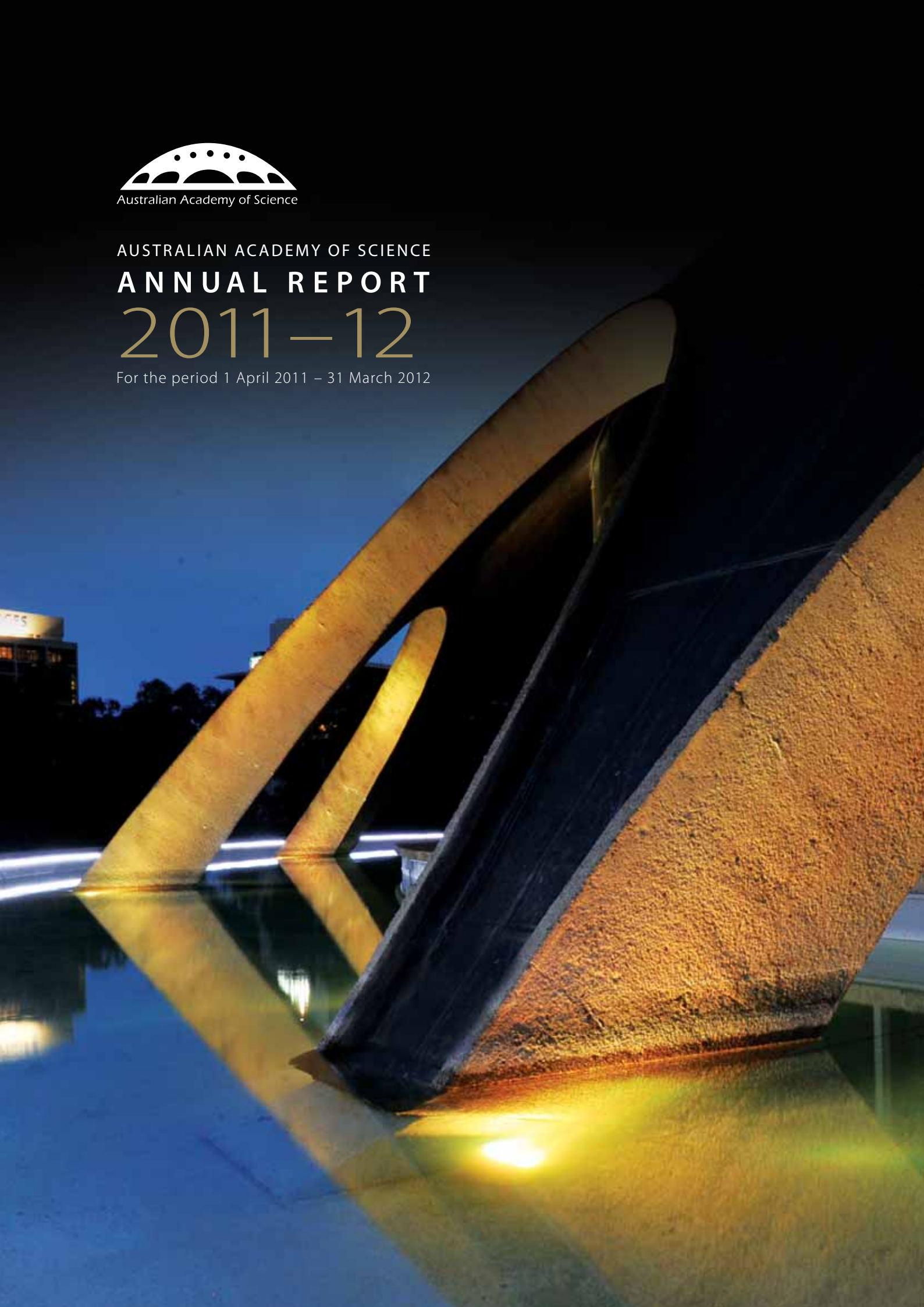
Australian Academy of Science

AUSTRALIAN ACADEMY OF SCIENCE

ANNUAL REPORT 2011–12

For the period 1 April 2011 – 31 March 2012



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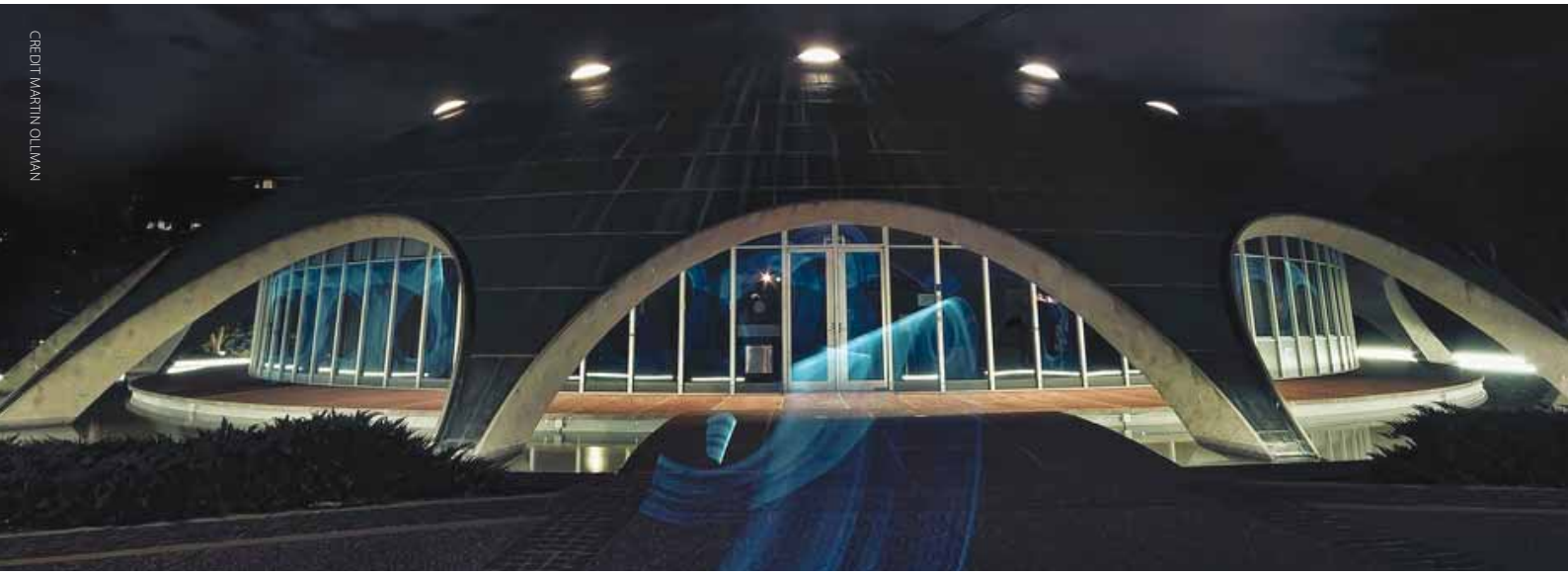


CREDIT MARTIN OLLMAN

President's foreword

THE ACADEMY IS GUIDING STRATEGIC THINKING FOR AUSTRALIAN SCIENCE NOW AND INTO THE FUTURE.

This has been a year of challenges and successes for the Australian Academy of Science.

A great deal of effort has been committed to raising public awareness of science, securing quality in science and maths education, recognising excellence and ensuring that science underpins public policy and decision-making.

Thanks to the many Fellows who contributed to these outcomes, with support from the Secretariat, we have seen a number of changes for the better.

The Academy welcomed the appointment of the new Chief Scientist, Professor Ian Chubb, in April 2011. He has already proven himself to be a strong and outspoken advocate for science in Australia.

In late 2011 we heard the wonderful news that Professor Brian Schmidt FAA had jointly won the Nobel Prize in Physics, for his work on the expansion of the universe. Along with my colleagues at the Academy, I warmly congratulate Brian for this highest of honours.

Professor Schmidt is proving to be a wonderful advocate for science. Not only has he donated one-third of his Nobel Prize winnings to *Primary Connections,* he has given considerable time to publicly advocating for stronger science education and international collaboration.

Improving education

In September I made a nationally televised address to the National Press Club, emphasising the importance of robust science and maths education to the future prosperity of Australia.

Professor Chubb also has brought a great enthusiasm for improving Australian science and maths education. The Academy is proud to have since made major contributions to Professor Chubb's review of science and mathematics education at all levels. We hope and understand that the Chief Scientist's review — which will be submitted to the Prime Minister — will form the

basis for Government's deliberations on future directions for education in this country.

Unfortunately this renewed focus on education came too late to influence the government decision not to renew funding for the Academy's school science education programs, *Primary Connections* and *Science by Doing*. Funding came to an end this year, despite the best efforts of Fellows and staff to advocate for a better outcome.

The Academy has taken the decision to establish *Primary Connections* as a wholly-owned not-for-profit business unit and to underwrite its operations while we continue to seek alternative sources of funding. Fortunately, boosted by the introduction of the National Curriculum, sales have been strong.

Science by Doing faces a less certain future. I am pleased that, at the time of writing, this proven program has been offered a grant that would allow us to develop more curriculum resources for Australian high schools. However, there is currently no support for the professional learning component, so critical to improving teaching quality.

Science in Australian policy

On a brighter note, it was heartening to see the science and broader community pull together ahead of the Federal Budget in 2011 to campaign for continued strong government support for medical research. Thanks to the outstanding efforts of a large number of people the mooted $400 million in cuts did not materialise.

In December we farewelled the former Minister for Industry, Innovation, Science and Research, Senator Kim Carr, who changed portfolios. Senator Carr was a passionate science minister and his contributions were greatly appreciated across the sector.

With a slightly altered portfolio, the new Minister for Tertiary Education, Skills, Science and Research, Senator Chris Evans, has in his short time proved to be enthusiastic and keen to engage. The Academy's Council was pleased to host Senator Evans at dinner in the Shine Dome soon after his appointment, as part of our ongoing dialogue with decision-makers in science. Other guests over the year have included Finance Minister Senator the Hon Penny Wong, the Chief Scientist, the Hon Malcolm Turnbull and ARC Chief Executive Professor Margaret Sheil.

The Academy's work to represent science and senior scientists has also been aided by the expansion of the role of the Australian Council of Learned Academies (ACoLA), of which I am currently President, on behalf of the Australian Academy of Science. Through the re-structured Prime Minister's Science, Engineering and Innovation Council, ACoLA and the Academies have a significant forum through which to provide interdisciplinary advice to government.

Strengthening international ties

The 2011 Federal Budget failed to replace the terminating International Science Linkages program, under which the Academy has been able to foster international relationships, identify collaborative research opportunities and connect many early career and senior scientists with their international colleagues, through travelling fellowships, exchanges and seminars. Federal funding remains for bilateral international relationships with China and India — and the Academy will continue to work with the Government on these — but regrettably there is now no comprehensive government-supported international science program.

This is not to say we have ceased our international activities — far from it. Our bold plan for international science, *Australian science in a changing world: innovation requires global engagement*, puts a strong case for investment in fostering Australia's international science relationships. This paper has become a touchstone for ongoing discussions with the government, as well as forming the basis of the Academy's submission to the government's White Paper on Australia in the Asian Century.

The Academy's relationships with our international friends, neighbours and colleagues remain strong. Last year I was pleased to meet the new President of the Chinese Academy of Sciences, Professor Bai Chunli, in Shanghai and we look forward to his visit to Australia later this year. The Academy hosted South African High Commissioner Ms Koleka Mqulwana; the Australian-born former President of the Royal Society, Professor Lord Bob May of Oxford; the Royal Society's new Chief Executive, Dr Julie Maxton; and the President of the Indonesian Academy of Science, Professor Sangkot Marzuki. I visited the Royal Society in London in early 2012 and also had the pleasure of meeting with the Israeli and French Academies of Sciences.

Of course, we also continue to enjoy strong international representation through other Fellows of the Academy and through our National Committees.

The Academy's status as Australia's adhering body to the International Council for Science (ICSU) and its subsidiary organisations allows us to bid for major international meetings, such as the General Assembly of the International Union of Geodesy and Geophysics which attracted 3500 delegates to Melbourne in mid-2011 and injected around $35 million into the national economy. These networks also open the opportunity to have hundreds of Australians involved in international programs of all sizes, in many nations and across scientific disciplines.

Australia received a significant international honour last year when Professor David Black FAA became the first Australian Secretary General of ICSU, an appointment that reflects the high esteem in which David is held and recognises the contributions of the Australian research community to global science.

Informing Australian science

As well as their important work in supporting the Academy's responsibilities in relation to ICSU, the National Committees for science have a strategic role in guiding the development of their disciplines in Australia. From national meetings and lecture tours to decadal plans, key submissions to government reviews and bids for international infrastructure, these committees undertake very important work.

The Academy is also guiding strategic thinking for Australian science now and into the future through the implementation of plans developed at its annual Theo Murphy High Flyers Think Tanks. These events are an excellent opportunity for outstanding early career researchers from across disciplines to come together to discuss new approaches to problems of national significance. Mechanisms are now in place to progress the recommendations of the 2010 and the 2011 Think Tanks.

Fostering careers and awarding excellence

The Academy has always recognised outstanding work by early and mid-career researchers through its awards and medals, and in recent years has increased resources dedicated to fostering excellence and providing guidance for young scientists.

We have recently strengthened this resource even further with the recent establishment of the Australian Early and Mid-Career Researchers Forum. This forum is an opportunity for the Academy to better understand the needs and concerns of younger researchers, and provide better access to the intellectual, networking and advocacy resources of the Academy.

The Academy has also strongly supported Science Meets Parliament and Science Meets Policy Makers, two annual events of Science and Technology Australia aimed at informing and supporting the development of early and mid-career researchers.

Securing the future

As you will read in this report, the Australian Academy of Science works hard on behalf of its Fellows, and on behalf of science in Australia. To enable the Academy to continue to carry out this important work, we have established an Endowment for Science Fund. If you would like to contribute to this fund, please contact the Chief Executive for a confidential discussion.

Vale

Over the past year, I am sad to say we have farewelled six friends and colleagues in Fellowship: Professor Kenneth Le Couteur, Professor Bernard Yarnton (Bernie) Mills, Professor Henry Robert (Harry) Wallace, Professor Alexander McLeod (Sandy) Mathieson, Dr Fraser John Bergersen and Professor Charles Angas (Angas) Hurst. We salute them for contributions to science and to the Academy, and extend our sincere sympathy to their families.

In appreciation

Many Fellows have given considerable time, energy and expertise to the activities of the Academy over the past 12 months. I warmly acknowledge the tireless dedication of Council and Committee members, as well as the organisers and conveners of our Think Tank, public lecture series and symposiums.

This year I would also like to single out for special thanks the members of the House Committee, which has been disbanded, and the Video Histories of Australian Scientists Committee, which has been suspended. I would also like to make special mention of the long-serving editor of our newsletter, Professor Neville Fletcher, who stepped down in January 2012, and Mr Fulton Muir, who retired in March 2012 from the Academy's Audit and Finance Committees after more than a decade of service.

Suzanne Cory AC PresAA FRS

Chief Executive's foreword

SUBSTANTIAL ACHIEVEMENTS IN... THE ENHANCEMENT OF SCHOOL SCIENCE EDUCATION, THE DEVELOPMENT OF YOUNG SCIENTISTS, COLLABORATIVE RELATIONSHIPS WITH SCIENTISTS IN THE ASIAN REGION, AND OUTREACH.

It has been a particularly busy year for the Secretariat of the Academy.

The five yearly review of the grant-in-aid funding provided to the Academy by the Australian Government under the Higher Education Research Promotion (HERP) and Learned Academies-Supplementation programs was a major preoccupation.

The review process has yet to be completed. However, I am pleased to report that we were able to demonstrate substantial achievements in regard to the recommendations of the previous review, in 2005, especially in relation to the enhancement of school science education, the development of young scientists, collaborative relationships with scientists in the Asian region, and outreach.

The 2005 review concluded that an increase in funding to enhance the infrastructures of the Academies was warranted to provide ready access to independent advice from some of the nation's best minds, in order to:

- build and maintain excellence in the disciplines represented by the Academies, and
- provide knowledge to underpin wise decision-making for the nation.

Numerous examples were provided by which the grant-in-aid funding has enabled the Academy to achieve the funding objectives of the HERP program — to foster understanding of the importance of, and to promote research and scholarship in, the disciplines represented by the four Academies.

Value provided by the Academy far exceeded the value of the grant-in-aid funding. In addition to the *pro bono* contribution of time and expertise by Academy Fellows and the broader Australian research community (particularly through the National Committees for Science) we:

- leveraged cash and in kind support from a range of government and non-government sources
- generated returns to the Australian economy through activities such as international conferences, and

- made more difficult to quantify (but no less important) benefits such as increased opportunities for research collaboration through enhancing Australia's international research reputation.

The increase in funding enabled both the capacity and capabilities of the Secretariat to be expanded, allowing us to increase the quantity and quality of activities in the key areas of science policy, support for National Committees and early and mid-career researchers, media promotion and public awareness. The results are evident in this annual report. The government's decision not to continue funding international and education programs presents challenges that we are all working hard to address, and we await the outcome of the 5 year funding review with great interest.

Sue Meek FTSE

Council and administration

THE AUSTRALIAN ACADEMY OF SCIENCE'S AFFAIRS ARE CONDUCTED BY A COUNCIL OF 17 FELLOWS THAT MET SIX TIMES BETWEEN 1 APRIL 2011 AND 31 MARCH 2012. TO ENSURE THAT 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

Professor Peter Hall FAA FRS CorrFRSE[12] — Vice President and Secretary for Physical Sciences
ARC Federation Fellow, Department of Mathematics and Statistics, University of Melbourne

Professor Marilyn Renfree FAA FAIBiol — 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 FRS — 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

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

Council members

Physical sciences

Professor Andy Gleadow FAA FGSAust[12] —
Professor of Earth Sciences, School of Earth Sciences, University of Melbourne

Professor Chennupati Jagadish FAA FTSE —
Australian Laureate Fellow and Distinguished Professor, Department of Electronic Materials Engineering, Research School of Physics and Engineering, Australian National University

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

Mechanical and Mechatronic Engineering, University of Sydney

Professor Michelle Simmons FAA[12] — ARC Federation Fellow and Professor, Centre for Quantum Computer Technology, University of New South Wales

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

Biological sciences

Professor Chris Goodnow FAA FRS[12] — NHMRC Australia Fellow, and Chief Scientific Officer, Australian Phenomics Facility, and Head, Department of Immunology, John Curtin School of Medical Research, Australian National University

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

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

Professor Hugh Possingham FAA[12] — ARC Federation Fellow, Professor and Director, The Ecology Centre, University of Queensland

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

[12] to retire at AGM 2012

CREDIT MARK GRAHAM

Strategic plan: 2010–15

THIS ANNUAL REPORT DESCRIBES THE ACTIVITIES OF THE ACADEMY FROM 1 APRIL 2011 TO 31 MARCH 2012 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 contribute 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

Since its creation by Royal Charter in 1954, gifts and legacies from Fellows and friends have helped the Australian Academy of Science to maintain a degree of financial independence. Many of our core activities such as scientific meetings, advice to support policy development, publications, education, public awareness and outreach, international activities, awards and fellowships would not be possible without this long-term support. It is critical to achieving our strategic objectives.

Science makes vital contributions to saving lives, improving standards of living and transforming our understanding of nature. At the laying of the Academy's foundation stone in 1959, Prime Minister Sir Robert Menzies said:

> The degree to which matters of the greatest complexity have been evolved and built on in our own lifetime is not only fascinating, but positively bewildering … By the end of this century … the boundaries of knowledge to the activities of scientists will have been pushed back to places as yet unseen and unimagined. In our own country this Academy, established by the finest body of scientists this country has ever had, adding as it will in the future to its own numbers men and women of corresponding gifts and enthusiasm, is going to make a contribution to the body of scientific knowledge … which … will extend over the world.

Menzies' words are as relevant today as they were last century. Major new challenges such as climate change, infectious diseases, biodiversity preservation, dwindling energy supplies, poverty and economic development demand strong scientific leadership on a national and global scale.

Those who make a donation to the Australian Academy of Science join a distinguished group of Fellows and friends in supporting an organisation dedicated to upholding Australian scientific excellence now and into the future. The work of the Academy is the legacy of these generous benefactors. Your support helps to maintain its outstanding work and allows future generations of scientists to make their own history.

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.

The Academy has deductible gift recipient status with the Australian Taxation Office. To discuss supporting the Academy, or for a confidential discussion about naming the Academy in your will, please contact the Chief Executive, Dr Sue Meek (tel 02 6201 9450, email sue.meek@science.org.au).

The Fellowship

AT 31 MARCH 2012 THE ACADEMY FELLOWSHIP COMPRISES 458 OF AUSTRALIA'S LEADING RESEARCH SCIENTISTS ELECTED FOR THEIR PERSONAL CONTRIBUTIONS TO SCIENCE. FELLOWS OCCUPY SENIOR POSITIONS IN UNIVERSITIES, GOVERNMENT RESEARCH AGENCIES, INDUSTRY, BUSINESS AND MEDIA.

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

2012 New Fellows (FAA)

The following scientists were elected to the Fellowship on 23 March 2012:

Professor Michael Alpers FRS
Centre for International Health, Curtin University

Professor Joss Bland-Hawthorn
Institute of Photonics and Optical Science, University of Sydney

Professor Paul Leslie Burn
Centre for Organic Photonics and Electronics, University of Queensland

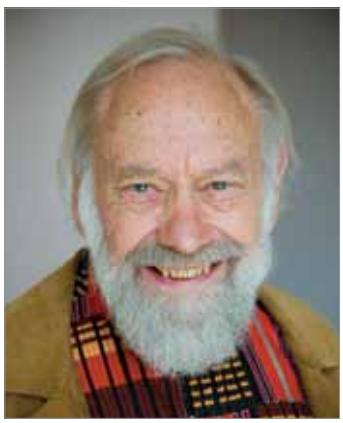
Dr John Church
CSIRO Marine and Atmospheric Research

Professor Patrick De Deckker
Research School of Earth Sciences, Australian National University

Dr Peter Dodds
CSIRO Plant Industry

Professor John Arthur Endler
School of Life and Environmental Sciences, Deakin University

Professor Timothy Fritjof Flannery
Environmental Sustainability, Macquarie University


Michael Alpers


Joss Bland-Hawthorn


Paul Burn

John Church

Patrick De Deckker

Peter Dodds

John Endler

Timothy Flannery

Johannes Lambers

Stephen MacMahon

James McCluskey

Graeme Moad

Tanya Monro

John Norris

Stephen Powles

Louise Ryan

Frances Separovic

Greg Stuart

Michael Tobar

Jane Visvader

Robert Williamson

Professor Johannes Thieo Lambers
School of Plant Biology, University of Western Australia

Professor Stephen William MacMahon
George Institute for Global Health

Professor James McCluskey
Department of Microbiology and Immunology, University of Melbourne

Dr Graeme Moad
CSIRO Materials Science and Engineering

Professor Tanya Mary Monro
Institute for Photonics and Advanced Sensing, University of Adelaide

Professor John Edward Norris
Research School of Astronomy and Astrophysics, Australian National University

Professor Stephen Bruce Powles
School of Plant Biology, University of Western Australia

Dr Louise Marie Ryan
CSIRO Mathematics, Informatics and Statistics

Professor Frances Separovic
School of Chemistry, Bio21 Institute, University of Melbourne

Professor Greg John Stuart
Neuroscience Department, John Curtin School of Medical Research, Australian National University

Professor Michael Edmund Tobar
School of Physics, University of Western Australia.

Professor Jane Visvader
Stem Cells and Cancer Division, Walter and Eliza Hall Institute of Medicine

Professor Robert Charles Williamson
National ICT Australia

2012 New Corresponding members

Professor Bruce William Stillman AO FRS
Cold Spring Harbor Laboratory, New York

Professor Brian Lawn
National Institute of Standards and Technology, Maryland

CREDIT IRENE DOWDY

2011 Nobel Prizewinner Brian Schmidt

© THE NOBEL FOUNDATION. PHOTO: FRIDA WESTHOLM

Brian Schmidt receives his Nobel prize medal

In 2011 Professor Brian Schmidt received one of the world's highest accolades, the Nobel Prize in Physics, in conjunction with two American colleagues in astronomy, Professors Adam Riess and Saul Perlmutter. The award acknowledges their discovery of the accelerating expansion of the Universe through observations of distant supernovae. Professor Schmidt joins several other Academy Fellows who have won Nobel Prizes.

Professor Schmidt believes that Australia needs strategic science and education policies that adapt to a changing world to capitalise on its opportunities. During an address at the 2011 Prime Minister's Prizes for Science Awards he encouraged policymakers to shape the long-term prosperity of Australia by investing in science and education. Professor Schmidt has demonstrated his own passionate support for education policies by generously donating $100,000 to the Academy's primary school science program, *Primary Connections*.

President of the Academy Professor Suzanne Cory and Fellows joined other leaders in science and Federal politicians at the Shine Dome in October 2011 for a special champagne breakfast to celebrate Professor Schmidt's prize. 'Brian's work richly deserved this honour', Professor Cory said. 'His findings have completely changed the way in which we understand the Universe.'

In 2001 Professor Schmidt won the Pawsey Medal, an Academy of Science early career research award which recognises outstanding research in physics by scientists of 40 or younger. Professor Schmidt was elected as a Fellow of the Academy in 2008. He will join the Academy's Council in May 2013.

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CREDIT IRENE DOWDY

David Solomon, Ezio Rizzardo, Julia Gillard and Kim Carr

Honours awarded to Fellows during the year 2011–12

2011 Nobel Prize in Physics

Professor Brian Schmidt

- jointly awarded the Nobel Prize in Physics with Professor Adam Reiss and Professor Saul Perlmutter for the discovery of the accelerating expansion of the Universe through observations of distant supernovae

2011 Prime Minister's Prize for Science

Professor David H Solomon and Dr Ezio Rizzardo

- jointly awarded for their role in revolutionising polymer science

Royal Society

Professor Alan Cowman

- elected as a Fellow for outstanding research that has led to understanding drug resistance in relation to malaria drugs, with important implications in the development of new antimalaria medications

Professor Ian Frazer

- elected as a Fellow for outstanding scientific achievement and lasting contribution to preventive medicine

Professor Mark Randolph

- elected as a Fellow for distinguished research in geotechnical engineering of offshore foundation system

Professor Patrick Tam

- elected as a Fellow for outstanding research into cell fate and cell lineage in mammalian development

US National Academy of Sciences

Professor Mark Harrison

- elected as a Fellow in recognition of his distinguished and continuing achievements in original research

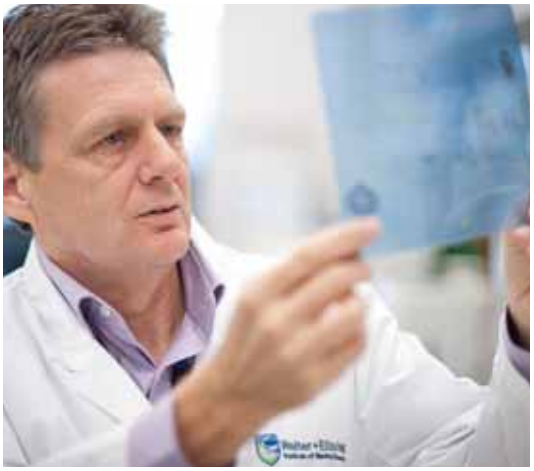
Professor Noel Hush

- elected as a Foreign Associate for his outstanding career in theoretical chemistry research

Royal Academy of Engineering

Professor Yui-Wing Mai

- elected as an international Fellow in recognition of his groundbreaking work in the field of advanced materials and fracture mechanics



CREDIT WALTER AND ELIZA HALL INSTITUTE

Alan Cowman

2011 Queen's Birthday Honours

Members in the General Division of the Order of Australia (AM)

Professor Les Field AM

- for service to the administration of higher education, and to the discipline of chemistry as an academic and researcher

Professor John McKenzie AM

- for service to higher education through administrative roles, to professional associations and to the community

2012 Australia Day Honours

Members in the General Division of the Order of Australia (AM)

Professor Roderick Boswell AM

- for service to science in the field of plasma physics as an academic and researcher and through contributions to the international scientific community

Professor Lorenzo Faraone AM

- for service to science as an educator and researcher, particularly in the field of micro-electronics, and to professional associations

Professor Martin Green AM

- for service to science education as an academic and researcher, particularly through the development of photovoltaic solar cell technology, and to professional associations

Professor Eugenie Lumbers AM

- for service to the medical sciences in the fields of physiology and pharmacology as a researcher, academic and administrator, and to the community

Professor Mandyam Srinivasan AM

- for service to visual and sensory neuroscience through the Queensland Brain Institute, as an academic, researcher and mentor, and to the national and international scientific community.

Medal of the Order of Australia (OAM)

Professor Rodney Tucker OAM

- for service to the electrical and electronics industry, particularly as an academic and educator

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

Professor Kurt Lambeck

- in recognition of his dedication to promoting and developing amicable relations between France and Australia

Royal Society Royal Medal

Dr Robin Holliday

- for outstanding research and highly influential discoveries of the 'Holliday junction' structure in meiotic recombination and the function of DNA methylation at CG base pairs

2011 CSL Florey Medal

Professor Graeme Clark

- for his pioneering work on the bionic ear

2011 Association for International Cancer Research Colin Thomson Award

Professor Suzanne Cory

- for award-winning research in immunology and cancer

ISICR 2011 Milstein Award and Research Australia Leadership and Innovation Award

Professor Doug Hilton

- for his outstanding contributions to cytokine research

WH (Beattie) Steel Medal of the Australian Optics Society

Professor Min Gu

- in recognition of a strong and sustained record of authority, enterprise and innovation in the field

Newton Abraham Visiting Professorship in the Medical, Biological and Chemical Sciences, University of Oxford

Professor Andrew Holmes

2011 Prince Albert I Medal

Dr Trevor McDougall

- for his outstanding work on important and fundamental problems of ocean fluid dynamics over the full range of ocean scales, and the thermodynamic properties of seawater

British Society for Reproduction and Fertility Distinguished Scientist Award

Professor Marilyn Renfree

Genetics Society of Australasia MJD White Medal

Professor David Smyth

- for outstanding contributions to the field of genetics

2011 Victoria Prize

Professor Andreas Strasser

- for his work on cell death and cancer

Chaire de la Vallée Poussin, Catholic University of Louvain, for 2011

Professor Ross Street

2012 Shoemaker Distinguished Lunar Scientist Award

Professor (Stuart) Ross Taylor

- for his significant contribution to the field of lunar science

2011 Australian Museum Eureka Prizes

Australian Infectious Diseases Research Centre at the University of Queensland Eureka Prize for Infectious Diseases Research
Professor Alan F Cowman

Distinguished Scientist award winner Marilyn Renfree

NSW Department of Trade and Investment Jamie Callachor Eureka Prize for Medical Research Translation
Professor Murray D Esler together with Associate Professor Markus Schlaich

Australian Government Eureka Prize for Promoting Understanding of Australian Science Research
Professor Richard Shine

ARC Australian Laureate Fellowships

Professor Peter Hall
Professor Ian Richard Petersen
Professor Gordon Wallace
Professor Nanda Dasgupta — Inaugural Georgina Sweet Fellowship

Research Australia Lifetime Achievement award winner Peter Doherty

2011 Research Australia Awards

Lifetime Achievement Award
Professor Peter Doherty

Leadership and Innovation Award
Professor Doug Hilton

The Peter Wills Medal
Professor John Shine

Deaths since 1 April 2011

We regret to record the following deaths:

Dr Fraser John Bergersen AM FAA FRS, 3 October 2011

Professor Charles Angas Hurst AM FAA Hon DSc (Melb), 19 October 2011

Professor Kenneth James Le Couteur FAA, 18 April 2011

Professor Alexander McLeod (Sandy) Mathieson FAA Hon DSc (St Andrews), 30 August 2011

Professor Bernard Yarnton (Bernie) Mills AC FAA FRS, 26 April 2011

Professor Henry Robert (Harry) Wallace FAA, 26 July 2011

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 NEW NATIONAL SCIENCE CURRICULUM BY DEVELOPING TEACHING RESOURCES TO ENHANCE TEACHER QUALITY AND CURRICULUM RESOURCES TO INCREASE STUDENT LEARNING, AND BY PROVIDING INFORMATION TO PROMOTE PUBLIC UNDERSTANDING OF THE IMPORTANCE OF SCIENCE. THE FOLLOWING IS AN OVERVIEW OF CURRENT ACTIVITIES.

School science programs

The Academy has two programs to support the effective teaching of science in primary and early secondary schools, *Primary Connections: linking science with literacy* and *Science by Doing*, respectively.

Program directors Ms Shelley Peers and Professor Denis Goodrum were integrally involved in the development of the *Australian Curriculum: Science — Foundation to Year 10* by the Australian Curriculum Assessment and Reporting Authority. The authority's chair Professor Barry McGaw AO FASSA has acknowledged the suitability of the Academy's programs to support its implementation.

Primary Connections aims to increase the confidence of primary school teachers (who often have no formal training in science) and to help maintain young students' natural interest in science, while also developing their communication, mathematical and documentation skills.

Science by Doing recognises that teachers of science in secondary schools are more likely to be trained in science, and focuses on establishing and maintaining mutually supportive learning communities in and between schools to provide ongoing teacher development, and content that will effectively engage adolescent pupils.

Both *Primary Connections* and *Science by Doing* use an inquiry-based approach which has been shown to generate better student engagement than more traditional models. Professional learning lies at the heart of both programs because research shows that improving the quality of teachers has the single biggest impact on student learning outcomes.

The development of *Primary Connections* and *Science by Doing* has occurred in close consultation with the education sectors in the States and Territories and the enthusiastic participation of teachers from across the country in trialling the materials.

In addition to very positive feedback from promotional presentations at education conferences and workshops, the programs have received strong endorsement of their quality and efficacy from a range of professional groups

including Primary and Secondary School Principals Associations and the Australian Science Teachers Association:

> *'The Australian Academy of Science has developed two significant resources with the support of substantial funding from the Australian Government. These resources, Primary Connections and Science by Doing, are quality resources, which have supported professional learning for teachers and are widely used by teachers around Australia.'*
>
> *Anna Davis, President,*
> *Australian Science Teachers Association*

Both programs have also achieved recognition internationally where, in addition to being regarded as outstanding examples of innovative inquiry-based science education, they are seen as leaders in the assessment of effectiveness. Rigorous research examining both impact and teaching staff perceptions of change has demonstrated a high level of satisfaction amongst users and measurable positive impacts for students and teachers alike.

PrimaryConnections®
Linking science with literacy

Primary Connections: linking science with literacy

Government funding of *Primary Connections* will end in April 2012 after receiving a total of $9.7 million from the Department of Education, Employment and Workplace Relations since 2004. However, due to the introduction of the national science curriculum, additional units are needed to provide full coverage for science from Foundation to Year 6, and earlier curriculum units require adjustment.

The Academy remains committed to the program and is exploring all options to ensure its long-term viability as a self-sustaining not-for-profit enterprise. In mid-2011 the Academy Council established the School Science Education Advisory Board, chaired by Mr Bruce Wilson, former Chief Executive of the Curriculum Corporation.

The Academy was delighted when Nobel Prize winner and Fellow Professor Brian Schmidt donated $100,000 of his prize money to the program in the hope that his donation might inspire others to consider making a similar gift, commenting: '*Primary Connections* has had a very good penetration across the country ... and it is one of the most effective tools I have seen to help in teaching science to this age group.'

Professor Kenneth Cavill FAA subsequently generously donated a further $20,000.

Curriculum resources

More than 329,000 *Primary Connections* curriculum units have been distributed since publication began in February 2006. This represents purchases by over 56 per cent of Australian primary schools including 61 per cent of all government schools, 44 per cent of Catholic schools, and 42 per cent of independent schools. The highest distribution is in South Australia followed by Queensland and Western Australia.

Eight new curriculum units, fully aligned with the *Australian Curriculum: Science,* were published in the reporting period and have been well received by teachers. Four of the 19 previously published units have been redrafted to provide alignment and the remainder will be aligned and republished by September 2012 (see **www.science.org.au/primaryconnections/** for details).

New and redrafted *Primary Connections* units released in 2011–12

New units

Year level	Unit title	Sub-strand of the Australian Curriculum: Science
1	*Up, down and all around*	Earth and Space sciences
2	*Watch it grow!*	Biological sciences
2	*All mixed up*	Chemical sciences
3	*Feathers, fur or leaves*	Biological sciences
3	*Melting moments*	Physical sciences
4	*Beneath our feet*	Earth and Space sciences
5	*Earth's place in space*	Earth and Space sciences
6	*Essential energy*	Physical sciences

Redrafted units

Year level	Unit title	Sub-strand of the Australian Curriculum: Science
Foundation year	*Staying alive*	Biological sciences
1	*Spot the difference*	Chemical sciences
4	*Smooth moves*	Physical sciences
6	*Earthquake explorers*	Earth and Space sciences

Professional learning

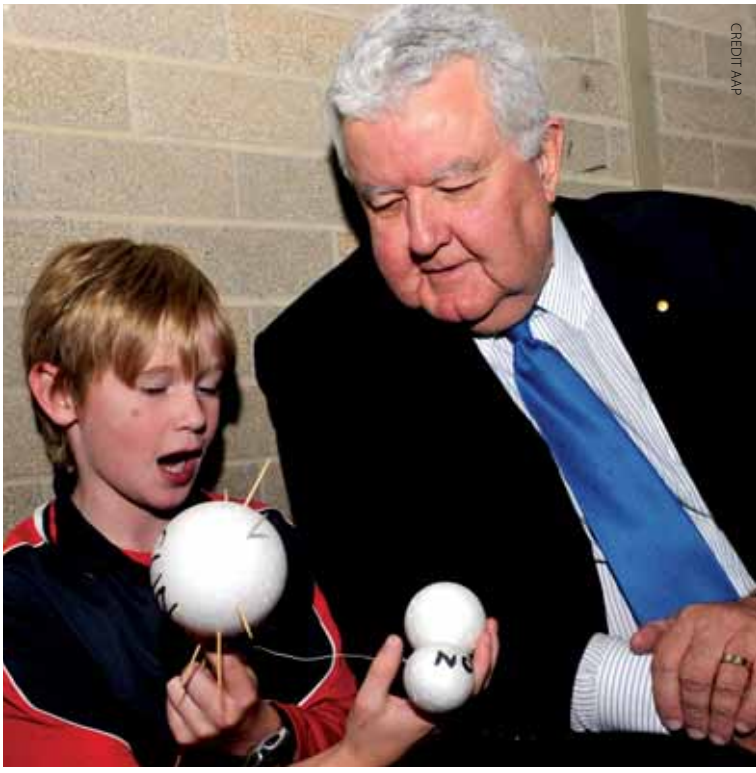
Primary Connections has provided two main professional learning training programs during 2011–12. Curriculum leader program training (two days) prepares teachers to be science leaders in their schools, and professional learning facilitator training (three days) prepares facilitators to train teachers across multiple school sites.

Twenty-eight curriculum leaders were trained in Sydney and Melbourne in October 2011 on a user-pays basis. Forty newly appointed primary science specialists were trained as professional learning facilitators at the invitation of the Victorian Department of Education and Early Childhood Development in Melbourne in November 2011 and March 2012. Additionally, previously trained master facilitators conducted professional learning facilitator training for 42 participants in Perth and Darwin.

A total of 196 learning facilitators and tertiary facilitators also benefited greatly from refresher workshops conducted under the government grant in Brisbane, Sydney, Adelaide, Melbourne and Perth in February and March 2012. These focused on the experiences of facilitators in using *Primary Connections*, and state-wide, district and regional initiatives in primary school science education.

Survey feedback by participants indicated their strong belief in the effectiveness of *Primary Connections* curriculum support materials and professional learning activities in improving science teaching in primary schools. The many positive comments received included: 'revolutionising science teaching', 'empowering teachers', and 'making science an important subject'.

The annual half-day professional learning session for the Questacon Science Circus in mid-2011 familiarised 16 presenters with the *Primary Connections* program so that they can then inform teachers and schools of its availability as an inquiry-based science education resource.



CREDIT AAP

Ian Chubb discussing the moon with a student at the launch of the 5Es DVD

Promotion of the program

The Chief Scientist of Australia, Professor Ian Chubb, launched the *Primary Connections 5Es* training DVD in June 2011 at the Fadden Primary School in Canberra. This DVD will be an important tool for training teachers in the 5Es approach (Engage, Explore, Explain, Elaborate and Evaluate) used in the program.

In August 2011 the Academy was also pleased to welcome the South African High Commissioner, Her Excellency Ms Koleka Mqulwana, who requested a briefing on *Primary Connections*.

Presentations to promote *Primary Connections* have included:

Date	Location	Event
June 2011	Perth	Western Australian Primary Principals' Association Conference
July 2011	Darwin	Australian Science Teachers Association
August 2011	Sydney	Department of Education and Training (Sydney Region) Quality Teaching Conference
August 2011	Sydney	New South Wales Science Teachers' Association Primary Science Conference
December 2011	Brisbane	Queensland University of Technology Faculty of Education graduation ceremony

Primary Connections has been selected as one of five not-for-profit organisations to partner with the Business Working with Education Foundation of Victoria as part of their *Maths and Science Partnerships Strategy 2012*. The foundation will provide assistance to develop its organisational capacity to become a viable not-for-profit enterprise. As a result of this partnership, *Primary Connections* expects to be able to offer every primary school in Victoria the opportunity to train a curriculum leader for their school.

At the invitation of the Mexican Academy of Science, Ms Shelley Peers made presentations on *Primary Connections* at the *Sixth International Conference: Innovate and improve the world through science education* in Mexico City and a regional science conference in Monterrey in November 2011. Her participation was supported by the US–Mexico Foundation for Science and the presentations focused on assessment in inquiry-based science education.

Shelley Peers was also invited to attend the International Coalition meeting of the National Science Resources Center in Washington in November, as well as a meeting of the centre's board. The National Science Resources Center is a program of the US National Academy of Sciences and the Smithsonian Institute. Such events facilitate liaison with similar education programs of sister academies.

Research

As part of the government contract, Adjunct Professor Keith Skamp of Southern Cross University was commissioned to prepare a report, *Teachers' implementation of science based on the 5Es learning model: insights from trial teacher feedback*. Teacher feedback from the trialling of 16 curriculum units between 2005 and 2011 will be analysed to enhance knowledge of how teachers understand and implement *Primary Connections* to aid development of future resources and professional learning.

Science by Doing

science.org.au/sciencebydoing/

The Academy was allocated $3.5 million by the Department of Employment, Education and Workplace Relations between 2007 and 2011 for the pilot and first stage of *Science by Doing*. This program improves science learning in early secondary schools by:

- engaging secondary students through an inquiry-based approach that uses digital technologies in effective ways
- supporting school science departments that acknowledge and build upon teacher expertise.

The resources

Following revision based upon teacher and student feedback from a very successful trial in 2010 (see **www.science.org.au/sciencebydoing/documents/SbD-report-020211.pdf**), a suite of *Science by Doing* materials comprising five professional learning resources and three curriculum resources was released for sale in July 2011. The release was accompanied by a marketing campaign involving advertisements and two mail-outs to every high school in Australia, a total of 2896 schools.

The professional learning resources comprised:

- inquiry-based teaching
- effective questioning
- assessment
- student learning
- leading for change

Each module contains a booklet explaining the ideas and research, a DVD demonstrating the ideas and skills, and an interactive CD for the user to practise the skills shown in the DVD.

To date three curriculum resources have been created:

- *Enough water fit for drinking*
- *DSI: Doing Science Investigations*
- *Inquiry: DIY guide*.

Enough water fit for drinking, comprising both a teacher guide and a student guide, will provide the template for all future curriculum units by integrating all three strands of the Australian curriculum for science — science inquiry skills, science as a human endeavour, and science understanding. An adaptation manual for existing science resources is also available. More information is available at **www.science.org.au/sciencebydoing/index.html.**

Future of the program

With the end of Department of Employment, Education and Workplace Relations funding in July 2011, *Science by Doing* applied to Education Services Australia for funding for stage two of the program. Education Services Australia has been commissioned by the Australian Government to distribute funds for the development of educational resources to support the new Australian Curriculum. The focus is on digital materials filling identified gaps in the currently available resources.

Science by Doing has been awarded $1.6 million to fund the development of additional curriculum units and to transpose the program's existing curriculum and professional learning resources to an online environment. This grant is the largest made by Education Services Australia.

Awards

Elements of the *Science by Doing* program were nominated for two awards in 2011. The digital components of *Science by Doing*'s professional learning resources, which were developed in partnership with CSIRO Publishing, were awarded first place in the Lifelong Learning category against a strong field of nominations which included education programs not aimed at students in schools or universities.

The *Science by Doing* suite of resources was also named as a finalist in the Education category of the Australian Innovation Challenge, which is sponsored by *The Australian* newspaper. This category was introduced for the first time in 2011 and recognises innovative programs using new technology or using existing technology in new ways to meet an educational need.

The status and quality of year 11 and 12 science in Australian schools

At the request of the Office of the Chief Scientist the *Science by Doing* team prepared a research report about senior science in Australian secondary schools. This work was funded by the Department of Industry, Innovation, Science, Research and Tertiary Education (DIISRTE) as part of a broader investigation by the Chief Scientist to examine the strengths and vulnerabilities of the nation's present science capabilities for his forthcoming *Health of Australian science report*.

The status and quality of Year 11 and 12 science in Australian schools includes an analysis of enrolment statistics supplied by the Department of Education, Employment and Workplace Relations, indicating there had been a continuing decrease in student enrolments in science since 1991.

Data gathered from questionnaire responses and focus groups with students suggested that many did not choose science out of interest — prerequisites for university were the most common motivation. Teacher telephone surveys indicated

that most of the teachers taking these courses have science qualifications. Some have more than one degree. Many reported that 'chalk and talk' teaching is the most common approach in their school, as well as practical lessons.

The report was released in mid-December. It received substantial media attention, with articles in many of the major papers and lead author Professor Denis Goodrum participating in a series of radio interviews.

The report has since been revised based on new information supplied by the Department of Education, Employment and Workplace Relations and is available at **www.science.org.au/publications/documents/Year11and12Report.pdf.**

Australia–Indonesia Institute grant

In November 2011, the Australia–Indonesia Institute of the Department of Foreign Affairs and Trade awarded funding to *Science by Doing* to support a visit from the Southeast Asian Ministers of Education Organization Regional Centre for Quality Improvement of Teacher and Education Personnel in Science. The purpose of the visit was to form links with Australian education organisations. The three-person delegation spent 12 days in Australia, beginning with a few days learning about the Academy's education programs. They also visited other organisations such as Questacon, CSIRO and the Science Teachers Association of Queensland.

Since returning to Bandung in Indonesia, members of the delegation have run several workshops for teachers, sharing their ideas about inquiry-based teaching and learning that they developed here in Australia.

NOVA SCIENCE IN THE NEWS

Nova: science in the news

has continued to rank as the most popular part of the Academy website over the past year, adding two new topics to its repertoire, one on honeybees and one on piezoelectric sensors in the detection of metal fatigue.

Worldwide there are more than 20,000 bee species, not all of which have been described by science. Of these, there are only seven known species of honeybees. The pollination services of honeybees are worth several billion dollars a year to Australia. The *Nova* topic **Getting the buzz on the value of bees** (sponsored by the Department of Agriculture, Fisheries and Forestry) explores the world of the honeybee, its contribution to Australian agriculture, and the threats that bees are currently facing, including the mite *Varroa destructor*.

CREDIT R MALESZKA, ANU

Worker honeybee

Piezoelectric sensors and self monitoring planes

(sponsored by the Defence Science and Technology Organisation) describes how aircraft can check their own vital signs and warn the pilots and ground crew of any possible trouble (known technically as 'structural health monitoring'). Some manufactured and natural materials have the amazing ability to convert a mechanical stress, vibration or change of shape into a tiny electric current and vice versa, a phenomenon known as piezoelectricity.

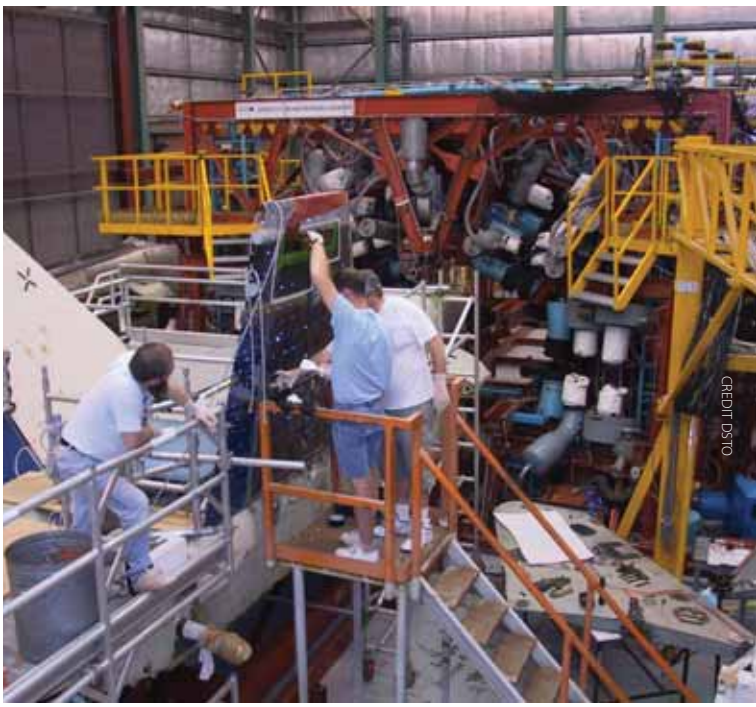
Piezoelectric sensors can now be used to detect and record cracking as a result of metal fatigue.

2011 was the 16th year of *Nova's* existence, and in July a comprehensive overhaul of each *Nova* topic began – a task akin to painting the Sydney Harbour Bridge. No sooner will it be done than it will be time to begin again, to ensure that the information *Nova* provides remains topical and up-to-date.

Nova promotions during 2011 included the distribution of publicity materials, and an interactive workshop entitled 'Inspire your students with Australia's science heroes and the science behind the news' for teachers attending the annual Conference of the Australian Science Teachers Association in Darwin (10–13 July 2011). A poster aimed at school students (for use in school libraries and classrooms) and flyer aimed at informing teachers about *Nova* and how it can help them to teach the science curriculum were sent to Australian secondary schools and colleges.

The feedback from teachers attending the workshop was very favourable and resulted in requests for Academy science information packs from several teacher organisations including the South Australian and NSW state science teacher associations. There is now an updated *Nova* subscription page on the website from which we will be able to collect information on the age, occupation and location of new subscribers, with details about how they found out about the site.

From 1 April 2011 until 30 March 2012, *Nova* pages were viewed 907,739 times, averaging out to 2486 a day. Though this does not equal YouTube with its



Piezoelectric installation

2–3 billion visits daily, it indicates a very healthy site that is performing well in its mission to provide accessible science information to the general public, and represents about 37% of the Academy website's traffic. Nearly all of *Nova's* 129 topics were well used over the period. The five most popular topics were

- Enhanced greenhouse effect – a hot international topic
- Fatal impact – the physics of speeding cars
- Wind power gathers speed
- Who will win the drugs race?
- Rocking on with hot rocks geothermal energy

interviews with **Australian** scientists

Interviews with Australian scientists

science.org.au/scientists

The *Interviews with Australian scientists* program aims to support the teaching of science, particularly in secondary schools, and to encourage students to consider a science-based career. During the interviews, scientists talk about their path into a scientific career and how that career developed. These stories from eminent Australian scientists provide inspiration for future generations of aspiring scientists. To achieve this aim, the *Interviews* program records the oral histories of scientists from diverse backgrounds, who have gone on to pursue research in many different fields. In the past year recordings have been made of a psychologist, a microbial geneticist, a zoologist, a plant scientist, a theoretical chemist, a geophysicist and an engineer from the country and the city. Not all of the scientists made it into university the first time and most had set-backs which they had to work to

overcome. Students contemplating a career in science see the varied paths taken by Academy Fellows and are encouraged to find their own niche.

To support the teaching of science, teachers' notes accompany the online *Interviews* transcripts and consist of focus questions and activities. The activities tie into the scientist's research work and highlight different aspects of the nature of scientific research. With the arrival and implementation of the new Australian Curriculum in 2011, new teachers' notes were specifically designed to support teaching the science strands of the curriculum.

The *Interviews* program also targeted teachers through industry magazines and email subscriber lists.

Interviews plans to continue supporting teachers of science, as well as promoting Australian science and developing a national scientific culture, with its scientist interviews available on DVD, transcripts and teachers' notes. In the past year, 13 new transcripts with accompanying teachers' notes were posted to the website (see Appendix 1). In addition, 15 new *Interviews* were filmed during the reporting period, taking the total number to 149 interviews since 1993 (see Appendix 2).

Science policy

A KEY AIM OF THE ACADEMY IS THE PROMOTION OF EXCELLENCE IN AUSTRALIAN SCIENCE. AS AN INDEPENDENT BODY OF AUSTRALIA'S TOP RESEARCH SCIENTISTS, THE ACADEMY HAS AUTHORITATIVE EXPERTISE IN MANY AREAS OF SCIENCE AND TECHNOLOGY, PROVIDING CAPACITY TO INFORM THE DEVELOPMENT OF EVIDENCE-BASED POLICY DIRECTED AT NATIONAL NEEDS, AND CONTRIBUTING TO INTERNATIONAL DEBATE. THE ACADEMY DOES NOT TAKE PART IN POLITICAL DEBATE, BUT RATHER ENSURES THAT ACCURATE SCIENTIFIC EVIDENCE IS AVAILABLE TO ALL WHO PARTICIPATE IN DEBATE AND CONSTRUCT POLICY.

Overview

Over the last year the Academy has increased its efforts to engage with governments at all levels, and has sought to provide science to underpin policy development and decision-making in a number of areas.

Council and Executive Committee of Council have hosted senior politicians and public servants at the Shine Dome, including current Science Minister Chris Evans, former Science Minister Kim Carr, Greens Member for Melbourne Adam Bandt, Shadow Minister for Communications and Broadband Malcolm Turnbull, Chief Scientist Ian Chubb, DIISRTE Secretary Don Russell, and Deputy Secretary Patricia Kelly, and Professor Margaret Shiel, chief executive officer of the Australian Research Council. These informal meetings provide important opportunities to discuss the state of Australian science and future science policy.

CREDIT KYLIE WALKER

Malcolm Turnbull and Council dinner guests

CREDIT PHOTOEVENTZ

Suzanne Cory and Bill Shorten at Science meets Super

The Academy has informed consideration of policy and legislation via a number of submissions to government inquiries, agency consultations and legislative reviews. Recommendations that have been adopted include the retention of the regulatory system for stem cell research, streamlining student visa conditions to improve access by international postgraduate students, and the removal of journal rankings from the Excellence in Research for Australia (ERA) process.

Substantial input was provided to the Strategic Roadmap for Australian Research Infrastructure by the Academy and its National Committees for Astronomy, Chemistry, Crystallography, Mathematical Sciences and Physics. After contributing to the development of the Research Workforce Training Strategy the Academy remains involved in its implementation. In addition, the recommendations of the 2012 and 2011 Theo Murphy Think Tanks are introducing the ideas of early and mid-career researchers into increasing Australia's mineral exploration capabilities and environmental regulatory reform.

The Academy has promoted discussion on the importance of government support for international research collaboration to achieve scientific, economic and diplomatic objectives via a position paper *Australian science in a changing world: innovation requires global engagement* and an 'in conversation' event featuring Nobel Laureate and Fellow Brian Schmidt.

The Academy provided Independent MP Tony Windsor with advice on the establishment of an independent expert scientific committee to oversee catchment science issues such as coal seam methane development and water resource planning.

The Academy sponsored, supported and participated in four Science & Technology Australia events: 'Women in Science and Engineering Summit' at Parliament House in April 2011, 'Science meets Parliament' in June 2011, 'Science meets Policy Makers' in February 2012 and 'Science Meets Superannuation' in March 2012. In additional, the Academy and Science & Technology Australia provided expertise to initiate the Parliamentary Friends of Science, a bipartisan group of

CREDIT KYLIE WALKER

Adam Bandt, Suzanne Cory, Chennupati Jagadish

CREDIT KYLIE WALKER

Chris Evans with Suzanne Cory

parliamentarians in support of science established in March 2012 by Parliamentary Secretary for Pacific Island Affairs Richard Marles and the Member for McPherson Karen Andrews, both of whom hold science degrees.

The Academy's inputs to various reviews, consultations and inquiries into science policy and program issues are available on the website, and are listed below.

Box 1: Academy submissions, responses and statements

2012

30 March — *McKeon Committee for a Strategic Review of Health and Medical Research*
urged an increase in Commonwealth, State and private contributions to health and medical research funding to reach 2% of the health budget by 2025; improved mechanisms for encouraging collaborations between sectors and disciplines, both nationally and internationally; and reform of research career structures. A parallel submission from Australia's Early–Mid Career Researcher Forum highlighted the challenges currently faced by early and mid-career researchers and presented possible solutions to address their specific needs.

4 March — *Australia in the Asian Century White Paper*
recommended creating an integrated international science program worth $250 million over 10 years to complement, coordinate and optimise the government's significant investments in science and innovation.

28 January — *2012–13 Federal Budget submission to Treasury*
proposed measures to foster international science collaboration, enhance career options for scientists, support the Academy's school science education programs, and underpin core functions of the Academy on an ongoing basis.

2011

2 December — *Revision of Australian Code of Practice for care and use of animals for scientific purposes*
suggested that the proposal to require the presence of a veterinary surgeon during any surgical procedure be removed from the regulations.

29 November — *Defining quality for research training in Australia Consultation Paper*
reinforced the need for strong and high quality standards in research training and during PhD research in particular, but also emphasised the need to improve the management of multidisciplinary environments, and to encompass a broader range of potential career paths.

1 August — *Parliamentary inquiry into Australia's biodiversity in a changing climate*
urged action to increase our knowledge and understanding of the effects of climate change on biodiversity and development of practical ways of mitigating such effects.

19 July — *2011 Strategic roadmap for Australian research infrastructure exposure draft*
endorsed the importance of a focus on providing support for facilities (including skilled technical support staff, operations and maintenance) in areas where Australia already has strength, and emphasised the adverse impacts of delayed funding.

6 May — *2011 Strategic roadmap for Australian research infrastructure Discussion Paper*
emphasised the need for a sustainable strategic policy for science and technology through increased and ongoing investment in research infrastructure.

19 April —*Strategic review of the student visa program*
encouraged a visa system for international research students with the minimum bureaucracy and the maximum flexibility, and allowing equivalent work rights to Australian research students.

7 April —*Excellence in Research for Australia (ERA) 2011 Consultation*
raised concerns about the quality and use of bibliometric data and requested more transparency about funding decisions.

More information and full submissions are available at **www.science.org.au/reports.**


CREDIT MONA AKBARI

Suzanne Cory launches *Australian science in a changing world*

Australian science in a changing world: innovation requires global engagement

The report builds on the Academy's 2010 position paper *Internationalisation of Australian science* which examined the challenges and opportunities posed by accelerating trends towards the internationalisation of science and innovation.

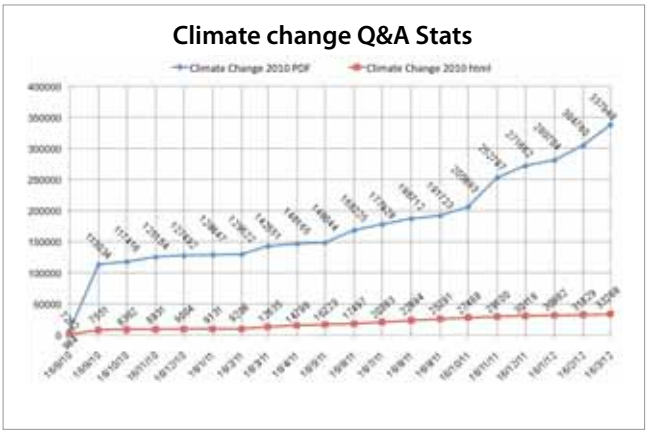
Australian science in a changing world puts forward a plan to ensure Australia's place on the world stage over the next century. It proposes a $250 million integrated international science program over the next 10 years, which would amount to only 0.25 per cent of the Australian Government's total investment in science, research and innovation over the period. This strategic investment would provide a substantial multiplier effect in terms of benefits gained through effective and ongoing access to the 97–98 per cent of new knowledge that is produced outside Australia.

To raise public awareness of the importance and benefits of engaging with the global science community, the Academy held an 'In Conversation' event with Nobel Laureate Professor Brian Schmidt FAA and Academy Foreign Secretary Professor Andrew Holmes FAA, moderated by ABC Science Show presenter Professor Robyn Williams FAA.

The two eminent speakers discussed the future of international science and the case for Australia's strategic engagement with international science, based on their own extensive experience.

The science of climate change: questions and answers

This document, launched in August 2010, had been downloaded from the Academy's website more than 330,000 times by March 2012. It is available at **www.science.org.au/policy/climatechange.html.**



Number of downloads of *The science of climate change* booklet from the Academy website

The science of immunisation: questions and answers

Based on the success of the climate change booklet as a contribution to public debate on a contentious science topic, the Department of Health and Ageing has provided supporting funds to enable the Academy to develop a similar publication on the science of immunisation.

A working group and an oversight committee, each composed of Academy Fellows and relevant experts, have been convened to prepare a document that explains to a non-expert audience the scientific basis of immunisation and addresses common misconceptions. The document will

provide responses to approximately seven targeted questions, using well illustrated and referenced answers.

Chaired by Professor Ian Frazer FAA FRCPA FRCP(Ed) FRS and Professor Antony (Tony) Basten AO FAA FTSE, the document is targeted for completion by mid-2012, with an anticipated launch date of August 2012.

Implementation of Theo Murphy Think Tank Recommendations

2010 Searching the deep Earth: the future of Australian resource discovery and utilisation

The key outcome of the 2010 Think Tank was the recommendation for a national road map for deep Earth exploration that integrates components of existing innovation efforts into a coherent deep Earth mapping program.

On launching the proceedings on 11 January 2011, the Minister for Resources and Energy Martin Ferguson requested further advice on the implementation of the report's recommendations. In response, leaders of the Australian mineral and resource research, government and industry sectors formed the Deep Earth Implementation Committee led by Think Tank Organising Committee Chair Dr Phil McFadden FAA, former Chief Scientist of Geoscience Australia.

In consultation with Minister Ferguson's office and the Department of Resources, Energy and Tourism, the implementation committee developed an action plan which led to the establishment, in March 2012, of the Unincorporated National Collaborative Venture for Exploration Geoscience Research (UNCOVER). With funding support from government research organisations, universities and industry, the Academy will support UNCOVER to build a cross-sector approach to addressing the challenges of exploration beneath the highly weathered surface of the Australian continent.

2011 Stressed ecosystems: better decisions for Australia's future

The report from the 2011 Think Tank (see page 27 for more information) was launched on 21 February 2012 at the University of Melbourne by former Premier of Victoria John Brumby, Vice-Chancellor's Professorial Fellow at the University of Melbourne and Monash University.

At the launch Think Tank co-convener Professor Mark Burgman FAA announced the establishment of an implementation committee comprising representatives from Australian Federal and state governments, Think Tank leaders, and early career researcher participants. The group's focus is to improve the management of Australia's natural environment by providing scientific input to two current trans-government initiatives:

- the National Reform Agenda for Environmental Regulation (Council of Australian Governments, August 2011), which aims to reduce regulatory burden and duplication across all levels of government to deliver better environmental outcomes, including through greater use of regional planning and strategic assessments

CREDIT GEOSCIENCE AUSTRALIA

Seismic vibration machines, Flinders Ranges

- the unit/taskforce devoted to foresighting to identify and guide management responses to emerging threats, to be established in response to Recommendation 23.3 of the Independent Review of the Environment Protection and Biodiversity Conservation Act.

Exploring Australia's futures — Australia 2050

The first phase of the Academy's ambitious project *Australia 2050: towards an environmentally sustainable and socially equitable way of living* is approaching completion. The project was funded in 2010 by the Australian Research Council's Learned Academies Special Projects scheme, and led by a steering committee chaired by Dr Michael Raupach FAA FTSE. The Academy hosted a five-day Dahlem-style workshop from 24–28 July 2011 in Bowral NSW for 32 participants from university, government and business who considered the question: 'What is our realistic vision for an ecologically, economically and socially sustainable Australia in 2050 and beyond?' Participants examined the resilience, quantitative modelling, scenario development and social dimensions of the question; the debate has been captured in a series of chapters for a book planned for release in the second half of 2012.

Australian research strategy for nanotechnology

The Academy's research report *Nanotechnology in Australia: trends, applications and collaborative opportunities,* produced for the Department of Industry, Innovation, Science, Research and Tertiary Education in February 2010, identified inadequate capacity to collaborate as one of the key impediments to the development of Australian nanotechnology research. In 2011 the Department funded a follow-on project to develop a National Nanotechnology Research Strategy.

An oversight committee chaired by Professor Chennupati Jagadish FAA FTSE and working group chaired by Professor Laurie Faraone AM FAA FTSE and Professor Frank Caruso FAA FRACI have begun preparing the National Nanotechnology Research Strategy and actively consulting with the research community. The research strategy is expected to be finalised during the last quarter of 2012.

Future science — computing science

As part of the Academy's efforts to contribute to national priority setting and policy development in support of science excellence, a program of foresight studies has been initiated to consider a number of scientific fields.

Foresighting studies differ from strategic reviews or decadal plans for science disciplines prepared by the Academy's National Committees for Science. The latter consider the overall development of a particular discipline in practical terms for Australia, whereas foresighting studies consider the scientific potential of specific scientific areas of research over a longer time frame.

The initial study, supported by the Defence Science and Technology Organisation, is on an enabling science, future computing. A working group of Fellows and other experts in the field has been established to scope the project and produce a concise report on future capacities and applications of high performance computing over the next 10 to 20 years.

Activities for early career researchers

THE AUSTRALIAN ACADEMY OF SCIENCE IS COMMITTED TO FOSTERING EXCELLENCE IN SCIENCE AND SCIENCE EDUCATION, FROM PRIMARY SCHOOL RIGHT THROUGH TO POSTGRADUATE STUDIES AND BEYOND. AS PART OF THIS COMMITMENT THE ACADEMY HAS IN RECENT YEARS DEVOTED INCREASED RESOURCES TO ENGAGING EARLY AND MID-CAREER RESEARCHERS. THE ACADEMY SUPPORTS EARLY TO MID-CAREER RESEARCHERS TO BUILD NETWORKS WITHIN AND ACROSS DISCIPLINES AND BRING THEIR FRESH PERSPECTIVES TO PROBLEMS OF NATIONAL IMPORTANCE. A DEDICATED EARLY CAREER RESEARCHER POLICY OFFICER HAS BEEN APPOINTED TO ENABLE THESE ACTIVITIES.

2011 High Flyers Think Tank: *Stressed ecosystems: better decisions for Australia's future*

Sixty young scientists from around Australia (and one from Malaysia) gathered in Brisbane on 29–30 September 2011 to bring their collective knowledge to bear on how to make better decisions for managing Australia's stressed ecosystems.

The participants came from universities and government institutions and brought with them a wide variety of skills and knowledge from fields as diverse as ecology, marine science, engineering, statistics, geology and the social sciences to discuss how scientific modelling can support decision-making about the management of Australian ecosystems.

Four ecosystems were identified for specific attention: Queensland's Bowen and Surat Basins, the Ningaloo Marine Park in Western Australia, Melbourne's peri-urban grasslands and the Murray-Darling Basin.

Each of these ecosystems is subject to competing needs and stresses, such as environmental, mining or tourism industry, urban expansion, recreation and community.

CREDIT JUSTIN PARKER

Ningaloo Marine Park, Western Australia

Using these four ecosystems as modelling examples, participants considered ways to ensure that each competing interest or voice is heard and integrated into a model for managing the ecosystem in a sustainable way.

The major recommendations of the Think Tank report were to:

- collect more data on Australia's ecosystems and make it freely available
- engage the community in data collection
- develop methods to determine the consequences of ecosystem decisions and make these accessible to all stakeholders
- involve all stakeholders in ecosystem planning and decision making

Australian Early and Mid-Career Researchers Forum

The Academy established a forum for early and mid-career researchers in 2011, with an interim committee of 10 early and mid-career researchers from a range of science disciplines. The forum will work with the Academy to provide an opportunity for researchers at or near the beginning of their careers to make a positive contribution to Australian science policy at a national level.

Workshops at *Science at the Shine Dome*

More than 70 early career researchers from a diverse range of disciplines participated in the early career researchers program during *Science at the Shine Dome* in May 2011. Sponsors were CSIRO, the National Health and Medical Research Council, the Victorian Department of Environment and Sustainability and the South Australian Department of Environment and Natural Resources.

In addition to the main program, participants had a choice of three career development workshops:

- *Media and communicating science* explored the 'nuts and bolts' of science communication and gave early career researchers practical advice on presenting their research effectively in the media.
- *Building successful collaborations* offered practical tips on how to establish and maintain professional networks.
- *Grant writing skills* provided advice on how to successfully 'sell' research ideas and avoid common pitfalls of the grant writing process.

Feedback indicated that the early career researchers valued the opportunity to learn about research being conducted in a diverse range of disciplines by some of Australia's leading scientists, and to gain important career development skills.

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Brunonia species in Melbourne's peri-urban grasslands

Nobel meeting: Lindau, Germany

The 61st Meeting of Nobel Laureates was held in Lindau, Germany from 26 June to 1 July 2011. The meeting, focused on Physiology and Medicine, brought more than 550 young researchers from around the globe together with 23 Nobel Laureates. A delegation of six young Australian scientists attended the meeting, led by the Secretary for Biological Sciences, Professor Marilyn Renfree FAA. The meeting gave the delegates a unique opportunity to interact with the most highly awarded scientists in their field, exchange ideas, and establish new contacts and networks.

Early Days

The Academy's quarterly newsletter *Early Days* covered a range of topics including gender equity, mentoring, alternative careers for scientists outside academia and the need to adapt the current PhD training program to changing realities. It is also a source of information about overseas exchange programs, fellowships, honorific awards and research funding opportunities, as well as feedback from science-related events and alerts about activities of other scientific organisations.

A new database of Australian early to mid-career researchers was established in June 2011. This will enable the compilation of non-identifiable data on institutions, research disciplines and career stage of these subscribers. More than 2000 subscribers were registered by March 2012.

Early Days is available at **www.science.org.au/ecr/ecr-newsletters/.**

National committees for science

THE ACADEMY'S 22 NATIONAL COMMITTEES FOSTER A DESIGNATED BRANCH OR THEME OF NATURAL SCIENCES IN AUSTRALIA AND SERVE AS A LINK BETWEEN AUSTRALIAN AND OVERSEAS SCIENTISTS IN THE SAME FIELD.

Nominations for committee members are sought by the Academy from committee chairs and from the relevant corresponding scientific societies and appointments are made by the Academy's Executive Committee on behalf of Council. Hence the National Committees provide an important link to the wider research community and provide valued expert advice from the perspective of their disciplines and support to the Academy in fulfilling its responsibilities as Australia's adhering body to the International Council for Science and its international scientific organisations.

Guidelines for national committees are available from **www.science.org.au/natcoms/guidelines.**

International Council for Science (ICSU) coordination

Chair: Professor Bruce McKellar FAA

The National Committee for ICSU Coordination exists to advise Council on interactions between the Academy and the International Council for Science (ICSU) and strengthen them, and to provide advice on material received from ICSU requiring a response from the Academy.

The year 2011 was a busy one for the committee as it was the year of the ICSU General Assembly. There was a steady stream of draft reports from ICSU, with requests for comments and with little time to provide them. The Committee drafted comments for the Academy's Executive Committee and Council to use as a basis for their response to ICSU on the following:

1. the resolution on freedom and responsibility in science
2. the report of the Working Group on Science Education
3. the report of the Science Planning Committee on Health and Wellbeing in the Changing Urban Environment
4. The draft ICSU foresight exercise
5. The 2012–17 ICSU strategic plan

The Australian comments had a significant influence on the final versions of the Science Education Report and the Strategic Plan presented to the ICSU General Assembly.

Meeting in early September, the committee reviewed the agenda of the General Assembly and prepared comments on it for the Australian delegation and other Australians representing scientific unions. These comments informed Australians present at the General Assembly of the views of the Australian Academy of Science.

At the General Assembly Professor David Black FAA was elected as the ICSU Secretary General. He is the first Australian to hold this important office in ICSU.

The National Committee for ICSU Coordination is pleased that its 2011 work has had a significant influence on ICSU.

Antarctic research

Chair: Dr Dana Bergstrom

Outgoing chair of the National Committee for Antarctic Research Professor Robert Vincent FAA (University of Adelaide) greatly assisted newly appointed chair Dr Dana Bergstrom (Australian Antarctic Division) in the change of committee membership during 2011. This coincided with the release of the new Australian Antarctic Program's 10-year science strategic plan.

Members of the committee and the Antarctic community contributed substantially to committees and working groups of the ICSU body SCAR (the Scientific Committee on Antarctic Research) in designing new SCAR research programs. Two of these began in 2011 — the Astronomy and Astrophysics from Antarctica program began mid-year, with a meeting hosted in Australia by the University of New South Wales Antarctic Astronomy and Instrumentation group, and the Southern Ocean Observing System program started up, with a secretariat co-located with Australia's Integrated Marine Observing System at the University of Tasmania.

Astronomy

Chair: Professor Elaine Sadler FAA

A major activity for the National Committee for Astronomy in 2011 was the completion of the mid-term review of our 2006–15 decadal plan. The review was published by the Academy of Science in 2011. Astronomy has been strongly supported by the Australian Government over the past five years, with significant financial investment in infrastructure for new research facilities and the recognition of space science and astronomy as one of Australia's three 'super science' areas in 2009.

The committee has continued to work on the implementation of the decadal plan in conjunction with Astronomy Australia Ltd. In 2011 a joint submission was made to the Department of Innovation, Industry, Science and Research in response to the *2011 Strategic roadmap for Australian research infrastructure exposure draft*.

Biomedical sciences

Chair: Professor Ian Dawes FAA

The National Committee for Biomedical Sciences has continued to strengthen links with the broad range of societies that it represents. All members of the committee are, or have been, on the executive of their corresponding society, and various

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National Committee for Biomedical Sciences

mechanisms are being explored to increase the interaction between its eight societies. In September the committee initiated discussions with the National Health and Medical Research Council with a view to providing feedback, and help if needed, for NHMRC Research especially in the area of the research grants and management system.

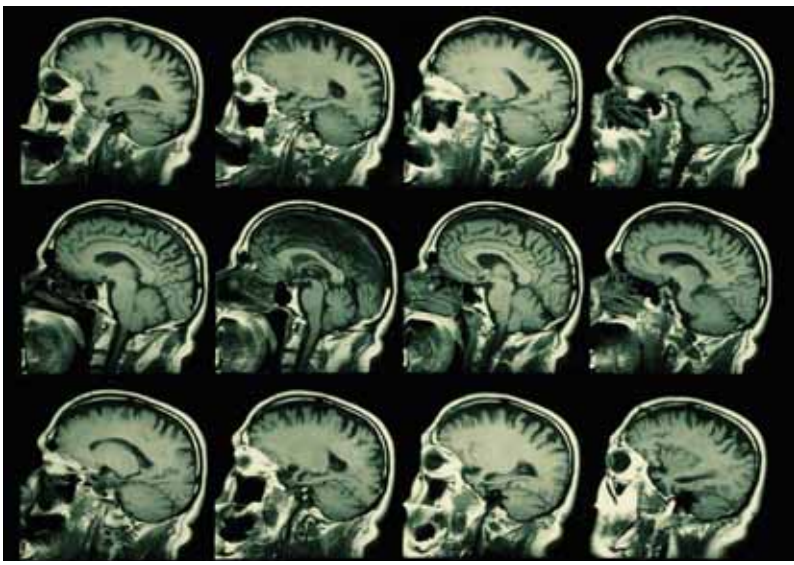
The committee also initiated the very successful National Forum on Education in the Biomedical Sciences which was held at the Shine Dome in December 2011. This meeting was organised by Professor Phillip Poronnik from RMIT and chaired by Dr Norman Swan. It attracted about 140 people. Before the meeting, as part of this project, a successful grant to the Australian Learning and Teaching Council for the CUBENet (Collaborative University Biomedical Education Network) project was obtained with substantial input from Professor Poronnik. This project will provide strong networking for education in the biomedical sciences. A follow-up meeting will be held in 2012 to maintain the impetus of this project.

Brain and mind

Chair: Professor Stephen Crain

In 2011, the National Committee for Brain and Mind is in the process of determining which national and international corresponding societies are most closely aligned to the committee's interests and would be appropriate for affiliation. The committee continued to work on the creation of a web directory for information exchange between brain imaging centres in Australasia, which is designed to include a series of media release/position papers. These papers are intended to explain in nontechnical terms what functional neuroimaging of the brain is, and what it can and can't reveal about mental activities.

At our next meeting the committee will hold an extended discussion of its possible contributions to an initiative called Cognitive Science in the Public Interest, in collaboration with the University of New England (Emeritus Professor Brian Byrne, lead). The committee's contributions to this program are also being coordinated with research programs at the ARC Centre of Excellence in Cognition and its Disorders (Distinguished Professor Stephen Crain, lead). The involvement of other centres in cognitive science and brain science in Australasia will be discussed at the 2012 meeting of the committee.



Chemistry

Chair: Professor Curt Wentrup FAA

The National Committee for Chemistry engaged actively in the International Year of Chemistry, which celebrated the achievements of women in chemistry and the 100th anniversary of Marie Curie's Nobel Prize in Chemistry. With finance from the Academy, the committee sponsored the Curie Lecturer, Professor Lynn Francesconi, who toured Australia in August. The Selby Lecturer, Dame Julia Higgins, was nominated by committee members and toured Australia in November 2011.

Following the committee's previous critique of the Australian Research Council's Excellence for Research in Australian (ERA) process, the committee made a new submission to the ERA consultation, critically evaluating the process and making numerous corrections to the Journals Ranking For codes. Based on such feedback from various sources, the journals ranking system in its present form was rescinded.

The committee chair was a member of the Expert Working Group of the Department of Innovation, Industry, Science and Research (now the Department of Industry, Innovation, Science, Research and Tertiary Education). The group drafted the final report on the Chemical Sciences Case Study within the department's enquiry into Australia's research workforce needs. Kim Carr issued a final report. A serious undersupply of Australian PhD graduates is predicted in all sciences.

The committee chair made a submission to the Department of Industry, Innovation, Science and Research's *Discussion paper on the strategic roadmap*

for Australian research infrastructure. A further submission to the *Exposure draft* of this roadmap emphasised the need to define career paths for chemists and technicians, the importance of international research collaborations, and the importance of support for fundamental science underpinning applied research.

The committee nominated five Australian PhD candidates to attend the 4th Japan Society for the Promotion of Science HOPE Conference in Japan. All were approved.

Crystallography

Chairs: Professor Jenny Martin (until 31 December 2011)
Professor Mitchell Guss (from 1 January 2012)

An international public symposium is being organised for December 2012 by current and past committee members and other members of the research community. This will celebrate the centenary of Lawrence Bragg's landmark publication in 1912 that led to the development of crystallography as a field of science. Lawrence Bragg was subsequently awarded the Nobel Prize in Physics in 1915, together with his father. Lawrence Bragg was the first Australian and youngest ever (25 years) Nobel Laureate. The symposium will include presentations by Bragg's descendants.

We are delighted to report that together with Dr John Jenkin (author of Bragg biographies) the committee successfully lobbied Australia Post to release a 2012 stamp of Lawrence Bragg. This will form part of a broader release commemorating five Australian Nobel Prize winners.

The committee strongly supports long-term funding for the Australian Synchrotron. An opinion piece by the Committee chair was published in *The Conversation* at **http://theconversation.edu.au/articles/australian-synchrotron-scientific-marvel-political-puzzle-1909.**

Through the *2011 Strategic roadmap for Australian research infrastructure exposure draft*, the committee made submissions to the Federal Government supporting the Synchrotron, the OPAL reactor and the program for access to major international research facilities. On March 28 the Minister for Science Senator Chris Evans announced the signing of an MOU between the Commonwealth and Victorian Governments to jointly commit $95 million for the running of the Synchrotron over the next four years.

In 2012, the incoming chair will be Professor Mitchell Guss (International Union of Crystallography executive council member, Asian Crystallographic Association (AsCA) past president). Other new members are Professor Alice Vrielink (AsCA treasurer/secretary) and young investigator Dr Andrew Whitten. We thank departing members Professor Jenny Martin (chair), Dr Steve Wilkins and Professor Mark Spackman for their valuable contributions.

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National Committee for Chemistry

Data in science

Chair: Dr Rhys Francis

In 2011 the National Committee for Data in Science focused on the developments around data and data storage infrastructure across the research sector, both national and internationally. As the value of data is inherently multidisciplinary, the committee plans to engage all Academies and identify the data collections of national importance to science, and research more generally. The committee considered whether it should have a role in promoting training and excellence in data management as an important component of scientific methods, and is planning a symposium on the transformations in science that could arise from more sophisticated and complete data collections.

In terms of data developments at an international level, the committee provided feedback to the Committee on Data for Science and Technology (CODATA) on the CODATA strategic plan, and reviewed its current understanding of the state of the World Data System and Australia's options about how best to relate to the system. It was agreed that members of the World Data System would need to be major holders of data and that the Academy itself was not well placed to be a primary participant, although it would have an interest in governance and through its involvement in ICSU.

The committee co-hosted a high level meeting on 10 November 2011, in conjunction with the eResearch Australasia conference. Members of the committee, the Chair of the Australian eResearch Infrastructure Council, the President of the Council of Australian University Directors of IT, the President of the Council of University Librarians, the Chair of the Go8 Digital Futures group, the directors of the Australian Government's research data infrastructure investments and other government representatives attended the meeting, which discussed the role of institutions in data infrastructure and the manner in which the cooperative capability and competitive opportunity inherent in data could be realised.

Earth sciences

Chair: Professor Brian Kennett FAA

The General Assembly of the International Union of Geodesy and Geophysics was held in Melbourne in July 2011, with strong Australian involvement in the development of the scientific program. Two Australians (Professors Greg Ayers and Brian Kennett FAA) were among the nine plenary speakers. This was a very successful meeting with more than 3600 international delegates, and the organisation gave considerable credit to Australia. Following the meeting the representation of Australia in the International Union of Geodesy and Geophysics is at a high level, with presidents of three associations and strong involvement with the others.

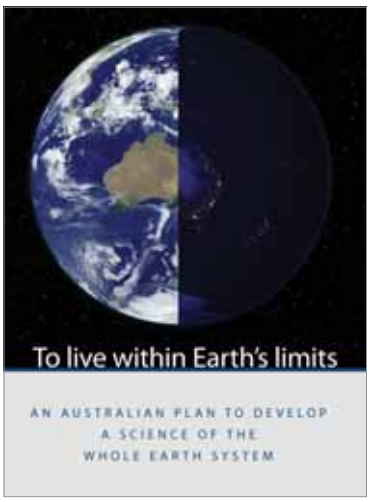
The International Geological Congress linked to the International Union of Geological Sciences will be held in Brisbane in August 2012. The complex program involves 37 major themes with associated symposiums, all to be held within one week. Members of the National Committee for Earth Sciences are involved with many aspects of the International Geological Congress, from the program committee itself to the preparation of articles for the IUGS journal *Episodes*, and the book *Shaping a nation: a geology of Australia*, which will be available in print at the Congress. It is also hoped that this will be freely available through the Australian National University E-Press, which requires a final external review. It is hoped that many facets of Australian Earth science will be well displayed at this Congress.

The committee has continued to promote the concept of national Geotransects. Investment by Geoscience Australia and by Western Australia has seen a further 800 kilometres of reflection profiling in 2011, with an equivalent amount planned in 2012.

Earth system science

Chair: Dr Roger Gifford

The committee's work focused on promoting and developing the recommendations of *To live within Earth's limits: an Australian plan to develop a science of*



the whole Earth system, the strategic plan for Earth system science, launched by the Chief Scientist in 2010. The plan has been promoted by distributing 8000 copies of a promotional flier, and about 1000 copies of the plan have been distributed worldwide through key groups and conferences. This includes the National Climate Change Adaptation Research Facility, the High Level Coordinating Group on Climate Change, the International Union of Geodesy and Geophysics Congress, the International Botanical Congress, the World Climate Research Program, the Greenhouse 2011 meeting in Cairns, the IPCC lead authors meeting on Extremes at the Gold Coast, the Future Steps meeting in New Zealand, and the International Geosphere/Biosphere Program.

A synthesis review has been prepared from the papers and discussions held at the First Earth System Outlook Conference (December 2010), for submission to an international journal. Planning has begun for the second Earth System Outlook Conference to be held in late 2012.

In collaboration with the Australian Academy of Technological Sciences and Engineering, a workshop was run in the Shine Dome on 'Geoengineering the climate? A southern hemisphere perspective' (26–27 September 2011). This conference was highly multidisciplinary and involved ethical, legal and governance issues as well as technical and environmental aspects (**http://science.org.au/natcoms/nc-ess/documents/GEsymposium.pdf**). An article in the popular e-journal *The Conversation* about the conference and its contribution to rolling out the recommendations of the strategic plan for Earth System Science generated considerable internet interest.

Geography

Chair: Professor Nigel Tapper

The National Committee for Geography met in November to discuss projects for the committee in 2012, when it will focus on the organisation of a national strategic planning day to feed into the development of a decadal plan for geography.

The 2012 Congress of the International Geographical Union will be held in Cologne in August. Australia is actively involved in the congress through Professor Tapper's presence on the Scientific Committee for Global Change and Globalisation. Further information about the meeting is available at **https://igc2012.org.**

CREDIT NATIONAL MUSEUM OF AUSTRALIA

Jenny Graves presents Christian O'Brien with his student essay prize

History and philosophy of science

Chair: Professor Rachel Ankeny

The National Museum of Australia and the National Committee for the History and Philosophy of Science student essay prize in Australian history of science or environmental history received four entries in 2011, all of very high quality from PhD candidates, on climate, resources, urban planning and agriculture. These were well written and researched and had an impressive historical scope; all could be publishable. First prize (a certificate and award of $2500) was awarded to Christian O'Brien, School of History, Australian National University, for his essay, 'A brief history of the monsoon'. The judging panel was Professor Rachel Ankeny (chair of the committee), Dr Mike Smith (National Museum of Australia) and Dr Libby Robin (committee member).

The committee continued to work with Mr Gavan McCarthy of the University of Melbourne to help achieve the aims of the World History of Science Online project (**www.dhst-whso.org/**). This project

aims to provide central online access to bibliographies and catalogues of archives and sources including scientific and technological bibliographies and archival sources, in order to build capacity in history of science and technology in all countries.

The committee participated in international and national discussions relevant to the discipline of the history and philosophy of science, relating to research reporting, journal ranking processes and development of standards for teaching undergraduate history.

Planning for the public lecture series to mark the Academy's 60th anniversary in 2014 has begun and will continue in 2012, as has planning for a special workshop focused on future directions in history and philosophy of science in Australia.

Mathematical sciences

Chair: Professor Nalini Joshi FAA

In 2011, the National Committee for Mathematical Sciences decided to formulate a decadal plan for the discipline. The Excellence in Research for Australia 2010 results for mathematical sciences (released in January 2011) point to issues of major continuing concern. While the average rating for mathematical sciences was 3.2 out of 5 (where a rating of 3 or more is above world standard), 17 out of 41 universities in Australia did not have sufficient output to be assessed in the mathematical sciences and 25 were not assessed in statistics.

The action taken by the government in 2007 to increase HECS funding for Commonwealth-funded places in the mathematical sciences was weakened by subsequent actions by universities who elected not to distribute the increased funding to local departments. The action taken by the Australian Government in 2009 to provide a 50% discount in HECS fees for Commonwealth-supported places in mathematics and science was rescinded in November 2011, with no other measures put in place to stop declining enrolments or declining numbers of mathematically qualified graduates entering the teaching profession.

The decadal plan will create a long-term vision for our discipline, in a way that is supported by cognate disciplines, and create a supporting framework for the benefit of individual mathematicians and statisticians and accepted by government. A seed document has been prepared and this major activity will shape the business plan for the committee for the next two to three years.

Mechanical sciences

Chair: Associate Professor Jim Denier

The 13th World Congress of the International Federation for the Promotion of Mechanism and Machine Science took place on 19–23 June 2011 in Guanajuato, Mexico. A member of the National Committee for Mechanical Sciences, Professor Ross McAree of the School of Mechanical Engineering, University of Queensland, was Australia's voting delegate at this congress.

The quality of papers at the congress was generally excellent, and a tribute both to the global machine science community's commitment to the congress and to the peer review process. Thirty-seven member nations attended the congress's General Assembly on 22 June 2011. Under outgoing president Professor Marco Ceccarelli's leadership, the federation has increased its visibility by expanding initiatives and by revitalising and some rationalising of permanent commissions and technical committees.

The committee welcomes the appointment of Professor Yoshihiko Nakamura (Japan) as incoming president of the federation.

Medicine

Chair: Professor Bronwyn Kingwell

The Chair of the National Committee for Medicine met with key policy drivers in the health and medical research sector including the Hon Mark Butler, Minister for Social Inclusion, Minister for Mental Health and Ageing and Minister Assisting the Prime Minister on Mental Health Reform; Adam Bandt, Federal MP for Melbourne; and Professor Warwick Anderson, Chief Executive Officer of the National Health and Medical Research Council (NHMRC). Discussion centred on the key issues of the NHMRC budget, the advanced health research centres (academic health science centres), and the Australian Government's Strategic Review of Health and Medical Research led by CSIRO chairman Simon McKeon.

Terms of reference for this review were announced in September 2011 (**www.health.gov.au/internet/main/publishing.nsf/Content/Review+of+Health+and+Medical+Research+Terms+of+Reference**), with calls for public submissions by the end of

March. Stakeholder consultations will begin in late April 2012 and continue until July. A final report to the Minister including a 10-year strategic health and medical research plan for the nation will be provided in late 2012.

It is important for the Academy to have input into the review on a range of issues including funding efficiency and productivity, NHMRC balance of investment (basic, clinical, population, health services research), clinical translation, building and sustaining capacity, and Indigenous research.

The committee's full submission to the NHMRC consultation on Advanced Health Care Research Centres is available at **www.science.org.au/natcoms/nc-medicine/documentsAdvancedHealthResearchCentres.pdf.** The NHMRC has not yet issued a call for applications.

Nutrition

Chair: Professor Andrew Sinclair

The National Committee for Nutrition received a report from a two-day workshop on the gaps in knowledge at the nexus between sustainable agriculture and health, organised by FOODplus, University of Adelaide, in December 2010 with support from the committee and the Australian Nutrition Trust Fund.

After discussions on the dietary recommended intakes (RDI) for vitamin D, following the recent increase in vitamin D RDIs by the US Institute of Medicine, Professor Caryl Nowson agreed to investigate the possibility of holding a workshop in 2012 on whether Australia should allow more vitamin D fortification of the Australian food supply in order to address the issue of the emergence of rickets.

The committee provided support for a workshop organised by the International Life Sciences Institute SEAR Australasia on 'Future directions in saturated fats', held in Melbourne on 14 September 2011. The chair attended and reported there was a very thorough cover of the topic from basic nutritional physiology through to the production of new plant oils produced by plant breeding techniques including genetic engineering.

The committee sponsored a workshop for 25 mid-career nutrition scientists at the annual scientific meeting of joint Nutrition Societies of Australia and New Zealand in Queenstown, New Zealand, on 30 November 2011. The invited speaker was the current Editor-in-Chief of the *American Journal of Clinical Nutrition*, Dr Dennis Bier, who gave valuable insights on getting published in this journal.

The committee agreed to sponsor an Australian speaker at the 2012 annual scientific meeting of the Nutrition Society of Australia as a way of promoting the role of the committee in supporting quality science in nutrition.

Physics

Chair: Professor Michelle Simmons FAA

The National Committee for Physics is overseeing the development of a decadal plan for physics titled *Physics: underpinning Australia's future*. Committee member Professor David Jamieson (University of Melbourne) was appointed in 2010 to chair the decadal plan working group. The plan will aim to provide recommendations on physics research; invigorating primary, secondary and tertiary education in physics; engagement with society and government about the application of physics; interaction with industry; and career pathways in physics

A draft of the plan will be released for comment from the physics community by mid-April with the aim of publishing the plan in mid-2012. More information on the decadal plan is available at **www.physicsdecadalplan.org.au/.**

The committee met four times in 2011, primarily to discuss the decadal plan and to prepare a submission for the *2011 Strategic roadmap for Australian research infrastructure exposure draft* of the Department of Innovation, Industry, Science and Research.

Plant and animal science

Chairs: Dr TJ Higgins FAA (until 15 April 2011)
Professor Roger Leigh (from 16 April 2011)

The chair of the National Committee for Plant and Animal Sciences transferred from Dr TJ Higgins (CSIRO Plant Industry) to Professor Roger Leigh (University of Adelaide) after the committee's meeting in April 2011

At this meeting, good progress was made in considering a decadal plan. Initial discussions were about a plan for agricultural sciences but this widened into a broader consideration of biological sciences. However, at a second meeting held by teleconference in December 2011 it was decided that the focus should be on agricultural sciences.

Two early career researchers are being sought to join the committee, initially as observers but with a view to full membership.

In July 2011 the 18th International Botanical Congress, under the auspices of the International Union of Biological Sciences, was held in Melbourne. More than 2000 delegates from 73 countries attended. The General Assembly of the International Union of Biological Sciences will be held in Suzhou, China, in July 2012.

Quaternary research

Chair: Professor Allan Chivas FAA

Quaternary research concerns the mechanisms and evolution of geological, biological and climatic processes and accompanying human evolution during the past 2.6 million years, the period during which large climate swings and sea-level changes were initiated as oscillating glacial and interglacial episodes. Many Quaternarists work with geological records of the past few hundreds or thousands of years, in an attempt to document and deduce mechanisms that relate to anthropogenic environmental changes.

The National Committee for Quaternary Research met in April and October 2011, and has begun preparing a strategic plan for its discipline by surveying relevant intellectual and infrastructural resources within Australia. The plan will cover future research directions, succession planning in an ageing workforce, infrastructure requirements and comparison of Australian and international research.

The committee is attempting to broker links between associations that utilise Quaternary research, such as the Australian Archaeological Association and the Australasian Quaternary Association.

A key aim of the committee is to enhance opportunities for early career researchers. A young scientists meeting for Quaternarists will be held in Australia in 2013, with financial support from the International Union for Quaternary Research (INQUA).

The quadrennial INQUA Congress was held in Bern, Switzerland, in July 2011 and attracted more than 2100 delegates, including about 100 from Australia. Drs Craig Sloss and Steven Phipps were Australia's voting delegates at the International Council of the Congress. The incoming INQUA President is Dr Margaret Avery (South Africa). Professor Allan Chivas will be past president (2011–15) and member of INQUA's executive committee. The next INQUA Congress will be in Nagoya, Japan, in July 2015.

Radio science

Chair: Professor Andrew Parfitt

The principal activity of the National Committee for Radio Science in 2011 was the General Assembly of the International Union of Radio Science held on 13–20 August in Istanbul, attended by more than 1100 people. Australian Dr Phil Wilkinson (Bureau of Meteorology) was elected as President of the International Union of Radio Science for the next triennium. There were also two Australian International Union of Radio Science Young Scientist Awards for the General Assembly, Dr Sarah Burke-Spolaor (CSIRO) and Jun Yi Koay (Curtin University), and one Australian finalist in the student paper competition, Galyna Safanova (Macquarie University).

Australian was well represented at the meeting with 24 registered delegates and 20 Australian authored or co-authored papers presented. Delegates attended from CSIRO, the Defence Science and Technology Organisation, the University of Adelaide and the University of Sydney.

The committee has initiated discussions with other groups about coordinating biannual technical meetings to maximise attendance. The committee's biennial Workshop on Applications of Radio Science was to have been next held in February 2012 as a stand-alone event. However, in the interests of maintaining wide disciplinary participation, it was agreed to discuss aligning the workshop meeting with other events later in the year.

Space science

Chairs: Professor Iver Cairns (to 5 August 2011)
Professor Russell Boyce (from 6 August 2011)

The Australian space science community has begun to implement the *2010–19 decadal plan for Australian space science: building a national presence in space*. The plan, which has already been successful in bringing together and growing the space science community, envisions building a long-term, productive Australian presence in space through its world leading innovative space science and technology, strong education and outreach, and international collaborations. Three substantial projects described in the plan's priorities have

already been funded — scramjet-based access-to-space systems, funded by the Australian Space Research Program; a plasma thruster and satellite test facility at the Australian National University's Mt Stromlo, also funded by the Australian Space Research Program; and a dedicated mass spectrometer laboratory for cosmochemistry, funded by ARC Linkage Infrastructure Equipment and Facilities and the Australian National University.

These and other projects were presented at the 11th Australian Space Science Conference in Canberra in late September 2011, opened by Senator Kim Carr, Minister for Innovation, Industry, Science and Research. Highlights of the conference were the release of guiding principles for the development of a national space industry policy; a bilateral Italy–Australia space symposium; and a resolution passed by conference delegates. This resolution acknowledged the current growth in the space and astronomy sectors in Australia that have been assisted by the Minister, and declared that the Australian space science and technology community seeks to work closely with government and industry to build Australia's presence and credibility in space and contribute to secure and assured access to space-based technologies. It also encouraged the government to provide funding certainty for the space policy unit, to continue the Australian Space Research Program, and to ensure access for Australia to data from the next generation of Earth observation satellites. The resolution was forwarded by the conference chairs to the minister.

An excellent outcome for space science has been its inclusion as an Enabling Capability Area in the recently released *2011 strategic roadmap for Australian research infrastructure*. The roadmap adopted many of the suggestions and arguments in submissions from the committee, took a broad view of space science and technology and emphases on Earth Observation Systems/ Global Navigation Satellite Systems as well as using the specific foci mentioned, and referred to the decadal plan.

Professor Iver Cairns of the University of Sydney retired as chair of the committee in August 2011. With his efforts and guidance during five years as chair, the space science community has gone from strength to strength and the decadal plan has been developed. Both the committee and the community acknowledge and applaud the tremendous effect of Professor Cairns' leadership, and extend their warmest thanks and gratitude to him. He was replaced as chair by Professor Russell Boyce, DSTO Chair for Hypersonics at the University of Queensland.

Spectroscopy

Chair: Professor Keith Nugent FAA

The National Committee for Spectroscopy recommends the Frew Fellows to Council. The Frew Fellowship is awarded to distinguished overseas scientists to participate in Australian spectroscopy conferences and to visit scientific centres in Australia. The 2011 Frew Fellow was Professor Jun Ye of the University of Colorado's JILA institute (a joint institute of the University of Colorado at Boulder and the National Institute of Standards and Technology). Professor Ye was funded through the fellowship to present a plenary talk at the International Conference on Quantum Electronics / Conference on Lasers and Electro-Optics Pacific Rim 2011 in Sydney on 29 August – 1 September 2011. The conference also incorporated the Australasian Conference on Optics, Lasers and Spectroscopy and the Australian Conference on Optical Fibre Technology.

Professor Ye is an internationally distinguished researcher in the field of laser spectroscopy, with major contributions in fields ranging from the creation of ultracold dipolar molecules, to atomic clocks to precision spectroscopic measurement.

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-governmental organisation with a global membership of 30 international scientific unions, 17 associated 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 for the benefit of society.

The Academy is Australia's adhering body for ICSU, for 21 of ICSU's member unions and for nine interdisciplinary bodies. Accordingly, the Academy has important formal national responsibilities arising from these memberships in which it is advised by the National Committees for Science and for ICSU Coordination. In addition to the administration of subscriptions, these responsibilities include nominating Australian candidates for executive committee positions, appointing voting delegates for General Assemblies and issuing invitations to host these events in Australia (for which membership of the parent union is a prerequisite).

The Academy has developed and maintains strong links with ICSU and the international scientific bodies. Each of these organisations has substructures of committees and task groups in which Australians can participate, based on membership of the parent body, and approximately 300–400 Australians serve in this capacity at any one time.

CREDIT ANDREW HOLMES

David Black and Bruce McKellar on the terrace of the FAO building in Rome

In October 2011 Professor David Black FAA was elected as the first Australian Secretary General of ICSU — a major coup for Australia. In addition, the activities of ICSU's regional office in Kuala Lumpur are guided by the ICSU Regional Committee for Asia and the Pacific which, until December 2011, was chaired by Professor Bruce McKellar FAA.

The office promotes the development of science throughout Asia and the Pacific, and helps strengthen the participation in international research of scientists from developing countries in the region.

International scientific unions

Australia's science credibility and influence have been enhanced globally through the high levels of representation achieved on the executives of ICSU and 18 of the international science organisations to which the Academy subscribes.

Five Australian presidents and eight vice-presidents, one past-president, one president-designate and three secretaries-general (including of ICSU itself) are amongst these prestigious appointments (see Appendix 3). This provides a high level of connectedness with other international leaders in their respective fields and opportunities to influence strategic planning and priority setting.

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

The General Assemblies held every two to three years by ICSU and its international scientific bodies are attended by large numbers of scientists, including the world's most highly regarded leaders in particular disciplines. The congresses held with them provide a forum for debates that shape the development of science, as well as venues where practical issues pivotal to the progress of international research are addressed.

Holding such events in Australia encourages eminent scientists to travel here, enabling interaction with our scientists and students. As well as profiling Australian science to an international audience and generating significant benefits to the Australian economy, these events attract widespread domestic and international media interest which raises awareness of the achievements and future directions of science in the Australian community and abroad.

The size and complexity of these General Assemblies and congresses mean that long lead times are required for organisation.

The Academy has issued a set of guidelines for mounting bids for international conferences, available at **www.science.org.au/natcoms/icsu-guidelines.**

Two such events were held in Australia in 2011 (both in Melbourne):

- International Union of Geodesy and Geophysics General Assembly on 28 June – 7 July (more than 3500 delegates from 91 countries, 90% international, forecast economic benefit $35.5 million)
- 18th International Botanical Congress on 23–30 July (more than 2000 delegates from 73 countries, 70% international, forecast economic benefit $24.3 million)

International Union of Geodesy and Geophysics General Assembly

June–July 2011 Melbourne

Earth on the Edge: science for a sustainable planet was the theme for this major international meeting of earth scientists, attracted to Australia and largely organised by the Australian Academy of Science's National Committee for Earth Science.

The sciences of plate tectonics, global water resources, earthquake forecasting, volcanic eruptions, sea-level rise and more brought thousands of international scientists to Australia for the nine-day event. The scientific program consisted of 4757 presentations — 2831 talks and 1926 posters — by leading scientists from more than 91 countries.

The Academy also issued invitations on behalf of the Australian research community for the following international meetings which are currently being organised with the support of the National Committees for Earth Sciences and Biomedical Sciences, respectively:

- International Geological Congress, Brisbane (2012)
- International Union for Pure and Applied Biophysics Congress, Brisbane (2014)

Appointment of voting delegates

Voting delegates appointed for the 2010–11 business meetings of ICSU and its international scientific bodies, with advice from the relevant National Committees for Science, are listed in Appendix 4.

InterAcademy Council

The InterAcademy Council has developed mechanisms and procedures to guarantee the scientific quality of its reports, the policy relevance of its recommendations and the absence of regional or national bias. The InterAcademy Council collaborates closely with the InterAcademy Panel, the InterAcademy Medical Panel, the International Council of Academies of Engineering and Technological Sciences, and the International Council for Science. The InterAcademy Council Secretariat is hosted by the Royal Netherlands Academy of Arts and Sciences in Amsterdam, The Netherlands.

The governing board of the InterAcademy Council comprises the Australian Academy of Science and 14 other national academies of science.

InterAcademy Panel: the global network of science academies

The InterAcademy Panel (IAP) enables its 104 member academies to work together to advise the general public and decision-makers internationally on the scientific aspects of critical global issues. These issues include climate change, medical biotechnology and global health. The IAP helps academies become effective and reputable advocates and influencers, and since 2000 has worked through the InterAcademy Council to mobilise the best scientists and engineers worldwide to provide high quality detailed advice to the United Nations and other bodies on critical issues such as energy, African agriculture, and — most recently — a critical review of the processes and procedures of the UN's Intergovernmental Panel on Climate Change.

The InterAcademy Panel is developing programs for scientific capacity-building, science education, science communication and other science-related issues of global significance.

The Academy has been elected to the IAP executive committee. Foreign Secretary Professor Andrew Holmes attended meetings in Mexico City on 18–19 October 2011 and in Halle, Germany, in March 2012.

An IAP Global Activities Committee science education meeting was held at the French Academy of Sciences in Paris on 2 April 2011. The Academy was represented by *Primary Connections* Program Director Ms Shelley Peers. Academy Past President Professor Kurt Lambeck attended in his capacity as President of the Federation of Asian Scientific Academies and Societies.

Federation of Asian Scientific Academies and Societies

The Federation of Asian Scientific Academies and Societies (FASAS) was established in 1984 with a membership of 15 scientific academies and societies. Its aims are the promotion of science and technology and the organisation of national and regional programs for the development of member countries. In particular, the federation emphasises the importance of science and technology in national development planning and policymaking processes.

The FASAS executive council met during 2011 in Ulan Bator, Mongolia and in Nepal, to progress a proposed merger between FASAS and the

CREDIT LUVSANDORJ DAWAGIV

President of the Mongolian Academy of Sciences Batbold Enkhtuvshin with FASAS executive council

Association of Academies of Sciences in Asia (AASA). Under the leadership of former Academy President, Professor Kurt Lambeck FAA, President of FASAS, and Professor Won-Hoon Park, President of AASA, a constitution has been finalised for the new merged body, to be called the Association of Academies and Societies of Sciences in Asia. It is expected that elections for executive council members of the new association will be held in Sri Lanka in September 2012.

Secretary for Education and Public Awareness Professor Jenny Graves represented Professor Kurt Lambeck as President of FASAS at three meetings on science education in Vancouver between 15 and 21 February 2012. Professor Graves was invited to the meetings to deliver a presentation on Australia's science education programs (including the Australian Academy of Science programs *Primary Connections* and *Science by Doing*) and provide information on science education programs of other sister FASAS Academies.

More information about FASAS is available at **www.fasas.org.au.**

Bilateral activities

Through its extensive national and international networks the Academy organises bilateral workshops in key areas of science and technology. In 2011–12 these activities were funded by the Australian Government Department of Innovation, Industry, Science and Research and Tertiary Education (DIISRTE).

These workshops and meetings provided forums 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.

Australian Academy of Science Speaker Series

Three eminent Australian scientists shared their knowledge with colleagues in Europe, America, Canada and Europe as part of the Australian Academy of Science Speaker Series.

Professor Doug Hilton FAA visited North America and Canada in May 2011, Professor Tanya Monro FTSE toured Europe in June 2011, and Professor Hugh Possingham FAA delivered his lectures in Asia in August 2011. In total, the speakers travelled for a combined 41 days, and in this time 18 lectures were delivered at 18 different organisations within 11 different countries.

Each of the speakers reported that the series was a worthwhile and rewarding exercise, which allowed Australian research to be showcased and identified opportunities for international collaboration.

Professor Possingham delivered an additional lecture at the Australian Embassy in Jakarta, and met separately with the Australian Ambassador to Indonesia and the Australian Deputy High Commissioner to Singapore.

Tanya Monro

CREDIT CLAIRE DUPRE

Suzanne Cory and Stephane Romatet, Australia-France biomedical symposium

French-Australian biomedical research forum

With funding support from the Embassy of France and DIISRTE, the Academy organised an international conference, 'Showcasing excellence in biomedical research', held on 23–24 November 2011 at the Shine Dome in Canberra.

The symposium featured presentations from leading scientists from France and Australia in neuroscience, cancer, infection and immunity, cardiovascular disease, and clinical translation. Participants also discussed policy and strategy. Twenty early to mid-career researchers received bursaries covering the cost of accommodation and registration.

Australia–Indonesia Environmental Science Workshop

Environmental scientists from Indonesia and Australia gathered at the Shine Dome on 18–19 April 2011 for a joint Australia–Indonesia Environmental Science Workshop. The workshop was organised in conjunction with the Indonesian Ministry of Research and Technology, on behalf of the Australian Government Department of Innovation, Industry, Science and Research.

Participants explored collaborative opportunities during plenary discussions and presentations, which covered earthquakes and tsunami, oceanography and marine science and geothermal energy.

Australia–Indonesia research collaboration

Indonesian Academy of Sciences President Professor Sangkot Marzuki visited Australia in December 2011 to discuss how Australia–Indonesia bilateral research collaboration can be strengthened. Professor Marzuki was accompanied by Professor Sjamsuhidajat, Chair of the Commission for Medical Sciences, and Dr Budhi M Suyitno, Secretary-General of the Indonesian Academy of Sciences.

The delegation met with Academy Council members, CSIRO, Science & Technology Australia, DIISRTE, the Australian National University and the Department of Foreign Affairs and Trade.

Australia–China workshops

Following on from the success of the seventh annual Australia–China Symposium 'Agriculture and food security relating to health' in November 2010, DIISRTE and Chinese Academy of Sciences jointly funded three follow-up workshops to explore potential opportunities for research collaboration. The following workshops, held between May and September 2011, were co-convened by Australian and Chinese researchers who participated in the 2010 symposium:

- Workshop 1: New approaches to agricultural water management in a changing climate (Australian convener Dr Keith Bristow, CSIRO Land and Water)
- Workshop 2: Environmentally friendly, safe and nutritionally enhanced food (Australian co-conveners Dr David Topping, CSIRO Food and Nutritional Sciences, and Professor Robert Gibson, University of Adelaide)
- Workshop 3: Nutrient use efficiency and recovery from urban waste streams (Australian convener Dr Mike McLaughlin, CSIRO Land and Water)

China–Australia Symposium on Green Materials and the Recycling Economy

The Academy of Science, together with the Australian Academy of Technological Sciences and Engineering and the Chinese Academy of Sciences, hosted the eighth annual China–Australia symposium in Shanghai and Suzhou, China, on 5–9 November 2011. The symposium explored the theme of green materials and the recycling economy, with three workshops in the areas of biomedical materials and devices, recycling hard waste and liquids, and materials for clean energy.

Visit by India's Science and Technology Secretary

In conjunction with the Department of Industry, Innovation, Science and Research, the Academy hosted a visit and public lecture in 2011 by Dr Thirumalachari Ramasami, Science and Technology Secretary to the Government of India.

The lecture, entitled 'Changing India's science, technology and innovation landscape', was held on 4 November 2011 in the Shine Dome. It explored how the Indian science and technology sector intends to fulfil the aspirations of the Indian Government and people.

Visit by Science Envoy to the US President

Professor Bruce Alberts, President's Barack Obama's special science envoy to Indonesia, visited the Academy in September 2011 to discuss his interest in the science education programs developed by the Academy and CSIRO, and the possible introduction of these into Indonesian schools.

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 perspective and experience, to exchange ideas, to be recognised in the international arena, to gain information and knowledge of techniques that will stimulate and advance Australian research and to be involved in large international projects.

The programs, which provide funding for living and travelling costs, were funded as part of the now discontinued Australian Government Department of Innovation, Industry, Science and Research International Science Linkages.

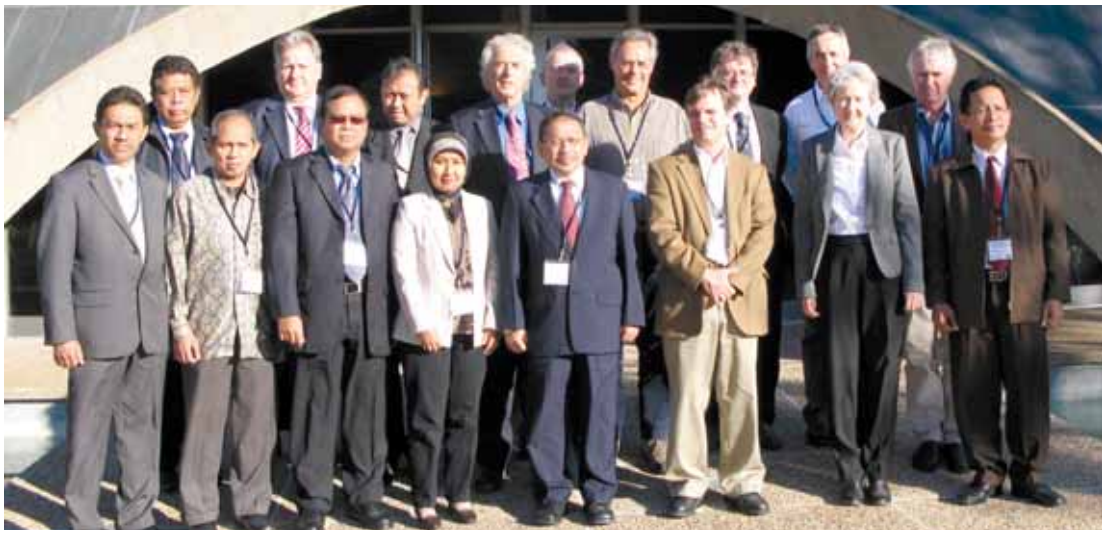
Full details of the programs are available at **www.science.org.au/internat.**

European Cooperation in Science and Technology (COST)

Australian researchers are eligible to join COST Actions under an agreement between the Academy and the COST office in Brussels. COST enables Australian researchers to access European sources of funding, expertise and facilities.

A full list of the 31 researchers supported by the scheme in 2011–12 can be found at **www.science.org.au/internat/europe/index.html.**

Below: Australia-Indonesia environmental science workshop at the Shine Dome



CREDIT: SHANNON NEWHAM

Japan scientific visits program

During the reporting period the scientific visits program supported 12 Australian scientists to undertake short-term visits to research institutions in Japan. Further information can be found at **www.science.org.au/internat/index.html.**

Japan Society for the Promotion of Science fellowships for overseas researchers

The Japan Society for the Promotion of Science, an independent administrative institution for contributing to the advancement of science, provides up to $2 million a year for the Academy to send Australian scientists on these visits.

The postdoctoral fellowships provide opportunities for Australian postdoctoral researchers to conduct cooperative research with leading research groups in universities and other Japanese institutions, attend seminars and give lectures.

In 2011–12 seven Australian researchers were awarded postdoctoral fellowships, seven researchers were awarded short-term invitational fellowships and one researcher was awarded a long-term invitational fellowship.

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

Support for visit by US PhD students

The Academy hosted 20 American PhD students selected to participate in the 2011 East Asia and Pacific Summer Institutes summer program, managed by the Academy and the US National Science Foundation. Science and engineering students visited Australia between June and August for eight weeks during the American summer to undertake research in laboratories and to initiate personal relationships with their Australian counterparts. The 2011 program was the eighth held in Australia.

Further details including a full list of researchers supported by the program are available at **www.science.org.au/internat/eapsi.html.**

Other Academy international collaboration programs include:

Embassy of France Cotutelle program

The Academy has administered the Cotutelle postgraduate fellowships program on behalf of the Embassy of France in Australia since 2002. The program operates in Australia and France and is designed to promote two-way international research collaboration. Cotutelle PhD students work under the direction of thesis supervisors in two institutions, and each project is established under a reciprocal arrangement. A 'Cotutelle Convention' binds the two partner institutions and recognises the validity of the studies undertaken. If successful, a double-badged degree is awarded to the student.

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

Adam J Berry Memorial Fund

The Adam J Berry Memorial Fund is co-managed on behalf of the Berry family by the Academy and the US National Institutes of Health Foundation. It helps one early career Australian researcher to

CREDIT SHANNON NEWHAM

US summer program participants

travel or work in the USA at one of the institutes of the National Institutes of Health each year. In addition to gaining valuable research experience, scientists are expected to make a contribution to the research program of the institution to which they are temporarily attached. Professor Jonathan Stone FAA chairs a special committee that assesses and recommends suitable candidates for this award.

Ms Ursula Sansom-Daly from the University of New South Wales is the recipient of this award for 2012. She will be working at the National Cancer Institute for eight weeks to research paediatric psycho-oncology practices and contribute to protocol development for a cross-cultural intervention for parents of children with chronic illness.

Academy medals and lectures

THE RECOGNITION OF OUTSTANDING CONTRIBUTIONS TO THE ADVANCEMENT OF SCIENCE IS CENTRAL TO THE PURPOSE OF THE ACADEMY.

Career award recipients

The 2011 honorific awards for scientific excellence were awarded to the following career researchers:

- **Macfarlane Burnet Medal and Lecture for research in the biological sciences**
  Professor Ruth Hall FAA, School of Molecular and Microbial Biosciences, University of Sydney
- **David Craig Medal for outstanding contributions to chemical research**
  Professor Maxwell J Crossley FAA, Professor of Chemistry (Organic Chemistry) and University Professorial Fellow, University of Sydney
- **Mawson Medal and Lecture for outstanding contributions to Earth sciences**
  Professor Gordon Lister, Research School of Earth Sciences, Australian National University

2012 Early career award recipients

- **Fenner Medal for distinguished research in biology (excluding the biomedical sciences)**
  Professor A Harvey Millar, ARC Australian Professorial Fellow and Winthrop Professor, ARC Centre of Excellence in Plant Energy Biology, School of Biomedical, Biomolecular and Chemical Science, University of Western Australia
- **Ruth Stephens Gani Medal for distinguished research in human genetics**
  Dr Manuel Ferreira, Senior Research Fellow, Genetic Epidemiology, Queensland Institute of Medical Research
- **Gottschalk Medal for outstanding research in the medical sciences**
  Associate Professor Katharina Gaus, NHMRC Senior Research Fellow, Centre for Vascular Research, University of New South Wales
- **Anton Hales Medal for distinguished research in the Earth sciences**
  Dr Todd Lane, School of Earth Sciences, University of Melbourne
- **Christopher Heyde Medal for distinguished research in the field of applied, computational and financial mathematics**
  Dr Josef Dick, ARC Queen Elizabeth II Fellow, School of Mathematics and Statistics, University of New South Wales
- **Dorothy Hill Award for female researchers in the Earth sciences**
  Dr Karen Black, Australian Research Council Postdoctoral Fellow, School of Biological, Earth and Environmental Sciences, University of New South Wales

Ruth Hall

Maxwell J Crossley

Gordon Lister

A Harvey Millar

Manuel Ferreira

Katharina Gaus

Todd Lane

Josef Dick

Karen Black

Pall Thordarson

Tanya Monro

Andrew Hogg

- **Le Fèvre Memorial Prize for outstanding basic research in chemistry**
  Dr Pall Thordarson, Senior Lecturer, School of Chemistry, University of New South Wales
- **Pawsey Medal for outstanding research in physics**
  Professor Tanya Monro, ARC Federation Fellow, Director, Institute for Photonics and Advanced Sensing, and Director, Centre of Expertise in Photonics, School of Chemistry and Physics, University of Adelaide
- **Frederick White Prize for physical, terrestrial and planetary sciences work**
  Dr Andrew Hogg, Fellow, Geophysical Fluid Dynamics, Research School of Earth Sciences, Australian National University

Research support and travelling fellowships

THE ACADEMY PROVIDES RESEARCH GRANTS TO EARLY CAREER RESEARCHERS. IT ALSO PROVIDES SEVERAL AWARDS THAT ENABLE DISTINGUISHED OVERSEAS SCIENTISTS TO COMMUNICATE THEIR RESEARCH TO AUSTRALIA'S SCIENCE COMMUNITY AND THE GENERAL PUBLIC AND ENABLE AUSTRALIA RESEARCHERS TO TRAVEL INTERNATIONALLY FOR THE SAME PURPOSE.

Douglas and Lola Douglas Scholarship in Medical Science

The Douglas and Lola Douglas Scholarship is offered as a 'top up' scholarship ($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.

- **2011 Michael Binks**, Menzies School of Health Research, investigating the impact between vitamin D and acute lower respiratory tract infection in Indigenous children.
- **2012 Kim Hare**, Menzies School of Health Research, for her study on the bacteriology of bronchiectasis in Australian Indigenous children.

Margaret Middleton fund for endangered Australian native vertebrate animals

The following researchers will receive financial support totalling $50,253 for their research into the conservation biology of vertebrate animals native to Australia:

- **Ross Alford**, James Cook University, Queensland. Understanding and managing threats to wet tropics amphibians: improving management prioritisation and using novel techniques to protect frogs.
- **Kellie Leigh**, Conservation Ecology Centre, Victoria. Finding the endangered spotted-tail quoll using new detection methods for declining and low density species.
- **Teagan Marzullo**, University of New South Wales Estuarine fidelity, home-range, habitat use and energetics of stingrays
- **Ben Scheele**, University of Canberra. Northern corroboree frog disease dynamics and recovery
- **Rebecca West**, University of Adelaide. Returning warru (black-footed rock-wallabies) to the Anangu Pitjantjatjara Yankunytjatjara (APY) Lands of South Australia

Reports on 2011 travelling fellowship

2011 Selby Travelling Fellow

Professor Dame Julia Higgins **DBE FRS FREng**, Emeritus Professor of Polymer Science, Department of Chemical Engineering, Imperial College, London. Professor Dame Higgins is a world-renowned polymer scientist whose research explores the boundaries between materials chemistry and engineering through neutron scattering techniques. Her Selby Fellowship tour of Australia took place from 27 October to 17 November 2011

and included a series of public lectures in Brisbane, Sydney, Melbourne and Perth entitled 'Polymers and neutron scattering' and 'Tangling with long molecules'.

2011 Frew Travelling Fellow

Professor Jun Ye, Department of Physics, University of Colorado, Boulder. Professor Jun Ye's research interests include precision measurement and metrology, ultracold atoms and molecules, ultrafast science and quantum control. His Frew Fellowship tour of 22 August – 1 September 2011 included colloquia at Griffith University, the University of Queensland, Swinburne University of Technology and the Australian National University. Professor Jun Ye was a plenary speaker at the 2011 Australasian Conference on Optics, Lasers and Spectroscopy.

2012 travelling fellowships

The following scientists were awarded travelling fellowships for 2012:

Graeme Caughley travelling fellowship (ecology)

Dr Andrea Bryom, Landcare Research New Zealand. To travel to the University of British Columbia, Canada in June.

Rudi Lemberg travelling fellowship (biological sciences)

Professor Peter Jones, University of Southern California School of Medicine. To lecture in Sydney, Hobart, Lorne, Melbourne, Perth, Brisbane and Canberra.

Selby fellowship (all sciences)

Professor Richard de Grijs, Kavli Institute for Astronomy and Astrophysics, and Department of Astronomy, Peking University. To lecture in Sydney, Canberra, Melbourne, Hobart, Adelaide, Perth, Brisbane and Townsville.

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

Peter Jones

Research conferences

THE ACADEMY SUPPORTS CONFERENCES AIMED AT ADVANCING THE DEVELOPMENT AND APPLICATION OF SCIENCE ACROSS A RANGE OF DISCIPLINES.

Reports on 2010 and 2011 research conferences

2010-11 Boden research conference

Metals in biological systems: structure, catalysis and metabolism

Dr Greg Anderson,
Queensland Institute of Medical Research

All organisms are critically dependent on metals for their function. Metals play essential roles in many biochemical processes including enzyme catalysis, protein structure and oxygen binding. There is a rich history of research into the biology of metals in Australia, but there is no single forum where researchers in this area can get together and exchange ideas. Therefore we were delighted when the Australian Academy of Science agreed to run a Boden Conference on this topic in late 2010.

The historic Shine Dome, with its copper-sheathed roof, was a highly appropriate venue for the conference, held from 28 November to 1 December 2010. About 90 enthusiastic delegates from across Australia (plus one from New Zealand) turned out for what proved to be an excellent three days of productive interaction.

The conference began on Sunday evening with Dennis Winge (University of Utah) providing a masterly overview of metal homeostasis in mitochondria using his own work on the yeast *Saccharomyces cerevisiae* to illustrate the major points. The program was started each day by one of the three international speakers, Dennis Winge, Guenter Weiss (University of Innsbruck) and Les Dutton (University of Pennsylvania). Another 11 sessions covered topics as diverse as metal transport and acquisition, the synthesis, structure and function of metalloproteins, metals and infection, disorders of metal homeostasis, the use of metal complexes in medicine, metals and the environment, and techniques for studying metals in tissues and organisms.

Perhaps the most appealing feature of this meeting was that it was truly multidisciplinary. Since the

Boden Conference was a resounding success, there was unanimous agreement that a similar metals in biology meeting should be held in Australia every two years. To facilitate this, we have constituted the Australian Biometals Group, an informal group which might grow into a formal society. If you were not able to make it to Canberra but are interested in being kept abreast of developments in this area, let me know at Greg.Anderson@qimr.edu.au.

2011–12 Boden research conferences

Cellular microbiology: new insights on host–pathogen interactions

18–21 October 2011, Shine Dome, Canberra. Organised by Professor Trevor Lithgow FAA, Monash University and Professor Jennifer Stow, University of Queensland.

New developments in imaging technology have revealed aspects of cellular ultrastructure that were previously beyond our imagination. The meeting focused on revelations in the organisation within bacterial cells and the nature of the interactions bacterial cells make when they encounter humans. This included three-dimensional structure of bacterial protein secretion machines and the nature and function of effector proteins that they secrete, imaging and understanding the dynamics of membrane ruffling and reorganisation in human macrophages as they encounter bacteria, nanotubes that dock bacteria to cells of other species and 'microbiology's platypus': bacterial cells that have an internal membrane structure mirroring many of the features previously thought exclusive to eukaryotes.

International speakers included Professor Thomas Marlovits (Institute for Molecular Biotechnology, Austria), Professor Chris Whitfield (University of Guelph), Dr Abigail Clements (Imperial College London), Professor Sigal Ben-Yehuda (IMRIC, Israel) and Dr Damien Devos (EMBL, Heidelberg).

Additional support was provided by the Australian Society for Microbiology, the Australian and New Zealand Society for Cell and Developmental Biology, Monash University and the University of Queensland.

Genome biology of corals and their relatives

Organising committee: Dr Line Bay, Dr Sylvain Foret, Professor David Miller and Ms Janet Swanson

This Boden conference was held immediately before the release of the whole genome sequences

David Miller and Thomas Bosch

of two corals, the venue being Peppers Blue on Blue resort, Magnetic Island, North Queensland on 6–9 March 2011. It was sponsored by the Australian Academy of Sciences and the ARC Centre of Excellence for Coral Reef Studies, with support from James Cook University and the Australia and New Zealand Society for Cell and Developmental Biology.

Acropora millepora was the first fully 'home-grown' complex genome project (i.e. the first animal whose genome has been sequenced and assembled entirely locally), thanks to support from the Australian Genome Research Facility and Illumina, and the genome of a second *Acropora* species was sequenced by a Japanese team led by Nori Satoh at the Okinawa Institute of Science and Technology.

Fifty delegates, including members of the ARC Centre of Excellence for Coral Reef Studies and six Australian universities, were involved, with 15 overseas speakers from eight institutions. The meeting featured an eclectic mixture of scientists from bioinformatics, genomics, developmental biology, physiology and microbiology, united by a common interest in corals, their relatives and their symbionts.

Prof Thomas Bosch (Kiel, Germany), a leading figure in the German academic system and the cnidarian biology community, was the keynote international speaker. Bosch's group is perhaps best known for developing transgenic technology for *Hydra* and other cnidarians. Other key international speakers were Dr Konstantin Khalturin (Kiel), Professor Nori Satoh, Professor Angela Douglas (Cornell), Dr Rebecca Vega-Thurber (Florida), Dr Oren Levy (Bar-Ilan University, Israel) and Dr Allen Chen (Academia Sinica).

One main theme of the meeting was the application of 'next-generation' DNA sequencing

technology to coral biology, and the power of using these methods coupled to the reference genomes and transcriptomes. Nori Satoh and members of his Marine Genomics Unit group outlined the assembly and main findings from the Japanese genome sequencing project, and Sylvain Forêt and David Miller described the Australian genome and transcriptome work. Experiments making use of these latter resources formed the basis of talks from Aurelie Moya and Yvonne Weiss on ocean acidification effects on early coral life history stages and coral immunity respectively. Another main theme was the interaction of the coral animal with microbes and viruses. David Bourne (Australian Institute of Marine Science) and Bette Willis outlined the microbiology and ecology of coral disease, while Becky Vega-Thurber and Adrienne Correa (Florida) talked about the viruses associated with corals. The interactions of *Hydra* with its microflora were elegantly outlined by Thomas Bosch, and Angela Douglas gave a wonderfully clear description of the pea aphid – *Buchnera* symbiosis, which in many ways resembles the coral–dinoflagellate symbiosis.

The contributions of the nine people from the Okinawa Institute of Science and Technology, the University of Kiel and Academia Sinica were particularly valuable. The meeting helped to forge stronger Australian links with these institutions, as well as collaborations between individual researchers.

Stromatolites, Shark Bay, Western Australia

Cyanobacteria

2011–12 Elizabeth and Frederick White research conferences

2011–12 conferences funded

Minerals at extreme conditions: integrating theory and experiment

13–15 April 2011, Shine Dome, Canberra. Organised by Professor Kate Wright, Curtin University

Evolution of photosynthesis and oxygenation of Earth

28–29 June 2011, University of New South Wales, Sydney. Organised by Professor Anthony Larkum, University of Sydney, Professor Brett Neilan, University of New South Wales and Professor Malcolm Walter FAA, University of New South Wales

Conference announcements for 2012

2012 Elizabeth and Frederick White research conference

Astronomy and Space Science, CSIRO were awarded up to $10,000 for their meeting **Exploring the radio continuum Universe with SKA pathfinders** (the second SKA pathfinders radio continuum surveys (SPARCS) meeting), to be held at CSIRO Astronomy and Space Science, Sydney 30 May – 1 June 2012.

2012 Boden Research Conference

Up to $10,000 was awarded to the Illawarra Health and Medical Research Institute, University of Wollongong, NSW, for their symposium **Proteostasis and disease**, to be held at the University of Wollongong on 28–30 November 2012.

2012 Fenner conference on the environment

A collaboration of the Oceans Institute at the University of Western Australia and the Department of Fisheries (Western Australia) was awarded up to $10,000 for the conference **Coral reefs on the edge – new challenges for high latitude coral reef communities**, to be held in July 2012 on Research Station, Houtman Abrolhos Islands and Perth.

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

Public awareness and outreach

THE ACADEMY SUPPORTS A RANGE OF ACTIVITIES AND EVENTS THAT AIM TO PROMOTE UNDERSTANDING OF SCIENCE AND TO FOSTER GREATER AWARENESS OF SCIENCE ISSUES AND SCIENCE-RELATED ACTIVITIES IN GOVERNMENT, INDUSTRY, THE MEDIA, ACADEMIA AND THE COMMUNITY.

Science at the Shine Dome

On 4 to 6 May 2011 the Australian Academy of Science held what was hailed as its 'best ever' Science at the Shine Dome.

Opened by Academy President Professor Suzanne Cory AM PresAA FRS, the three-day program began with the Flinders Lecture given by Professor Brian Kennett FAA. This lecture and medal were established in 1957 to commemorate the scientific endeavour and maritime discoveries of Matthew Flinders by recognising scientific research of the highest standing in the physical sciences.

Eighteen new Fellows were formally admitted to the Academy and presented highlights of their outstanding research to an enthralled audience. Winners of the Academy's 2011 career and early career researcher awards were presented with their medals and also discussed their latest work.

Fellows and their guests attended the annual black tie dinner at the National Museum of Australia on 5

CREDIT MARK GRAHAM

President's address, annual symposium

May. The guest speaker was Professor Lord Robert May of Oxford AC FAA FRS, a Corresponding Member of this Academy and former President of the Royal Society of London, who spoke on 'Science advice and government policymaking'.

More than 60 early career researchers participated in the 2011 Science at the Shine Dome, along with nine science teachers.

The final day's Science at the Shine Dome program offered a stellar line-up of speakers for the annual symposium 'Australia 2050: population challenges to sustainability', a long-running focus of the Academy. The symposium was opened by the Hon Dr Barry Jones AO FAA FASSA FAHA FTSE, and featured Professor Lord May and Professor Sir Peter Gluckman FRS, Chief Scientist of New Zealand. Simon McKeon, 2011 Australian of the Year, and Professor Tim Flannery, 2007 Australian of the Year, also joined the diverse program to tackle Australia's challenges with regard to prosperity, population growth and environmental sustainability. The symposium program was convened by Professor Bob Williamson FAA FRS and Professor Roger Short FAA FRS.

CREDIT MONA AKBARI

Simon McKeon, annual symposium

CREDIT MARK GRAHAM

Annual symposium speaker Tim Flannery

CREDIT MARK GRAHAM

Roger Short, annual symposium

Shine Dome Open Day 13 August

Held during National Science Week, the 2011 Shine Dome Open Day attracted around 500 people from the ACT and New South Wales. With a food chemistry theme to celebrate the International Year of Chemistry, the Open Day featured Questacon's Excited Particles' science of taste show, 'Tasty science: do yourself a flavour and hang with your buds', a cartoon workshop by children's author and cartoonist Michael Salmon (whose creation Alexander Bunyip devoured the Shine Dome as an apple pie in the book *The monster that ate Canberra*), a talk on food allergies by Anaphylaxis Australia President Maria Said and a presentation by glycaemic index guru Professor Jennie Brand-Miller, former Chair of the Academy's National Committee for Nutrition.

Younger visitors also kept busy with a treasure hunt, food classification games, colouring-in and active learning about converting food to energy, while adults enjoyed hands-on demonstrations of molecular gastronomy, the chemistry of wine, safe food handling and hygiene, how to make cassava flour safer, the many health-giving properties of honey, a confronting visual demonstration of the amount of salt consumed by the average Australian over a year and a range of other stalls. Adult guests were further entertained with three well-attended tours of the Shine Dome led by architects John Armes, Pip Giovanelli and Eric Martin.

CREDIT NORTHSIDE CHRONICLE ACT

Shine Dome Open Day 2011

Public lecture series

2011 Fenner's science today and tomorrow

The Academy's 2011 public lecture series was a tribute to the life and work of the late Frank Fenner, providing an opportunity to hear about the latest scientific advances in the research areas that he pioneered. Professor Frank Fenner's diverse career spanned many areas of science, beginning with malaria and tuberculosis research, and working on population dynamics, and the biological control of rabbit populations. Frank Fenner played a pivotal role in the elimination of smallpox and had a passion for the environment.

The series, organised by Professor Graeme Farquhar FAA FRS, Professor Michael Dopita FAA and Professor Adrian Gibbs FAA ARCS and chaired by Professor Farquhar, attracted considerable media attention. Australia's Public Affairs TV Channel broadcast several of the lectures in their entirety. For the first time in 2011, each lecture was live-streamed from the Academy website, attracting increasing numbers of online viewers. Attendance at each lecture was close to capacity. With the additional online viewers, this made it the most popular series yet. Those held during the reporting period were:

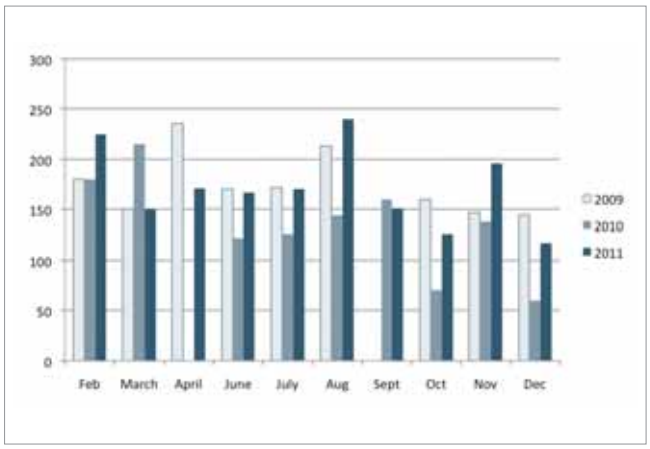
- **5 April 2011** *Malaria: the plant connection*
  Professor Geoffrey McFadden FAA
- **7 June 2011** *New perspectives on ecologically sustainable forest management*
  Professor David Lindenmayer FAA
- **5 July 2011** *The history of science and 'The two cultures': envisaging multidisciplinary approaches in a complex scientific age* **Dr Ann Moyal AM**
- **2 August 2011** *Killer viruses and killer T cells*
  Nobel Laureate **Professor Peter Doherty FAA FRS**
- **6 September 2011** *The miracle of immunity: how the immune system tells foe from friend*
  Professor Christopher Goodnow FAA FRS
- **4 October 2011** *Frank Fenner, the evolution of virulence and the birth of Darwinian medicine*
  Professor Andrew Cockburn FAA
- **1 November 2011** *Pestilence, pandemics and climate change: 2000 years of experience, 100-plus years of risk* **Professor Tony McMichael AO**
- **6 December 2011** *Myxomatosis and rabbits: biological control and evolution* **Dr Peter Kerr**

CREDIT MONA AKBARI

Fenner public lecture series opening symposium speakers Suzanne Cory, Peter Doherty, Henry Nix, Adrian Gibbs

The Fenner series public lectures are available for viewing at **http://science.org.au/events/publiclectures/fs/index.html**

Attendance at Academy public lectures (including online)



*Public lectures are not held in January or May.
Figures are unavailable for April 2010 and September 2009

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

In February 2012 the Academy started a new public lecture series examining sustainable communities, mining, agriculture, culture and environment in country Australia. The series began with Adjunct Professor Bill Gammage, who described Aboriginal land management in 1788. The lecture broke attendance records for a public lecture with 300 audience members packing the Shine Dome, and 70 online viewers. The following lecture, Dr John Kirkegaard's examination of the revolution in conservation farming, also attracted a large and diverse audience. Details of other talks in the 2012 series are available at **www.science.org.au/events/publiclectures/.**

Other lectures

In addition to the public lecture series, from time to time the Academy stages other lectures and public events to reach a broader audience and take advantage of visits to Australia by international scientists of note.

- **25 August 2011** 'Women in Chemistry @ Parliament House' by Professor Carol Robinson FRS, Australian Research Council CEO Professor Margaret Sheil and Professor Suzanne Cory AM PresAA FRS, at Parliament House, Canberra
- High school students from the ACT and its surrounding regions were invited to attend this special event held at Parliament House, at which three women prominent in national and international science spoke about their career highlights and challenges.

CREDIT SALLY SPIERS

National Press Club address

- **28 September 2011** 'Driving Australia's economic future through robust investment in science and maths education', by Professor Suzanne Cory AM PresAA FRS, National Press Club in Canberra
- In this nationally televised address, the Academy President detailed the argument for strong and sustained investment in quality maths and science education at all levels.
- **21 November 2011** 'From continental drift via plate tectonics to a new paradigm', by new Corresponding Member Professor John Dewey FAA FRS
- Professor Dewey's visit to Australia presented an opportunity to formalise his Corresponding Membership of the Academy and invite him to make a public address about his life's work.

CREDIT MONA AKBARI

Margaret Sheil, Carol Robinson and Suzanne Cory, Women in Chemistry meeting at Parliament House

- **30 March 2012** 'Innovation requires global engagement: In Conversation' with Nobel Laureate Professor Brian Schmidt FAA and Academy Foreign Secretary Professor Andrew Holmes FAA FRS FTSE, at the University of Melbourne

In a forum-style presentation moderated by ABC Science broadcaster Professor Robyn Williams FAA, Professors Schmidt and Holmes spoke about their ground-breaking work and the international ties that made it possible, as well as exploring Australia's place in international science.

Publications

Publications produced by the Academy are generally available in hardcopy and online. A full listing of 2011–12 publications is provided at Appendix 5.

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.

The journal is edited jointly by Professor Rod Home, who has been the editor since 1984, and Professor Libby Robin, who took on joint editorship in early 2010. During the next few years, there will be a staged transfer of editorial responsibilities to Professor Robin, who will become sole editor in about 2014. 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 2011 with three historical articles, 10 biographical memoirs, two series of book reviews covering 28 books and one exhibition review, 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.

CREDIT MONA AKBARI

Suzanne Cory with Corresponding Member John Dewey

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.**

National Museum student prize

The 2011 National Museum of Australia Student Prize for History of Australian Science or Environmental Science was awarded to Christian O'Brien, a PhD student at the Australian National University's School of History, for his entry, 'A brief history of the monsoon'. Christian was presented with his certificate and prize by Museum Director Andrew Sayers and Academy Secretary for Education and Public Awareness Professor Jenny Graves at a ceremony at the National Museum of Australia on 15 June 2011. For more information see the report of the National Committee for the History and Philosophy of Science, which judges the prize.

Australian Journals of Scientific Research

The Academy of Science and CSIRO jointly publish 12 Australian journals of scientific research. The current five year agreement ends in 2012. The journals and their editors-in-chief are:

- *Australian Journal of Botany* Professor Bob Hill
- *Australian Journal of Chemistry* Professor Curt Wentrup FAA
- *Australian Journal of Zoology* Professor Mark Elgar
- *Australian Systematic Botany* Dr Mike Bayly
- *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* Professors Andrew Boulton and Keith Hunter
- *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

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 since 2009. Details of these and other journals published by CSIRO are available at **www.publish.csiro.au/%20nid/50.htm?nid=17.**

Communications and media

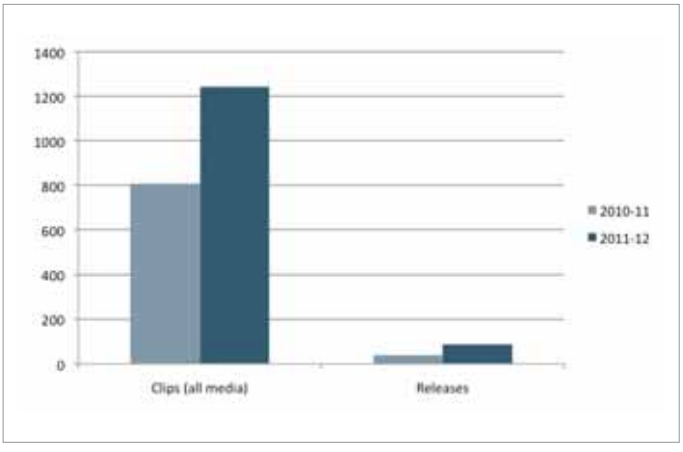
Media coverage of Academy activities

The Academy's efforts in the past year to increase its activity and recognition in the media have paid off, with a significant increase in mentions of the Academy in mainstream print and broadcast media, and a fourfold rise in online coverage, including in respected new media publications such as *The Conversation* and *Crikey*. The overwhelming majority of these mentions were positive in nature.

More than twice as many media releases were distributed than in the previous period, publicising all areas of Academy activity, including policy and position papers, international activities, awards, medals, fellowships and events. As well, the Academy has been significantly more vocal in the media about issues of science as they pertain to public policy.

In just a few examples of how our media presence has made a difference, a strategically planned public engagement strategy has lifted the profile of the Academy's primary and high school education programs *Primary Connections* and *Science by Doing*; mentions in the mainstream media of the document *The science of climate change: questions and answers* occur at least twice a week; the Academy's media and advocacy efforts have contributed to policy changes to improve visa conditions for international tertiary students and protect stem cell research; attendance has improved at the Academy's public events, and the number of applications for the Academy's awards, medals and fellowships has increased.

Our reach in the news media



Website and social media

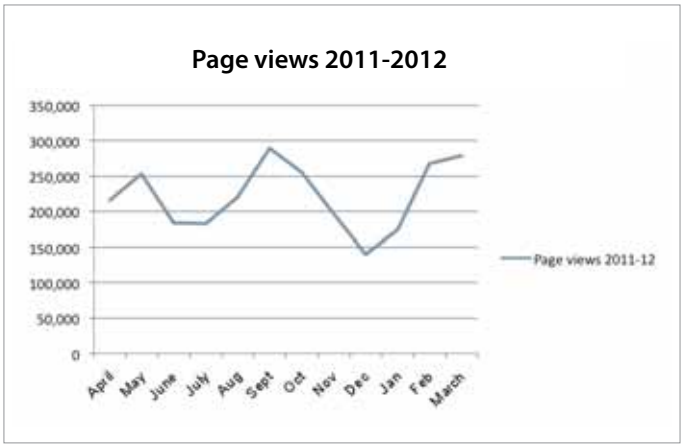
In addition to outreach via traditional media, this year for the first time the Academy has ventured into social media. The Twitter account @Science_ Academy was launched during National Science Week in August 2011, and has been successfully used to publicise Academy programs and news to new audiences. By March 2012, the @Science_ Academy account had attracted more than 1100 followers, including many organisations, journalists, politicians and scientists. Its tweets about events, awards, lectures and other activities, education, outreach and Fellows' achievements have directly reached hundreds of thousands of people.

The Academy's website is a dynamic and important resource for Fellows, National Committees and the general public. Since its 2010 upgrade the Academy has continued to refine and update the website. New items are posted every day; often these are also announced via Twitter.

Nova: science in the news remains one of the most popular sections of the site, particularly among education specialists and the media, with more than 1000 subscribers receiving regular updates on new topics. *Primary Connections* has also widened its outreach with 1500+ subscribers who receive information about the availability of new units and training events. More than 900 early and mid-career researchers also receive notifications about Academy activities and other information that may help advance their careers.

For up-to-date news and announcements see **www/science.org.au/news.**

Academy website: page views



*As the Academy has updated its web data collection software, comparable data is not available for the previous period.

Newsletter

The quarterly Academy Newsletter is now mailed to about 1000 people and has 890 online subscribers. The news and announcements section of the Academy website **www.science.org.au/news** also continues to provide up-to-date news of Academy activities, awards and related science at **www.science.org.au/news/media/.**

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

The regular combined Academies dinners continued throughout the year, thanks to Fellows and to Professors Susanne von Caemmerer and John Passioura.

In November 2011 a number of Fellows expressed an interest in discussing Academy business and in particular the general participation of the Fellowship and attendance at the annual general meeting. As regional convener, Professor White was asked to chair preparatory meetings for an annual meeting of Canberra regional Fellows to discuss Academy business and prepare for the annual general meeting discussions that was held on 27 March 2012.

New South Wales

Chair: Professor Ian Dawes FAA

The NSW regional group held two functions in 2011. In conjunction with local Australian Academy of Technological Sciences and Engineering colleagues, it continued to host the very successful evening of 'Scientists' stories – the Academies meet high school students'. About 75 enthusiastic registrants, mainly students but also members of the Academies, teachers and parents attended the July 2011 evening. There were presentations on the world's reproductive future and population growth by Professor John Aitken, Professor Ken Buckle's 'Can science prevent world hunger?', Professor Veena Sahajwalla on recycling waste plastics and rubber tyres as a resource for steelmaking, and Professor Michelle Simmons on how her group manipulates individual atoms in the quest for the future of supercomputing. Our thanks go to the Faculty of Science, University of New South Wales, who funded the meeting and to the Dean, Professor Merlin Crossley, for acting as MC.

The regional group congratulates physicist Professor Michelle Simmons on being awarded New South Wales Scientist of the Year for 2012.

Queensland

Chair: Professor Perry Bartlett FAA

Two Queensland scientists, Professor Mark Blows (University of Queensland) and Professor Emma Whitelaw (Queensland Institute of Medical Research) were elected as Fellows of the Academy in 2011. Professor Ian Frazer was elected as a Fellow of the Royal Society of London, joining Professors Jack Pettigrew and Mandyam Srinivasan as current Queensland members of the Royal Society.

The scientific contributions of the newly elected Fellows were showcased to the wider public and

academic communities at a joint public forum by Queensland Fellows of the Australian Academies at Customs House on 8 November 2011. Professor Ian Frazer presented the keynote lecture with a stimulating talk on 'Cancer and how to avoid it'. The new Australian Academy of Science Fellows also gave talks — Professor Blows on 'Why evolution fails' and Professor Whitelaw on 'Epigenetics – the new genetics'. The final speakers were Professor Suresh Bhatia FTSE (representing the Australian Academy of Technological Sciences and Engineering), who discussed 'Engineering at the nanoscale', and Professor Gillian Whitlock FAHA (representing the Australian Academy of the Humanities), who gave a delightful insight into the importance of archival material.

The talks were highly appreciated by the 100-strong audience and generated spirited discussions during the cocktail party that followed. Plans are already under way for next year's public forum, when it is hoped that a representative from the Australian Academy of Social Sciences will also be able to participate.

Professor Hugh Possingham is thanked for chairing the Steering Committee that organised the Academy's 2011 Theo Murphy High Flyers Think Tank, *Stressed ecosystems: better decisions for Australia's future*, in Brisbane on 29–30 September 2011. It brought together about 60 of the country's high-achieving early and mid-career research scientists to tackle some of the challenges facing our stressed ecosystems. Examples of these examined in the Think Tank were the Murray–Darling Basin, Melbourne's grasslands, Ningaloo Reef and Queensland's Surat and Bowen basins. These basins have been the subject of recent controversy over the extraction of coal seam gas. It was pleasing to note that an Australian Academy of Science initiative to better manage our nation's stressed ecosystems was launched in February 2012, with the announcement of a national working group to implement the recommendations developed in Brisbane.

We bid farewell to two Queensland Fellows who moved interstate in the second half of the year — Professors Scott O'Neill and John Mattick, who relocated to Monash University and the Garvan Institute of Medical Research, respectively. We wish them continued success in their new positions.

Victoria

Chair: Professor Tony Klein AM FAA

The annual New Fellows and Medallists Symposium on 16 June 2011 covered a varied range of fascinating topics in brief talks. Newly elected FAA Professor Marilyn Anderson of La Trobe University generated a great deal of interest with her talk 'Safe sex in plants'. She was followed by another new Fellow, Professor Michael Goddard of the University of Melbourne, who spoke on 'The genetics of complex traits'. Professor Joe Monaghan of Monash University spoke on 'The myriad uses of particles in simulation'. Professor Terry Speed of the Walter and Eliza Hall Institute (who was elected several years ago, but unable to be present at the symposium until this year) talked on 'Bioinformatics – separating gold from dross'. Dr Colin Ward, also of the Walter and Eliza Hall Institute and a newly elected FAA, spoke on 'The structures of insulin and growth factor receptors'. The last two speakers were medal winners. Dr Alicia Oshlack of the Walter and Eliza Hall Institute, winner of the Ruth Stephens Gani Medal for research in human genetics, gave the third genetics-related talk, 'The evolution of gene expression in humans'. Dr Harry Quiney (University of Melbourne), winner of the prestigious Syme Prize of the Faculty of Science, spoke on 'Blasted biological molecules', which described a novel technique for determining the structure of complex molecules by hitting them with a very intense pulse of x-rays and recording the diffraction pattern before the molecules are blasted apart. As usual, the symposium ended with cocktails and dinner for the speakers, Victorian Fellows and guests.

The Combined Academies' Dinner, an annual event organised this year by the Victorian Section of the Academy of Humanities, was held on 25 August 2011. After-dinner speaker Professor Judith Brett of La Trobe University gave an account of exploring the changing relationship between rural and urban Australia in her talk '*Country and city in Australia*'.

The traditional Christmas party and dinner on Monday 28 November 2011 at the Boulevard Restaurant in Yarra Bend Park was very enjoyable.

The Shine Dome and Ian Potter House

THE NATIONAL HERITAGE-LISTED SHINE DOME JOINS OTHER CANBERRA LANDMARK BUILDINGS.

In October 2011 the National Heritage-listed Shine Dome joined other Canberra landmark buildings with new colourful evening lighting. The Academy's House Committee oversaw the installation of the new energy-efficient lighting, with funding from the Australian Government National Historic Sites Program. At the same time, the roof lights were replaced with environmentally friendly alternatives and the external lights to the entryways were revamped — including the non-intrusive under-lip moat lighting — to reintroduce features of the original building. Evening illumination of the Dome with coloured lights from the moat emphasises the building's unique design and draws attention to its heritage values.

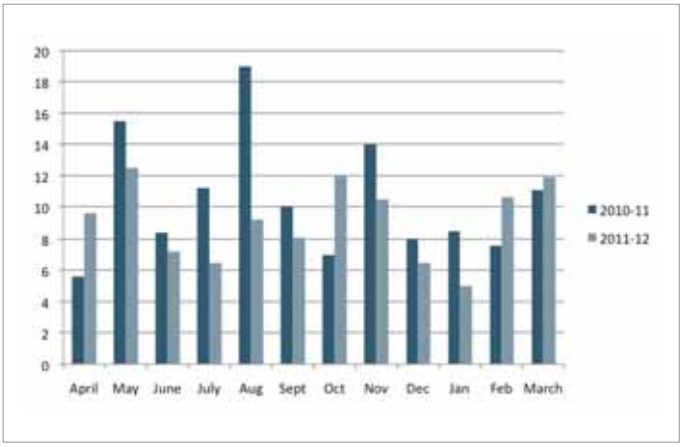
The new lights were officially turned on by the Member for Canberra Ms Gai Brodtmann on 27 October 2011 at an evening event attended by local media and dignitaries, Academy Fellows, suppliers and Academy staff.

New signs outside both the Shine Dome and Ian Potter House provide information about the background of the buildings, and directions on how to find more details. The signs were partially funded by the Australian Government National Historic Sites Program.

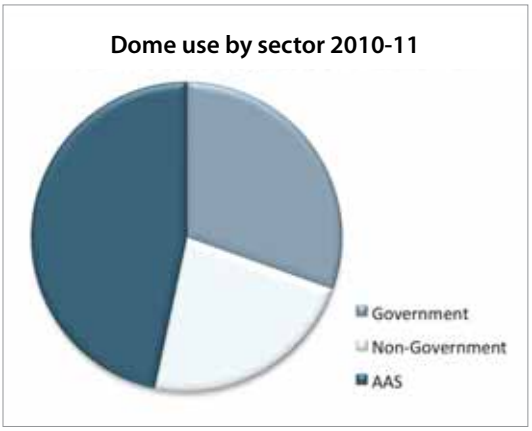
As well as housing the library and a number of Secretariat staff, the Shine Dome is used regularly as a meeting, lecture and conference venue by the Academy, its Council and National Committees. It also remains a popular conference venue for government and other organisations.

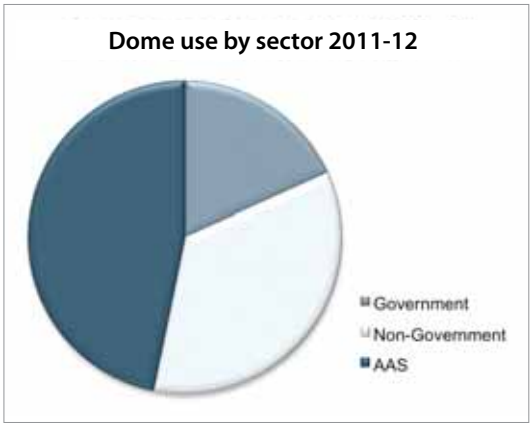
Dome use (days per month)

April 2010 – March 2011 compared with April 2011 – March 2012



Dome use by sector





CREDIT MARK GRAHAM

THE SHINE DOME AND IAN POTTER HOUSE

Basser Library

THE LIBRARY WAS ESTABLISHED IN 1960 WITH A GIFT OF £25,000 FROM THE PHILANTHROPIST SIR ADOLF BASSER (1887–1964). RESEARCHERS ARE WELCOME TO WORK ON ITS COLLECTION OF PUBLISHED AND UNPUBLISHED MATERIAL DOCUMENTING THE HISTORY OF SCIENCE IN AUSTRALIA.

Manuscripts collection

The manuscript collections have grown to 230 with the addition of three new collections — those of FWE Gibson, NS Hush and R Williamson — this year.

Material was added to the papers of the Australian Society for Parasitology, KE Bullen, DG Catcheside, JPV Madsen and EW Titterton.

Staffing and use

Academy Librarian Rosanne Walker devoted considerable time in 2011 to archiving Academy secretariat material. Since the beginning of 2012 attention has focused on accessioning manuscript material now held by the library.

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

Richard Jacek (FJ Fenner)
Kathy de la Rue (JA Gilruth)
Tony Friend (Australian Mammal Society)
Ann Moyal (JE Moyal)
Julia Robinson (WS Sheridan)
Peter Pockley (RN Robertson, ALG Rees)
Frank Ingwersen (ACD Rivett)
Murray Batchelor (Hanna Neumann)
Alessandro Antonello (1957–58 International Geophysical Year)
Dan Flatt (LGH Huxley)
Amy Lay (FL Stillwell)
Margaret Allen (ACD Rivett)
Claire Ward (FL Stillwell)
Heather Rossiter (FL Stillwell)

The Librarian consulted the following collections in response to requests from researchers: Australian Botanists, ALJ Beckwith, Culgoora Solar Observatory, FJ Fenner, OH Frankel, JA Gilruth, RG Giovanelli, Human Genetics Society of Australasia, HR Marston, D Mawson, AE Mills and GP Whitley.

On Open Day the library proved popular when it was opened for four hours, instead of only during conducted tours.

Moran Award for the History of Science Research

The Moran Award for the History of Science Research was awarded to two researchers this year, Lachlan Clohesy and Ailie Smith, both of whom will take up their fellowships later in 2012.

Frank Stillwell's antarctic diaries

In November the Academy lent out a historic antarctic diary written during 1912. The diary, from FL Stillwell's collection, is on display in a National Archives of Australia travelling exhibition, 'Traversing Antarctica: the Australian experience'. Stillwell was a geologist on Douglas Mawson's Australasian Antarctic Expedition of 1911–14, whose centenary the exhibition commemorates. The exhibition will tour until 2015, visiting 10 museums and galleries within Australia. As part of the lending agreement for the diary, National Archives generously funded the scanning of Stillwell's antarctic diaries for preservation purposes. The diary lent for the exhibition will be returned to the Academy during Science at the Shine Dome activities in May 2012.

Abbreviations

AASA	Association of Academies of Sciences in Asia
AC	Companion of the Order of Australia
AGM	annual general meeting
AM	Member of the Order of Australia
AO	Officer of the Order of Australia
ARC	Australian Research Council
AsCA	Asian Crystallographic Association
CEO	Chief Executive Officer
CG	cytosine–guanine
CODATA	Committee on Data for Science and Technology
COST	European Cooperation in Science and Technology
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CUBENet	Collaborative University Biomedical Education Network
DBE	Dame Commander of the Most Excellent Order of the British Empire
DIISR	Department of Industry, Innovation, Science and Research (now DIISRTE)
DIISRTE	Department of Industry, Innovation, Science, Research and Tertiary Education
DNA	deoxyribonucleic acid
DSTO	Defence Science and Technology Organisation
ERA	Excellence in Research for Australia
FAA	Fellow of the Australian Academy of Science
FAHA	Fellow of the Australian Academy of the Humanities
FAIBiol	Fellow of the Australian Institute of Biology
FASAS	Federation of Asian Scientific Academies and Societies
FGSAust	Fellow of the Geological Society of Australia
FRACI	Fellow of the Royal Australian Chemical Institute
FRCPA	Fellow of the Royal College of Pathologists Australasia
FRCP(Ed)	Fellow of the Royal College of Physicians of Edinburgh
FRS	Fellow of the Royal Society
FTSE	Fellow of the Academy of Technological Sciences and Engineering
HECS	Higher Education Contribution Scheme
IAP	InterAcademy Panel on International Issues
ICSU	International Council for Science
INQUA	International Union for Quaternary Research
IPCC	Intergovernmental Panel on Climate Change
ISICR	International Society for Interferon and Cytokine Research
IT	information technology
MOU	memorandum of understanding
NHMRC	National Health and Medical Research Council
OAM	Medal of the Order of Australia
RDI	recommended dietary (or daily) intake
RMIT	RMIT University
SCAR	Scientific Committee on Antarctic Research
UN	United Nations
UNCOVER	Unincorporated National Collaborative Venture for Exploration Geoscience Research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Appendixes

Appendix 1 New transcripts and teachers' notes posted on the Academy website for *Interviews with Australian scientists*

Academy Fellow	Interviewer	Sponsor
Professor Henry Burger	Professor Rob McLachlan*	Prince Henry's Institute
Professor Andrew Cole	Professor Donald Watts*	University of Western Australia
Professor Ross Day	Professor Max Coltheart	Monash University
Professor Christopher Heyde	Professor Steve Kou*	(filmed by American Statistical Association)
Professor John Lovering	Professor Robyn Williams	University of Melbourne, Faculty of Science
Dr Oliver Mayo	Professor Robyn Williams	CSIRO Livestock Industries
Dr Angus McEwan	Dr Trevor McDougall	Bureau of Meteorology
	Professor Graham Farquhar	Australian Academy of Science
Professor Roger Short	Professor Robyn Williams	University of Melbourne, Faculty of Medicine, Dentistry and Health Sciences
Dr Guy White	Professor Neville Fletcher	CSIRO Materials Science and Engineering
Other Australian scientists		
Dr Bryan Fry*	Dr Cecily Oakley*	University of Queensland
Professor Nick Hoogenraad*	Professor David Vaux	La Trobe University
Dr Alicia Oshlack*	Dr Cecily Oakley*	Murdoch Childrens Research Institute

*non-Fellow

Appendix 2 New *Interviews* filmed with Australian scientists

Academy Fellow	Interviewer	Sponsor
Dr Cyril Appleby	Dr Jim Peacock	Australian Academy of Science
Professor Geoffrey Burnstock	Professor Robyn Williams	International Society of Autonomic Neuroscience University College London Australian Physiological Society
Professor Graeme Clark	Professor Stephen O'Leary*	University of Melbourne
Professor Bob Crompton	Professor Erich Weigold	Australian National University
Professor Ross Day	Professor Max Coltheart	Monash University
Professor Noel Hush	Professor Robyn Williams	University of Sydney
Professor Kurt Lambeck	Professor Robyn Williams	Australian National University
Lord Robert May	Professor Robyn Williams	University of Sydney
Dr Angus McEwan	Dr Trevor McDougall	Bureau of Meteorology
Dr Keith Norrish	Professor Bruce Chappell	CSIRO Land and Water
Dame Bridget Ogilvie	Professor Robyn Williams	Wellcome Trust University of New England
Professor Jim Pittard	Professor Michael Hynes	University of Melbourne
Professor M Srinivasan	Professor Graham Farquhar	Queensland Brain Institute
Other Australian scientists		
Dr Bryan Fry*	Dr Cecily Oakley*	University of Queensland
Dr Alicia Oshlack*	Dr Cecily Oakley*	Murdoch Childrens Research Institute

*non-Fellow

Appendix 3 Australian executive committee members of International Unions

Scientific organisation	Office holder	Position
International Association of Cryospheric Sciences (of the International Union of Geodesy and Geophysics)	Dr Ian Allison	President
International Astronomical Union	Prof Matthew Colless FAA	Vice-President
International Commission for Optics (of the International Union of Pure and Applied Physics)	Prof Min Gu FAA	Vice-President
International Council for Science	Prof David Black FAA	Secretary General
International Geographical Union	Prof Ruth Fincher	Vice-President
International Geosphere-Biosphere Programme	Prof Jean Palutikof	Vice-Chair
International Union for Pure and Applied Biophysics	Prof Cris G Dos Remedios	Secretary General
International Union of Pure and Applied Chemistry	Prof David Black FAA	Secretary General
International Union of Pure and Applied Physics	Prof Bruce McKellar FAA	President-Designate
International Union for Quaternary Research	Prof Allan Chivas FAA	Past-President
International Union of Crystallography	Prof Peter Colman FAA	Vice-President
International Union of Geodesy and Geophysics	Dr Tom Beer	President (to 2011) Immediate Past President (2011–15)
International Union of History and Philosophy of Science / Division of Logic, Methodology and Philosophy of Science	Prof Cliff Hooker	Second Vice-President
International Union of Immunological Societies	Prof Peter Doherty FAA	President
International Union of Radio Science	Prof Phil Wilkinson	President
Scientific Committee on Oceanic Research	Dr John Volkman	Vice-President
Scientific Committee on Solar-Terrestrial Physics	Prof Bob Vincent FAA	President
World Climate Research Programme	Prof David Griggs	Vice-Chair

Appendix 4 Australian 2011 delegates to International Unions

Committee	Union	Date	Location	Delegate
ICSU coordination	International Council for Science	26–30 September	Rome, Italy	Prof Andrew Holmes FAA
Biomedical sciences	International Union of Microbiological Societies	5–16 September	Sapporo, Japan	Dr Charlene Kahler Assoc Prof David Ellis
	International Union for Pure and Applied Biophysics	30 October – 3 November	Beijing, China	Prof Cris dos Remedios Assoc Prof Brett Hambly
Chemistry	International Union of Pure and Applied Chemistry	29 July – 4 August	San Juan, Puerto Rico	Prof Curt Wentrup FAA Prof Mary Garson Prof Brynn Hibbert Prof Robert Loss
Crystallography	International Union of Crystallography	22–29 August	Madrid, Spain	Prof Mitchell Guss Prof Ray Withers FAA Dr Steve Wilkins
Earth sciences	International Union of Geodesy and Geophysics	28 June – 7 July	Melbourne, Australia	Dr Ian Allison Prof Iver Cairns Prof Ian Jackson Prof John Middleton Assoc Prof Stewart Franks Prof Ray Cas Prof Robert Vincent FAA Prof Will Featherstone
Earth system science	World Climate Research Program	24–28 October	Denver, USA	Prof David Karoly
History and philosophy of science	International Union of History and Philosophy of Science / Division of Logic, Methodology and Philosophy of Science	19–26 July	Nancy, France	Mr Erik Nyberg
Mechanical sciences	International Federation for the Promotion of Mechanism and Machine Science	19–25 June	Guanajuato, Mexico	Prof Ross McAree
Physics	International Union of Pure and Applied Physics	31 October – 4 November	London, UK	Prof Bruce McKellar FAA Prof Robert Robinson Prof Marc Duldig
Spectroscopy	International Commission for Optics	15–19 August	Puebla, Mexico	Dr John Holdsworth Prof Min Gu FAA
Quaternary research	International Union for Quaternary Research	20–27 July	Bern, Switzerland	Dr Craig Sloss Dr Steven Phipps
Radio science	International Union of Radio Science	13–20 August	Istanbul, Turkey	Prof Mike Tobar Prof Paul Smith Prof Andrew Parfitt Prof Tony Parker Dr John O'Sullivan FAA Ms Carol Wilson Dr Phil Wilkinson Assoc Prof Colin Waters

Appendix 5 List of printed and online publications

Publication	Month	Link
2011		
Annual Report 2010–11	April	www.science.org.au/reports/2011anrep.html
2011 public lecture series transcripts		
Malaria: the plant connection Professor Geoffrey McFadden	April	www.science.org.au/events/publiclectures/fs/mcfadden.html
The History of Science and 'The two cultures': envisaging multidisciplinary approaches in a complex scientific age Dr Ann Moyal	July	www.science.org.au/events/publiclectures/fs/moyal.html
Killer viruses and killer T cells Professor Peter Doherty	August	www.science.org.au/events/publiclectures/fs/doherty.html
The miracle of immunity: how the immune system tells foe from friend Professor Christopher Goodnow	September	www.science.org.au/events/publiclectures/fs/goodnow.html
Frank Fenner, the evolution of virulence and the birth of Darwinian medicine Professor Andrew Cockburn	October	www.science.org.au/events/publiclectures/fs/cockburn.html
Pestilence, pandemics and climate change: 2000 years of experience, 100-plus years of risk Professor Tony McMichael	November	www.science.org.au/events/publiclectures/fs/mcmichael.html
Myxomatosis and rabbits: biological control and evolution Dr Peter Kerr	December	www.science.org.au/events/publiclectures/fs/kerr.html
Early Days: Early Career Researcher Newsletter nos 6, 7, 8, 9	April, August, October, December	www.science.org.au/ecr/ecr-newsletters/
Historical Records of Australian Science vol 22 nos 1 and 2	June, December	www.publish.csiro.au/?nid=108
Newsletter 84, 85, 86, 87	June, September, December 2011, March 2012	http://science.org.au/publications/newsletters/index.html
Mid-term review of the Australian Astronomy Decadal Plan 2006–2015	July	www.science.org.au/natcoms/ncastronomy/documents/AstronomyDecadalPlan(2011).pdf
Geoengineering the climate? A Southern Hemisphere Perspective	September	www.science.org.au/natcoms/nc-ess/documents/GEsymposium.pdf
Theo Murphy (Australia) High Flyers Think Tank — *Stressed ecosystems: better decisions for Australia's future*	September	www.science.org.au/events/thinktank/thinktank2011/documents/ThinkTankRecommendations2011.pdf
Australian science in a changing world: innovation requires global engagement. Position paper	November	www.science.org.au/reports/documents/Innovationrequiresglobalengagement.pdf
Australian Academy of Science *Directory* 2011–12	December	http://www.science.org.au/fellows/fellowship-list.html
2012		
The status and quality of Year 11 and 12 science in Australian schools	February	www.science.org.au/publications/documents/Year11and12Report.pdf
2012 public lecture series transcripts		
The biggest estate on Earth: Aboriginal land management Adjunct Professor Bill Gammage	February	www.science.org.au/events/publiclectures/ac/gammage.html
From dust bowls to food bowls: the conservation farming revolution Dr John Kirkegaard	March	www.science.org.au/events/publiclectures/ac/kirkegaard.html

Appendix 6 Support for Academy activities

(amounts of $1000 and above are acknowledged)

Benefactors of the Academy

Donor	Purpose / Fund	Amount
Professor B Schmidt FAA	Primary Connections: linking science with literacy	100,000
Estate of Ian Gordon Ross	Ian Gordon Ross Fund	68,000
Professor K Cavill FAA	Primary Connections: linking science with literacy	20,000
Anonymous	Endowment for Science	4707
Professor M Dopita FAA	Endowment for Science	1500
Professor C Jagadish FAA FTSE	Endowment for Science	1000

Awards and fellowships

Sponsor	Prize / Scholarship	Amount
Thomas Lewis Davies Estate	Thomas Lewis Davies Fund	2,332,955
William H Gladstones Estate	Population & Environment Fund	180,000
Dr Margaret Middleton	Fund for the Conservation of Endangered Native Animals	60,000
Rio Tinto	Haddon Forrester King Medal	40,000
Heyde Family	Christopher Charles Heyde Fund	23,710
Selby Scientific Foundation	Selby Fellowship Fund	10,000
Professor R Stanton FAA	Haddon Forrester King Medal	2000
Dr Anna Rickards	Rod Rickards Fellowship	15,000

Sponsorships

Sponsor	Event / Program	Amount
Theo Murphy events		
Royal Society of London	2011 Theo Murphy High Flyers' Think Tank	130,462
Royal Society of London	2012 Frontiers of Science	80,023
Royal Society of London	2012 Theo Murphy High Flyers' Think Tank	74,445
conferences and lectures		
The Atlantic Philanthropies	Nobel Laureate Professor Elizabeth Blackburn's 'Hooked on Science' Tour	50,000
NSW Ministry of Health	Nobel Laureate Professor Elizabeth Blackburn's 'Hooked on Science' Tour	10,000
Queensland Department of Premier and Cabinet	Nobel Laureate Professor Elizabeth Blackburn's 'Hooked on Science' Tour	10,000
Servier Laboratories (Aust) Pty Ltd	French–Australian Joint Symposium on Innovation in Health Sciences and Biotechnology	15,000
Science at the Shine Dome		
Professor D Craig FAA	Science Teachers program	10,000
Anonymous	Science Teachers program	2000
Department of Climate Change and Energy Efficiency	2012 Annual Dinner	5000
CSIRO	2011 Early Career Researchers Program	6818
CSIRO	2012 Early Career Researchers Program	6000
National Health and Medical Research Council	2011 Early Career Researchers Program	6818
Department of Sustainability and Environment	2011 Early Career Researchers Program	4545

Sponsor	Event / Program	Amount
Department of Environment and Natural Resources Management – Queensland	2012 Early Career Researchers Program	2273
Department of Environment and Natural Resources – South Australia	2011 Early Career Researchers Program	2273
Department of Environment and Natural Resources – South Australia	2012 Early Career Researchers Program	2273
Geoscience Australia	2012 Early Career Researchers Program	2273
University of Tasmania	2012 Early Career Researchers Program	6818
University of Tasmania	2012 symposium	3000
Australia Antarctic Division	2012 symposium	2000
Department of Economic Development, Tourism and Arts	2012 symposium	2000
Professor R Short FAA	2011 symposium DVD	1000
Interviews with Australian Scientists		
Australian National University		6364
University of Melbourne		6364
University of Queensland		6364
University of Sydney		5455
CSIRO Land and Water		3182
Murdoch Children's Research Institute		3182
Queensland Brain Institute		3182
University College London		2500
Wellcome Trust		2500
International Society for Autonomic Neuroscience		2273
Early and Mid-career Researchers Forum		
Monash University		1818
Walter and Eliza Hall Institute		1818
Telethon Institute for Child Health Research		1818

Academy revenue — general and special grants*

General Academy grants — Funding body	Project / Program	Amount
Department of Innovation, Industry, Science and Research	Higher Education Support Act Learned Academies Program (Grant in Aid)	1,294,064
Department of Innovation, Industry, Science and Research	Learned Academies Program Supplementary funding (Grant in Aid)	295,782

Special grants		
Australian Antarctic Division	Contribution to Scientific Committee on Antarctic Research subscription	8967
Australian Institute of Physics	Development of a Physics Decadal Plan	5000
Australian Research Council	Learned Academies Special Project grant *Australia 2050*	113,006
Defence Science and Technology Organisation	Advances in Computer Science report	27,273
Department of Climate Change	Australian Climate Change Science Program	200,000
Department of Climate Change	*Climate change science: questions and answers* (4th reprint)	10,000
Department of Foreign Affairs and Trade	2012 Australia–Malaysia Green Growth Think Tank	20,000
Department of Foreign Affairs and Trade	Australia–Indonesia Institute	18,736
Department of Health and Ageing	*Science of immunisation: questions and answers*	31,137
Department of Innovation, Industry, Science and Research	Strengthening Australia's International Science Engagement	650,000
Department of Innovation, Industry, Science and Research	International Science Linkages — Science Academies Programme (Year 5)	244,500
Department of Innovation, Industry, Science and Research	2011 Australia–Japan Bilateral Exchange Program	115,000
Department of Innovation, Industry, Science and Research	Study on *The status and quality of Year 11 and 12 science in Australia*	70,000
Department of Innovation, Industry, Science and Research	2010 Shanghai World Expo Science Week	57,055
Department of Innovation, Industry, Science and Research	Australian National Nanotechnology Research Strategy	47,997
Department of Innovation, Industry, Science and Research	EU International Research Staff Exchange Scheme	16,000
Department of Innovation, Industry, Science and Research	2010–11 Australian Academy of Science Speaker Series	12,500
French Embassy	French–Australian Joint Symposium on Innovation and Sustainability	18,742
French Embassy	French–Australian Joint Symposium on Innovation and Energy	13,387
French Embassy	French–Australian Joint Symposium on Innovation and Transport	13,387
French Embassy	Cotutelle Exchange Program	10,000
Geoscience Australia	Contribution to the IUGS subscription	5200

Grant figures comprise total grant excluding GST

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