantial common interests with the National Committee for Medicine, another joint meeting between the two committees in 2010 is being considered. Biomedical science workforce issues have been a continuing topic of discussion for the NCBMS, both in regard to the declining numbers of young people interested in entering the profession, and ageing of the current workforce. The NCBMS is keen to discuss these matters, which also affect other branches of Australian science.

Following the highly successful National Forum on Education in Biomedical Sciences held in late 2007, preliminary discussions have confirmed a willingness to plan for a second national forum in late 2010, or 2011.

Brain and mind

Chair: Professor Max Coltheart FAA (until end 2009), succeeded by Professor Stephen Crain

The activities of the National Committee for Brain and Mind (NCBM) in 2009 focused on interactions with federal and state governments in relation to the condition of dyslexia, particularly by providing scientific advice. The chair, with advice from committee members, contributed to the development of the new national English curriculum by the National Curriculum Board (now Australian Curriculum and Assessment and Reporting Authority), which has a specific focus on evidence-based methods of teaching reading in the initial school years. The chair was also asked by the Parliamentary Secretary for Disability, the Hon Bill Shorten MP, to convene a working party to make recommendations for a national agenda for action to assist people with disability, and a report making such recommendations was submitted at the end of 2009. Sir James Rose, who was commissioned by the UK government to produce a similar report on action on dyslexia, visited Australia in September 2009 under the auspices of Learning Difficulties Australia (of which the chair of NCBM was president in 2008–09) and several in-depth meetings with him, including one involving the Parliamentary Secretary, greatly assisted the preparation of the report to the Australian Government.

Chemistry

Chair: Professor Chris Easton FAA (until September 2009), succeeded by Professor Curt Wentrup FAA

The Asia-Pacific Seminar on Chemical Safety and Security to Counter Terrorism was held at the Shine Dome from 10 to 12 June. The event was run by the Department of Foreign Affairs and Trade and co-sponsored by the Academy and the National Committee for Chemistry. The event created important links between the Academy and the Department of Foreign Affairs and Trade.

Three voting delegates attended the International Union for Pure and Applied Chemistry General Assembly, held in Glasgow, from 31 July to 6 August. The delegates were Professors Chris Easton FAA, Mary Garson and Brynn Hibbert.

Crystallography

Chair: Professor Jenny Martin

The Society of Crystallographers in Australia and New Zealand held its national meeting (CRYSTAL 26) in the Barossa Valley in April, where the annual meeting of the National Committee for Crystallography (NCCr) was also held. The 1987 Fund Fellow at CRYSTAL 26 was Professor Harald Reichert, who is Deputy Director of the European Synchrotron Radiation Facility.

Australian scientists were well represented at the very successful Asian Crystallographic Association (AsCA) meeting in Beijing in October. The program chair of the meeting was Professor Peter Colman FAA, immediate past chair of NCCr. The next AsCA meeting will be held in October–November 2010 in Busan, Korea, and the program chair for that meeting is the current chair of NCCr. Also of note is that the 21st Australian Conference on Microscopy and Microanalysis is to be held in Brisbane from 11 to 15 July 2010.

NCCr remains engaged with events surrounding the upcoming centenary of crystallography. In 1915, Lawrence Bragg and his father William Bragg were jointly awarded the Nobel Prize in Physics for their pioneering work in crystallography. Lawrence Bragg was the first Australian to receive a Nobel prize and remains the youngest ever recipient of this honour, being awarded the prize at the age of 25. An international commemorative symposium is planned in 2012 to celebrate the centenary of Lawrence Bragg's landmark publication on X-ray structure determination. Preliminary acceptance has been received from AsCA to hold its 2012 meeting in Adelaide, held jointly with a Bragg symposium. The organising committee consists of Professor Steve Wilkins (of NCCr), Professor Jose Varghese (of NCCr and president of the Society of Crystallographers in Australia and New Zealand), Dr Rob Robinson (of NCCr), Professor Peter Colman FAA, Associate Professor John Jenkin and Professor John Carver.

In addition, NCCr supports current initiatives aimed at expanding the range of beamlines and capabilities at the Australian Synchrotron. It also supports initiatives aimed at providing long-term funding for the Australian Synchrotron and enhancing its role as a national facility.

Data for science

Chair: Dr Rhys Francis

The National Committee for Data in Science (NCDS) had initially planned a one or two day 'state of play' workshop for November 2009, targeting discipline needs and data intensive infrastructure investments. The intention was to develop a baseline from which an outlook report might be generated during 2010. The significant funding announced around data initiatives in the May federal budget and the rapid evolution of activities has led the NCDS to revise the proposal into an annual workshop to be held towards the middle of each year, each followed by a 'state of play' report from the committee. The intention is to provide a sequence of development summaries from which longer term trajectories and issues can then be derived.

Other NCDS activities include:

- the attendance of Dr Ray Norris at the CODATA Executive Committee Meeting in Paris;
- the nomination and acceptance of Ms Kim Finney to the ICSU Ad Hoc Coordinating Committee on Information and Data, who attended its second meeting in March 2010; and
- a presentation by Dr Lesley Wyborn on the role of data standards in science at the eResearch Australasia Conference.

Earth sciences

Chair: Professor Brian Kennett FAA

Australia will host the two main meetings for the international unions linked to the National Committee for Earth Science (NCES) in the next two years:

- General Assembly of the International Union of Geodesy and Geophysics (IUGG) in Melbourne in July 2011; and
- International Geological Congress (IGC) linked to International Union of Geological Sciences in Brisbane in August 2012.

In order to achieve effective liaison, a member of each meeting's organising committee has joined the NCES as an observer: Professor Ray Cas from Monash University for IUGG 2011 and Dr Ian Lambert from Geoscience Australia for IGC 2012. The NCES receives regular reports on developments from these meetings. Both international unions held executive meetings in Australia during the year. NCES is expected to act as the principal link to IUGG but only covers three of the topics from the eight associations comprising IUGG and consideration is being given to ways of improving this interaction.

Members of the NCES are playing an active part in organising the Australian Earth Sciences Convention to be held in Canberra in July 2010 with the theme Earth Systems: Change, Sustainability, Vulnerability.

A major effort of the NCES in 2009 has been to re-examine the 2003 publication *Strategic Plan for the Earth Sciences*. This has been discussed at two meetings: the main meeting in June and a teleconference in late November. On the whole, the plan is still very relevant and a number of its key recommendations have come to pass through different paths. A supplementary document is being prepared to provide a perspective on the status of the plan. Members of the NCES have worked through the goals and recommendations to examine how far they have been implemented and what still needs to be done. The responses are being collated for the overview document.

Associate Professor Paulo Vasconcelos, along with two students, attended the International Year of Planet Earth meeting in Lisbon in November.

Earth system science

Chair: Dr Roger Gifford

The primary work of the National Committee for Earth System Science (NCESS) in 2009 was the continued development of a decadal strategic research plan for ESS. However, defining the boundaries of the subject has been particularly problematic as it has been changing rapidly. Several changes in members of NCESS have also tended to change the perspective of the document. About 25 senior scientists were invited to form an ESS reference group, which came together at a two-day workshop on 2 and 3 September to critique the draft and to help further develop the ESS strategic plan. The major comment arising from the workshop was agreement that the plan should treat the interactions between humans and the biogeophysical global spheres as an integral part of the analytical framework of the ESS approach, rather than considering just the natural domain as impacted by humans, with human domain responses to global changes treated as another subject. The NCESS is interacting with the Chief Scientist, Dr Penny Sackett, to link the Australian strategic planning activity to the current ICSU Earth system 'visioning' agenda.

The NCESS also participated in the fast-track development of the document *An Australian Strategic Plan for Earth Observations from Space,* intended to complement the *Strategic Plan for Space Science*.

NCESS co-sponsored with ATSE a three-day workshop in Melbourne from 8 to 10 July, Managing our Urban Areas in a Changing Climate. With both Australian and overseas speakers, the meeting aimed to prepare an authoritative report to identify key issues and management strategies, and provide a framework for urban policy development. The report from the workshop will be launched by the academies in 2010.

Geography

Chair: Professor Nigel Tapper

The major activity of the National Committee for Geography (NCG) for 2009 was to participate in the development of the national curriculum for geography. Geography has been accepted as compulsory from kindergarten to year 12, and the Australian Curriculum, Assessment and Reporting Authority is now developing a national curriculum. The NCG, along with the Institute of Australian Geographers and teacher

organisations, is assisting the process through consultation and direct support. For example, the NCG contributed to an application to the Australian Government from the geography community for funding of a multi-million dollar curriculum implementation program.

In other activities, the NCG contributed to the organisation of a joint Academy and ATSE workshop mentioned above and held a productive meeting on 20 November that identified a number of initiatives for the forthcoming year(s).

History and philosophy of science

Chair: Professor Rachel Ankeny

The National Museum of Australia (NMA) student essay prize in Australian environmental history was again offered in 2009. The judging panel comprised the chair of the National Committee for History and Philosophy of Science (NCHPS), Dr Mike Smith (NMA) and Dr Libby Robin (NCHPS). A total of $5000 was awarded, including monies carried over from the previous year, with two honourable mentions and a shared first prize (see page 88). Funding for the prize has been renewed for an additional five years by the NMA, with the focus to be on both Australian scientific and environmental history.

The NCHPS continued to work with Mr Gavan McCarthy from the University of Melbourne to help achieve the aims of the World History of Science Online project (www.dhst-whso.org/). The main objectives of the project are: to provide central online access to bibliographies and catalogues of archives and sources including scientific and technological bibliographies and archival sources; to build capacity in history of science and technology in all countries; to make available historical information for the scientific and technological disciplines that require it; and to 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.

Discussions continued among members of study programs for history and philosophy of science and S&T around Australia about the future of the discipline and strategies to build it. In addition, the NCHPS contributed to discussions nationally and internationally on research reporting and journal ranking processes.

The Academy's Executive Committee agreed to the NCHPS developing a proposal to the Academy to mark its 60th anniversary in 2014 with a series of public lectures introducing the history of science.

Mathematical sciences

Chair: Professor Hyam Rubinstein FAA

The main activities of the National Committee for Mathematical Sciences (NCMS) in 2009 were producing a *National Strategic Plan for the Mathematical Sciences*, (with the assistance of the Australian Mathematical Sciences Institute), and participation in the ERA journal ranking exercise and in the Group of Eight review of mathematical sciences, chaired by Professor Gavin Brown FAA.

The strategic plan was produced after consultation with personnel in the Australian Government Department of Education, Employment and Workplace Relations (DEEWR) and DIISR. An action plan, with evidence of the decline in numbers of mathematics and statistics students in schools and universities, was requested. The strategic plan gave a small number of recommendations, especially to improve the supply and support of mathematics teachers in schools.

Problems associated with the production of a journal-ranking list in the mathematical sciences gave rise to discussions between the NCMS, the Australian Mathematical Society, the Statistical Society of Australia Inc and the Australian Research Council (ARC). It was decided that panels would be convened to analyse and improve the interim lists produced by the ARC and this was done for several months in the middle of 2009. The Australian Mathematical Society was the overall coordinator of this program.

The Group of Eight decided to hold a review of the mathematical sciences in 2009 after becoming aware of

declining school participation rates, increasing shortage of mathematically-qualified school teachers and the flow-on effects in engineering and physical sciences programs in universities. The review report has several important recommendations, such as improving mathematics training for primary teachers and increased funding for catch-up programs for students entering university courses, such as engineering, who need additional mathematical skills.

Mechanical sciences

Chair: Associate Professor Jim Denier

The National Committee for Mechanical Sciences (NCMS) did not meet this year. The committee discussed the possible formation of a National Committee for Theoretical and Applied Mechanics and a National Committee for the Theory of Machines, and made recommendations for membership of the NCMS.

A submission was made to the ARC regarding representation of theoretical and applied mechanics on the ARC College of Experts. The submission emphasised changes in the fields of research codes within the mathematical sciences which, in the past, have excluded many applied mathematicians from submitting grants through the ARC Mathematics, Information and Communication Sciences Panel.

Medicine

Chair: Professor Bronwyn Kingwell

The major issues considered by the National Committee for Medicine (NCM) in 2009 were medical research funding and healthcare reform (direct research costs), indirect research costs for medical research institutes and hospitals, NHMRC policy, and scientific conduct.

Particular concerns include maintaining the level of funding for medical research, given the planned reduction of the NHMRC budget by approximately $100 million in 2011, and achieving contributions to the indirect cost of research in medical research institutes and hospitals comparable to those obtained for universities in the government's response to the Cutler and Bradley reviews.

Over the past year NHMRC has undertaken multiple consultations with regard to funding schemes culminating in the recent formulation of the NHMRC strategic plan for the forthcoming triennium. This has provided a further opportunity for the NCM to comment on a range of issues including:

- balance of investment;
- transactional costs of research;
- clinical translation and health reform;
- building capacity;
- salary gaps;
- indigenous research; and
- Auditor General's report on NHMRC.

Actions of the NCM include:

- meetings and discussions with politicians and policy leaders:
  - Ms Jane Halton and Ms Mary Murnane, Secretary and Deputy Secretary for the Department of Health and Ageing;
  - The Honourable Lindsay Tanner MP, Minister for Finance and Deregulation; and
  - Professor Warwick Anderson, CEO of NHMRC.
- engagement with health and medical research groups (such as Research Australia, the Australian Society for Medical Research and the Association of Australian Medical Research Institutes) to unify lobbying strategies and actions; and

- responses to major national consultations including the Cutler review of the Australian Innovation System, *Venturous Australia*, the Bradley review of Australian Higher Education and the NHMRC strategic plan.

Following the release of the Australian Code for the Responsible Conduct of Research in 2007, the NCM has watched the mechanisms to ensure consistent national compliance and made a submission to the consultation on an Australian Research Integrity Committee in December 2009.

Muses-C (task force of the National Committee for Space Science)

Chair: Professor Trevor Ireland

The Hayabusa Mission (Muses-C), operated by the Japanese Space Agency JAXA, is nearing its culmination with return scheduled for June 2010. A capsule containing samples of the asteroid Itokawa is to land near Woomera and then be transferred to Japan for preliminary examination. At this stage the mission is proceeding well and is on schedule. A problem in neutralising the ion propulsion system has been rectified and the spacecraft will maintain the current return cruise schedule back to Earth. A successful landing will hopefully see the analysis of the first in situ samples taken from an asteroid. This information is vital in determining the sources of meteorites that continually bombard Earth.

Nuclear matters and Australian Research Reactor (task force of the National Committee for Crystallography)

Chair: Professor John White FAA

The task force met on 20 August to consider reports from the chair and members, and an update on the performance of the OPAL reactor. The meeting with Dr Adi Paterson, CEO of ANSTO, was very fruitful and open, and the exchange of ideas and information valuable. His subsequent public lecture at the Australian National University was stimulating and interactive, all in a very good spirit. The present and future operations at ANSTO and matters of potential national interest related to the task force's remit were discussed. Progress was described on the National Academies Forum's ARC-funded Learned Academies Special Project Understanding the Formation of Attitudes to Nuclear Power in Australia and material on the opening of the Japan Proton Accelerator Research Complex facility in Japan presented.

Nutrition

Chair: Professor Jennie Brand-Miller

The National Committee for Nutrition (NCN) held a successful symposium, Salt in the Diet (Why Health Professionals Need a Shake-up), under the auspices of the Academy, the George Institute for International Health and the Sydney group of the Nutrition Society of Australia on 13 August at the George Institute in Sydney. Professor Caryl Nowson was the chair of the scientific program committee.

A media release was issued and some of the speakers were interviewed. The committee subsequently engaged in useful correspondence with Food Standards Australia New Zealand regarding apparent under-estimation of salt intake by the average Australian, and a paper has been prepared for submission to the *Medical Journal of Australia*.

An NHMRC public statement on iodine supplementation in pregnant and breast-feeding women was released in December 2009. The NCN viewed this as a successful outcome to its focus on the iodine deficiency issue in 2008.

The committee has begun planning a major meeting, Food, Health and Sustainable Agriculture, to determine the research needs to set dietary guidelines that are commensurate with a sustainable agricultural system. A closed meeting of about 40 people is envisioned, including eminent international speakers, as a satellite of the Nutrition Society of Australia annual scientific meeting in December 2010. The University of Adelaide has indicated that it will contribute $50,000 to this meeting and Professor Robert Gibson from the University of Adelaide School of Agriculture, Food and Wine was an observer at three of this year's committee meetings.

The NCN helped to organise a highly successful workshop for mid-career researchers at the annual meeting of the Nutrition Society of Australia in Newcastle in December. The aim of the workshop was to help the attending mid-career researchers to hone their grant applications to increase success rates.

The committee also provided input to the ERA Ranked Journal List.

Physics

Chair: Professor Michelle Simmons FAA

In December 2008 the National Committee for Physics (NCP) pre-launched its proposal to prepare a decadal plan for physics, *Investing in the Future of Physics*, at the Australian Institute of Physics Congress in Adelaide. This initiative was subject to the success of the ARC LASP application which was announced in April 2009. A process for nominating the chairs and sub-chairs of the 23 different sub-disciplines was announced and nominations made. However, the serious illness of the chair of the committee necessitated postponement of the project until 2010.

In the meantime a town hall meeting was held in Adelaide on 25 June, linked with the Australian Institute of Physics, to outline the aims of the proposal and seek feedback. Professor Murray Hamilton provided an introduction and background to the physics strategic plan. Extensive discussion highlighted that the report needed to include the problems Australia faces as a nation and how physicists can help to solve them. It was also considered important to identify the job market for physicists, include an industrial sector for R&D, provide a view beyond the next 10 years, address the possible creation of new industries and consult government agencies that may have existing reports. There was also some discussion on the format of the 23 sub-disciplines. Comments were reviewed by the NCP, who met by phone on 3 July to discuss the plan and adapt the timetable for the extension period of 2010–11, which has been submitted to the ARC.

Plant and animal sciences

Chair: Dr TJ Higgins FAA

The main activity for National Committee for Plant and Animal Sciences (NCPAS) in 2009 was evaluating what role the committee could play in furthering the objectives of the Academy. Substantial clarification was obtained at the national committee chairs' meeting in November and in discussion with Dr Martin Callinan. Previous discussions about managing interdisciplinarity and the background undergraduate and postgraduate training needed to provide the workforce to address current major issues turned out to be highly relevant.

Quaternary research

Chair: Professor John Chappell FAA

Members of the Quaternary research community met at the ANSTO in April. Recommendations were made to the Academy's Council regarding the re-establishment of a committee in this discipline area.

Radio science

Chair: Professor Andrew Parfitt

The National Committee for Radio Science (NCRS) acted as a conduit to the scientific community for communications from the 10 scientific commissions of the International Union of Radio Science.

Planning for the 2010 Workshop on Applications of Radio Science (WARS) commenced in 2009 and the workshop was held in Canberra on 11 and 12 February. The event was opened by Academy President Professor Kurt Lambeck and was attended by about 50 people. WARS2010 celebrated two firsts: the publication of the WARS2010 proceedings in a special issue of *Radio Science*, and the inaugural Young Radio Scientist Keynote

Award. In lieu of establishing a Christiansen Medal, given constraints on financing such medals, the NCRS agreed to award an Australian Radio Scientist Prize at each WARS conference, the award being one of the three keynote presentations at the conference and travel expenses to attend. This year's awardee was Dr Jean-Michel Le Floch, who presented his paper *From micro to millimetre waves low phase noise and filtering devices design* during the workshop. A student poster prize was also awarded. The winner was King Yuk (Eric) Chan, for his poster *The enabling technology for the next generation wireless communications: RF MEMS*.

The NCRS website has been relocated and is currently under development, with an update of the accompanying 'Directory of Radio Science' the NCRS' primary activity in early 2010.

Space science

Chair: Professor Iver Cairns

The year 2009 was extremely busy for the National Committee for Space Science (NCSS). Four major items are reported here, all in addition to managing Australia's participation in international societies for space science (COSPAR, IAGA, IUGG, and SCOSTEP).

First and most importantly, the first *Decadal Plan for Australian Space Science* was revised by the steering committee, approved by the NCSS and endorsed by the Academy. The plan will be released officially in mid-2010. The NCSS thanks the steering committee for their sterling work and looks forward to implementation of the plan and resulting invigoration of Australian space science, industry and services. Second, NCSS contributed to a joint Academy–ATSE process to develop *An Australian Strategic Plan for Earth Observations from Space*, which was released on 30 October. Third, NCSS jointly sponsored and organised with the National Space Society of Australia, the 2009 Australian Space Science Conference (ASSC) at the University of Sydney. The Parliamentary Secretary for Innovation and Industry, the Hon Richard Marles MP, opened the conference and Senator Annette Hurley, chair of the Senate Standing Committee on Economics 2008 *Inquiry into New Directions for Australia's Space Science and Industry Sector*, opened the decadal plan workshop. Fourth, presentations to the ASSC, Australian Institute of Physics, and other groups promoted the plan and Australian space science, as did media interviews and articles.

Spectroscopy

Chair: Professor Keith Nugent FAA

The main activity of the National Committee for Spectroscopy is to choose the Frew Fellow, which is awarded to distinguished overseas scientists to participate in Australian spectroscopy conferences and to visit scientific centres in Australia.

The 2009 Frew Fellowship was awarded to Professor Rudolf Grimm, Research Director at the Institute of Quantum Optics and Quantum Information of the Austrian Academy of Sciences in Innsbruck. Professor Grimm delivered a plenary lecture entitled *Few-body physics with ultracold atoms: Efimov's dream and 40 years later* to the Australasian Conference on Optics, Lasers and Spectroscopy and Australian Conference on Optical Fibre Technology conference held at the University of Adelaide from 29 November to 3 December. Professor Grimm also presented public lectures with the title *Cool and fascinating: Quantum matter at absolute zero* in Melbourne on 8 December and in Canberra on 10 December.

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

Chair: Professor Andy Pitman

The Terrestrial Carbon Task Force has released its recommendations on research priorities for the next decade relating to vegetation dynamics and global climate change. The report can be found on the National Committee for Earth System Science web page at www.science.org.au/natcoms/nc-ess.html.

International activities

Multilateral activities

International Council for Science

The International Council for Science (ICSU) is a non-governmental organisation representing a global membership that includes national scientific bodies (119 members) and international scientific unions (30 members).

ICSU's mission is to strengthen international science for the benefit of society, aiming to address this mission by:

- identifying and addressing major issues of importance to science and society;
- facilitating interaction amongst scientists across all disciplines and from all countries;
- promoting the participation of all scientists in the international scientific endeavour; and
- providing independent, authoritative advice to stimulate constructive dialogue between the scientific community and governments, civil society, and the private sector.

ICSU mobilises knowledge and resources to focus on activities in three areas: international research collaboration; science for policy; and universality of science. This is done though links with strategic partners, the scientific community, policy makers and the broader society.

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

ICSU has established regional offices in Africa, the Arab region, Asia and the Pacific, and Latin America. The Regional Office for Asia and the Pacific (ROAP) was established in 2006 and is based in Kuala Lumpur, Malaysia. The office promotes the development of science throughout Asia and the Pacific and helps strengthen the participation of scientists in international research from developing countries in the region. The Academy has maintained strong links with the ROAP since its inception. The priority areas for the ROAP are:

- the ecosystem;
- human-induced and natural hazards and disasters; and
- sustainable energy.

Guiding the activities of the ROAP is the ICSU Regional Committee for Asia and the Pacific. This committee consists of 13 members from across the region, with Professor Bruce McKellar FAA being the current chair.

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

To enhance the interaction between the Academy and ICSU, the Academy has decided to form a new committee whose focus will be on ICSU activities, both at a global and regional level. It is proposed that Professor McKellar will be the chair. The remaining membership will include Fellows with strong links to ICSU and international science unions.

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 from www.science.org.au/internat/guidelines.html

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 2009 are listed here.

Committee	Union/conference	Date	Location	Delegate names
Astronomy	International Astronomical Union	3-14 August	Rio de Janiero, Brazil	Professor Matthew Colless FAA Professor Warrick Couch FAA (1st week) Dr John O'Byrn Professor Elaine Sadler (2nd week)
Biomedical sciences	International Union of Biochemistry and Molecular Biology	7 August	Shanghai, China	Professor Denis Crane Professor Phillip Nagley
	International Union of Physiological Sciences	27 July - 1 August	Kyoto, Japan	Professor David Adams Professor David Cook FAA Professor Joe Lynch
Chemistry	International Union of Pure and Applied Chemistry	31 July - 6 August	Glasgow, Scotland	Professor Chris Easton FAA Professor Mary Garson Professor Brynn Hibbert
History and philosophy of science	International Congress on the History of Science and Technology	26-31 July	Budapest, Hungary	Mr Gavan McCarthy Professor David Mercer Dr Libby Robin
Nutrition	International Union of Nutritional Societies	4-9 October	Budapest, Hungary	Professor Jennie Brand-Miller
Plant and animal sciences	International Union of Biological Sciences	10-13 October	Cape Town, South Africa	Professor John Buckeridge
Space science	International Association of Geomagnetism and Aeronomy (of the International Union of Geodesy and Geophysics)	23-30 August	Sopron, Hungary	Professor Iver Cairns

InterAcademy Council

Created in 2000, the InterAcademy Council (IAC) mobilises the best researchers across the globe to advise international bodies such as the United Nations and the World Bank on the great global challenges of our time. The IAC recently released the reports *Women for Science* and *Lighting the Way: Toward a Sustainable Energy Future*. Current important issues for the IAC are emerging infectious diseases and water supply and quality.

The governing board of the IAC comprises the Presidents of 15 academies of science and equivalent organisations (including the Australian Academy of Science), representatives of the InterAcademy Panel on International Issues (IAP), the International Council of Academies of Engineering and Technological Sciences, and the InterAcademy Medical Panel of medical academies, plus the African Academy of Sciences and the Academy of Sciences for the Developing World.

Professor Lambeck attended an IAC board meeting, held in Amsterdam on 23 and 24 March 2010, where a request from the Secretary-General of the United Nations to undertake a review of the processes and procedures of the Intergovernmental Panel on Climate Change was unanimously agreed to.

InterAcademy Panel on International Issues

The goal of the IAP, a global network of over 100 of the world's science academies, is to help member academies work together to advise citizens and public officials on the scientific aspects of critical global issues.

Networks and links created by the IAP allow academies to raise both their public profile among citizens and their influence among policy makers. IAP organises international conferences, sponsors workshops and serves as a forum for the exchange of ideas and experiences among academies. It helps science academies to achieve greater public presence within their nation and region.

The IAP's flagship program focuses on capacity building for younger and smaller science academies, particularly those in developing countries. In addition, IAP supports projects that are coordinated by member academies and regional networks. The projects include:

- digital knowledge and infrastructure;
- science education;
- water research and management; and
- biosecurity.

The Academy President, Professor Kurt Lambeck, attended the IAP executive committee meeting held in Tokyo (hosted by the Science Council of Japan) on 15 and 16 September 2009, and in Amsterdam on 22 and 23 March 2010. He also participated in an IAP general assembly and conference held at the Royal Society of London, from 13 to 15 January 2010, which the Chief Executive, Dr Sue Meek, also attended. The Academy was re-elected to the IAP executive committee for a second term from 2010 to 2012 at the general assembly, and Professor Mohammed Hassan, President of the African Academy of Sciences, was elected to replace outgoing co-chair Professor Chen Zhu, Vice-President of the Chinese Academy of Sciences.

The IAP released a communiqué following their conference Integrating Ecosystems Services into Biodiversity Management which contained a series of recommendations for policy and decision makers, and for scientists (http://royalsociety.org/communique-of-the-IAP-Biodiversity-Conference/)

The Academy Council has endorsed two statements by the IAP on tropical forests and climate change and on ocean acidification, joining over 50 academies from around the world to express their concern over these issues.

InterAcademy Panel Meeting of Young Scientists

The Academy supported the attendance of Dr James Tickner of CSIRO Minerals as the Australian representative at the IAP's Meeting of Young Scientists at the 2009 World Economic Forum (WEF) (also known as the 'Summer Davos') in Dalian, China, from 10 to 12 September. The meeting was designed to provide a forum for young scientists to discuss international issues and to participate in sessions of the main WEF meeting. Discussion focused on the teaching of science to produce future innovators, and ways in which innovation could address problems facing society.

The Academy also supported the attendance of Mr David Fisher of ABC Radio's *The Science Show*, which featured the meeting during their 14 November broadcast.

Federation of Asian Scientific Academies and Societies

Professor Kurt Lambeck FAA has assumed the presidency of the Federation of Asian Scientific Academies and Societies (FASAS) for the period of 2010 to 2012. During this time the Academy will act as secretariat for FASAS.

FASAS was established in 1984 and currently has a membership of 15 scientific academies and societies from the Asian region. The aims of FASAS are the promotion of S&T, and the organisation of national and regional programs for the development of member countries. In particular, FASAS emphasises the importance of S&T for development in the region, and the integration of S&T into national development planning and policy-making processes.

To achieve these aims FASAS maintains the following areas of focus:

- the promotion of teaching practices of all levels of science; and
- increasing awareness of the importance of science and technology in governance, business and everyday life.

During his tenure as president of FASAS, Professor Lambeck intends to focus on increasing awareness of the importance of science literacy and science education in the region.

The Foreign Secretary, Professor Jenny Graves FAA, attended the 2009 FASAS council meeting in Dhaka, Bangladesh, on 9 and 10 October 2009. She gave a presentation on the Academy's science education program *Primary Connections* at the science education workshop on 10 October.

Asia-Pacific Forum on Chemical Safety and Security

Approximately 80 people attended a regional conference, Asia-Pacific Seminar on Chemical Safety and Security to Counter Terrorism, from 10 to 12 June, which was co-hosted by the Academy, through the National Committee for Chemistry, and the Department of Foreign Affairs and Trade.

Bilateral cooperation

The bilateral activities conducted by the Academy provide opportunities for Australian researchers and government officials to meet high-level international researchers and research funders to discuss international science and technology policy and practices, and to promote Australian research and technology capabilites. These interactions also help to promote and strengthen long-term relationships, identify areas for future collaboration, and increase Australia's presence and influence at the international level.

The Academy's bilateral activities are substantially supported by DIISR's International Science Linkages (ISL) – Science Academies Program. A key component of the program is a series of scientific symposia and workshops on global issues, conducted in Australia and overseas. To enable wide dissemination of information from the workshops the presentations and publications have been posted on the Academy's website at www.science.org.au/events/proceedings.html. The other component is support for international collaboration which is reported on pages 54 to 70.

Americas

Brazil

Visit by University of Minas Gerais

At the request of the Embassy of Brazil in Canberra, the Academy hosted a delegation from the National Institute for Science and Technology: Natural Resources, Water and Biodiversity of the Federal University of Minas Gerais in Brazil at the Shine Dome on 17 September. The delegation comprised chemical engineers, biologists and geoscientists interested in learning about sustainability, water and environmental issues in Australia.

Australian attendees included researchers from the Australian National University, the Cooperative Research Centre for Greenhouse Gas Technologies and representatives from DIISR. Discussions chaired by Professor Martin Banwell FAA were held on issues of common interest, including potential topics for future bilateral workshops.

Chile

Australia-Chile Mining Workshop

The Academy, in conjunction with the Embassy of Chile in Australia, organised the Australia–Chile Mining Workshop on 11 November 2009 in Adelaide.

The workshop, which was funded by DIISR, was opened by Professor John Taplin, Pro Vice-Chancellor of the University of Adelaide, and Mr Jose Luis Balmaceda, Chilean Ambassador to Australia. Six Chilean presenters and six Australian presenters participated in the one-day event. Participants represented government agencies, research institutes and industry from both countries. As a result of the workshop, several areas of potential collaboration were identified.

United States of America

National Science Foundation US Graduate Students Summer Program

The Academy hosted 20 American PhD students selected to participate in the 2009 East Asia and Pacific Summer Institutes (EAPSI) program, run by the Academy and the US National Science Foundation.

This is the sixth year that students in science and engineering have visited Australia between June and August for a period of eight weeks during the American summer to undertake research in laboratories and to initiate personal relationships with their Australian counterparts. This activity is funded under the DIISR-ISL program.

Visiting US graduate students attended an orientation session at the Shine Dome

This year's orientation session, held from 22 to 24 June, marked the beginning of the students' stay in Australia. The participants of the program came from a number of research areas, and were hosted by various institutions including universities, CSIRO divisions, museums, teaching hospitals and government institutions.

The Academy organised a series of lectures and site visits to cultural institutions as part of the orientation session which began with a welcome by the Secretary for Biological Sciences Professor Graham Farquhar FAA and Chef Executive Dr Sue Meek. Professor David Lindenmayer FAA delivered a presentation on Australian biodiversity and Dr Joe Hlubucek, Executive Director of the Australian–American Fulbright Commission, spoke about postdoctoral research opportunities in Australia.

Participants in National Science Foundation summer program

Researcher	Project	Host institution
Ms Rachell Barker University of Texas at El Paso	Cross-race face perception	Professor Gillian Rhodes University of Western Australia
Ms Elizabeth Basha Masschusetts Institute of Technology Cambridge	Autonomous pump control using sensor networks	Dr Michael Brunig CSIRO
Mr Michael Castrence University of Hawaii at Manoa	Object-based image analysis for remote sensing of coral reefs	Dr Stuart Phinn University of Queensland
Ms Nancy Chaney University of Hawaii at Hilo	The relationship between larval development and population structure in Pacific micro-gastropods	Dr Cynthia Riginos University of Queensland
Mr Aaron Geller University of Wisconsin at Madison	The progeny of stellar dynamics and stellar evolution	Dr Jarrod Hurley Swinburne University of Technology
Ms Angela Grant George Washington University	Reverse cholesterol transport and HIV infectivity	Dr Dimitri Sviridov Baker IDI Heart and Diabetes Institute
Mr Jonathan Ito University of Southern California	Leveraging belief revision to model self deception	Professor Liz Sonenberg University of Melbourne
Ms Jennifer Martin Virginia Institute of Marine Science	An Indo-Pacific contribution to the systematics, ontogeny and phylogeny of ribbonfishes (Lampridiformes, Trachipteridae)	Dr Jeff Leis Australian Museum
Ms Michelle Meighan Arizona State University	Hydrodynamic electrofocusing utilising commercial capillary electrophoresis for the separation of proteins	Dr Michael Breadmore University of Tasmania
Ms Christine Moore Stanford University	Hydrodynamics of fringing reef systems	Dr Ryan Lowe University of Western Australia

Researcher	Project	Host institution
Mr Adam Nelson University of Utah	Testing the adaptive significance of Mup epigenetic regulation	Dr Emma Whitelaw Queensland Institute of Medical Research
Mr Jon Pula University of Denver	Transversals of Latin squares	Dr Ian Wanless Monash University
Mr Brian Roberts University of Florida	Morphing control strategy for turbulence compensation	Professor Simon Watkins RMIT
Ms Diana Snelling University of Texas at Austin	In vivo biosensors from porous silicon rugate filters and environmentally responsive hydrogels	Professor John Justin Gooding University of NSW
Mr Christopher Stapel University of Kentucky	Migrants or myth? Educational and residential aspirations of rural sexual minority young people	Dr Gordon Waitt University of Wollongong
Ms Rebecca Swab University of California, Riverside	Increasing realism of extinction risk predictions under global climate change through coupling dynamic bioclimate habitat and stochastic population models	Dr David Keith NSW Department of Environment and Climate Change
Ms Noel Takeuchi University of Florida	Comparative study of trace metal distribution and cellular response in sirenians	Dr Susan Bengtson-Nash University of Queensland
Mr Derick Weis Tennessee Technological University	Inverse design of ionic liquids for the pre-treatment of cellulose	Professor Douglas MacFarlane Monash University
Mr Shomir Wilson University of Maryland	Distinguishing use and mention in natural language	Professor Robert Dale Macquarie University
Mr Moriel Zelikowsky University of California, Los Angeles	The neural correlates of renewal, reinstatement, disinhibition and spontaneous recovery	Dr Bryce Vessel Garvan Institute of Medical Research

Asia

China

Sixth Australia-China symposium

The China–Australia Symposium on Sustainable Coastal and Deltaic Systems held in China on 14 and 15 October was organised jointly by the Academy and ATSE as part of the DIISR-ISL program. This symposium is the sixth in a series of high-level annual symposia to be conducted with the Chinese Academy of Sciences.

The Australian delegation was led by Professor Kurt Lambeck FAA and ATSE Vice-President, Mr Peter Laver. The symposium was coupled with pre- and post-event site visits to research institutions.

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.

The symposium was divided into five separate workshops which were each co-convened by an Australian and a Chinese participant. The subjects of the workshops were:

- sustainable land use;
- sustainable coastal wetland ecosystems;
- environmental pollution and public health;
- sustainable marine use; and
- coastal management and observation.

Japan

Second HOPE meeting in Hakone, Japan

The Academy supported five young Australian researchers to attend the second Japan Society for the Promotion of Science HOPE meeting, held in Hakone, Japan, from 28 to 30 September. Ms Ruth Amos, Mr Russell Driver, Ms Reena Halai, Mr Dominik Konkolewicz and Ms Boon Teo attended the meeting with the theme art in science and featuring seven Nobel laureates as speakers. Participants enjoyed lectures, networking opportunities and a visit to the Ohara Museum of Art.

Photo: istockphoto

Reef ecosystems are a valuable bioresource

Australia-Japan Workshop on Biodiversity

The Japan Science and Technology Agency and the Academy, on behalf DIISR, organised the Australia–Japan Workshop on Biodiversity, which was held at the Academy on 27 and 28 October.

The aim of the workshop was to bring together leading researchers from both countries to continue to strengthen bilateral cooperative research links in areas of mutual priority. Twenty Australian and Japanese researchers presented on the theme of biodiversity across three topics: informatics of rare animals and plants; biodiscovery of chemical ecology in plants and animals; and investigation, conservation and utilisation of Australian and Japanese bio-resources and ecosystems.

The conveners were Professor Barry Osmond FAA of the Australian National University and Professor Motomi Ito of the University of Tokyo. Professor Jenny Graves FAA opened the workshop and Dr David Patterson of the Encyclopaedia of Life project at the Marine Biological Laboratory in the US presented an open lecture on 26 October at the Shine Dome, in conjunction with the workshop.

The Japanese delegation attended a series of site visits at James Cook University in Townsville at the completion of the workshop.

Korea

Australia-Korea Foundation Early Career Researchers Program

The Academy, in collaboration with ATSE, the Australia-Korea Foundation (AKF) and the National Research Foundation of Korea (NRF, previously KOSEF), ran the third AKF Early Career Researchers Program between 15 June and 14 August. This program is supported by the Department of Foreign Affairs and Trade. It began in 2007 and is designed to enhance Australia–Korea links in S&T.

An orientation session was held in Canberra on 15 and 16 June, and a debriefing session, attended by NRF representatives and the researchers' Korean mentors, was held in Sydney on 14 August.

Under this program, with funding from AKF and NRF, the following four young Korean scientists conducted research for two months at Australian universities.

Researcher	Project	Host institution
Dr Byoung-uhn Bae Korea Atomic Energy Research Institute	Development of three-dimensional CFD code for sub-cooled boiling two-phase flow	Dr Jiyuan Tu Australian Nuclear Science and Technology Organisation
A/Professor Inpil Kang	A biometric nanosensor feasibility study for ubiquitous structural health monitoring	Professor Andy Tan Queensland University of Technology
Dr Soung-won Kang	Modern architectural heritage in Australia, preservation and utilisation of modern buildings and sites	Dr Peter Raisbeck University of Melbourne
Dr Young-min Woo Korea Institute of Energy Research	Performance assessment of the prototype free piston generator systems	Dr John Olsen University of New South Wales

Singapore

Australia–Singapore Energy Workshop

Following a high-level visit by the Singapore Agency for Science, Technology and Research (A*STAR) in 2008, A*STAR and the Academy, on behalf of DIISR, organised the Australia–Singapore Energy Workshop which was held at University House in Canberra from 14 to 16 June.

The Singaporean delegation was led by Professor Charles Zukoski, chairman of the Science and Engineering Research Council of A*STAR. The Australian co-conveners were Professor Andrew Holmes FAA, a member of the Academy's Council, as well as Mr Peter Laver, Vice-President of ATSE.

Approximately 30 Singaporean and Australian invited participants explored collaborative opportunities during plenary discussions and presentations in the areas of carbon capture and utilisation, bioenergy, organic photovoltaics, energy storage devices and intelligent energy distribution systems.

Following the workshop, the Singaporean delegation attended site visits at Dyesol Industries in Canberra before flying to Melbourne to visit Monash University, the University of Melbourne and CSIRO.

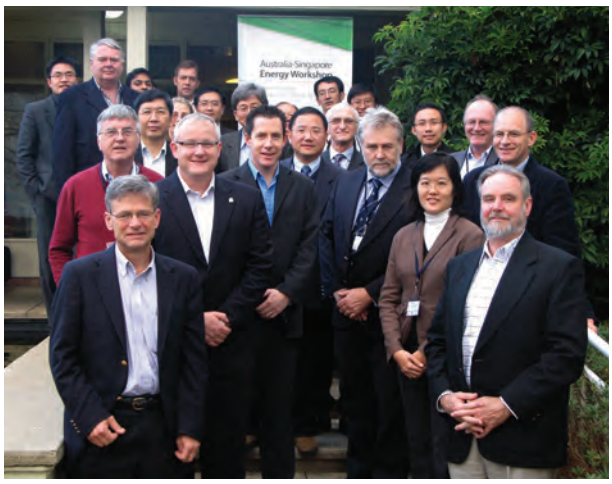


Photo: Shannon Newham

Participants of the Australia-Singapore Energy Workshop

Taiwan

Visit to Academia Sinica

In October the Academia Sinica in Taiwan hosted a visit by Professor Jenny Graves FAA, who was invited to give a seminar at the Academia Sinica's Institute of Molecular Biology. Professor Graves also met with the Director of Australian Education International in Taipei, Mr Nicholas McKay, and visited the National Taiwan University, the National Science Council and the Academia Sinica's National Research Program for Genomic Medicine.

Europe

Awards in recognition of strong relationship with France

Professor Suzanne Cory FAA and Foreign Fellow of the French Academy of Sciences received France's highest honour, Knight of the Legion of Honour, in a ceremony held on 12 June 2009. Former Executive Secretary, Professor Sue Serjeantson, and Manager for International Relations, Ms Nancy Pritchard, were made Officer and Knight, respectively, of the Order of Academic Palms by the French government at a ceremony at the Shine Dome on 21 July. All received their awards for their services in promoting bilateral collaborations in science, education and culture.

Photo: Richard Bray

Nancy Pritchard and Sue Serjeantson were made Knight and Officer of the Order of Academic Palms

European Cooperation in Science and Technology (COST) Actions

The Director of the European COST Office, Dr Martin Grabert, visited the Academy on 12 August 2009. Dr Grabert presented a public lecture on the COST program, its role within Europe's science, research and innovation system, and its ability to act as a gateway to the European Research Area. The Australian Government funds the Academy through the DIISR-ISL Program to support involvement by Australian researchers within COST Actions. This year's recipients are reported on page 55.

Support for international collaboration

The objectives of the Academy in promoting international scientific and technological collaboration are to improve Australian access to science and technology, to increase awareness of Australian research, and to enhance research capabilities.

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

The Academy's international exchange programs comprise scientific visits and exchanges to Asia, Europe and North America, and also short-term, long-term and postdoctoral fellowships to Japan. Funding for the program is derived from a variety of sources. The Australian Government is a major contributor through the DIISR-ISL program which contributes travel and living costs to support collaborative research between Australian scientists and technologists and their colleagues in Europe, the US, Canada, Mexico, China, Japan, Korea and Taiwan.

A 2001 review of the Academy's government-funded exchange programs from 1998 to 2000 indicated that the government's financial contribution to the cost of facilitating exchanges and collaboration was leveraged by a factor of 7.7 for each dollar expended. Data from the most recent analysis undertaken in 2009, using the same methodology, indicates government investment in funding rounds between 2001 and 2008 has been leveraged by a factor of 6.6 (noting that funding per person has not changed and exchange costs have increased significantly since 2001). When commercial outcomes, and the attraction of international funding to the end of the survey period were taken into account, the leverage factor increases to 21.

Other sponsors of the Academy's international collaboration program include overseas governments and donors who generously support individual travelling fellowships.

Full details of the programs are available from www.science.org.au/internat/

Europe

Bede Morris Fellowship

The Bede Morris Fellowship is supported by the family and friends of Professor Bede Morris FAA, in honour of Professor Morris' contribution to research in immunology and Australian–French relations. This award supports one outstanding scientist to travel to France each year to undertake research.

Researcher	Project	Host institution
Professor Kerry Hourigan Monash University	Cardiovascular and respiratory flows: Understanding and control	Dr Thomas Leweke CNRS France

COST Actions

European Cooperation in Science and Technology (COST) is an integral part of the European Commission's Seventh Framework Program for Research and Technological Development. COST does not fund research itself but provides financial support for joint activities, such as conferences, short-term scientific exchanges and publications to approved COST 'Actions'. These comprise networks centred on nationally-funded research projects in fields that are of interest to at least five European member countries. Australian researchers are able to join Cost Actions under an agreement between the Academy and the COST office in Brussels.

In the last year 16 Australian researchers received funding to participate in COST Actions.

Researcher	Project	Host institution
Professor Lex Brown Griffith School of Environment Griffith University	Working group meetings and related presentations of discussion of TD	Professor Jian Kang University of Sheffield UK
Dr Teresa Chataway Griffith Law School Griffith University	Knowledge transfer on the philosopher Noberto Bobbio (1909-2004) through a humanities specialist supported by an e-learning system	Professor Gastone Cottino Norberto Bobbio Archive Italy Dr Carla Gobetti Norberto Bobbio Archive Italy
Dr David Coote University of Melbourne	Development and harmonisation of new operational research and forest assessment procedures for sustainable forest biomass supply	BOKU University Austria
Professor Donna Cross Department of Health and Wellness Edith Cowan University	Cyber bullying: Coping with negative and enhancing positive uses of technologies in educational settings	Professor Rita Zukauskiene Mykolas Romeris University Lithuania
Dr Christopher Davies CSIRO Plant Industry	What's up in viticulture?	Professor Serge Delrot Institute des Sciences de la Vigne et de Vin Université Bordeaux France
A/Professor John Davy School of Applied Sciences RMIT University	Net-acoustics for timber-based lightweight buildings and elements	Professor Eddy Gerretsen TNO Netherlands Dr Jean-Luc Kouyoumji FCBA-CTBA Technical Centre for Wood and Furniture Bordeaux France Mr Michel Villot Centre for Building Science and Technology France

Researcher	Project	Host institution
Dr Katherine Evans Tasmanian Institute of Agricultural Research University of Tasmania	To attend the annual COST 873 meeting	Dr Brion Duffy Agroscope FAW Wadenswil Switzerland
Dr Pauline Grierson University of Western Australia	Below ground carbon turnover in European forests	Dr Ivano Brunner Swiss Federal Institute for Forest, Snow and Landscape Research Switzerland
Professor Giles Hardy School of Biological Sciences and Biotechnology Murdoch University	Establishing an emerging Phytophthora – increasing threats to woodland forest ecosystems in Europe Working Groups 3 and 4; and Explore the use of remote sensing tools (digital multispectral imagery) to monitor the spread and control of Phytophthora species in natural ecosystems and to explore control measures	Professor Andre Vannini Universita Tuscia Italy
Dr Marta Krasowska Ian Wark Research Institute University of South Australia	Influence of wetting film radius on rate of film drainage and time of three phase contact line formation	Professor Kazimierz Malysa Institute of Catalysis and Surface Chemistry Polish Academy of Sciences Poland
Professor Wieslaw Krowlkowski Laser Physics Centre Australian National University	Towards functional sub-wavelengths photonic structures	Dr Crina Cojocaru Universitat Politecnica de Catalunya Spain
Dr Nathan Lo School of Biological Sciences University of Sydney	Purification and genome estimation size of *Midichloria mitochondrii* symbionts from the DIPAV holocyclus	A/Professor Claudio Bandi Veterinary Parasitology University of Milan Italy
A/Professor Cristina Martinez-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
A/Professor Gregory Metha Department of Chemistry University of Adelaide	Inorganic oxide surfaces and interfaces and to discuss nano catalysis of gold clusters on cerium-oxide surfaces	Professor Ulrich Heiz Department of Physical Chemistry Technical University of Munich Germany Professor Gianfranco Pacchioni Department of Materials Science University of Milano-Bicocca Italy

Researcher	Project	Host institution
Professor Phillip Slee Department of Education Flinders University	Cyber bullying: Coping with negative and enhancing positive uses of technologies in educational settings	Professor Rita Zukauskiene Department of Psychology Mykolas Romeris University Lithuania
Dr Catherine Whitby Ian Wark Research Institute University of South Australia	Anchoring particles at the oil-water interface	Dr Francesca Ravera Institute for Energetics and Interphases Italy

French Embassy Cotutelle Program

The Academy has administered the cotutelle postgraduate fellowships program on behalf of the French Embassy since 2002. The program operates in Australia and France and is designed to enhance two-way international research collaboration. Cotutelle PhD students work under the direction and responsibility of thesis supervisors 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.

International Research Staff Exchange Scheme

The Marie Curie International Research Staff Exchange Scheme (IRSES) was introduced into the Seventh Framework Programme in 2008 to strengthen research partnerships through short-term staff exchanges and networking activities between European research organisations and organisations from countries with which the European Community has an S&T agreement, including Australia. The European Commission provides support for the travel and living costs of European staff travelling to Australia.

In 2009 the Academy provided support for twelve Australian research groups to be involved in IRSES.

Researcher	Project	Host institution
A/Professor Clayton Adam Queensland University of Technology	Muscle-up: Towards a detailed interface for musculoskeletal modelling	Professor Oliver Rohrle University of Stuttgart Dr Leo Cheng University of Auckland Professor Richard Hall University of Leeds
Dr Helen Askell-Williams Flinders University	Developing a multi-level, transnational framework for the promotion of mental health in schools	Dr Carmel Cefai University of Malta
A/Professor Hugh Blackburn Monash University	Instability and control of massively separated flows (ICOMASEF)	Professor Vassilis Theofilis Universidad Politecnica de Madrid

Researcher	Project	Host institution
Professor Peter Bruza Queensland University of Technology	QONTEXT: Quantum theory of context representation for information access and retrieval	Professor Dawai Song Robert Gordon University, Scotland Dr Sven Aerts Brussels Free University A/Professor Massimo Melucci University of Padua
Professor Frank Caruso University of Melbourne	Transfection ability and intracellular pathway of layer-by-layer nanostructured siRNA delivery systems	Dr Francesca Cavalieri University of Rom Tor Vergata Professor Andreas Fery Universitaet Bayreuth Dr Nadia Zaffaroni Istituto Nazionale di Astropisica
Dr Robert Grandin University of the Sunshine Coast	Individual and small group level interventions in mental health within schools	Professor Paul Cooper University of Leicester
Professor Nalini Joshi University of Sydney	Random and integrable models in mathematical physics	A/Professor Tamara Grava Scuola Internazinoale Superiore di Studi Dr Christian Klein Université de Bourgogne
Professor David Le Couteur University of Sydney	LSECs and ageing	Professor Bard Smedsrod University of Tromso
A/Professor Catherine Lovelock University of Queensland	Coastal research network on environmental changes	Professor Uta Berger Technische Universitaet Dresden
Dr Robert Osborne University of Sydney	HYOPCAVE – Hypogene caves morphology: Europe–Australia comparison	Dr Bojan Otonicar Slovenian Academy of Sciences and Arts Dr Andrzej Tyc University of Silesia
Professor Ian Paulsen Macquarie University	Functional and structural analysis of bacterial membrane transporters	Professor Peter Henderson University of Leeds Professor Anne-Brit Kolsto University of Oslo
A/Professor Edward Szczerbicki University of Newcastle	SASD: Smart multipurpose knowledge administration environment for intelligent decision support systems development	Professor Cezary Orlowski Gdansk University of Technology

Rod Rickards Fellowship

The Rod Rickards Fellowship was established in 2009 by the family of Professor Rod Rickards FAA, to honour Professor Rickards' important contributions to Australian science through his achievements in the chemistry of compounds of medical, biological, agricultural and veterinary importance. The award provides funding for a researcher to travel to Europe to undertake research in the area of chemistry or biology.

Researcher	Project	Host institution
Dr Rosanne Guijt University of Tasmania	Evaluation of a new but simple manufacturing method to improve sensitivity in contactless conductivity detection	Professor Peter Hauser University of Basel Switzerland

Scientific visits to Europe

Researcher	Project	Host institution
A/Professor Peter Daivis RMIT University	Thermostats and thermodynamic temperature far from equilibrium	Professor David Jou Universitat Automona de Barcelona Spain
Professor Bernard Degnan University of Queensland	The evolution of animal multicellularity: Defining critical genomic innovations leading to the emergence of self-nonself recognition and immunity	Dr Inaki Ruiz-Trillo Universitat de Barcelona Spain Professor Pedro Martinez Universitat de Barcelona Spain
Dr Heloise Gibb La Trobe University	The colonisation ability of forestry-intolerant species: A core factor for conservation in fragmented forest landscapes during climate change	Professor Joakim Hjalten Swedish University of Agricultural Sciences Sweden
Dr Christian Guttmann Monash University	Building an agent-based microsimulation to investigate collaborative models in complex and open systems	Professor Magnus Boman Stockholm University Sweden
Professor Gustaaf Hallegraeff University of Tasmania	Climate change and ocean acidification: Will coccolithophorids be winners or losers?	Professor Phillip Reid Sir Alistair Hardy Foundation for Ocean Science UK
Dr John Hooper Queensland Museum	Progressing collaboration of the DNA Barcoding of Life (MarBOL) and Porifera Tree of Life (PorTOL) projects	Professor Gert Woerheide Ludwig-Maximilians-Universität München Germany

Researcher	Project	Host institution
Dr Mark Hutchinson Northern Territory Geological Survey	Age determinations of deep mantle diamonds from Juina, Brazil	Professor Graham Pearson University of Durham UK
Dr Baohua Jia Swinburne University of Technology	Direct laser writing in quantum dot nanocomposties: From 3D active photonic crystals to 3D active metamaterials	Professor Nikolay Zheludev University of Southampton UK
Dr Tim Karl University of New South Wales	Maternal infection: Part of the 'two-hit hypothesis' of schizophrenia	Professor Joram Feldon Swiss Federal Institute of Technology Switzerland Professor Stephan von Hoersten Friedrich Alexander University Germany
Professor Sergei Kuzenko University of Western Australia	New superconformal theories and their applications	Professor Ulf Lindstrom Uppsala University Sweden
Dr Graham Marshall Macquarie University	3-dimensional chip-based quantum information systems	Professor Jeremy O'Brien University of Bristol UK
Professor Donald McNaughton Monash University	Spatial and intensity enhanced Raman microspectroscopy and imaging within single cells	Professor Janina Kneipp Humbolt University zu Berlin Germany Dr Jens-uwe Grabow Gottfried Wilhelm Leibniz Universität Germany
Professor Karol Miller University of Western Australia	Biomechanical modelling of brain diseases	Professor Dimos Poulikakos Swiss Federal Institute of Technology Switzerland
Dr Shannon Notley Australian National University	Tuneable adhesion between particles in water mediated by adsorbed polymer layers	Professor Simon Biggs University of Leeds UK Professor Mark Rutland KTH Sweden
Dr John Pimanda University of New South Wales	Transcriptional networks regulating blood stem cell development	Dr Bertie Gottgens Cambridge Institute for Medical Research UK

Researcher	Project	Host institution
Dr Justin Seymour Flinders University	Microbial behaviour and the marine DMSP cycle	Dr Rafel Simo Institut de Ciencies del Mar Spain
Dr Ilya Shadrivov Australian National University	Nonlinear chiral metamaterials	Professor Nikolay Zheludev University of Southampton UK Dr Pavel Belov Queen Mary University of London UK
Dr Jason Sharples University of NSW	Analysing complex combustion processes: Combustion wave stability and eruptive fire behaviour of bushfires	Professor John Dold University of Manchestor UK Professor Domingos Vegas Universidade de Coimbra – Polo II Portugal
Dr Andrew Try Macquarie University	Designed chiral frameworks for the synthesis of self-structured bridged silsesquioxanes	Dr Michel Wong Chi Man Ecole Nationale Superieure de Chemie de Montpellier France
Professor John Wade University of Melbourne	Novel synthetic oligonucleotide analogues and their peptide conjugates for therapeutic applications	Dr Michael Gait MRC Laboratory of Molecular Biology UK
Dr Nicole Webster Australian Institute of Marine Science	Exploring the impact of climate change on microbial composition and function in a model marine symbiosis	Professor Michael Wagner University of Vienna Austria Dr Ute Hentschel University of Wurzburg Germany
Dr Kerrie Wilson University of Queensland	Conservation planning in a dynamic world	Professor Niels Strange University of Copenhagen Denmark
Dr Annette Worthy University of Wollongong	Mathematical modelling of reconfigurable circuits based on nematic liquid crystals	Dr Noel Smyth University of Edinburgh Scotland Professor Gaetano Assanto University of Rome Italy

The following six researchers also received support from the French Embassy as part of the scientific visits to Europe.

Researcher	Project	Host institution
Dr David Coward University of Western Australia	Smart data analysis tools with applications to the France–Australia robotic telescope network, satellite and gravitational observatory data analysis	Dr Catherine Man Centre Nationale de la Recherche Scientifique France
Dr Christian Grillet University of Sydney	Active 2D photonic crystal micropillars: A new platform for reconfigurable optofluidic devices	A/Professor Pedro Rojo-Romeo Institut de Nanotechnologies de Lyon France Dr Pierre Kern Laboratoire d'Astrophysique Observatoire de Grenoble France
Professor John Hartnett University of Western Australia	Development of ultra-low noise frequency transfer for atomic clocks using a cryogenic sapphire oscillator	Dr Giorgio Santarelli Observatoire de Paris France
Professor Kerry Hourigan Monash University	Cardiovascular and respiratory flows: Understanding and control	Dr Thomas Leweke Centre Nationale de la Recherche Scientifique France
Dr Sherie Ma University of Melbourne	Electrophysiological and neurochemical characterisation of neurons that respond to relaxin-3 in the medial septum in anaesthetised and unanaesthetised rats	Professor Jacques Epelbaum Institut National de la Santé et de la Recherche Médicate France
Dr John Provis University of Melbourne	Developing glass-ceramics to valorise fly ashes	Professor Ange Nzihou Ecole des Mines d'Albi-Carmaux France

North America

Adam J Berry memorial Fund

The Adam J Berry Memorial Fund is co-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 US at an institute 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 institution to which they are temporarily attached. Professor Jonathan Stone FAA chairs a special committee that assesses and recommends suitable candidates for this award.

Researcher	Project	Host institution
Ms Annie Xin Walter and Eliza Hall Institute of Medical Research	Dissecting the role of IL2 and Blimp1 in shaping CD8+ T cell response using the direct RNA sequencing technology	Dr Warren Leonard National Heart, Lung, and Blood Institute National Institutes of Health

Scientific visits to North America (Canada, Mexico and USA)

Australian researcher	Title of research project	Host researcher
Dr Tracey Ainsworth James Cook University	Host-microbe interactions and the impacts of pollution to inshore coral reefs	Professor Ruth Gates University of Hawaii USA
A/Professor Jason Antenucci University of Western Australia	Internal wave controls on plankton patchiness in lakes due to shear and pseudo-chaotic advection	Professor Roman Stocker Massachusetts Institute of Technology USA
A/Professor Stefan Arndt University of Melbourne	Methane uptake of soils in Australia	A/Professor Joseph von Fischer Colorado State University USA A/Professor Noah Fierer University of Colorado USA
Dr Julie Brown University of NSW	Investigation of the effect of modified spinal properties on rear-seat dummy response in adult seat belts	Mr Richard Morgan George Washington University USA
Dr Tasman Daish University of Adelaide	Identification of miRNA candidates involved in sex chromosome silencing in monotremes	Professor Gregory Hannon Howard Hughes Medical Institute USA
A/Professor Scott Donne University of Newcastle	Adsorption phenomena during electrocatalytic oxygen reduction	Professor Yang Shao Horn Massachusetts Institute of Technology USA
Dr Justine Ellis Murdoch Childrens Research Institute	International collaboration for genome-wide association studies in juvenile idiopathic arthritis	Dr Hakon Hakonarson Childrens Hospital of Philadelphia USA
Dr Yuangton Gu Queensland University of Technology	Advanced multiscale modelling techniques for exploring the deformation mechanism of materials	A/Professor Shaofun Li University of California at Berkeley USA
Dr Adam Koboroff University of New England	The role of experience in a natural behavioural system	Professor Donald Owings University of California, Davis USA

Australian researcher	Title of research project	Host researcher
Dr Jasmina Lazendic-Galloway Monash University	A search for the origin of galactic cosmic rays: Catching up with the fastest particles known	Dr Patrick Slane Smithsonian Astrophysical Observatory USA
Dr Roman Makarevich La Trobe University	Ionospheric plasma dynamics during geomagnetically disturbed conditions	Professor Alexandre Koustov University of Saskatchewan Canada
Dr Joshua Mylne University of Queensland	Evolutionary development of cyclic peptides in the sunflower family	A/Professor Jose Panero University of Texas USA Professor Edward Schilling University of Tennessee USA
Professor John Pandolfi University of Queensland	Incorporating appropriate ecological baselines into management of natural resources	Professor Jeremy Jackson University of California, San Diego USA Ms Kathryn Mengerink University of California, San Diego USA Mr Steve Roady Duke University USA
Dr Amy Richards Food Science Australia	Exploring the potential of natural antioxidants for healthier food products: To enhance the viability of the Australian food industry into the future	Dr Jill Winkler-Moser United States Department of Agriculture USA
Dr Linda Stalker CSIRO Petroleum Resources	Accelerating deployment of carbon storage and monitoring and verification strategies	Dr Barry Freifeld Lawrence Berkeley National Laboratory USA
Dr Tianhai Tian Monash University	Spatio-temporal modelling of the mitogen-activated protein (MAP) kinase pathway	Professor John Hancock University of Texas Health Science Center at Houston USA Professor Zhixiang Chen University of Texas at Pan American USA

Australian researcher	Title of research project	Host researcher
Dr Caroline Ummenhofer University of New South Wales	Indian Ocean variability and long-term change linked to regional rainfall and drought	Professor Mark Cane Columbia University USA Dr Rosanne d'Arrigo Columbia University USA
A/Professor Jeffery Walker University of Melbourne	Development of global soil moisture retrieval algorithms for the soil moisture active passive (SMAP) mission	Dr Thomas Jackson US Department of Agriculture USA Dr Eni Njoku NASA Jet Propulsion Laboratory USA Dr Peggy O'Neill NASA Goddard Space Flight Center USA
Dr Changbin Yu Australian National University	Building the Australian capability for micro autonomous systems and technology	Professor Shankar Sastry University of California at Berkeley USA

Asia

Scientific visits to China

Australian researcher	Title of research project	Host researcher
A/Professor Corey Bradshaw University of Adelaide	Determining the relationship between environmental degradation and human health at the national scale	Professor Lingli Tang Academy of Opto-Electronics Chinese Academy of Sciences A/Professor Guo-Jing Yang Jiangsu Institute of Parasitic Diseases Professor Xiao-Nong Zhou National Institute of Parasitic Diseases
Dr Jituo Guo Monash University	Somatic cell reprogramming by cytoplasts of iPS cells	Professor Yue Ma Institute of Biophysics Chinese Academy of Sciences
Dr Bo Li University of Sydney	Dicimetric type III solar radio bursts: Observations and numerical simulations	Professor Yihua Yan Beijing Astronomical Observatory Chinese Academy of Sciences

Australian researcher	Title of research project	Host researcher
Dr Hongyuan Liu University of Queensland	Three-dimensional hybrid continuous-discrete multi-physical modelling of heterogeneous rock fracture	Dr Li Chen Institute of Mechanics Chinese Academy of Sciences Professor Chun'an Tang Dalian University of Technology Professor Wancheng Zhu Northeastern University
Dr Joe Miller CSIRO Plant Industry	Plant biogeographic patterns of large plants shared between China and Australia	Dr Zhiduan Chen Institute of Botany Chinese Academy of Sciences Professor Dian-Xiang Zhang South China Botanical Garden Chinese Academy of Sciences
Professor John Morrison University of Wollongong	Improving the link between scientific research and policy/ planning activities for coastal zone management	Professor Shi Ping Yantai Institute of Coastal Zone Research for Sustainable Development Chinese Academy of Sciences Professor Zhiming Yu Institute of Oceanology Chinese Academy of Sciences

Scientific visits to Japan

Australian researcher	Title of research project	Host researcher
Mr Graeme Auchterlonie University of Queensland	Synthesis of novel thin film solid oxide fuel cell electrolytes	Dr Toshiyuki Mori National Institute for Materials Science
Professor John Black University of NSW	Environmental stressors and public health: Modelling and visualisation of exposures over time and place	Professor Makoto Okumura Tohoku University
Dr Natalie Dillon Queensland Department of Primary Industries and Fisheries	Development of molecular markers for improved mango varieties	Professor Keizo Yonemori Kyoto University Dr Chitose Honsho University of Miyazaki
Dr Waheed Hugrass University of Tasmania	Optimisation of EUV radiation from the Kansai rotamak	Professor Masami Ohnishi Kansai University
A/Professor Zhengyi Jiang University of Wollongong	Mechanics of surface effects in micro rolling of metals	Professor Ken-ichi Manabe Tokyo Metropolitan University

Australian researcher	Title of research project	Host researcher
Dr James McMillan University of Queensland	Assessing the role of kindlin family proteins in skin cell adhesion, migration and proliferation on artificial substrates	Professor Hiroshi Shimizu Hokkaido University
Dr Hideaki Ogawa University of Queensland	The science of optimal, robust scramjet propulsion systems for efficient access to space	Professor Kazuhiro Nakahashi Tohoku University Dr Tetsuji Sunami Japan Aerospace Exploration Agency
Dr Sihai Zhou University of Wollongong	Fabrication of MgB2 superconductor wires with novel processors and characterisation of their high magnetic field properties	Professor Hiroaki Kumakura National Institute for Materials Science

Scientific visits to Korea

Australian researcher	Title of research project	Host researcher
Dr Naveen Chilamkurti La Trobe University	Ubiquitous computing systems and services for environmental sustainability	Professor Jin Kwak Soonchunhyang University
Dr Richard Dodson University of Western Australia	Pinning back the veil of the radio sky: An Australian and Korean collaboration	Dr Bong Won Sohn Yonsei University
Dr Vincent Lemiale CSIRO Materials Science and Engineering	Numerical modelling of the mechanical response of metals under extreme conditions with a view to designing novel advanced materials	Professor Hyoung Seop Kim Pohang University of Science and Technology
Dr Sokcheon Pak Charles Sturt University	Immune regulatory effect of medicinal herbs	Professor Hyung Min Kim Kyung Hee University
Dr Claudia Vickers University of Queensland	Genome-scale modelling in *Escherichia coli* for rational strain design	Professor Sang Yup Lee Korea Advanced Institute of Science and Technology

Scientific visits to Taiwan

Australian researcher	Title of research project	Host researcher
Dr Andrew Baird James Cook University	Hybridisation in reef corals: Source of evolutionary novelty or experimental artifact?	Professor Chaolun Chen Academia Sinica

Australian researcher	Title of research project	Host researcher
Dr Jennifer Chan University of Sydney	Accurate volatility estimation in financial time series models	Professor Cathy Chen Feng Chia University
A/Professor Richard Lai La Trobe University	Managing the complexity of an automotive software system	A/Professor Sun Jen Huang National Taiwan University of Science and Technology
Dr Yi-chen Lan University of Western Sydney	A conservational knowledge management platform for a cluster of SMEs in an innovation and incubation centre in Taiwan	A/Professor Maria Lee Shih Chen University
Dr Jun Ma University of South Australia	Modification of graphite for functional polymer nanocomposites	Dr Hsu-Chiang Kuan Far East University
Dr San Thang CSIRO Molecular and Health Technologies	RAFT-generated nanoprobes for rapid targeted protein identification and profiling	Dr Yu-Ju Chen Academia Sinica Professor Chun-Cheng Lin National Tsing Hua University
Dr Conny Turni Department of Primary Industries and Fisheries	Establishment of a challenge model for Glässer's disease in pigs	Dr Shih-Ping Chen Animal Technology Institute Taiwan

Japan Society for the Promotion of Science fellowships for overseas researchers

The Japan Society for the Promotion of Science (JSPS) is an independent administrative institution for the purpose of contributing to the advancement of science. JSPS is largely funded by the Japanese Government and plays a pivotal role in the administration of a wide spectrum of Japan's scientific and academic programs. This part of the Academy's international program is fully funded by JSPS and, depending on the number of Australian participants, support can amount to $2 million per year.

JSPS Postdoctoral Fellowships

The JSPS Postdoctoral Fellowships provide opportunities for Australian postdoctoral researchers to conduct cooperative research with leading research groups in universities and other Japanese institutions. The program aims to help such researchers advance their own research while contributing to the advancement of research in Japan and the counterpart countries. The JSPS funded 12 postdoctoral fellowships in 2009.

Participant	Project	Host
Dr Laura Dales University of South Australia	Women's groups and women's centres: Activism and change in contemporary Japan	A/Professor Beverley Yamamoto Osaka University
Dr Jason Doukas University of Melbourne	Black hole phenomenology	Professor Misao Sasaki Kyoto University

Participant	Project	Host
Dr Boyen Huang University of Western Australia	Alternative sources of embryonic oral epithelium for tooth regeneration	Professor Kazuhisa Bessho Kyoto University
Dr Peggy Kao Australian National University	Super-symmetry in global T-duality	Professor Yoshiaki Maeda Keio University
Dr Henry Larkin Bond University	Context-aware personalised service delivery for mobile devices	Professor Michael Cohen University of Aizu
Dr Andrew Lavender University of Adelaide	Effects of ageing and exercise on single motor units and motor cortical function	Dr Kimitaka Nakazawa Research Institute of National Rehabilitation
Dr Hui Liu Monash University	Development of transformation systems in *Eustoma grandiflorum*	Dr Akemi Ohmiya National Agriculture and Food Research Organisation
Dr Michael Rose University of Sydney	Investigations into biological nitrification inhibition to improve nitrogen-use efficiency in forage and biofuel crops	Dr Matthias Wissuwa Japan International Research Centre for Agricultural Sciences
Dr Alka Saxena University of Western Australia	Identifying transcriptional regulatory networks involved in plasticity and development of pyramidal neurons using systems biology	Dr Piero Carnici RIKEN Yokohama Institute
Mr Jonathan Tan Australian National University	Generation of artificial spleen in mice	Professor Takeshi Watanabe Kyoto University
Dr Yoel Tenne University of Sydney	Developing frameworks for high-dimensional model-assisted engineering design optimisation with computer simulations	A/Professor Shinji Nishiwaki Kyoto University
Mr Damon Tumes University of Adelaide	Chromatin remodelling and the concept of 'stemness' in memory T cells	Professor Toshinori Nakayama Chiba University

JSPS Invitational Fellowships (short-term)

The JSPS Short-Term Fellowships allow researchers employed at designated Japanese research institutions and universities to invite fellow researchers from Australia to Japan to participate in discussions, attend seminars, give lectures or perform similar functions at their research institutions. The JSPS funded 11 short-term fellowships in 2009.

Participant	Project	Host
Professor Clive Fraser University of Melbourne	Geospatial information generation from the Japanese ALOS satellite imaging system	Professor Ryosuke Shibasaki University of Tokyo
Dr Kioumars Ghamkhar University of Western Australia	Comparative mapping of subterranean clover and red clover	Dr Sachiko Isobe Kazusa DNA Research Institute
Dr Antonietta Giudice Monash University	Analysis of expression profiles associated with amniotic epithelial cells, iPS cells generated through novel methods, and endodermal and ectodermal ES cell progeny; and the study of iPS cell biology	Dr Shinichi Nishikawa RIKEN Institute of Psychical and Chemical Research
A/Professor Han Huang University of Queensland	Removal mechanisms of silicon in wafer thinning	Professor Libo Zhou Ibaraki University
Professor Andy Lee Curtin University of Technology	Nutritional factors for chronic obstructive pulmonary disease	A/Professor Naoko Hiramatsu University of Hyogo
Dr Zongwen Liu University of Sydney	In-situ TEM observation and measurements of novel nanostructures	Professor Yoshio Bando National Institute for Materials Science
Dr Irek Malecki University of Western Australia	Development of methods for freezing ratite semen as part of a long-term goal to develop a viable artificial insemination technology for ratites: Quantitative assessment of nuclear and mitochondrial damage to sperm after freezing-thawing process	A/Professor Hiroya Kadokawa Yamaguchi University
Professor Ralph Martins Edith Cowan University	Development of a blood test for Alzheimer's disease	Professor Toshiharu Suzuki Hokkaido University
A/Professor Tuan Pham University of NSW	Fuzzy fractal analysis in mental health	Professor Mayumi Oyama-Higa Kwansei Gakuin University
Dr John Purser University of Tasmania	Improving our understanding of welfare in farmed fish through behavioural investigations and use of self feeders	Professor Mitsuo Tabata Teikyo University of Science and Technology
A/Professor Minjie Zhang University of Wollongong	Automated negotiation mechanisms in multi-agent systems in open and dynamic e-markets	A/Professor Takayuki Ito Nagoya Institute of Technology

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 career researchers for contributions made during their working lives, and for outstanding achievements of early-career researchers under the age of 40.

Career award recipients

2010 announcements

The 2010 honorific awards for scientific excellence were awarded to the following career researchers:

Macfarlane Burnet Medal and Lecture

Professor David Vaux FAA, La Trobe University

David Craig Medal for research in chemistry

Professor Robert Gilbert FAA, University of Queensland

Haddon Forrester King Medal for research in mineral exploration

Professor Emeritus Steven Scott, University of Toronto, Canada

Ian Wark Medal and Lecture for applied research

Professor Aibing Yu, University of New South Wales

Mawson Medal and Lecture for research in the Earth sciences

Professor Patrick De Deckker, Australian National University

2009 report

The recipient of the 2009 Haddon Forrester King Medal (sponsored by Rio Tinto), Dr J David Lowell, of Lowell Mineral Exploration LLC in Arizona, USA, received his medal at a presentation dinner held on 19 February 2010 in Canberra.

Macfarlane Burnet medal

Macfarlane Burnet medallist, David Vaux

Academy Medal

The Academy Medal was awarded to journalist Dr Peter Pockley, who is considered a pioneer of science broadcasting. The medal recognises 'outstanding contributions to science by means other than the conduct of scientific research', and is awarded no more than once every three years.

Academy medallist, Peter Pockley

Early-career award recipients

The 2010 honorific awards for scientific excellence were awarded to the following early-career researchers:

Fenner Medal for research in biology (excluding the biomedical sciences)

Professor Robert Brooks, University of New South Wales

Ruth Stephens Gani Medal for research in human genetics

Dr Stuart Macgregor, Queensland Institute of Medical Research

Stuart Macgregor

Gottschalk Medal for research in the medical sciences

Professor James Whisstock, Monash University

Anton Hales Medal for research in Earth sciences

Professor David White, University of Western Australia

Dorothy Hill Award for female researchers in the Earth sciences

Dr Nicole Webster, Australian Institute of Marine Science

Nicole Webster

Le Fèvre Memorial Prize for research in basic chemistry

Associate Professor Michelle Coote, Australian National University

Pawsey Medal for research in physics

Professor Andrew White, University of Queensland

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

Dr Amanda Barnard, CSIRO Materials Science and Engineering

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

Research support and travelling fellowships

The Academy provides funding support to early-career researchers for individual research projects in Australia and travelling fellowships to enable distinguished, usually international, researchers to interact with Australian researchers and inform the community more broadly through public lectures.

Research support

2010 Margaret Middleton fund for endangered Australian vertebrate species

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

Mr Bastian Egeter, University of Otago
Predation on Leiopelma species and *Litoris reniformis* by rats, *Litoria aurea* and other introduced species in New Zealand

Mr Adam Kerezsy, Bush Heritage Australia and Ms Leanne Faulks, Macquarie University
Population genetics and captive breeding – red-finned blue-eye and the Edgbaston goby

Dr Vee Lukoschek, James Cook University
Sea snake declines and extinctions on Australia's coral reefs: Ecological causes and genetic effective population sizes

Dr Jane Melville, Museum Victoria
Immunogenetics of pardalote species in south-eastern Australia: Genetic diversity in MHC II β immune genes in fragmented landscapes

Dr Nicola Mitchell, University of Western Australia
Predicting the sex ratios of loggerhead turtles: Where are male loggerhead turtles produced in Western Australia? Current and future scenarios

2010 JG Russell Awards

The following researchers will receive support for infrastructure costs involved in experimental research:

Dr Benjamin Phillips, James Cook University
The evolution of dispersal on range edges

Photo: istockphoto

Where are the male loggerhead turtles produced in Western Australia?

Photo: Vee Lukoschek

Sea snakes are in decline on Australia's coral reefs

Dr Scott Sisson, University of New South Wales
Innovations in Bayesian likelihood-free interference

Dr Marnie Blewitt, Walter and Eliza Hall Institute of Medical Research
An RNA interference based genetic screen for novel epigenetic modifiers involved in mammalian X inactivations

Reports on 2009 travelling fellowships

The following distinguished researchers undertook the travel for their 2009 fellowships:

2009 Geoffrey Frew Fellowship

Professor Rudolf Grimm
Research Director at the Institute of Quantum Optics and Quantum Information of the Austrian Academy of Sciences, Innsbruck.

Professor Grimm is an experimental physicist whose work interests centre on ultracold atoms and quantum gases, Bose-Einstein condensation and Fermi gases, cold collisions and cold molecules, interaction of cold atoms with surfaces, atom optics, quantum optics and laser spectroscopy, laser physics and optics.

The Geoffrey Frew Fellowship is awarded to distinguished overseas scientists to participate in Australian spectroscopy conferences and to visit scientific centres in Australia. Professor Grimm's Fellowship coincided with the Australian Conference on Optics, Lasers and Spectroscopy held in Adelaide from 29 November to 3 December, and included public talks in Melbourne and Canberra.

2009 Selby Fellow

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

Professor Bob Kirshner is one of the world's foremost researchers on supernovae. He was the original driving force which revolutionised cosmology in the late 1990s by discovering that the expansion of the universe is accelerating.

Professor Kirshner's public talks, entitled *Exploding stars and the accelerating cosmos: Einstein's blunder undone*, were presented in Canberra, Melbourne, Adelaide, Perth and Sydney. They were used to promote an understanding of how science is done, and an appreciation of the scientific and technological skills that enable discovery in astronomy and are themselves driven by its challenges. His tour also raised awareness of Australia's contributions, strengths and role in astronomy, and encouraged people, particularly young people, to engage with the natural world and deepen their understanding of it.

50th Anniversary Selby Fellow

Professor Peter Gregory
Director and Chief Executive
Scottish Crop Research Institute

The Selby Scientific Foundation generously provided a second Selby Fellowship to celebrate the 50th anniversary of their establishment in 1959. The recipient, Professor Peter Gregory, visited a number of organisations, speaking to researchers in Canberra and Melbourne. He also gave public talks in Canberra and Melbourne on 20 and 23 October and presented the keynote address at the Theo Murphy High Flyers Think Tank, Agricultural Productivity and Climate Change, on 22 October (see page 26). His talk, *Food security in a changing climate*, demonstrated how global, environmental and social changes are affecting food systems, and suggested some technological and policy responses that might be applied. The transcript is available from www.science.org.au/events/lectures-and-speeches/gregory.html

2010 travelling fellowships

The following researchers were awarded fellowships for 2010:

2010 Graeme Caughley Travelling Fellowship (ecology)

Professor David Bowman
Professor of Forest Ecology, School of Plant Science, University of Tasmania

2010 Rudi Lemberg Travelling Fellowship (biological sciences)

Professor Johann Deisenhofer
Virginia and Edward Linthicum Distinguished Chair in Biomolecular Science and Regental Professor, University of Texas Southwestern Medical Center

2010 Selby Fellowship (all sciences)

Professor Peter Sadler
Professor of Chemistry and Head of Department, University of Warwick

Research conferences

The Academy supports conferences that bring together researchers at the forefront of particular subjects to discuss future directions in their fields.

Reports on research conferences held in 2009

Elizabeth and Frederick White Conference

– supporting researchers in the physical and mathematical sciences related to the solid Earth, the terrestrial oceans, the Earth's atmosphere, solar-terrestrial science, space sciences and astronomy.

Nuclear Astrophysics in Australia
24–25 August 2009, Shine Dome, Canberra
Organised by Professor John Lattanzio and Dr Maria Lugaro, Monash University (www.cspa.monash.edu.au/activities/white-conference/index.html).

Nuclear astrophysics investigates the origin of the elements via nuclear reactions in astrophysical environments, such as stars, supernovae, and the big bang. About 50 scientists from different fields, nuclear physics, astrophysics, astronomy, and meteoritic and planetary science, attended the conference to share information on current research in Australia in nuclear astrophysics and to launch the Australasian Network for Nuclear Astrophysics (ANNA).

Photo: istockphoto

Elements evolve from nuclear reactions in space, like supernovae

The conference program covered the topics of observations of stellar abundances, stellar thermonuclear explosions, modelling of stellar nucleosynthesis and galactic chemical evolution, nuclear physics in astrophysics, and signatures of stellar nucleosynthesis in meteoritic materials. Speakers from Japan, the US, and Europe talked about overseas activities, networks, and institutes in nuclear astrophysics and the conference was concluded with a discussion session of planning for future ANNA activities.

Sir Mark Oliphant Conference

– support for strategically significant international conferences in Australia on high priority, cutting edge, multi-disciplinary themes.

The Sir Mark Oliphant conferences are supported under the DIISR-ISL program, administered by either the Academy or ATSE.

Nanophotonics Down Under: Devices and Applications
21–24 June 2009
Organised by ATSE
(www.smonp2009.com/)

This interdisciplinary meeting was devoted to lasers and lights interacting with nano-dimensional objects for photonics applications such as photovoltaics, plasmonics, photonic crystals, biomedicine and data storage. It brought together leading international specialists with the primary aim of collectively identifying key challenges in emerging applications of nanophotonics.

Conference announcements for 2010

2009–10 Fenner Conference on the Environment

Healthy Climate, Planet and People: Co-Benefits for Health from Action on Climate Change
23–24 June 2010, Shine Dome, Canberra
Organised by Professor Anthony Capon, and Professor Janette Lindesay, Australian National University
(http://nceph.anu.edu.au/Fenner2010/index.php)

The conference will address the health impacts of key climate change mitigation and adaptation strategies, in particular alternate approaches to human mobility, diet, housing and energy generation. Such strategies will increase physical activity levels and improve nutrition and air quality, whilst reducing greenhouse gas emissions. The economic implications, including for social equity, will also be discussed.

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

Public awareness and outreach

The Academy supports a range of activities and events that aim to promote understanding of science and to foster a greater awareness of science issues and science-related activities in government, industry, the media, academics and various publics.

Science at the Shine Dome symposium

The year 2009 marked 400 years since Galileo founded modern astronomy, the International Year of Astronomy, the 200th anniversary of Darwin's birth, and the 150th anniversary of his landmark book *On the Origin of Species*. As a tribute to the inspiration provided by the work of these two giants of science the Academy's annual symposium in May was dedicated to evolution and titled Evolution of the Universe, the Planets, Life and Thought.

The keynote address was delivered by Professor Mike Turner from the Departments of Astrophysics and Physics at the University of Chicago. He set the scene for an exciting morning program on the evolution of the universe. He said that cosmology is a young science, powered by ideas and instruments, and that the last 30 years have dramatically improved our knowledge of the universe, as well as refined our understanding of its origin and evolution. Dr Tamara Davis from the University of Queensland talked about the evolution of the laws of physics, and Professor Matthew Colless FAA from the Anglo Australian Observatory, used spectacular images to show the evolution of structure in the universe.

This was followed by a session on the evolution of planets with Professor Chris Tinney of the Department of Astrophysics and Optics at the University of NSW, on the identification of Earth-like planets with favourable conditions to support life. Professor Malcolm Walter FAA of the Australian Centre for Astrobiology at the University of NSW then spoke of evidence for early life on Earth and the search for life on Mars.

Photo: Irene Dowdy

Speakers and chairs for the annual symposium on 'life, the universe and everything'

The second international speaker, Professor Euan Nisbet from the University of London, discussed the roles of biochemical reactions performed by early life forms in 'warm little ponds' in the creation of an atmosphere on Earth, and their influence on climate cycles through the phases of Earth's history.

The sessions on the evolution of life began with a presentation by evolutionary biologist and author Dr Olivia Judson from Imperial College, London. She said that the diversity of life we have on Earth helped to shape the planet. Organisms have altered the atmosphere, the seas, and the rocks, and humans too have been moulded and evolved by other living beings. She also provided examples of sexual selection in a number of species. Professor Lindell Bromham from the Centre for Macroevolution and Macroecology at the Australian National University provided evidence for biological evolution recorded in DNA. The research of Professor Steve Simpson FAA, from the School of Biological Sciences at the University of Sydney, revealed the epigenetic control of brain development.

The final speaker was Professor Kim Sterelny, currently based at the Australian National University, but also associated with the School of History, Philosophy, Political Science and International Relations at the Victoria University in Wellington, New Zealand. He gave a sketch of current thinking on how and why humans became so very different from our ancestors.

The proceedings are available from www.science.org.au/events/sats/sats2009/symposium.html

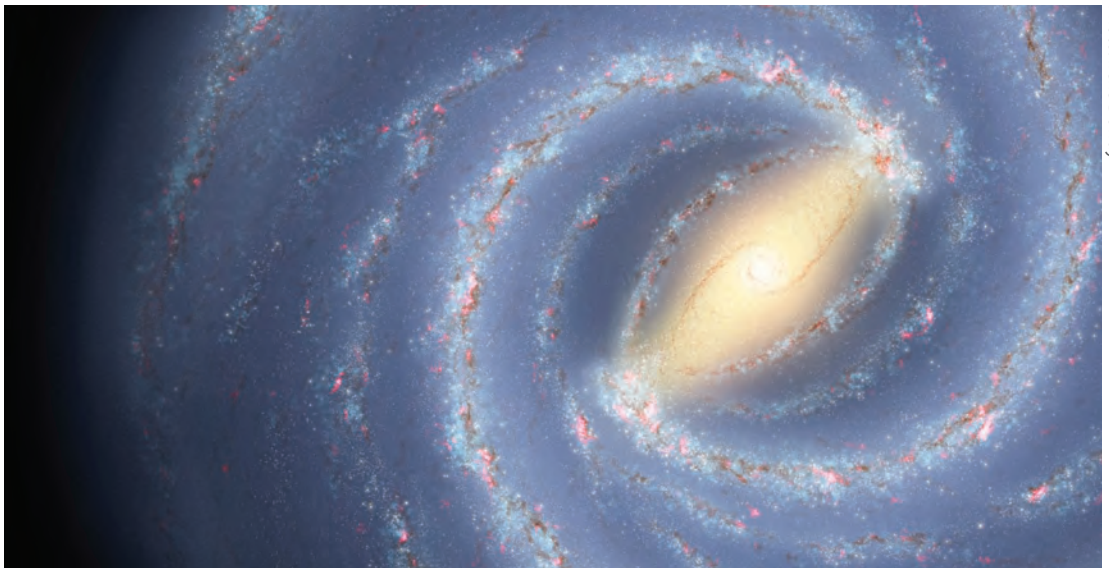


Photo: Irene Dowdy

The birth of galaxies like the Milky Way were the topic of the annual symposium

Public lectures

Public lecture series

Australia's Renewable Energy Future

The Australia's Renewable Energy Future lecture series that ran through 2008–09 concluded with a summary lecture in August by Dr John Wright. The series examined a range of renewable energy technologies that are currently being developed, and aimed to provide a realistic assessment of their ability to supply Australia's energy needs into the future. Each lecture focused on a particular renewable energy source, discussing the current state of play of the various technologies. The lectures in the series for 2009 were:

7 April 2009

Solar thermal concentrators: Capturing the sun for large scale power generation and energy export

Professor Keith Lovegrove

Solar Thermal Group Leader, Department of Engineering, Australian National University College of Engineering and Computer Science

2 June 2009
Wind energy: How it works and where is it going?
Professor David Wood
Priority Research Centre for Energy, University of Newcastle

7 July 2009
Tidal energy: A viable form of renewable energy
Dr Tim Finnigan
CEO and founder, BioPower Systems

4 August 2009
The contribution of renewables in Australia's future energy mix
Dr John Wright
Adviser, Sustainable Energy Partnerships, CSIRO Energy Transformed Flagship

Transcripts and slides for all lectures are available from www.science.org.au/events/publiclectures/re. The final lecture from the series was filmed and is available from www.science.org.au/events/publiclectures/re/wright.

The report *Australia's renewable energy future* that arose from the lecture series has been reported on page 29 and is available from www.science.org.au/publications/research-projects-and-policy.html

Photo: Richard Bray

John Wright gave the final presentation of the renewable energy lecture series

Photo: Richard Bray

Attendances remained high for the water management lectures

Water Management Options for Urban and Rural Australia

In October 2009, the Academy commenced a new public lecture series titled Water Management Options for Urban and Rural Australia.

Water is our most fundamental natural resource – one that is both limited and subject to great variations in availability. Balancing the needs of agriculture, industry and people for water, while maintaining the diversity and functionality of our unique ecosystems, is providing many technical and policy challenges. The magnitude and complexity of these challenges are further compounded by our expanding population and the impacts of climate change.

This series aims to inform both debate and action on Australia's future water security by exploring the role of science in understanding the location and amounts of water we have, in predicting how supply and demand may change into the future, and in developing technical responses and improved management techniques. It will also examine situations where such information is being brought

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

together to provide practical, environmentally responsible solutions.

The lectures in the water series so far have been:

6 October
Australia's water challenges
Dr Don Blackmore AM FTSE
Chairman, eWater CRC Chairman, Advisory Council for CSIRO's Water for a Healthy Country Flagship

4 November
Converging insecurities: The water, energy, carbon and food nexus
Andrew Campbell
Managing Director, Triple Helix Consulting

1 December
Water as a limiting resource in dryland agriculture
Dr John Passioura FAA
Honorary Research Fellow, CSIRO Plant Industry

2 February
Building water sensitive cities: From socio-technical path-dependency to adaptive governance
Associate Professor Rebekah Brown
School of Geography and Environmental Science, Monash University, Director of the National Urban Water Governance Program and the Centre for Water Sensitive Cities

2 March
Leveraging Australia's water information
Dr Rob Vertessy
Deputy Director (Water), Bureau of Meteorology

Transcripts and slides from the series are available from www.science.org.au/events/publiclectures/wm.

Photo: Richard Bray

Don Blackmore began the water management lecture series with an overview


Photo: Richard Bray

John Passioura discussed water use in dryland agriculture

Non-series lectures

COST – European Cooperation in Science and Technology
Public lecture on the COST program by
Dr Martin Grabert, Director, COST Office
Shine Dome, Canberra, 12 August 2009

Climate change, human aspiration and the finite capacity of planet Earth
Public lecture for National Science Week by
Dr Michael Raupach FAA, CSIRO
Shine Dome, Canberra, 19 August 2009

Food security in a changing climate
Public lectures by 50th Anniversary Selby Fellow
Professor Peter Gregory, Director and Chief Executive, Scottish Crop Research Institute
Shine Dome, Canberra, 20 October
Oaks on Collins Conference Centre, Melbourne, 23 October

Research and technology in space science
Shine Dome, Canberra, 21 October 2009

Australia's future place in space
Professor Steven Freeland
University of Western Sydney

The involvement of Australian industry in space and astronomy
Brett Biddington
Chairman of the Australia Telescope Steering Committee
Chairman of the Australian Space Industry Chamber of Commerce

The Encyclopaedia of Life project
A lecture by Dr David Patterson, Marine Biological Laboratory, Woods Hole, USA
Shine Dome, Canberra, 26 October 2009

Celebrating the International Polar Year: Looking to the past to see the future
Two public lectures to celebrate the conclusion of the International Polar Year
Royal Institution of Australia, Adelaide,
5 November 2009

Climate of the Antarctic and Southern Ocean: Scientific advances during and beyond the International Polar Year 2007-08
Dr Ian Allison
Australian Antarctic Division and Antarctic Climate and Ecosystems CRC, Tasmania

Biological signatures in Antarctica: A window into the past, to predict the future.
Dr Mark Stevens
South Australian Museum

Francis Crick: Who was the man who discovered DNA?
A lecture by Professor Robert Olby, Department of the History and Philosophy of Science, University of Pittsburgh from 1994–2001, in association with the British High Commission
Shine Dome, Canberra, 10 March 2010

Challenges for the next 50 years
A lecture by Lord Martin Rees of Ludlow, President of the Royal Society of London, in association with the British High Commission
Shine Dome, Canberra, 25 March 2010


Photo: Richard Bray

Mike Raupach drew capacity crowds to the Dome for his lecture on climate change


Photo: Mona Akbari

Martin Rees at the Shine Dome

Lectures and speeches hosted by the Academy are available from www.science.org.au/events/speeches.

Activities of regional groups

Fellows of the Academy in all states and territories, including the ACT, may host events and meetings to maintain contact not only with each other but also Fellows of the other learned academies. These events serve to raise public awareness of the Academy and its activities and help raise the Academy's profile throughout Australia.

Australian Capital Territory

Chair: Professor John White

Aspects of climate change, and of the Darwin bicentenary, were two features of the Academy's ACT events in 2009. The public lectures in the series Australia's Renewable Energy Future and Water Management Options for Urban and Rural Australia provided regular opportunities for ACT Fellows to meet throughout the year. The lecture series, and other non-series lectures, were held in the Shine Dome page 79.

Fellows and guests of the four learned academies attended meetings of the Canberra Fellows Dining Club for presentations and dinner on four occasions in the reporting period. Professor Susanne von Caemmerer FAA and Dr John Passioura FAA are thanked for this. The 2009 program of lectures featured a range of speakers: Dr Rosemary Purdie's *Charles Darwin's botany* on 28 May; Dr Neil Byron's *Affluence and the environment* on 30 July; Professor Martin Williams' *Living on the edge: Human response to climate change* on 24 September; and the Christmas dinner was held on 3 December. The first lecture of 2010, *Exploring the universe*, was given by Professor Brian Schmidt FAA on 25 February. All events were well attended and greatly appreciated.

Corresponding Member Professor Terry Tao gave a series of lectures, as the Australian Mathematical Society's 2009 Clay-Mahler Lecturer, in various capitals including Canberra over two months from late August.

Sponsored by the Academy's Nuclear Matters and Australian Research Reactor Taskforce, Dr Adi Paterson, CEO of ANSTO, spoke on 21 August at a public lecture at the Research School of Chemistry, in collaboration with the Research Schools of Engineering Sciences and of Physics, on *Nuclear futures and the role of ANSTO in Australia*.

An invitation-only free seminar was held on 22 June, *Bunnies on the brain: The love/hate relationship between Australian science and Australia's worst pest*, led by Stephen Dando-Collins and Professor Tony Peacock.

Academy Fellow Professor David Craig's 90th birthday was celebrated with a morning of presentations of the latest research at the Australian National University Research School of Chemistry on 16 December to interested members of the chemical and physical science communities, past and present. It was an enjoyable occasion.

New South Wales

Chair: Professor Ian Dawes

The NSW regional group's main function in 2009 was a joint dinner with the NSW branch of ATSE. This year's dinner was organised by ATSE at their traditional location in North Sydney, which was possibly less colourful than last year's venue (the Trust Suite at Sydney Cricket Ground), but well attended by Fellows from both academies. The guest speaker was Dr Fred Watson, who needed no introduction to anyone with an interest in astronomy. He gave a very entertaining and

amusing presentation on astronomy and his special interest in the subject. The images he presented were outstanding, and while they illustrated his talk perfectly, they also provided an excellent backdrop to the dinner.

Earlier in the year the group also held a seminar presented by Professor John Hodges. John is a Federation Fellow and professor of cognitive neurology at the Prince of Wales Medical Research Institute. This seminar was held in conjunction with the School of Biotechnology and Biomolecular Sciences of the University of NSW. Following a rethink of the role of the NSW group, in 2010 there will be a function in which a number of NSW Fellows will provide a short presentation of their research to upper secondary school students, to which Fellows will be invited. There will also be a joint dinner with the NSW ATSE Fellows at which Professor Abing Yu will present the Ian Wark Lecture.

Queensland

Chair: Professor Perry Bartlett

In March 2009 a public forum and reception were held at Rydges Southbank Convention Centre in Townsville. This was an ideal forum to showcase the depth of research talent prevalent in the state to the community in the northern parts of Queensland. Speakers included Fellows Professors Terry Hughes, Peter Koopman, Nicholas Martin and Howard Wiseman, and also Associate Professor Sean Connolly, the 2009 Fenner medallist. Large numbers of high school students and members of the public were in attendance, who were highly appreciative of the forum and have asked for similar events to be undertaken by the Academy. Professor Ross Crozier FAA, FAAAS was a key person organising this event and the Queensland members were greatly saddened by his passing in November.

In September a joint function with Queensland ATSE Fellows was held at the Queensland Brain Institute. The two speakers were recently-elected Professor Robert Parton FAA and Dr Cherrell Hirst AO, FTSE. The talks were highly appreciated by the 80-strong audience and generated spirited discussions during the cocktail party which concluded the evening. The combined Academy–ATSE event was deemed to be successful and worthy of repeating in 2010.

South Australia

Chair: Professor Robert Vincent

South Australian (SA) Fellows met with President Professor Kurt Lambeck and Chief Executive Dr Sue Meek during their visit to Adelaide on 8 October for the opening of the Royal Institution of Australia. A range of national and state issues was discussed, including the need for more coordination of local activities. To this end a small group consisting of Fellows Professors Marcello Costa, John Ralston, Sally Smith and Bob Vincent has been formed to initiate and promote Academy activities in SA. Coordination between the learned academies in the state also developed further during 2009. Professor Vincent met regularly with the local conveners of SA chapters of ATSE and the Academy of Social Sciences in Australia to coordinate activities. Regular meetings are planned for 2010, including with the convener of the Australian Academy of the Humanities in order to advance the activities of all academies and exert a broader influence within the state.

Victoria

Chair: Professor Tony Klein

Eight new Fellows and medal winners from Victoria gave talks in the Victorian annual symposium, which was held on 9 July. The program was opened by Professor Bruce McKellar FAA, the 2008 Matthew Flinders medallist, which recognises scientific research of the highest standing in the physical sciences. He gave a fascinating overview of the concept of symmetry in physics, and was followed by Professor Frank Caruso FAA who talked about nanoengineered materials in biomedicine applications. Professor Andy Choo FAA from the Murdoch Childrens' Institute was next to talk on *Distribution of genetic wealth*. Professor Paul Mulvaney FAA then talked about the fascinating properties of nanoscale gold particles. Next on the program were the other medal winners from Victoria: Dr Melanie Bahlo, winner of the Moran Medal for outstanding research in statistics, with a talk entitled *Hunting genes involved in disease*; Dr Marnie Blewett, winner of the Ruth Stephens Gani Medal for research in human genetics, who spoke about *Differences between the sexes: More than just genetics*; and Professor Geoffrey Walker, winner of the inaugural Anton Hales Medal for research in the Earth sciences who talked about *Remote sensing of soil moisture*. Last on the very interesting and wide-ranging program was Professor Stuart Wyithe, winner of the Pawsey Medal for outstanding research in the physical sciences, who talked about *The first galaxies*.

The annual joint academies dinner, organised this year by ATSE, was held on 3 September. The after dinner speech was by Professor Phil Batterham FTSE, in commemoration of the Charles Darwin bicentenary.

As reported elsewhere (page 26), the 2009 High Flyers Think Tank, Agricultural Productivity and Climate Change, was held in Melbourne on 22 and 23 October, bringing together recognised experts in the field as well as about 65 early- and mid-career participants from a diverse range of disciplines.

Finally, the traditional Christmas party and dinner was held on 26 November in the Matthei Room of University House at the University of Melbourne. The current President, Professor Kurt Lambeck and Mrs Meg Lambeck, the President-Elect Professor Suzanne Cory and her husband Professor Jerry Adams FAA, and Past-President Professor Sir Gustav Nossal and Mrs Lyn Nossal were present. A pleasingly large number of Fellows and their guests were also present, including the Chief Executive, Dr Sue Meek. A local trio provided a passable imitation of Stephan Grapelli and Django Reinhardt. The foot-tapping gypsy swing was very well received by all.

Publications

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

Printed and online publications for 2009

Annual Report 2008–09 (and Financial Report) www.science.org.au/reports/2010anrep.html	April
Science at the Shine Dome 2009 program, banner and slides www.science.org.au/sats2009/index.html	April
50th anniversary of the Dome flags	April
Australia's Renewable Energy Future lecture transcripts (4 of 10) ***Solar thermal concentrators: Capturing the sun for large scale power generation and energy export*** ***Wind energy: How it works and where is it going?*** ***Tidal energy: A viable form of renewable energy*** ***The contribution of renewables in Australia's future energy mix*** www.science.org.au/events/publiclectures/re/index.html	April–August
Newsletter 76 www.science.org.au/newsletters/aas76.pdf	June
Evolution of the Universe, the Planets, Life and Thought Science at the Shine Dome 2009 symposium proceedings www.science.org.au/events/sats/sats2009/symposium.html	June
Australia–Singapore Energy Workshop Program cover, banner and slides www.science.org.au/events/conferences-and-workshops/australiasingapore/Australia-Singapore%20Energy%20Workshop%202009-Web.pdf	June
President's Note 64 www.science.org.au/presnotes/pres64.html	July
Preventative Health: Science and Technology in the Prevention and Early Detection of Disease 2008 Theo Murphy High Flyers Think Tank proceedings www.science.org.au/events/thinktank2008/report.pdf	July
An Australian Strategic Plan for Earth Observations from Space www.science.org.au/reports/documents/EOSfinal.pdf	August
Academy Directory 2009–10	August
Newsletter 77 www.science.org.au/newsletters/aas77.pdf	September
Public lecture transcript/video – National Science Week ***Climate change, human aspiration and the finite capacity of planet Earth*** www.science.org.au/events/lectures-and-speeches/raupach.html	September
Open day booklet, signs, poster, PowerPoint presentations	September
President's Note 65 www.science.org.au/presnotes/pres65.html	October

Agricultural Productivity and Climate Change Program cover, banner and slides www.science.org.au/events/confrences-and-workshops/australiajapan09/Aust-Jap%20Workshop%202009%20-%20booklet.pdf	October
Water Management Options for Urban and Rural Australia lecture transcripts (3 of 5) ***Australia's water challenges*** ***Converging insecurities: The water, energy, carbon and food nexus*** ***Water as a limiting resource in dryland agriculture*** www.science.org.au/events/publiclectures/wm/index.html	October–December
Public lecture transcript – 50th anniversary Selby Lecture ***Food security in a changing climate*** www.science.org.au/events/lectures-and-speeches/gregory.html	November
Newsletter 78 www.science.org.au/newsletters/aas78.pdf	December

Printed and online publications for 2010

Agricultural Productivity and Climate Change Theo Murphy High Flyers Think Tank proceedings www.science.org.au/events/thinktank2009/report.pdf	January
***Nanotechnology in Australia: Trends, Applications and Collaborative Opportunities* report** www.science.org.au/reports/nanotech2010.pdf	January
***Internationalisation of Australian Science* discussion paper** www.science.org.au/reports/internationalisation.pdf	February
***Australia's Renewable Energy Future* discussion paper** www.science.org.au/reports/renewable.pdf	February
East Asia and Pacific Summer Institutes for US graduate students Reports from participants www.science.org.au/internat/documents/eapsi-2009.pdf	February
Water Management Options for Urban and Rural Australia lecture transcripts (2 of 5) ***Building water sensitive cities: From socio-technical path-dependency to adaptive governance*** ***Leveraging Australia's water information*** www.science.org.au/events/publiclectures/wm/index.html	February–March
Newsletter 79 www.science.org.au/newsletters/aas79.pdf	March
A Big, Bold, Simple Concept: A History of the Australian Academy of Science Dome www.science.org.au/publications/history-and-biographies.html	March

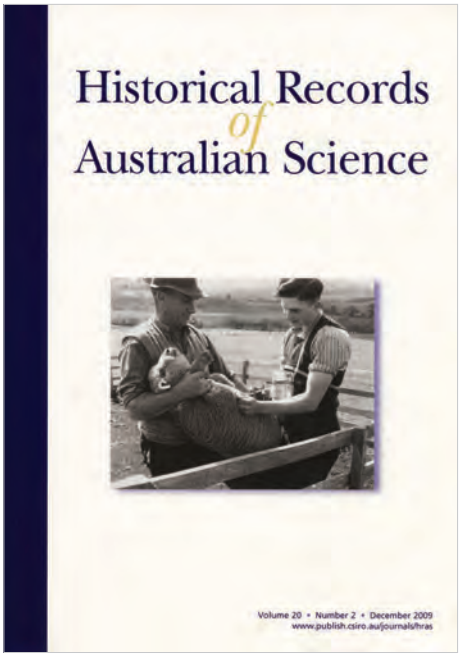
Historical Records of Australian Science

Historical Records of Australian Science is the journal of record for the history of science, both 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 which sets and maintains the editorial standards for the journal and advises Council on matters of policy. The June issue of *Historical Records* was the last to be produced under the guidance of Professor David Curtis FAA as chair of the editorial board. Since being appointed to this position in 2002, like his predecessors, he has taken primary responsibility for identifying suitable authors for the biographical memoirs of deceased Fellows of the Academy that are published in the journal. The Academy has appointed Dr John Passioura FAA, as the new chair of the editorial board.

Dr Libby Robin, who has been book reviews editor since 2000, became joint editor of the journal together with Professor Rod Home in early 2010. During the next few years, there will be a staged transfer of more and more editorial responsibilities to Dr Robin, until she becomes sole editor in about 2014.

A new book reviews editor, Dr Sara Maroske, began in early 2010. She is a research associate at the Royal Botanic Gardens Melbourne and lectures in history and philosophy of science at the University of Melbourne. Dr Maroske is also ex officio a member of the journal's editorial board.



Two issues were published in 2009 with four historical articles, six 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.

Prize winners explore the rich variety of environmental history

This year's National Museum of Australia Student Prize for Australian Environmental History attracted a very strong and varied field. The prize was shared by Jodi Frawley from the University of Sydney and Benedict Taylor from the University of New South Wales. Two entries, from Kylie Carman- Brown and Lawrence Niewójt, (both from the Australian National University) received an Honourable Mention. The essay prize is a joint initiative of the Academy and the National Museum of Australia (NMA) and is open to students undertaking research at any tertiary educational institution. The awards were presented at a function at the Academy on 2 June by Dr Craddock Morton, Director of the NMA and Dr Sue Meek, Chief Executive of the Academy.

In her entry, *Trans/Nationalising wattle from the Sydney Botanic gardens*, Jodi Frawley explores the criss-crossing of the national and the transnational paths of the wattle. The essay opens up the idea that what is national can also be transnational, and what is transnational is also global without ever losing the sense of wattle being an iconic Australian tree.

Benedict Taylor's essay was *It is curious how the convict loves a pet: Animals in Australian prisons and penal discourse*. Prisoners have a long history of keeping pets and Taylor shows how these informal relationships were probably the basis for official animal care programs, developed from the 1970s. Animals provided a refuge from the brutality of prison life and an outlet for their feelings.

The judging panel, chaired by Associate Professor Rachel Ankeny, chair of the Academy's National Committee for History and Philosophy of Science, was impressed by the range and number of entries and the quality of the essays. They have encouraged many of the entrants, including the winners, to seek publication in various peer reviewed journals.

The National Museum of Australia Student Prize for Australian Environmental History is awarded in alternate years with the National Museum of Australia Student Prize for History of Australian Science. Information about both prizes is available from www.science.org.au/natcoms/nc-hps.

Australian Journals of Scientific Research

The Academy of Science and CSIRO jointly publish 11 Australian journals of scientific research. The current five year agreement ends in 2012. The journals and their editors-in-chief are:

Australian Journal of Botany
– Professor Bob Hill

Australian Journal of Chemistry
– Professor Curt Wentrup FAA

Australian Journal of Soil Research
– appointment pending

Australian Journal of Zoology
– Professor Mark Elgar

Australian Systematic Botany
– Dr Mike Bayly

Crop and Pasture Science
– Professor John Irwin

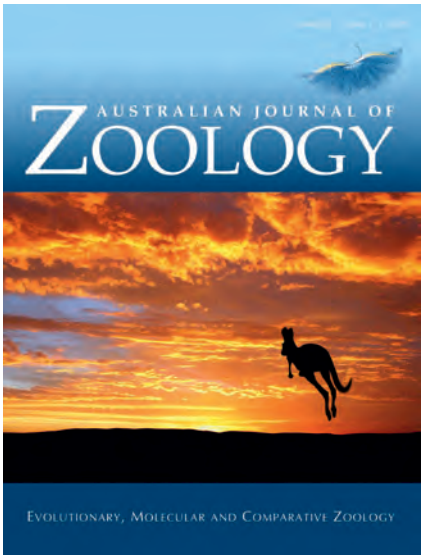
Functional Plant Biology
– Dr Rana Munns FAA

Invertebrate Systematics
– Professor Andy Austin

Marine and Freshwater Research
– Professor Andrew Boulton and Professor Keith Hunter

Reproduction, Fertility and Development
– Professor Tony Flint

Wildlife Research
– Professor Charles Krebs



The journals have an international readership with subscribers in around 100 countries and, through the United Nations' Research4Life program, the journals may be used for free by scientists in 71 developing nations around the world. Approximately 50 per cent of published papers originate outside Australia. Researchers from 89 countries submitted papers to the journals during 2009.

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. Professor Pauline Ladiges FAA replaced Professor Marilyn Renfree FAA as the Academy's chair in 2009.

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

Communications and media

Media coverage of Academy activities

The Academy issued 21 media releases from April 2009 to March 2010. These were distributed to a range of radio, print or TV journalists appropriate to each release using a web-based distribution service. Releases were also sent to over 70 people (primarily journalists) who have subscribed to receive them. A list of Academy media releases is available from www.science.org.au/news/media/

Media enquiries included coverage of the Shine Dome's 50th anniversary, climate change and higher education topics. Monitoring of radio, print and TV outlets for use of key words revealed widespread print and radio coverage of the Academy and its programs around Australia. An average of five mentions per week of the search terms 'Professor Kurt Lambeck', 'Australian Academy of Science' and 'Shine Dome' were recorded.

Academy President Professor Kurt Lambeck appeared on ABC Radio's *Ockham's Razor* program on 7 June, refuting claims made by Professor Ian Plimer in his book *Heaven and Earth*, which dismisses human-induced climate change. Professor Lambeck concluded that the book 'is not a work of science, it is an opinion of an author who happens to be a scientist.' The transcript is available from www.abc.net.au/rn/ockhamsrazor/stories/2009/2589206.htm

Professor Lambeck also featured on ABC Television's *The 7.30 Report* on 8 September, the eve of his National Press Club address (reported in more detail on page 24). He highlighted the need for more international collaboration in science research, so that Australian researchers could stay at the forefront of global discoveries. He called for increased funding for cooperation with international scientists, and increasing researcher exchanges and other similar measures to ensure that Australia's involvement in the global science effort is secured.

Science at the Shine Dome 2009 received excellent media attention, especially new Fellows and award winners. Professor Marilyn Ball FAA was profiled due to her work on the effects of climate change in enhanced frost damage. Professor Hugh Durant-Whyte FAA attracted particular interest with his address on robotics and the concept of a robotic 'healthcare assistant' with numerous articles in newspapers across Australia. The work of Fenner

Photo: Richard Bray

The renewable energy lecture series attracted considerable media attention

medallist Professor Sean Connelly on the causes and consequences of coral reef biodiversity was also well received. In collaboration with Dr Susannah Eliott, CEO of the Australian Science Media Centre, symposium speakers took part in an online background briefing for journalists on dark energy and the fate of the universe. Expert commentary was provided by keynote speaker Professor Mike Turner, and Academy Fellows Professor Brian Schmidt and Professor Matthew Colless. Coverage resulting from the online briefing included ABC Radio in Sydney and *The World Today*. Audio is available from www.aussmc.org/DarkEnergyMay09.php

The Academy's public lecture series continued to generate media interest with coverage in the local print media and interview opportunities for speakers on Canberra's ABC 666 Radio, notably Dr John Wright on the renewable energy series and Dr Don Blackmore and Andrew Campbell on the water management series. The lectures were also broadcast on Canberra's community radio 2XX. Promotion for the lectures was distributed to more than 550 subscribers who have asked to be notified of Academy events, and advertising through the *Canberra Times* encouraged the general public to attend. Email circulars about the lectures were sent to a range of Canberra-based organisations including the Australian National University, CSIRO, numerous government ministries and departments, and professional bodies.

The producer and film crew from ABC Television's program *Landline* were present at the Theo Murphy (Australia) High Flyers Think Tank, Agricultural Productivity and Climate Change. As a result of their attendance, a segment called *Carbon Copy* was screened on 21 March 2010. The transcript is available from www.abc.net.au/landline/content/2010/s2851825.htm.

Electronic communication

The quarterly Academy *Newsletter* is mailed to 1500 people, and a similar number of subscribers are notified by email when the electronic copy is available on the Academy website. *Nova: Science in the news* remains popular among education specialists and the media, with just over 1000 people asking to receive regular updates on new topics. *Primary Connections* has also widened its outreach with more than 1300 subscribers who receive information about the availability of new units and training events. In total over 6000 subscribers receive email notices about the Academy's activities on a regular basis.

Over the last two years, the Academy has been in the process of designing and implementing a new website (www.science.org.au). The original website was developed in the early- to mid-1990s and was in need of a major upgrade. The new site, which uses the latest script, supporting broader functionality and improved navigation options, was launched in March 2010. Much of the existing content was transferred to the new design templates: other material will continue to be uploaded to the site to document fully the activities of the Academy. The *Nova: Science in the news* section of the site is still being redeveloped and remains in the old format. *Nova* comprises more than half of the total number of pages on the Academy site, and the navigation requires extensive technical modifications. All *Nova* files will be uploaded at the same time when it is in the new format.

A new expanded section for news and announcements at www.science.org.au/news includes up-to-date news on the Academy and its related activities, feature stories, media releases, and a list of experts who can be approached by the media for comment. A section for videos and an image gallery will be used to profile the Academy's events, such as Science at the Shine Dome, Open Day and public lectures.

The new-look Academy home page

The Fellowship section of the website has had a secure area for Academy documentation for some time. A secure discussion forum for Fellows is now also available from www.science.org.au/fellows. The first discussion topic was on the science of climate change with nearly 40 Fellows registered to post items for discussion.

Support for Academy activities

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

Special-purpose funds

Adam J Berry Memorial Fund	
M & S Berry	$1,000
Adolph Basser Library	
WK Whitten FAA	$5,000
FJ Fenner FAA	$5,000
Christopher Charles Heyde Fund	
B Heyde	$50,000
Margaret Middleton Fund for Endangered Australian Native Vertebrates	
M Middleton	$60,000
Haddon Forrester King Medal	
Rio Tinto	$40,000
Ian Gordon Ross Fund	
IG Ross FAA estate	$466,052
WH Gladstones Population & Environment Fund	
WH Gladstones	$15,000
Rod Rickards Fellowship	$15,000
Dr Anna Maria Rickards	
Selby Fellowship Fund	
The Selby Scientific Foundation	$10,000
Marley Pty Ltd	$9,600

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

Contribution to the international subscription	
Australian Antarctic Division	$13,042
Interviews with Australian scientists	
Australian National University	$6,137
University of New England	$2,955
University of New South Wales	$2,955
National Measurement Institute	$3,182
National Museum Student Prize	
National Museum of Australia	$3,000

Nova: Science in the news	
CSL Limited	$5,000
Queensland Resource Council	$2,000
Defence Science and Technology Organisation	$10,000
University of Queensland	$5,000
Primary Connections Stage 4 Project	
Department of Education, Employment and Workplace Relations	$4,000,000
Science at the Shine Dome sponsorship for early-career researchers and teachers	
Australian Research Council	$12,000
D Craig FAA	$10,000
NMHRC	$6,000

Special project grants

Additional Support for International Research Staff Exchange Scheme (IRSES)	
International Science Linkages Strategic Policy - Department of Innovation, Industry, Science and Research	$102,500
Australia–Chile Scoping Workshop	
International Science Linkages Strategic Policy - Department of Innovation, Industry, Science and Research	$14,600
Australia–Indonesia Joint Science and Technology Workshop 2009	
International Science Linkages Strategic Policy - Department of Innovation, Industry, Science and Research	$37,500
Australia–Japan Researcher Symposium 2009	
International Science Linkages Strategic Policy - Department of Innovation, Industry, Science and Research	$45,000
Australia–Korea Foundation Early Career Researchers Program	
Department of Foreign Affairs and Trade	$52,500
Australian Climate Change Science Program	
Department of Climate Change	$160,000
Australian science books to Italy	
South Australia Government	$10,000
Climate change science questions	
Department of Climate Change	$39,700
East Asia and Pacific Summer Institutes program for US graduate students in science and engineering 2010	
International Science Linkages Strategic Policy - Department of Innovation, Industry, Science and Research	$75,000
European Cooperation in Science and Technology (COST)	
International Science Linkages Strategic Policy - Department of Innovation, Industry, Science and Research	$86,000
French–Australian Scientific Visits to Europe Program	
French Embassy	$15,000
French Embassy Cotutelle Program	
French Embassy	$8,897

Higher Education Support Act Learned Academies Program (Grant in Aid) Department of Innovation, Industry, Science and Research	$1,241,395
Investing in the future of physics Australian Research Council	$122,430
Joint Australia–Singapore Energy Research Workshop 2009 International Science Linkages Strategic Policy - Department of Innovation, Industry, Science and Research	$3,512
Sir Mark Oliphant Frontiers of Science and Technology Conferences (Year 4) Department of Innovation, Industry, Science and Research	$100,000
South Africa–Australia Joint Science and Technology Committee (JSTC) meeting Department of Innovation, Industry, Science and Research	$13,055
Theo Murphy Think Tank The Royal Society of London	$125,000
TWAS Singapore Workshop TWAS Singapore Workshop	$46,784

The Shine Dome and Ian Potter House

Dome 50th anniversary celebrations

The year 2009 marked the 50th anniversary of the official opening of the Academy's dome-shaped building on Wednesday 6 May 1959 by the Governor-General Field Marshall Sir William Slim. The anniversary of this event was celebrated with champagne and canapés, and the cutting of a dome-shaped cake by Professor John Shine FAA. The master of ceremonies was Professor David Curtis FAA. Professor Frank Fenner FAA, who was elected to the Academy in 1954, spoke about the 'other' Academy building, Ian Potter House. The author of an upcoming book documenting the first 50 years of the dome, Dr Alan Roberts, entertained the audience with anecdotes uncovered whilst researching for the book. Professor Kurt Lambeck FAA also spoke about what the dome headquarters means to the Academy today.

The 50th Anniversary Open Day held on 1 October increased the significance of this event that is held for the benefit of the general public each year. Over 300 local and interstate visitors, including many children, who had not previously been inside the Shine Dome attended. The Open Day gave people a chance to explore the architecture of the building, with the help of local heritage architects John Armes, David Hobbes and Eric Martin. One of the 'Excited Particles' from Questacon was on site to help keep the public entertained, and Dr Alan Roberts gave a talk on the history of the Shine Dome.

The Shine Dome featured in the 2009 Canberra and Region Heritage Festival from 4 to 19 April. A public lecture titled *Hulks to horizons* by Dr James Warden was held in the Dome as part of the festival on 9 April. The Academy also hosted an open house on 14 April, featuring talks by scientists, informal tours, screening of rare film footage, activities for school children and live music.

Other events

A variety of functions and events were held at the Shine Dome throughout the year. The Australian Competition and Consumer Commission held a two-day conference and forum on the *Trade Practices Act*, and we welcomed the American Fullbright Commission for the first time to the Shine Dome to hold a US Enrichment Seminar. We welcomed back the Catholic Education Office who held in-

Photo: Irene Dowdy

John Shine cuts the dome-shaped cake at anniversary celebrations

Photo: Stephanie Kafkaris

An 'Excited Particle' kept visitors of all ages to the Open Day entertained

Photo: Stephanie Kafkaris

Balloons were given to children at the Open Day

service days through the year. The Department of the Environment, Water, Heritage and Arts held their Annual Commonwealth Research Environment Facilities Conference over a two-day period. Events were held by the Meat and Livestock Board, and the Academy of the Social Sciences in Australia held their annual general meeting, Cunningham Lecture and symposium.

Many organisations held one day events, including the Australian Catholic University, Australian Government Land and Coasts, the Australian Institute of Architects, the Australian National University Summer School of Mathematics, Castelain Security, and the National Youth Science Forum. Over 10,000 people attended events at the Shine Dome for the period from April 2009 to March 2010.

The Academy's public lecture series continues to be one of the major attractions at the Shine Dome. Many of the lectures in the Australia's Renewable Energy Future series filled the Ian Wark Theatre to maximum capacity and this trend has continued for the Water Management Options for Urban and Rural Australia series.

However, the largest audiences during the reporting period were in response to the Academy's National Science Week presentation *Climate change, human aspiration and the finite capacity of planet Earth* by Dr Michael Raupach FAA, and the address *Challenges for the next 50 years* by the President of the Royal Society of London, Lord Martin Rees.

Dome maintenance and upgrades

The Shine Dome had a complete system upgrade by specialist audio visual design and installation company EO Design from late December 2009 to January 2010. The new equipment is state of the art and will increase the flexibility and capability of the system to handle lectures and presentations in the Ian Wark Theatre, as well as providing an overflow projection capacity in the Jaeger Room. The new system also incorporates video conferencing facilities in the Ian Wark Theatre and Becker Room, and foyer signage.

The Shine Dome moat required works to replace worn components in the filtration system. A new contract was negotiated for ongoing maintenance of the moat that has seen the water quality much improved.

Part of the car park between the Dome and Ian Potter House was dug up for access to drains while drainage works were underway, providing an opportunity to resurface damaged sections and to mark parking bays.

In addition, a compactus was installed in the basement to increase the storage capacity for the Basser Library.

The Academy used various means to lodge objections to a proposed massive development on the last undeveloped part of the New Acton site, across Edinburgh Avenue from the Shine Dome. The proposed Nishi building of 10 storeys of modern and energy efficient office space, along with a 16-storey apartment building, is not well located as it imposes on the heritage values of the Shine Dome. A prominent architect with a passion for the history of the Shine Dome, Roger Pegrum, provided assistance in developing the Academy's strategy to address the adverse impact on the heritage values of the building and its landscape.

Ian Potter House

Staff consultations regarding renovations required for Ian Potter House, with the assistance of architectural and design experts from the engineering firm GHD Pty Ltd, have produced plans for recarpeting and modifications to the office spaces on the ground floor.

A long-term project to reduce dampness in the underfloor area of Ian Potter House has been completed. Initial works required a significant excavation to reduce water entering sub-floor areas, related works to remove condensate from air-conditioning units located under the building and improved clearance of a drainage sump. The second stage of works required major works to improve stormwater drainage and the replacement of old, broken and various sized stormwater pipes, some of which had been in place, but ineffective, for many years. A civil engineer with hydraulics experience, Ramsay Howard, was of great help while this work was undertaken.

Some guttering was replaced last year, and the job was completed this year with the further benefit that the stormwater from the new guttering is now more effectively removed, thanks to the previously mentioned

drainage project. Those repairs have highlighted further issues with the flat areas of the Ian Potter House roof, which will be addressed in the near future. This work may have heritage implications as there have been some roof repairs completed in the past (prior to the Academy taking responsibility for the building) that have not followed heritage guidelines.

An asbestos survey of Ian Potter House has been completed to meet ACT Government requirements. The small amount of asbestos identified is intact and does not require immediate removal. A similar survey of the Shine Dome is about to be undertaken.

Part of the first floor of Ian Potter House has been vacant since the previous tenant moved to new premises. A new tenant has been identified and lease negotiations are underway.

Photo: Irene Dowdy

A family of ducks enjoyed the improved water quality of the moat

Events held at the Dome

Date	Function	Organisation
2009		
14 April	*Australian Government Land and Coasts Divisional Meeting*	Department of Agriculture, Fisheries and Forestry
21 April	Blake Dawson Public Lecture: Professor Hugh White, *The Defence White Paper and Australia's future in Asia: Will we remain a middle power?*	ANU Events, Communications and External Liaison Office
22 April	Earth Observation Plan Working Group Meeting	Australian Academy of Science
26 April	Adjudication Branch Training Session	Australian Competition and Consumer Commission
28 April	Combined learned academies lecture and dinner: Dr Rosemary Purdie, *Charles Darwin's botany*	Australian Academy of Science
6-8 May	Science at the Shine Dome	Australian Academy of Science
2 June	House Committee meeting	Australian Academy of Science
2 June	Public lecture: Professor David Wood, *Wind energy: How it works and where is it going?*	Australian Academy of Science
10-12 June	Asia-Pacific Seminar: Developments in Chemical Safety, Security and Chemical Counter Terrorism	Department of Foreign Affairs and Trade, Australian Academy of Science and National Committee for Chemistry.
15 June	Australia–Singapore Energy Workshop	Australian Academy of Science

Date	Function	Organisation
22 June	Public seminar: Stephen Dando-Collins, *Pasteur's gambit: Louis Pasteur, the Australasian rabbit plague, and a ten million dollar prize*	Invasive Animals CRC
23 June	National Science Forum Orientation Program and Dinner	Australian Academy of Science
25 June	Council meeting	Australian Academy of Science
3 July	Earth Observation Plan Working Group and Steering Committee Meeting	Australian Academy of Science
7 July	Public lecture: Dr Tim Finnigan, *Tidal energy: A viable form of renewable energy*	Australian Academy of Science
21 July	Conferring of French Government Palme D'Or awards for bilateral collaborations between Australia and France	Australian Academy of Science and French Government
23 July	Council meeting	Australian Academy of Science
27-28 July	*Trade Practices Act* forum	Australian Competition and Consumer Commission
29 July	Annual Fraser Lecture	Office of Bob McMullen MP
30 July	Combined learned academies lecture and dinner: Dr Neil Byron, *Affluence and the environment*	Australian Academy of Science
4 August	Environmental Regulation Roundtable	Academy of the Social Sciences in Australia
4 August	Public lecture: Dr John Wright, *The contribution of renewables in Australia's future energy mix*	Australian Academy of Science
5 August	National Committee for Medicine meeting	Australian Academy of Science
11 August	Travel seminar	FCM Travel Australia
12 August	Public lecture: Dr Martin Grabert, *COST - European Cooperation in Science and Technology*	Australian Academy of Science
19 August	Meeting of the local planning group for the National Committee for Earth System Science Workshop	Australian Academy of Science
19 August	Public lecture: Dr Michael Raupach FAA, *Climate change, human aspiration and the finite capacity of planet Earth*	Australian Academy of Science
20 August	IT security forum on identity management issues	Castelain Security
24-25 August	Elizabeth and Frederick White Conference: Nuclear Astrophysics in Australia	Australian Academy of Science, Monash University, Australian National University and Stellar Interiors and Nucleosynthesis

Date	Function	Organisation
2-3 September	National Committee for Earth Systems Science workshop	Australian Academy of Science
9-10 September	Red Meat R&D forum and board meeting	Meat and Livestock Australia
14 September	National Forum on Biodiversity, Biodiscovery and Traditional Knowledge	Department of the Environment, Water, Heritage and the Arts - Genetic Resources Management
15-16 September	Commonwealth Research Environment Facilities (CERF) Conference	Department of the Environment, Water, Heritage and the Arts
17-18 September	Fulbright US Enrichment Seminar	Australian-American Fulbright Commission
24 September	Council meeting	Australian Academy of Science
24 September	Combined learned academies public lecture and dinner: Professor Martin Williams, *Living on the edge: Human response to climate change*	Australian Academy of Science
25 September	Nanotechnology Stakeholder Day	Australian Academy of Science
1 October	50th anniversary Open Day	Australian Academy of Science
6 October	Public lecture: Dr Don Blackman, *Australia's water challenges*	Australian Academy of Science
8 October	Library Committee meeting	Australian Academy of Science
13 October	House Committee meeting	Australian Academy of Science
14 October	Public Policy Institute launch	Australian Catholic University
20 October	Selby Lecture: Dr Peter Gregory, *Food security in a changing climate*	Australian Academy of Science
21 October	Research and Technology in Space Science	Embassy of Italy and Australian Academy of Science
22 October	Staff meeting	Australian Government Land and Coasts
26 October	Public lecture: David J Patterson, *The Encyclopedia of Life*	Australian Academy of Science
27-28 October	Australia-Japan Biodiversity workshop	Australian Academy of Science
29 October	National Committee for Biomedical Sciences meeting	Australian Academy of Science
3-4 November	Annual symposium, annual general meeting and Cunningham Lecture by Professor John Dryzek, *Green Democracy, Global Governance*	Academy of the Social Sciences in Australia
4 November	Public lecture: Andrew Campbell, *Converging insecurities: The water, energy, carbon and food nexus*	Australian Academy of Science
13 November	Presentation of Australian Mathematics Competition Awards	Australian Mathematics Trust

Date	Function	Organisation
17-18 November	Digicore Consortium annual conference	Australian National University - Research School of Physics and Engineering
19-21 November	Frontier Symposium on Biosecurity on the New Bioeconomy – Threats and Opportunities	CSIRO - Entomology Division
23-24 November	Second annual meeting	Australasian Society for Stem Cell Research
30 November	Walter Burley Griffin Memorial Lecture by Professor Jan Gehl	Australian Institute of Architects
1 December	Public lecture: Dr John Passioura FAA, *Water as a limiting resource in dryland agriculture*	Australian Academy of Science
3 December	Council meeting	Australian Academy of Science
3 December	Combined learned academies dinner	Australian Academy of Science
4 December	The Worlds of Ecology & Environmental Policy: *Never the two shall meet? Using bushfire as a case study'*	Ecological Society of Australia
2010		
11 January	Blakers Lecture - Summer School of Mathematics	Australian National University and Australian Association of Mathematical Teachers Inc.
12 January	National Youth Science Forum	National Youth Science Forum
21 January	Australia Day Achievement Awards	Department of Agriculture, Fisheries and Forestry
26 January	National Youth Science Forum	National Youth Science Forum
2 February	Public lecture: A/Professor Rebekah Brown, *Building water sensitive cities: From socio-technical path-dependency to adaptive governance*	Australian Academy of Science
4 February	Council and Sectional Committees	Australian Academy of Science
4 February	Sectional Committee chairs dinner	Australian Academy of Science
5 February	Council meeting	Australian Academy of Science
11-12 February	Workshop on Applications of Radio Science (WARS)	Australian Academy of Science
16 February	House Committee meeting	Australian Academy of Science
19 February	2009 Haddon Forrester King Medal presentation	Australian Academy of Science and Rio Tinto
25 February	Combined learned academies public lecture and dinner: Professor Brian Schmidt FAA, *Exploring the universe*	Australian Academy of Science

Date	Function	Organisation
2 March	Public lecture: Dr Rob Vertessy, *Leveraging Australia's water information*	Australian Academy of Science
4-5 March	Council meeting	Australian Academy of Science
10 March	Public lecture: Professor Robert Olby, *Francis Crick: Who was the man who discovered DNA?*	Australian Academy of Science and British High Commission
25 March	Public lecture: Lord Martin Rees, *Challenges for the next 50 years*	Australian Academy of Science and British High Commission

Adolph Basser Library

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

Manuscript collection

The manuscript collection contains more than 220 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, however; the papers of Sir Neil Hamilton Fairley, for example, are heavily used by people interested in malarial research. A number of scientific societies have also chosen the Basser Library as the repository for their archives, with the Australian Institute of Physics and the Geological Society of Australia providing the largest collections.

Recent additions to the manuscript collection were made by Dr Beth Heyde, who deposited a large collection of papers from her late husband Professor Chris Heyde FAA; Dr Paul Kriedeman, who gave additional material for the Ecological Society of Australia collection; and Janet Witham, who presented additional material for the collection of her grandfather, Professor Charles Weatherburn.

Listings of the library's manuscript collections are on the Academy's website at www.science.org.au/basser/mslist, where they generate a large number of hits and significant email enquiries.

Photo: Irene Dowdy

The Basser Library continues to receive donations for the manuscript collection

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.

The part time library assistant, Penny Whitten, has made substantial progress in cataloguing a significant proportion of the backlog of monographs. This work will be continued thanks to generous donations from her father, Dr Wes Whitten FAA, and Professor Frank Fenner FAA.

Photo: Irene Dowdy

A variety of researchers consult the Basser Library's resources

Staffing and use

The library is currently staffed four days a week (closed on Wednesdays) 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. The use that is made of the library ranges from simple requests for a copy of an article to multiple visits from scholars. The 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 the only overseas researcher to visit the library was from Arizona University. However, there were requests for information from the manuscript collection from Miami, Ontario and London as well as almost every state of Australia. Requests for copies of material from the printed collection came from such diverse places as Argentina, Brazil, Illinois and Sweden.

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 Jodi Frawley, from the University of Sydney.

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

Obituary notices

Hans Adolf Buchdahl

Died 7 January 2010, elected to Fellowship 1968

Born in Mainz Germany, Hans Buchdahl was already studying at the Royal College of Science London, later absorbed into Imperial College, when his German Jewish parents moved to England mid 1939 to escape Nazi persecution. He completed a BSc and received the Associate of the Royal College of Science (ARCS) from Imperial College.

When WWII began, the UK Government, unable to determine individual allegiance, interned German nationals including many Jewish refugees already fully assimilated. In July 1940 Hans came to Australia in the infamous *Dunera*, fitted to accommodate 1,500 including crew, but on that voyage carrying 2,036 Jewish refugees, 451 German and Italian prisoners of war and the survivors of the *Arandora Star*. On arrival in Sydney after a 57 day voyage in appalling conditions due to gross overcrowding, ill-treatment by poorly-trained crew and at constant risk of enemy attack (the *Dunera* was twice hit by torpedoes but neither went off), the local army medical officer was so appalled, his subsequent report resulted in the court martial of the British army officer in charge. The 1985 television movie *The Dunera Boys* depicted the experiences of these unfortunates.

Hans was detained initially at Hay in New South Wales, then at the Tatura centre in Victoria in May 1941. The internees set up an unofficial 'university' to pass the time. It is said that Hans continued his research on general relativity, writing on the only available paper, the reverse of jam-tin labels.

Members of a government optical munitions panel noticed his talents and on 29 October 1941 Hans was released under a guarantor and transferred to the University of Tasmania in Hobart to 'assist with the teaching load of particular physics staff heavily involved in local optical munitions work'. He integrated quickly into his new role and gained the confidence and respect of fellow staff and students. His interest in the theory of geometrical optics began at this time, initiated by optical munitions work at the Waterworth Annexe, where he worked out formulae for optical aberrations taken to high orders that the Waterworth group used in designing imaging systems. These formulae were later applied worldwide, including in systems carried by satellites. The estimated total value of optical systems using his formulae now runs into billions of dollars. At the same time he continued research in general relativity and classical thermodynamics.

Beginning at the university as honorary assistant in physics, he was appointed research physicist in 1946, lecturer part-time and research physicist in 1947 and senior lecturer in 1952. In 1949 the university awarded him a DSc for his research including important publications in his three major interests – general relativity, geometrical optics and classical thermodynamics. He was awarded a DSc from Imperial College London in 1956. In the same year he was appointed as one of the first readers at the University of Tasmania and held that position until appointment in 1963 to the inaugural chair of theoretical physics in the Faculty of Science at the new School of General Studies of the Australian National University where he stayed until his retirement in 1985.

Continued research in his three major areas of interest resulted in some 160 published research papers and five books. He was elected a Fellow of the Australian Academy of Science in 1968, received the Academy's Thomas Ranken Lyle Medal in 1972, the Walter Burfitt Medal from the Royal Society of New South Wales in 1980, the CEK Mees Medal from the Optical Society of America in 1993 and the AE Conrady Award of the

International Society for Optical Engineering in 1997. He was a Nuffield Foundation Dominion Fellow in 1951, a member of the Institute for Advanced Study at Princeton 1959–60, a NY State Professor of Optics, University of Rochester (New York) in 1967–68, an Overseas Fellow of Churchill College, Cambridge in 1979, and was made an Australian National University (ANU) Fellow and Emeritus Professor following his retirement.

While his optical work had a profound impact in the design of optical systems Hans was also internationally recognised for his work on 'relativistic fluid spheres' obtaining a more physically realistic solution than the earlier one by Schwarzschild for the interior of a perfect fluid-spherical symmetric-non-rotating star. The literature refers to the 'Buchdahl fluid spheres' and also to 'Buchdahl's Theorem'. He corresponded with Einstein on his relativistic research.

His work on classical thermodynamics is also noteworthy and became the subject of two books; *The Concepts of Classical Thermodynamics* was published in 1966 and the other, a series of twenty lectures in thermodynamics, was published in 1975. He had a strong interest in the logical structure of the theory and in how to teach it. These two books are typical of his gifts in distilling the essence of the underlying theory and presenting it with rigour but in a logical, concise and lucid manner. His lecture notes on general relativity also appeared in book form as *Seventeen Simple Lectures in General Relativity Theory* in 1981. His teaching mirrored his depth of knowledge, passion for rigour and logical structure. He demanded high standards but, as a 'gentleman of the old school' he was highly respected by his students, and staff.

Hans did much bushwalking while in Tasmania and later would often walk up Mt Ainslie in the early mornings from his home in Campbell and also to his office at ANU. His passions included music, particularly Bruckner and Bach and extended to the cactus plants that adorned window sills in his room and ante room as well as the stairwell close to his office. While some might not consider them particularly attractive they did produce beautiful flowers for one day of the year.

Hans is survived by his wife Pamela, and two of their three children Tanya (Tintner) and Nicholas. Their second daughter Catriona (Kate), a gifted violinist who trained at the Juilliard School and then with Sandhor Vegh and Valery Klimner in Europe, tragically died of cancer in 1992.

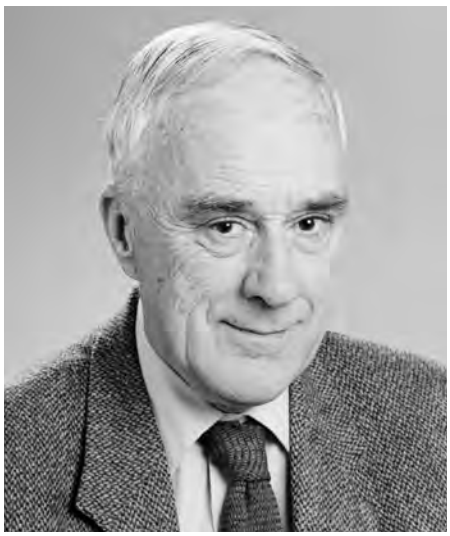
A consummate theoretical physicist, Hans Buchdahl may not enjoy the public image of many of his contemporaries but his contribution to all his chosen fields was enormous and his legacy to theoretical physics will particularly live on in the thousands of imaging systems which bear the fruits of his remarkable calculations of higher-order aberration coefficients.

The author gratefully acknowledges the assistance of Hans's former staff, the recent publication *History of Physics in Tasmania 1792–1982* by Arthur Geoffrey Fenton, and the Buchdahl family.

John Sandeman

Alan Kenneth Head

Died 9 January 2010, elected to Fellowship 1971



Alan Head was the first child of Elsie May (nee Burrell) and Rowland Henry Jack Head. They were childhood sweethearts who had grown up and married in Surrey Hills in Sydney and then moved to Bairnsdale to run the newsagency there. Within a few years, however, they moved back to Melbourne to take over the Toorak newsagency. Alan was born on 10 August 1925 at West Melbourne.

Alan was seven when his father died suddenly. By this time he had two siblings, Keith and Margaret, with Sybil on the way. Nevertheless, his mother continued running the newsagency whilst raising four young children during the depression.

At the age of about 10 or 11 Alan won a scholarship to Ballarat Grammar School as a boarder. He was dux of the school in 1940, but he had to move to Scotch College, again as a boarder and again on a scholarship, to do his two honours years. He was dux of Scotch in 1942. His formal undergraduate education was completed by a BA in mathematics in 1945 and a BSc in physics in 1946, both at the University of Melbourne.

After graduating, he spent a year tutoring in mathematics at Trinity College, Melbourne. In 1948 he joined CSIR as research officer in the Division of Aeronautics, just before the division became the Aeronautical Research Laboratories (ARL) under the auspices of the Department of Supply.

In 1951, he married Gwenneth Nancy (Gwen) Barlow and soon afterwards obtained a Department of Supply Studentship to study for his PhD. He went to the University of Bristol which, at that time, was one of the main centres where the science of the newly discovered 'dislocations' in crystalline materials was being established. He obtained his PhD in 1954 for a thesis on dual topics; *The Interaction of Dislocations and Boundaries and The Growth of Fatigue Cracks.*

Alan rejoined ARL in 1954 to work on deformation, fatigue and fracture of aluminium aviation alloys. During this time, Alan received a query from the CSIRO Division of Radiophysics concerning the suitability of aviation alloys in the construction of a giant radio telescope dish. Alan could see that, despite the strength and weight of these alloys, the dish would distort under gravity as it was tilted from one viewing position to another leading to unacceptable distortions. He suggested that the dish be non-steerable and assembled in a hole in the ground so that it could be fully supported and adjusted to precisely the correct shape. He then calculated the complex shape of the receiving sensor at the focus of the dish which was to be movable to scan the sky. The design was published in *Nature* in 1957 and four telescopes of this design were built and successfully operated in the Soviet Union.

In 1957, Alan left ARL and took up a position as a theoretical physicist with CSIRO Division of Tribophysics to work on the physics of materials. He stayed with CSIRO until his retirement in 1990.

Although his 'mainstream' research was in materials science, there were notable exceptions. One was the invention of a method of refrigeration that worked on the principle of radiation cooling. The device consisted of a surface coated with a substance that selectively radiated electromagnetic radiation at an infra-red wavelength of about 10 microns. This wavelength can penetrate the atmosphere (if it is cloud free) and escape. Thus the device loses heat energy to outer space and cools down. Small-scale tests showed that the device was viable and patents were taken out, but so far there have been no commercial applications.

Alan Head received many honours during his career. He was awarded a DSc from the University of Melbourne in 1963 for a thesis, on three topics; *Fatigue of Metals, Dislocation Theory* and *Geometrical Optics of Aspherical Surfaces*. He was awarded the Syme Prize by the same university in 1969. He held visiting professorships or fellowships at Brown University, the University of Florida and the University of Oxford. He was elected a Fellow

of the Australian Academy of Science in 1971 and a Fellow of the Royal Society of London in 1988. He was made an Officer of the Order of Australia in 1992. However, offers of chairs at overseas universities and the position as founding director of the Institute of Physical Sciences in CSIRO failed to tempt him. Alan preferred to stay in Australia and work as an active research scientist. That is not to say he avoided administrative roles completely. He was acting chief of the Division of Tribophysics on several occasions and was the acting chief of the Division of Materials Science and Technology during the difficult period immediately after its formation in January 1987. He was a member of the committees set up to review the Divisions of Radiophysics and Mathematics and Statistics. Outside CSIRO he served for many years on the Australian Aeronautics Research Committee.

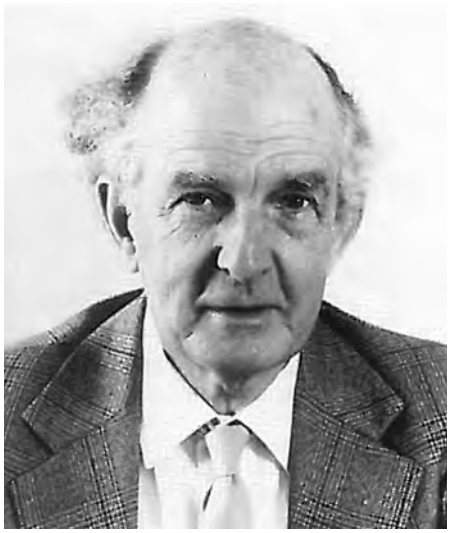
Despite all his success he kept his feet on the ground. He was a quietly spoken, unassuming, approachable man. Although he spent a lot of time by himself with 2B pencils, a pile of paper, a desktop computer and his feet up on the desk, thinking, he was always ready to talk, help, and collaborate with his CSIRO colleagues and his contacts throughout the world. A characteristic of Alan was that his knowledge was underpinned with a strong foundation of commonsense and it was this aspect that so many appreciated when they sought his advice. Since his passing, on 9 January 2010, messages of appreciation have been arriving from all over the scientific world. He was a guide, a teacher, a mentor and a friend to us all and we will miss him greatly.

He is survived by his wife, Gwen, his brother, Keith and his sisters, Margaret Boston and Sybil Kent.

Keith Head, Leo Clarebrough and Peter Humble

Albert Russell (Bert) Main

Died 3 December 2009, elected to Fellowship 1969



Bert Main was born in Perth, Western Australia, on 6 March 1919 and died at the age of 90 on 3 December 2009. He grew up in the Swan valley with easy access to the then undeveloped bush nearby. Almost every weekend he enjoyed accompanying his grandfather on walks through the bush. Undoubtedly these early experiences prepared the base on which his later interests developed.

He began his working life as a clerk in the State Public Service in Perth, sorting seeds in the Western Australian Department of Agriculture. He joined the Army Reserve and after the outbreak of WWII moved to the Australian Army and then 'deserted' to the RAAF to which he was better suited. He was transferred to Britain and served as a Warrant Officer Navigator on Lancaster bombers, surviving a number of sorties before being shot down in early 1945 and serving a period as a POW in a German prisoner of war camp.

On being repatriated, Bert matriculated at night school and enrolled at the University of Western Australia (UWA) in 1947. He graduated with first class honours in zoology in 1950 and was awarded a Fulbright Scholarship in 1951 to study with the renowned geneticist Sewell Wright at the University of Chicago. On returning to UWA he was appointed lecturer in zoology in 1952 and in the same year married fellow student Barbara York, already well known for her work on spiders.

Following his PhD on the evolution of Australian frogs in 1956, Bert was promoted to reader in 1961, and then appointed to one of UWA's first personal chairs in 1967. Two years later he was elected a Fellow of the Australian Academy of Science.

Bert received many honours during his career, including the Britannica Australia Award for Science in 1970 that he shared with Harry Waring, Honorary Membership of the Royal Society of WA in 1982 and medallist in 1995, an Honorary DSc from UWA in 1987, the Ecological Society of Australia Medal in 1988, made a Fellow of the Australian and New Zealand Association for the Advancement of Science in 1981 and received the von Mueller Medal in 1990. In 1981, in recognition of both his public service and his scientific research, he was made a Commander in the Civil Division of the Order of the British Empire. Following his retirement in 1985, the title of Emeritus Professor was conferred on him by the UWA Senate and he held the position of Honorary Senior Research Fellow until recently.

Bert's primary research was on Australian frogs and their evolution but he was first and foremost a superb naturalist; his knowledge of the Australian flora and fauna in its natural and geohistorical setting was legion. This led him to supervise over 30 postgraduate students on organisms ranging from blennioid fish, tortoises, dragon lizards, marsupials and mountain ducks, various invertebrate groups including both terrestrial and marine to Christmas trees and pitcher plants as well as the effect of phenomena including fire on the biota. From his earliest days Bert believed in taking science to the public. He was a member of the Western Australian Naturalists' Club for many years and was very active in club affairs in the 1950s. His commitment to enthusing others about natural history and ecology is reflected in the publication, in 1954, of two of the early WA Naturalists' Club handbooks.

Unlike many academics, Bert Main had an extensive career associated with government. His work focusing on the protection of wildlife commenced as a member of the state Fauna Protection Advisory Committee (FPAC) and developed while a member of the WA sub-committee of the National Parks Committee that was established by the Australian Academy of Science in 1958. The report from this committee, *National Parks and Nature Reserves in Western Australia*, which was published by the Academy in 1963, recommended the creation of what are now WA's best known and most important national parks and nature reserves – Prince Regent

Nature Reserve, Karajini (Hamersley Range) National Park, Great Victoria Desert Nature Reserve, Nuytsland Nature Reserve and Drysdale River National Park.

The FPAC was replaced by the WA Wildlife Authority in 1968 and Bert became a founding member and continued in this role until the authority was superseded under the *Conservation and Land Management Act* of WA in 1985. His influence was much felt in these circles as a member of the Fisheries Research Committee, the Zoological Gardens Board (President 1979–85) and the National Parks Authority (President 1980–85). He also served for several years on the council of the Australian Institute of Marine Science in Townsville and was a member of the Australian Universities Commission from 1971 to 1977.

Bert's most important contribution though was undoubtedly as a founding member of the Environmental Protection Authority (EPA) that was established in 1972, becoming its deputy chair in 1981, then chairman from 1982 until his retirement in 1985. One of the EPA's first decisions was to set up a Conservation Through Reserves Committee that ultimately resulted in the creation of numerous reserves, including Rudall River, Peak Charles, d'Entrecasteaux, Shannon and Millstream-Chichester National Parks, Ningaloo Marine Park and the enlargement of the Leeuwin-Naturaliste National Park.

Bert Main's contribution to Australian science was substantial with almost 100 publications on its wildlife and its preservation, and the theoretical background to conservation applications. He pioneered research on the origins and evolution of Australia's unique wildlife and taught ecology long before it became a household word. Many of his students went on to hold influential positions in universities, CSIRO and state environmental bodies.

He is survived by his wife and colleague, Barbara, and their three children Rebecca, Gilbert and Monica, and three grandchildren Eleanor, Marjorie and Harold.

Don Bradshaw

Alan McLeod Sargeson

Died 29 December 2008, elected to Fellowship 1976.

Alan Sargeson was born in Armidale, NSW, on 13 October 1930 to Herbert Leslie Sargeson, a magistrate, and Alice McLeod Sargeson. He had two older brothers both now deceased. Because of his father's occupation he moved frequently and consequently often changed schools. Despite these frequent disruptions, Alan enjoyed his school years developing an early interest in science. Expecting to become a school teacher he studied science at the University of Sydney where he received an honours degree in organic chemistry (1952). He, however, was more attracted to inorganic coordination chemistry because of his acquaintance with Frank Dwyer, a coordination chemist of considerable distinction. With Dwyer he completed his doctorate titled *The Metal-oxygen Bond in Inorganic Complexes* in 1956. In the same year, rather than pursuing a school teaching career, he took a lectureship in the University of Adelaide. While in Adelaide he met his wife Marietta whom he married in 1959. They had four children, Kersten, Frank, William, and Bente. All survive him.

The possibility of Dwyer leaving Australia prompted the John Curtin School of Medical Research at the ANU to set up a research unit for him to pursue work in a field he had initiated, bioinorganic chemistry. Alan was asked to join the group in Canberra. In 1958 he moved there as a research fellow. During the next four years he first collaborated with Dwyer on the antibacterial activity of o-phenanthroline and 2,2'-bipyridyl metal complexes and on the diasterioselectivity found in dissymmetric octahedral complexes containing chiral ligands. The latter was a long-standing problem that had defied solution until the work of Sargeson and Dwyer.

After this initial collaboration, he began his own independent career at the medical school where he initiated seminal studies on the chirality and configurational stability of metal coordinated amine ligands. This elegant and arresting work proved to be pivotal for understanding the factors controlling the topology of complexes derived from multidentate ligands. The medical school thrived until 1962 when Dwyer died suddenly leaving Alan with the responsibility of leading the unit. He ably ran the unit until the establishment of the Research School of Chemistry to which he transferred in 1967 as a senior fellow.

He completed his career at the school despite receiving attractive offers from other institutions. He soon became a Professorial Fellow (1968) and was elevated to the rank of professor in 1978. Although he did not relish the prospect of becoming dean of the school, he accepted the position (1986–1988) out of a sense of duty and responsibility to his colleagues. He retired in 1996 to become Professor Emeritus. He frequented the department often until his death.

Alan worked with many talented students, postdoctoral fellows and senior collaborators but his ideas and scientific judgment anchored and propelled the work. Early on Alan hired David Buckingham, a former Dwyer student, to join him as senior member of the group. The collaboration that ensued proved remarkably productive and synergistic. Their respective strengths were complementary. The collaboration produced several important discoveries. Perhaps the most notable of these was the demonstration that stable cobalt complexes could be used to hydrolyse amino acid esters and peptide bonds by rates one million time faster than those observed in dilute solution. This work demonstrated with remarkable clarity the origins of the rate accelerations observed in similar enzyme reactions. Another important piece of work that emerged from this collaboration was the demonstration that base hydrolysis of cobalt amine complexes occurred by a base catalysed mechanism. This work showed Alan's incisiveness and cleverness in elucidating reaction mechanisms. Eventually Buckingham left the school to return to New Zealand as a professor.

Alan had many capable postdoctoral fellows; perhaps the most notable of these were Jack Harrowfield and Greg Jackson. The talents and stability that these co-workers provided allowed Alan to make his frequent trips to the US and Denmark. Alan took these trips very seriously. He regarded them as a crucial part of his research program because he was exposed to new ideas and new ways of thinking about his subject. Perhaps Alan's most notable achievement was his high yield synthesis of macrocyclic cage compounds that encapsulated a metal ion. The preparation of these cages proved to be remarkably simple and relied on the organisation the parts provided by metal coordination to assemble the cage. Chemistry provides few examples of kinetically controlled formation of complex macrocyclic compounds. The chemistry of these cage compounds was as unique as their structures. It was extremely difficult to remove the metal ion from the cage and reactions that relied on molecular pre-organisation were accelerated. Alan published over 400 papers and each had something interesting to say. He was without doubt one of the leading chemists of his generation and certainly among the top inorganic chemists in the world. The really great ideas in science are usually the simple ones. Alan never complicated a problem more than was necessary. Perhaps this was the secret of his many achievements.

Alan received many awards including the Burrows Lecture (1975), the HG Smith Medal (1978) and the Leighton Medal (2000) from the Royal Australian Chemical Institute, to which he had also been elected to fellowship in 1972, the Award in Inorganic Chemistry from the American Chemical Society, the Bailar Medal (University of Illinois), Nyholm Medal (1985) and the Centenary Medal from the Royal Society of Chemistry, Sammet Award from the Johann Wolfgang Goethe Universität (1995), Izatt-Christensen Award in Macrocyclic Chemistry (1997) and the Matthew Flinders Medal from the Australian Academy of Science.

He was the recipient of three honorary degrees from the University of Sydney (1990), University of Copenhagen (1996) and University of Bordeaux (1997) – each bestowed Doctors of Science honoris causa. Alan was elected to the Australian Academy of Science (1976), became a Foreign Member of the Royal Danish Academy of Sciences and Letters (1976), he was made a Fellow of the Royal Society of London (1983), and was made a Foreign Associate of the National Academy of Sciences (USA) (1996). He was a guest lecturer in numerous universities and was invited as a speaker or plenary lecturer at over 40 conferences.

Despite these accomplishments, the awards he received, and the distinctions bestowed on him Alan carried his achievements lightly. He recognised that what really mattered was what he had done in science. Alan Sargeson was a most engaging, quick witted and humorous colleague. It was not difficult to like him. He was generous and kind. When others went abroad to achieve their ambitions, Alan remained mostly because he wanted to show that much could be done in Australia. He succeeded admirably.

Brice Bosnich

Ernest Oliver (Ernie) Tuck

Died 11 March 2009, elected to Fellowship 1988

Ernie Tuck was born in Adelaide on 1 June 1939. After the early death of his father in a car accident, he and his younger brother Bob were raised by their mother. Ernie received his primary and secondary education at Unley Primary School and Unley High School, and then went on to study pure and applied mathematics and physics as an undergraduate at the University of Adelaide, where he graduated with a BSc in 1959. In 1960, he completed a BSc (Hons) with first class honours in mathematics. It was here that he first met Professor Ren Potts AO FAA, a connection which would resume after Ernie returned to the University of Adelaide. Then, having been awarded a John Gellibrand Scholarship, Ernie moved to the UK to do postgraduate research at the Department of Applied Mathematics and Theoretical Physics at the University of Cambridge. Here his supervisor was Professor Fritz Ursell FRS, and Ernie entered the field of fluid dynamics with a focus on water waves, which would remain his lifelong major research interest. Although Professor Ursell moved to take up the Beyer Chair of Applied Mathematics at the University of Manchester at the end of 1961, it was arranged that Ernie spend his second year at Cambridge and his third year at Manchester. Ernie's PhD topic was the application of slender-body theory to ship hydrodynamics. This was a completely new field and Ernie's approach was revolutionary, based on the method of matched asymptotic expansions, which he applied to the prediction of the wave resistance of a ship moving in steady motion on the free surface. An indication of the impact of this work is that after his second year a small meeting, sponsored by the US Office of Naval Research (ONR), was organised at Wageningen, Netherlands, to discuss his research and the complementary work of Gerrit Vossers on the same topic. That meeting was also attended by Nick Newman and Francis Ogilvie, another connection which helped to shape Ernie's career. While at Cambridge, Ernie married Helen Wood in Trinity College on 21 October 1961. Their son Warren was born in 1965 in Washington DC, and their second son Geoffrey was born in 1969 after they returned to Adelaide.

From 1963–66 Ernie took up a position as a research mathematician at the David Taylor Model Basin, a research facility of the US Navy located just outside Washington DC. Here he linked up again with Nick Newman and Francis Ogilvie. In 1966–67 Ernie moved to Cal Tech in Pasadena, where he took up a position as senior research fellow in engineering science, working with Professor Ted Wu. In these two periods he worked on a wide variety of research topics in ship hydrodynamics, acoustics, biofluid mechanics and numerical analysis. His contributions to these fields were based primarily on analytic methods, but it was during this time that the possibility of numerical simulations using high-speed computers emerged. Ernie was quick to embrace this developing field and combined his theoretical analyses with practical and illustrative results obtained numerically. Two pieces of his research from this period stand out. First, his numerical simulations of nonlinear water waves generated by a submerged two-dimensional dipole in steady motion created great interest, especially the finding that the streamlines included jets emerging from the free surface. Second, Ernie addressed the 'squat' problem, where ships at high speeds in shallow water can sink vertically. Using slender-body theory in the nonlinear shallow water equations, he obtained an elegant and simple theory of great value to ship operators.

In 1968 Ernie returned to the University of Adelaide, initially as a reader in applied mathematics, and then in 1974 he was promoted to a personal chair. In 1990, after the retirement of Professor Ren Potts, he became the Elder Professor of Applied Mathematics, named after Sir Thomas Elder, a renowned Australian pastoralist, businessman and benefactor of the university. He remained at Adelaide until his retirement in June 2002 when he became an Emeritus Professor. During his time at Adelaide Ernie successfully supervised 25 PhD and four research masters students. He served as head of department (1974–75, 1980–81, 1983) and then

as dean of the Faculty of Mathematics and Computer Science (1986, 1993–96). He received many honours including his election as a Fellow of the Australian Academy of Science (1988), award of the Georg Weinblum Lectureship (1990), Fellow of the Australian Academy of Technological Science and Engineering (1995), award of the Thomas Ranken Lyle Medal by the Australian Academy of Science (1999), and the ANZIAM Medal by the Australian and New Zealand Industrial and Applied Mathematics division of the Australian Mathematical Society (1999). From 1984 to 1992 he was editor of Series B (applied mathematics) of the *Journal of the Australian Mathematical Society* and as such was instrumental in establishing this journal as the leading outlet for Australian applied mathematics. In 2008 Ernie served as president of the International Congress of Theoretical and Applied Mechanics, which took place in Adelaide; this was a prestigious responsibility which he accomplished with his usual skill and enthusiasm. He spent sabbaticals and made short research visits to many places, including Cal Tech, Stanford University, University of Michigan, University of Delaware, University of California (Santa Barbara) and MIT, and was an influential and leading figure in the ship hydrodynamics community. At the same time, he attracted many research visitors to the University of Adelaide. In addition to his frequent participation in the annual ANZIAM conferences, the showcase for applied mathematics in Australia, he was a regular participant in the ONR Symposia on Naval Hydrodynamics, and the IUTAM Congress, International Workshop on Water Waves and Floating Bodies (IWWWFB). Adding to Ernie's long list of honours, the IWWWFB and the University of Adelaide have established the Tuck Fellowship Fund, endowed by contributions from a large number of individuals from many countries, in order to support participation in these workshops by students and young researchers.

Ernie published over 180 research articles, characterised by their clarity and conciseness. His research is distinguished by the seeking of new or unsolved problems, the application of novel mathematical methods, and careful numerical calculations. He was particularly adept at solving complex problems with simple methods, for instance in his application of the method of matched asymptotic expansions. His early work on the wave resistance of slender ships, and the 'squat' problem was noted above. Later he addressed many other significant problems involving water waves, including wave transmission through small gaps, end effects on blunt slender bodies, and bodies moving near a plane wall or in close proximity to other bodies. Other topics which recur as themes in his publications include the strip theory of ship motions, Michell's thin-ship theory of wave resistance, planing, bodies with zero wave resistance, nonlinear free-boundary problems, numerical solution of integral equations, low-Reynolds number flows, wave resistance of multihull vessels, and lifting-surface theory. After his retirement he took up the unsolved problem of Riemann's hypothesis and was able to make a significant new contribution to the properties of the zeta function. Ernie will be remembered as a brilliant and outstanding Australian applied mathematician, who throughout his long career was a leading international figure in ship hydrodynamics. He was a caring and fun-loving person, who will be missed by many.

Roger Grimshaw

Abbreviations

A*STAR	(Singapore) Agency for Science, Technology and Research
AAS	Australian Academy of Science
AKF	Australia–Korea Foundation
ANSTO	Australian Nuclear Science and Technology Organisation
ARC	Australian Research Council
ATSE	Australian Academy of Technological Sciences and Engineering
CAS	Chinese Academy of Sciences
CEO	Chief Executive Officer
CODATA	Committee on Data for Science and Technology
COSPAR	Committee on Space Research
COST	European Cooperation in Science and Technology
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEEWR	Department of Employment, Education and Workplace Relations
DIISR	Department of Industry, Innovation, Science and Research
ECR	Early Career Researcher
E-MCR	Early- to mid-career researcher
FAA	Fellow of the Australian Academy
FRS	Fellow of the Royal Society
FTSE	Fellow of Academy of Technological Sciences and Engineering
IAC	InterAcademy Council
IAGA	International Association of Geomagnetism and Aeronomy
IAP	InterAcademy Panel on International Issues
ICSU	International Council for Science
ISL	International Science Linkages
IUGG	International Union of Geodesy and Geophysics
LASP	Learned Academies Special Project
NHMRC	National Health and Medical Research Council
NRF	National Research Foundation (of Korea)
OPAL	Open Pool Australian Lighwater
SCOSTEP	Scientific Committee on Solar-Terrestrial Physics

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