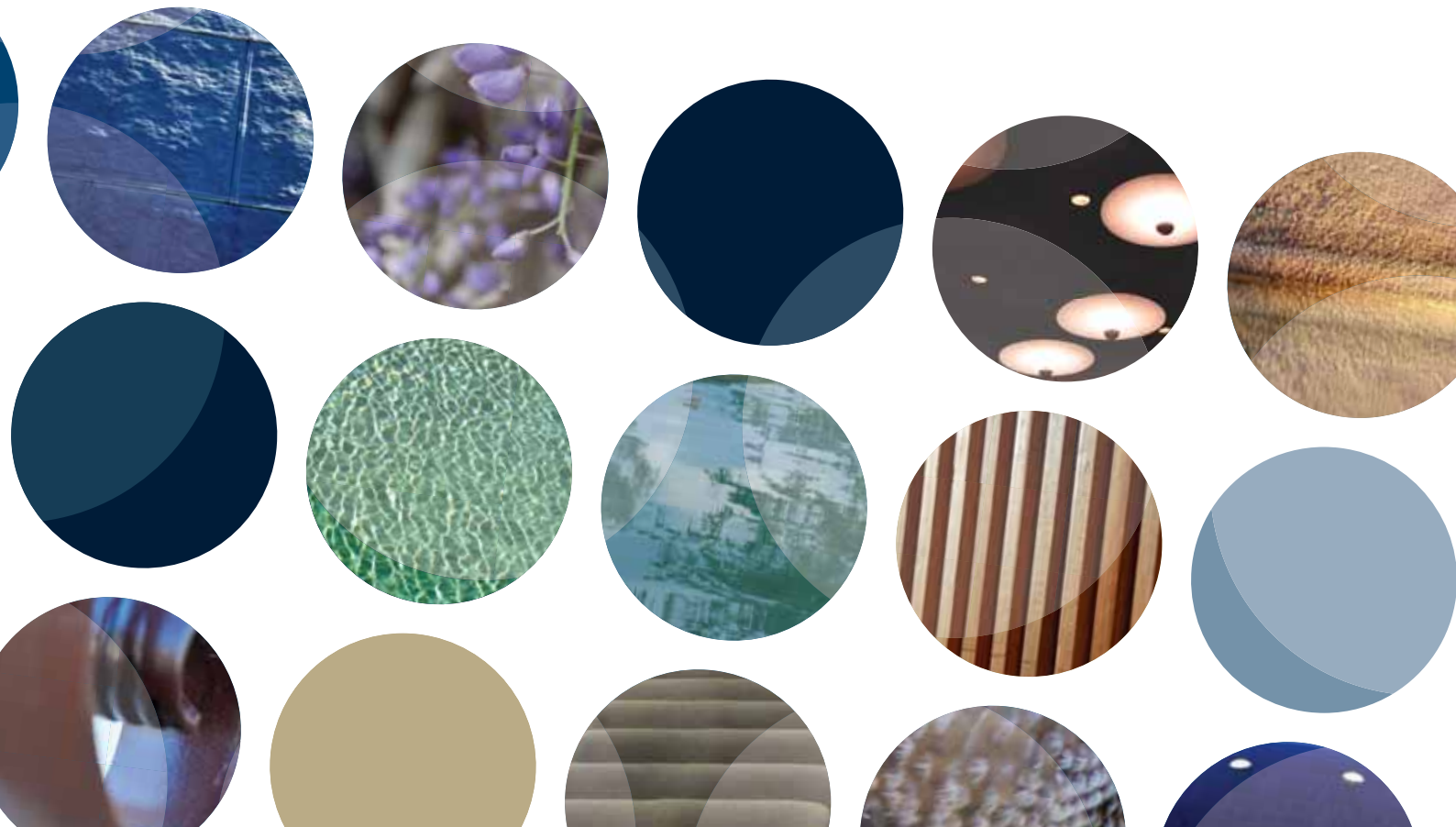


AUSTRALIAN ACADEMY OF SCIENCE
ANNUAL REPORT 2012–13

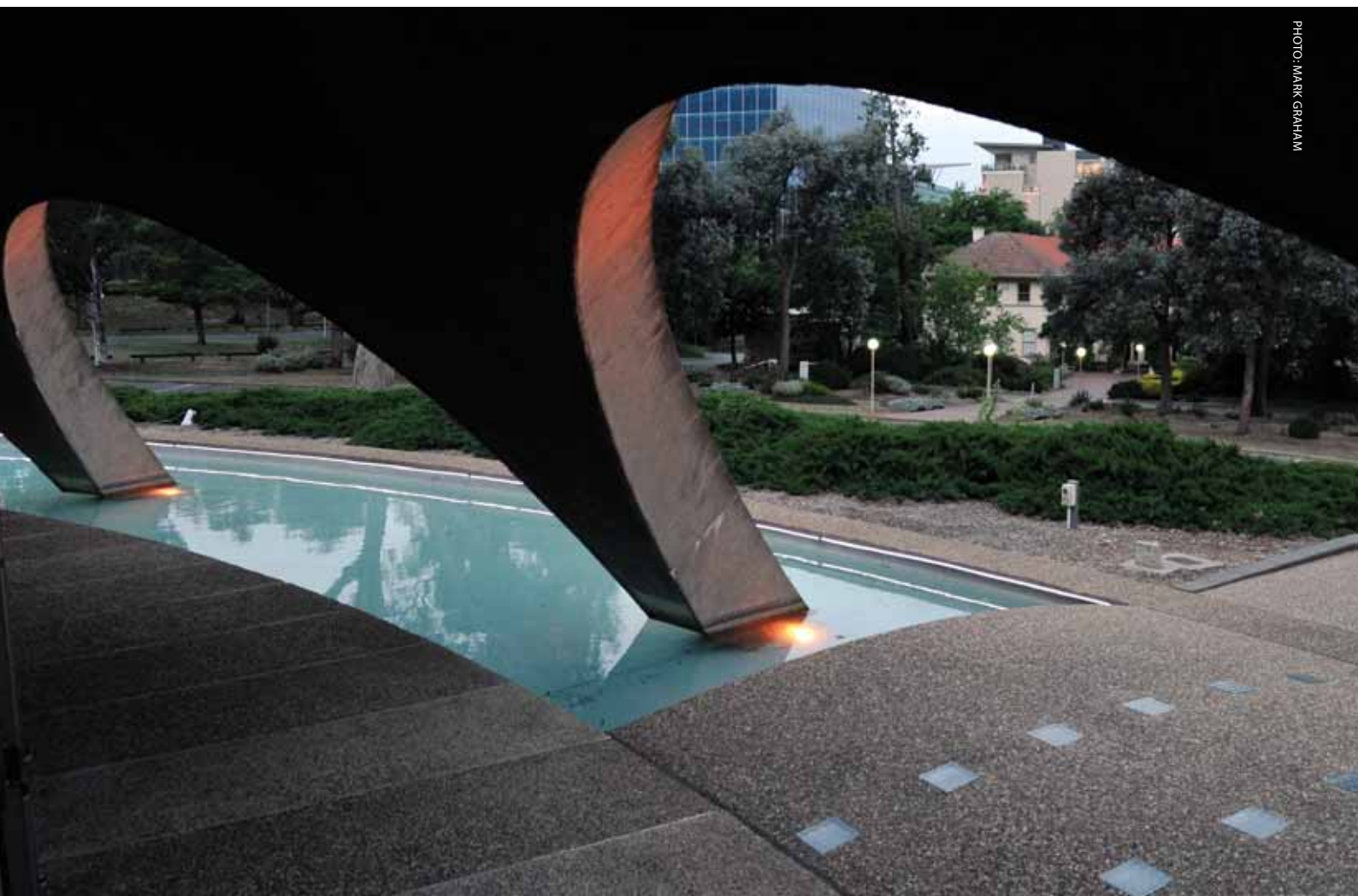
For the period 1 April 2012 – 31 March 2013



AUSTRALIAN ACADEMY OF SCIENCE
ANNUAL REPORT 2012–13

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President's foreword

I am proud to commend to you the 2012–13 Annual Report of the Australian Academy of Science: it is a compendium of a year of substantial achievement, in which we have energetically pursued our strategic objectives of promoting excellent science and supporting quality science education; ensuring science underpins public policy; enhancing public awareness of science; and enhancing national and international scientific relationships and collaborations.

Supporting young scientists

This has been a great year for increasing the Academy's engagement with younger scientists. Not only have we held a successful and stimulating Theo Murphy Think Tank and Frontiers of Science meetings, but the Australian Early and Mid-career Researchers Forum has also gone from strength to strength. Its first national meeting, *Science pathways*, was both well attended and enthusiastically received.

I was most pleased that the Science and Industry Endowment Fund (SIEF) agreed to support the Academy's initiative to send bright young Australian researchers to the annual Nobel Laureate Meetings in Lindau for the next eight years, and by the Japan Society for the Promotion of Science's request to nominate a small group of young Australian researchers to attend the similarly prestigious 5th HOPE meeting in Tokyo.

School science education

I was also delighted that the 2012 Federal Budget allocated a further \$5 million over three years for our *Primary Connections* and *Science by Doing* programs. This was particularly welcome at a time when Australian school students' interest and participation in science is in steady decline. The programs continue to prove worthy of



such support, with major national and international recognition in the past year. The new funding will enable the production of sufficient curriculum resources to support the implementation of the national science curriculum, from Foundation to Year 10. However, much still needs to be done to support the professional development of teachers, particularly in regional and remote areas of Australia. Furthermore, new programs to inspire students in years 11 and 12 — key requirements to improving tertiary science enrolments — remain to be developed.

In an effort to ensure the Academy's continued capacity to contribute to enhanced teaching quality and improved student learning outcomes, the Academy has embarked upon a capital raising and bequest campaign with a major focus on school science. I am truly heartened by the enthusiasm with which the Fellowship and members of the broader community have embraced the campaign in its early days, and look forward to reporting back to you on its success in the coming year.

Ensuring science underpins policy

Members of the Fellowship have actively engaged in the Federal Government's ongoing consideration of the *Australia in the Asian Century White Paper* and new Strategic Research Priorities. However, the Academy remains deeply concerned about the adverse effects of limited funding availability for national collaborative research infrastructure and the absence of a program to promote international science engagement. We will be encouraging all parties to address these and other important science issues as they approach the federal election.

To increase parliamentarians' awareness of science, the Academy supported the establishment of two new groups this year, in conjunction with Science & Technology Australia. The Parliamentary Friends of Women in Science, Maths and Engineering was launched in June 2012, with guest speaker, Nobel Laureate Professor Elizabeth Blackburn AC FAA FRS. The Parliamentary Friends of Science was launched in September with an exposition on the stars by Nobel Laureate Professor Brian Schmidt AC FAA FRS.

The relevance of these groups has grown over the past 12 months, during which Australia has seen the departure of two Ministers for Science: Senator Chris Evans and Chris Bowen. The Academy looks forward to working with the new Minister for

Tertiary Education, Skills, Science and Research, Dr Craig Emerson, and his junior ministers, including Minister for Science and Research, Senator Don Farrell.

The Academy will continue to vigorously argue that Australia must have a scientifically literate population with high technical skills and the ability to compete internationally in scientific research and tertiary education. In its 2013 pre-Budget submission to Treasury, the Academy advocated for long-term strategic investment in Australian science; enhanced development and utilisation of our talented research workforce; further investment in science and maths teaching; augmentation of international science linkages; ongoing investment in major research infrastructure; provision of true research costs; and improvement of research productivity by reduction of the administrative burden.

Public engagement

The Academy's public education, awareness and outreach efforts have continued with a host of events.

The 2012 *Science at the Shine Dome* symposium, *100 years of Antarctic science*, was a fascinating celebration of the science that has grown and matured since Mawson's historic Australasian expedition.



PHOTO: MARK GRAHAM

SATS 2012 symposium participants (L to R) Steve Rintoul, Sharon Robinson, Thomas Trull, Jan Strugnell, Ian Allison, Kate Selway, Tas van Ommen, Phil Reid, Tim Naish, Trevor McDougall, Martin Siegert, Mike Coffin and Charles Barton



PHOTO: NATIONAL ACADEMY OF SCIENCES, SRI LANKA

Launch of the new Association of Academies and Societies of Sciences in Asia, Colombo, October 2012

The well-received *Caring for the Australian countryside* public lecture series drew to a close in December after a year of inspiring and diverse presentations. The 2013 series, *Australian science: global impact* features Australian researchers whose work has changed their area of science. These lectures continue to be enjoyed by new audiences online, as viewers download video and audio recordings from the web.

This year's public program also featured the National Science Week speaker series, *Giants of science*; the *Hooked on science* tour by Nobel Laureate Professor Elizabeth Blackburn AC FAA FRS; and *Innovation requires global engagement*, a public forum with broadcaster Professor Robyn Williams AM FAA and Professors Andrew Holmes AM FAA FRS FTSE and Brian Schmidt.

The Science of Immunisation, the second booklet in the Academy's *Questions and Answers* series, is clearly fulfilling a need for trusted and balanced expert information. In addition to receiving substantial media attention, more than 1.1 million copies have been downloaded or ordered in hard copy since its launch in November 2012.

A number of other major projects came to fruition through the year: the *Physics decadal plan 2012–2021: building on excellence in physics* and the *National nanotechnology research strategy* will help guide two important and rapidly shifting disciplines into the future. Launched by the Governor-General

Ms Quentin Bryce AC CVO, *Negotiating our future: living scenarios for Australia 2050* will guide Australia's approaches to long-term economic, environmental and social stability. National Committees for Science have also been bringing science to a broader audience; most notably with the very successful Second Earth System Outlook conference *Ticking time bombs in the human-Earth system* at the Shine Dome, the *Bragg centennial symposium* in Adelaide, and the workshop *Should Australia and New Zealand allow more vitamin D into the food supply?* in Melbourne.

Fostering international relationships

Despite funding uncertainty, the Academy's broader international engagement has remained strong throughout the year and some valuable ties have been forged and strengthened: particularly important during this Asian Century.

In July, it was a great pleasure to co-host with the Academy of Technological Sciences and Engineering the President of the Chinese Academy of Sciences, (CAS) Professor Chunli Bai, for our ninth bilateral symposium, this time focused on *Healthy ageing: new approaches from genomics, stem cells and smart technologies*. In September, I was invited to speak at the National Academies and Open Innovation Forum of the Academy of Science for Developing

Countries in Tianjin, China, where I heard Chinese President Hu Jintao speak eloquently about the importance of science and technology as a driving force behind economic prosperity, social development and human civilisation. In March I met in Tokyo with the Japanese Academy of Science and Australian diplomatic officials, and gave lectures at universities in Tokyo, Osaka and Kyoto.

The inaugural meeting of the Association of Academies and Societies of Sciences in Asia (AASSA) in October 2012 marked the culmination of a long process to amalgamate two existing bodies into a single entity. This important merger, nurtured by past president of the Academy Professor Kurt Lambeck AO FAA FRS, is expected to support a more integrated approach to promoting the role of science in education, government policy and public discourse in the region.

Also in October, the Academy was pleased to award the first fellowships to be supported by the Australia–India Strategic Research Fund (AISRF), for visits to laboratories in India in 2012–13.

Amongst our international visitors this year we were very pleased to welcome the UK Royal Society President Sir Paul Nurse FRS and Executive Director Dr Julie Maxton, and UK Chief Scientific Adviser Sir John Beddington CMG Kt FRS, as well as two Corresponding Members, Sir David Attenborough OM CBE FAA FRS and Professor Gunnar Öquist FAA, and Nobel Laureate Professor Dan Schechtman who gave a masterclass in the Shine Dome to

a small and very enthusiastic group of early career researchers.

Vale

Over the past year, I am sad to report we have lost 11 friends and colleagues in Fellowship (p 11). We salute them for their contributions to science, and extend our sincere condolences to their families.

In appreciation

Of course, all of these programs, projects, events and engagements would not be possible without the highly professional and dedicated support of our Chief Executive and Secretariat, whom I warmly thank on behalf of the Fellowship. I am also deeply grateful to the many Fellows who have given so generously of their time and expertise to Academy programs. My sincere thanks to 2012 symposium conveners Dr Ian Allison and Professor Trevor McDougall FAA FRS, to Professor John Passioura FAA for chairing the 2012 public lecture series as well as his ongoing role as Chair of the Editorial Board of *Historical Records of Australian Science*, and to Professor Pauline Ladiges AO FAA for serving as the Academy's representative on the CSIRO Editorial Board. Finally, I thank the outgoing Treasurer Professor Michael Dopita and Secretary for Science Policy Professor Bob Williamson, both of whom have been extraordinary and tireless contributors, and have left enduring legacies that will benefit the Academy for years to come.

Suzanne Cory AC PresAA FRS

Chief Executive's foreword

I am pleased to report a favourable outcome of the five year review of Australian Government funding to the Learned Academies and the Australian Council of Learned Academies (ACOLA) under the *Higher Education Support Act 2003 — Higher Education Research Promotion (HESA HERP) and Learned Academies — Supplementation*. The review, conducted by the Department of Industry, Innovation, Science, Research and Tertiary Education for the period 2006–10, concluded in May 2012.

The review report, *Pursuit of excellence — 2012 review of government funding to the Learned Academies*, concluded that the Learned Academies had met all reporting and compliance requirements for the grant in aid funding. In addition their status was confirmed as 'important national assets which provide a unique and valuable contribution to the pursuit of excellence in Australia's innovation system and in the provision of advice to government on issues of national and international significance'.

The review's primary recommendation was that the Australian Government maintain ongoing support to enable the Learned Academies and ACOLA to continue to pursue the HESA-HERP objectives of 'fostering understanding of the importance of, and/or promoting research and scholarship in, science, technology, social science or humanities in Australia for the national benefit'.

We had hoped to be able to present a case for an increase based on performance. However, the core funding that is crucial to the Secretariat's capacity to support the Academy in achieving these objectives — which are entirely consistent with our own mission — will continue at the same level as previously for all Learned Academies. A small but significant change is that the 25% increase allocated following the previous five year review in 2005 was incorporated into HESA-HERP and will therefore now be indexed.

The Government also provided a one off allocation of \$500 000 that was distributed between the



Learned Academies to support relationships with international communities. This funding was very valuable in enabling the Academy to undertake a range of activities that enhanced Australia's global research engagement, and strengthened relationships with sister academies in our region.

The review recommended the development of a consistent annual reporting process across the Learned Academies, and twice yearly individual meetings with senior departmental officials to exchange views on strategic priorities and emerging issues of national importance. Both are now in place and are contributing to enhanced mutual awareness of our respective roles and activities.

All four Learned Academies embraced the opportunity presented in April 2012 by the Australian Chief Scientist's three year, \$10 million research program, *Securing Australia's future*, to enhance their and ACOLA's strategic role in providing independent, evidence-based advice on issues of national importance to the Prime Minister's Science, Engineering and Innovation Council. The Chair of ACOLA rotates amongst the Presidents of Learned Academies. In 2012 our President chaired the council and I chaired the board of the ACOLA Secretariat Pty Ltd during the establishment phase

of this important new collaborative venture. An Academy representative on the Program Steering Committee, Professor Michael Barber FAA FTSE, was appointed as its Chair in February 2013.

During the reporting period the Academy Council undertook the scheduled mid-term review of the Academy's 2012–2015 Strategic Plan and concluded that its objectives and focus are still regarded as appropriate, with little that is currently being undertaken no longer required.

An area of increased focus during the reporting period has been to enhance the Academy's online presence, including a gradual process to engage with new audiences via social media. Videos of our public lectures and annual Symposium presentations were seen and heard by more than 10 000 viewers; this number continues to climb as we make these lectures available through our new YouTube and iTunes channels. Our Twitter and Facebook accounts are allowing us to

communicate about science and the Academy's activities directly with tens of thousands of users who are predominantly in a younger demographic than the Academy usually reaches.

Regular attendees of events at the Shine Dome will be pleased to hear that extensive fire rating works have been completed to enable the Shine Dome to comply with relevant Australian Standards. In addition, the appearance of Ian Potter House will be greatly improved by the upgrading of the gardens on the Marcus Clarke Street side that were in poor condition after years of drought.

Finally, and very importantly, the dedication and professionalism of Secretariat staff continues to impress those who interact with them. This report provides many highlights of their substantial achievements over the past year. I thank them deeply for their commitment to the Academy.

Dr Sue Meek FTSE FAICD

Council and administration

The Australian Academy of Science's affairs are conducted by a Council of 17 Fellows who met five times between 1 April 2012 and 31 March 2013. To ensure Academy business was managed effectively between Council meetings, the Executive Committee, which has delegated authority, met nine times during the reporting period.

Executive Committee

Professor Suzanne Cory AC FAA FRS — President

Vice-Chancellor's Professorial Fellow, University of Melbourne and Honorary Distinguished Professorial Fellow, Walter and Eliza Hall Institute of Medical Research

Professor Chennupati Jagadish FAA FTSE — Vice President and Secretary for Physical Sciences

Australian Laureate Fellow and Distinguished Professor, Department of Electronic Materials Engineering, Research School of Physics and Engineering, Australian National University

Professor Marilyn Renfree AO FAA — Vice President and Secretary for Biological Sciences

Laureate Professor of the University of Melbourne and Ian Potter Chair of Zoology, University of Melbourne

Professor Bob Williamson AO FAA FRS¹³ — Secretary for Science Policy

Honorary Senior Principal Fellow, Faculty of Medicine, University of Melbourne

Professor Andrew Holmes AM FAA FRS FTSE — Foreign Secretary

Laureate Professor, School of Chemistry, Bio21 Institute, University of Melbourne and Newton Abraham Visiting Professor, Oxford University



PHOTO: MARK GRAHAM

Professor Jennifer Graves AO FAA — Secretary for Education and Public Awareness

Distinguished Professor, La Trobe Institute for Molecular Science, La Trobe University

Professor Mike Dopita AM FAA¹³ — Treasurer

Emeritus Professor, Research School of Astronomy and Astrophysics, Australian National University

Council members

Physical sciences

Professor Nalini Joshi FAA — Professor of Applied Mathematics and Associate Head, School of Mathematics and Statistics, University of Sydney

Dr Michael Raupach FAA FTSE — CSIRO Fellow, Marine and Atmospheric Research, CSIRO

Professor Brian Schmidt AC FAA FRS Nobel Laureate — Research School of Astronomy and Astrophysics, Australian National University

Professor Mark von Itzstein FAA¹³ — ARC Federation Fellow, Professor and Director, Institute for Glycomics, Griffith University

Professor Yiu-Wing Mai AM FAA FRS FTSE —
University Chair and Professor of Mechanical
Engineering, Centre for Advanced Materials
Technology, University of Sydney

Biological sciences

Professor Ian Frazer AC FAA FRS FTSE — CEO and
Director of Research, Translational Research Institute
Pty Ltd, Queensland

Dr TJ Higgins FAA FTSE — Honorary Fellow, Plant
Industry, CSIRO

Professor Richard Hobbs FAA¹³ — Australian
Laureate Fellow, School of Plant Biology, University
of Western Australia

Professor Rick Shine AM FAA — ARC Laureate
Fellow and Professor in Evolutionary Biology
(Personal Chair), School of Biological Sciences,
University of Sydney

Professor Steve Simpson FAA — ARC Laureate
Fellow and Professor, School of Biological Sciences,
University of Sydney

13 to retire at AGM 2013

Strategic plan

This annual report describes the activities of the Academy from 1 April 2012 to 31 March 2013 to meet the objectives outlined in the 2010–15 strategic plan.

Vision

Excellence in Australian science

Mission

The Academy's mission is:

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

Objectives

Promote excellence in scientific research nationally and internationally, by:

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

Develop and sustain a national scientific culture, by:

5. Ensuring that the Academy and the Fellowship are fully representative of the best scientists in Australia and, through competitive awards, promoting community recognition of the contributions of high quality science to health, well-being and national prosperity.
6. Supporting the teaching of science at all levels (primary, secondary and tertiary), elevating national standards, enhancing teacher competencies and encouraging student consideration of science and technology-based careers.
7. Providing 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, by:

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

Supporting the Academy

New philanthropic campaign

Philanthropy has played a pivotal role in the life of the Australian Academy of Science. The Academy's home — The Shine Dome — was built entirely from private and corporate donations, sourced through a campaign led by the Academy's founding President, Sir Mark Oliphant AC KBE FAA FRS FTSE. History records that the Academy recruited a number of eminent industrialists to its cause and received its first cheque (for £25 000) from BHP. Originally known as Becker House, the building, which became an internationally renowned example of architectural accomplishment, was renamed The Shine Dome in honour of a \$1 million gift in 2000 from Professor John Shine AO FAA. This gift significantly helped to fund major restoration work at the Dome.

The Academy is now launching a major new philanthropic endeavour. This campaign is not about bricks and mortar; it is about elevating science in public debate, ensuring quality science education at all levels, and invigorating scientific understanding, inquiry and enthusiasm nationwide. Its impact on the nation will be profound. This \$12 million campaign will drive a transformational improvement in science literacy, in our schools and in our community. It will be the catalyst for unleashing the power of science to improve our nation's future. Addressing the decline in our scientific literacy must be a national priority.

New Endowment Fund: Australian Futures Science Fund

In addition to the urgent \$12 million injection of funds to sustain its education and awareness program, the Australian Academy of Science has



Brochure for the Academy's philanthropic campaign

established a new Endowment Fund: the Australian Futures Science Fund. The seed that is planted through donations and bequests to this Fund will help to underpin the breadth of the Academy's work in Australia and internationally, for many years to come.

Gifts at all levels are greatly appreciated and regular support from the Fellowship, as ambassadors for the Academy, is valued deeply. Each gift makes a valuable contribution by enhancing the capacity of the Academy — an independent organisation — to continue its essential work. For more information about making a donation to the campaign or about a bequest please contact Director Communications and Outreach, Kylie Walker, on kylie.walker@science.org.au or 02 6201 9427.

The Fellowship

At 31 March 2013 the Academy Fellowship comprised 466 of Australia's leading research scientists elected for their personal contributions to science. Fellows occupy senior positions in universities, medical research institutes, government research agencies, industry, business and media.

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

2013 New Fellows (FAA)

The following scientists were elected to the Fellowship on 22 March 2013:

Dr Benjamin Hardwick Andrews FAA, Mathematical Sciences Institute, Australian National University

for leading international research in differential geometry and related partial differential equations, particularly for his work in geometric evolutions

Professor Matthew Brown FAA, Diamantina Institute, University of Queensland

for important contributions to the field of common human disease gene-mapping and development of

genome-wide association studies, a genetic study design which has revolutionised gene-mapping

Professor David James Craik FAA, Institute for Molecular Bioscience, University of Queensland for important discoveries in the field of structural biology, particularly in the structural elucidation of peptide toxins and proteins having novel topologies

Professor David Alexander Day FAA, Deputy Vice Chancellor (Research), Flinders University

for research into plant mitochondrial respiration and symbiotic nitrogen fixation and providing a model for the integration of carbon metabolism, mitochondrial electron transport and respiratory gene expression in plants

Professor Yuri Estrin FAA, Department of Materials Engineering, Monash University

for world-leading research in materials science, on physically based materials models that have become classic and are broadly used for calculating mechanical behaviour of materials

Professor John Richard Evans FAA, Research School of Biology, Australian National University

for elucidating the nitrogen economy of photosynthesis, showing how photosynthetic adaptations of species to environmental conditions



Benjamin Andrews



Matthew Brown



David Craik



David Day



Yuri Estrin



John Evans



Bryan Gaensler



Andrew Hassell



Ove Hoegh-Guldberg



Ian Jackson



Sharad Kumar



Max Lu

become quantitatively manifest in the allocation of nitrogen to biochemical processes

Professor Bryan Malcolm Gaensler FAA, ARC Centre of Excellence for All-sky Astrophysics, University of Sydney

for fundamental contributions to our understanding of the Universe through his outstanding research on high-energy astrophysics, cosmic magnetic fields and the structure of our Galaxy

Professor Andrew Wollaston Hassell FAA, Department of Mathematics, Australian National University

for significant contributions to quantum ergodicity and quantum chaos, analysis on asymptotically conic spaces, time-dependent Schrodinger equations and Strichartz estimates, scattering theory, spectral invariants and numerical analysis

Professor Ove Hoegh-Guldberg FAA, Global Change Institute, University of Queensland

for pioneering our understanding of endosymbiosis between invertebrates such as reef-building corals and dinoflagellates (*Symbiodinium*), particularly the flow of energy and carbon and its breakdown during ecosystem-level mass-coral bleaching events

Professor Ian Neil Sandford Jackson FAA, Research School of Earth Sciences, Australian National University

for research on the physical properties of Earth materials, and their application in understanding its interior structure and behaviour, leading to innovative laboratory studies of seismic properties, with special application to olivine-rich rocks of the upper mantle

Professor Sharad Kumar FAA, Centre for Cancer Biology, SA Pathology, South Australia

for path-breaking contributions to two areas of fundamental biology: the understanding of programmed cell death, and the regulation of protein homeostasis

Professor Max Lu FAA FTSE, ARC Centre of Excellence for Functional Nanomaterials, University of Queensland

for significant contributions including the new method for synthesis of highly reactive single crystal TiO_2 , insights into the surface chemistry and modifications of nanoporous materials, molecular engineering of membranes and efficient photocatalyst for clean energy and water

Professor Boris Martinac FAA, Cardiac Research Unit, Victor Chang Cardiac Research Institute, Sydney

for pioneering studies of ion channels in microbes, particularly the discovery, cloning and structural and functional characterisation of mechanosensitive ion channels in bacteria



Boris Martinac



James Paton



Richard Richards



Michael Sandiford



Geoffrey Taylor



Brian Walker



Andrew White



Bryan Williams

Professor James Cleland Paton FAA, School of Molecular and Biomedical Science, University of Adelaide

for major scientific contributions to the field of pathogenesis and prevention of bacterial infectious diseases, particularly to the human pathogens *Streptococcus pneumoniae* and Shiga toxin-producing *Escherichia Coli*

Professor Richard Anthony Richards FAA, Plant Industry, CSIRO

for developing an approach, now used widely internationally, that integrates physiological understanding of what determines grain yield in drought-prone environments with understanding of the molecular and genetic bases of influential physiological traits

Professor Michael Andrew Sandiford FAA, Melbourne Energy Institute, University of Melbourne

for important contributions to metamorphic geology, tectonics, earthquake geology, geomorphology and geothermics, especially on the activity in the young Indo-Australian tectonic plate

Professor Geoffrey Norman Taylor FAA, ARC Centre of Excellence for Particle Physics at the Terascale, University of Melbourne

for important contributions to the recent discovery of the Higgs boson, including in the design and construction of the advanced detectors for the proposed Large Hadron Collider at CERN

Dr Brian Harrison Walker FAA, CSIRO Ecosystem Sciences, Canberra

for pioneering studies of the functional significance of biodiversity, the dynamics of ecosystems that exhibit alternate stable states, and novel insights into the resilience of linked social-ecological systems

Professor Andrew Gerard White FAA, School of Mathematics and Physics, University of Queensland

for world-leading experiments in quantum computation and quantum optics: the first unambiguous demonstration of a quantum-logic gate operation set the standard for all competing quantum logic gates

Professor Bryan Williams FAA, Monash Institute of Medical Research, Monash University

for his discoveries in innate immunity and mechanisms of interferon action, including 2'-5' oligoadenylate activated endoribonuclease, cloning and characterisation of protein kinase R, first description of induced gene expression profiles in mammalian cells, and the critical role of promyelocytic zinc finger protein in innate immunity



Chunli Bai



Birger Møller

Honours awarded to Fellows during the year 2012–13

Other Academies

2012 Royal Medal from the Royal Society

Professor Andrew Holmes AM FAA FRS FTSE

in recognition of his work on polymeric light-emitting diodes

Election as Fellows of the Royal Society

Professor Trevor McDougall FAA

for outstanding research in the field of oceanic mixing and its role in climate models

Professor Hugh O'Neill FAA

for outstanding research of mineral equilibria and their application to understanding planetary processes

Professor Brian Schmidt AC FAA FRS Nobel Laureate

for discovery of the accelerating expansion of our Universe

Australian Academy of Technological Sciences and Engineering (ATSE)

Dr John O'Sullivan FAA

for contributions to innovation, research and leadership in wireless technologies and networking that has had impact worldwide

Academy of Athens

Professor George Paxinos AO FAA

elected for his contributions to neuroscience

2013 New Corresponding Members

Professor Chunli Bai

President, Chinese Academy of Sciences for important contributions in developing new research techniques and methodologies, and applying them to research in chemistry and molecular sciences, and for promoting scientific and technological cooperation between Australia and China

Professor Birger Lindberg Møller

Professor of Plant Biochemistry, Denmark for exceptional contributions to the areas of photosynthesis, bio-active natural products and synthetic biology and for extensive engagement with Australian science, including as Chairman of the Federation Fellowships Selection Committee for the Australian Research Council, and for ARC Linkage Projects

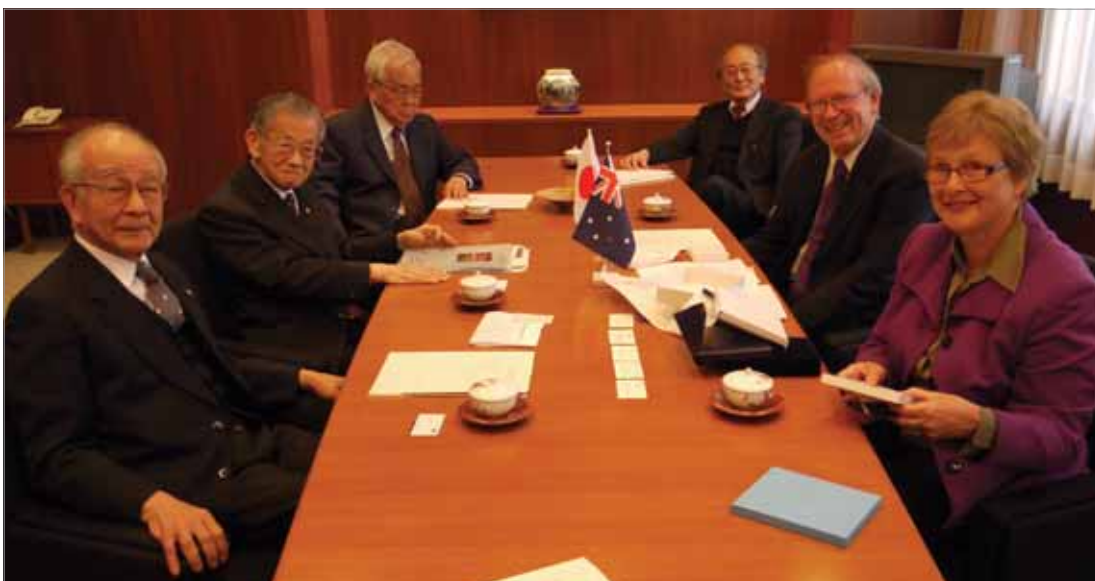


PHOTO: JAPAN ACADEMY

(L–R) Japan Academy President Masaaki Kubo, Vice President Takashi Sugimura, Yoshihide Kozai and Kunihiko Suzuki meet with Jerry Adams and Suzanne Cory



John O'Sullivan



Frances Separovic



Ken Freeman



Kurt Lambeck

Japan Academy

Professor Suzanne Cory AC PresAAS FRS

elected as Honorary Member for her devotion to encouraging young researchers of Japan and the world.

Other Fellowships

American Association for Cancer Research Academy

Professor Suzanne Cory

Professor Don Metcalf AC FAA FRS

elected as inaugural Fellows for their significant contributions to the study of blood and blood cancers

International Society for Magnetic Resonance in Medicine

Professor Frances Separovic FAA

elected for research as a leader in nuclear magnetic resonance studies of membrane structure and biophysics

Other Awards

2012 Prime Minister's Prize for Science

Professor Ken Freeman FAA FRS

for contributions to the field of astronomy and in particular identification of the necessity of dark matter in galaxies, that has shaped our current understanding

ARC Australian Laureate Fellowships 2012

Professor Frank Caruso FAA

Professor Terry Hughes FAA

Professor Nalini Joshi (Georgina Sweet Fellowship) FAA

Professor David Lindenmayer FAA

Professor Doug MacFarlane FAA FTSE

Professor Malcolm McCulloch FAA FRS

Professor Rick Shine AM FAA

2012 Australian Museum Eureka Prizes

Professor Suzanne Cory

for Leadership in Science in recognition of her leadership of the Australian Academy of Science, the Walter and Eliza Hall Institute of Medical Research, and her leadership in research

Professor Victor Flambaum FAA

for Scientific Research for his work with colleagues at the University of New South Wales that suggests the laws of physics vary across the cosmos

Professor Doug Hilton FAA

for Outstanding Mentoring of Young Researchers in recognition of his support and encouragement provided to young scientists over the past two decades and in particular for his establishment of the highly successful Undergraduate Research Opportunities Program

2012 Australia and New Zealand Society for Cell and Developmental Biology President's Medal

Professor Marilyn Renfree AO FAA

in recognition of pioneering research as a developmental biologist in Australia and internationally

Australian Society of Soil Science JA Prescott Medal

Professor Sally Smith FAA

for contribution to soil science

2012 Balzan Prize for Solid Earth Sciences

Professor Kurt Lambeck AO FAA FRS

in recognition of his findings that have radically modified climate science

Chevalier dans l'Ordre National de la Légion d'Honneur

Professor Kurt Lambeck

from the French Government in recognition of his contribution to the field of science and his strong ties to France

David de Kretser Lifetime Achievement Award from Monash University

Sir Gus Nossal AC CBE FRS FTSE

for outstanding contribution, both nationally and internationally, to human health and well-being

2012 European Inventor Award

Dr John O'Sullivan

for work with his team on the patented wireless local area network technology

2012 GlaxoSmithKline Award for Research Excellence

Professor Chris Goodnow FAA FRS

for research that has improved the medical world's understanding of how the immune system distinguishes between healthy body tissue and invading microbes

2012 Martha T Muse Prize for Science and Policy in Antarctica

Professor Stephen Rintoul FAA

for outstanding research on the Southern Ocean

Public Service Medal (PSM)

Professor Brian Boyle FAA

for outstanding public service to Australian astronomy and for leadership of the Australian team bidding to host the international Square Kilometre Array facility

2012 Rabobank Leadership Award

Dr Jim Peacock AC FAA FRS FTSE

in recognition of his outstanding contribution to the food and agricultural industries

2012 Research Australia Awards Peter Wills Medal

Sir Gustav Nossal

for his outstanding contribution to building Australia's national and international reputation in the realm of health and medical research

Royal Society of New South Wales Clarke Medal

Professor Marilyn Renfree

for distinguished work in the field of zoology

Henry Norris Russell Lectureship

Professor Kenneth C Freeman

for a lifetime of contributions to astronomy, including work on the structure and dynamics of galaxies

2012 Shoemaker Distinguished Lunar Scientist Award

Professor Ross Taylor AC FAA

for contributions to the field of lunar science throughout his scientific career

2012 Thomson Reuters Citation Awards

Dr Greg Stuart FAA — in Neurosciences

Professor Kurt Lambeck — in Geosciences

Professor Rana Munns FAA — in Plant Sciences

Professor Terence Speed FAA — in Biochemistry and Molecular Biology

US Society for Sedimentary Geology 2013 Moore Medal

Professor Ken Campbell FAA

for outstanding contributions in palaeontology

2012 Victoria Prize for Science and Innovation

Professor Terence Speed

for Life Sciences

2012 Whitley award from the Royal Zoological Society of NSW

Professor David Lindenmayer

for contributions to conservation

2012 Wigglesworth Medal of the Royal Entomological Society

Professor Stephen Simpson FAA

for outstanding services to the science of entomology

4th Ahmed Zewail Prize in Molecular Sciences

Professor Noel Hush AO FAA FRS

in recognition of contributions to electron transfer processes

Deaths since 1 April 2012

We regret to record the following deaths:

Professor Bruce William Chappell FAA,
22 April 2012

Professor Stephen John Angyal OBE FAA,
14 May 2012

Professor Peter Orlebar Bishop AO FAA FRS,
3 June 2012

Professor William (Bill) Herdman Elliott FAA
25 July 2012

Professor Gordon L Ada AO FAA
25 September 2012

Emeritus Professor Nancy F Millis AC MBE FAA FTSE,
29 September 2012

Professor Paul Ivan Korner AO FAA,
3 October 2012

Professor Robert Lyndsay Sutherland AO FAA,
10 October 2012

Allen (Alan) Forrest Reid AM FAA FTSE,
17 January 2013

Professor John B Moore FAA FTSE,
19 January 2013

Professor James (Jim) Douglas Morrison AO FAA,
1 February 2013

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 implementation of the national science curriculum. It is developing teaching resources to enhance teacher quality and curriculum resources to stimulate student interest and increase learning, and providing information to promote public understanding of the importance of science.

School science programs

The Academy has two programs to support the effective teaching of science in schools — *Primary Connections: Linking science with literacy* in primary schools, and *Science by Doing* in early secondary schools. During the reporting period, program directors Ms Shelley Peers and Professor Denis Goodrum contributed to the review by the Australian Chief Scientist Professor Ian Chubb AC of mathematics, engineering and science education.

Primary Connections aims to increase the confidence of primary school teachers (who often have no formal training in science) and help maintain young students' natural interest in science and develop their communication, mathematical and documentation skills. Teachers of science in secondary schools are more likely to be trained in



A student uses a *Science By Doing* online unit

science, so *Science by Doing* focuses on establishing and maintaining mutually supportive learning communities in and between schools to provide ongoing teacher development, and on developing content to effectively engage adolescents.

Both programs use an inquiry-based approach to promote better student engagement. Professional learning lies at the heart of both programs: research shows improving the quality of teachers has the single biggest impact on student learning. The development of the two programs has involved close consultation with education sectors in the states and territories and enthusiastic participation from teachers across Australia in trialling the materials. All resources are fully aligned with the Australian Curriculum Assessment and Reporting Authority's *Australian Curriculum: Science*, which both program directors were involved in developing.

The quality and efficacy of the programs has been strongly endorsed by professional groups including primary and secondary school principals' associations and the Australian Science Teachers Association.

Both programs have also achieved international recognition as outstanding examples of innovative inquiry-based science education.

Funding *Science by Doing*

2012 was a transformative one for *Science by Doing*. In the previous year funding ceased and prospects for the program were bleak. However, in May *Science by Doing* was awarded \$3.5 million over three years as part of the Government's 'Investing in Science and Maths for a Smarter Future' initiative announced in the 2012 Federal Budget in response to the Australian Chief Scientist's *Review of mathematics, engineering and science in the national interest*. This report was informed by a commissioned study by the *Science by Doing* team, 'The status and quality of year 11 and 12 science in Australian



Science By Doing team members in their new Shine Dome offices, (L to R) Denis Goodrum, Katie Ryan, Kerrie Wilde, Georgina Ovin, Jef Byrne and Jen Liu

schools' December 2011, www.science.org.au/sciencebydoing/research-evaluation/year11-12study.html). The new funding, in conjunction with \$1.6 million over one year allocated by Education Services Australia in February 2012, will enable completion of stages 2 and 3 of *Science by Doing*. Using online delivery in visually attractive and interactive ways, the real world of the scientist, industry and the environment can be brought into the classroom in ways never thought possible, to significantly improve early secondary science education in Australia. For more information about the development stages of *Science by Doing* see Appendix 1.

Resources developed by the Academy are extensively trialled and revised after feedback from schools, a process that is even more important with online delivery. For Stage Two, 29 schools covering

Year	Unit 1	Unit 2	Unit 3	Unit 4
Year 7	The circle of life	Enough water fit for drinking	The science of toys	Earth and space
Year 8	From little things big things grow	Rock, paper, scissors	Energy	Rock your world
Year 9	Ecosystems and change	Chemical reactions	Light, sound, action	Plate tectonics
Year 10	Evolution and heredity	Chemical patterns	Motion and energy transfer	Systems on the big scale

Key

Available from July 2013 (Stage 1)
 Available from July 2013 (Stage 2)
 Available from December 2014 (Stage 3)

Table 2: Education conferences attended in 2012 to promote *Science by Doing*

Date	Conference	Location	Topic
25–26 May	Science Teachers Association of WA	Margaret River, WA	' <i>Science by Doing</i> and the Australian Curriculum'
27–30 June	Australasian Science Education Research Association	University of the Sunshine Coast	'The status and quality of Year 11 and 12 Science'
23–24 July	<i>Exploring the Australian Curriculum</i>	Toorak College, Melbourne	'Implementing the Science Curriculum'
4–5 August	International Society on Leadership in Pedagogies and Learning	Brisbane	'Leading for change'

every state and territory are trialling curriculum units before they are revised and released to all teachers and students.

Program structure

The *Science by Doing* curriculum program will have 16 online units covering Years 7 to 10. These units will be freely available to all Australian schools and educational institutions.

Each curriculum unit consists of a student guide, with classroom, hands-on and discussion activities; student digital, which provides digital learning objects, film clips, interactive and notebook activities; and a teacher guide, with suggestions for teaching and assessing the unit.

For convenience of use, each digital section is linked with the relevant page of the student guide, and the teacher guide also has links to related student activities.

Promotional activities

During 2012, Professor Goodrum was an invited speaker at four major Australian education conferences (see Table 2 above), indicating the high level of interest in the program in the sector.

Professor Goodrum was also invited by the Australian Embassy in Jakarta to speak at a workshop in Indonesia, *Curriculum Development in SE Asian Countries*, involving nine countries from the region. A follow-up meeting, with the Southeast Asian Ministers of Education Organization's Regional Centre for Quality Improvement of Teacher and Education Personnel in Science, in Bandung, led to a successful proposal for an Australia Indonesia Science Education Pilot Study to be undertaken in 2013 that will be jointly funded by Questacon (\$25 000) and AusAid (\$100 000).



Primary Connections: linking science with literacy

www.science.org.au/primaryconnections/

The School Science Education Advisory Board that was established by the Academy Council in mid-2011 to support the transition of *Primary Connections* to a self-sustaining not-for-profit entity within the Academy met five times during the year: twice each in Sydney and Canberra, and once by teleconference.

Funding

Funding for Stage 4 of *Primary Connections* came to an end in May 2012. In the May 2012 Budget a further \$1.5 million over two years was allocated under the 'Investing in Science and Maths for a Smarter Future' initiative (refer *Science by Doing*, above, for further information). An agreement signed in February 2013 provides for the full suite of *Primary Connections* curriculum units to be placed online for access by Australian schools through Education Services Australia's password-enabled portal.

An agreement with Schools Connect Australia under the Victorian Government's Maths and Science Partnerships Strategy 2012 resulted in the formation of a partnership with CSL Ltd. Schools Connect Australia and CSL will each provide \$60 000 funding to support professional learning for teachers in Victoria over the next three years.

Curriculum resources

Primary Connections published four new curriculum units fully aligned with the *Australian Curriculum: Science* in the reporting period, in Physical Sciences (Years 1, 5 and 6) and Chemical Sciences (Year 5). In addition, 14 previously published units were redrafted to provide alignment. This means 28 of a full suite of 31 aligned curriculum units required to implement the national science curriculum from Foundation to Year 6 are now complete. For more details see the website (www.science.org.au/primaryconnections/curriculum-resources). In total, 43 500 curriculum units were sold in the reporting period. Queensland, Western Australia and New South Wales had highest sales.

Ordering and distribution of *Primary Connections* resources have been outsourced to Abacus Educational Suppliers in Perth. This will improve warehousing and distribution operations and reduce postal costs for teachers. Joint marketing activities are also part of the agreement with Abacus. Supplementary resources such as student wristbands used in collaborative learning groups and student and teacher playing cards to support student activities are also being produced.



Members of the Sydney-based *Primary Connections* team

Professional learning

There were 216 participants at two-day *Primary Connections* Curriculum Leader training programs in Perth, Melbourne, Sydney and Brisbane. This training prepares teachers to become science leaders in their schools and is the basis of the Academy's professional learning activities, which aim to train a science leader in every primary school in Australia.

A student story — Year 2, Fadden Primary School, ACT

Aaron is always looking at rocks and bugs in the playground, trying to discover how the world works. One day his teacher Janet brought her dad (a geophysicist) to school. The visit helped students to connect their science with the world outside the classroom.

As soon as Aaron gets to school, he and his friends come straight into class and check on the tadpoles — they are reporting on the development of the tadpoles into frogs. In his science lessons, Aaron is engaged and questioning. 'Science is the only subject I like writing in,' he said. 'I try hard when I write in science. It is the only subject that is important.'

The way students think is changing. They are analytical — they want to know how things work. The Academy's *Primary Connections* units have helped Aaron and his friends to find the literacy and language skills they need, from kindergarten through each level of primary school.

'Primary Connections has reinvented my teaching career. I am the happiest, most motivated and engaged teacher. My students adore science and I truly believe that the basis for this is your incredible resource. Keep up the fabulous work.'

Jacquie Cleary, teacher, Balgowlah Heights Public School, NSW

'Primary Connections is an amazing resource that I will undoubtedly be using in my teaching career for science. It is simple yet informative and is easy to use. It has been very valuable.'

Laura Capes, pre-service teacher, Notre Dame University WA

'The presenter was fantastic! The way the course was organised, especially the hands-on activities, kept me so engaged for two days, which is hard to do. Well done! She also spoke at our level and answered all our questions.'

Teacher, NSW

'I wanted to tell you how much I enjoyed the two-day *Primary Connections* Professional Development. I was truly inspired.'

Michelle Kelly, teacher, NSW

'Probably one of the best personal development courses I have been to in a long time. Well done, fantastic, professional, knowledgeable, well prepared, well researched.'

Teacher, Victoria

As part of the Academy's ongoing commitment to helping teachers use the program to its fullest extent, the range of professional learning training available was increased in 2012–13. Workshops were held on how to use *Primary Connections* to meet the requirements of the *Australian Curriculum: Science* (with 141 participants) and how to use *Primary Connections* with multi-age classes (12 participants).

Research

More than 20 research reports that provide substantial evidence of the impact of *Primary Connections* were commissioned between 2005 and 2009 (see www.science.org.au/primaryconnections/research-and-evaluation).

In July 2012 the results of a major study of feedback from teachers' implementation of *Primary Connections* and the 5E model over the period 2005 to 2012 were reported at the annual conference of the Australian Science Teachers Association (see www.science.org.au/primaryconnections/research-and-evaluation/ASERA.pdf).



Koleka Mqulwana at Fadden Primary School, ACT, November 2012

The research, for 'Teaching primary science' was independently commissioned from Adjunct Professor Keith Skamp (Southern Cross University, NSW) and funded by the Australian Government. The analysis of more than 200 sets of responses including 3000 teacher statements indicated that *Primary Connections* improved most, if not all, teachers' thinking about the nature of inquiry-orientated learning. The report also found that the inquiry-based system enhanced students' inquiry skills, conceptual development and enjoyment of science.

Awards

The *Primary Connections* program was recognised in two major national awards and one international award (see Table 3 below).

International promotion of the program

Three invitations to present at international fora provided opportunities to increase awareness of *Primary Connections* and explore its potential application in other countries (see Table 4 opposite).

Following a briefing about *Primary Connections* in August 2011, South African High Commissioner Her Excellency Ms Koleka Mqulwana visited

Table 3: Awards to *Primary Connections* in the reporting period

Date	Organisation	Award
September 2012	Australian Publishers Association	Excellence in Educational Publishing: 'Melting moments' Year 3 chemical sciences unit — shortlisted; '5Es' DVD — highly commended
11 October 2012	French Academy of Sciences	2012 Purkwa Prize for educators: Ms Shelley Peers
December 2012	<i>The Australian</i>	Innovation Challenge Award for education: Ms Shelley Peers

Table 4: Primary Connections presentations at international fora

Date	Event	Speaker/s
June 2012	InterAcademy Panel (IAP) biennial science education conference, Helsinki, <i>Developing inquiry-based science education: new issues</i>	Professor Jenny Graves Ms Shelley Peers
16 July 2012	Presentation for the Australia Indonesia Science Seminar Series 'Primary Connections — making a difference', Australian Embassy Theatre, Jakarta; Presentation on the viability of trialling Primary Connections in Indonesia; Southeast Asian Ministers of Education Organization Regional Centre for Quality Improvement of Teacher and Educational Personnel in Science, Bandung, Indonesia	Ms Shelley Peers
24–26 February 2013	Presentation on developing scientific literacy, Grand challenges and integrated innovations: science for poverty eradication and sustainable development conference, Rio de Janeiro (IAP and Brazilian Academy of Sciences)	Ms Shelley Peers

Fadden Primary School, ACT, on 16 November 2012 to see *Primary Connections* in action, to assist with consideration of its applicability to South African education.

Students and teachers commented: 'I love science. Science is my favourite subject because it's all hands-on. We learn more because we are doing it.' The students are always engaged. They really enjoy it.'

The InterAcademy Panel also provided financial assistance for the *Primary Connections Collaboration with Asia* workshop in Sydney on 25–27 March 2013, attended by 18 overseas participants from 12 countries as well as 23 Australians. Funds were also provided by the former Federation of Asian Scientific Academies and Societies and the Association of Academies of Science in Asia and the newly merged Association of Academies and Societies of Sciences in Asia (for more details, see International section).

Nova: science in the news

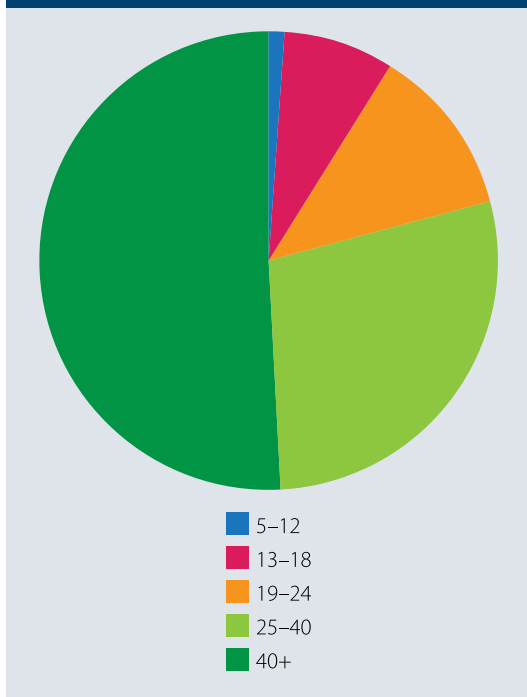
www.science.org.au/nova

Nova: science in the news has maintained its position as the Academy's most popular and often used online resource, accounting for roughly one third of all visits to the website over the past year.



The following *Nova* topics have been updated during the reporting period:

- 'Getting the buzz on the value of bees'
- 'Piezoelectric sensors and self-monitoring planes'
- 'Bioinformatics — making sense of the information flood'
- 'The rise and rise of asthma'
- 'A plague on the pest — rabbit calicivirus disease and biological control'
- 'Geoengineering — can it help our planet keep its cool?'
- 'Rebuilding humans using bionics'
- 'Australia's low-emission energy future'
- 'Dirty, rotten swine flu — and how to beat it'
- 'Making light of metals'
- 'Excuse me! The problem with methane gas'
- 'Science for sustainable reefs'
- 'Rocking on with hot rocks geothermal energy'
- 'Hunting for dark energy with the WiggleZ'
- 'The buzz about insect robots'
- 'Simply astronomical — the Square Kilometre Array'
- 'Australia's threatened species'
- 'Sun and skin — a dangerous combination'
- 'Earth's sunscreen — the ozone layer'
- 'Harnessing direct solar energy — a progress report'

Figure 1: Age of new *Nova: science in the news* subscribers, 2012

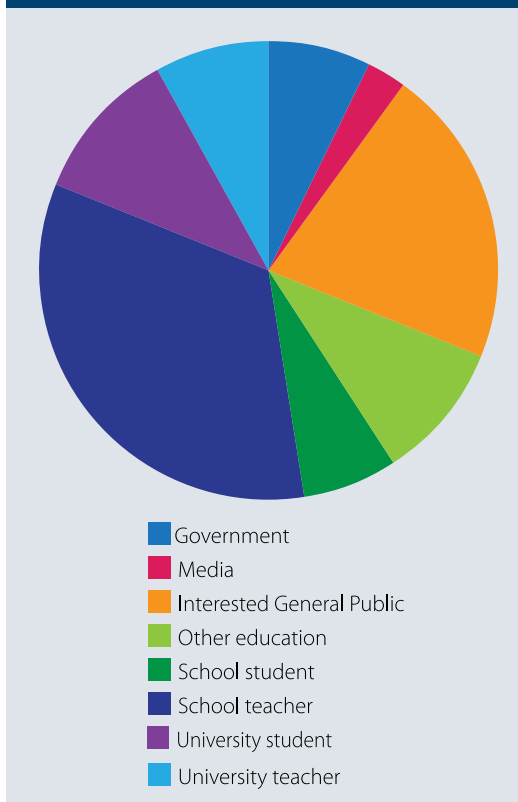
Nova currently has 123 topics spanning biology, environment, health, mathematics, physical sciences and technology.

The most viewed *Nova* topic by far was ‘Enhanced greenhouse effect — a hot international topic’, reflecting the importance of providing the fundamentals of climate science to the public. The next most popular topics were:

- ‘The picture becomes clear for magnetic resonance imaging’
- ‘Putting it together — the science and technology of composite materials’
- ‘Who will win the drugs race?’
- ‘Putting on a good face — the chemistry of cosmetics’
- ‘Fatal impact — the physics of speed’

This year *Nova* was transitioned to a new website. This included a major overhaul of existing topics — with a particular focus on topics that have enjoyed increased popularity due to other Academy publicity activities, such as climate change and immunisation.

Work has also started on several new topics, including the Higgs boson and ‘Climate change and agriculture’.

Figure 2: Occupation of new *Nova: science in the news* subscribers, 2012

Nova subscribers

A new *Nova* email alert subscriber form was introduced in 2012 and is gradually being added to every *Nova* webpage as updates occur. New *Nova* subscribers are asked to sign up for email updates and share information about themselves, to enable us to better understand the needs and wants of our subscribers; 177 subscribers signed up during the reporting period (bringing the total to 1119) and this de-identified information is providing interesting insights into who uses *Nova* and how it is used.

Age

Figure 1 shows the relative proportions of different age groups that signed up to receive *Nova* alerts. The biggest age group for new *Nova* subscribers was older than 40 years and the smallest was primary school age.

Occupation

The biggest group of new *Nova* subscribers was school teachers (Figure 2). School students and

Figure 3: Country of origin for new *Nova*: science in the news subscribers, 2012

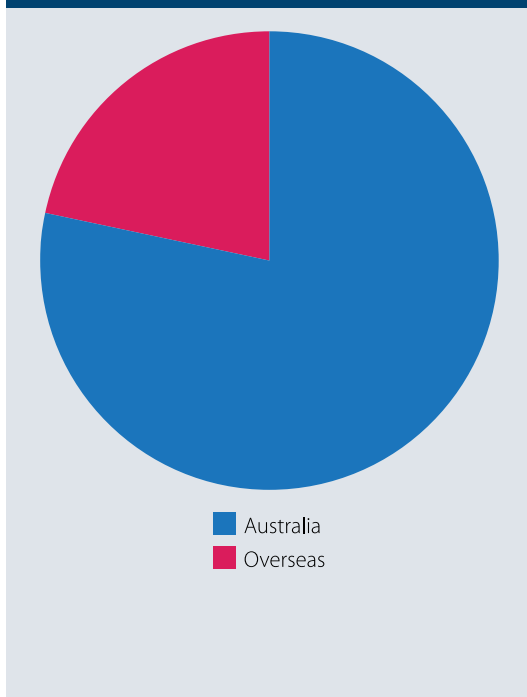
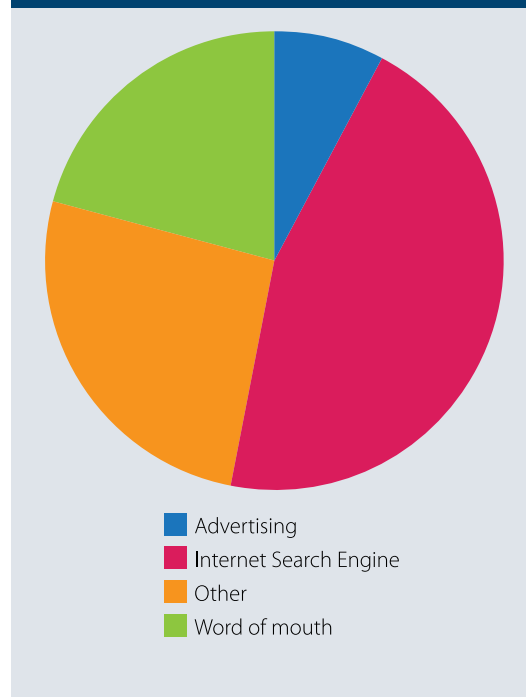


Figure 4: Place of discovery for new *Nova*: science in the news subscribers, 2012



media employees were only a small fraction of new subscribers.

Country of origin

Most new *Nova* subscribers were from Australia (Figure 3). International subscribers hailed from a diverse range of countries, most commonly from India, the United States, New Zealand, India and Iran.

Finding *Nova*

While almost half of new *Nova* subscribers arrived at the site through an internet search engine such as Google or Bing — where *Nova* appears in the top listed search terms for a diverse range of scientific topics — almost one-quarter reported learning of *Nova* through word of mouth, highlighting *Nova*'s continued high reputation for scientific information (Figure 4).



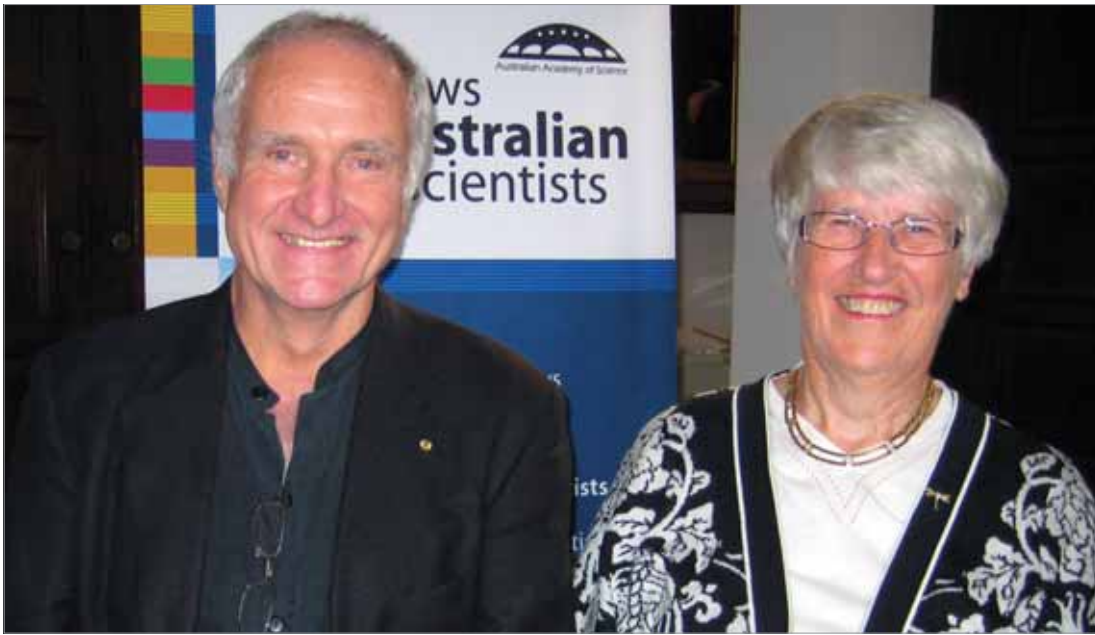
interviews with **Australian scientists**

Interviews with Australian Scientists

The *Interviews with Australian Scientists* series is a unique Australian science resource. It provides a historical record of the lives of Australian scientists and serves as an excellent science teaching resource (supporting the teaching of the 'science as a human endeavour' strand in the *Australian Curriculum: Science*). It is also a source of inspiration for future and early career scientists.

Table 5: New interviews filmed for *Interviews with Australian Scientists*

Academy Fellow	Interviewer	Sponsor
Dr Cyril Appleby FAA	Dr Jim Peacock AC FAA FRS FTSE	Australian Academy of Science
Dame Bridget Ogilvie AC FAA FRS	Professor Michael Hynes FAA	University of Melbourne
Professor Elizabeth Blackburn AC FAA Nobel Laureate	Professor Julie Campbell AO FAA	Atlantic Philanthropies
Professor Jan Anderson FAA FRS	Professor Barry Osmond FAA FRS	CSIRO Plant Industry



Contributors to the Academy's *Interviews with Australian Scientists* program Robyn Williams and Bridget Ogilvie

Table 6: New transcripts and teachers notes posted on the Academy website for *Interviews with Australian Scientists*

Academy Fellow	Interviewer	Sponsor
Dame Bridget Ogilvie AC FAA FRS	Professor Robyn Williams AM FAA	University of Melbourne
Professor Mandyam Srinivasan FAA FRS	Professor Graham Farquhar FAA FRS	Queensland Brain Institute
Professor Geoffrey Burnstock FAA FRS	Professor Robyn Williams AM FAA	International Society for Autonomic Neuroscience, University College London and the Royal Society

Four new interviews (Table 5) were filmed during the reporting period, taking the total number of interviews to 143 since 1993. Three new transcripts with accompanying teachers' notes and focus questions were also posted (Table 6).

The *Interviews* program gratefully acknowledges the generosity of the many sponsors who provided

time and money for filming. The Academy is also indebted for the time and effort graciously provided by many esteemed Australian scientists who served as interviewers or interviewees.

Science policy

The Academy is an independent body made up of Australia's top research scientists, with internationally recognised expertise in many areas of science and technology. While the Academy does not take part in political debate, it can provide authoritative information and timely advice on science, technology and research to help inform public debate and assist the development of evidence-based policy.

Overview

In the past year the Academy has met with a diverse range of parliamentarians and departmental officials and proactively provided science advice to assist in development of evidence-based policy and decision-making. There have been a number of instances where the Academy has helped make a difference and secured positive outcomes for the future of science in Australia.

These include the Federal Government's decision to provide further funding for the Academy's school science education programs in the May 2012 Budget (see *Science by Doing* section for more detail); the creation of a Chief Scientist position in the Department of Employment, Education and Workplace Relations; and the retention of the Australian Research Council (ARC) and National Health and Medical Research Council research budgets following concerns regarding possible cuts in the 2012 Mid-Year Economic and Fiscal Outlook.

The Academy has consistently argued the value of having science advisers within government agencies, similar to the practice of the UK Government. The Academy was greatly encouraged when, on the occasion of introducing an address by the UK Chief Scientist, Sir John Beddington CMB FRS, who



Bill Shorten MP announces that his department will appoint a Chief Scientist

championed this approach, the Minister for Employment and Workplace Relations, the Hon Bill Shorten MP took the opportunity to announce that his Department would be appointing a Chief Scientist. (For more information on his address at the Shine Dome see www.science.org.au/events/lectures-and-speeches/beddington.html)

Academy submissions, responses and statements

Over the past 12 months, the Academy has provided submissions and responses to eight government reviews, consultations and parliamentary inquiries on a diverse range of topics. These included identifying priorities for the 2012–13 Federal Budget; the National Research and



UK Chief Scientist John Beddington with Suzanne Cory and Academy Foreign Secretary Andrew Holmes

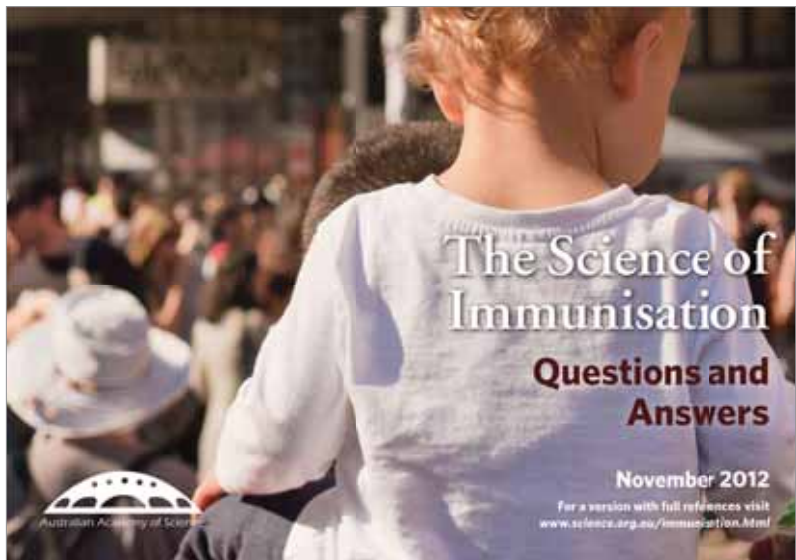
Investment Plan; Australia's preparedness for extreme weather events; and the satellite utilisation policy by the Academy's National Committee for Space Science, in conjunction with the committees for Antarctic Research, Earth Sciences, and Radio Science. These are summarised, with responses where applicable, at Appendix 2 and are available on the Academy's website at www.science.org.au/reports.

The Academy also issued three statements on the topical issues of open access publishing (February 2013), research integrity (August 2012) and the conviction of Italian earthquake scientists (October 2012). The last of these emphasised the importance of developing effective processes to translate scientific evidence and knowledge into public policy and advice. These are listed at Appendix 3 and are available on the Academy's website at www.science.org.au/policy/position-statements.html.

Academy Projects

The science of immunisation: questions and answers

Community concern arising from contradictory and inaccurate information in the public domain, and declining rates of immunisation in some areas, prompted the Academy to undertake a project on the science of immunisation. The Academy successfully sought funding for the management and publishing costs of the project from the



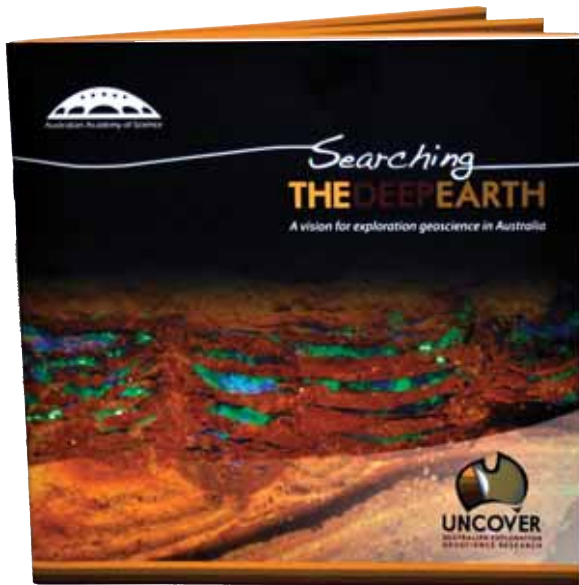
Department of Health and Ageing. A panel of experts, including a number of Academy Fellows, provided more than 1000 hours of *pro bono* skills and expertise, and set out to produce an easy-to-read document that summarised the current situation in immunisation science, identifying areas where there is consensus in the scientific community and others where uncertainties exist.

The document was endorsed by both the Australian Medical Association and the Royal Australasian College of Physicians. It has surpassed previous Academy publication distribution records and has been downloaded or distributed in hard copy more than one million times (for details about the media launch see the Public Awareness and Outreach section). Hard copies have been distributed on request to nurses, childcare centres, Medicare locals, schools and pharmacies across the country. A copy of the publication is on the Academy website at www.science.org.au/policy/immunisation.html

Implementation of Theo Murphy Think Tank Recommendations

Searching the deep Earth

A key recommendation from the 2010 Think Tank on the future of Australian resource discovery and utilisation was to develop a national road map for deep Earth exploration integrating existing innovation efforts into a coherent deep Earth mapping program. Representatives from research, government and industry sectors subsequently contributed funding to support the establishment of the UNCOVER Implementation Committee under the aegis of the Academy.



The committee developed a vision for geoscience exploration to help address the decline in Australian mineral exploration success. The resulting publication, *Searching the deep Earth: a vision for exploration geoscience in Australia*, was launched by the Minister for Resources and Energy the Hon Martin Ferguson AM MP at the International Resource Ministers Forum at the 34th International Geological Congress on 8 August 2012.

Minister Ferguson announced that it had inspired the Council of Australian Governments' Standing Council on Energy and Resources to develop a national exploration strategy to assist Australia in developing greenfields exploration capabilities. Since then the Minister has committed a total of \$114 million to Geoscience Australia over four years to improve understanding of Australia's onshore and offshore resource base. A copy of *Searching the deep Earth* can be found at www.science.org.au/policy/uncover.html

Stressed ecosystems: better decisions for Australia's future

The Academy secured ministerial support from governments across Australia to hold a meeting of senior officials from federal and state environment departments to consider the recommendations from the 2011 Think Tank *Stressed ecosystems: better decisions for Australia's future*. The meeting, held on 29–30 September 2012, marked the first time such a meeting had occurred. Officials discussed ways in which the recommendations could be developed and used to assist in future planning and decision-making. The Academy provided assistance in organising the meeting and producing an implementation plan.

National nanotechnology research strategy

The Academy's 2009 report *Nanotechnology in Australia* prepared for the Department of Industry, Innovation, Science, Research and Tertiary Education (DIISRTE) recommended development of a national research plan for nanotechnology. In 2011 the Academy secured funding from the department to project-manage and publish such a plan. Academy Fellows and other nanotechnology experts provided more than 2000 hours of their time and expertise on a pro bono basis to develop this comprehensive research strategy. There was broad consultation with the research community, including release of an exposure draft and hosting of stakeholder engagement workshops around the country.

The plan was launched by the Minister Assisting for Industry and Innovation, Senator Kate Lundy, on 6 December 2012. It identifies opportunities for a nanotechnology-driven economy and ways in which nanotechnology can improve community health and environmental stewardship, aid national security and revitalise Australian manufacturing. A copy of the research strategy can be found at www.science.org.au/policy/nanotechnology-strategy.html

Australia 2050

The publication of Volume one of *Negotiating our future: living scenarios for Australia to 2050* marked the conclusion of the first phase of the





Quentin Bryce launches *Australia 2050* at the Shine Dome

Academy's ambitious 'Australia 2050: towards an environmentally sustainable and socially equitable way of living' project. The book's chapters have been synthesised from a five-day workshop at Bowral in 2011, where vibrant group discussions covered system resilience, social and cultural perspectives, scenarios for Australian futures, and quantitative models.

Her Excellency the Governor-General Ms Quentin Bryce AC CVO launched the book at the Shine Dome on 21 February 2013. In her speech the Governor-General congratulated the Academy on its foresight in initiating this ambitious undertaking, noting 'The challenge of the 21st century is to achieve environmental sustainability and social equity'. The publication is available at www.science.org.au/policy/australia-2050/index.html. Volume 2 includes background papers for Bowral participants, and is also available on the website.

The project is funded by a three-year ARC Learned Academies Special Projects (LASP) grant, and the publication comes after two years of work by a multidisciplinary project steering committee

comprising Dr Michael Raupach FAA FTSE (Chair), Professor Anthony McMichael AO FTSE, Dr John Finnigan FAA, Professor Lenore Manderson FASSA and Dr Brian Walker FAA FTSE.

The main outcome of the workshop is an exciting proposal for national foresighting through the development of 'living scenarios' and the steering committee has commenced on the second phase of the project.

Engagement with national leaders

Australian Council of Learned Academies (ACOLA)

The Academy's President chaired the Australian Council of Learned Academies (ACOLA) and its Chief Executive chaired the board of the ACOLA Secretariat Pty Ltd in 2012 — a transformative year for both organisations.

ACOLA comprises the presidents of Australia's four learned academies: the Australian Academy of Science, Australian Academy of the Humanities, the Academy of Social Sciences in Australia, and the Australian Academy of Technological Sciences and Engineering.

Established in 2010 as the successor to the National Academies Forum (established in 1995), ACOLA provides a forum where the expert knowledge of 2000 of the nation's most eminent scientists, researchers, scholars and practitioners can inform national policy and help develop innovative solutions to complex global problems and emerging national needs.

The ACOLA Secretariat, established concurrently with the Council, conducts projects and activities on behalf of Council that are within its objects and powers.

In late 2011 Australia's Chief Scientist, Professor Ian Chubb AC, initiated a process to position ACOLA as a source of multidisciplinary expert advice to government, modelled on the role of the US National Research Council. In the May 2012 Federal Budget \$10 million was allocated over three years through the ARC Learned Academies Special Projects scheme for a series of strategic research projects within the overarching framework 'Securing Australia's Future'.

The research findings are intended to provide the Prime Minister's Science Engineering and

Innovation Council (PMSEIC) and the Chief Scientist with a strong evidence base to underpin future policy development.

Six research projects of different sizes and duration have been initiated on Australia's comparative advantage; country comparisons in science, technology, engineering and mathematics education; Asian literacy — beyond language; the role of science, research and technology in lifting Australian productivity; new technologies and their role in our security, cultural, democratic, social and economic systems; and engineering energy, in particular unconventional gas exploration.

ACOLA has established a Program Steering Committee (PSC) of three Fellows from each learned Academy to oversee the research, and Expert Working Groups (EWGs) for each research project where the disciplines of each Academy are represented. Although the expertise of all four Academies is represented on each EWG, different academies have assumed responsibility for particular research projects.

The Academy is represented on the PSC by Professor Michael Barber FAA FTSE (who became Chair in February 2012), Professor Graham Mitchell AO FAA FTSE and Dr Jim Peacock AC FAA FRS FTSE. It has also assumed responsibility for supporting the EWG on 'New technologies and their role in our security, cultural, democratic, social and economic systems', which is chaired by Professor Rob Evans FAA FTSE.

Australian Research Committee

Early in 2013, the Australian Research Committee (ARCom) convened an expert working group to assist in the development of new strategic research priorities for Australia, as recommended in the new National Research Investment Plan. Participating Fellows were Professor Les Field AM FAA, Professor Hugh Durrant-Whyte FAA FRS FTSE, and Professor Chennupati Jagadish FAA FTSE.

Engaging with Parliamentarians

Together with Science and Technology Australia (STA), the Academy has provided advice and support to the establishment of two cross-party Parliamentary Friendship Groups. These aim to

enhance the engagement of politicians with science, and help promote awareness of the conduit between policy inputs and research outcomes, including policies to encourage women to enter and stay in scientific careers.

Academy President Professor Cory, former Chief Scientist Dr Penny Sackett, and former President of STA and Chief of CSIRO Materials Science and Engineering Dr Cathy Foley FTSE helped establish the Parliamentary Friends of Women in Science, Engineering and Maths. Co-chaired by Labor MP Amanda Rishworth and Liberal MP Kelly O'Dwyer, the group was launched in June 2012 by Nobel Laureate Professor Elizabeth Blackburn AC FAA FRS. As well as parliamentarians, the event was attended by women scientists across a diverse range of disciplines and featured presentations by the Minister for Science and Research, Senator the Hon Chris Evans, and the Leader of the Opposition, the Hon Tony Abbott MP.

The Parliamentary Friends of Science group is co-chaired by Labor MP Richard Marles and Liberal MP Karen Andrews. Its first event was held on the roof of Parliament House in September 2012, with Academy Fellow and Nobel Laureate Professor Brian Schmidt AO giving a master class on astronomy to more than 50 parliamentarians.

The group's second event in December 2012 focused on forging a bipartisan approach to health and medical research following the strategic review on this topic by Mr Simon McKeon AO. In January 2013, Shadow Minister for Health and Ageing Peter Dutton MP announced that a future Coalition government would protect medical research, calling it 'the best long-term investment that a government can make in the health of the Australian people'.

The Academy has also increased its engagement with state and territory governments through a new monthly e-newsletter distributed to more than 90 federal, state and territory parliamentarians with a science, engineering or medical background. The newsletter presents the latest science and policy developments in an easily accessible format to inform parliamentarians with the aim of assisting science policy development.

Activities for early and mid career researchers (EMCRs)

2012 Theo Murphy High Flyers Think Tank — *Australia's population: shaping a vision for our future*

The 2012 Think Tank was held on 26–27 July 2012 at the Intercontinental Hotel in Adelaide on the topic *Australia's population: shaping a vision for our future*.

The Think Tank's steering committee was co-chaired by the University of Adelaide's Dr Oliver Mayo FAA FTSE and Dr Kristin Alford. Committee members were Professor Bob Williamson AO FAA FRS, University of Melbourne; Dr Nicky Grigg, CSIRO Land and Water, Canberra; Professor Nick Martin FAA FASSA, Queensland Institute of Medical Research; Professor Graeme Hugo FASSA, University of Adelaide; and Dr Cathy Foley FTSE, CSIRO Materials and Engineering, Sydney. The Royal Society's Theo Murphy (Australia)

Fund supported the Think Tank, and the Royal Society's Executive Director Dr Julie Maxton attended.

Sixty EMCRCs from across Australia and from Malaysia and Indonesia attended the Think Tank to explore a vision for Australia's future population, the demographic and social challenges we face, and how Australia can use science to develop policy responses to achieve national goals related to future population changes.

Dr Paul Willis, Ri Aus Director, gave a memorable dinner address at the Adelaide Zoo.

A publication summarising the recommendations of the Think Tank rapporteurs and attendees was launched at the Ri Aus Science Exchange on 6 December 2012 by Hon Tom Kenyon, South Australian Minister for Science and Information Economy, who formally opened the Think Tank.



Paul Willis entertains dinner guests at the 2012 Theo Murphy High Flyers Think Tank in Adelaide

The recommendations can be found at www.science.org.au/events/thinktank/thinktank2012/documents/thinktankRecommendations2012.pdf.

Theo Murphy 2012 Australian Frontiers of Science: Science for a green economy



A green economy is one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. The *2012 Australian Frontiers of Science — Science for a green economy* meeting was held in Sydney on 2–4 December 2012, with support from the Royal Society Theo Murphy (Australia) fund. Seventy EMCRs drawn from a range of disciplines and from around Australia were selected by the oversight committee of Professors Graham Farquhar FAA FRS, Kenneth Baldwin FTSE and Dr Roger Gifford.

The program was developed by a steering committee comprising Professor Barry Brook, Dr Lisa Alexander, Dr Paul Burke, Dr Adriana Downie, Dr Richard Little, Dr Lynne Macdonald, Dr Karel Mokany and Associate Professor Tim Stephens. It included poster presentations and speaker sessions including panels on a diverse range of topics across the biological, physical and social sciences. The talks were presented in themed sessions on topics ranging from 'Agriculture and

aquaculture — nutrients and nutrition' to 'Social sciences — behavioural changes at individual, organisational and government scales'.

Emerging innovative technologies discussed at the conference included commercialising the conversion of organic waste to energy, achieving lowest cost transfer to renewable, and using alternative aviation fuels from gas and biomass feedstock. A panel forum, 'What motivates people to act in support of pro-environmental policies?' was a highlight for participants.

Feedback from participants indicated that the researchers appreciated the broad context of the meeting, and the fact that it allowed them to grasp how science 'applies to the real world' via specific policies or the direction of the economy. Many participants indicated the meeting was of immense help in giving a better sense of their 'research landscape' and allowing them to be more confident to engage outside their traditional circles.

The conference program is available at www.science.org.au/events/frontiers/frontiers2012/index.html

Early career researchers at Science at the Shine Dome

Forty-five early career researchers (ECRs) from a diverse range of research disciplines in Australia and New Zealand attended *2012 Science at the Shine Dome*. Twelve received travel awards of \$2500 for registration, travel and accommodation from the following sponsors:

- CSIRO (4)
- Department of Environment and Natural Resources of South Australia (1)
- Antarctic Climate and Ecosystems Cooperative Research Centre, University of Tasmania (3)
- Antarctica New Zealand with the Universities of Waikato and Otago as co-sponsors (2)
- Geoscience Australia (1)
- Department of Environment and Resource Management of Queensland (1).

Seven of the ECRs were the Academy's Australian postgraduate student nominees for the 62nd Meeting of Nobel Laureates in Lindau in July 2012 (see over).

ECRs were offered a choice of three workshops convened by recipients of ECR Academy awards and one senior media expert, as follows:



Early career researchers at *Science at the Shine Dome*, May 2012

PHOTO: MARK GRAHAM

1. *Media and communicating science* — convened by Dr Paul Willis, Director, Royal Institution of Australia.
2. *Successful scientific collaborations* — convened by Dr Manuel Ferreira, Senior Research Fellow in Genetic Epidemiology, Queensland Institute of Medical Research and recipient of the 2012 Ruth Stephens Gani Medal, and Dr Andrew Hogg, Research Fellow in Geophysical Fluid Dynamics, Research School of Earth Sciences, Australian National University and recipient of the 2012 Frederick White Prize.
3. *Grant writing skills: getting your research ideas funded* — convened by Professor Tanya Monro FAA (new Fellow in 2012), Director of the Institute for Photonics and Advanced Sensing, School of Chemistry and Physics, University of Adelaide and recipient of the 2012 Pawsey Medal, and Professor Katharina Gaus, NHMRC Senior Research Fellow, Centre for Vascular Research, University of New South Wales and recipient of the 2012 Gottschalk Medal.

More than 30 Fellows attended the informal dinner held for ECRs, teachers and Fellows.

Feedback from participants showed ECRs found both the workshops and the overall *Science at the*

Shine Dome program informative and useful. In particular participants highly valued the excellent opportunities for networking with Academy Fellows and other ECRs.

Meeting of Nobel Laureates in Lindau

Each year since 2004 the Academy has supported between seven and 15 Australian young researchers and an accompanying member of Council of the Australian Academy of Science to attend the annual Meeting of Nobel Laureates in Lindau, Germany. The meetings provide a globally recognised forum for conveying knowledge between generations of scientists and are an extraordinary network-building opportunity.

A delegation of eight excellent young Australian scientists led by Academy Treasurer and astronomer Professor Mike Dopita AM FAA, attended the 62nd Lindau meeting, dedicated to physics, on 1–6 July 2012. They joined about 500 other students from all over the world to meet and talk with Nobel Prize winners in the field of physics, including Australia's most recent Nobel Laureate, Professor Brian Schmidt AC FAA FRS.



PHOTO: ANDY CASEY (ANU)

2012 Australian delegation to the Meeting of Nobel Laureates in Lindau

The Academy was delighted to support the following researchers:

Ms Sarah Beavan, Australian National University

Ms Jacinta Delhaize, University of Western Australia

Ms Minnie Mao, formerly of the University of Tasmania

Mr Andrew McCulloch, University of Melbourne

Ms Adele Morrison, Australian National University

Ms Melissa Ness, Australian National University

Ms Grace Shephard, University of Sydney

Mr Andy Casey of the Australian National University also attended the meeting as Professor Schmidt's PhD student with support from the Lindau Foundation, and joined the Academy-supported delegation before and during the meeting. (See International section for details about future Lindau meeting funding).

'It was a fantastic experience and a once-in-a-lifetime opportunity. I was inspired in so many ways, gained a better education of important issues in science and I now feel well and truly connected to the international scientific community and very proud to be part of it!'

Jacinta Delhaize

'Another great aspect was meeting the Laureates themselves. Most days we had lunch with one or more Laureates, and in these circumstances they were much more relaxed and it was great to just talk. I think one of the more entertaining discussions was the trials and tribulations that occurred at the ceremony while receiving the Nobel prize, along with hearing about the discovery of [the fullerene molecule] C₆₀.

Andy McCulloch

Science meets Parliament

In conjunction with Science and Technology Australia, the Academy supported organisation of the annual *Science meets Parliament* two-day event at Parliament House, a meeting designed to give EMCRs a chance to learn about advocacy and meet personally with politicians to discuss a range of science, research and policy issues. Around 100 parliamentarians met with the scientists and attended the Science Meets Parliament dinner in the Great Hall.

More information about the forum can be found at www.science.org.au/ecr/emcr.html

Submissions to government

The EMCR Forum provided input to government inquiries on health and medical research and the National Career Development Strategy, highlighting the specific needs and challenges facing EMCR researchers (summarised in Appendix 4). The full submissions can be found at www.science.org.au/reports/2012.html.

The Chair of the Forum Dr Marguerite Evans-Galea took part in a panel discussion related to the latter inquiry and scientific training in Australia more generally — 'Is Australia producing too many PhDs?' — for the ABC's 'Big Ideas' program on 18 March 2013.

The program considered the findings of a report on 'Career Support for Researchers' prepared for the ACOLA secretariat.

The Forum also published working guidelines to ensure that women and men have equal opportunities to pursue a successful career in science. Endorsed by the Council of the Academy, *Gender equity: current issues, best practice and new ideas* describes current issues and presents 15 practical initiatives to ensure gender equity at work. The document can be found at www.science.org.au/policy/documents/GenderEquityEMCRForum.pdf

Early and Mid Career Researchers Forum

In 2011, in recognition of the challenges faced by Australia's young researchers, the Academy established the Australian Early and Mid Career Researchers Forum. The Forum has become a national voice for Australia's future scientific leaders and advises the Academy on key issues for younger researchers, to help inform its policy recommendations to government.

National Meeting

The Forum's inaugural national meeting, *Science pathways 2012: getting science on the national agenda* was held at the Shine Dome on



Maggie Hardy



Kate Hoy



Oliver Jones



Sharath Sriram

24–25 September 2012. More than 130 early and mid-career researchers from many scientific disciplines across the nation engaged in passionate debate to identify challenges they face and discuss possible solutions. The event was also attended by representatives of the Academy, industry and government, and messages of support were received from parliamentarians across the political spectrum. Australia's Chief Scientist Professor Ian



Nobel Laureate Dan Shechtman presented a masterclass for EMCRs on technological entrepreneurship and quasicrystals (see opposite)

Chubb AC opened the meeting and an early highlight was the Chuwen Keynote by Nobel Laureate Professor Brian Schmidt AC FAA FRS. The program is available at www.science.org.au/ecr/emcr/documents/SciencePathwaysProgram.pdf

Four new members — Drs Maggie Hardy, Kate Hoy, Oliver Jones and Sharath Sriram (pictured opposite) — joined the Forum committee in January 2013, replacing Drs Andrew Brooks, Michelle Dunstone and Rosemary Keogh who stepped down. Further details about the Forum and its members can be found at www.science.org.au/ecr/emcr/emcrforum.html

EMCR database and mailing list

Since June 2001 EMCRs have been able to subscribe to the Academy's EMCRCR database. This contains the names, institutions, research disciplines and career stages of EMCRCRs. It is used to distribute information on career, training and funding opportunities, to promote events and initiatives relevant to EMCRCRs, and to send Early Days, the Academy's quarterly newsletter for EMCRCRs (issues of Early Days are available at www.science.org.au/ecr/ecr-newsletters).

Membership has grown rapidly to reach 3100 by March 2013, an increase of more than 40% in 12 months. All EMCRCRs in Australia are strongly

encouraged to join, as is anyone interested in EMCRCR issues (see www.science.org.au/ecr/ecrlist.html).

International visitors

Global Young Academy co-chair

The Foreign Secretary arranged for Professor Greg Weiss, co-chair of the Global Young Academy to visit Australia on 24–30 August 2012. As part of his visit Professor Weiss met with EMCRCRs in Perth, Melbourne and Sydney. These local meetings were arranged with support from the secretariat and with thanks to the Academy's national EMCRCR database.

Masterclass with 2011 Nobel Prize winner in Chemistry

On 13 February 2012 Professor Chennupati Jagadish FAA, Academy Secretary, Physical Sciences, hosted an enthusiastic group of early career researchers at a masterclass with the winner of the 2011 Nobel Prize in Chemistry, Professor Dan Shechtman, who teaches technological entrepreneurship to students at the Israel Institute of Technology (Technion). He spoke about this topic and his controversial work on quasicrystals that led to his Nobel Prize. Twenty early career researchers attended the event at the Shine Dome.

National Committees for Science

The Academy's national committees have two important roles. They foster a designated branch or theme of natural sciences, and assist the Academy to establish collaborative links between Australian and overseas scientists.

The 22 National Committees for Science and two task forces are widely representative of the Academy's discipline areas. Their membership comprises 215 scientists from across Australia.

The Secretaries for Physical and Biological Sciences have particular responsibility for the national committees, and the Academy's Executive Committee is responsible for appointments. Nominations for committee members are sought from committee chairs and relevant scientific societies. Guidelines for national committees are available at www.science.org.au/natcoms/guidelines.html

In May 2012 the Academy initiated a review of the effectiveness of the national committees

Physics decadal plan launched

The physics community celebrated the launch by Nobel Laureate Professor Brian Schmidt of the *Physics Decadal Plan 2012–21: Building on excellence in physics*, on 6 December 2012. It presents the Australian physics community's strategic vision for the 10 years from 2012 to 2021. The plan was prepared by a working group of experts tasked by the National Committee for Physics and chaired by Professor David Jamieson of the University of Melbourne with funding provided by the Australian Research Council, the Australian Academy of Science and the Australian Institute of Physics. The working group consulted the Australian physics community extensively through the entire decadal planning process.



Nobel Laureate Brian Schmidt launches the *Physics decadal plan*, December 2012

in achieving their roles. The terms of reference included the interaction of the national committees with relevant national bodies and societies, and consideration of current ICSU organisation memberships (see International section). The review committee included the Secretaries for Physical and Biological Sciences and the Foreign Secretary, and was chaired by former Secretary Physical Sciences and Foreign Secretary, and current chair of the National Committee for ICSU Co-ordination, Professor Bruce McKellar FAA. The committee consulted widely in preparing its comprehensive report, which was provided to the Council meeting of 8 March 2013 and is currently under consideration.

During the reporting period the national committees held 45 meetings (in person, by teleconference or by video conferencing). Summaries of their annual reports for 2012 are provided in Appendix 5. Full reports are on the committees' respective web pages at www.science.org.au/natcoms.

Committees have been proactive in providing expert advice nationally and internationally on a wide range of important issues (see Table 7). Eight national conferences and workshops were organised covering topics as diverse as Vitamin D deficiency and the 100th anniversary of X-ray crystallography (Table 9), some attracting extensive media interest. International activities, including the hosting of major meetings of three international unions for science, are described in greater detail in the International section. Following extensive consultation with the Australian physics community, the ARC-LASP funded *Physics decadal plan 2012–21* was launched on 6 December 2012 by Nobel Laureate Brian Schmidt AC FAA FRS (see opposite). Professor Nalini Joshi FAA has raised significant sponsorship for the decadal plan for the mathematical sciences. Professor Peter Hall AO FAA FRS is chairing the Steering Committee for the plan, and a series of presentations have been held around the country.

Table 7: Advice provided by National Committees during the reporting period

National Committee for Science	Advice provided
Antarctic Research	Review of the Australian Antarctic Science application process
Antarctic Research	Proposal to merge the British Antarctic Survey with the UK National Oceanographic Centre
Astronomy	Implications of US's National Science Foundation Astronomy portfolio review
Biomedical Sciences; Medicine	McKeon Strategic Review of Health and Medical Research
Chemistry	Australian Curriculum Resources and Assessment Authority Draft Senior Secondary Chemistry Curriculum
Chemistry	Chief Scientist's request for 10 ideas on 'Actions needed to be taken to improve the translation of research into innovation leading to national prosperity'.
Chemistry; Space Science	National Research Investment Plan Discussion Paper
Crystallography	Helped secure operational funding for the Australian Synchrotron for the next five years
Earth System Science	Initiated high level meetings between the International Geosphere-Biosphere Programme, National Committee for Earth System Science and Chief Scientist, ARC, CSIRO and Department of Climate Change and Energy Efficiency regarding need for and creating ways to fund in Australia highly multi-disciplinary research like Earth system science.
Geography	Australian Curriculum Resources and Assessment Authority Draft Geography Curriculum
Medicine	Submission on the National Preventive Health Research Strategy (2012–2016)
Medicine	Contributed to Academy submission on the NHMRC Consultation on the Draft Principles of Peer Review
Nutrition	Initiated discussions with NHMRC re panel for diet and lifestyle
Plant and Animal Sciences	Department of Agriculture, Fisheries and Forestry's draft National Food Plan
Space Science	National Earth Observations from Space Strategic Infrastructure Plan
Space Science	Munro review of the Bureau of Meteorology
Space Science with Antarctic Research, Earth Sciences and Radio Science	Review of the Australian Satellite Usage Policy

The National Committee for Astronomy has been implementing the 2006–15 decadal plan for Australian astronomy. New decadal plans for mechanical sciences, plant and animal sciences and quaternary research are under active consideration.

National committees are also engaged in a range of other activities (summarised in Table 8) many of which aim to foster the next generation of scientists through support to attend international conferences, holding skills workshops and rewarding achievement.

Table 8: Other National Committees activity during the reporting period

National Committee	Other activities
Antarctic Research	Sponsored early career researcher to attend international Scientific Committee for Antarctic Research conference. Pure Antarctic touring cultural/science event proposal and planning
Brain and Mind	'Cognitive science in the public interest' initiative including a series of articles in 'The Conversation'
Chemistry	Selection of inaugural Science and Industry Endowment Fund–Academy Fellowships for 2013 Lindau Nobel Laureates meeting
Earth System Science	Publication of synthesis review of First Australian Earth System Outlook Conference
Mechanical Sciences	Raising sponsorship for establishment of an early career award
Medicine; Plant and Animal Sciences	Selection of ECRs to attend 5th HOPE meeting organised by Japan Society for the Promotion of Science
Nutrition	Sponsorship of plenary speaker at Nutrition Society conference; Raising the standard of nutrition science teaching and research

Ticking time bombs — advancing Earth system science

Australia's Chief Scientist Professor Ian Chubb AC opened the Second Earth System Outlook conference *Ticking time bombs in the human-Earth system*, held at the Shine Dome on 26–27 November 2012. The Outlook conference series was a major recommendation of the National Committee for Earth System Science strategic research plan 'To live within Earth's limits'. Its purpose is to bring together natural environmental scientists with participants in the human sciences, science communication, industry, finance, and sustainability advocacy to advance the development of this new discipline area. The event was broadcast live via the website, and a webcast is available at www.science.org.au/events/conferences-and-workshops/earth-system-outlook2/index.html

The Academy hosted the annual officers meeting of the International Geosphere-Biosphere Programme (IGBP), held in Australia for the first time at Ian Potter House from 28–30 November. The Outlook conference served as the public symposium for the IGBP meeting. Both meetings were generously sponsored by the Department of Climate Change and Energy Efficiency.



PHOTO: MARK GRAHAM

Sybil Seitzinger, CEO of IGBP, addressing the Earth System Outlook Conference

Stamps commemorate youngest-ever Nobel Prize winner

The National Committee for Crystallography led an initiative for a series of Australia Post stamps commemorating Australian Nobel Prize winners, including Sir William Lawrence Bragg CH OBE MC FRSc, to be issued on 28 August 2012 to celebrate the centenary of his pioneering work on X-ray diffraction. In addition a special block of stamps featuring the Academy logo and Sir WL Bragg, was released to coincide with the 100th anniversary celebrations held in the town of his birth, Adelaide from 2–6 December 2012, including the *Bragg Symposium*.

At 25, WL Bragg remains the youngest ever recipient of a Nobel Prize and he and his father Sir William Henry Bragg KBE FRSc are the only father and son ever to share a Nobel Prize.



PHOTO: AUSTRALIA POST

Table 9: National Committees workshops and conferences since April 2012

Workshops and Conferences ¹					
Date	Event	National Committee	Attendees	Opened by	Partners
12 June 2012	<i>Should Australia and New Zealand allow more vitamin D into the food supply?</i>	Nutrition	83	Professor Andrew Sinclair, Chair, National Committee for Nutrition	International Life Sciences Institute Southeast Asia Region Australasia, Nutrition Society of Australia, Deakin University
24–26 September 2012	<i>History and Philosophy of Science in Australia: looking forward</i>	History and Philosophy of Science	60	Professor James Griesemer (University of California, Davis)	Sydney Centre for the Foundations of Science
26–28 September 2012	<i>Australian Space Science Conference</i>	Space Science, Radio Science	40	Professor Daine Alcorn, Deputy Vice-Chancellor for Research and Innovation, RMIT	DIISRTE, RMIT, ASRI, National Space Society of Australia Ltd, Engineers Australia
26–27 November 2012	Second Earth System Outlook conference: <i>Ticking time bombs in the human-Earth system</i>	Earth System Science	100	Professor Ian Chubb AC, Chief Scientist for Australia	International Geosphere Biosphere Programme, Dept Climate Change and Energy Efficiency
28 November 2012	<i>Becoming independent: A workshop for mid career researchers</i>	Nutrition	30	N/A	Nutrition Society of Australia
6 December 2012	<i>Bragg Symposium: Celebrating 100 years of X-ray crystallography</i>	Crystallography	333 from 22 countries	The Hon Tom Kenyon MP, South Australian Minister for Science and Information Economy	Asian Crystallographic Society (AsCA) and the Society of Crystallographers in Australia and New Zealand (SCANZ)
10–11 December 2012	<i>Game on: preparing our biology and biomedical graduates for the future</i>	Biomedical Sciences	100	Dr Norman Swan, ABC Radio National	University of Sydney, VIBEnet, CUBEnet, QS Network, University of Western Sydney, University of Queensland, Monash University, ANU, AMSLaTNet, ADInstruments, Australian Council for Educational Research

¹ See International section for additional international meetings

Mike Smith National Museum of Australia Student Prize for the History of Australian Science or Australian Environmental History

PhD candidate Christina Dyson from the Faculty of Architecture, Building and Planning at the University of Melbourne was awarded first prize in the 2013 Mike Smith Prize. The prize, a joint undertaking by the Academy and the National Museum of Australia, was formerly known as the Student Prize for the History of Australian Science or Australian Environmental History, and was renamed in 2013 to honour celebrated Australian archaeologist Dr Mike Smith AM.

Christina's essay, 'Living fossils and mouth-watering stones: manipulating history in the

post-World War II natural Australian plant garden', was part of a field of extremely competitive entries, which reflected a wide range of topics and approaches and a high level of interest. Papers were judged by a panel consisting of the Chair for the National Committee for History and Philosophy of Science, Associate Professor Rachel Anekny, Professor Libby Robin representing the museum, and Professor Rod Home, representing the Academy's journal *Historical Records of Australian Science*.



PHOTO: GEORGE SERRAS, NATIONAL MUSEUM OF AUSTRALIA

Christina Dyson (centre) and joint runners-up Sonya Duus and Alessandro Antonello with Academy CE Sue Meek and National Museum of Australia Director Andrew Sayers AM, at the National Museum in February 2013 for the awarding of the prizes.

International activities

A key aim of the Academy is to foster excellence in Australian scientific research, including facilitating access to international scientific organisations and programs, supporting the promotion of Australian science capabilities internationally, and contributing expertise and leadership in regional and global collaborative networks.

International Council for Science

The International Council for Science (ICSU) is a non-government organisation with a global membership of 48 scientific unions and interdisciplinary bodies and 120 national scientific bodies representing 140 countries. These organisations convene scientists within and across the disciplines to coordinate research and address issues of global significance to the benefit of society. Professor David Black FAA of the University of NSW is the current Secretary General for ICSU.

International Scientific Union and related body memberships

The Academy is Australia's adhering body for ICSU, for 21 of ICSU's member unions and nine interdisciplinary science bodies. The Academy has responsibilities arising from these memberships, for which it is advised by the Academy's National Committees for Science, and for ICSU Coordination. These include the nomination of Australian candidates for executive committee positions, appointment of voting delegates to general assemblies (23 delegates to 11 meetings in current reporting period — see Appendix 6), and issuing invitations to host these events in Australia.

Australia's global science credibility and influence is enhanced by the high level of representation achieved on the executives of ICSU organisations. In 2012, three secretary-generals; four incoming, current or outgoing presidents; and seven vice-



International Geosphere-Biosphere Programme Officers meeting at Ian Potter House

presidents were among 23 Australian executive committee appointments (see Appendix 7). In addition, each ICSU organisation has substructures of committees and task groups in which an estimated 350 Australians serve at any given time. This affords Australian scientists extensive opportunities to influence international strategic planning and priority setting, and to establish research collaborations with other leaders in their fields.

Consideration of the value and relevance of ICSU organisation memberships was a key term of reference in the current review of the National Committees for Science (refer National Committees section).

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

General assemblies of ICSU and its international scientific bodies occur every two to four years. Large numbers of scientists, including the world's most highly regarded leaders in particular disciplines, attend these. The congresses held

The 2012 International Geological Congress, held in Brisbane in August was an outstanding success. The Academy acknowledges the considerable efforts of the National Committee for Earth Sciences in winning the bid to bring this meeting to Australia and make it such a successful event. The event was the culmination of more than eight years of planning by the Australian earth sciences community. The IGC — a joint activity including the council meetings and congress of the International Union of Geological

Science (IUGS) — attracted more than 6000 delegates from 112 countries, making it the largest ever geoscience event in the Southern Hemisphere. The IGC was also the venue for many major meetings of international organisations, including the successful 2nd World Young Earth Scientist (YES) Congress (see: www.networkyes.org). The city of Brisbane turned on its best weather for the week and the venue, the Brisbane Convention & Exhibition Centre, functioned excellently.

with them provide fora for debates that shape the development of science and address issues pivotal to the progress of international research.

Hosting these events in Australia provides outstanding opportunities for established and emerging local scientists to interact with eminent global researchers. As well as highlighting Australian science on an international level and generating significant benefits to the Australian economy, these meetings attract international and domestic media interest which raises the awareness of the achievements and future directions of Australian science in the broader community.

The National Committee for Earth System Science successfully bid to host the 2012 Officers Meeting

of the International Geosphere-Biosphere Programme. The Second Earth System Outlook conference, *Ticking time bombs in the human-Earth system* acted as the public symposium for the meeting (see Appendix 5: Earth system science). The Executive Committee of the International Union of Crystallography met in Adelaide on 4–5 December 2012, in conjunction with the *Bragg Centenary Symposium* (see National Committees section and Appendix 5: Crystallography).

Guidelines for mounting bids for international conferences can be found at www.science.org.au/natcoms/icsu-guidelines.html.

In the reporting period successful bids were submitted to hold two international meetings:



PHOTO: IUCR

Members of the International Union of Crystallography's Executive Committee in Adelaide. (Back, left to right) Wulf Depmeier (Germany), Mike Dacombe (Executive Secretary, Chester, UK), Hanna Dabkowska (Canada), Marvin Hackert (USA), Mitchell Guss (Australia), Juan Manuel Perez-Mato (Spain); (front, left to right) Elena Boldyreva (Russia), Claude Lecomte (Vice President, France), Gautam Desiraju (President, India), Luc Van Meervelt (General Secretary and Treasurer, Belgium), Sine Larsen (Past President, Denmark).

- International Union for Quaternary Research-sponsored week-long gathering of international early career researchers in quaternary science in Wollongong in December 2013 (National Committee for Quaternary Research)
- International Union for Pure and Applied Chemistry-sponsored International Congress on Physical Organic Chemistry in Sydney in 2016 (National Committee for Chemistry)

IAP: the global network of science academies

The IAP: the global network of science academies (IAP, previously known as the InterAcademy Panel) was launched in 1993 and includes 105 academies. Its primary goal is to help member academies work together to advise citizens and public officials on scientific aspects of critical global issues.

The IAP helps to create science academies in countries where academies do not exist and assists young and small academies to become more prominent in their own countries. In addition, the IAP sponsors programs for young scientists designed to help them build strong foundations for successful careers and to more effectively engage decision-makers.

Since its inception, the IAP has also produced statements on important issues such as human reproductive cloning, science education and ocean acidification. In June 2012 the Academy endorsed a statement calling for action by world leaders on population and consumption, available at www.interacademies.net/10878/19191.aspx, along with other national science academies, including the UK, New Zealand, Japan, South Africa, Bolivia and Nicaragua.

The Academy was elected to the IAP Executive Committee for an initial three-year term in 2006 and a second term in 2009, which ended in March 2013. The Academy's Foreign Secretary Professor Andrew Holmes AM FAA FRS FTSE attended the Executive Committee meeting of the IAP in Kuala Lumpur on 15–17 October 2012. The meeting considered issues including memberships, funding affiliated network grant applications, project applications, publications and communications, and policy activities. The Executive Committee also considered and accepted the Academy's expression of interest to host the IAP Executive Committee meeting in Canberra in October 2013 (see ICSU, p 37).

Professor Holmes also attended the IAP General Assembly and conference in Rio de Janeiro on 24–27 February 2013. At this meeting, reports from the six regional IAP Affiliated Networks were presented, including the first report from the merged regional organisation, the Association of Academies and Societies of Sciences in Asia (AASSA), which the Academy has played a major role in establishing (for more about ASSA, see p 40). The IAP Strategic Plan III (2013–15) was approved and importantly, elections for the positions of IAP Co-chairs and membership on the Executive Committee took place. Prof Mohamed Hassas, former President of the African Academy of Sciences, was re-elected as a Co-chair and Prof Volker ter Meulen, past President of the German Academy of Sciences Leopoldina, was also elected as a Co-chair. New Academies elected to the Executive Committee of the IAP were from Brazil, Canada, Cuba, India, Japan, Mexico and South Africa.

Ms Shelley Peers, Director of the *Primary Connections* program, was invited to deliver a presentation on the challenges of developing scientific literacy at the conference. In addition, the IAP, along with the Federation of Asian Scientific Academies and Societies, the Association of Academies of Science in Asia and the Association of Academies and Societies of Sciences in Asia, funded a workshop 'Primary Connections Collaboration with Asia', held in Sydney on 25–27 March 2013. (See Science education section: *Primary Connections* for more information).

InterAcademy Council

The InterAcademy Council (IAC) was established by the IAP in 2000 to produce reports on scientific, technological, and health issues related to the great global challenges of our time, providing knowledge and expert advice to international organisations, such as the United Nations.

The IAC governing body includes 15 academies of science and equivalent organisations from developed and developing countries, and representatives from the IAP, the International Council for Science, the International Council of Academies of Engineering and Technological Sciences, the InterAcademy Medical Panel and the Academy of Sciences for the Developing World. The Academy's President was a member of the council until the end of 2012.

In October 2012, the IAC and IAP released the report *Responsible conduct in the global research enterprise*, an effort by the scientific communities to provide advice in forging an international consensus on responsible conduct in the global research enterprise. The Academy's Council provided input to this initiative and Professor David Vaux FAA was one of the international reviewers. The Academy subsequently endorsed the Singapore Statement on Research Integrity in response to the report (www.singaporestatement.org).

Association of Academies and Societies of Sciences in Asia

Since 2010 the Academy has held the presidency and hosted the secretariat of the Federation of Asian Scientific Academies and Societies (FASAS), with former Academy President Professor Kurt Lambeck as the federation's elected president.

For the past two years, and at the urging of the IAP, discussions have been facilitated between FASAS and the Association of Academies of Sciences in Asia about merging the two organisations into a single Asian science grouping in order to be more visible and effective in the region, and to tackle the long-term challenges requiring science-based advice. The new Association of Academies and Societies of Science in Asia (AASSA) was launched on 18 October 2012 in Colombo at its inaugural four-day general assembly organised and hosted by the National Academy of Sciences of Sri Lanka.

The Academy's Secretary of Public Awareness and Education Professor Jenny Graves AO FAA was elected member-at-large of the AASSA Executive Board. Professor Lambeck will hold the position of Immediate Past President for one year. Others elected to the executive board were from Bangladesh, China, India, Korea, Malaysia, Russia and Turkey.

Professor Graves chaired the organising committees for a very successful FASAS workshop, 'Improving the Quality of Life Through Science', which was held in conjunction with the general assembly, with speakers from Australia, Afghanistan, Thailand, Malaysia, Russia, Sri Lanka, China and Bangladesh.

Bilateral activities

The Academy's extensive national and international networks enable organisation of bilateral workshops in key areas of science and technology. Activities

were funded by various government agencies including the Department of Industry, Innovation, Science, Research and Tertiary Education (DIISRTE) and the Australia–Malaysia Institute, part of the Department of Foreign Affairs and Trade.

The bilateral workshops and symposia provide a forum for senior Australian researchers and government officials to meet with their counterparts to identify areas of mutual research interest and establish and strengthen long-term relationships.

Ninth Annual Australia–China Symposium and visit to Australia by Professor Chunli Bai

The ninth annual Australia–China Symposium, *Healthy ageing: new approaches from genomics, stem cells and smart technologies* was held on 22–24 July 2012 in Canberra at the Academy's Shine Dome.

The symposium was jointly organised by the Academy, the Australian Academy of Technological Sciences and Engineering (ATSE) and the Chinese Academy of Sciences (CAS) and involved 30 Australian and Chinese researchers. Nine early to mid-career researchers were supported to attend and observe.

The symposium was opened by Professor Chunli Bai, together with Academy President Suzanne Cory and ATSE Vice-President Professor Mary O'Kane. Participants explored collaborative opportunities across the five session themes:

- burden of disease and new strategies
- infectious diseases
- stem cells and regenerative medicine
- genomics and personalised medicine
- medical bionics and nanotechnology

Academy Fellows Professors Perry Bartlett FAA, Frank Caruso FAA and Ian Frazer AC FAA FRS FTSE spoke at the seminar.

While in Canberra, Professor Bai met with Professor Ian Young, Vice Chancellor of the Australian National University, and Dr Megan Clark FTSE, Chief Executive of CSIRO. He also took the opportunity to visit the National Arboretum Canberra. Senator the Hon Chris Evans, Minister for Tertiary Education, Skills, Science and Research, hosted a lunch for Professor Bai on 23 July 2012.

Following the symposium, the Chinese delegation of 19 members travelled to Melbourne for site visits



Australia–China Symposium participants. From left, Jie Xu, Embassy of the People's Republic of China; Tieniu Tan, Chinese Academy of Sciences (CAS); Andrew Holmes; Mary O'Kane, ATSE; Chunli Bai, CAS; Suzanne Cory; Jinghua Cao and Bolun Ning, CAS.

'Like all modern symposia, the main objective is to connect scientists. The talks themselves are more like introductory tools and, in that sense, they have served the purpose brilliantly'

Professor Chung-I Wu, Director, Beijing Institute of Genomics, Chinese Academy of Sciences

to various institutions, including Stem Cells Australia, the Mental Health Research Institute, the Australian Regenerative Medicine Institute and CSIRO. This activity was funded by DIISRTE.

Australia–China post-symposium follow up workshops

An outcome of the Australia–China post-symposium follow up workshop on environmentally friendly, safe and nutritionally enhanced food in 2011 (see *Annual report 2011–12*, page 44) was a visit to China by organisers Dr Oliver Mayo FAA and Professor Robert Gibson on 14–17 November 2012. The visit confirmed the feasibility of establishing research links between the University of Adelaide and the Institute of Nutritional Science of the Shanghai Institute of Biological Sciences and Zhejiang University in Hangzhou, and an action plan for an international research facility is in development. There is a good opportunity to establish an international research facility between Adelaide

and China through these two institutions, and a plan for doing so is being developed.

Australia–Malaysia Green Growth Think Tank

The Academy received funding from the Australia–Malaysia Institute of the Department of Foreign Affairs and Trade for an *Australia–Malaysia Green Growth Think Tank* held at the Shine Dome on 15 May 2012, with site visits in Canberra and Sydney on 16 and 17 May.

Three Malaysian researchers selected by the Malaysian Academy of Sciences attended the meeting: Associate Professor Ahmad Fariz and Professor Abdul Hadi from the Institute for Environment and Development, Universiti Kebangsaan Malaysia, and Dato' Ghazali, Executive Chairman of Nusantara Technologies. The main interest of the researchers was to learn how Australia is implementing green growth policies in the areas of science and innovation, business and industry as well as environmental economics and skills training. The Australian participants included representatives from the Department of Industry, Innovation, Science, Research and Tertiary Education; Department of Resources, Energy and Tourism; CSIRO; the Cooperative Research Centre for Greenhouse Gas Technologies; the Australian National University; and Dyesol Technologies.

The event showcased Australian capabilities and encouraged further research exchanges between



Australia–Malaysia Think Tank participants touring the facilities at the University of NSW. From left, Abdul Hadi, Ahmad Fariz and Dato' Ghazali.

Australia and Malaysia. Think Tank participant Dr Mike Smith of the Australian National University will travel to Malaysia in 2013 to meet with Malaysian experts on green growth, including participants from the 2012 Think Tank, and members of the business community.

2012 East Asia and Pacific Summer Institutes program in Australia

The East Asia and Pacific Summer Institutes program provides US graduate students in science and engineering with the chance to conduct research in Australian laboratories and to initiate personal relationships with their Australian counterparts. The program, which also introduces students to Australian science policy infrastructure and orientation to the culture, is funded by the Department of Industry, Innovation, Science, Research and Tertiary Education (DIISRTE) and the US National Science Foundation (NSF).

The Academy was pleased to welcome 20 American graduate students to Australia in 2012. An orientation program in Canberra included a series of lectures and site visits to cultural institutions. Its highlight was a visit to Tidbinbilla Nature Reserve where the students saw Australian animals in their natural habitat and learned about life in Australia before European settlement.

Participants from a wide range of research areas were hosted by various institutions including

Did you know that more than 36% of applicants for the 2012 East Asia and Pacific Summer Institutes program listed Australia as their first or second choice of destination? Other potential destinations included China, Japan, Korea, New Zealand, Singapore and Taiwan.

'This was my first experience of the program and I have nothing but praise for it!'

Professor Roger Lewis, 2012 host, University of Wollongong

'The time I spent in Australia was short, but irreplaceable. The program has provided me with a very special chapter in my graduate study, allowing for the potential of international friendships and collaborations that would not have come about otherwise. I have taken away a better understanding of science and the way it connects people throughout the world.'

Shay Mailloux, 2012 participant, Clarkson University

universities, CSIRO divisions, museums, teaching hospitals and government institutions. Professor Neil Trudinger FAA FRS from the Australian National University was among the Australian hosts this year. Host institutions provide students with office



2012 East Asia and Pacific Summer Institutes Program participants.

accommodation and access to laboratories, libraries, computing facilities, major equipment and special apparatuses, as well as technical assistance and the time and expertise of the host researcher.

The students establish strong collaborative links with Australia and about 10% return to Australia within a year of the program to continue their research or undertake new research. The 2012 participant research reports can be found at www.science.org.au/internat/documents/EAPSI-2012-report.pdf.

French Researchers in Australia workshop

The French Embassy supported the inaugural annual workshop for 70 French researchers in Australia at the Shine Dome on 13–14 December 2012. The workshop was jointly organised with the Academy and opened by Academy President Professor Suzanne Cory and His Excellency Mr Stéphane Romatet, Ambassador of France to Australia.

The workshop established a network of French researchers in Australia and provided opportunities for connecting with researchers and key members of the scientific community in Australia, including the Australian Chief Scientist Professor Ian Chubb AC, who provided a presentation to delegates on the final day of the workshop.

This workshop is intended to be the first in a series of annual events.



PHOTO: MS CLAIRE DUPRE

Professor Suzanne Cory and His Excellency Mr Stéphane Romatet at the opening of the French Researchers in Australia workshop.

International visits

Chinese National Office for Science and Technology Awards Commission

Professor Graham Farquhar FAA FRS hosted the visit of a delegation from the Chinese National Office for Science and Technology Awards Commission on 20 April 2012. The commission confers the State Science and Technology Awards, the highest honours in China in science and technology, which are presented in the Great Hall of the People. The awards recognise remarkable contributions to

scientific and technological progress by researchers and organisations.

The Chinese delegation was in Australia to learn more about the administration of our national science and technology awards, especially those relating to the Academy, the Australian Research Council and the Prime Minister's Science Prize.

International Institute for Applied Systems Analysis

The Secretary for Physical Sciences Professor Chennupati Jagadish FAA and Dr Michael Raupach FAA met with the Director of the International Institute for Applied Systems Analysis (IIASA), Professor Pavel Kabat, at the Academy on 2 May 2012.

IIASA is a scientific research institute based in Austria, which conducts policy-oriented research into problems of a global nature that are too large or too complex to be solved by a single country or academic discipline. The institute is sponsored by its national member organisations in Africa, Asia, Europe, and the Americas. Its research is independent and therefore unconstrained by political or national self-interest.

Professor Kabat was in Australia to gauge Australia's level of interest in joining the institute. Professor Kabat noted that Australian researchers are highly regarded around the world. While in Australia, Professor Kabat also met with CSIRO and the Department of Innovation, Industry, Science, Research and Tertiary Education.

In late 2012 Australia joined IIASA, with CSIRO as Australia's national member organisation, enabling Australian researchers to access IIASA research and other programs such as postdoctoral fellowships. (See www.iiasa.ac.at/web/home/about/whatisiiasa/what_is_iiasa.html)

Chinese Academy of Sciences Forum of National Academies

On 18 September 2012, the President of the Chinese Academy of Sciences, Professor Chunli Bai FAA invited Academy President Professor Suzanne Cory to attend a session of the general conference of the Academy of Sciences for Developing Countries in Tianjin, China. Professor Cory was one of nine national academy presidents asked to present at the *National Academies and open innovation* forum, where the roles of national

academies in promoting national innovation and in enhancing global science and technology and innovation cooperation were discussed. For more details about the forum go to www.science.org.au/news/media/documents/NationalAcademiesandOpenInnovationForum.pdf

Two thousand researchers from China and many other countries around the world attended the forum, which was opened by the President of China, Mr Hu Jintao. President Hu noted that science and technology were important driving forces behind economic prosperity, social development and human civilisation.

Indian National Science Academy



Suzanne Cory and Krishan Lal at the signing of the MoU at the Academy's Shine Dome.

President of the Indian National Science Academy Professor Krishan Lal, accompanied by Vice-President Professor N Sathyamurthy and Executive Director Dr Alok Kumar Moitra, visited the Academy on 5 December 2012. The purpose of the visit was to sign a renewed Memorandum of Understanding (MoU) with the Academy. The MoU better reflects the Australia–India Fellowships supported by the Australia–India Strategic Research Fund (AISRF), a platform for bilateral collaboration in science jointly managed and funded by the governments of Australia and India in collaboration with the Academy and the Indian National Science Academy.

While in Canberra, members of the delegation visited CSIRO Plant Industry and the Australian National University, and were guests of honour at a dinner at the Academy's Shine Dome. The delegation then travelled to Sydney for further visits at the University of Sydney and University of New South Wales.



Alok Kumar Moitra, Krishan Lal and N Sathyamurthy conducting a site visit in Sydney.

Special events

Academy President's visit to Japan

Professor Cory visited Japan in March 2013 to be formally admitted as one of only 27 Honorary Members. While there, she met with the Japanese Academy of Science President, Dr Masaaki Kubo, and other senior members of the Japanese Academy, to discuss bilateral relationships. Professor Cory also met with senior science and diplomatic officials at the Australian Embassy in Tokyo, and gave lectures at the University of Tokyo Medical School, the Kyoto University Graduate School of Medicine/Biostudies and Osaka University.

The Australian Academy of Science has built collaborative relationships with scientists in Japan over many years, including through a joint exchange program with the Japanese Society for the Promotion of Science and a program of postdoctoral and invitational fellowships for Australian researchers to work in Japanese research institutions.

Professor Kurt Lambeck awarded Legion of Honour

Professor Kurt Lambeck was awarded the Legion of Honour by the French Government in recognition of his contribution to the field of science and his strong ties to France.



PHOTO: MEL ADAM, THE CANBERRA TIMES

Kurt Lambeck with his Legion of Honour medal, Shine Dome, 6 March 2013

Professor Lambeck was presented with the Legion of Honour medal — the highest decoration in France — by French Ambassador Stéphane Romatet on 6 March 2013 at a reception at the Shine Dome.

40th anniversary of diplomatic relations between Australia and China

In recognition of the Academy's longstanding relationship with the Chinese Academy of Sciences (dating back to 1980), Academy President Professor Suzanne Cory was invited to events organised by the Australian Government to celebrate the 40th anniversary of diplomatic relations between Australia and China. These included the Prime Minister's gala dinner in the Great Hall of Parliament House on 12 December 2012. A briefing at CSIRO

Black Mountain on CSIRO's activities for a Chinese delegation led by Madam Liu Yandong, China State Councillor responsible for Health, Education, Science, Culture and Sport on 13 December afforded an opportunity to talk about the Academy's activities with China and science-related activities between the two countries.

Future Lindau funding secured

The Academy is delighted that for eight years from 2013, support for attendance will be provided through the Science and Industry Endowment Fund under the Australian Academy of Science Fellowships to the Lindau Nobel Laureate Meetings scheme.

Applications for attendance at the meetings undergo a competitive selection process, and are judged by the relevant National Committee for Science and by a selection committee comprised of Academy Council members.

Up to 10 Australian-based early career science researchers will be supported by fellowships to attend meetings in specialist discipline years, and up to 15 in multidisciplinary years. The funding will also cover a member of Council or prominent senior Australian scientist nominated to accompany the delegation.

Before the Lindau meeting the selected young researchers will be sponsored by the Academy to attend *Science at the Shine Dome* to participate in a pre-meeting briefing and the early career researcher programs. More information on Lindau meetings can be found at www.lindau-nobel.org.

Support for international collaborations

The Academy's international scientific and technological collaboration programs aim to improve Australian access to global science and technology and increase awareness of Australian research. These programs provide Australian researchers with opportunities to collaborate with foreign colleagues, to widen research perspectives and experience, exchange ideas, access facilities and equipment unavailable in Australia, gain information and knowledge of techniques that will stimulate and advance Australian research, and be involved in large international projects.

The activities outlined below were managed by the Academy and financially supported by the Australian Government Department of Industry, Innovation, Science, Research and Tertiary Education (DIISRTE). Full details about these activities are available at www.science.org.au/internat

EUROPE

European Cooperation in Science and Technology (COST)

COST is one of the longest-running European frameworks supporting cooperation among scientists and researchers across Europe. In 2007 the Academy and COST signed a reciprocal agreement to enable Australian researchers to participate in 'COST Actions' and access European expertise, facilities and sources of funding. Each COST Action is a network of funded research projects in an area of interest to at least five COST countries. COST provides financial support to COST Actions for activities such as conferences, short-term scientific exchanges and publications. Each COST Action has an objective, defined goals and clear deliverables.

Involvement in COST Actions helps raise the international profile of Australian research through joint publications, by creating research networks with Europe, and by increasing Australian scientists' awareness of industry partners and support provided by European funding agencies.

Further details about the program and a full list of the 39 researchers supported by the scheme to undertake visits in the reporting period can be found at www.science.org.au/internat/europe/index.html.

Dr Peter Macreadie, University of Technology Sydney, received a 2012–13 COST grant to attend a meeting in November 2012 for COST Action ES0906, 'Seagrass productivity: from genes to ecosystem management'. He noted that the trip involved working with about 100 seagrass scientists from around the world, attendance at about 60 talks and five workshops, presentation of his latest research on climate and human impacts on coastal carbon sinks, a field trip involving sampling of Brazilian seagrasses, initiation of a global study on seagrass structural carbohydrates, completion of one paper and start of another.

Dr Lidia Matesic from the Australian Nuclear Science and Technology Organisation (ANSTO) visited the Centre Cyeron in France in October – December 2012. Her visit strengthened ANSTO's collaboration with Dr Sobrio at Centre Cyeron, who shares a mutual interest in caspase-3 inhibitors for the imaging of stroke. Dr Matesic also had initial discussions about an exchange of PhD students or researchers between ANSTO LifeSciences and Centre Cyeron.

Dr Jenna Iwasenko from the University of New South Wales undertook research on human cytomegalovirus (CMV)-induced

placental damage by dysregulation of host cellular pathways in the placenta and the effect of CMV therapeutics. The FASIC early career fellowship was essential for her visit to the Centre National de Référence des Cytomégalo virus. Her work there will result in at least one publication, with more publications from further collaboration, which will continue to be funded by a NHMRC Project Grant (2013–15). While in Limoges, Dr Iwasenko also had the opportunity to contribute to the analysis of a France-wide study of CMV antiviral resistance, and will be an author on at least one publication resulting from this large study group.

France–Australia early career fellowships

The France–Australia Strategic Innovation Collaboration (FASIC) Program for bilateral collaboration in science is jointly managed and funded by the governments of Australia and France. It expands research and innovation activities and initiates sustainable research networks and linkages to support both countries' research and innovation priorities by supporting high calibre Australian and French early career researchers, nominated by their institutions.

Because of its strong links with France, the Academy was invited by the Department of Industry, Innovation, Science, Research and Tertiary Education to manage the Australian component of the 2012 FASIC program. In March – April 2012, 21 Australian researchers applied to the program; 15 leading early career researchers selected by a panel of fellows were awarded grants.

Details of the programs and a list of the researchers supported by this scheme can be found at www.science.org.au/internat/europe/index.html.

Joint Australia–EU and Australia–Germany meetings

The Academy, in conjunction with the Group of Eight, provided administrative assistance to the Australian delegation attending the Australia–Germany Joint Science and Technology Cooperation meeting on 18–19 October 2012 in Bonn, and the Australia–EU Joint Science and Technology Cooperation Committee meeting on 15–16 October 2012 in Brussels. Led by Patricia Kelly,

Deputy Secretary of DIISRTE, the delegation included representatives from Australian research organisations, universities and the department. The first meeting provided an opportunity for government officials to share recent policy developments and discuss ways to further strengthen and enhance the bilateral relationship. The latter meeting provided an opportunity for Australia and Germany to share expert knowledge on global challenges in the areas of preventative health and biodiversity.

ASIA

Australia–India Fellowships

The Australia–India Strategic Research Fund (AISRF) for bilateral collaboration in science is jointly managed and funded by the governments of Australia and India (www.innovation.gov.au/aisrf). The Academy's Chief Executive Dr Sue Meek FTSE FAISD was invited to participate in a review of the fund conducted during the reporting period as a member of the AISRF Evaluation Steering Committee.

The Academy, on behalf of DIISRTE, managed the first call for Australian researchers to apply for Early Career and Senior Visiting Fellowships to travel to India and undertake research during 2012–2013. Twenty applications for the Early Career Fellowships and 44 applications for the Senior Visiting Fellowships were received. Two selection committees made up of 19 Fellows from a range of discipline areas assessed the applications and approved 16 early career applications and 33 senior visiting applications. The total amount of funding allocated to the 49 fellowships was \$621 700.

Australia–India Early Career and Senior Visiting Fellowships 2012–13

Dr Md Mizanur Rahman, University of South Australia, visited Professor TG Sitharam from the Indian Institute of Science in Bangalore, India. He worked with his host in collaborative research on instability behaviour of sand with fines. The two researchers are now exploring the potential of extending the collaboration with discrete element method and liquefaction hazard zonation by GIS image analysis. This fellowship enabled Dr Rahman to access a large quantity of data to further evaluate his hypothesis.

The fellowship also promoted the development of collaboration with Dr Nurhan Ecemis from the Izmir Institute of Technology, Turkey, who is part of a group that applied for collaborative funding under the Marie Curie International Research Staff Exchange Scheme for a collaborative effort by researchers from Australia, Germany, India and Turkey.

Lists of the successful early career researchers and senior visiting researchers can be found at www.science.org.au/internat/asia/india-ecr-participants-2012-2013.html and www.science.org.au/internat/asia/india-senior-participants-2012-2013.html respectively.

The Indian National Science Academy is the Academy's counterpart organisation in India for this fellowship scheme, which it manages on behalf of the Indian Department of Science and Technology and the Indian Department of Biotechnology. The Indian National Science Academy opened a call for applications during August and September 2012 and selected 21 early career researchers and 11 senior visiting researchers.

A list of the successful Indian early career researchers in 2012–2013 can be found at http://insaindia.org/pdf/Indo-Australia_Visiting_Fellowship_Programme-2012.pdf.

Australia–Japan joint meeting in Tokyo

The 14th Australia–Japan Joint Science and Technology Committee meeting organised by the Department of Industry, Innovation, Science, Research and Tertiary Education (DIISRTE) and the Japanese Ministry of Education, Culture, Sports, Science and Technology was held on 23–24 August 2012 in Tokyo.

DIISRTE invited Ms Nancy Pritchard, the Academy's manager of international programs, to be part of the Australian delegation and to give a presentation on the Academy's exchange programs (which began in 1979) with the Japan Society for the Promotion of Science.

This high-level bilateral government meeting with Japan was an opportunity for the two governments to update key policy information in science and research, and to reaffirm the importance and value Australia sees in its science and technology relationship with Japan. The meeting agreed to increase bilateral collaboration, including the continuation of the exchange program with the Japan Society for the Promotion of Science and funding for two bilateral workshops. The Academy will manage these workshops in the second half of 2013 on the topics of marine sciences and neutron sciences. The marine science workshop will take place in Japan while the neutron science one will be hosted by Australia.

Japan Society for the Promotion of Science (JSPS)

JSPS fellowships for overseas researchers

The JSPS has made postdoctoral and invitational fellowships available to Australian researchers every year since 1979. The number of awards varies from year to year up to a maximum of \$2 million a year. This year around \$1 million was allocated.

The postdoctoral fellowships provide opportunities for Australian researchers to conduct cooperative research with leading research groups in universities and other Japanese institutions, for a period of 12 to 24 months. In 2012–13, 14 Australian researchers were awarded postdoctoral fellowships.

Additionally, eight researchers were awarded short-term invitational fellowships and one researcher was awarded a long-term invitational fellowship. These fellowships are for senior

Australian researchers invited to attend seminars and give lectures. These visits depend on established contacts between scientists in both countries, a condition considered favourable to the promotion of future scientific cooperation and exchange.

Further information on the researchers who participated in this program can be found at www.science.org.au/internat/asia/index.html.

Japan scientific visits program 2012–13

The Academy and the JSPS have also had an exchange program of short-term visits of up to four weeks for senior researchers in each direction. For Australians, these visits support senior scientists to visit Japan to collaborate with researchers in institutions associated with the society. During the reporting period the scientific visits program supported eight Australian scientists.

Further information can be found at www.science.org.au/internat/participants.html.

JSPS Alumni Association in Australia

The JSPS has established alumni associations in a number of countries including the UK, USA, Germany and France. These associations organise activities such as symposiums and workshops, annual or general assemblies, pre-orientation and pre-departure meetings and newsletters.

In January 2013, the Department of Industry, Innovation, Science, Research and Tertiary Education (DIISRTE) funded the Academy to survey Australian recipients of the society's invitational and postdoctoral fellowships, to assess interest and support for this initiative in Australia. The responses demonstrated strong support for an alumni association and the department and the Academy are in the process of establishing an organising committee.

Fifth JSPS HOPE Meeting

Six Australian PhD or postdoctoral students were selected by the Academy's National Committees for Medicine, and Plant and Animal Sciences, to attend the Fifth HOPE meeting in Tokyo, Japan from 26 February to 2 March 2013. The theme for the meeting was life sciences and related fields. During the meeting, the students were able to

engage in interdisciplinary discussions with Nobel Laureates and other distinguished scientists.

Previous HOPE participants have indicated that the meetings helped them to develop their scientific careers via the establishment of professional networks that have sustained them throughout their careers.

All of the Academy's activities with JSPS listed above were funded by DIISRTE.

Other international collaboration programs

Embassy of France Cotutelle program

Since 2002, the Academy has administered the Cotutelle postgraduate fellowships program on behalf of the Embassy of France in Australia. The program operates in Australia and France and is designed to promote two-way international research collaboration. A 'Cotutelle Convention' binds the two partner institutions and recognises the validity of studies undertaken. If successful, a double-badged degree is awarded to the student.

Two Australian and five French PhD students were supported under this activity during the reporting period.

Rod Rickards Fellowships

The Rod Rickards Fellowships were established in 2010 by the family of Professor Rod Rickards FAA (1934–2007) to honour his outstanding achievements in the chemistry of compounds of medical, biological, agricultural and veterinary importance. Two fellowships are awarded each year to excellent scientists undertaking research in Europe in the areas of chemistry or biology. The fellowships are supported by the family of Professor Rickards. For details see www.science.org.au/internat/europe/rod-rickards-participants.html.

Bede Morris Fellowships

A Bede Morris Fellowship has been awarded by the Academy in most years since 1990 to an outstanding Australian scientist undertaking research in France. The fellowship is in honour of Professor Bede Morris's contribution to science and French–Australian relations. Professor Morris was a pioneer of immunology in Australia, establishing the first department of immunology in Australia in 1969 at



Bowen Dempsey, Macquarie University — see Academy's Adam J Berry Memorial Fund web page (below)

the John Curtin School of Medical Research at the Australian National University.

Further details of the current and previous recipients of the Bede Morris Fellowship can be found at www.science.org.au/internat/europe/bede-morris-participants.html

Adam J Berry Memorial Fund

The Adam J Berry Memorial Fund has been co-managed since 2004 on behalf of the Berry

family by the Academy and the US National Institutes of Health Foundation. Each year it helps an early career Australian researcher to travel or work in the USA at one of the institutes of the National Institutes of Health.

Further details and photos of the current and previous recipients of the Adam J Berry Memorial Fund can be found at: www.science.org.au/internat/americas/berry-participants.html

Academy medals and lectures

The recognition of outstanding contributions to the advancement of science is central to the purpose of the Academy. Honorific awards for distinguished research are made to career researchers for contributions made during their working lives, and for outstanding achievements by early career researchers under the age of 40.

Career awards

The 2013 honorific awards for scientific excellence were awarded to the following researchers for their contributions to science:

2013 Matthew Flinders Medal and Lecture for scientific research of the highest standing in the physical sciences: Professor Kenneth

Freeman FAA FRS, Research School of Astronomy and Astrophysics, Australian National University

2013 David Craig Medal for research in chemistry: Professor Peter Andrew Lay FAA, School of Chemistry, University of Sydney

2013 Hannan Medal for research in statistical science: Professor Matthew Paul Wand FAA, School of Mathematical Sciences, University of Technology Sydney

2013 Thomas Ranken Lyle Medal for research in mathematics or physics: Professor Cheryl Elisabeth Praeger AM FAA, School of Mathematics and Statistics, University of Western Australia

2013 Jaeger Medal for research into earth sciences: Professor Roger Powell FAA, School of Earth Sciences, University of Melbourne

More information about the awardees is available at www.science.org.au/awards/awardees/2013/awards.html#career



Kenneth Freeman



Peter Lay



Matthew Wand



Cheryl Praeger



Roger Powell



Ulrike Mathesius



Benjamin Kile



Alexandra Filipovska



Lisa Alexander



Wouter Schellart



Aurore Delaigle



Christopher Blake



Sébastien Perrier

Early Career awards

The 2013 honorific awards for scientific excellence were awarded to the following early career researchers (of no more than 40 years of age in the calendar year of nomination):

2013 Fenner Medal for research in biology (excluding the biomedical sciences): Dr Ulrike Mathesius, Research School of Biology, Australian National University

2013 Gottschalk Medal for research in the medical sciences: Dr Benjamin Kile, Cancer and Haematology Division, Walter and Eliza Hall Institute of Medical Research, Victoria

2013 Ruth Stephens Gani medal for research in human genetics: Professor Alexandra Filipovska, Western Australian Institute for Medical Research

2013 Dorothy Hill Award for female researchers in the Earth sciences including reef science, ocean drilling, marine science and taxonomy in marine systems: Dr Lisa Alexander, Climate Change Research Centre, University of New South Wales

2013 Anton Hales Medal for research in earth sciences: Associate Professor Wouter Pieter Schellart, School of Geosciences, Monash University, Victoria

2013 Moran Medal for research in statistics: Dr Aurore Delaigle, Department of Mathematics and Statistics, University of Melbourne

2013 Pawsey Medal for research in Physics: Associate Professor Christopher Adam Blake, Centre for Astrophysics and Supercomputing, Swinburne University of Technology, Victoria

2013 Le Fèvre Memorial Prize for research in basic chemistry: Professor Sébastien Perrier, School of Chemistry, University of Sydney

More information about the awardees is available at www.science.org.au/awards/awardees/2013awards.html#earlycareer

2012 career medal presentations and dinners

2012 Haddon Forrester King Medal, sponsored by Rio Tinto

(Funded through the support of family and friends of Haddon Forrester King, and CRA Limited, now Rio Tinto)

The Haddon Forrester King Medal is made to scientists for original and sustained contributions to earth and related sciences. The award is for work of particular relevance to the discovery, evaluation and exploitation of mineral deposits, including the hydrocarbons.

On 19 October 2012 Professor Anthony Naldrett and Dr Shunso Ishihara jointly received this medal from Academy President Professor Suzanne Cory at a black-tie dinner in the Shine Dome. More information about the awardees is available at www.science.org.au/awards/awardees/2012awards.html#haddon

After receiving their medals, the recipients spoke about the highlights of their life's work, Dr Ishihara on 'Discovery and modern relevance of the magnetite-series and ilmenite-series granitoids', and Professor Naldrett on 'Evolution in our thinking about magmatic sulphide deposits over the past 50 years'. Mr Gerard Rheinberger, Exploration Director, Rio Tinto, concluded the dinner with an appreciation of the work of both recipients from an industry perspective.



Suzanne Cory presents the Haddon Forrester King Medal medal to Shunso Ishihara

2012 Ian Wark Medal Dinner and Lecture

On 11 September 2012 Professor Kevin Galvin received the 2012 Ian Wark Medal from Academy Vice President and Secretary, Physical Sciences, Professor Chennupati Jagadish FAA FTSE at a gala dinner at University House, Australian National University, Canberra. Professor Galvin is a world leader in the separation of particles on the basis of size and density in fluidised beds, and the motion of particles near inclined surfaces.

After receiving his medal, he gave his Ian Wark Lecture, 'Why the old adage "publish or perish" is no longer enough', drawing on his experience in getting the reflux classifier developed and funded by industry, to emphasise the importance of links between industry and scientific research. More information about the award and the awardee is available at www.science.org.au/awards/awards/wark.html

2012 MacFarlane Burnet Medal and Lecture

The Macfarlane Burnet Medal and Lecture is the Academy's highest award in the biological sciences, and is presented every second year, alternating with



Anthony Naldrett speaking about magmatic sulphide deposits

the Matthew Flinders Medal and Lecture for the physical sciences. It recognises research of the highest standing in the biological sciences, and commemorates the contributions to science by Nobel Laureate Sir Macfarlane Burnet OM KBE FAA FRS.

Professor Ruth Hall FAA, School of Molecular Bioscience, University of Sydney, received the 2012 MacFarlane Burnet Medal from Academy President Suzanne Cory on 3 May 2012 during Science at the Shine Dome. Professor Hall then presented her Macfarlane Burnet Lecture, 'Acquired antibiotic resistance in bacteria'.

In this she described how superbugs are created by the accumulation by the bacteria of resistance to a number of different antibiotics, making it difficult to find an antibiotic suitable to treat them. This is facilitated by the fact that gram negative bacteria can acquire novel genes that confer resistance to one or more antibiotics, and that groups of antibiotic resistance genes can transfer all together into new bacterial hosts.



Kevin Galvin receives the Ian Wark medal from Chennupati Jagadish

PHOTO: TRIPHOGRAPHY, TATE NEEDHAM



Ruth Hall delivering the 2012 Macfarlane Burnet Lecture

Ruth Hall's research in this field began in the 1980s when she helped investigate an outbreak of gentamicin resistance at the Royal North Shore Hospital, Sydney. With just 2240 base pairs of DNA sequence, and using a VAX computer to compare it with the few DNA sequences available at the time, she discovered something completely unexpected — different resistance genes occupying the same position in a conserved DNA backbone.

Having discovered integrons and gene cassettes in this way, she went on to characterise the way gene cassettes carrying the antibiotic resistance genes are incorporated into integrons, and to show that gene cassettes are a major source of the antibiotic

resistance genes found in difficult to treat gram negative bacteria. A second quite different gene acquisition system was also found sitting next to the gene cassettes in some cases.

Professor Hall continues to work on novel antibiotic resistance gene acquisition systems. More broadly, her work now underpins our understanding of how genes of all types are mobilised by bacteria and hence how bacterial genomes evolve.

More information about the award and the awardee is available at www.science.org.au/awards/awards/burnet.html

Research support and travelling fellowships

The Academy provides research grants to early career researchers for individual research projects in Australia, and travelling fellowships to enable distinguished overseas and Australian Scientists to visit scientific centres and inform the community more broadly through public lectures.

2013 travelling fellowships and scholarships

The following scientists were awarded travelling fellowships and scholarships for 2013:

Oxford Nuffield Medical Fellowship

Dr Jane Hirst, lecturer in Obstetrics and Gynaecology at the University of Sydney/Royal North Shore Hospital, was awarded the prestigious 2013 Oxford Nuffield Medical Fellowship by the Oxford Nuffield Medical Foundation on recommendation from the Academy's Oxford and Nuffield Medical Fellowship Selection Committee.

Dr Hirst has a Master of Public Health. Her doctoral research investigated the prevalence and effects of gestational diabetes mellitus on maternal and perinatal outcomes in Ho Chi Minh City, Vietnam. She has two major goals for her time in Oxford — to learn about randomised control trials and specifically the use of M-Health to manage gestational diabetes mellitus, and to interact with engineering and biotechnology groups to develop alternative technology for underdeveloped countries/regions where mobile phone coverage is still lacking. In addition, she intends to undertake short courses in the ethics of setting up of randomised control trials and good clinical practice.

Douglas and Lola Douglas Scholarship in Medical Science

The Douglas and Lola Douglas Scholarship is offered as a 'top up' scholarship of \$7000 a year for three years to a high-ranked PhD candidate awarded an NHMRC training scholarship in Indigenous or primary health care, with preference to the former.

Ms Emma Grant, University of Melbourne, has received the 2013 scholarship to investigate the immune response to influenza in Indigenous and non-Indigenous populations.

Selby Travelling Fellowship (all sciences)

The Selby Travelling Fellowship is financed through the generosity of the trustees of the Selby Scientific Foundation. Fellowships are awarded to distinguished overseas scientists for visits to Australia for public lecture tours and to visit scientific centres in Australia. Fellows are expected to increase public awareness of science and scientific issues and accordingly will be outstanding lecturers to general audiences.

Professor Robert Warner, Research Professor, Department of Ecology, Evolution, and Marine Biology, University of California Santa Barbara won the Selby fellowship to visit Western Australia, Brisbane, Townsville, Melbourne and Sydney in February – March 2014.

2013 AK Head Travelling Scholarship

The AK Head Travelling Scholarship for Mathematical Scientists is named in honour of the late Dr Alan Kenneth Head AO FAA FRS (1925–2010) and is funded through the Gwenneth Nancy Head Foundation.

The scholarship supports mathematical science students and young researchers to further their studies and develop new international networks

and collaborations whilst visiting facilities that they would not normally be able to access in Australia.

Dr Julie Clutterbuck, Australian National University, won the Inaugural AK Head Travelling Scholarship to visit Professor Rafael Benguria in the Department of Physics, University of Santiago, and Professor Rajesh Mahadevan at the University of Concepcion, Chile, for five weeks, as well as attending a workshop at the Banff International Research Station, Canada, to collaborate on her proposal 'Curvature flows in shape optimisation'.

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

2013 research support grants

The following scientists were awarded research support for 2013:

WH Gladstone Population and Environment fund grants

This fund supports empirical research into the effect of Australia's population on the environment in terms of health, well-being, the economy and security:

Dr Isaac Santos, Southern Cross University

Do residential canal estate developments increase greenhouse gas emissions from Australian estuaries? Funding \$24 000 over two years.

Margaret Middleton fund for endangered Australian native vertebrate animals

Mr Phil Bouchet, University of Western Australia

Characterising the diversity of mobile ocean predators in a biological hotspot and proposed marine reserve, the Perth Canyon (32°S, 115°E). Funding \$14 950

Ms Amanda Edworthy, Australian National University

Causes of decline in endangered forty-spotted pardalotes. Funding \$11 765

Mr Bastian Egeter, University of Otago, New Zealand

Development and utilisation of molecular techniques to detect and quantify predation on New Zealand and Australian frog species by introduced mammals. Funding \$3244.

Ms Claire Foster, Australian National University

Interacting effects of herbivory and fire on understorey vegetation and its dependent fauna. Funding \$7621

Ms Jenny Molyneux, Charles Darwin University

Understanding the role of fire in managing brush-tailed mulgara (*Dasyercus blythi*) populations in central Australia. Funding \$13 900.

Ms Katrin Schmidt, James Cook University

The ecological role of tadpoles in rainforest streams. Funding \$9480

Reports on 2012 travelling fellowships and lectures

2012 Graeme Caughley Travelling Fellowship

Dr Andrea Byrom, Landcare Research

Dr Byrom made two visits to international institutions as part of the fellowship in April and June 2012. At the University of Sydney she gave a departmental seminar and worked with colleagues Dr Peter Banks, Professor Chris Dickman and Dr Roger Pech to draft a manuscript entitled 'Reinvasion is not invasion again'.

At the University of British Columbia Dr Byrom worked with colleagues Professor Tony Sinclair, Charles Krebs and Roger Pech to draft a manuscript entitled 'Rebranding rewilding'.

Both manuscripts are intended for submission to international scientific journals



Andrea Byrom

2012 Selby Travelling Fellowship

Professor Richard de Grijs, Kavli Institute for Astronomy and Astrophysics, and Department of Astronomy, Peking University, travelled to



Richard de Grijs takes the Shine Dome audience on a journey through the Universe.

Sydney, Canberra, Melbourne, Hobart, Adelaide, Perth, Brisbane and Townsville in October – November 2012.

During the fellowship Professor De Grijs gave public lectures in most capital cities including Canberra, where a packed audience at the Shine Dome took a journey with him through the immensity of the Universe. He used recent images, animations and his own research to traverse the cosmos, starting from planet Earth and visiting the nearest stars, the Milky Way galaxy and beyond to the edge of the observable Universe in just 26 steps. His presentation is available at www.science.org.au/events/lectures-and-speeches/deGrijs.html.

2012 Rudi Lemberg Travelling Fellowship

The Rudi Lemberg Travelling Fellowship is financed through donations from the family of the late Professor Max Rudolf Lemberg FAA FRS and the Australian Society for Biochemistry and Molecular Biology.

Professor Peter A Jones, University of Southern California, travelled to Sydney, Hobart, Lorne,



Peter Jones



Joanne Etheridge and Alexander Moodie FAA after the Lloyd Rees Lecture.

Brisbane, Perth and Canberra in February 2012 on a successful public lecture tour entitled 'How the exploding science of epigenetics will transform our understanding of health and disease and Australia's participation in it'. The tour included the Garvan Institute of Medical Research, Menzies Research Institute, Murdoch Childrens Research Institute, Lorne Genome Conference, WA Institute of Medical Research, Queensland Institute of Medical Research and John Curtin School of Medical Research.

2012 Lloyd Rees Lecture

Professor Joanne Etheridge, Monash Centre for Electron Microscopy, Monash University, gave the 2012 Lloyd Rees Lecture, '101 things to do with an energetic electron', at the Ian Wark Lecture Theatre, CSIRO Materials Science and Engineering, in Clayton Victoria on 4 September 2012.

This was the 11th biennial Lloyd Rees lecture commemorating the life and work of Dr Lloyd Rees CBE FAA, foundation Chief from 1947 to 1978 of the CSIRO Section (later Division) of Chemical Physics.

Professor Etheridge began by highlighting the pioneering contributions of the CSIRO Division of Chemical Physics to the field of electron microscopy and diffraction, and then described recent revolutionary advances in modern electron-optics that are enabling the generation of electron beams that can focus on a point much smaller than an atom. She described how these tiny electron beams can be used to determine the local structure and bonding of small numbers of atoms selected from within a material. She illustrated this with applications to a range of nanostructured materials using the ultrahigh resolution electron microscope capability at Monash University. These included the determination of the structures of nanoparticles for photonic applications, nanoprecipitates in light weight structural alloys, and nanostructured perovskites for battery and memory applications.

Research conferences

The Academy supports conferences aimed at advancing the development and application of science across a range of disciplines.

2012 research conference reports

2012–13 Elizabeth and Frederick White research conference

Exploring the radio continuum Universe with SKA Pathfinders

30 May – 1 June 2012, CSIRO Astronomy and Space Science, Marsfield, NSW. Organised by Dr Nicholas Seymour.

The Square Kilometre Array (SKA) is an international \$2 billion project to develop the most advanced radio telescope in the world with a collecting area of one square kilometre, with orders of magnitude larger than the current most sensitive radio telescopes. Construction of the first phase of the SKA is due to start in 2016, with the first operations in 2020.

Given the recent SKA dual-site decision (Australia and South Africa), the importance of the South Africa pathfinder (MeerKAT) and the two Australian pathfinders (Australian SKA Pathfinder and the Murchison Widefield Array) is now greater than ever.

The conference was the second meeting of the SKA Pathfinders Radio Continuum Surveys (SPARCS) working group, which reports to the SKA project scientist.

The forum aimed to coordinate the radio continuum surveys of the groups in a project that heralds the beginning of a second 'golden age' of radio astronomy. The group also acknowledged that continuum observations are just one facet of radio surveys. Continuum information is vital for spectral line, polarisation and time domain surveys, and there is a large scope for commensality between

different types of surveys. The 3rd SPARCS meeting will be held in 2013, possibly in South Africa or Calgary.

Fenner conference on the environment

Coral Reefs on the edge — new challenges for high latitude coral reef communities

29 June – 3 July 2012, Department of Fisheries (WA) Perth, and the Saville Kent Houtman Abrolhos Island Research Station. Drs Lynda Bellchambers, Stephen Newman, Euan Harvey and Dave Abdo organised the conference.

The National Estate-registered Houtman Abrolhos Islands (Abrolhos) archipelago about 65–90 kilometres offshore from Geraldton, Western Australia, is a unique habitat for tropical and temperate species. Its coral reefs are the most southern in the Indian Ocean and are extremely diverse for the high latitudes at which they occur, with 184 species in 42 genera of coral recorded. Major threats — both anthropogenic (e.g. fishing and tourism) and natural (e.g. ocean warming and the associated potential for ocean acidification) — can affect the ability of coral and macroalgae to grow. In March 2011 warmer than normal sea surface temperatures resulted in the first recorded large-scale coral bleaching at the islands.

This provided the impetus for the conference, which has generated strong links between delegates. Peer-reviewed publications and grant applications arising from the conference will enable further research into the unique islands and the processes that maintain them in the tropical–temperate transition zone of the Western Australian coastline.

Boden Conference

Proteostasis and disease symposium

28–30 November 2012, Novotel Wollongong. Organised by Professor Mark Wilson, School of



Coral and macroalgae assemblages dominate the Abrolhos Islands.

Biological Sciences, Illawarra Health and Medical Research Institute, University of Wollongong.

The processes that maintain protein homeostasis are collectively referred to as proteostasis, a term generally jointly attributed to Professors Rick Morimoto (Northwestern University, USA) and William Balch (Scripps Research Institute, USA), both of whom were invited speakers at the inaugural *Proteostasis and disease symposium* (see proteostasis2012.com.au/2012). The symposium was an initiative of the recently formed Proteostasis and Disease Research Centre at the University of Wollongong, a collective of researchers working on chaperones, protein folding and related diseases www.uow.edu.au/science/researchgroups/pdrc/index.html

Because of the diversity of sub-fields within proteostasis, only a few previous international meetings have been held. In an enthusiastic response from people around the globe, 21 of the 80 delegates came from overseas. A keynote address was given by Professor Chris Dobson FRS (University of Cambridge) on new approaches to understanding and preventing neurodegenerative diseases. A highlight was a student session where six postgraduate student researchers spoke about their results in short 12-minute talks.

2013 research conference announcements

2013 Elizabeth and Frederick White research conference

The University of Melbourne and the University of Newcastle were awarded \$10 000 for their conference *Mathematics of planet Earth 2013*, to be held at Rydges Melbourne, 8–12 July 2013 — mathsofplanetearth.org.au/events/2013/.

2013 Boden research conference

The University of Sydney was awarded \$10 000 for its conference *Photobiology — 6th Asia and Oceanic conference on photobiology*, to be held at Citygate Central, Sydney, on 10–13 November 2013 — www.aocp2013.org.au

2013 Fenner conference on the environment

Sustainable Population Australia Inc was awarded \$10 000 for its conference *Population, resources and climate change — implications for Australia's near future*, to be held at the Shine Dome, Canberra, in October 2013.

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 that aim to promote understanding of science and foster greater awareness of science issues and science-related activities in government, industry, the media, academia and the community.

The Academy engages in outreach and public awareness activities on a daily basis. These include staging public events such as seminars, lectures and conferences; generating and responding to selected news and opinion pieces in the mainstream and online media; initiating and participating in conversations on various social media; participating in broader science sector outreach activities such as National Science Week and the Department of Industry, Innovation, Science, Research and Tertiary Education's 'Inspiring Australia' initiative. The Academy also maintains an up-to-date and dynamic web presence highlighting a range of interesting and important science news, research, reports, education and activities; and publishing books, educational booklets and journals.

Science at the Shine Dome

Science at the Shine Dome is the Academy's flagship annual event to celebrate science. Held in association with the Academy's Annual General Meeting (AGM) for Fellows, it incorporates the formal admission of new Fellows, the presentation of career and early career honorific awards, the annual dinner and symposium, as well as development streams for early career researchers and science teachers.

At *Science at the Shine Dome* in May 2012, the Academy admitted 21 new Fellows and presented

15 awards. Each new Fellow and awardee spoke briefly about their research, providing fascinating insights into Australian scientific achievements and applications across a diverse range of disciplines.

Forty-five early career researcher and 15 teacher delegates attended all public sessions. During the AGM, the early career researchers engaged in targeted professional development sessions on media, grant writing and collaborations (see Early and Mid Career Researchers section), and teacher delegates engaged in hands-on science activities in the classroom.

The Academy's annual black-tie dinner was held for the first time at the National Gallery of Australia's new Gandel Hall. Guest speaker Professor Tom Griffiths FAHA entertained the audience with a vivid exposition on the living and working conditions and ambitious research program of the Australasian Antarctic Expedition led by Sir Douglas Mawson OBE FAA FRS, setting the scene for the following day's annual symposium.

Featuring an outstanding range of speakers, *100 years of Antarctic science* commemorated the centenary of Mawson's expedition (to view the program and presentations go to www.science.org.au/events/sats/sats2012/symposium.html). The symposium was convened by Professor Trevor McDougall FAA and Dr Ian Allison and sponsored by the Institute of Marine and Antarctic Studies at the University of Tasmania.

The Academy holds the original account by Dr Frank Stillwell OBE FAA of Mawson's expedition in the archives of the Basser Library. *Still no Mawson: Frank Stillwell's Antarctic diaries 1911–13* was painstakingly edited by Dr Bernadette Hince and published by the Academy with support from Geoscience Australia and the Geological Society of Australia. The book was launched during the

symposium by the Director of the Australian Antarctic Division, Dr Tony Fleming, in front of an audience that included members of Dr Stillwell's extended family.



Public lecture series

Through its annual public lecture series, the Academy proudly showcases great Australian science and educates the public on national scientific issues of importance. These lectures are held monthly (except for New Year and during *Science at the Shine Dome*) at the Shine Dome in Canberra, simultaneously broadcast via the internet for live viewing, and made available as downloads on our website and through our YouTube and iTunes channels.

2012 *Caring for the Australian countryside: lessons from the past and present*

The 2012 public lecture series was a holistic examination of country Australia, with experts on sustainable communities, mining, agriculture, culture and environment. This popular series, chaired by Professor John Passioura, attracted near-capacity audiences throughout the year, as well as a growing online audience. This series was the Academy's most popular to date, with a total of 1908 attending in person; an increase of 200 from the previous year. The diverse audience came from universities, research institutions, schools,

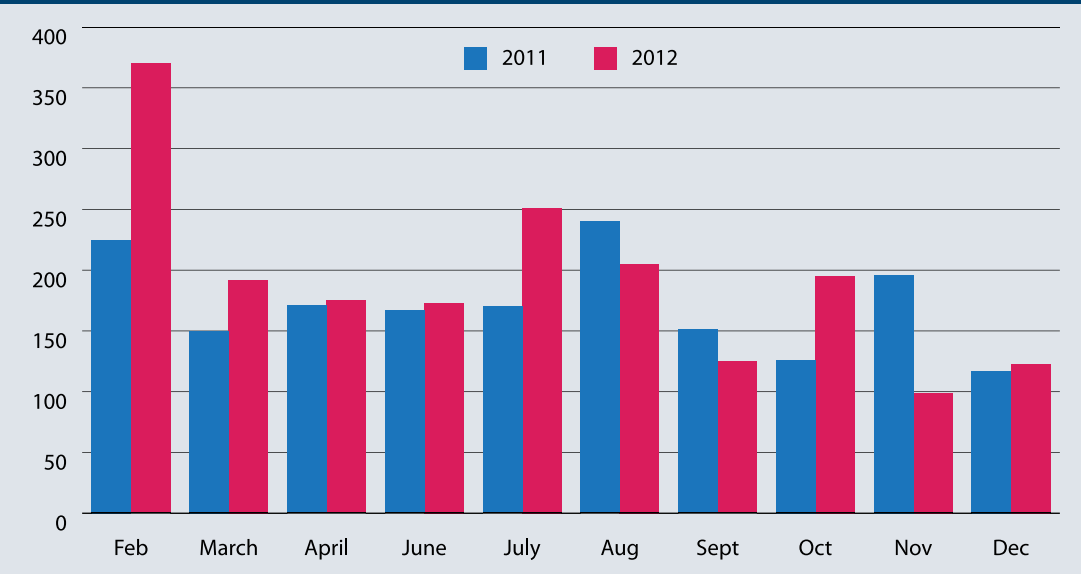
government departments and the general public, with the younger demographic growing steadily. There was also considerable media attention for speakers and topics throughout the series.

For more information about the series and to view the lectures, visit www.science.org.au/events/publiclectures/

2013 *Australian science: global impact*

In February 2013 the Academy began a new public lecture series, *Australian science: global impact*, highlighting some of Australia's top scientists and their world-changing breakthroughs to complement Centenary of Canberra celebrations (and appearing in the Centenary program). The series is chaired by Nobel Laureate Professor Brian Schmidt AC FAA FRAS. In addition to Professor Schmidt speaking on his discoveries on the accelerating expansion of the Universe, the series will feature scientists including those behind the invention of the bionic ear, the development of the cervical cancer vaccine, wi-fi, and the chemistry of turning waste into environmentally friendly bio-oil.

Figure 5: Attendance at 2011 and 2012 Academy public lecture series (including online)*



*Public lectures are not held in January or May



Elizabeth Blackburn with student members of the audience during her Hooked on Science Australian lecture tour

For more information about the series and to view the lectures, visit www.science.org.au/events/publiclectures

Other lectures

The Academy also stages other lectures and public events in Canberra and other Australian capital cities throughout the year, often taking advantage of visits by international scientists. These lectures can be found at www.science.org.au/events/speeches.html.

- **21 January 2013**, *Making science work*, lecture by UK Royal Society President Sir Paul Nurse, Melbourne University, Melbourne. This lecture was proudly supported by the Academy and the University of Melbourne
- **5 November 2012**, *Out and about in the Universe*, Academy's 2012 Selby Travelling Fellowship public lecture by Professor Richard de Grijs at the Shine Dome, Canberra
- **10 October 2012**, *Bringing science to the forefront of government policy: addressing today's challenges*, lecture by UK Government Chief Scientific Advisor Professor Sir John Beddington, at the Shine Dome, Canberra (see below)
- **4 September 2012**, *101 things to do with an energetic electron*, Academy's 2012 Lloyd Rees lecture by Professor Joanne Etheridge, at CSIRO Materials Science and Engineering, Melbourne

- **9 August 2012**, *Whither the mountains: an odyssey*, Academy's 2012 Mawson Medal and Lecture by Professor Gordon Lister, at the International Geological Congress, Brisbane
- **14–21 June 2012**, *Hooked on science: from Australian schoolgirl to Nobel Laureate*, by Professor Elizabeth Blackburn at various locations in Brisbane, Sydney, Canberra, Melbourne and Hobart. This speaking tour was aimed at high school students and proudly supported by the Academy and Atlantic Philanthropies.

UK Chief Scientific Adviser speaks at the Shine Dome

In association with the British High Commission, the Academy hosted the UK Government Chief Scientific Adviser Professor Sir John Beddington CMG FRS, who gave a public lecture to a capacity audience at the Shine Dome in October 2012. He spoke about how providing accurate and timely scientific advice to government can aid responses to catastrophic events such as the 2009 swine flu outbreak, the 2010 volcanic ash incident, and the 2011 Fukushima nuclear disaster.

Public lecture by the President of the UK Royal Society

In partnership with the University of Melbourne the Academy hosted a public lecture by the President of the UK Royal Society, Sir Paul Nurse FRS, in January 2013. In his talk *Making Science Work*, Sir Paul discussed the challenges of providing good scientific advice to society and how good decisions can be made about what public-good research should be supported. The full text of his speech is available at www.science.org.au/events/documents/Sir_Paul_Nurse_Jan_2012.pdf

attracting a new and diverse audience to the Shine Dome, including school and undergraduate university students as well as adults without a tertiary education. This series was fully sponsored by the ACT Government.

For more information about the series and to view the lectures, visit www.science.org.au/events/science-week/2012

Publications

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

Appendix 8 lists all 2012–13 printed and online publications.

National Science Week

The Academy was closely involved in National Science Week in August 2012, with representation on the federal coordinating committee and stewardship of the ACT National Science Week program. As well as promoting National Science Week activities generally, the Academy ran its own special week-long speaker program 'Giants of Science', featuring Fellows Professor Brian Schmidt, Dr Mike Raupach, Professor Chris Goodnow and multimedia science artist Peter McLeish. The series was a resounding success, reaching more than 1400 people in person and online during the week and

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, and an annual bibliography of the history of Australian science. The board chair is Dr John Passioura FAA, who takes primary responsibility for identifying suitable authors for the biographical memoirs, which are commissioned by the Council of the Academy.



Science artist Peter McLeish during National Science Week, 2012

The journal is edited jointly by Professor Rod Home AM FAHA (who has been the editor since 1984) and Professor Libby Robin, an arrangement extending for five years from early 2010. The book reviews editor is Dr Sara Maroske, who is an ex officio member of the journal's editorial board.

Two issues of the journal were published in 2012 with six historical articles, six biographical memoirs, two series of book reviews and notices covering 25 books and two DVDs, and the annual bibliography of the history of Australian science compiled by Helen Cohn. 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. Biographical memoirs reproduced from the journal are also made available on the Academy website after publication, at www.science.org.au/fellows/deceased.html.

Australian Journals of Scientific Research

The Academy of Science and CSIRO jointly publish 13 Australian journals of scientific research (see Appendix 9). The current five-year agreement covering publication ends in 2018.

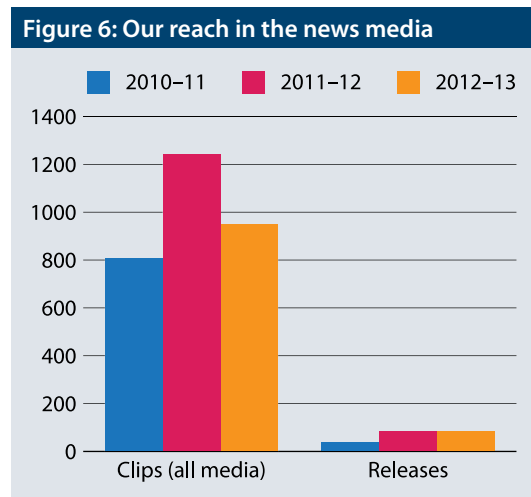
The journals have an international readership with subscribers in about 100 countries and can be used free by scientists in 71 developing nations around the world, through the United Nations' Research4Life program. About half of the published papers originate outside Australia. Researchers from almost 90 countries submitted papers to the journals during 2011. 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 has been the Academy's chair of the board since 2009 and stepped down in 2012. She has been replaced by Professor Andrew Holmes AM FAA FRS FTSE. Details of these and other journals published by CSIRO are available at www.publish.csiro.au/%20nid/50.htm?nid=17.

Academy in the media

The Academy maintains a strong presence in the news media and opinion pages of Australia's mainstream press, radio, television and online news outlets.



David Attenborough signed the Academy's Charter Book in Melbourne, August 2012 (see p 67)



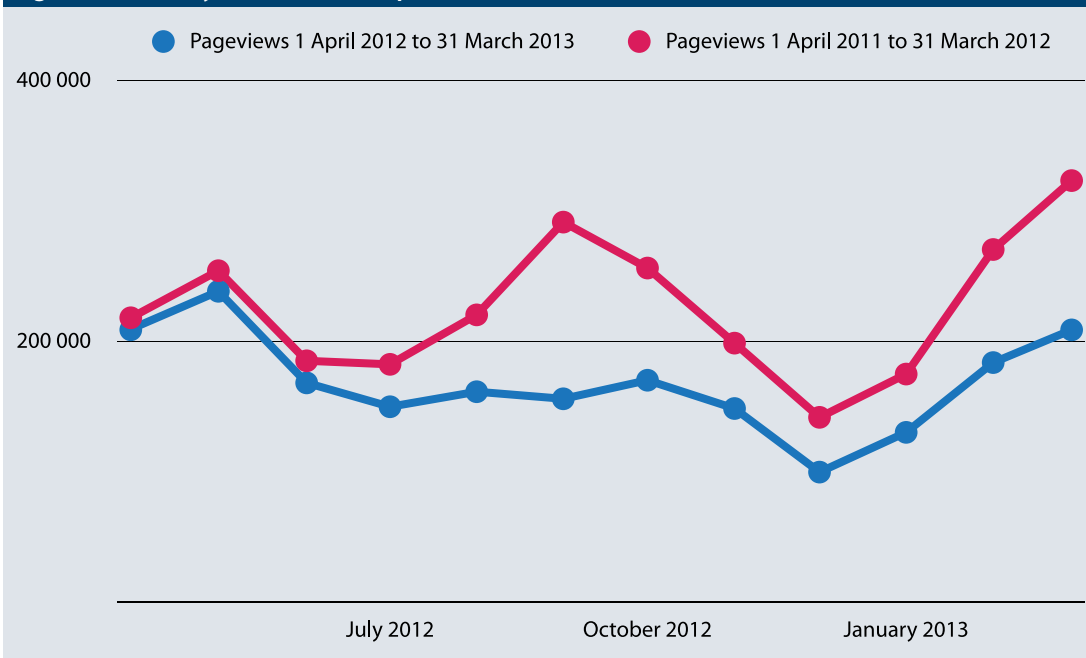
During the reporting period, media coverage extended beyond major metropolitan newspapers to more major regional publications, indicating that the sphere of the Academy's influence has broadened. Broadcast coverage was achieved on major television and radio stations across the country, including current affairs television and radio programs such as *Sunrise*, *AM*, *The World Today*, *The Project* and *24 News Breakfast*. There has been

Table 10: Age and gender of Academy Facebook followers

	13-17	18-24	25-34	35-44	45-54	55-64	65+
Female 49.8%	0.6%	5.9%	18.9%	15.3%	4.8%	3.1%	1.1%
Male 48%	0.6%	10.5%	16.4%	9.7%	7%	2.2%	1.7%

Percentages may not add up to 100 because not everyone on Facebook specifies gender.

Figure 7: Academy website traffic April 2012 – March 2013



a steady increase in online clips in keeping with the society-wide trend to digital media. Mentions of the Academy in editorial commentary and opinion pieces have increased considerably during the reporting period, demonstrating that the Academy's activities and policies are influencing thought. An overwhelming majority of media items this year has been positive in nature, with only seven unfavourable articles (see Figure 5).

The launch of *The science of immunisation: questions and answers* in November 2012 was the most successful media event in the Academy's history, generating more than 250 clips from across all major media outlets, including all free-to-air television news bulletins, Channel 7's *Sunrise* program, ABC 24's Breakfast program, all major radio networks, Fairfax and News Ltd broadsheet and tabloid newspapers, 'The Conversation', 'Crikey', and other major online outlets. It also received significant attention from the medical press and blogs with a relevant target audience, such as essentialbaby.com.au and mamamia.com.au, which even staged a 'pledge campaign' encouraging



A duckling uses the ramp specially designed and built for this purpose by the Academy's groundsman

readers to sign an online pledge promising to have their children immunised.

Assisted by this extensive coverage of a topical issue, more than one million copies of the booklet have now been ordered in hard copy or downloaded as a pdf. For more information about development of the booklet see the Science Policy section.

Its predecessor in the series, *The science of climate change: questions and answers* continues to receive regular mentions in the media and more than 800 000 copies have been ordered or downloaded, more than two years after its release.

Social media

The Academy uses social media to publicise events, public lectures, policy statements, awards winners, Academy programs and to share interesting science stories.

The Academy's social media presence has expanded this year with its Twitter account (**@Science_Academy**) more than doubling its followers to 2447 from 1100 in 2011. Top tweets from the Academy account have directly reached

in excess of 38 000 accounts. An Academy Facebook account (www.facebook.com/AustralianAcademyofScience) was launched on 31 July 2012; there are now 718 registered 'likes' for the Academy page, and about 1500 people visit the Facebook page every week.

The most popular issues for the Academy on social media have been immunisation, the admission of Sir David Attenborough as a Corresponding Member, the Early and Mid Career Researcher Forum and the adventures of the ducks living in the Shine Dome moat.

Newsletter

This year, the quarterly Academy Newsletter became fully electronic from September 2012. It is now emailed to more than 1000 people and has a further 854 online subscribers. The news and announcements section of the Academy website www.science.org.au/news is updated in real time with news of Academy activities, Fellows' achievements and new publications.

Activities of regional groups

Regional groups of Academy Fellows host local events, often with other learned academies, to promote public awareness of the Academy. These local activities also provide opportunities for Fellows to meet socially.

Australian Capital Territory

Chair: Professor John White FAA FRS

Late in 2011 and early in 2012, a number of Canberra region Fellows became concerned about the extent to which Fellows were participating in the business of the Academy. The issues were discussed in two meetings which formulated resolutions to Council in time for discussion at the annual general meeting in May 2012. The value of more widespread participation by Fellows was expressed by all, as was the desire for continued discussion of issues and an open meeting of the Canberra Fellows in March or April 2013.

NSW

Chair: Professor Ian Dawes FAA

The NSW regional group held two functions in 2012. In conjunction with our local ATSE colleagues, the group hosted another very successful evening of 'Scientists' stories — the Academies meet high school students'. This year the meeting was at the University of NSW (UNSW) on Tuesday 14 August during National Science week, and had about 120 registrants (more than the previous year), who were mostly students but also members of the academies, teachers and parents.

The evening involved four short talks of 15 minutes, followed by refreshments during which the students had the opportunity to meet and discuss science with members of the Academy. Professor Richard Harvey FAA provided a stimulating view on heart development and Professor Joss Bland-Hawthorn FAA gave an enthusiastic presentation on

manipulating the flow of light and the applications of photonics in astronomy. The focus then switched to materials science with Professor Aibing Yu FAA FTSE on small particles. The talks were rounded off with a wonderful discussion entitled 'Beyond the nano-world: tales of quantum physics, new elements, and the natural environment' by Professor Mahanadah Dasgupta FAA who braved serious back pain to travel from the Australian National University and contribute to the success of the evening.

As on the previous occasion the students all sought out the speakers to ask questions rather than the food and drinks. Our thanks go to the Faculty of Science, UNSW, who funded and helped organise the meeting and to the Dean, Professor Merlin Crossley, for once more acting as the MC for the evening. A similar event is being organised for 2013, although the group will continue to experiment with the timing to try and ensure there is a maximum opportunity for students to attend.

The joint AAS/ATSE dinner with speaker was held on 22 August 2012. Speaker Dr Barry Goldstein is South Australia's Executive Director for Energy Resources, the current Chair of Australia's Coal Seam Gas Steering Group, and Chairman of the Australian Geothermal Energy Group. He is an expert on unconventional energy sources including coal seam and shale gas, and his overview of the future utilisation of energy sources in Australia was very stimulating.

Victoria

Chair: Professor Tony Klein AM FAA

The annual Victorian New Fellows and Medal Winners symposium took place on 7 June 2012, with the usual very wide range of subjects covered in short 10-minute talks. The first speaker was Professor James McCluskey, Deputy Vice-Chancellor (Research) at the University of Melbourne who spoke on 'How genes control immunity'. He was

followed by Professor Francis Carbone FAA, also of the University of Melbourne, who continued the theme by speaking about 'Immunity at Body Surfaces'. Professor John Endler FAA, the first Fellow of the Academy to have been elected from Deakin University, talked on 'Visual effects and animal diversity', and Dr Graeme Moad FAA of the CSIRO Division of Materials Science and Engineering spoke about 'Polymer design and synthesis'. Professor Frances Separovic FAA of the University of Melbourne was next, on 'Killer molecules, toxins and cells', and she was followed by Professor Jane Visvader FAA of the Walter and Eliza Hall Institute of Medical Research whose subject was 'Breast stem cells and implications for breast cancer'.

The final speaker on this fascinating program of talks was the winner of the 2012 Anton Hales Medal for research in Earth Sciences, Dr Todd Lane of the School of Earth Sciences at the University of Melbourne whose subject was 'Thunderstorms,

waves and turbulence'. The symposium was followed by a dinner for speakers, Academy Fellows and guests.

The Combined Academies' Dinner, an annual event, organised this year by the Academy of Technological Science and Engineering, was held on 23 August. The after-dinner speaker was Professor Rob Sheppard, Director of the Bionics Institute, who gave an excellent account of bionics in various applications, from the bionic ear to the bionic eye that is currently being developed.

Finally, the 2012 Christmas party and dinner took place once again at the Boulevard Restaurant in Yarra Bend Park on 29 November. The entertainment provided by a flamenco troupe was a riotous affair, with music and dancing that got Fellows and guests of all ages up on the dancefloor.

The Shine Dome and Ian Potter House

The Shine Dome's basement had extensive fire rating works completed to enable the Shine Dome to comply with relevant Australian Standards (AS 1682.2 - Fire Dampers and AS 1530.4, AS 4072.1 - Penetrations).

In 2012 the Australian National University requested an increase in the area it leases on the first floor of Ian Potter House. To accommodate this, the Science by Doing team was relocated to the Shine Dome after modification of offices and the Fellows Room. In the process a new meeting room known as the Fenner Room was created in the Basser Library.

In February and March 2013 the gardens on the Marcus Clarke Street side of Ian Potter House were upgraded. The gardens were in poor condition after years of drought. The design of the new gardens has greatly improved the appearance of Ian Potter House.



Gardens of Ian Potter House in early 2013, when restoration works began

Figure 8: Dome use (days per month)
April 2011 – March 2012 compared with April 2012 – March 2013

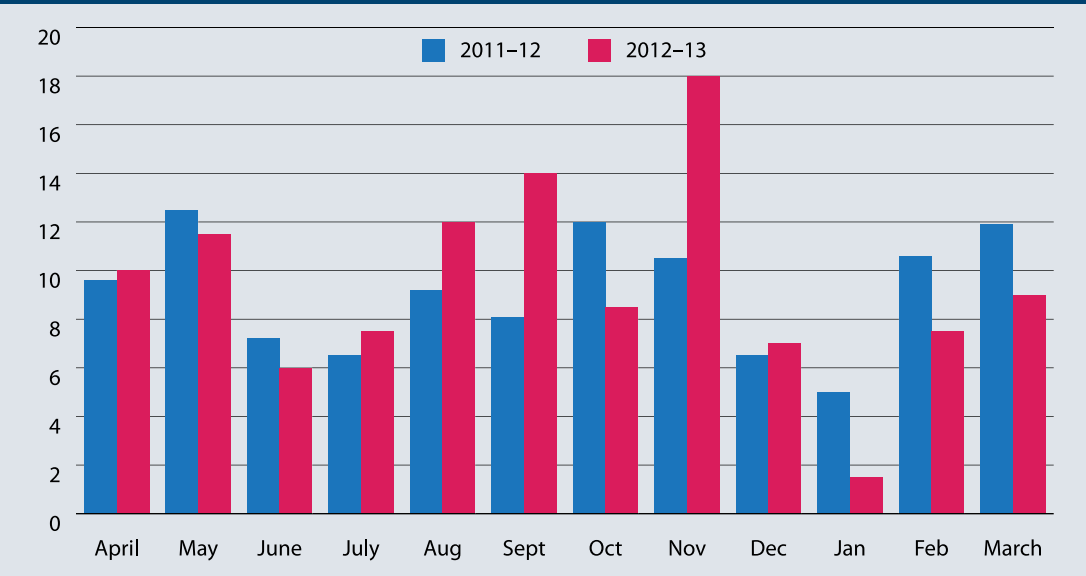
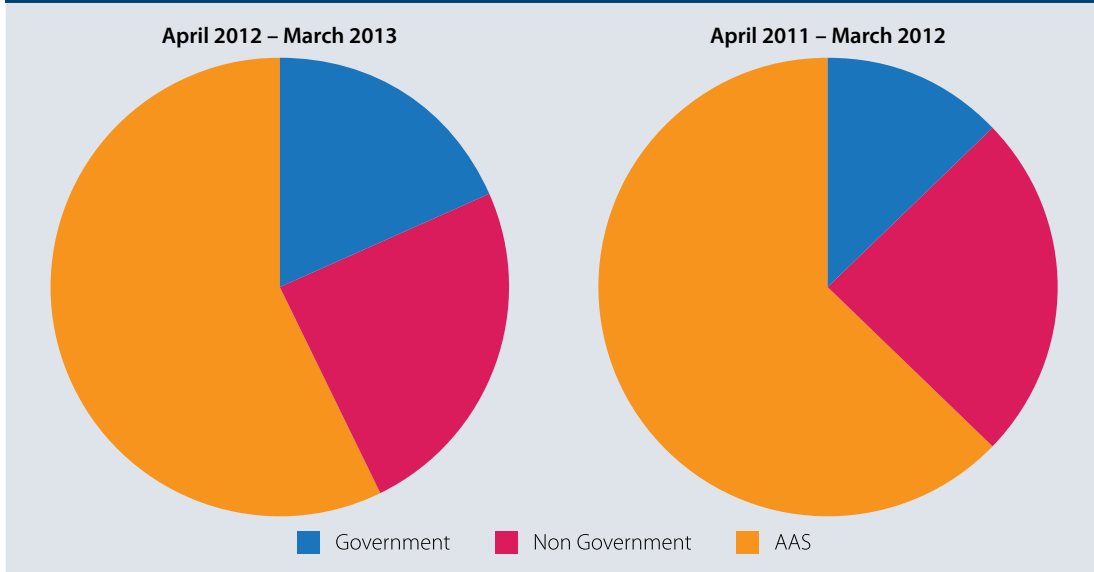


Figure 9: Dome use by sector



As well as housing the Library and offices for a number of Secretariat staff, the Shine Dome is used regularly as a meeting, lecture and conference venue by the Academy, its Council and National Committees for Science. It also remains a popular conference venue for government and other organisations, with total use days in the reporting period of 112.5 in 2012–13 compared with 109.5 the previous year.

The Academy accepted an invitation from the Canberra Convention Bureau to become a member of the Research and Learning Institutions Group.

The Group includes a big component of the Bureau's promotion of Canberra as a conference venue and includes the Australian National University, the National Film and Sound Archive, the National Library and the National War Memorial. An event to introduce potential users to the Shine Dome's facilities was held on 8 November 2012, with about 60 guests attending, including ACT Chief Minister Katy Gallagher, ACT federal parliamentarians Andrew Leigh and Gai Brodtmann, and ACT Greens MLA Shane Rattenbury.

Basser Library

Manuscript collection

The manuscript collections have grown to 231 with the addition of one new collection — that of Dr Susan Turner (biographical material on Queensland women geologists) — this year.

Material was added to the papers of the Australian Society for Parasitology, FJ Bergersen, AJ Birch and JM Swan.

Staffing and use

Academy Librarian Ms Rosanne Walker has focused on accessioning the backlog of manuscript material this year. Five collections have been listed: MS 226 (ALJ Beckwith), MS 227 (AK Head), MS 228 (FWE Gibson), MS 229 (NS Hush) and MS 230 (Susan Turner). The listings for 22 collections with added material have all been brought up to date.

Visitors to the library (showing the collections they have consulted) include:

- Miss Ailie Smith*, eScholarship Research Centre, University of Melbourne (whole collection)

- Dr Lachlan Clohesy*, Faculty of Arts, Education and Human Development, Victoria University (ACD Rivett, EW Titterton)
- Professor Brad Pillans, Research School of Earth Sciences, Australian National University (Geological Society of Australia)
- Dr John Brockwell, CSIRO Plant Industry (FJ Bergersen)
- Dr Haylee Weaver, Research School of Biology, Australian National University (Australian Society for Parasitology)
- Professor Warwick Anderson, Department of History and Centre for Values Ethics, and the Law in Medicine, University of Sydney (WE Agar, FJ Fenner)
- Dr Ragbir Bhathal, University of Western Sydney (EW Titterton, WG Duffield)
- Dr Helen Billman-Jacobe, Department of Microbiology, University of Melbourne (A Albert)
- Dr Ann Westmore, Population Health, University of Melbourne (A Albert, FM Burnet, JP Hill, T Cherry, AE Mills, R Scot Skirving, Society of Chemical Industry of Victoria)



(L to R) Bernadette Hince, Emma Jolley, Joe Gani, Rosanne Walker, John Passioura and Hugh Tyndale-Biscoe at a Library committee meeting, November 2012

The Librarian consulted the following collections in response to requests from researchers:

- WE Agar
- FJ Fenner
- OH Frankel
- Human Genetics Society of Australia
- JA Prescott
- RN Robertson
- W Sutherland
- EW Titterton

These all involved scanning jobs, the largest one being WE Agar's diary of a field trip to Paraguay from July 1907 to March 1908.

All of the books received during the past year have been catalogued.

**2011 winners of the Moran Award for History of Science Research*

Abbreviations

AASSA	Association of Academies and Societies of Sciences in Asia	FTSE	Fellow of the Australian Academy of Technological Sciences and Engineering
ACOLA	Australian Council of Learned Academies	IAP	IAP (formerly InterAcademy Panel)
AM	Member of the Order of Australia	ICSU	International Council for Science
ANSTO	Australian Nuclear Science and Technology Organisation	IGBP	International Geosphere-Biosphere Programme
ARC	Australian Research Council	IGC	International Geological Congress
ATSE	Academy of Technological Sciences and Engineering	IIASA	International Institute for Applied Systems Analysis
CAS	Chinese Academy of Sciences	IUCr	International Union of Crystallography
CEO	Chief Executive Officer	IUGS	International Union of Geological Sciences
CMV	human cytomegalovirus	IUPAC	International Union for Pure and Applied Chemistry
CODATA	Committee on Data for Science and Technology	IUTAM	International Union of Theoretical and Applied Mechanics
COST	European Cooperation in Science and Technology	MOU	memorandum of understanding
CSIRO	Commonwealth Scientific and Industrial Research Organisation	NHMRC	National Health and Medical Research Council
CUBENet	Collaborative Universities Biomedical Education Network	OAM	Medal of the Order of Australia
DIISRTE	Department of Industry, Innovation, Science, Research and Tertiary Education	OECD	Organisation for Economic Co-operation and Development
DNA	deoxyribonucleic acid	R&D	research and development
ERA	Excellence in Research for Australia	RMIT	RMIT University
E(M)CR	early (to mid) career researcher	SCAR	Scientific Committee on Antarctic Research
FAA	Fellow of the Australian Academy of Science	SKA	Square Kilometre Array
FAHA	Fellow of the Australian Academy of the Humanities	UCLA	University of California, Los Angeles
FASAS	Federation of Asian Scientific Academies and Societies	UN	United Nations
FASSA	Fellow of the Academy of the Social Sciences in Australia	UNCOVER	Unincorporated National Collaborative Venture for Exploration Geoscience Research
FRS	Fellow of the Royal Society	UNSW	University of NSW
		VAX	virtual address extension

Appendices

Appendix 1

Science by Doing timeline

Pilot	2007–08	\$1.5m	Proof of concept of inquiry science learning in secondary school network.
Stage 1	2009–11	\$2.0m	Developed and trialled professional learning approach, professional learning modules and three initial curriculum resources.
Stage 2	2012–13	\$1.6m ¹	Transpose previously developed curriculum resources and develop and trial another seven curriculum units for online delivery.
Stage 3	2013–16	\$3.5m ²	Develop and trial final eight curriculum units and transpose professional learning modules for online delivery. Establish a system-based network for implementation.

1 Funding provided by Education Services Australia

2 Funding provided by the Australian Government Department of Education, Employment and Workplace Relations, through the Mathematics and Science Participation Program

Appendix 2

Academy submissions and responses to government reviews and inquiries

2012

18 July *Submission to Revision of the national principles of intellectual property management for publicly funded research* urged that further emphasis be placed on encouraging research institutes and researchers to work together to avoid intellectual property rights issues that result in barriers to future research.

3 August *Submission to National research investment plan discussion paper* called for further recognition of the role and importance of basic science disciplines in the plan; increased investment in research to grow to at least the OECD average; further consultation on the development of the plan; improved career pathways for EMCRs; and urgent consideration of investment in future landmark research infrastructure proposals.

Each of the recommendations received attention within the final plan, and the Academy was invited to nominate Fellows to the expert working groups responsible for developing the new national research priorities recommended by the plan.

20 September *Submission to Business tax working group discussion paper* provided advice to the government's working group on the negative effects that proposed changes to the R&D tax incentive could have on future science research and development. Following the Academy's submission and representations by others in the sector to reconsider any such changes, the working group did not proceed with the recommendation to change the R&D tax incentive.

12 November *Submission to Consultation on Australia's satellite utilisation policy* proposed ways in which the proposed draft Satellite Utilisation Policy could be strengthened to meet future challenges. The Academy recommended that a successor to the Australian Space Research Program be developed, and for further interaction between industry and the science and research community. The consultation response was developed by the Chair of the National Committee for Space Science, Professor Russell Boyce, in conjunction with the National Committees for Radio Science, Antarctic Research, and Earth Science.

2 November *Response to the Strategic review of health and medical research in Australia consultation paper summary* reinforced the Academy's support for the review's proposal to link medical research expenditure to expenditure on health and illness; making a further \$2–3 billion per annum available for health and medical research; providing the NHMRC with overall responsibility for all health and medical research; and providing research institutions with funding for indirect costs incurred through research. The Academy in its response called for further details on how funding costs will be met; a general review of the balance of the entire health and medical research workforce, with particular attention being drawn to the needs of early career researchers; for a reduction in the bureaucracy associated with science research; and for further proposals to be provided in the final report on ways in which Australian scientists can interact and collaborate effectively with scientists worldwide.

2013

30 January *Submission to the Senate inquiry into recent trends in and preparedness for extreme weather events* outlined how the shift in the climate baseline will change the frequency and intensity of extreme weather events, and urged a range of mitigation and adaptation policy responses to be developed to avoid increased risks of impact from heatwaves, rainfall extremes and coastal flooding. The inquiry has invited the report author to attend a hearing in Sydney in April 2013 to provide further evidence.

30 January *Submission to the National Health and Medical Research Council on the Draft principles of peer review* outlined ways in which conflict of interest rules could be better managed to help increase peer review participation.

31 January *Priorities for Australian science (pre-Budget submission to Treasury)* identified priorities for the Federal Government to consider

in preparing the 2013–14 Federal Budget. These priorities included making a long-term strategic investment in Australian science; enhanced development and utilisation of our talented research workforce; further investment in science and maths teaching; augmentation of international science linkages; ongoing investment in major national research infrastructure; provision of indirect research costs; and improvement of research productivity by reduction of the administrative burden.

The Academy would like to thank the following Fellows for their assistance in preparing Academy submissions: Dr John Church FAA FTSE, Professor Leslie Field AM FAA, Dr Bob Frater AO FAA FTSE, Professor Brian Kennett FAA FRS, Professor Kurt Lambeck AO FAA FRS, Professor Trevor McDougall FAA, Professor Graham Mitchell AO FAA FTSE, Dr Graeme Pearman AM FAA, Dr Michael Raupach FAA FTSE, Dr Steve Rintoul FAA, and Professor Curt Wentrup FAA.

Appendix 3 Academy statements

Open access publishing

The Academy has produced an interim paper and a set of general guiding principles to aid discussion and debate on recent policy changes to encourage the open access publishing of research. The Academy acknowledges that this is a complex and changing area and this interim paper reflects current thinking and will be reviewed again in two years. A copy of the statement can be found at www.science.org.au/policy/openaccess.html.

Statement regarding the conviction of Italian earthquake scientists

Following the conviction of six scientists who gave advice before the LAquila earthquake, the Academy

released a statement expressing concern about the liability apportioned in the case. In the statement the Academy notes the importance of developing effective processes to translate scientific evidence and knowledge into public policy and advice. A copy of the statement can be found here: www.science.org.au/policy/position-statements.html#earthquake

Research integrity

The Academy declared its support for the Singapore Statement on Research Integrity and encouraged research to observe the principles and responsibilities set out in the statement.

Appendix 4

EMCR submissions and responses

2012

31 July *Follow-up submission to the McKeon strategic review of health and medical research provides practical suggestions for modifying the NHMRC grant application and review process to increase opportunities for EMCR researchers. The submission also put forward several different NHMRC grant and career structure scenarios for consideration by the review panel.*

7 August *Early and Mid-career Researcher Forum response to the National career development strategy*

green paper proposed that the new National Career Development leadership body work to provide effective career development and professional support for early and mid career researchers.

31 October *Response to the Strategic review of health and medical research in Australia consultation paper summary* urges the McKeon review panel to detail in their final report effective strategies for future PhD training, research fellowships, research career structures, and gender equity.

Appendix 5

National Committee reports

Antarctic research

Chair: Dr Dana Bergstrom

In the past year several new members joined the committee, which was very active in contributing to the Scientific Committee for Antarctic Research (SCAR), the ICSU body. At SCAR's *Open Science Conference* and delegates meeting in Portland Oregon in July 2012, the National Committee Chair attended as the Australian delegate and Dr Tas Van Ommen (National Committee for Earth System Science) attended as alternate delegate.

The Academy supported early career researcher Dr Robyn Schofield's attendance at the Portland meeting, where leading Australian Antarctic scientists were recognised for outstanding achievements. Dr Ian Allison received the SCAR Medal for International Coordination and Dr Steve Rintoul FAA received the prestigious Martha T Muse Prize for achievements in science and policy in Antarctica. Dr Graham Hosie was elected as the Chief Officer of the SCAR Life Sciences Group.

Committee members participated in the review of the Australian Antarctic Science application process, the review of Academy national committees, and the review of the Australian Satellite Usage Policy. The chair commented on the proposal for the merger of the British Antarctic Survey with the UK National Oceanographic Centre. The committee also began planning a community outreach activity called Pure Antarctic.

Astronomy

Chairs: Professor Elaine Sadler FAA (to December 2012), Professor Stuart Wyithe (from December 2012)

The committee continued to work on the implementation of the decadal plan in conjunction with Astronomy Australia Limited (AAL), and developed a timetable for production of the 2016–25 decadal plan.

Members attended a meeting called by the Department of Industry, Innovation, Science, Research and Tertiary Education to discuss the implications of the US's National Science Foundation Astronomy portfolio review on Australian astronomy aspirations and priorities. As part of its contribution, the committee prepared a document describing implications of the review for priorities in the Australian astronomy decadal plan.

Professors Elaine Sadler FAA and John Dickey represented Australia as voting delegates at the General Assembly of the International Astronomical Union in Beijing, China, in August. Professor Matthew Colless FAA was re-elected as Vice-President of the union.

Biomedical sciences

Chair: Professor Ian Dawes FAA

The National Committee for Biomedical Science continued to support CUBenet (the Collaborative Universities Biomedical Education Network, www.cubenet.org.au).

cubenet.org.au), which was set up following the successful *National Forum on Education in the Biomedical Sciences* held at the Shine Dome in December 2011. Professor Phillip Poronnik reported on the activities of CUBENet in May 2012 and a follow-up meeting was held in Sydney in December 2012 to maintain the impetus. CUBENet is funded by a grant which Professor Phillip Poronnik obtained from the Office for Teaching and Learning. The project has initiated strong networking for education in the biomedical sciences.

The committee submitted a statement to the McKeon Strategic Review of Health and Medical Research aligned with the submissions of the relevant Australian societies involved and has explored ways to increase interaction between its eight societies.

Brain and mind

Chair: Professor Stephen Crain

In 2012, the committee met for an extended discussion of an initiative entitled 'Cognitive science in the public interest', with participation from Ms Kylie Walker, the Academy's Director of Communications and Outreach. The initiative is being coordinated by the University of New England (Emeritus Professor Brian Byrne, lead) and the ARC Centre of Excellence in Cognition and its Disorders (Professor Stephen Crain, lead). Professor Byrne proposed a series of media releases/position papers, including articles that explain in non-technical terms what brain imaging is, and what it can and cannot reveal about mental activities. In 2012 'The Conversation', an independent online source of commentary from the university and research sector, published articles by committee members Professors Anne Castles (2), and Colin Clifford, and an article by former committee chair, Emeritus Professor Max Coltheart FAA, on the (ir)relevance of neuroscience for education and classroom practice.

Chemistry

Chair: Professor Curt Wentrup FAA

In a very active and productive year, the committee endorsed two bids to hold international meetings in Australia: a successful bid to hold the IUPAC-sponsored *International Congress on Physical Organic Chemistry* in Sydney in 2016 and another one by the Royal Australian Chemical Institute to hold the

General Assembly and Congress of the International Union for Pure and Applied Chemistry (IUPAC) in Melbourne in 2017.

The committee provided critical responses to the Australian Curriculum, Assessment and Reporting Authority's Draft Senior Secondary Chemistry Curriculum and the National Research Investment Plan Discussion Paper, and responded to a request from the Chief Scientist for 10 ideas on 'Actions needed to be taken to improve the translation of research into innovation leading to national prosperity'.

In October the committee assisted with the evaluation and ranking of applicants for the inaugural fellowships to be supported by the Science and Industry Endowment Fund, to attend the 2013 Lindau Nobel Laureates meeting.

Crystallography

Chair: Emeritus Professor Mitchell Guss

A highlight of the year was *The Bragg symposium: celebrating 100 years of X-ray crystallography* sponsored by the Academy in December 2012, celebrating Sir William Lawrence Bragg CH OBE MC FRs. The symposium took place 100 years after Bragg's seminal contribution to structure analysis by X-ray diffraction was presented to the Cambridge Philosophical Society. Bragg is the youngest ever recipient of a Nobel Prize, and he and his father Sir William Henry Bragg KBE FRs are the only father and son ever to share a Nobel Prize.

Current and past committee members contributed to the success of the symposium in Adelaide, the birthplace of Sir Lawrence. His younger daughter Patience Thompson, former colleagues, and a past member of the Nobel Committee spoke there. Celebrations included a civic reception with the Lord Mayor of Adelaide and a dinner in the Bragg's former Adelaide home attended by his Excellency the Governor of South Australia.

Following extensive lobbying from the committee, Australia Post issued a series of stamps commemorating Australian Nobel Prize winners on August 28 2012, including WL Bragg (see National Committees section).

During the meetings in Adelaide the executive committee of the International Union of Crystallography (IUCr) and the National Committee for Crystallography met. It was the first meeting in

Australia of the union's committee (of which Professor Guss is a member) since the IUCr Congress and General Assembly in Perth in 1987.

The national committee's successful lobbying of federal and state governments and national funding agencies helped secure operational funding for the Australian Synchrotron for the next five years. The committee expressed its support for the Australian Nuclear Science and Technology Organisation (ANSTO) as managing agency and recognises the opportunities for users of the Synchrotron and neutron facilities. The committee is disappointed that no funding has yet been made available for development of new beamlines at the Synchrotron or for capital investment in the existing facilities.

Data in science

Chair: Dr Rhys Francis

Professor Jane Hunter, Deputy Chair of the National Committee for Data in Science, represented Australia and the Academy as the voting delegate at the International Committee on Data for Science and Technology (CODATA) 2012 General Assembly in Taipei.

The National Committee was disappointed that it was unable to engage the eResearch Australasia conference in time to enable the promotion of a national data workshop associated with the conference. It assisted the Academy with its review of national committees.

Earth sciences

Chairs: Professor Brian Kennett FAA (2009–12), Professor Sue O'Reilly FAA (2013–16)

The 2012 *International Geological Congress* (IGC) in Brisbane (see International section) was an outstanding success and was also the venue for many major meetings of international organisations, including the successful second *World young Earth scientist congress* (see www.networkyes.org). The considerable success of the congress and the number of Australians in major positions in earth science related ICSU bodies demonstrate the strength of Australian earth science on the international scene.

With the major international meetings behind it, the committee will now turn its attention to updating the *Strategic plan for the Earth sciences*

prepared in 2003, many of whose recommendations have come to fruition.

Brian Kennett concluded his term as chair at the end of 2012, but will continue to be an observer on the committee. The Academy is deeply grateful for his dedication to the work of the national committees, especially with the considerable extra effort that comes with organising two earth sciences international meetings in consecutive years.

Earth system science

Chair: Dr Roger Gifford

The committee has continued its long term goal to implement recommendations of its strategic research plan 'To Live within Earth's Limits: an Australian plan to develop a science of the whole Earth system'. It planned and convened its Second Earth System Outlook conference — *Ticking time bombs in the human-Earth system* at the Shine Dome on 26–27 November 2012. Consistent with a concept of Earth system science, this meeting brought together natural environmental scientists with participants in the human sciences, science communication, industry, finance, and sustainability advocacy. The conference was formally opened by Australian Chief Scientist, Professor Ian Chubb AC. Broadcast live via the website, a webcast is available at www.science.org.au/events/conferences-and-workshops/earth-system-outlook2/index.html.

The Academy through the National Committee hosted the annual officers meeting of the International Geosphere-Biosphere Programme (IGBP), at Ian Potter House from 28–30 November. The Outlook conference served as the public symposium for the IGBP meeting. Both meetings were generously sponsored by the Department of Climate Change and Energy Efficiency.

Committee members met Professor Chubb, alerting him to the urgent need to fund highly multidisciplinary research like Earth system science. Similar meetings were held with representatives of IGBP and Professor Aidan Byrne, CEO of the Australian Research Council; Dr Subho Banerjee, Department of Climate Change and Energy Efficiency; and Dr Mike McWilliams, Chief, CSIRO Earth Science and Resource Engineering.

The synthesis review from the first Earth System Outlook conference was placed on the National Committee website as a contribution to an emerging Australian Earth System Science website.

The chair attended two meetings in London. The first was the IGBP *Planet Under Pressure* science conference co-convened by Australian Dr Mark Stafford Smith, which produced important inputs to the *Rio+20 Earth Summit* in Rio de Janeiro a few weeks later. The conference stressed that human action will cause major undesirable pressures over the coming decades through environmentally unsustainable practices. The second meeting brought the chairs of national committees for global environmental change research together to compare approaches and to discuss the 'Future Earth — Research for Global Sustainability' program of the International Council for Science, International Social Science Council, Belmont Forum and other international agencies.

Geography

Chairs: Professor Nigel Tapper (2009–12), Professor Alaric Maude (2013–16)

In continuing to contribute to the development of the *Australian Curriculum: Geography* by ACARA, the committee submitted its detailed comments on the draft curriculum in early 2012. Individual committee members are also involved in producing resource materials for the new curriculum and in monitoring implementation of the new curriculum.

The committee is actively involved in an ARC Linkage Fund proposal 'The Australian Curriculum, Geography and Geospatial Reasoning: the Impact of Policy on Perceptions', formally endorsed by the Academy and led by deputy chair Professor Margaret Robertson, whose book *Schooling for sustainable development: a focus on Australia, New Zealand, and the Oceanic Region* was published in March 2012.

The December 2012 committee meeting in Canberra considered the Academy proposal to restructure national committees. Nigel Tapper concluded his term as chair at this meeting, but will remain a committee member in 2013–16. The Academy is very grateful to Professor Tapper for chairing the committee, and for representing Australia at several meetings of the International Geographical Union.

History and philosophy of science

Chair: Associate Professor Rachel Ankeny

The committee convened a workshop on 26–28 September 2012 in Sydney, 'History and Philosophy

of Science in Australia: looking forward'. The workshop was highly successful, with approximately 60 attendees representing most major institutions and individuals involved in history and philosophy of science teaching and research.

PhD candidate Christina Dyson from the Faculty of Architecture, Building and Planning at the University of Melbourne was awarded first prize in the 2013 Mike Smith National Museum of Australia Student Prize for the History of Australian Science or Australian Environmental History. The prize, a joint undertaking by the Academy and the National Museum of Australia, has been dedicated to celebrated Australian archaeologist Dr Mike Smith AM (for more about the Prize see the National Committees section).

Mathematical sciences

Chair: Professor Nalini Joshi FAA

The committee decided in 2011 to create a decadal plan for mathematical sciences. The decision was prompted by major concerns in the discipline, including poor international rankings in mathematics achievements for school students, declining numbers of mathematically qualified graduates entering the teaching profession, and unsatisfactory Excellence in Research for Australia results for mathematical sciences, including a large number of institutions that continue to be deemed not to have assessable output in statistics.

In 2012, Professor Peter Hall AO FAA FRS was appointed chair of the steering committee to produce the plan (see www.mathscidecadalplan.org.au), which will assess the current state of the mathematical sciences in Australia, describe and prioritise actions for the period 2015–25, and outline ways to achieve priorities. Subcommittees will examine mathematics and statistics education in schools, colleges (including TAFE colleges) and universities; research (including interdisciplinary research) in universities and related institutions such as medical research institutes, government instrumentalities, both state and federal (including government laboratories such as CSIRO and the Defence Science and Technology Organisation). They will also look at business and industry; present and future research centres; and the Australian mathematics diaspora abroad. A project officer has been appointed.

Mechanical sciences

Chair: Professor Ivan Marusic

In 2012 new members joined the committee, which had a productive meeting in Canberra in October 2012 and is working on three exciting new projects.

To improve engagement with relevant societies and organisations, including those in biomechanics and biophysics, the societies are being asked to help co-invest to cover the cost of membership to the international bodies. The Australasian Fluid Mechanics Society has already committed \$600 annually towards the subscription fee for the International Union of Theoretical and Applied Mechanics (IUTAM).

Another major new initiative of the committee is a decadal plan for mechanical sciences. No such plan has previously been proposed and this activity is expected to last some time, with extensive consultations.

The final major initiative was to create an early career researcher award with the Academy. Following advice from the Academy's Fellowship officer Ms Jen Nixon, the committee aims to raise \$150 000 for the establishment of the award. At the end of 2012 it had already received \$60 000 in pledges.

There were two meetings of IUTAM in Beijing in 2012 — a General Assembly, and the *23rd International Congress of Theoretical and Applied Mechanics*. The Chair and Professor Min S Chong were the Australian voting delegates and representatives of the committee. At the General Assembly Professor Viggo Tvergaard, Technical University of Denmark, was elected as the new IUTAM President, succeeding Professor Tim Pedley who is the retiring president. The next general assembly of IUTAM will be in 2014.

Medicine

Chair: Professor Bronwyn Kingwell

During the year the committee made a submission to the National Preventive Health Research Strategy (2012–2016) and contributed towards Academy submissions to the McKeon Strategic Review of Health and Medical Research in Australia and the NHMRC Public Consultation on the Draft Principles of Peer Review.

The Chair met with key policy drivers in health and medical research including the Federal Minister for Health, Chair of the McKeon Review Panel Simon

McKeon AO, Professor Ian Frazer AC FAA and CEO of the NHMRC Professor Warwick Anderson AM FAA. Issues discussed at this meeting included the NHMRC budget, advanced health research centres (academic health science centres) and the McKeon Review.

The Panel for the Strategic review of health and medical research in Australia released a summary consultation paper on 3 October 2012, and received feedback on this paper until 31 October 2012. The NCM will continue to work with the members of the McKeon panel and the Government regarding the recommendations and implementation of the review.

The committee helped identify early career researcher Dr Brian Drew (NHMRC CJ Martin Fellow, UCLA) for funding to attend the 5th HOPE meeting organised by the Japan Society for the Promotion of Science in Tokyo on 26 February – 2 March 2013.

Nutrition

Chair: Professor Andrew Sinclair

A high-profile symposium, *Should Australia and New Zealand allow more vitamin D into the food supply?* was organised by the committee with the International Life Sciences Institute Southeast Asia Region Australasia and the Nutrition Society of Australia. It was held in Melbourne on 12 June 2012 and drew 83 health professionals. The symposium raised awareness of vitamin D deficiency in Australia and New Zealand and highlighted the need for the government to urgently consider allowing more vitamin D into the food supply.

The committee sponsored a mid career workshop for 30 nutrition researchers (*Becoming Independent*) and a plenary speaker (Dr Allan Green, CSIRO) at the annual scientific meeting of the Nutrition Society of Australia in November 2012 in Wollongong. Senior researchers and committee members Professors Maria Makrides and Frank Dunshea were invited to speak at the workshop, which also provided an opportunity for mid-career researchers to meet and talk about their research. Dr Green gave a very informative and interesting plenary presentation on developments in new oilseed crops through gene technology.

The committee worked on its long-term aims to raise the standard of nutrition science teaching and research in Australia, working more closely with the Nutrition Society of Australia, initiating discussions

with the NHMRC on the formation of a diet and lifestyle panel, and running a multidisciplinary conference on nutrition in conjunction with the World Diabetes Congress in December 2013.

Physics

Chairs: Professor Michelle Simmons FAA (2006–12), Professor Hans Bachor (2012–16)

The main work of the committee this year was the completion of the physics decadal plan. At its launch in December 2012 (see National Committees section) the committee farewelled Chair Professor Michelle Simmons and thanked her for her outstanding work on the plan.

Physics is a fundamental science underpinning many disciplines, and crossing the boundaries of chemistry, biology, engineering and medicine. It provides fundamental understanding and new tools for advances in all fields of science and technology, and builds capacity for new industries and business — recent examples include enhanced biomedical imaging techniques and cancer treatments, nanotechnology and advanced materials, and enhanced models to predict disruptions of our global ecosystem. The plan was prepared by working group of experts tasked by the committee and chaired by Professor David Jamieson of the University of Melbourne.

The plan will ensure the process of strategic investment in teaching and research in physics in Australia continues for the next 10 years, allowing Australia to build on present excellence, to remain a strong member of the world's physics community and to enjoy the associated intellectual, economic and social rewards. A copy of the plan and further information is available at www.science.org.au/natcoms/physicsdecadalplan.html.

Plant and animal sciences

Chair: Professor Roger Leigh

The committee submitted a comprehensive summary of its views and held a teleconference between the chair and Professor Bruce McKellar, chair of the Committee to Review National Committees. At a meeting in Canberra in August the committee endorsed a proposal to develop a decadal plan for agricultural sciences.

With the help of the Academy's science policy section, the committee responded to the Department of Agriculture, Fisheries and Forestry's

draft National Food Plan. Committee members Professors Maria Byrne and Myron Zalucki were reappointed for three years, and the Academy gave permission for membership to expand to include additional members with expertise in crop science and animal or livestock science. This will help the committee to cover all areas for the decadal plan. Professor TJ Higgins FAA FTSE rejoined the committee as a representative of the Academy.

The committee was asked to identify early career researchers for support to attend the 5th HOPE meeting (see Medicine report, above, and International section: Asia). The successful applicants nominated by the committee were Dr Vipul Bansal (RMIT), Dr Damian Drew (University of Adelaide), and Dr Emily Wong (University of Queensland).

Quaternary research

Chair: Professor Allan Chivas FAA

The committee finalised plans for a week-long gathering of early career researchers in quaternary science in Wollongong in December 2013. The International Union for Quaternary Research and other organisations are financially supporting the meeting, which aims to assist researchers from Australasia and beyond with a series of workshops, formal presentations, laboratory visits and field trips.

Work continued on the decadal plan for the discipline, which will be completed in draft form in 2013 and discussed at the next Australasian Quaternary Association meeting in Mildura in July 2014.

A highlight of the year was the *International Geological Congress* in Brisbane (see Earth sciences report, above). Of the 37 conference themes, 15 were related to aspects of Quaternary history and processes.

Space science

Chair: Professor Russell Boyce

The committee made significant progress in 2012, and provided input either directly or via the Academy to the National Earth observations from space strategic infrastructure plan, the National research investment plan discussions, the Munro review of the Bureau of Meteorology — in particular, input concerning the Ionospheric Predictions Service — and the draft 'Australia's satellite utilisation policy'.

It supported Australia's bid to host the 2014 International Astronautical Congress in Adelaide (the congress will be in Toronto). Key Australian space stakeholders from government, industry, the research community and the committee met to consider issues of growing importance to the Australian space sector, and to help the committee in its effort to form views and promote space science and the space sector in the context of those issues. *The Australian Space Science Conference*,

organised jointly with the National Space Society of Australia, held 24–27 September 2012 in Melbourne, was very successful.

Finally, the committee recognised the need for revisiting (and revising, if necessary) the goals of the decadal plan for Australian space science to ensure the space science community continues to partner effectively with government and industry in space, for the benefit of all.

Appendix 6

Australian voting delegates for international meetings

Committee	Organisation	Date	Location	Delegate/s
Antarctic research	Scientific Committee on Antarctic Research	13–25 July 2012	Portland, USA	Dr Dana Bergstrom Dr Tas van Ommen
Astronomy	International Astronomical Union	20–31 August 2012	Beijing, China	Prof Elaine Sadler FAA Prof John Dickey
Biomedical sciences	International Union of Biochemistry and Molecular Biology	4–9 September 2012	Seville, Spain	Prof Phillip Nagley Prof Denis Crane Dr Sheena McGowan
Data in science	Committee for Data in Science and Technology	28–31 October 2012	Taipei, Taiwan	Prof Jane Hunter
Earth sciences	International Union of Geological Sciences	5–10 August 2012	Brisbane	Prof Brian Kennett FAA Mr Paul Kay Dr Dave Mason Dr Marita Bradshaw Dr Richard Blewett Prof Alan Chivas Mr Keith Scott Mr Mike Smith
Earth system science	Scientific Committee on Oceanic Research	21–24 October 2012	Halifax, Canada	Dr John Volkman
	Planet Under Pressure / International Geosphere-Biosphere Program National Committees meeting	26–29 March 2012	London, UK	Dr Roger Gifford
Geography	International Geographical Union	26–30 August 2012	Cologne, Germany	Prof Nigel Tapper
Mathematical sciences	International Commission for Mathematical Sciences	8–15 July 2012	Seoul, South Korea	Prof Merrilyn Goos
Mechanical sciences	International Union of Theoretical and Applied Mechanics	August 2012	Beijing, China	Prof Ivan Marusic Prof Min Chong
Plant and animal sciences	International Union of Biological Sciences	5–9 July	Suzhou, China	Prof John Buckeridge
Space science	Committee on Space Research	14–22 July 2012	Mysore, India	Prof Iver Cairns

Appendix 7

Australian executive committee members of international scientific organisations

Scientific organisation	Office-holder	Position
International Council for Science	Professor David Black FAA	Secretary General
International Astronomical Union	Professor Matthew Colless FAA	Vice-President
International Federation for the Promotion of Mechanism and Machine Science	Professor James Trevelyan	Member
International Geographical Union	Professor Ruth Fincher	Vice-President
International Geosphere-Biosphere Programme	Professor Jean Palutikof	Vice-President
International Mathematical Union	Professor Cheryl Praeger AM FAA	Member-at-large
International Commission for Mathematical Instruction	Professor Cheryl Praeger AM FAA	Vice-President
International Union for Quaternary Research	Professor Allan Chivas FAA	Past President
International Union of Biochemistry and Molecular Biology	Professor Susan Hamilton	Member for Education
International Union of Biological Sciences	Professor John Buckeridge	Past President
International Union of Crystallography	Professor Mitchell Guss	Member
International Union of Geodesy and Geophysics	Dr Tom Beer	Retiring President
International Union of Geological Sciences	Dr Ian Lambert	Secretary General
	Dr Colin Simpson	Councillor
International Union of History and Philosophy of Science / Division of Logic, Methodology and Philosophy of Science	Professor Cliff Hooker	Second Vice-President
International Union of Immunological Societies	Professor Peter Doherty AC FAA FRS Nobel Laureate	Past President
	Professor Nicholas King	Treasurer
International Union of Pure and Applied Chemistry	Dr Robert Loss	Member
International Union for Pure and Applied Biophysics	Professor Cris G Dos Remedios	Secretary General
International Union of Basic and Clinical Pharmacology	Dr John Miners	Councillor
	Professor Donald Birkett	Councillor (Chair of the Division on Clinical Pharmacology)
International Union for Pure and Applied Physics	Professor Bruce McKellar FAA	President-Designate
International Commission for Optics	Professor Min Gu FAA	Vice-President
International Union of Physiological Sciences	Professor Caroline McMillen	Council Member
Scientific Committee on Oceanic Research	Dr John Volkman	Vice-President
International Union of Radio Science	Professor Phil Wilkinson	President
World Climate Research Programme	Professor Dave Griggs	Vice-Chair
	Professor David Karoly	Member

Appendix 8

Printed and online publications

Publication	Speaker/month	Link
2012		
<i>Annual Report 2011–12</i>	April	www.science.org.au/reports/2012anrep.html
2012 public lecture series transcripts		
Trade-offs between agriculture and the environment — how do we decide what to protect?	Dr Anna Roberts, April	www.science.org.au/events/publiclectures/ac/roberts.html
Australia's desert heartlands — a vibrant future or a victim in decline?	Dr Mark Stafford Smith, June	www.science.org.au/events/publiclectures/ac/staffordsmith.html
Coal seam gas: alternative energy source or environmental hazard	Professor Sue Golding, July	www.science.org.au/events/publiclectures/ac/golding.html
Management of invasive plants	Dr Richard Groves, August	www.science.org.au/events/publiclectures/ac/groves.html
Buying biodiversity — the role of philanthropy in nature conservation	Dr Michael Looker, September	www.science.org.au/events/publiclectures/ac/looker.html
Resolving the conflict between agriculture and mining over prime land on the Liverpool Plains	Mr Tony Windsor MP, October	www.science.org.au/events/publiclectures/ac/windsor.html
Rural policy, people and place — sustainability in an uncertain future	Professor Margaret Alston OAM, November	www.science.org.au/events/publiclectures/ac/alston.html
Australia's non-metropolitan population — trends and implications	Professor Graeme Hugh AO, December	www.science.org.au/events/publiclectures/ac/hugo.html
Other publications		
<i>Early Days: early career researcher newsletter</i> nos 10–12	March, June, November	www.science.org.au/ecr/ecr-newsletters/
<i>Historical Records of Australian Science</i> vol 23 nos 1 and 2	June, December	www.publish.csiro.au/?nid=108
<i>Academy Newsletter</i> 88–91	June, September, December 2012, March 2013	www.science.org.au/publications/newsletters/index.html
<i>Australian science in a changing world: innovation requires global engagement</i>	November	www.science.org.au/reports/documents/Innovationrequiresglobalengagement.pdf
<i>Searching the deep earth: a vision for exploration geoscience in Australia</i>		www.science.org.au/policy/documents/uncover-report.pdf
<i>The science of immunisation: questions and answers</i>	November	www.science.org.au/policy/immunisation.html
<i>Physics decadal plan 2012–2021: building on excellence in physics, underpinning Australia's future</i>	December	www.science.org.au/natcoms/nc-physics/decadal-plan.html
<i>National nanotechnology research strategy</i>	December	www.science.org.au/policy/documents/nanotech-research-strategy.pdf

Appendix 9

Editors-in-chief of Academy–CSIRO Australian Journals of Science

Animal Production Science Professor Wayne Bryden

Australian Journal of Botany Professor Bob Hill

Australian Journal of Chemistry Professor Curt Wentrup FAA

Australian Journal of Zoology Dr Paul Cooper

Australian Systematic Botany Dr Daniel Murphy

Crop and Pasture Science Professor John Irwin

Environmental Chemistry Dr Kevin Francesconi

Functional Plant Biology Dr Rana Munns FAA

Invertebrate Systematics Professor Andy Austin

Marine and Freshwater Research Professor Max Finlayson

Reproduction, Fertility and Development Professor Tony Flint

Soil Research (formerly *Australian Journal of Soil Research*) Professor Bob Gilkes

Wildlife Research Drs Stan Boutin, Andrea Taylor and Piran White

Appendix 10

Support for Academy activities

(amounts \$1000 and above are acknowledged)

Benefactors of the Academy

Donor	Purpose/fund	Amount \$
AAS Victorian Regional Group	Endowment for Science	2,000
Professor S Cory	Endowment for Science	21,945
Professor N Dasgupta	Endowment for Science	1,000
Selby Scientific Foundation	Selby Fellowship Fund	10,000
Professor DA Denton	Fellowship donation	1,000
Professor M Dopita	Endowment for Science	1,000
Dr TJ Higgins	Endowment for Science	1,000
Estate of P Johnston	Endowment for Science	100,000
Professor C Jagdish	Endowment for Science	1,001
Estate of Ian Gordon Ross	Ian Gordon Ross Fund	4,716

Awards and fellowships

Sponsor	Purpose/fund	Amount \$
Mrs S Berry	Adam Berry Fund	5,000
Estate of William H Gladstones	Population & Environment Fund	84,724
Dr Margaret Middleton	Fund for the Conservation of Endangered Native Animals'	60,000
National Museum of Australia	NMA Student Prize funding 2012	3,000
National Museum of Australia	NMA Student Prize funding 2013	3,000
Perpetual Limited	AK Head Travelling Scholarship	30,000
Ms Anna Rickards	Rod Rickards Fellowship	15,000

Sponsorships

Conferences and Lectures

Sponsor	Prize/scholarship	Amount \$
ACT Economic Development Directorate	Professor Elizabeth Blackburn's 'Hooked on Science Tour'	5,000
ARC Centre of Excellence for Electromaterials Science	2013 Public Lecture Series	2,273
Australian National University	2013 Public Lecture Series	4,091
Australian National University	Professor Elizabeth Blackburn's 'Hooked on Science Tour'	5,000
The Centre for Australian Weather and Climate Research	2013 Public Lecture Series	2,273
Cochlear Foundation	2013 Public Lecture Series	2,273
Dept of Education and Early Childhood	Professor Elizabeth Blackburn's 'Hooked on Science Tour'	10,000
Dept of Premier and Cabinet (Tasmania)	Professor Elizabeth Blackburn's 'Hooked on Science Tour'	4,545
La Trobe University	2013 Public Lecture Series	2,272
Royal Society of London	Frontiers of Science Think Tank	63,980
Royal Society of London	2012 Theo Murphy High Flyers Think Tank	60,854
Royal Society of London	2013 Theo Murphy High Flyers Think Tank	78,167
University of Sydney	2013 Public Lecture Series	4,545
University of Canberra	2013 Public Lecture Series	2,272
University of Tasmania	Professor Elizabeth Blackburn's 'Hooked on Science Tour'	5,000

Science at the Shine Dome

Sponsor	Prize/scholarship	Amount \$
Annelise Wiebkin	2013 Early Career Researchers Program	2,272
Antarctica New Zealand	2013 Early Career Researchers Program	4,545
Australian National University	2013 Science at the Shine Dome	9,090
Bio21 Institute	2013 Science at the Shine Dome	4,545
CRC Mining	2013 Early Career Researchers Program	2,272
Flinders University	2013 Early Career Researchers Program	4,545
Geoscience Australia	2013 Science at the Shine Dome	4,091
Ignite Energy Resources	2013 Science at the Shine Dome	4,090
Melbourne Convention & Visitors Bureau	2013 Science at the Shine Dome	9,091
National Environment Research Program — Marine Biodiversity Hub	2013 Early Career Researchers Program	2,272,72
National Environment Research Program — Tropical Ecosystems Hub	2013 Early Career Researchers Program	4,545,45
Office of Environment and Heritage	2013 Early Career Researchers Program	2,272
Paul Gregory	2013 Early Career Researchers Program	2,272
Prue Roughley	2013 Early Career Researchers Program	2,272
Tony Fleming	2013 Science at the Shine Dome	4,545
University of Newcastle	2013 Science at the Shine Dome	4,090

General Academy grants

Donor	Project/program	Amount \$
Dept of Innovation, Industry, Science, Research and Tertiary Education	Higher Education Research Promotion (Grant in Aid)	1,640,558

Special grants

Decadal plan in mathematical sciences

Donor	Amount \$
The Australian Association of Mathematics Teachers Inc	4,000
Australian National University	15,273
CSIRO Mathematics, Informatics and Statistics	10,000
Curtin University	3,000
Defence Science Institute	8,636
Flinders University	3,636
La Trobe University	5,000
Monash University	8,000
Murdoch University	4,000
Queensland University of Technology	2,000
Statistical Society of Australia	1,818
University of Canberra	4,000
University of Melbourne	8,000
University of New South Wales	8,000
University of Queensland	10,000
University of South Australia	5,000
University of Sydney	4,000
University of Tasmania	1,000
University of Western Australia	8,000
University of Wollongong	8,000

UNCOVER Program

Donor	Amount \$
Australian Resources Centre	20,000
CSIRO	20,000
Deep Exploration Technologies Cooperative	10,000
Fugro Airbourne Surveys Pty Ltd	9,091
Geoscience Australia	20,000
University of Western Australia	20,000

EMCR Forum meeting – Science Pathways

Donor	Amount \$
ANU Science Marketing Division	2,273
Baker IDI Heart & Diabetes Institute	2,273
CAASTRO (University of Sydney)	2,273
The CASS Foundation Ltd	4,545
CSIRO	4,545
Edith Cowan University	4,545
Elsevier S & T	2,273
Monash University	5,455
RMIT University	11,364
Telethon Institute for Child Health Research	2,273
University of Melbourne	2,273
Victoria University	2,273
Walter & Eliza Hall Institute	2,000

Other special grants

Donor	Project/program	Amount \$
Australian Institute of Physics	Development of the physics decadal plan	5,000
Australian Research Council	Australia 2050: achieving an environmentally sustainable and socially equitable way of living	79,745
CSIRO Discovery Centre	National Science Week — Giants of Science	9,091
Defence Science and Technology Organisation	Advances in Computer Science	69,520
Department of Health & Ageing	Science of Immunisation	31,137
Dept of Innovation, Industry, Science, Research & Tertiary Education	Australia–China Symposium 2012	222,700
Dept of Innovation, Industry, Science, Research & Tertiary Education	Australia–India Fellowship	1,000,000
Dept of Innovation, Industry, Science, Research & Tertiary Education	Australian National Nanotechnology Research Strategy	23,998
Dept of Innovation, Industry, Science, Research & Tertiary Education	Supporting Australia's International Science Engagement	1,015,000
Dept of Innovation, Industry, Science, Research & Tertiary Education	Support relationships with international communities	147,891
Education Services Australia Ltd.	Science by Doing Stage 2	1,083,000
French Embassy	French–Australian Research Collaboration Development Program	61,350
Geoscience Australia	Contribution to the IUGS subscription	5,684
Questacon	Curriculum Unit Pilot Study (SEAMEO QITEP)	25,000
Schools Connect Australia	Primary Connections	60,000
Science and Industry Endowment Fund	Australian Academy of Science Fellowships to the Lindau Nobel Laureate Meeting	75,800

Grant figures comprise total grant excluding GST



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