



Australian Academy of Science

# Australian Academy of Science Annual Report 2014–15

1 APRIL 2014 – 31 MARCH 2015





# Australian Academy of Science Annual Report

2014–15

1 APRIL 2014 – 31 MARCH 2015





The Shine Dome and Ian Potter House, autumn 2015

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# President's foreword

As I come to the end of my first year as President I have the privilege of penning this foreword to the Annual Report of the Australian Academy of Science Council for the year ending 31 March 2015.

I would like to mention here just a small selection of the Academy's achievements, in this our 60th anniversary year, against the three objectives of the Strategic Plan for 2010–2015. For an impressive snapshot of major highlights turn to page 4 which graphically illustrates the extensive range of contributions that the Academy makes to Australian scientific life (and elsewhere). These are further elucidated in the report that follows and this year, in a new move, we are issuing the Annual Report to Fellows electronically in advance of the Annual General Meeting, to provide the opportunity to review these achievements before the meeting.

## **PROMOTING EXCELLENCE IN SCIENTIFIC RESEARCH NATIONALLY AND INTERNATIONALLY**

The Academy has been active in maintaining science-based relationships with other countries, while continuing to highlight the importance of having a national strategy to promote and support international research collaboration. In addition to organising bilateral meetings with key overseas counterparts for the Australian Government, we have successfully administered a number of exchanges, including longstanding programs with Japan and the US.

Australia continues to be ably represented by officials successfully nominated by the Academy for election to the executives of many international scientific unions. I particularly congratulate Professor David Black AO FAA for his re-election as Secretary-General of the International Council for Science, and wish Professor Bruce McKellar AC FAA well for his term as the first Australian President of the International Union of Pure and Applied Physics.

A particular highlight this year was the international day at the 2014 Lindau meeting of Nobel Laureates in Germany. Hosted by the Academy, with the support of the Australian Government and major research organisations, the day was a masterly exercise of cultural and scientific diplomacy, and an outstanding opportunity to showcase Australian scientific achievement on a global stage.

## **DEVELOPING AND SUSTAINING A NATIONAL SCIENTIFIC CULTURE**

Undoubtedly the award of the Prime Minister's Prize for Science to Professors Sam Berkovic AC FAA FRS and Ingrid Scheffer AO FAA recognises the pinnacle of achievement in Australia. Their research on epilepsy has had a profound impact on the diagnosis and treatment of this condition. Some 18 of our Fellows were also recognised through election to other scientific academies or by receipt of prestigious international awards.



PHOTO: MARK GRAHAM



We have received generous support from Fellows and others for our Enlightening Campaign. We especially thank Telstra for a significant contribution to support the redevelopment of the science website 'Nova', which is shortly to be relaunched. Our donors are now listed in the foyer of the Shine Dome; I encourage you to visit and browse this impressive roll-call of supporters.

Primary Connections: Linking science with literacy, which is reaching more Australian primary schools than ever before, has increased activities in most of its key areas of engagement. In parallel, the development program to enhance outreach to teachers in regional and rural areas, particularly those with Indigenous communities, is gathering momentum with new government support.

The registration rates for Science by Doing have increased significantly since its launch in 2013. These high quality, online learning resources for junior secondary science have already been enthusiastically accessed by more than one-quarter of all Australian high school teachers, and the program's award-winning professional learning modules are now also freely available. The team is on track to complete the development of all resources required for Years 7–10 with further government support guaranteed through to 2018.

Our enhanced public profile has been most ably managed by our Communications and Outreach team. We continue to enjoy a high level of engagement with the public through the news and social media, and the release of an updated version of *The science of climate change: Questions and answers* in February was well received.

In another highlight of the year, we were honoured that immediate past President Professor Suzanne Cory AC FAA FRS was invited to deliver the Radio National Boyer Lectures, 'The promise of science: a vision of hope', and also appeared alongside other Fellows on the first science-themed edition of ABC TV's Q&A program.

## **PROVIDING VALUED INDEPENDENT SCIENTIFIC ADVICE TO ASSIST POLICY DEVELOPMENT AND PROGRAM DELIVERY**

The Academy played an important role in galvanising the research sector to make the case for ongoing investment

in Australia's research infrastructure when it looked as though government support for Australia's major national research infrastructure would cease at the end of the 2014–15 financial year.

Thanks to invaluable input from Fellows and the National Committees for Science, the Academy continues to provide influential advice to governments, policy developers and decision makers. Over the last year, 19 submissions and responses were made to a wide range of consultations and inquiries, and the Academy's contributions made a positive impact in a range of areas.

Recognising the chronic gender equity problems in Australian science, the Academy convened the Science in Australia Gender Equity Forum to investigate practical ways in which the situation can be improved. Our capacity to make meaningful contributions to science policy has been greatly strengthened by the appointment of Director Science Policy and Projects, Dr Chris Hatherly, allowing the Academy to put in place a long-term advocacy plan aimed at enhancing planning and support for Australian science.

## **VALE**

It is my sad duty to report that six of our Fellows and one of our Corresponding Members died this year (see page 10). Their achievements enhanced the global store of scientific knowledge and understanding, and their participation in the life of the Academy will be greatly missed. I feel it is also appropriate to acknowledge the many contributions of the late Professor Anthony McMichael FTSE, most recently in his contribution to the Academy 2014 Theo Murphy High Flyers Think Tank, 'Climate change challenges to health: Risks and opportunities'.

In summary, this has been a successful year for the Academy that has benefited significantly from the contributions made by its Fellows, the National Committees for Science, a dedicated and hard-working Secretariat to whom we owe our gratitude, and many other supporters. I commend this Annual Report to you, and look forward to the Academy's continued successes in the year to come.

**Andrew Holmes AM PresAA FRS FTSE**



# Chief Executive's foreword

Fellows provided very positive feedback about the restructuring of the Academy's 2013–14 Annual Report to align with the objectives and strategies of the 2010–15 plan rather than by program areas within the Secretariat. The many achievements for the period 1 April 2014 to 31 March 2015 are documented here, following the same format.

The Council and the Secretariat also undertook substantial work on two major initiatives, that will be reported to the Academy's Annual General Meeting in May 2015 and included in a report for the period 1 April to 31 December 2015 that will enable a shift to calendar year reporting.

One is the preparation of the *next* five year Strategic Plan for 2015–20. Since a Council strategy workshop in October 2014, kindly facilitated by Mr Joe Flynn, Director of Joe Flynn & Associates, the Academy's vision and mission have been comprehensively reviewed. New themes and objectives have been identified and a prioritisation process agreed for the activities that will form the basis of the Academy's budget and Operational Plan for financial year 2015–16 and beyond.

In addition, as incoming President, Professor Andrew Holmes AM PresAA FRS FTSE, decided it was timely to initiate a parallel review of the Academy's governance processes. Although the Academy is not a corporate entity, as it was established by Royal Charter, the legal obligations and responsibilities placed on companies still apply and there have been many changes in the requirements since 1954.

Similarly, the expectations of transparency have risen considerably amongst donors and for organisations registered with the Australian Charities and Not-for-profits Commission. So, for the first time, we have incorporated the Academy's audited financial statements for the previous year into this document.

Another key area of accountability is the Australian Government grant-in-aid to the Learned Academies and the Australian Council of Learned Academies provided under the *Higher Education Support Act 2003—Higher Education Research Promotion* program. The administering agency, the Department of Education and Training (DET), advised that the bi-annual reporting process established following the 2012 review of the program created such a valuable forum for exchange in areas of common interest between the academies, DET and the Department of Industry and Science it has obviated the need for additional review.

Many of Australia's outstanding early- and mid-career researchers (EMCRs) have benefited greatly from support generously provided by The Royal Society's Theo Murphy (Australia) Fund for Think Tanks and Frontiers of Science meetings. We are delighted that the returns from the fund will enable both types of meeting to be held annually for the next three years.

The expertise and enthusiasm of the Fellows and the professionalism and creativity of the Secretariat have been fundamental to the year's achievements, and I take this opportunity to thank everyone for their deep commitment and many contributions.

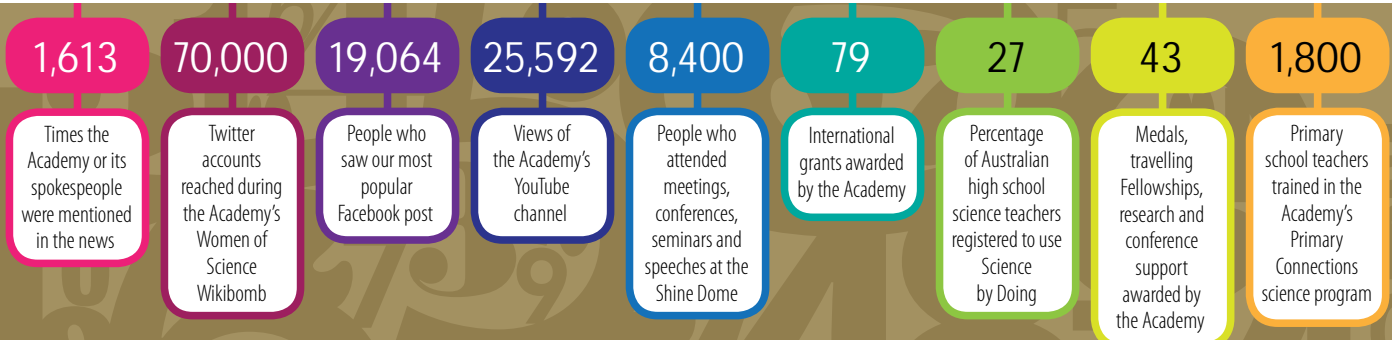
**Sue Meek AO FTSE**



# Academy highlights 2014–15



## Academy in numbers 2014–15



# Council and administration

The Australian Academy of Science's affairs are conducted by a Council of 17 Fellows, which met four times between 1 April 2014 and 31 March 2015. To ensure Academy business was managed effectively between Council meetings, the Executive Committee, under delegated authority, met nine times, and the Finance Committee met twice.

The following is a list of Council members current from 29 May 2014.

## EXECUTIVE COMMITTEE

### **Professor Andrew Holmes AM PresAA FRS FTSE—President**

Laureate Professor Emeritus of the School of Chemistry, the University of Melbourne

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

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

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

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

### **Professor Leslie Field AM FAA—Secretary for Science Policy**

Vice-President and Deputy Vice-Chancellor (Research) and Professor of Organic Chemistry, the University of New South Wales

### **Professor Cheryl Praeger AM FAA—Foreign Secretary**

Professor of Mathematics, Centre for the Mathematics of Symmetry of Computation, the University of Western Australia

### **Professor Pauline Ladiges AO FAA—Secretary for Education and Public Awareness**

Professorial Fellow, Botany, School of Biosciences, the University of Melbourne

### **Dr Oliver Mayo FAA FTSE—Treasurer**

Honorary Research Fellow, CSIRO Food and Nutrition, and Adjunct Professor of Biometry, the University of Adelaide

## OTHER MEMBERS OF COUNCIL

### Physical sciences

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

**The late Professor Michael Raupach FAA FTSE** (deceased 10 February 2015)—Director, Climate Change Institute, the Australian National University

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

**Professor Robert Vincent FAA**—Professor, Department of Physics, the University of Adelaide

**Professor Jim Williams AM FAA FTSE**—Professor, Research School of Physics and Engineering, the Australian National University

### Biological sciences

**Professor David de Kretser AC FAA FTSE**—Professor, Department of Anatomy and Developmental Biology, Faculty of Medicine, Nursing and Health Sciences, Monash University, Melbourne

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

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

**Professor Peter Koopman FAA**—Senior Principal Research Fellow and Professor of Developmental Biology, the University of Queensland

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

**Professor Susanne von Caemmerer FAA**—Professor of Molecular Plant Physiology, Research School of Biology, the Australian National University



## FINANCE COMMITTEE

The Academy's Finance Committee is established under Chapter III 13a of the Standing Orders, which states that 'Council shall appoint a Finance Committee, consisting of the Officers, and three other members, one of whom shall be a Fellow'. In July 2012 Council amended the Finance Committee Charter to require 'at least' three other members.

In addition to the Executive Committee members, the Finance Committee comprised Fellows' representative Professor Michael

Barber FAA FTSE and external members Mr Mark Waldron and Mr David Holmesby (Audit Committee Chair). The Finance Committee met twice during the year.

An abridged version of the Academy's audited financial statements for the year ended June 2014 is on page 81 of this report. The full financial report is at [www.science.org.au/publications/financial-report-2013-14](http://www.science.org.au/publications/financial-report-2013-14)



From left: Chief Executive Sue Meek with Executive Committee members Pauline Ladiges, Oliver Mayo, Leslie Field, Marilyn Renfree, Chennupati Jagadish, Andrew Holmes and Cheryl Praeger



## NEW FELLOWS

To enable a transition from the current reporting period (1 April to 31 March) to calendar years (1 January to 31 December), new Fellows elected in 2015 will be included in a report for the period 1 April to 31 December 2015. New Fellows will also be profiled in the Science at the Shine Dome 2015 program and on the Academy's website from the date of the media release announcing the new Fellows on 25 May.

## HONOURS AWARDED TO FELLOWS

Honours awarded to Fellows from 1 April 2014 to 31 March 2015

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### Election to international academies

#### *The Royal Society*

**Professor Peter Colman** **FAA FRS FTSE** elected as a Fellow in recognition of his scientific achievements in determining the three-dimensional structure of the influenza virus neuraminidase and, in one of the earliest cases of structure-based drug design, discovered zanamivir, the first-in-class neuraminidase inhibitor for influenza.

**Professor Chunli Bai** **FAA FRS** (Corresponding Member) elected as a Foreign Member in recognition of his scientific achievements in designing and developing China's first atomic force microscope, scanning tunnelling microscope (STM), low-temperature STM, ultrahigh vacuum-STM, and ballistic electron emission microscope.

#### *The National Academy of Engineering (USA)*

**Professor Graham Jameson** **AO FAA FTSE** elected as a Foreign Member for his excellence in research, in particular the development of innovative flotation technology for advanced mineral processing.

#### *American Academy of Arts and Sciences*

**Professor Michelle Simmons** **FAA** elected as a Foreign Member in recognition of her groundbreaking research into quantum electronics.

#### *The World Academy of Sciences (TWAS)*

**Professor Rana Munns** **FAA** elected as a Fellow for her insights into the principles of crop adaptation to saline soil, and their applications.

#### *The Institute of Electrical and Electronics Engineers (Global)*

**Professor Min Gu** **FAA FTSE** elected as a Fellow for his contributions to multiphoton microscopy, endoscopy, and optical data storage.

#### *American Association of Cancer Research*

**Professor Jerry Adams** **FAA FRS** elected as a Fellow in recognition of his outstanding contributions to understanding the genes that provoke cancer and control cell death.

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### International awards

#### *Asia–Oceania Neutron Scattering Association Prize 2015*

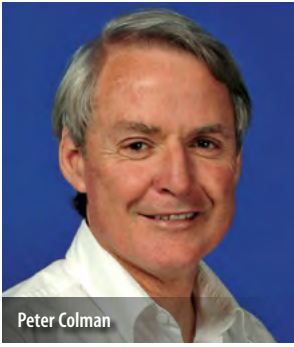
**Professor John White** **CMG FAA FRS** awarded by the Asia–Oceania Neutron Scattering Association for contributions to the field of neutron scattering in the Asia–Oceania region.

#### *Breakthrough Prize in Fundamental Physics 2014*

**Nobel Laureate Professor Brian Schmidt** **AC FAA FRS**, together with co-2011 Nobel Laureates in physics Professor Saul Perlmutter and Professor Adam Riess, in recognition of major insights into the deepest questions of the Universe.

#### *Breakthrough Prize in Mathematics 2014*

**Professor Terence Tao** **FAA FRS** (Corresponding Member) for his outstanding contributions to the field of mathematics, recognising his numerous breakthrough contributions to harmonic analysis, combinatorics, partial differential equations and analytic number theory.



Peter Colman



Chunli Bai



Graham Jameson



Michelle Simmons



Rana Munns

PHOTO: MICHAEL JOHN HOOD



Min Gu

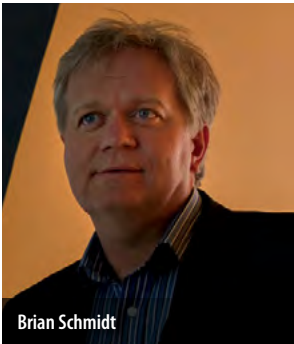


Jerry Adams

PHOTO: CAMERON WELLS



John White



Brian Schmidt

PHOTO: MICHAEL JOHN HOOD



Terence Tao

PHOTO: KYLE ALEXANDER



Michael Tobar

PHOTO: MARK GRAHAM



Marc Feldmann

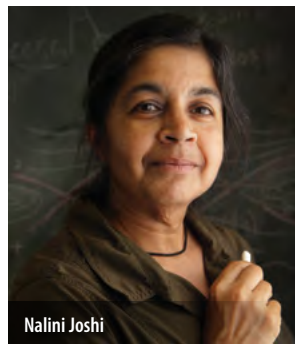


Ken Freeman



David Craik

PHOTO: MARK GRAHAM



Nalini Joshi

PHOTO: MICHAEL JOHN HOOD



Kurt Lambeck



Graeme Clark

PHOTO: BIONICS INSTITUTE

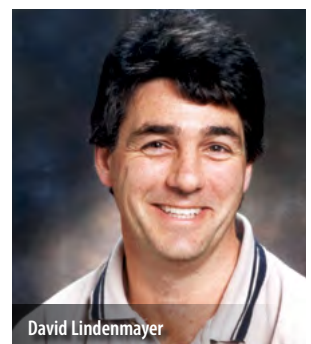


Alan Cowman

PHOTO: CZESIA MARKIEWICZ



Barry Jones



David Lindenmayer

### **WG Cady Award 2014**

**Professor Michael Tobar** FAA FTSE awarded by the Institute of Electrical and Electronics Engineers (IEEE) for the development of high-Q resonators and low-noise devices with application to frequency control, precision measurement and sensing.

### **Canada Gairdner International Award**

**Professor Sir Marc Feldmann** FAA FRS (Corresponding Member) for his discovery of anti-TNF therapy for the treatment of rheumatoid arthritis and other inflammatory diseases.

### **Gruber Prize for Cosmology 2014**

**Professor Ken Freeman** FAA FRS, with Dr Jaan Einasto, Dr R Brent Tully, and Dr Sidney van den Bergh, for their individual roles in the development of near field cosmology.

### **GSK Award for Research Excellence 2014**

**Professor David Craik** FAA for his discovery of the largest-known family of circular proteins, called cyclotides, which he is using to develop drug design approaches to treat pain and disease, and to develop insecticides to protect Australian crops.

### **Hardy Fellowship 2015**

**Professor Nalini Joshi** FAA awarded by the London Mathematical Society in its 150th anniversary year to a distinguished overseas mathematician.

### **The Order of Merit of the Italian Republic**

**Professor Kurt Lambeck** AO FAA FRS awarded by the President of the Italian Republic for excellent scientific merits and outstanding leadership and personal contributions to international relations.

### **Royal Medal 2014**

**Professor Terence Tao** FAA FRS (Corresponding Member) awarded by The Royal Society for his many deep and varied contributions to mathematics, including harmonic analysis, prime number theory, partial differential equations, combinatorics, computer science, statistics, representation theory, and much more.

### **Russ Prize 2015**

**Professor Graeme Clark** AC FAA FRS FTSE awarded by the US National Academy of Engineering and Ohio University for bioengineering.

### **Sornchai Looareesuwan Medal 2014**

**Professor Alan Cowman** FAA FRS awarded by the Faculty of Tropical Medicine, Mahidol University, for his distinguished achievements in malaria research.

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## **National awards and recognition**

### **Queen's Birthday Honours 2014**

#### **COMPANION OF THE ORDER OF AUSTRALIA (AC)**

**Professor Marc Feldmann** AC FAA FRS (Corresponding Member) for eminent service to medicine and to public health as an acclaimed researcher in the field of chronic immune disease, and through the development of innovative treatment therapies.

**The Honourable Dr Barry Jones** AC FAA FTSE for eminent service to the community as a leading intellectual in Australian public life, through contributions to scientific, heritage, musical, medical, political and public health organisations, and to the Australian Parliament.

#### **OFFICER OF THE ORDER OF AUSTRALIA (AO)**

**Professor David Lindenmayer** AO FAA for distinguished service to conservation and the environment in the field of landscape ecology, to tertiary education, and to professional organisations.

**Professor Barry Ninham** AO FAA for distinguished service to physical sciences through landmark theoretical and practical advances in colloids and surfaces, and as an academic, educator and mentor.

#### **The late Emeritus Professor Ian Ritchie** AO FAA FTSE

for distinguished service to science in the field of chemistry and hydrometallurgy, as an academic and educator, and to fostering technical innovation in business and industry.

**Professor Ingrid Scheffer** AO FAA for distinguished service to medicine in the field of paediatric neurology as a clinician, academic and mentor, and for research into the identification of epilepsy syndromes and genes.

### **Prime Minister's Prize for Science 2014**

**Professor Sam Berkovic** AC FAA FRS and **Professor Ingrid Scheffer** AO FAA for their groundbreaking work in epilepsy and its genetic links.

### **Australian Laureate Fellowships 2014 (ARC)**

**Professor Rose Amal** FAA FTSE will use her fellowship to develop technology to transform carbon dioxide into sustainable fuels.

**Professor Joss Bland-Hawthorn** FAA will use his fellowship to assemble a team to build Hector, which will look at a hundred galaxies simultaneously for the first time and will investigate how the gas that forms stars gets into dark matter halos to make galaxies, and why these galaxies spin.

### **George Szekeres Medal 2014**

**Professor Cheryl Praeger** AM FAA awarded by the Australian Mathematical Society for making an outstanding contribution to the mathematical sciences in the 15 years prior to the year of the award.

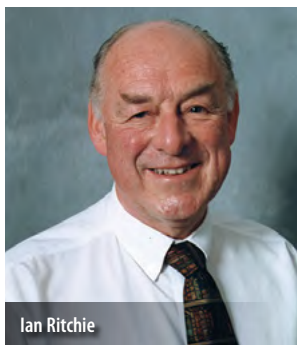
### **CSIRO Eureka Prize for Leadership in Science 2014**

**Professor Terry Speed** FAA FRS awarded by the Australian Museum.





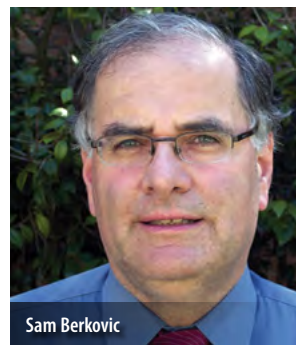
Barry Ninham



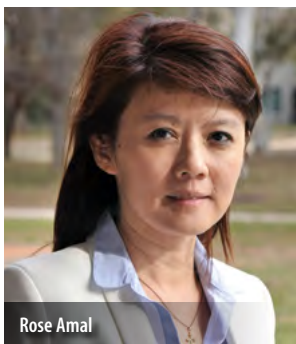
Ian Ritchie



Ingrid Scheffer



Sam Berkovic



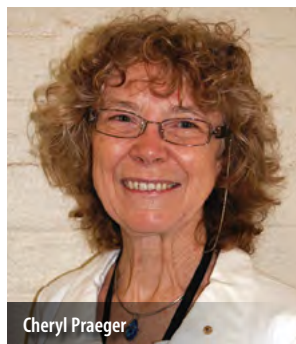
Rose Amal

PHOTO: MARK GRAHAM



Joss Bland-Hawthorn

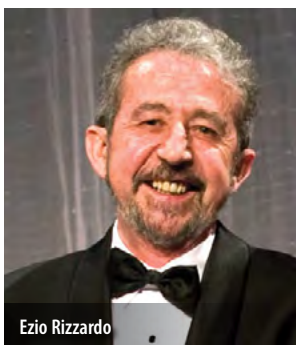
PHOTO: MARK GRAHAM



Cheryl Praeger

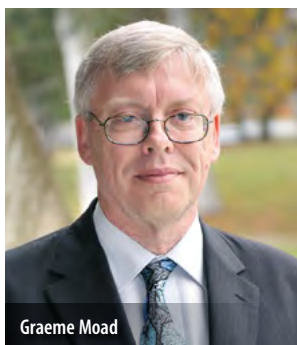


Terry Speed



Ezio Rizzardo

PHOTO: HELE DOWDY



Graeme Moad

PHOTO: MARK GRAHAM



Chennupati Jagadish

### Clunies Ross Awards 2014 (ATSE)

Professor Ezio Rizzardo FAA FRS FTSE and Dr Graeme Moad FAA, with Dr San Thang FTSE, for their outstanding achievements in developing better ways of making polymers and plastics.

Professor Michael Tobar FAA FTSE, with Professor Eugene Ivanov, for their outstanding achievements inventing the world's lowest-noise oscillators.

### Walter Boas Medal 2013

Professor Chennupati Jagadish FAA FTSE awarded by the Australian Institute of Physics for his outstanding contributions to the fields of compound semiconductor optoelectronics and nanotechnology.

### REGIONAL GROUPS

Professor Andrew Holmes AM PresAA FRS FTSE met with Regional Groups in most states to get to know more of the Fellowship and provide briefings on Academy activities. The annual reports of the Regional Groups are at Appendix 1.

### DEATHS OF FELLOWS

#### Fellows

Dr Robin Holliday FAA FRS  
9 April 2014

Professor George Dennis Dracoulis FAA  
19 June 2014

Professor Ian Mackay Ritchie AO FAA FTSE  
12 August 2014

Professor Donald (Don) Metcalf AC FAA FRS  
15 December 2014

Professor Michael (Mike) Robin Raupach FAA FTSE  
10 February 2015

Dr Lloyd Evans AO FAA FRS  
24 March 2015

#### Corresponding Members

Sir Henry Harris FAA FRS  
31 October 2014



# Supporting the Academy

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

This year, the support of generous donors through The Enlightening Campaign allowed us to grow our national programs to improve school education and raise public awareness to improve Australia's national scientific and

technological literacy, and to elevate scientific evidence in the formulation of public policy. The highlight of our fundraising campaign this year has been a major gift of \$1 million from Telstra, which has allowed us to begin reimagining and revitalising our popular science website, Nova.

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... continues on page 12

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Note: Every effort has been made to ensure the accuracy of this report. We sincerely apologise if any error or omission has occurred. If you notice an error or omission please notify the Academy on 02 6201 9400

This annual report describes the activities of the Academy from 1 April 2014 to 31 March 2015 to meet the objectives and strategies contained in the 2010–15 strategic plan. The sections of this report reflect the objectives below and report the outcomes delivered, as well as highlights, for each strategy.

## 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 AND STRATEGIES



### A. Promote excellence in scientific research nationally and internationally, by:

**Strategy 1.** Identifying priority areas of research, training and infrastructure support for discipline development, in conjunction with the National Committees for Science.

**Strategy 2.** Providing career development and network building opportunities for young researchers.

**Strategy 3.** Promoting support for the best Australian scientific research, including facilitating access to international scientific organisations and programs.

**Strategy 4.** Promoting Australian science capabilities internationally and contributing expertise and leadership in regional and global collaborative networks.

### B. Develop and sustain a national scientific culture, by:

**Strategy 5.** Ensuring that the Academy and the Fellowship are fully representative of the best scientists in Australia and promoting community recognition of the contributions of high quality science to health, well-being and national prosperity.

**Strategy 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.

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

### C. Provide valued independent scientific advice to assist policy development and program delivery, by:

**Strategy 8.** Developing networks and alliances with relevant stakeholders to provide conduits for input of insights and expertise on scientific matters.

**Strategy 9.** Providing authoritative advice to inform policy development on matters of research support, education and training, and science application.

**Strategy 10.** Monitoring scientific developments in Australia and overseas to anticipate and communicate potential impediments and opportunities.





## **Objective A**

Promote excellence in scientific research nationally and internationally



# 1

## Identifying priority areas of research, training and infrastructure support for discipline development, in conjunction with the National Committees for Science

Given the accomplishments of the Australian Academy of Science and its [Information and Communications Sciences] Committee, I know that, together, we will cultivate endless scientific excellence.

DR DAVID TIEN, CHAIRMAN, THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS INC, NSW SECTION

The Academy fosters the advancement of the natural sciences in Australia and, with its National Committees for Science, proactively provides expert advice to help develop scientific disciplines, particularly through effective targeting of funding and support.

### IMPLEMENTATION OF REVIEW OF NATIONAL COMMITTEES FOR SCIENCE—NATIONAL

In May 2013 Council accepted the Report on the Review of National Committees for Science, chaired by Professor Bruce McKellar AC FAA. To see an executive summary of the report go to [www.science.org.au/report-review-national-committees-science-executive-summary](http://www.science.org.au/report-review-national-committees-science-executive-summary).

The review implementation, led by the Secretaries for Physical and Biological Sciences and National Committee Chairs, has provided a more balanced representation of the physical and biological sciences and revitalised the Academy's connection with Australian science and scientists. Linkages have been built with professional scientific societies and other specialist bodies to provide a valuable national mechanism to promote the development of research disciplines and to develop common perspectives on priorities. Currently about one quarter of the committee memberships represent linkages with Australian professional science organisations (see Appendix 4). In addition, 10 National Committees have appointed 12 early- and mid-career researchers as interns as per the review's recommendations.

In implementing the recommendations of the review, terms of reference were established for all 22 National Committees,

and two co-funding arrangements to pay international union subscriptions were established in 2014, totalling seven contributing organisations overall (see Strategy 4).

### ACTIVITIES OF THE NATIONAL COMMITTEES FOR SCIENCE

National Committee (NC) memberships comprise approximately 215 eminent experts across Australia, including Fellows of the Academy and representatives of relevant Australian scientific societies and other national bodies. The committees held 35 face-to-face and virtual meetings, and several high-level meetings with, among others, the Chief Scientist, the Chief Defence Scientist (DSTO), the Chief Executive Officer of the Australian Research Council, and the Past President of the UK Institute for Physics (see box page 17). The committees:

- are producing national strategies for discipline-wide development through preparation of six decadal plans and implementation of six plans
- proactively provided expert advice to the Academy as input to nine submissions and reports on science policy issues (see Strategies 9 and 10)
- identified researchers to represent Australia in key meetings and research programs of the International Council for Science and 33 International Unions for which the Academy is the adhering body (see Strategy 4)
- organised four workshops and symposia (see Strategy 7)
- assisted with the selection of early- and mid-career researchers (EMCRs) for the Geoffrey Frew Fellowship, the Japan Society for the Promotion of Science's Hope Meeting, the Heidelberg Laureate Forum and the Lindau Nobel Laureates Meeting (see Strategy 2)
- contributed to the organisation of national events to promote two United Nations' International Years: Crystallography and Light (see box page 17).

### UNDERTAKING DISCIPLINE-WIDE REVIEWS AND DECADAL PLANS

Decadal (10-year) plans are influential documents for the development of disciplines, with the primary aim of gathering





information and reaching consensus about the discipline's current status, strengths and future priorities. Decadal plans are currently being implemented for astronomy, physics, geosciences, Earth system science and space science, and are proving instrumental in shaping their disciplines.

The ecosystem science long-term plan was launched in July (see box below), and work continued on producing decadal plans for astronomy, mathematical sciences, geographical sciences, chemistry, agricultural sciences, and Earth sciences.

Of these, the decadal plans for chemistry, agricultural sciences and Earth sciences are being undertaken with \$474 000 of competitive funding from the Australian Research Council's Learned Academies Special Projects scheme. In announcing the funding, the Education and Training Minister, the Hon Christopher Pyne MP, noted that all three areas are fundamental to the Australian economy—particularly relating to manufacturing, agricultural productivity and minerals exploration.

The other plans are being resourced through support raised from the respective communities, both financially (more than \$200 000) and in-kind. The preparation of decadal plans are characterised by extensive consultation with the scientific

community and with industry through consultative meetings, workshops and road shows (see box page 19). During the year about 54 decadal plan consultative meetings and workshops were held around Australia, attended by more than 1400 members of the scientific communities. An estimated quarter to half of the attendees were early- and mid-career researchers. In addition, about 800 responses were received to online surveys.

## ADVISING GOVERNMENT AND OTHER ORGANISATIONS

The National Committee for Cellular and Developmental Biology raised concerns about the regulation of autologous stem cell therapies with Government, and was involved in the preparation of the Academy's submission to the Therapeutic Goods Administration consultation on this issue (see Strategy 10).

At the invitation of the Australian Department of Education and Training, the National Committee for Data in Science provided input to a report on the status of national eResearch infrastructure in Australia, funded under the National Collaborative Research Infrastructure Strategy (NCRIS) program (see Strategy 9).

### LAUNCH OF ECOSYSTEM SCIENCE LONG-TERM PLAN

'Foundations for the future—A long-term plan for Australian ecosystem science' was launched in Canberra in July. Chief Scientist Professor Ian Chubb AC FTSE and Academy Vice-President Professor C Jagadish FAA FTSE were among the speakers. The plan was developed jointly by the Terrestrial

Ecosystem Research Network (TERN), the Ecological Society of Australia and the National Committee for Ecology, Evolution and Conservation, and was informed by extensive consultation with the ecosystem science community. See [www.ecosystemscienceplan.org.au](http://www.ecosystemscienceplan.org.au)



At the launch of the ecosystem science long-term plan were: (back row) TERN Associate Science Director Professor Stuart Phinn; Chief Scientist Professor Ian Chubb; Professor Mark Westoby; TERN Associate Science Director Professor Andrew Lowe. (Front row) Associate Professor Glenda Wardle; Professor Jagadish; TERN Communication and Engagement Manager Dr Bek Christensen; and Professor Kris French





At the BioBreakfast 'Future of Chemistry, Future of Manufacturing' were (from left to right): Professor Paul Mulvaney, Chair, National Committee for Chemistry; Dr Ian Dagley, Chief Executive Officer, Cooperative Research Centre for Polymers; Chris Such, New Technology Manager, DuluxGroup; Phillip Leslie, Manager, GlaxoSmithKline; and Dr Krystal Evans, Chief Executive Officer, BioMelbourne Network

## ENGAGING WITH INDUSTRY

As part of the consultation to develop the Decadal Plan for Chemistry, which will provide a roadmap for the role of chemistry in advancing Australian industry and society, the National Committee for Chemistry and the BioMelbourne Network organised a breakfast in November to engage with industry. It included an expert panel with representatives from industry and cooperative research centres to share their views on the existing capabilities, current challenges and opportunities to build the global competitiveness of chemistry in Australia for the future. The meeting was an important step to bring industry and academia closer together to discuss the needs for chemistry.

## 2

# Providing career development and network building opportunities for young researchers

The Academy offers a range of opportunities for early- and mid-career researchers (EMCRs) to develop skills and national and international networks to further their careers.

Through Theo Murphy High Flyers Think Tanks (see Strategy 7), EMCRs learn about the application of science for policy. Additionally, the Academy supports the EMCR Forum, providing a vital connection between current and potential Australian science leaders and identifying and addressing critical issues facing younger researchers.

### INTERNATIONAL NETWORKING

The National Committees for Science assist the Academy in assessing applications from EMCRs to attend high-profile international meetings, including the Nobel Laureates Meeting in Lindau, the Heidelberg Laureate Forum and the Japan Society for the Promotion of Science HOPE Meeting.

### AUSTRALIA ON SHOW AS NOBEL LAUREATES AND YOUNG RESEARCHERS MEET

Lindau meetings are globally recognised for promoting scientific and cultural exchange and for providing inspirational role models to younger researchers. The 64th meeting of Nobel Laureates, with a focus on physiology and medicine, brought together more than 600 undergraduate and postgraduate students in late June and early July. Thirty-seven Laureates attended, including three representing Australia: Professor Elizabeth Blackburn AC FAA FRS, Professor Barry Marshall AC FAA FRS and Professor Brian Schmidt AC FAA FRS. The Australian students were selected by an Academy expert group, with the support of the National Committees for Biomedical Sciences, Cellular and Developmental Biology and Medicine and Public Health, and the Group of Eight. Their participation was generously supported by the Science and Industry Endowment Fund—Australian Academy of Science Fellowships to the Lindau Nobel Laureate Meetings, and by the Group of Eight. Immediate past President Professor Suzanne Cory AC FAA FRS and Professor Jerry Adams FAA FRS led a delegation of 15 outstanding young Australian scientists (see box page 21). Professor Marilyn Renfree AO FAA was an accompanying senior member.

After attending the Lindau meeting I feel really inspired about being a scientist. The economic crisis has meant that it is a tough time to be in science and quite often it is difficult to lift your head and see the forest for the trees. The Lindau experience allowed me to lift my head again and see what is truly important and why I started science in the first place. I feel confident enough now to start making changes so that I can feel part of the wonderful world of scientific exploration again and feel proud of my work. The Lindau experience has changed how I feel about myself for the better by encouraging me, supporting me and rewarding me. I never expected this and I am so thankful to everyone who has given me this opportunity.

ROSS HAMILTON, CSIRO, 2014 LINDAU DELEGATE

Australian science, innovation, technology, education, food and wine were prominently on show during the 2014 Lindau Nobel Laureate Meeting as, for the first time, Australia hosted the event's International Day. The meeting generated national media interest in *The Australian*, the *Sydney Morning Herald*, the *Border Mail* and a number of other online outlets.

The International Day began with a science breakfast that featured a panel discussion on women in science. The panellists included Professor Blackburn and Professor Schmidt, Professor Suzanne Cory and the inaugural winner of the Academy's Nancy Millis Medal for Women in Science, Professor Emma Johnston. Each shared their own experiences and views on the subject. The panel was moderated by the Ambassador for Science and Mathematics at the University of Sydney, Adam Spencer.

## LINDAU 2014: 'THE WONDERFUL WORLD OF SCIENTIFIC EXPLORATION'

The 2014 Australian delegates to the Meeting of Nobel Laureates in Lindau were:

- Michael Bergin—the University of Queensland
- Nady Brady—the University of New South Wales
- Melissa Cantley—the University of Adelaide
- Ross Hamilton—CSIRO
- Rae-Anne Hardie—Garvan Institute of Medical Research
- Sarah Lockie—Monash University
- Yi Lu—QIMR Berghofer Medical Research Institute
- Maria Markoulli—the University of New South Wales
- Hannah Moore—the University of Western Australia
- Kate Murphy—the University of Melbourne
- Rebecca Segrave—Monash University
- Kirsty Short—the University of Queensland
- Angela Spence—the University of Western Australia
- Sónia Troeira Henriques—the University of Queensland
- Catriona Wimberley—Australian Nuclear Science and Technology Organisation.



The Australian delegation of young scientists with Trade and Investment Minister Andrew Robb (centre); Australian Ambassador to Germany Mr David Ritchie (left of centre); Academy Secretary Biological Sciences Marilyn Renfree (left of Mr Ritchie); Emma Johnston (right of centre); and delegation leaders Suzanne Cory and Jerry Adams (far right).

The Hon Andrew Robb MP, Minister for Trade and Investment, welcomed everyone at the evening International Get Together. He was followed by a uniquely Australian musical performance by recorder virtuoso Genevieve Lacey and harpist Marshall McGuire. Professor Johnston then explained to the audience why she has the best job in the world—as a marine biologist in Australia.

Professor Schmidt, who is also a vigneron, made sure that top quality Australian wines—all made by Australian scientists—were on offer throughout the night.

Another of Australia's Nobel Laureates, Professor Peter Doherty, was not able to attend but appeared in a short video during the evening program. A copy of Professor Doherty's book, 'The Beginner's Guide to Winning the Nobel Prize', was given to each of the 1000 guests.

It was a pleasure to be surrounded by Australia's best and brightest across various fields of scientific endeavour. . . I was impressed by the thoughtfulness, passion and intelligence of all Australian participants in Lindau.

**THE HON ANDREW ROBB AO MP,  
MINISTER FOR TRADE AND INVESTMENT**

The International Day was just the first day of a week-long program that makes up the Lindau Nobel Laureate Meetings. These meetings give young researchers the opportunity to interact with their scientific heroes, exchange ideas, gain



exposure to areas of their chosen disciplines and establish new contacts and networks with their peers. The International Day and the attendance of the young Australian scientists were made possible with the support and sponsorship of:

- Department of Industry and Science
- Group of Eight Australia
- Austrade
- Australian Nuclear Science and Technology Organisation
- Department of Education and Training
- CSIRO
- Science and Industry Endowment Fund
- Defence Science and Technology Organisation.

### AUSTRALIAN STUDENT GUEST BLOGGER AT HEIDELBERG FORUM

Mr Alex Amenta, a PhD candidate from the Australian National University, attended the 2014 Heidelberg Laureate Forum in September. He was nominated by the National Committee for Mathematical Sciences. Modelled on Lindau, the forum allows young researchers in mathematical and computer sciences to meet and be inspired by winners of the Abel Prize and Fields Medal (mathematics) and the Turing Award and Nevanlinna Prize (computer science).

The forum is . . . a transformative experience which changed many of my perspectives on fundamental research. The trajectory of my future work, and to some extent my personal life, will be greatly influenced by my participation in this event.

ALEX AMENTA, 2014 ACADEMY NOMINEE AND HEIDELBERG FORUM GUEST BLOGGER (<http://www.scilogs.com/hlf/good-at-maths-to-have-fun/>)

### YOUNG SCIENTISTS ATTEND 2015 HOPE MEETING IN TOKYO

The 7th HOPE meeting in physics, chemistry, physiology/medicine and related fields, organised by the Japan Society for the Promotion of Science (JSPS), was held during March in Tokyo. Six Australian PhD students and postdoctoral researchers were identified by relevant National Committees for Science and nominated by the Academy to attend the meeting. The Department of Education and Training provided support to the Academy to enable Australian participation at this event.

HOPE meetings enable graduate students selected from the Asia-Pacific and Africa regions to engage with Nobel Laureates and other distinguished scientists. It is hoped that the experience

I found this meeting to be stimulating and exciting, and have now made new collaborations with two Japanese cardiology researchers. . . We hope to share ideas, experience and biological samples in the near future.

DR BIANCA BERNARDO, 2015 HOPE MEETING PARTICIPANT

the students gain at the meeting will inspire and motivate them to become excellent scientists able to lead the future of science and technology in the region.

Australian Dr Bianca Bernardo from the Baker IDI Heart and Diabetes Institute won a poster presentation award and the 'Best of the Best' award which was presented to her by the Chairperson of the session, Professor Makoto Kobayashi. This is the second consecutive year an Australian participant has received this award for a poster presentation.

### EMCRs ATTEND SCIENCE AT THE SHINE DOME

The 2014 EMCR program for the Academy's annual celebration, Science at the Shine Dome, was fully subscribed. Seventy-six EMCRs from around Australia participated. Eighteen were sponsored by their institutions or partnering organisations, 44 were self-funded, and 14 were supported by the Academy as part of their preparation for the 64th Nobel Laureate Meeting in Germany in June (see box page 21).

The EMCRs had the opportunity to attend one of the four career development workshops (see Table 1).

The EMCRs found the workshops and the broader program to be of great benefit. They particularly valued the opportunity to see the broad range of excellent research underway in Australia, found the event to be very productive in terms of networking,

Table 1: EMCR workshops at Science at the Shine Dome

Title	Presenters
Management and leadership in research careers	<b>Associate Professor Kieran Harvey</b> (2014 Gottschalk Medal) and <b>Dr Krystal Evans</b> (Chair of EMCR Forum)
Practical grants writing workshop: Guide to successful funding applications	<b>Professors Ryan Lister</b> (2014 Ruth Stephens Gani Medal) and <b>Aleksandra Filipovska</b> (2013 Ruth Stephens Gani Medal)
Facilitating multidisciplinary scientific collaborations	<b>Professors David Warton</b> (2014 Christopher Heyde Medal) and <b>Andreas Fouras</b> (EMCR Forum committee)
Communicating science: Media and social media	<b>Dr Darren Saunders</b> (EMCR Forum committee) and <b>Professor Emma Johnston</b> (inaugural Nancy Millis Medal)

and appreciated the generosity of Fellows sharing their time throughout the event.

## EMCR FORUM

Since its establishment in 2011, the Academy's Early- and Mid-Career Researcher (EMCR) Forum has advocated effectively on issues of importance to young Australian scientists. Membership of the EMCR Forum is open to researchers up to 15 years post-PhD or other research higher degree, with allowance made for career interruptions (see [www.science.org.au/emcr-forum](http://www.science.org.au/emcr-forum)).

This year's submissions by the EMCR Forum are listed in Table 2 and, as part of ongoing engagement with the Australian Research Council (ARC), a Forum Executive Committee member attended the 2014 ARC selection meetings as an observer.

The Forum Executive Committee benefited greatly from the leadership of Chair, Dr Krystal Evans, and Deputy Chair, Dr Sharath Sriram. The latter took over as Acting Chair during the year and was subsequently appointed to the role by the Academy in December following the annual elections. The continuing level of enthusiasm for the Forum's activities was demonstrated by the submission of 84 applications for three vacant positions on the committee. More information about the committee is at [www.science.org.au/about-forum](http://www.science.org.au/about-forum)

A series of engagement events with guest speakers was held in Melbourne, Adelaide, Sydney and Perth (see Table 3) to raise awareness of the Forum, its activities and its achievements. At the events the Forum launched its new logo and the re-branded EMCR newsletter 'emcrpathways' (see [www.science.org.au/emcr-forum](http://www.science.org.au/emcr-forum)). The results of the nation-wide 2013 Australian Postdoctoral Reference Survey to gather data on best practices and the current environment for postdoctoral researchers in Australia were also presented (see box right).

The number of people on the Academy's EMCR database was 3201 at 31 March, an eight-fold increase in numbers since its establishment in 2010. The database enables the distribution of information on career, training and funding opportunities, the promotion of events and initiatives relevant to EMCRs, and the distribution of the quarterly EMCR newsletter (see [www.science.org.au/emcr-pathways](http://www.science.org.au/emcr-pathways)).

**Table 2: EMCR Forum submissions and statements**

Date	Title
June	<b>NHMRC's gender equity initiatives in Australian science</b>
July	<b>Australian Research Council proposed changes to funding rules</b>
August	<b>Senate inquiry into Australia's Innovation System</b>
December	<b>Boosting the commercial returns for research discussion paper</b>

Note: see [www.science.org.au/submissions-and-statements](http://www.science.org.au/submissions-and-statements)

**Table 3: EMCR Forum engagement events**

Date	Location	Guest speaker
30 Oct	Melbourne	Ms Leonie Walsh Lead Scientist of Victoria
30 Oct	Adelaide	Dr Rachel Popelka-Filcoff Executive committee member
5 Nov	Perth	Professor Cheryl Praeger AM FAA Foreign Secretary Australian Academy of Science
26 Feb	Sydney	Professor Mary O'Kane Chief Scientist of NSW

## 2013 AUSTRALIAN POSTDOCTORAL REFERENCE SURVEY SUMMARY

Within the research community, post-PhD career plans can include positions in academia, industry, and government agencies. It's becoming more common for graduates—particularly women—to move into careers outside research, such as patent attorneys.

The survey showed that postdoctoral researchers (PDRs) are passionate about their work and most want to stay in research for the remainder of their careers. They most needed help to develop a PDR career plan, increase professional development, and enhance their capacity for science communication and outreach (see [www.science.org.au/sites/default/files/user-content/postdoctrainingbestpractice.pdf](http://www.science.org.au/sites/default/files/user-content/postdoctrainingbestpractice.pdf)).

# 3

## Promoting support for the best Australian scientific research, including facilitating access to international scientific organisations and programs

Recognising the global nature of scientific endeavour, and the importance of profiling Australian research and researchers internationally, the Academy works with other science organisations and the Australian government to coordinate bilateral and multilateral meetings, events and exchange programs with the goal of creating collaborative research opportunities, facilitating access to research facilities and promoting network development.

### BILATERAL INTERNATIONAL MEETINGS

The Academy assisted the Australian Government Department of Industry and Science with the organisation of several Joint Science and Technology Commission (JSTC) meetings (see Table 4).

The JSTC meetings provide opportunities for government-to-government discussions on major policies and programs in science and research between Australian officials and their overseas counterparts.

**Table 4: Joint Science and Technology Commission meetings arranged and supported by the Academy on behalf of the Department of Industry and Science**

Name of meeting	Date	Location
9th Australia–China Joint Science and Technology Commission meeting	28 August 2014	Melbourne
Australia–Switzerland Joint Science, Research and Innovation Committee meeting	27 November 2014	Canberra
Australia – European Union (EU) Joint Science and Technology Cooperation Committee meeting	2 December 2014	Canberra
Australia–Germany Joint Science and Technology Meeting	10 December 2014	Canberra
Australia–India Joint Science and Technology Committee (and Joint Biotechnology Committee Meeting)	12 February 2015	Sydney

The Academy was represented at these important meetings and contributed to the discussions on Australia's scientific strengths and potential areas of mutual scientific interest.

### INTERNATIONAL EXCHANGES BROADEN HORIZONS

Grants were administered by the Academy to enable 21 senior Australian researchers and 60 early- and mid-career researchers to visit and undertake research in France, the USA, Japan and the European Union. Additionally, 15 Taiwanese researchers and 25 US graduate students were supported to conduct research in Australia. The selection was made by panels of Fellows and representatives from other organisations with relevant expertise (see Table 5 page 26).

The East Asia and Pacific Summer Institutes (EAPSI) program aims to introduce outstanding US graduate students to Australian science and engineering in the context of a research laboratory, and to initiate personal relationships that will enable future collaborations with Australian counterparts.

His Excellency Mr John Berry, US Ambassador to Australia, met with the 2014 EAPSI participants over breakfast on the first day of their orientation program at the Academy and spoke to each participant about their EAPSI project and field of research.

The organisation of the Australia EAPSI program was excellent. I am very grateful for the opportunity to work on this research project, and am excited to explore future collaborations. I have encouraged fellow graduate students at my home institution to apply for next year's program, and I consider the EAPSI experience a valuable part of my PhD career.

EAPSI 2014 PARTICIPANT



For the first time, the program overlapped with meetings of the Academy's Executive Committee and Council. EAPSI participants heard lectures from Professor Marilyn Renfree AO FAA and Dr TJ Higgins FAA FTSE, before networking with more Academy Fellows at dinner.

The reports from the program participants (see [www.science.org.au/east-asia-and-pacific-summer-institutes-program-research-reports](http://www.science.org.au/east-asia-and-pacific-summer-institutes-program-research-reports)) highlight the substantial benefits of international exchanges for both participants and host institutions (see also box below).



Erica Marti

### **EAPSI RESEARCH: OZONE AS A TREATMENT TECHNOLOGY IN WATER REUSE SYSTEMS**

Erica Marti, from the University of Nevada, conducted research at Curtin University to identify the feasibility and cost effectiveness of ozone as a treatment technology in water reuse systems. Erica's advisors at Curtin University, Dr Kathryn Linge and Dr Cynthia Joll, reported that Erica generated a dataset that will be valuable for her PhD research as well as their own understanding of N-nitrosodimethylamine (NDMA) formation in wastewater. Her results complement research they have previously carried out in this area. They hope that this visit will be the first step in ongoing collaboration with both Erica and the research team in Nevada.

'I feel that I greatly benefited from the international research experience. It has increased my network of researchers and the research conversations have generated new ideas for more projects,' said Erica.



The 2014 EAPSI participants in Canberra

**Table 5: International exchanges facilitated by the Academy**

<b>Date awarded</b>	<b>Program</b>	<b>Funding organisation(s)</b>	<b>Recipients</b>
May 14	France–Australia Science Innovation Collaboration program Early Career Fellowships 2014	French Embassy	10 EMCRs
May 14	Rod Rickards Fellowships 2014	Rod Rickards Fellowship Fund	3 EMCRs
May 14	Taiwan–Australia Exchange Program 2014	Ministry of Science and Technology (MOST) Taiwan	15 Taiwanese researchers
Jun 14	East Asia and Pacific Summer Institutes program	US National Science Foundation and Australian Department of Education and Training	25 US graduate students
Jul 14	Australia – United States research collaboration project 2014	Department of Education and Training and US Air Force Office of Scientific Research	2 senior scientists and 5 EMCRs
Sept 14	Japan Society for the Promotion of Science (JSPS) Invitation and Postdoctoral Fellowships 2014–15	JSPS and the Department of Industry and Science	9 senior scientists and 11 EMCRs
Nov 14	Visit to the US National Institutes of Health	Adam J Berry Memorial Fund and the Foundation for the National Institutes of Health	1 EMCR
Nov 14	7th HOPE Meeting with Nobel Laureates	JSPS and the Department of Education and Training	6 EMCRs
Dec 14	Research Visits to Japan 2015–16	Department of Education and Training and JSPS	3 senior scientists and 6 EMCRs
Feb 15	Australia – European Union Collaboration Program 2014	Department of Industry and Science	2 senior scientists
Mar 15	JSPS Postdoctoral and Invitation Fellowships 2015–16	JSPS and the Department of Education and Training	5 senior scientists and 18 EMCRs

# Promoting Australian science internationally

The Academy interacts widely with scientists and officials from research organisations and governments in many countries to increase awareness of Australia's capabilities in science and technology, and to create opportunities to influence and contribute to international research agendas and policy development activities.

## INTERNATIONAL SCIENCE ORGANISATION PARTICIPATION

The International Council for Science (ICSU) is a non-government organisation with 121 national members representing 141 countries. It comprises 31 international scientific unions (ISUs) and 23 international scientific associate organisations which bring together scientists within and across disciplines to coordinate research and address issues of global significance. The Academy is Australia's adhering body for ICSU and 31 ICSU organisations (20 ISUs and 11 interdisciplinary bodies). More information on ICSU is at [www.icsu.org](http://www.icsu.org).

With the support of the National Committees for Science, the Academy meets Australia's responsibilities and obligations arising from ICSU membership. These include the nomination of Australian candidates for executive committee positions and the appointment of voting delegates to general assemblies. Five nominations were successful (see Appendix 2) and 30 voting delegates were appointed to 14 meetings (see Appendix 3 and box right).

In 2014–15, three secretaries-general (including the Secretary-General of ICSU), three incoming, current or outgoing presidents, one treasurer and six vice-presidents were among 23 Australian executive committee office holders helping to enhance Australia's global science credibility and influence (see Appendix 2 and box page 28). Each ICSU organisation has substructures of committees, commissions and other working groups, with active participation of about 370 Australian scientists in international strategic planning, priority-setting and research collaborations.

## IMPLEMENTATION OF REVIEW OF NATIONAL COMMITTEES FOR SCIENCE—INTERNATIONAL

The McKellar Review of the National Committees for Science (see page 16) included detailed consideration of the benefits and relevance of international memberships to Australian science. The National Committees have sought to partner with Australian professional science organisations to increase their involvement. Currently four such organisations have decided to contribute to their corresponding scientific union (see Appendix 9).

The Advisory Committee on International Matters was established on the review's recommendation. It provided valuable advice to the Academy Council on matters related to ICSU, the IAP—the global network of science academies, the InterAcademy Council (IAC), the InterAcademy Medical Panel (IAMP), and the Association of Academies and Societies of Sciences in Asia (AASSA). The Committee also facilitated interactions with other international scientific organisations.

### SCIDATACON 2014 AND CODATA GENERAL ASSEMBLY

SciDataCon 2014 and the CODATA General Assembly were held in November in New Delhi. The theme of SciDataCon was 'Data Sharing and Integration for Global Sustainability'.

Deputy Chair of the National Committee for Data in Science, Dr Lesley Wyborn, presented work done by the committee highlighting the potential role for CODATA to be the organisation that, through the coordination of the Data and Information committees of the various International Science Unions, created a register of data standards, vocabularies and ontologies that are essential to the integration and harmonisation of science data within and between the various science disciplines. This proposal was well received by the Executive Committee and the potential value to the ICSU Future Earth initiative was noted.

## ACADEMY FELLOW FIRST AUSTRALIAN HEAD OF INTERNATIONAL PHYSICS UNION

Professor Bruce McKellar AC FAA took office as Australia's first President of the International Union of Pure and Applied Physics (IUPAP) at the 28th General Assembly in Singapore in November 2014.

Academy Fellows Professor Brian Schmidt AC FAA and Professor Tanya Monro FAA FTSE presented public lectures at the General Assembly, hosted by the Nanyang Technological University.

IUPAP was formed in 1922 to represent physics internationally. Australia became a member in 1925. The mission of the Union is to assist in the worldwide development of physics, to foster international cooperation in physics, and to help in the application of physics toward solving problems of concern to humanity.

### 31st ICSU General Assembly

The 31st General Assembly of ICSU took place in Auckland, New Zealand on 31 August – 3 September 2014. Australia was well represented at the meeting with at least 12 Australians attending in various capacities. The Foreign Secretary, Professor Cheryl Praeger FAA, was Australia's voting delegate.

Professor David Black AO FAA was re-elected as Secretary General of ICSU for a second term for 2014–2017, and Professor John Buckeridge was elected as an Ordinary Member of the Executive Board, representing biological sciences.

The Chair of the Science Committee of ICSU's Future Earth initiative (see box at right), Australian Dr Mark Stafford Smith, briefed the meeting on progress with the initial design and future plans.

Another major focus of the meeting was a presentation on the final report of an external review of ICSU by an eminent international panel chaired by Sir Peter Knight FRS. This was provided by Academy President Professor Andrew Holmes AM PresAA FRS FTSE, who was an invited member of the panel.

The review recommended improving ICSU's visibility, relations with other global scientific institutions, funding and governance structure, and increasing support of the regional offices. The full review report is at [www.icsu.org/publications/reports-and-reviews/external-review-of-icsu](http://www.icsu.org/publications/reports-and-reviews/external-review-of-icsu)

### International meeting on Science Advice for Governments

Immediately prior to ICSU's 31st General Assembly, a high-level meeting convened by New Zealand's Chief Scientist Sir Peter Gluckman KNZM FRS was held on the topic of 'Science Advice for Governments'. More than 200 senior scientists, officials, science advisors, experts and scholars from over 40 countries considered opportunities, challenges and best practices on national science policy processes. Australian participants included Chief Scientist Professor Ian Chubb AC FTSE; Chief Scientist for Queensland, Dr Geoff Garrett FTSE; Chief Scientist and Engineer for New South Wales, Professor Mary O'Kane FTSE; Victorian Lead Scientist,

### FUTURE EARTH

Future Earth is a 10-year international research program launched in 2012 at the UN Conference on Sustainable Development (Rio+20) that will provide critical knowledge and support required for societies to face the challenges posed by global environmental changes and to identify opportunities for a transition to global sustainability. Future Earth will involve researchers from all disciplines, research funders, governments, business and industry, interest groups, civil society and media. [www.futureearth.org/](http://www.futureearth.org/)

With the appointment of Dr Mark Stafford-Smith of CSIRO as the inaugural Chair of the Future Earth Science Committee, and Australian National University researcher Professor Xuemei Bai as a member of this committee, Australia is already making important scientific contributions to the work of Future Earth. The Australian Council of Learned Academies allocated funding to the Academy to produce a strategic plan for Australia's engagement in Future Earth (see Strategy 10).

Professor Leonie Walsh and the Chief Executive Officer of Science & Technology Australia, Catriona Jackson. Professor Michael Barber FAA FTSE, who currently chairs the Program Steering Committee of 'Securing Australia's Future' (see Strategy 10), and the Academy's Chief Executive, Dr Sue Meek AO FTSE, represented the Academy.

The meeting agreed to explore the establishment of a formal network supported by an expanded organising committee together with ICSU and the OECD Global Science Forum. A report on the meeting is at [www.icsu.org/publications/reports-and-reviews/synthesis-report-of-the-science-advice-to-governments-conference-2014/synthesis-report-pdf](http://www.icsu.org/publications/reports-and-reviews/synthesis-report-of-the-science-advice-to-governments-conference-2014/synthesis-report-pdf)

### Successful bids for international meetings

The National Committees for Science advise the Academy regarding invitations to host ICSU General Assemblies and participation in related events in Australia, and are actively



engaged when bids are successful. During the year, two successful bids were made:

- The 2017 International Astronautical Congress will be held in Adelaide. This bid was strongly supported by the National Committee for Space and Radio Science and led by committee member Professor Brett Biddington, Chair of the local organising committee. See <http://adelaideiacbid.com/>
- The 2018 International Conference of Young Researchers on Advanced Materials, organised biennially by the International Union of Materials Research Societies, will also be held in Adelaide. This bid was strongly supported by the National Committee for Materials Science. Approximately 1000 young researchers from around the world are expected to attend.

## LIAISON WITH SISTER ACADEMIES AND EQUIVALENT ORGANISATIONS

The Academy hosted international delegations from Germany, Indonesia, Taiwan and Thailand, all with the primary purpose

of discussing potential bilateral research collaborations with Australia (see Table 6).

The Indonesian delegation in November comprised a group of young Indonesian scientists, accompanied by the President and other senior members of the Indonesian Academy of Sciences who were charged with producing an Indonesian science agenda (see box below).

## PARTICIPATION IN INTERNATIONAL SCIENCE ACADEMY ACTIVITIES

### InterAcademy Partnership

Then Foreign Secretary of the Academy, Professor Andrew Holmes, attended the joint Executive Committee meeting of the IAP: the global network of science academies (IAP) and the InterAcademy Council (IAC) hosted by the Accademia Nazionale dei Lincei, in Rome in May. The meeting discussed science strategic planning, poverty eradication, science education,

## INDONESIAN SCIENTISTS RESEARCH AUSTRALIAN SCIENCE AND INNOVATION

In November, a group of young Indonesian scientists, accompanied by the President and other senior members of the Indonesian Academy of Sciences, visited Australia to meet with representatives from science research and funding agencies to obtain an appreciation of Australia's science and innovation system.

The delegation heard from representatives of the Australian Research Council, the National Health and Medical Research Council, the Cooperative Research Centres Association, the Office of the Chief Scientist, the Academies of the Social Sciences and the Humanities, and the Department of Education and Training (DET). Dr Oliver Jones, member

of the Academy's EMCR Forum Executive Committee, provided an overview of the activities of the Forum. They then undertook a program of site visits in Sydney and Melbourne put together by the Academy, the Academy of Technological Sciences and Engineering and CSIRO.

Since the meeting, the Academy has been in discussions with DET to identify and support 10 young Australian scientists to participate in the 2015 Indonesian–American Kavli Frontiers of Science meeting (for more information see: [www.kavlifoundation.org/kavli-frontiers-science](http://www.kavlifoundation.org/kavli-frontiers-science)). This will be the first time that Australian researchers take part.



The Indonesian delegation, with Dr Oliver Jones of RMIT (centre back), member of the Academy's Early- to Mid-career Researcher (EMCR) Forum, and Professor Sangkot Marzuki AM (front, fourth from left), President of the Indonesian Academy of Sciences



**Table 6: Visits from international delegations to the Academy**

Date	Country	Organisation	Delegation leader
1 October 2014	Taiwan	Taiwan Ministry of Science and Technology	<b>Dr San-Cheng Chang,</b> Taiwanese Minister of Science and Technology
23 October 2014	Germany	Helmholtz Association of Germany	<b>Professor Jürgen Mlynek,</b> President of the Helmholtz Association of Germany
24 October 2014	Thailand	Royal Institute of Thailand	<b>Professor Santhad Rojanasoonthon,</b> President of The Royal Institute of Thailand
24 November 2014	Indonesia	Indonesian Academy of Sciences	<b>Professor Sangkot Marzuki,</b> President of the Indonesian Academy of Sciences



Young researchers from Australia, Papua New Guinea and the Pacific Islands at the Commonwealth Science Conference in Bangalore, India

initiatives on ‘smart villages’, science diplomacy, and future statements and policy reports.

In late 2014 the IAP and IAC were replaced by the newly formed InterAcademy Partnership (also to be known as IAP). As an umbrella organisation, IAP is intended to harness the expertise of the world’s scientific, medical and engineering leaders to advance sound policies, promote excellence in science education, improve public health, and achieve other critical development goals.

A March 2015 article in the American Association for the Advancement of Science quarterly publication *Science & Diplomacy*, entitled ‘Academies of Science as key instruments of science diplomacy’ highlighted the IAP’s capacity to form effective global and regional networks to address issues of global and regional importance. [www.sciencediplomacy.org/perspective/2015/academies-science-key-instruments-science-diplomacy](http://www.sciencediplomacy.org/perspective/2015/academies-science-key-instruments-science-diplomacy)

### Chinese Academy of Sciences

In June 2014, Academy Vice-President and Secretary Physical Sciences, Professor C Jagadish FAA FTSE, was one of seven international speakers at the 17th General Assembly of the Chinese Academy of Sciences (CAS). Invited by CAS President Professor Chunli Bai FAA FRS, the speakers delivered plenary talks on how their academies provide science policy advice to their governments and the broader community.

The event was attended by the highest levels of the Chinese Government, with an important speech given by the President of China Jinping Xi on the direction of China’s science, technology and innovation. The Premier of China Keqiang Li also participated in the conference.

### Korean Academy of Science and Technology

In November 2014, the Academy’s Foreign Secretary, Professor Cheryl Praeger AM FAA, attended the 2014 Inter-Academy Seoul

Science Forum (IASFF), organised by the Korean Academy of Science and Technology (KAST). The Forum coincided with the 20th anniversary of KAST, and the InterAcademy Partnership (IAP) and the science academies of thirteen countries were represented at this event. Professor Praeger participated in a roundtable discussion on 'Science for Creative Economy', the major theme of the Forum.

## **COMMONWEALTH SCIENCE CONFERENCE**

The Royal Society held the first Commonwealth Science Conference in 47 years in Bangalore, India, in November.

Professor Holmes, immediate past President Professor Suzanne Cory AC FAA FRS, Professor Jagdish, and Fellows Professor Bob Williamson AO FAA FRS, Professor Tam Sridhar FAA FTSE and Professor Peter Colman FAA FRS FTSE were among 300 eminent scientists invited from around the Commonwealth to attend the conference.

At the request of The Royal Society, the Academy selected 32 doctoral and postdoctoral participants from Australia, Papua New Guinea and Fiji to attend the conference. These young researchers indicated that this event provided a unique overview of science within the Commonwealth and that the scope and breadth of the research presented in the lectures was inspiring.

## **ASSOCIATION OF ACADEMIES AND SOCIETIES OF SCIENCES IN ASIA**

The Association of Academies and Societies of Sciences in Asia (AASSA) is a non-profit international organisation with science and technology interests made up of 34 scientific and technological academies and science societies in Asia and Australasia.

The Australian Academy of Science is a member of AASSA, and was represented on the Executive from 2012–14 by immediate past Secretary Education and Public Awareness, Professor Jenny Graves AO FAA.

Professor Graves attended the General Assembly of AASSA in New Delhi, India, that was hosted by the Indian National Science Academy in October. At this meeting, a new Executive Board for 2014–16 was elected, and Professor Graves chaired the Election Committee.

## **INTERNATIONAL AWARENESS OF AUSTRALIA'S SCIENCE AND RESEARCH CAPABILITIES**

The Academy undertook a number of activities to promote Australia's research capabilities internationally and to identify opportunities for collaborative partnerships, including:

- facilitating a visiting lecture series by three senior Australian researchers to visit research institutions in India, supported by the Department of Industry and Science
- convening an organising committee, chaired by Professor Peter Koopman FAA, tasked with establishing a Japan Society for the Promotion of Science (JSPS) Alumni Association in Australia
- responding to requests for assistance from Australian embassies to identify experts in biomedicine, agriculture and energy to take part in a research seminar series in Indonesia
- continuing to liaise closely with other countries' embassies in Canberra (in particular China, European Commission, France, Germany, Italy, Japan, Mexico, Switzerland, Taiwan, UK and USA), including a briefing and introduction for the incoming science specialist of the Embassy of Japan; a briefing for the outgoing Counsellor for Education at the Australian Embassy in Brazil; and a discussion on bilateral research collaborations hosted by the Belgian Ambassador
- maintaining contact with Australian embassies overseas, in particular Brazil, China, Germany, India, Indonesia, Japan, Malaysia, Mexico and USA.



## **Objective B**

Develop and sustain a national scientific culture





# 5

## Ensuring that the Academy and the Fellowship are fully representative of the **best scientists in Australia**, and promoting community recognition of the contributions of **high quality science** to health, well-being and national prosperity

The Academy's rigorous election process creates a Fellowship that includes Australia's most eminent researchers and science advocates, representing a powerhouse of intellect, passionate about science and active in ensuring that science contributes to the future of the nation. Fellows are available as an independent source of knowledge and expertise to inform evidence-based decisions and government policy.

Through the generosity of Fellows, their families and colleagues, and like-minded individuals and organisations, the Academy presents a range of honorific awards, research grants and travelling fellowships each year. These awards celebrate and raise awareness of the achievements of both the person after whom they are named and the recipients, and contribute towards the advancement of science in many fields of research.

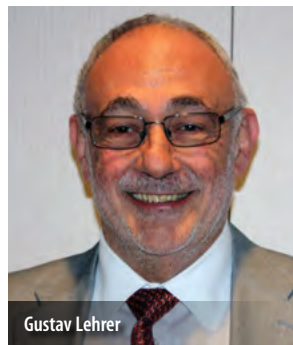
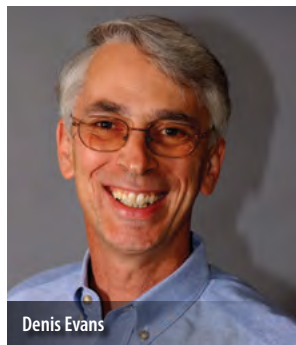
### COMPOSITION OF THE FELLOWSHIP

Up to 20 new Fellows are elected each year by Ordinary Election on the basis of outstanding research that has pushed back the

frontiers of knowledge. The Academy may also elect a limited number of Fellows by Special Election for their conspicuous service to the advancement of science, and up to two eminent scientists living outside Australia who have strong connections with Australian science as Corresponding Members.

As part of the transition to a calendar year reporting cycle, new Fellows elected in 2015 will be included in the report for the period 1 April to 31 December 2015. They will also be profiled in the 2015 Science at the Shine Dome program and on the Academy's website from the date of the media release announcing the new Fellows on 25 May.

As at 31 March 2015 the Fellowship comprised 478 Fellows. The high quality of the scientists elected to the Fellowship continues to be confirmed by their election to other academies around the world, and their receipt of prestigious international and national awards, prizes and honours recognising outstanding achievements (see pages 7 to 10).



## THE 2014 MACFARLANE BURNET MEDAL AND LECTURE

was awarded to Professor Jerry Adams FAA FRS from the Walter and Eliza Hall Institute of Medical Research. Professor Adams presented a lecture on 'Control of cell suicide by the Bcl-2 protein family' during Science at the Shine Dome in May. He was awarded the medal for his work in advancing the understanding of cancer development, particularly of genes activated by chromosome translocation in lymphomas, through molecular analysis and transgenic mouse models. By clarifying how the Bcl-2 protein family controls the life and death of cells, he and his colleagues have galvanised the development of a promising new class of anti-cancer drugs that directly engage these cell death regulators.



PHOTO: MARK GRAHAM

## ACADEMY MEDALS AND LECTURES

The 2015 honorific awards were announced in November 2014 and will be presented at the Academy's annual celebratory event, Science at the Shine Dome, in May 2015.

### Career awards

The Academy's 2015 honorific career awards for distinguished lifetime contributions to science were awarded to the following:

- **2015 Matthew Flinders Medal and Lecture for scientific research of the highest standing in the physical sciences**  
Professor Kurt Lambeck AO FAA FRS, Research School of Earth Sciences, Australian National University
- **2015 David Craig Medal for research in chemistry**  
Professor Denis Evans FAA, Research School of Chemistry, Australian National University
- **2015 Hannan Medal for research in pure mathematics**  
Professor Gustav Lehrer FAA, School of Mathematics and Statistics, University of Sydney; and Professor Alan McIntosh FAA, Mathematical Sciences Institute, Australian National University
- **2015 Jaeger Medal for research in Earth Sciences**  
Professor Trevor McDougall FAA FRS, School of Mathematics and Statistics, University of New South Wales
- **2015 Thomas Ranken Lyle Medal for research in mathematics or physics**  
Professor Michelle Simmons FAA, ARC Centre for Excellence for Quantum Computation and Communication Technology, University of New South Wales.

In addition, Professor Graham Farquhar AO FAA FRS was announced as the recipient of the **2016 Macfarlane Burnet medal and lecture**.

The award and lecture for the 2014 Macfarlane Burnett Medal and Lecture were made at the 2014 Science at the Shine Dome, by the awardee Professor Jerry Adams FAA FRS (see box above).

The Academy Council amended the timetable for the Macfarlane Burnet and Matthew Flinders medals and lectures to bring them into line with other awards. In future, the call for nominations will be made in the year preceding the award presentation year instead of two years before.

### Early- and mid-career awards

The 2015 honorific early- and mid-career (EMCR) awards for scientific excellence (see Table 7) were awarded to researchers who were no more than 15 years post-PhD when nominated, except in the case of significant interruptions to a research career. They included the inaugural John Booker Medal supported by the Deans of Engineering, announced in last year's annual report.

The Academy Council also approved the establishment of new EMCR awards to honour two pre-eminent Australian researchers in the biological sciences through a generous donation by Lady Tania Feldmann and Corresponding Member Sir Marc Feldmann AC FMedSci FAA FRS:

- **Jacques Miller Medal for Experimental Biomedicine**—the inaugural medal was awarded to Professor Michael Cowley FTSE from the Monash Obesity and Diabetes Institute, Monash University
- **Gustav Nossal Medal for Global Health**—the inaugural medal was awarded to Professor Nicholas Anstey from the Global and Tropical Health Division of the Menzies School of Health Research.

Council subsequently made further adjustments to the Academy's awards for younger scientists by separating EMCR awards into two categories. From the 2016 award round the Nancy Millis, Jacques Miller and Gustav Nossal medals will become mid-career researcher (MCR) honorific awards and the remainder will become early-career researcher (ECR) honorific awards.

**Table 7: 2015 Early-and Mid-Career awards**

Award	Awardee
John Booker Medal for research in engineering	<b>Associate Professor Kylie Catchpole</b> College of Engineering and Computer Science, Australian National University
Fenner Medal for research in biology (excluding the biomedical sciences)	<b>Dr Ian Wright</b> Department of Biological Sciences, Macquarie University
Gottschalk Medal for outstanding research in the medical sciences	<b>Dr Peter Czabotar</b> Structural Biology Division, Walter and Eliza Hall Institute of Medical Research
Anton Hales Medal for research in Earth sciences	<b>Dr Yingjie Yang</b> Department of Earth and Planetary Sciences, Macquarie University
Christopher Heyde Medal for research in pure mathematics	<b>Associate Professor Catherine Greenhill</b> School of Mathematics and Statistics, University of New South Wales and <b>Dr Scott Morrison</b> Mathematical Sciences Institute, Australian National University
Dorothy Hill Award for female researchers in the Earth sciences	<b>Dr Nerilie Abram</b> Research School of Earth Sciences, Australian National University
Le Fèvre Memorial Prize for research in basic chemistry	<b>Professor Chengzhong Yu</b> Australian Institute for Bioengineering and Nanotechnology, University of Queensland
Nancy Millis Medal for Women in Science	<b>Associate Professor Tamara Davis</b> School of Mathematics and Physics, University of Queensland
Moran Medal for research in statistics	<b>Associate Professor Yee Hwa Yang</b> School of Mathematics and Statistics, University of Sydney
Pawsey Medal for research in physics	<b>Dr Naomi McClure-Griffiths</b> Research School of Astronomy and Astrophysics, Australian National University
Ruth Stephens Gani Medal for research in human genetics	<b>Dr Jian Yang</b> Queensland Brain Institute, University of Queensland



Kylie Catchpole, John Booker Medal



Tamara Davis, Nancy Millis Medal

The eligibility for ECR awards will be up to 10 years post-PhD (or first equivalent higher degree e.g. DPhil, DPsych, DSc), whereas the eligibility for MCR awards will be 8 to 15 years post-PhD (or first equivalent higher degree) retaining Council’s capacity to allow for significant career interruptions.

## RESEARCH AWARDS

The Academy administers funds donated by individuals wishing to support younger scientists to conduct research on a range of topics in Australia.

### Inaugural 2015 Thomas Davies Research Fund for Marine, Soil and Plant Biology

The Thomas Davies Research Fund for Marine, Soil and Plant Biology was established through a generous philanthropic bequest from the estate of the late Thomas Lewis Davies. The fund offers grants of up to \$10 000 each to EMCRs in the fields

of marine, soil and plant biology. Four grants were awarded in the inaugural year:

- **Dr Melanie Bishop**, ‘Developing indicators of seagrass carbon storage’—\$9994
- **Dr Rebecca Lester**, ‘Carbon sequestration by wetlands: A fresh(water) approach to tackling climate change’—\$9943
- **Dr Jonathan Plett**, ‘Enhancing root health through a better understanding of plant genetics that enable mutualistic beneficial relationships with soil microbes’—\$9950
- **Dr Shane Powell**, ‘Effect of pH changes on biofilm communities’—\$6200.

### 2015 Douglas and Lola Douglas Award

This scholarship is offered as a ‘top up’ scholarship to a highly ranked PhD candidate awarded a National Health and Medical Research Council training scholarship in either Indigenous or primary health care, with preference given by the Academy to the area of Indigenous health research:

- **Dr Gabrielle Diplock**, Alice Springs Hospital ‘Readmission Prevention Project’—\$7000 per year for up to three years.

### 2015 WH Gladstones Population and Environment Fund

This fund offers support for empirical research into how the size, distribution, material aspirations and other characteristics of Australia’s population are likely to affect our environment:

- **Dr Michalis Hadjidakou**, University of New South Wales, 'Our "foodprint" matters: Australian diets and their environmental, economic and health impacts'—\$24 000 over two years.

### 2015 Margaret Middleton Fund for endangered Australian native vertebrate animals

This fund provides support for conservation-based research of Australian ecosystems that will ultimately lead to tangible outcomes for management:

- **Dr Renee Catullo**, CSIRO, 'Cryptic diversity on Cape York: assessing conservation priorities in endemic Toadlets (*Uperoleia*)'—\$14 975
- **Mr Michael Hitchcock**, University of Melbourne, 'The decline of hollow-dwelling mammals in northern Australia: hollows be thy bane'—\$15 000
- **Ms Robyn Shaw**, Australian National University, 'Halting Australia's mammal declines: a demographic, ecological and genetic approach to fire response in Australian native rodents'—\$14 512
- **Ms Melissa Wynn**, Australian National University, 'Threat mitigation to support reintroduction of critically endangered reptiles on Christmas Island'—\$14 966.

In addition, a report was received on the research results from 2013 Margaret Middleton Fund recipient, Mr Phil Bouchet, from the University of Western Australia (see box below).

### 2015 Moran Award for the History of Science Research

The Moran Award is aimed at postgraduate students and other independent researchers with expertise in the history of Australian science. Its purpose is to encourage use of the

Basser Library and Fenner Archives collections (see Strategy 7), especially by younger researchers, and it can be used towards travel and accommodation costs.

The 2015 Award for the History of Science Research of \$2500 was awarded to **Andrea Candela**, 'Researches on uranium: history, mining and technology'. Mr Candela will consult the Basser Library's geological society collection, along with collections held at the National Library of Australian and the Australian National University.

### 2015 JG Russell Awards

Following the settlement of the estate of the late Miss JG Russell, the Academy has relaunched these awards, which aim to provide young researchers with \$4000 to assist with the costs involved in experimental research including the costs of equipment, maintenance and travel. Awardees are chosen from an Australian Research Council list of highly ranked Discovery Early Career Researcher Award recipients:

- **Dr Andrea Giuliani**, Macquarie University, 'Melt inclusions to provide new understanding of the constraints on melting processes and recycling of crustal material in the deep mantle'
- **Dr Sean Hodgman**, Australian National University, 'Develop a quantum simulator using ultracold helium atoms in an optical lattice'
- **Dr Sean Hudson**, Australian National University, 'Gain insights into the interactors, effectors and fate of misfolded protein aggregates within cells, using new, cutting-edge, catalytic-tagging biochemical tools'
- **Dr Sasha Tetu**, Macquarie University, 'Design and validate novel, rapid environmental stress assays, based on gene expression profiling.'

## IDENTIFICATION OF 'HOT SPOTS' HELPS PROTECT MARINE ORGANISMS

2013 Margaret Middleton Fund awardee, Phil Bouchet, from the University of Western Australia, conducted research to characterise and map marine organism 'hot spots' to assist with their protection. To overcome limitations of current video recording equipment, Phil's project developed a new drifting video sampling tool that overcomes existing depth constraints and can be deployed in areas of complex seabed relief. The project also developed a novel pattern-detection algorithm that automates the digital processing of baited underwater imagery.

The video tool was used to document pelagic wildlife in a small marine national park off the coast of Fremantle, WA. Nearly 150 hours of video footage detected 15 species from 11 different families, including tunas and sharks. The latter were particularly inquisitive and came in close contact with the cameras, allowing their sex to be determined, their size

to be estimated, any physical wounds to be recorded, and their natural behaviour to be captured.

The research has implications for the marine park's future management and for human activities around its boundaries.

The video can be viewed at [youtu.be/MHymrOKlgvw](https://youtu.be/MHymrOKlgvw)





## Travelling fellowships

The Academy administered funding that enabled distinguished overseas scientists to interact with Australian researchers and, through public lectures, with the broader community (see Table 8).

Other fellowships enabled Australian scientists to build networks and access facilities that are not available here (see Table 9).

For more information on honorific awards see [www.science.org.au/awards/research-awards](http://www.science.org.au/awards/research-awards)

Table 8: Incoming Travelling Fellowships				
Awardee	Institution	Funded by	Award	Purpose
<b>Geoffrey Frew Fellowship</b>				
Professor Ursula Keller	Institute of Quantum Electronics, ETH Zurich, Switzerland	Australian Optical Society	up to \$5000 towards travel costs	To attend the Australasian Conference on Optics, Lasers and Spectroscopy
<b>Selby Travelling Fellowship for excellence in science</b>				
Professor Ray Jayawardhana	York University, Toronto, Canada	Australian Centre for Astrobiology	\$13 000	To present research seminars and public lectures at the University of Western Australia, the University of New South Wales, Swinburne University of Technology and Port Hedland

Table 9: Outgoing Travelling Fellowships				
Awardee	Institution	Funded by	Award	Purpose
<b>AK Head Travelling Scholarship for Mathematical Scientists</b>				
Mr Hien Duy Nguyen	University of Queensland	The Gwenneth Nancy Head Foundation	\$13 000	To visit research laboratories in Hamilton, Canada and Pennsylvania State University, USA
Mr Yi Huang	University of Melbourne	The Gwenneth Nancy Head Foundation	\$7000	To visit collaborators at the University of Western Illinois, the University of Grenoble and the National University of Singapore

# Supporting the teaching of science

The Academy is committed to promoting science education as a contribution to informed citizenship and to encourage young people to prepare for careers based on science and technology. In close consultation with state and territory education sectors, the Academy is actively involved in the implementation of the national science curriculum through the development of inquiry-based curriculum resources that stimulate student interest and enhance learning, and professional learning to improve teacher quality.

## SCHOOL SCIENCE PROGRAMS SUPPORT TEACHERS AND STUDENTS

The Academy has two award-winning programs that support the effective teaching of science in primary and early secondary schools: 'Primary Connections: Linking science with literacy' and 'Science by Doing'. The Australian Government provides funding to both programs through the Department of Education and Training.

## PRIMARY CONNECTIONS: LINKING SCIENCE WITH LITERACY

Primary Connections was launched by the Academy in 2004 to help boost the confidence of primary school teachers (who often have no formal training in science) and to encourage young students' natural interest in science and to develop their mathematical, communication and documentation skills. The program is funded by the Australian Government through six funding agreements totalling \$14.7 million, with the latest agreement to conclude in 2018.

Two major milestones for Primary Connections this year were the development and approval by the Academy's School Science Education Advisory Board of a three-year strategic plan in May, and securing funding from the Australian Government to provide professional learning to pre-service teachers and teachers from remote, regional and rural schools (see Primary Connections Development page 40).

### Operations

The principal objective of the Primary Connections strategic plan (see above) is for Primary Connections Operations to become self-funding within the three-year plan period. The plan includes a detailed publishing plan for generating publications, including new digital resources.

### Teaching and learning

Three new Primary Connections units were published in February:

- Growing well (Foundation Year)—biological sciences
- Bend it! Stretch it! (Year 1)—chemical sciences
- Magnetic moves (Year 4)—physical sciences

These new units provide teachers with greater choice and flexibility, particularly when teaching multi-level classes, and are a direct response to teachers' requests for more options within the current selection of units.



Primary Connections team. Left to right: Maria Thompson, Marketing Coordinator; Amy Stoneham, Editor and Resource Development Coordinator; David Kellock, Director, Primary Connections Operations; Kaylene Sanders, Sales and Marketing Manager; Sophia McLean, Professional Learning Manager; Claire Sparrow, Business and Operations Manager; Shelley Peers, Director, Primary Connections Development

The first five interactive teaching resources (ITRs) were also published:

- Staying alive (Foundation Year)—biological sciences
- Spot the difference (Year 1)—chemical sciences
- All mixed up (Year 2)—chemical sciences
- Feathers, fur or leaves? (Year 3)—biological sciences
- Earth's place in space (Year 5)—Earth and space sciences

ITRs are designed to be used on interactive whiteboards and computers. They support the Primary Connections units by providing interactive versions of all the student activities within the units. They will encourage whole class and group work and

bring science alive in the classroom by allowing students to interact more closely with these resources.

Through a new writers' training program, up to four new writers have been identified to help develop Primary Connections resources over the next three years.

### Professional learning

The aim of professional learning is to improve the quality of science teaching; it also recognises that primary school teachers have a wide range of professional learning needs, from pre-service teachers to those who have been using Primary Connections units for several years. Primary Connections' professional learning program reflects these broad requirements (see Table 10).

In response to feedback from teachers, the 2014–15 professional learning program introduced new courses and updated existing courses. For example, Primary Connections ran eight new workshops for NSW teachers to support schools implementing the new K–6 Science and Technology syllabus. The workshops attracted 289 participants representing 206 schools. Overall, the number of participants across all activities more than doubled from last year.

### Promotion and distribution

Twenty-two per cent (1705) of Australian primary and combined schools purchased Primary Connections resources during the year. Of these, 307 were new customers. Together with sales in previous years, more than 70% of primary and combined schools in Australia have purchased Primary Connections units.

Sales and marketing activities maintained or increased the already high level of awareness of Primary Connections among primary school teachers, particularly in relation to publications and professional learning. The Primary Science Teaching Survey Report, conducted by the Australian Science Teachers' Association and Office of the Chief Scientist in June 2014, confirmed that Primary Connections has 85% recognition amongst primary teachers.

The new Primary Connections website, launched in March 2014, played a key role in sales and marketing activities, with membership increasing to 11 074 during the year. Additional upgrades of the website were completed to allow for the sale of our new ITRs as downloadable files.

### Development

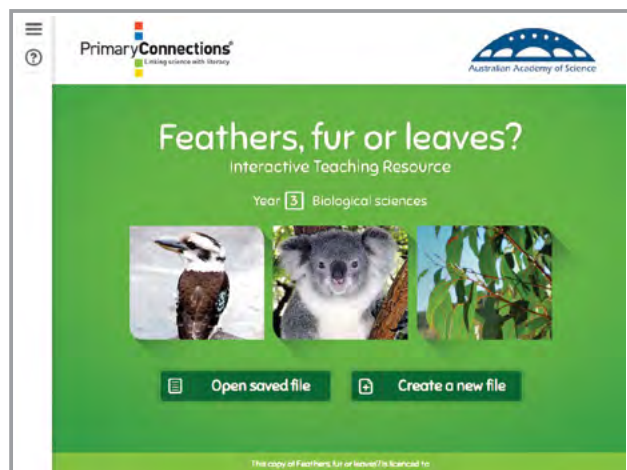
Primary Connections Development designs and manages projects that support the program's approach in Australian schools and internationally, utilising government grants, sponsorship funding and donations. The focus is particularly on regional, rural and remote schools in Australia, including those with a significant Indigenous population.

### Renewed government funding

A further \$3.5 million Australian Government funding for Primary Connections (Stage 6) was announced in the May 2014

If this resource could be made for every [Primary Connections] book it would save teachers a lot of time. I use my interactive whiteboard for all my lessons and make interactive class science journals. This will make life so much easier.

TEACHER INVOLVED IN TRIAL



Home-screen of Feathers, fur or leaves ITR



Example of a Class chart from Feathers, fur or leaves ITR

**Table 10: Professional learning activities**

Type of training	Number of workshops	Number of schools/campuses	Number of participants
Introductory workshop for teachers (1hr to 1 day)	27	168	881
Curriculum Leader training for school leaders (2 days)	7	113	151
Continuing Professional Development (1 day)	4	121	151
NSW Syllabus to Success workshop	12	226	335
Conference/marketing presentations	14	156*	195**
Facilitator training (3 days)	1	9	9
1-day training commissioned by Sustainability Victoria	1	18	18
Pre-service teacher training workshop delivered for Stage 6 (2 days)	1	1	16
2-day training commissioned by the Victorian Department of Education and Training	1	32	50

\*This figure is lower than the actual number of schools represented because some events only recorded the number of participants

\*\* Participant numbers were not recorded at some events

federal budget. Over four years to June 2018, this will provide a one-day professional learning program for 700 teachers from regional, rural and remote schools, and a two-day program for 240 pre-service teachers in universities so they enter the workforce skilled in the use of Primary Connections. Support for the latter is very welcome, as research shows<sup>1</sup> that Primary Connections improved pre-service teachers' confidence to teach science in 86% of study participants. Embedding awareness and use of Primary Connections in teacher education programs positively influences their intention to teach science, with 96% of participants associating a positive attitude to using Primary Connections when they begin their teaching career.

A two-day pre-service teacher program trialled at the University of Canberra in November is informing the finalisation of the program prior to it being rolled out across Australia over the next three years.

In addition, new professional learning presenters were trained in Sydney in August, and six of these have now been contracted to the project to conduct the Stage 6 workshops as well as to support Primary Connections professional learning events.

### International

The Director of Primary Connections Development, Ms Shelley Peers AO, made an invited presentation and poster display at an InterAcademy Partnership-funded international education conference in Rome in May, conducted by the African–European–Mediterranean Academies for Science Education (AEMASE) and hosted by the Lincei Academy. The conference was attended by 75 delegates from more than 30 countries across five continents. It focused on inquiry-based science education and aimed to foster dialogue between developed and developing countries for renewing science education,

1 Cooper, G, Kenny, J and Fraser, S 2012, 'Influencing intended teaching practice: Exploring pre-service teachers' perceptions of science teaching resources', *International Journal of Science Education* Vol 34, No 12 pp 1883–1908



Trialling pre-service teacher training at the University of Canberra



Primary Connections resources ready for shipping to Vanuatu

PHOTO: OLINDA FERNY CREEK FOOTBALL NETBALL CLUB

and to strengthen partnerships between science academies and ministries of education for the renewal of science education in each country.

### Primary Connections resources to Vanuatu

In August, Primary Connections surplus resources were dispatched to Vanuatu for schools in need. They were part of 11.5 tonnes of education, medical, trade and sporting goods donated as part of a drive by the Olinda Ferny Creek Football



Netball Club, a community sports club in Melbourne. Deakin University, which sends pre-service teachers to international and remote communities through its Global Experience Program, is helping ni-Vanuatu schools and students use the resources.

### Corporate and philanthropic partnerships

The 2012–15 Primary Connections \$120 000 sponsorship partnership with CSL and Schools Connect Australia (a Victorian Government initiative) to promote the program in Victorian primary schools continues to increase awareness and uptake in that state. In addition, bursaries were provided for teachers—mainly from regional areas who were unable to access workshops—so they could support uptake of the program in their schools.

Bursaries were awarded to five teachers from four schools: St Anthony’s Primary School, Noble Park; Meredith Primary School, Meredith; Nullawil Primary School, Nullawil; and Thornbury Primary School, Thornbury. The teachers attended two days of professional learning in Melbourne in November, and received a set of curriculum resources for their school.

I just want to thank you for the scholarship for the Primary Connections professional development. A free set of all the Primary Connections books arrived yesterday, which will be a fantastic resource for our school. I will be running training with the staff early next year in regards to using these books successfully!

... I found the Primary Connections professional development to be very informative and engaging. . . I would recommend this course to anyone who plans to use the Primary Connections books to their full potential.

**BURSARY RECIPIENT**

## SCIENCE BY DOING

Science by Doing is a comprehensive online science program for Years 7 to 10 available free to all Australian students and teachers that provides a practical way of implementing the Australian Curriculum: Science. It is supported by award-winning professional learning modules and a research-based professional learning approach.

Australian teachers and students can access Science by Doing resources through the website [www.sciencebydoing.edu.au](http://www.sciencebydoing.edu.au)



Science by Doing caption to come: Denis Goodrum, Jen Liu, Katie Ryan, Jim Woolnough, Jef Byrne and Kerrie Wilde

**Table 11: Science by Doing stages**

<b>Pilot</b>	2007–08	Proof of concept of inquiry science learning in high schools
<b>Stage One</b>	2009–11	Five professional learning modules Foundation curriculum unit, Professional learning approach
<b>Stage Two</b>	2012–13	Eight online curriculum units
<b>Stage Three</b>	2013–16	Final eight online curriculum units Seven online professional learning modules Implement state-based professional learning approach
<b>Stage Four</b>	2016–18	Revision of curriculum units with student e-workbook Implement teacher education approach for universities

The purpose of Science by Doing is to improve science learning by better engaging high school students through an inquiry approach, and supporting teachers with relevant resources using innovative technology.

The Australian Government continued its funding of the program in the 2014 budget, allocating a further \$1.5 million for Stage Four that will be completed in 2018. The stages of Science by Doing are described in Table 11.

### Year of growth

There was substantial growth in the uptake of Science by Doing during the year. The Science by Doing website went live in July 2013, and the following six months saw a steady rate of teachers and students registering to use the website. But during 2014 the rate of registrations increased significantly and continued in 2015 following a short hiatus over the summer break (see Figure 1). At 31 March, 6875 teachers were registered, representing approximately 27.5% of Australian high school science teachers.

Figure 1: Total registrations for Science by Doing

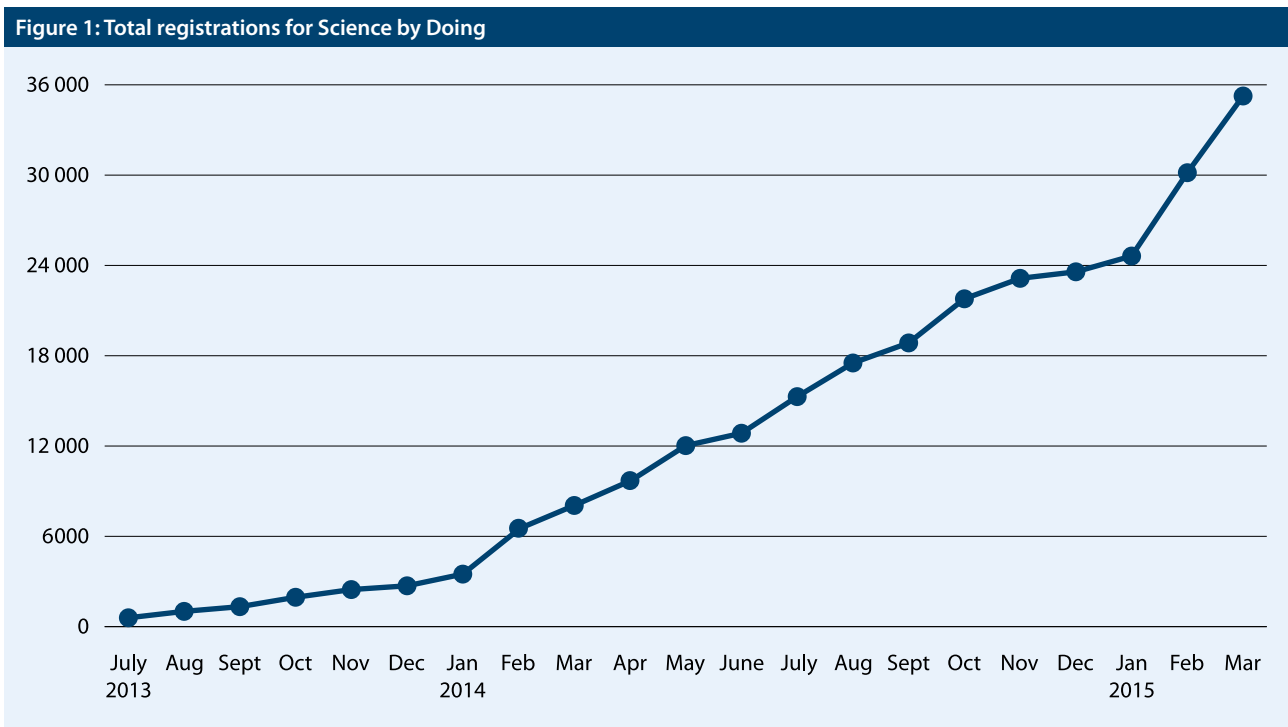


Table 12: Science by Doing website usage

Month	Number of hits*
August 2013	131 456
November 2013	274 765
March 2014	950 062
May 2014	1 102 453
August 2014	1 133 146
October 2014	1 471 135
March 2015	2 154 368

\* A hit is a measurement of interaction with a website and is recorded for each file that is accessed during a visit. Hits generally outnumber visits by a significant factor.

Besides the growth in registration, there has been a significant increase in the usage of the Science by Doing website. The usage rate, measured by the number of hits, is indicated in Table 12. Since school holidays affect the usage, the mid-term month has been used to illustrate hits.

**New curriculum units**

A number of new curriculum units were built and trialled:

- Year 8 unit 'Energy'
- Year 9 units 'Chemical Reactions' and 'Light, Sound, Action'
- Year 10 units 'Chemical Patterns' and 'Motion and Energy'
- Year 10 unit 'Evolution and Heredity' (built).



New curriculum units for Science by Doing



Science by Doing’s professional learning modules

### Professional learning

Science by Doing’s professional-learning modules ‘Inquiry-based Teaching’, ‘Effective Questioning’, ‘Assessment’, ‘Student Learning’ and ‘Leading for Change’ were converted to an online format and are now freely available from the Science by Doing website.

In February, Science by Doing commenced its national professional learning roll-out. Initial workshops for high school heads of science were held in Adelaide, Canberra and Hobart. Sixty-two high schools participated in these programs, preparing an action plan to improve student learning using Science by Doing resources.

### Promotional activities

Science by Doing staff attended several national conferences to help familiarise the education sector with the program, and delivered presentations to international events in Indonesia and Hong Kong (see Table 13).

Date	Location	Conference/workshop
May	Sydney	NSW Science Teachers’ Association Conference
July	Adelaide	CONASTA 63
August	Melbourne	STEM Education Conference
September	Solo, Indonesia	5th International Conference on Science Education and Teacher Professional Development
October	Parramatta	Science Education Conference
November	Hong Kong	Asia Pacific Educational Research Association Conference

### NOBEL LAUREATES POSTERS ENCOURAGE STUDENTS TO STUDY SCIENCE

The Academy produced posters of Australian Nobel Laureates Professor Elizabeth Blackburn AC FAA FRS and Professor Brian Schmidt AC FAA FRS that were developed specifically for high schools. Every high school in Australia—around 3000—was invited to apply for copies of the posters and more than 1000 posters were distributed.

Not only do these eye-catching posters celebrate great Australian achievements, they also encourage young people to study science at school and to consider a career in science.





# 7

## Fostering discussion and debate on significant scientific issues

The Academy supports a wide range of activities to promote understanding, advancement and informed consideration of science issues in government, industry, the media, academia and the community. These include public presentations, conferences and workshops, and a variety of publications.

### RAISING AWARENESS AND CONTRIBUTING EXPERTISE

The Academy engaged in promoting public discussions about science and science policy in a range of ways, including newsletters, reports, flyers, programs, booklets and brochures (see Appendix 7). It generated and responded to selected news and opinion pieces in the mainstream and social media and a range of digital channels.

#### Academy in the media

The Academy continued to raise its profile as an authoritative source of balanced expert information in the national and international news media, generating a total of 1613 clips across print, broadcast and online news media (see Figure 2). The Academy's October submission on the Federal and Queensland governments' draft plan for the long term sustainability of the Great Barrier Reef generated more than 425 news articles across all media, including a substantial amount of international coverage.

Academy Council members and Fellows authored a number of opinion pieces and columns in a range of outlets including

Fairfax and News Ltd newspapers, and The Conversation, including a widely-read column on gay genes by Professor Jenny Graves AO FAA (see box below).

A particular highlight this year was the invitation to immediate past President Professor Suzanne Cory AC FAA FRS to deliver Radio National's acclaimed Boyer Lecture series (see box next page). Speaking to the theme 'The promise of science: a vision of hope', Professor Cory explored the achievements and possibilities of Australian science and scientists. The year also saw ABC television's first science-themed Q&A program in September, featuring Professor Cory, Nobel Laureates Professor Brian Schmidt AC FAA FRS and Professor Peter Doherty AC FAA FRS, and Australia's Chief Scientist Professor Ian Chubb AC FTSE.

The Academy also took a proactive role in National Science Week (see box page 47).

#### Social media

The Academy's presence and influence on the social media channels Twitter, Facebook and YouTube grew this year (see Figure 3), with nearly 9300 direct followers on Twitter and 2400 on Facebook. Video website YouTube enables the Academy to bring its events and talks to a much broader audience than could ever fit into one lecture theatre. Videos of public lectures, Science at the Shine Dome, and Interviews with Australian Scientists attracted more than 42 000 individual views.

The Academy also launched a video series called Brain Box, highlighting the work and lives of scientists (see box page 49).

### GAY GENES PROVE POPULAR FOR ACADEMY FELLOW

A column on gay genes penned by Professor Jenny Graves became the most-viewed and most-shared piece on academia-meets-news website The Conversation this year.

The column, which explored the research around genetic markers for homosexuality in men, attracted more than 800 000 views and become the fourth-most-read piece ever on The Conversation's Australian

website. It was republished around the world, including by the Washington Post.

The column further boosted Professor Graves' media profile after the YouTube posting of her public lecture at the Shine Dome in 2013 on 'Weird mammal genomes, sex and the future of men'.





## BOYER LECTURES A VISION OF HOPE

'The promise of science: a vision of hope' was the theme for the ABC's annual Boyer lecture series, during September by immediate past President Professor Suzanne Cory AC FAA FRS.

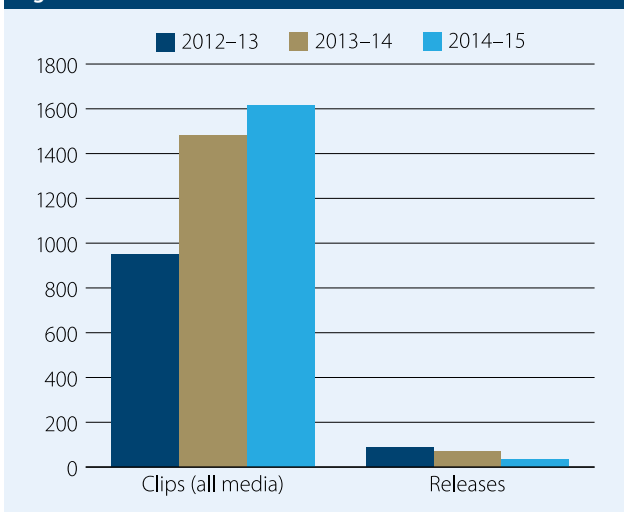
Professor Cory gave the first of her four lectures, 'Science for a healthy people', to an enthusiastic live audience in ABC's Iwaki Theatre in Melbourne. She spoke about Australia's achievements in medical science and the promise of future research.

The second and third of the weekly talks further examined Australia's contributions and potential around the themes of 'Science for a healthy economy' and 'Science for a healthy environment'.

In her fourth and final lecture, Professor Cory turned to women in science. Entitled 'People for science', the talk delved into some of the little known stories of Australian and international heroines of science and mathematics. Professor Cory then proposed ideas for encouraging and keeping women in science.

The talks can be downloaded for free as a podcast from the ABC website, or purchased from the ABC shop as a book or audio book.

Figure 2: Our reach in the news media

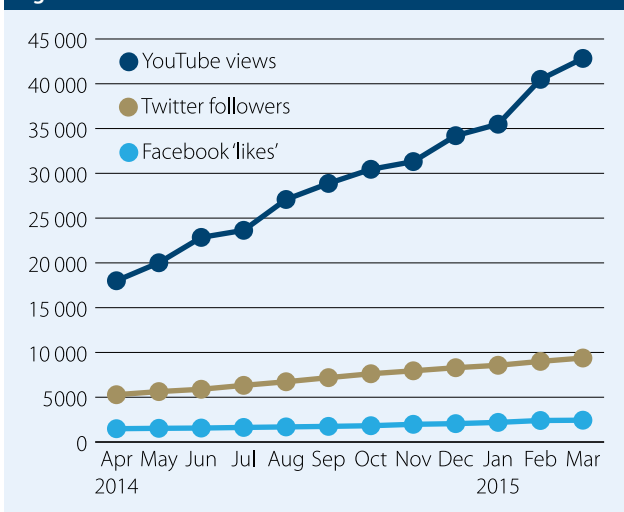


### Academy website

The Academy's website is its primary interface with the world and is critical to communicating its activities and achievements. The news pages are constantly updated with stories about the achievements of Fellows and the Academy, and with announcements of forthcoming activities such as awards nominations and events.

Apart from the home page, the most popular pages on the website were related to publications on climate change and immunisation science. The release of the revised booklet 'The science of climate change: Questions and answers' significantly raised the number of visitors to the site after its launch in February (see Figure 4 page 48).

Figure 3: Our reach on social media



### Newsletter

The Academy's quarterly newsletter had 2241 subscribers at 31 March. In addition to Fellows, it is emailed to individuals and organisations with an interest in Australian science. The transition from a PDF to a fully online publication has made its content more accessible to online searches and enabled videos and hyperlinks to be included in the articles. It is also easier for subscribers to share content with others. The newsletter is available at [www.science.org.au/academy-newsletter](http://www.science.org.au/academy-newsletter).

## SCIENCE DEVELOPMENT AND APPLICATION

The Academy organises and participates in a range of events designed to enhance scientific knowledge, explain science to the broader community and explore ways in which science can be used for the benefit of the economy and society.



The ACT launch of National Science Week at the Shine Dome was a fiery event

## NATIONAL SCIENCE WEEK

The Academy celebrated National Science Week in August by raising the online profile of Australian women scientists, staging an explosive launch event at the Shine Dome and hosting a talk by a renowned climate scientist.

Many prominent women scientists, engineers and mathematicians have had little or no online presence. The Academy's Women of Science Wikibomb was a multimedia success story, creating 118 new and improved Wikipedia pages for Australian women in science and increasing awareness of their achievements in Australia and around the world.

More than 140 people signed up to the six-hour event, including several groups in different locations around Australia. Thirty participants were chosen to join in the event at the Shine Dome.

Those at the Dome were treated to visits from the current and immediate past Presidents of the Academy, Professor Andrew Holmes AM PresAA FRS FTSE and Professor Cory, the Vice-President and the Executive Director of The Royal Society, Professor Anthony Cheetham FRS and Dr Julie

Maxton, the inaugural Nancy Millis Award Winner, Professor Emma Johnston, and a number of Academy Council members.

The Wikibomb attracted significant news coverage across television, radio, newspapers and online news sites.

It was followed the same day by the ACT launch of National Science Week by ACT Chief Minister Katy Gallagher. It was a fun night filled with science and musical performances, fire twirling and ice sculpture, and talks by Professor Holmes and visiting astronaut Richard Hieb.

Later in the week, former Climate Change Institute Director, the late Professor Mike Raupach FAA FTSE, enlightened an attentive Shine Dome and online audience with his talk, 'The past, present and future of Australian environmental science'. Professor Raupach spoke of the fundamentally trans-disciplinary nature of future environmental research, and highlighted the importance of narrative in exploring how new environmental understanding is shaping societal ethics as humans learn to live in vulnerable ecosystems.

## Annual Speaker Series

Through its annual speaker series, the Academy proudly showcases great Australian science and informs the public about scientific issues of national importance. These well-attended lectures are held at the Shine Dome in Canberra, broadcast live via the internet, and made available for later viewing on the Academy's YouTube channel.

### 2014: Science stars of tomorrow

The 2014 speaker series featured some of Australia's 'Science stars of tomorrow' —young Australian scientists whose work offers new insights into outer space, inner space and the world around us. It was chaired by three prominent public friends of science,

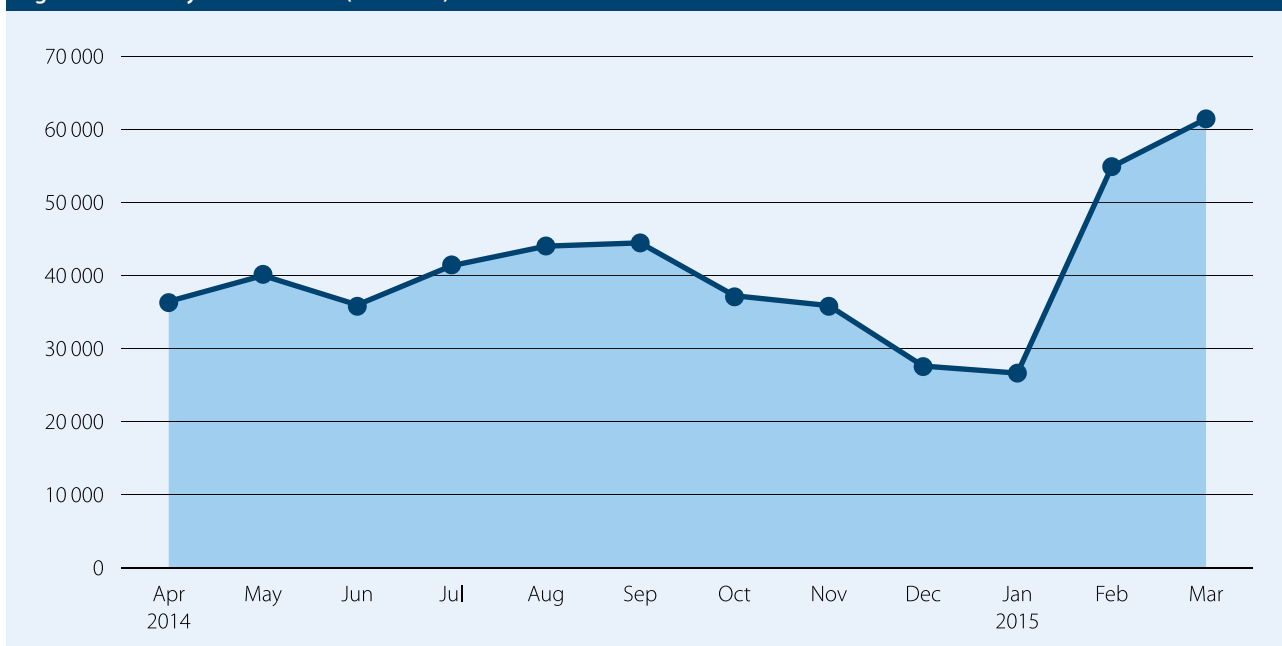
'Great series. Good to increase public access to good science. There is a need.'

'Brilliant speaker and fantastic explanations when answering the questions. Very friendly language.'

SCIENCE STARS OF TOMORROW AUDIENCE FEEDBACK

veteran science broadcaster Professor Robyn Williams AM FAA, former Climate Commissioner Professor Tim Flannery FAA and ABC journalist Louise Maher.

**Figure 4: Academy website traffic (sessions\*)**



\* A session is a measure of activity a user undertakes on a website during a specified period of time, similar to a visit.

The series featured talks on new findings in autism spectrum disorder, flexible electronics and wound-healing antibacterial dressings, extreme weather events, the evolution of venom, young driver road safety, nanotechnology for vaccine delivery, the mathematics of zombies, cosmic magnetism, and the project to build the world’s biggest telescope. Read more and watch the talks at [www.science.org.au/science-stars-tomorrow](http://www.science.org.au/science-stars-tomorrow).

Talks in the series attracted an average of 146 attendees with an additional 12 watching in real time on YouTube.

**2015: Science fiction becomes science fact**

The 2015 series explores where the work of scientists meets the imagination of writers. Lasers, robots, rocket ships and atomic power were all described in fiction long before they became a reality. It features Australian scientists working in artificial intelligence, quantum computing, invisibility, mind control and more.

The series is convened by Professor Bryan Gaensler <sup>FAA</sup> and chaired by Dr Rod Lamberts of the Australian National Centre for the Public Awareness of Science. See [www.science.org.au/public-speaker-series](http://www.science.org.au/public-speaker-series)

**Other presentations and lectures**

The Academy also staged or supported other presentations and lectures in Canberra and other locations (see Table 14), often taking advantage of visits by international scientists. More information can be found at [www.science.org.au/events](http://www.science.org.au/events)

**2014 Science at the Shine Dome**

The Academy’s flagship annual event to celebrate science is held in May in association with the Annual General Meeting (AGM)



March 2015 speaker, forensic scientist Annalisa Durdle

for Fellows. It incorporates the formal admission of new Fellows, the presentation of career and early- and mid-career honorific awards (see Strategy 5), the annual dinner and a symposium, as well as a professional development and networking program for early- and mid-career researchers (EMCRs) (see Strategy 2).

In 2014 a distinctly celebratory air was brought to the 60th anniversary event by special messages from His Royal Highness the Prince of Wales, the Prime Minister the Hon Tony Abbott MP, and all living former Presidents of the Academy; a Dome-shaped birthday cake (see photo next page); the lighting of Canberra’s Telstra Tower in Academy colours; and displays of Academy memorabilia.

The new Fellows’ seminar featured an outstanding array of scientists who spoke on topics as diverse as photocatalyst systems for water and air purification, the mathematics of soap bubbles, breast cancer gene mutations, controlling plant disease, healthcare in developing nations, predicting turbulent fluid flows, and what memes have to teach us about evolution.



**Table 14: Occasional presentations and lectures**

Date	Event	Presenter(s)	Location
August 2014	The past, present and future of environmental science	Professor Mike Raupach FAA FTSE	Shine Dome, Canberra
August 2014	Boyer Lectures	Professor Suzanne Cory AC FAA FRS	Melbourne (and broadcast on Radio National and ABC 2)
September 2014	Nuclear reprogramming: past, present and prospects	Sir John Gurdon	Shine Dome, Canberra
September 2014	Reactive intermediates and unusual molecules: photo and thermo-chemistry of tetrazoles, sydnonones and related compounds	Professor Curt Wentrup FAA, David Craig Medallist	Sydney, Melbourne
September 2014	Superconductivity: Lloyd Rees Lecture	Dr Cathy Foley FTSE	Canberra, Melbourne
October 2014	The green economy	Professor Cheryl Praeger AM FAA	South Korea
November 2014	Green photonics-empowered big data centres	Professor Min Gu FAA FTSE, Wark Medallist	Melbourne
December 2014	Trapping ions and creating quantum logic devices	Professor Rainer Blatt, 2013 Frew Fellow	Fremantle, Brisbane, Sydney, Canberra, Melbourne

## BRAIN BOX

'I was only four years old when I announced that I was going to make venomous snakes my life's work, and somehow I've managed to turn that childhood passion into a career.' So says Associate Professor Bryan Fry in one of the Academy's first Brain Box podcasts. Brain Box was launched this year as a channel on YouTube and a podcast on iTunes, with the aim of showing the personal side of scientists and the huge range of people, personalities and passions in Australian science.

The series features short clips of scientists speaking about their motivations, heroes, work and life experiences. Subscribe at [www.science.org.au/brain-box](http://www.science.org.au/brain-box)



Venom expert Bryan Fry



Suzanne Cory, Andrew Holmes and Gus Nossal cutting the Academy's 60th anniversary cake

PHOTO: MARK GRAHAM

Professor Jerry Adams FAA FRS gave the Macfarlane Burnet address at the start of the Awards session. He was followed by other honorific awardees who spoke about climate change science, photonic quantum information, why some statistical methods are like outdated pop stars, the interactions between contamination and communities, and much more (see Strategy 5).

At the AGM, Fellows thanked and farewelled outgoing President, Professor Cory, and officially welcomed Professor Holmes to the Presidency.

EMCRs mingled with Fellows at a barbeque at the Shine Dome then attended the formal dinner the following night, where the Academy was delighted to welcome as guests the Governor-General Sir Peter Cosgrove AK MC and Lady Lynne Cosgrove. Dinner guests heard from 2014 Academy Medallists Professor Harry Messel AC CBE and Mr Simon McKeon AO, and ABC science broadcaster Professor Williams, who commemorated 50 years



of the Science Show with a passionate dinner speech titled 'Flying over the cuckoo's nest—50 years of ABC Science'.

Science at the Shine Dome concluded with a stellar symposium, 'Australian Science: past present future', featuring high-profile Fellows of the Academy and organised by a committee led by Professor Tony Klein AM FAA.

Sir Gus Nossal AC CBE FAA FRS FTSE gave an entertaining overview of great achievements in Australian medical science and forecast a strong future in personalised medicine. Evolutionary geneticist Professor Jenny Graves AO FAA made some surprising revelations about marsupials in her presentation on the life sciences. Professor Brian Schmidt AC FAA FRS gave a talk on physics, Professor John Dewey FAA FRS of Oxford University provided an overview of Australian geoscience, Professor John White CMG FAA FRS spoke about changing chemistry through the decades, and Professor Michelle Simmons FAA explored the promise of the quantum computing revolution.

For more information see [www.science.org.au/events/science-shine-dome-2014](http://www.science.org.au/events/science-shine-dome-2014)

### Research conferences

Through the generosity of donors the Academy provides seed funding for up to three annual research conferences (see Table 15).

The National Committees for Science also provided opportunities for researchers in their discipline area to showcase advances, and to identify research and training priorities (see box page 51).

### Theo Murphy High Flyers Think Tank

The Academy's annual Theo Murphy High Flyers Think Tank brings together EMCRs from a broad range of disciplines to consider a topic of national significance.

The Academy receives support for Think Tanks from the Theo Murphy (Australia) Fund, courtesy of The Royal Society. They provide a unique opportunity for career development and network creation for participants, and report recommendations that have been well received and instrumental in influencing policy development.



Robyn Williams' annual dinner address included a passionate defence of science in the media

'A really fantastic event. I was so very honoured and humbled to be invited and to be part of such an event. . . I am so appreciative of this opportunity. Highly rewarding and memorable.'

'Great diversity of science.'

'I really appreciated the open and friendly nature of the fellows and their willingness to talk to EMCRs. The event was fantastic for networking. I also really appreciated the effort put into discussing gender equality at this meeting.'

'The professionalism of the Academy staff was outstanding.'

SCIENCE AT THE SHINE DOME PARTICIPANTS' FEEDBACK

Table 15: Research workshops and conferences

Date	Event	Supporters	Attendees
8–12 October 2014 The Garvan Institute of Medical Research, Sydney	Heme Oxygenase 2014 Sydney, Australia. An Australian Academy of Science Boden Research Conference. 8th International Conference on Heme Oxygenases, Biolron and Oxidative Stress. <a href="http://www.hemeoxygenase2014.org.au/">http://www.hemeoxygenase2014.org.au/</a>	Ikaria, NSW Government Trade and Investment, StressMarq Biosciences, Shimadzu, Mutagenesis and Experimental Pathology Society of Australasia, Agilent Technologies, Don Whitely Scientific, DMT, Randox	152
2–3 October 2014 UNSW, Sydney	2014 Fenner Conference on the Environment 'Addicted to Growth?' How to move to a Steady State Economy in Australia. <a href="http://www.ies.unsw.edu.au/our-research/steady-state-economy">http://www.ies.unsw.edu.au/our-research/steady-state-economy</a>	The Institute of Environmental Studies, UNSW/ NSW Chapter of the Center for the Advancement of a Steady State Economy/ Institute of Land, Water and Society, Charles Sturt University, The Institute of Land Water and Society CSU, Mr Dick Smith	180

## ACTIVITIES SUPPORTED BY NATIONAL COMMITTEES FOR SCIENCE

### Cities in Future Earth

The Third Australian Earth System Outlook Conference, Cities in Future Earth, was organised by the National Committee for Earth System Science and supported by the Department of the Environment.

Held in December, the conference covered environmental, economic and social issues surrounding urbanisation. It was attended by 90 researchers, academics, policy makers and interested individuals.

The conference was an important achievement for Earth system science in Australia and an important outcome of the implementation of the Earth System Science Decadal Plan, 'To live within Earth's limits: An Australian plan to develop a science of the whole Earth system', which also supports the development of other projects and initiatives such as Australia's participation in Future Earth (see Strategies 4 and 10).

### Science content of nutrition science undergraduate courses

The National Committee for Nutrition co-sponsored a workshop with the Nutrition Society of Australia and the Australian Nutrition Trust Fund in November, focusing on the diversity of science content of nutrition science included in undergraduate courses. Course coordinators outlined their respective degrees and what each course sees as key student attributes, resources that are utilised in the delivery of their

program, and career opportunities for graduating students. Coordinators formed networks which will support planning for future nutrition science programs, and shared examples of best practice at Australian institutions. The participants agreed on the need to establish consensus on what constitutes the core of a nutrition science unit or program.

### Theory meets practice: Master Class in science engagement and policy making

This one-day master class convened by the National Committee for History and Philosophy of Science aimed to apply best practice and bridge the gap between theory and practice of science communication and policy making. In each session, a leading scholar was paired with a

successful practitioner working at the front-line of science engagement to discuss practical approaches, research and future directions. The diverse audience of 90 included government officials, academics, museum curators, and PhD and postdoctoral students.

### Crossing the boundaries in biosciences education

The Collaborative Universities in Biomedical Education discipline network (CUBEnet), an initiative of the Academy's National Committee for Biomedical Sciences, is a network of biomedical academics who work to provide a sustainable framework for a program-wide approach to the biomedical curriculum. In December, the Academy hosted the annual

meeting of CUBEnet, organised in conjunction with Vision and Innovation in Biology Education (VIBEnet). The meeting brought together local and international bioscience education experts and allowed the audience to interact with speakers, examine on-going successes and explore new collaborative opportunities.

### 2014 Think Tank

The 2014 Theo Murphy High Flyers Think Tank, held in Brisbane in July, focused on the topic of 'Climate change challenges to health: Risks and opportunities'.

Fifty-eight EMCRs from across Australia and two from New Zealand explored the topic with the help of senior experts. Discussion focused on temperature and extreme weather events; infectious disease ecology and epidemiology; food and water supplies; livelihood and disadvantage; and security, social instability and conflict.

Each theme was addressed by a small multidisciplinary group who proposed potential solutions to addressing the impacts of a

warming global climate on human health. Professor Ian Lowe AO, President of the Australian Conservation Foundation, addressed the Think Tank dinner held at the Queensland Museum.

A short video featuring comments by the senior experts, released shortly before the event, helped to attract greater than usual media attention, including from the BBC.

Benefits for attendees included learning skills for negotiating and dealing with complex issues in interdisciplinary groups, identifying potential collaborative partners, receiving invitations for papers, exploring potential new areas of research and increasing connections with EMCRs.



2014 Theo Murphy High Flyers Think Tank participants

Sadly, the Think Tank's opening speaker and steering committee member Professor Tony McMichael AO FTSE, an internationally-recognised expert on health and climate change, passed away in late 2014.

### Theo Murphy Frontiers of Science

Increasingly, the most significant research advances are occurring at the interface of disciplines. The aim of the Theo Murphy Frontiers of Science symposia is to bring together the very best young Australian scientists in multidisciplinary areas of science to discuss emerging scientific issues and identify potential opportunities for future research collaboration. Like Think Tanks they are supported by The Royal Society's Theo Murphy (Australia) Fund.

The symposia are organised by EMCRs under the guidance of Academy Fellows and other experts. The chairs of sessions and speakers are all EMCRs.

The 2014 Frontiers of Science symposium, The edges of astronomy, was held in December at the Shine Dome and involved 61 EMCRs from universities, government and industry. As the scope of the event went beyond conventional astronomy research boundaries, mentors with experience from disciplines at the 'edges' of astronomy were also invited to speak at the event and be part of panel discussions to pass on their perspectives.

The event commenced with a welcome reception hosted by Academy President Professor Holmes following a presentation, Building the world's biggest telescope, by Dr Lisa Harvey-Smith, CSIRO Astronomy and Space Science, that formed part of the Academy's 2014 public speaker series. 'Stand-up mathematician', Mr Simon Pampena, was the speaker at the event's dinner held at the Australian National Botanic Gardens.

Attendees benefited from the wide variety of participants' backgrounds and topics, the panel discussions and the networking opportunities. (See box page 53).

## PROMOTING SCIENCE AWARENESS

The Academy continued to participate actively in broader outreach activities across the science sector. These included being a founding member of the national non-government Science Sector Group, which works collaboratively to promote scientific issues of national significance; participating in organising committees for National Science Week 2014 (see box page 47); partnering with the Australian Science Media Centre; and providing support for the annual Science Meets Parliament and Science Meets Policymakers events.

The Academy also continued to partner with the National Youth Science Forum (see photo page 54), a summer school that exposes around 200 year 11 students talented in science, mathematics or engineering to major scientific institutions and researchers. Dr TJ Higgins FAA FTSE addressed the students at the Shine Dome in January 2015 on behalf of the Academy.

### Expert information about science

In 2014 the Academy was thrilled to receive a \$1 million donation from Telstra in response to The Enlightening Campaign (see page 11) to support the complete redevelopment and revitalisation of 'Nova: science in the news'. This longstanding high quality and popular online science education resource is suitable for a broad audience and work has commenced on new topics and website branding. Topics by will be enhanced by interactive and visually-rich elements and the new Nova is due to be launched in mid-2015.

## ACADEMIC SCIENCE PUBLICATIONS

### Historical Records of Australian Science

Historical Records of Australian Science (HRAS) is published in June and December each year by CSIRO Publishing on behalf of the Academy. HRAS publishes peer-reviewed articles on the history of science in Australia and the southwest Pacific, and biographical memoirs of deceased Fellows of the Academy.





2014 Theo Murphy Frontiers of Science participants at the Shine Dome

## 2014 THEO MURPHY FRONTIERS OF SCIENCE: A PARTICIPANT'S PERSPECTIVE

'The edges of astronomy' [had a] focus on the links between astronomy and the 'outside world'—society, government, industry and other disciplines.

It was particularly illuminating to see the perception of astronomy from outside the field. We cannot convince 'astronomy stakeholders' of the value of astronomy using historical, entitlement or cultural reasons alone; more than ever, it is critical to share the worth of astronomy with the world, and it was useful to see how this might be done.

Another highlight... was hearing the stories of previous astronomers who had since left the field to pursue other disciplines. In hearing their backgrounds, I saw a common thread in their tales—all had a very hands-on experience with telescopes, instruments and data during their time as an astronomer. One of the common concerns about moving into an era of remotely-controlled telescopes, which I share, is how we give those hands-on experiences to the next generation of astronomers. These experiences equip young scientists with both the knowledge and the experience to potentially build new instruments or forge paths in new fields, and it is critical that we ensure such experiences continue.

The session on outreach looked at how and why science is communicated to society, and how important it is for science to be shared with people who are not already supportive of science.

I gained from this meeting a new perspective on how astronomy and science are viewed from the outside, in society, industry, government and education. It is clear that we as scientists have to take an active role in shaping that perception, communicating with as many different audiences as possible. I, like many of the early-career researchers at this year's Frontiers of Science, have no idea what path I will take or where I will end up in future. But we are explorers of the Universe, and we all share a love of science. With the new perspectives gained here, each of us can hopefully take this passion to new frontiers in astronomy and beyond.

### Dr Vanessa Moss

Postdoctoral researcher  
ARC Centre of Excellence for All-sky Astrophysics  
University of Sydney



Vanessa Moss

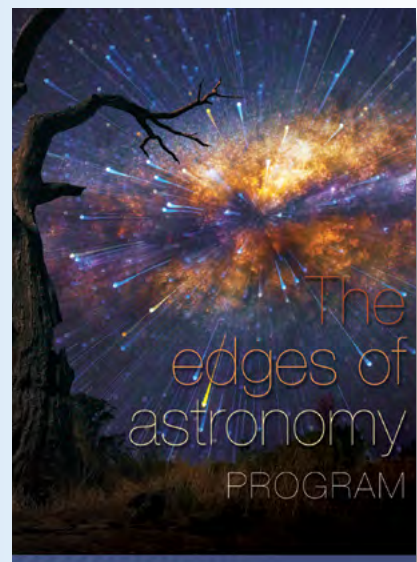






PHOTO: NSF

The National Youth Science Forum brought talented secondary science students to the Shine Dome as part of their summer school

For the 2014 calendar year (the period for which data is available), HRAS had 86 institutional subscribers and was downloaded 10,528 times. Of the 40 articles published, 18 were reviews, 12 historical and 10 biographical memoirs. The number of people registered to receive early alert emails of upcoming editions was 810 for the June edition and 839 for December.

The long-serving joint editors, Professor Rod Home AM FAHA and Professor Libby Robin FAHA, retired from their posts. The Academy is grateful for their dedicated service—20 years for Professor Home. Professor Ian Rae and Dr Sara Maroske are the journal's new editors, while Professor Robin will remain on the journal's editorial board which is chaired by Dr John Passioura FAA.

Following a review of the journal and a survey of readership, HRAS will be published online only, with hard copies available on request for an annual subscription of \$110.

Memoirs are available on the Academy website after publication, at [www.science.org.au/deceased-fellows-and-memoirs](http://www.science.org.au/deceased-fellows-and-memoirs). Online subscriptions are available at [www.publish.csiro.au/?nid=108](http://www.publish.csiro.au/?nid=108) (Fellows are subscribed to the online version for free).

### Australian journals of scientific research

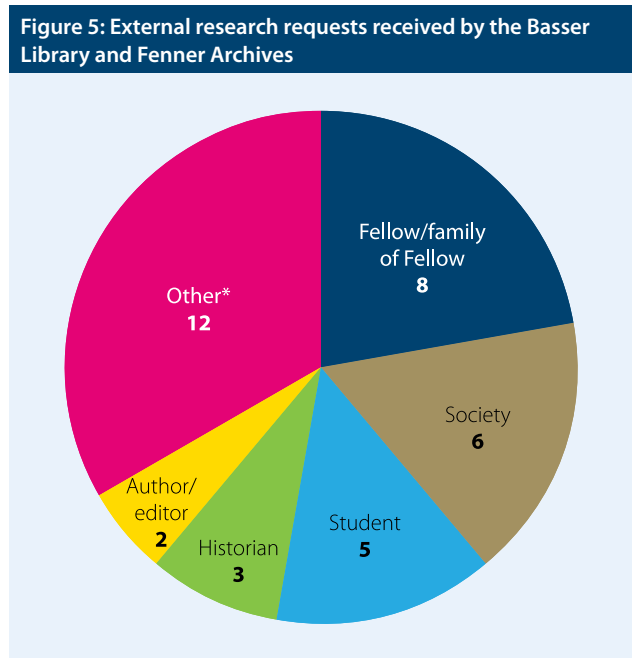
The Academy and CSIRO jointly publish 13 Australian journals of scientific research (see Appendix 8 for a list of journals and Editors-in-Chief).

The journals have an international readership, with subscribers in 90 countries. They can be accessed for free by scientists in more than 100 developing nations through the United Nations' Research4Life program. About half the published papers originate outside Australia. Editorial policy is determined by a Board of Standards, which is jointly chaired by CSIRO and the Academy. In 2014 Professor Holmes stepped down as the Academy's co-Chair and was replaced by Professor Barbara Howlett FAA. Details of these and other journals published at CSIRO are available at [www.publish.csiro.au/%20nid/50.htm?nid=17](http://www.publish.csiro.au/%20nid/50.htm?nid=17)

### BASSER LIBRARY AND FENNER ARCHIVES

Located in the Shine Dome, the Basser Library and Fenner Archives collect published and unpublished material

documenting the history of science in Australia, with a particular emphasis on collecting biographical material about pre-eminent scientists. The archival manuscript collections grew with the addition of donated material, including publications of Professor Ray Stalker AO FAA FTSE and an unpublished book manuscript by Professor Lourens Baas Becking. The Librarian received 105 research requests from internal and external clients (see Figure 5 for external requests).



\* Includes non-Fellow scientists, universities, government agencies and other organisations

Materials accessed this year included architectural information about the Shine Dome and Ian Potter House, Fellows' collections, scientific society archives, and ephemera.

The Academy installed new library software and commenced digitising the catalogue to make it searchable online. The catalogue can be accessed at <http://library.science.org.au>

### Library Committee

The Library Committee advises Council on the operation and development of the Basser Library.

Dr David Branagan, University of Sydney, resigned from the committee after a phenomenal 42 years of service, and Professor Joe Gani FAA also stepped down after 13 years. The Academy and committee members warmly thank them for their invaluable support and contributions over the years, in particular for their involvement in the current library review, their involvement with the Moran History of Science Research Committee and the Moran Award Selection Committee respectively.

Professor Patrick De Deckker AM FAA was appointed to the committee in October. Dr Wolf Mayer, visiting Fellow at the Australian National University, will join in 2015.



## **Objective C**

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





# 8

## Working with others to provide expertise on scientific matters

The Academy seeks to inform and engage with parliamentarians and relevant government officials, and liaises with other organisations in the research sector to increase awareness of Academy Fellows as an expert resource, and to raise awareness of key science issues and important achievements.

### NETWORKING WITH GOVERNMENT

The Academy consistently expressed the importance of having a Minister for Science and was pleased when, in December, Prime Minister the Hon Tony Abbott MP formally added the title to the portfolio responsibilities of the Minister for Industry, the Hon Ian Macfarlane MP. Academy President Professor Andrew Holmes AM PresAA FRS FTSE and Secretary for Science Policy Professor Leslie Field AM FAA were invited to meet with the new Parliamentary Secretary for Industry and Science, the Hon Karen Andrews MP, soon after her appointment. In addition, five Fellows were appointed to the new Commonwealth Science Council that replaced the Prime Minister’s Science, Engineering and Innovation Council (see Table 16 for membership). A number of Fellows worked with the Office of the Chief Scientist to identify new national science and research priorities for approval by the Commonwealth Science Council and ultimately for consideration by the Government for future funding.

Academy representatives met with departmental officials to provide practical, science-based perspectives on a range of

Table 16: Membership of Commonwealth Science Council	
<b>Ex Officio</b>	
The Prime Minister (Chair)	
The Minister for Industry and Science (Deputy Chair)	
The Minister for Education and Training	
The Minister for Health	
Australia’s Chief Scientist	
<b>Individual</b>	
<b>Scientists</b>	
Professor Timothy Davis	
Professor Ian Frazer AC FAA FTSE	
Professor Nalini Joshi FAA	
Professor Tanya Monro FAA FTSE	
Professor Brian Schmidt AC Nobel Laureate FAA FRS	
<b>Business leaders</b>	
Mr Ken Boal	
Dr Michael Chaney AO FTSE	
Dr Jackie Fairley	
Mr David Knox FTSE	
Ms Catherine Livingstone AO FAA FTSE	

government policy initiatives including the development of a national science strategy, the industry innovation and competitiveness agenda, and the future of the National Collaborative Research Infrastructure Strategy (NCRIS). The Academy’s input was also sought on the terms of reference for the threatened species commissioner, and in regard to the trial process and amendment bill for the *Defence Trade Control Act 2012* which aims to strengthen controls for the export of certain ‘dual-use’ technologies developed for commercial or scientific purposes which may also be used for military purposes.

### ALLIANCES WITH STAKEHOLDERS

#### National Research Alliance

The Academy convened the second meeting of the National Research Alliance at the Shine Dome in April, just prior to the release of the National Commission of Audit and the 2014



## ALLIANCE CAMPAIGN GETS RESULTS

In early 2015 the Australian research community was galvanised into collective action under the banner of the National Research Alliance following uncertainty of funding for the National Collaborative Research Infrastructure Strategy (NCRIS). The Academy worked with other Alliance members to coordinate a campaign to raise awareness of the need for the continued availability of facilities established under NCRIS funding. High-profile scientists and members of the business community made personal representations to Ministers and cross-bench Senators, Alliance members wrote an open letter to the

Prime Minister outlining the adverse impacts caused by the funding uncertainty (see [www.science.org.au/news/australian-research-infrastructure-preparing-shutdown](http://www.science.org.au/news/australian-research-infrastructure-preparing-shutdown)). A concerted communications strategy through media and social media generated significant attention, including newspaper editorials and cartoons. The Academy welcomed the Government's subsequent announcement of funding NCRIS for the next 12 months as an important first step towards establishing a viable future for Australia's research infrastructure.



The National Research Alliance's NCRIS campaign attracted intense media interest

Federal Budget. The Alliance is a broad-based grouping of research bodies and professional organisations that has supported calls from the Business Council of Australia and the Chief Scientist of Australia for a research and innovation strategy—a three-way partnership between government, business and researchers for a more productive and innovative nation.

Emphasising that Australia must maintain a healthy balance between fundamental and applied research, medical and non-medical, the hard technical disciplines and the social sciences and humanities, the Alliance indicated its willingness to work with the Government to achieve the Government's election commitment to provide the long-term stable policies and vision that scientists and researchers need to excel in their work.

Future funding of NCRIS was a major focus of the Alliance's activities (see box above).

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### Research agency meetings

The Australian Nuclear Science and Technology Organisation (ANSTO) organises quarterly research agency meetings, attended by approximately 20 organisations, to provide updates on their activities and discuss research matters of national concern such as international collaborations, research funding, white and green papers, inquiries, reviews and discussion papers. Organisations represented at these meetings include the four Learned Academies, government departments, funding agencies and research organisations.

# 9

## Providing authoritative advice to inform policy and decision-making

While the Academy does not take part in political debate, its membership base of Australia's top research scientists with internationally recognised expertise represents a potent source of independent, expert advice to inform and clarify debates and answer questions on science, technology and research issues.

### SCIENCE IN AUSTRALIA GENDER EQUITY FORUM

Under the leadership of the Science in Australia Gender Equity (SAGE) Forum Steering Committee (see Table 17 for membership), the Academy convened leaders from the broad science and research sector (including universities, medical research institutes, government research bodies and research funders) in November to explore whether an initiative similar to the UK's Athena SWAN Charter could help address the chronic under-representation and loss of female talent in Australia's scientific workforce (for more information see [www.science.org.au/events/sage-forum-workshop/schedule](http://www.science.org.au/events/sage-forum-workshop/schedule)).

Representatives from the UK Equality Challenge Unit which manages the Charter, outlined their experience to date, and workshop participants discussed how a similar initiative might work in Australia. Several institutions expressed interest in participating in a pilot program that is currently under development.

### INFLUENCING BUDGET PROCESSES

The Academy's analyses of the 2014 Federal Budget acknowledged that a proposed new \$20 billion Medical Research Future Fund provided a positive vision, and welcomed additional support for the agricultural research and development corporations. However, its overall conclusion was that cuts to most of Australia's major research agencies and the Cooperative Research Centres Program of over \$400 million, coming on top of an overall decline in the science budget of \$470 million since 2011, would leave the rest of Australian science substantially weakened (for more detail see [www.science.org.au/sites/default/files/user-content/2014-15federalbudgetinitialanalysis.pdf](http://www.science.org.au/sites/default/files/user-content/2014-15federalbudgetinitialanalysis.pdf)).

**Table 17: SAGE Forum steering committee members**

**Professor Nalini Joshi FAA (co-Chair)**

University of Sydney, Academy Council member, and Georgina Sweet Australian Laureate Fellow

**Nobel Laureate Professor Brian Schmidt AC FAA FRS (co-Chair)**

Australian National University, Academy Council member,

**Professor Jenny Martin**

University of Queensland, Australian Laureate Fellow, and member of the NHMRC Women in Health Sciences Committee

**Professor Caroline McMillen**

University of Newcastle, Vice-Chancellor and President

**Dr Marguerite Evans-Galea**

Murdoch Childrens Research Institute, and former Chair of the Academy's Early- and Mid-Career Researcher Forum

**Dr Roslyn Prinsley**

Office of the Chief Scientist, National Adviser Maths and Science Education and Industry

**Professor Sharon Bell**

Charles Darwin University, Deputy Vice-Chancellor and author of 2009 report for Science and Technology Australia 'Women in Science in Australia: Maximising productivity, diversity and innovation'

The Budget contained allocations in two areas that the Academy had identified as high priority in its 2014 pre-Budget submission to Treasury: the expiring National Collaborative Research Infrastructure Strategy (NCRIS) (see Strategy 8) and the Australian Research Council (ARC) Future Fellowship scheme. It also delivered on pre-election commitments to continue to fund the Academy's education programs (see Strategy 6).

In response to subsequent uncertainty (see Strategy 8), the Academy's 2015 pre-Budget submission to Treasury recommended maintaining science funding at current levels until the Government has considered its response to the Chief Scientist's 'Science, Technology, Engineering and Mathematics: Australia's Future' strategy. It also proposes that a fixed percentage of overall Government investment in science be allocated to maintaining and operating vital research infrastructure. For more detail on the submission, see [www.science.org.au/sites/default/files/user-content/2015-16\\_pre-budget\\_submission\\_to\\_treasury.pdf](http://www.science.org.au/sites/default/files/user-content/2015-16_pre-budget_submission_to_treasury.pdf)



Participants in the SAGE Forum workshop in November explored how to address the under-representation of females in Australia's scientific workforce

## EXPERT INPUT TO UNDERPIN SCIENCE AND RESEARCH POLICY

Drawing on the scientific knowledge and expertise of the Fellows and the National Committees for Science, the Academy undertakes rigorous research and review processes to prepare reports and provide submissions and responses to consultations, reviews and inquiries. It also provides scientific assessment and evidence on issues of public concern, or affecting the sustainability of science and research in Australia.

### Submissions and responses

The Academy responded to 19 consultations, reviews and inquiries on topics relevant to Australian science and research (see Appendix 5). These included submissions to white papers on agricultural competitiveness and defence, an inquiry into Australia's innovation system, and reviews of the CRC program and space weather services.

In addition, responses were provided to discussion papers on a support program for entrepreneurs, proposed research funding rule changes, and enhancing the commercial returns from research. The Academy's commentary on a draft sustainability plan for the Great Barrier Reef received extensive national and international media coverage.

### Impacts of inputs

The Academy's previous submissions continued to contribute in a meaningful way to state and federal policy formulation. The areas impacted include Antarctic research, research spending priorities, the national science curriculum, the development of northern Australia and alpine grazing in Victoria (see Appendix 6).

### Identifying experts to support strategy and policy

The Academy was asked to identify relevant experts to participate in a range of review and assessment processes, including working groups established by the Chief Scientist for Australia, Professor Ian Chubb AC FTSE, regarding:

- studies of Australia's capability in science, technology, engineering and maths (STEM) education
- identification of Australia's strategic science and research priorities

- Prime Minister's Science Prizes
- Australian Research Council's Excellence in Research for Australia Research Evaluation Committees
- NHMRC Council and Principal Committees
- independent review of the Bureau of Meteorology's surface air temperature dataset.

The National Committees for Science were also asked to provide nominations for the ARC's 2015 Excellence in Research for Australia evaluation committees.

## Economic contribution of advanced physical and mathematical sciences

A report commissioned by the Academy and the Office of the Chief Scientist found that developments made in physical and mathematical sciences during the last 20 years make a direct contribution to the Australian economy of about \$145 billion a year.

The report, 'The importance of advanced physical and mathematical sciences to the Australian economy', was produced by the Centre for International Economics (CIE). The Centre worked closely with relevant National Committees for Science as it attempted to quantify the direct and indirect economic contributions of physics, mathematics, chemistry and earth sciences.

Key findings were that:

- the economic benefit of these scientific fields, including flow-on benefits, is about \$292 billion annually, or about 22% of the nation's economic activity
- 7% of total Australian employment (about 760 000 jobs) is directly related to the advanced physical and mathematical sciences
- exports associated with these sciences are worth about \$74 billion a year.

The report was launched at Parliament House during Science Meets Parliament in March by the Chief Scientist Professor Ian Chubb AC FTSE, CIE Executive Director David Pearce, and Chair of the National Committee for Physics Professor Hans Bachor AM FAA. The report is published at [www.science.org.au/publications/science-impacts-economy](http://www.science.org.au/publications/science-impacts-economy)



# 10

## Anticipating and communicating scientific impediments and opportunities

### EXPERT COMMENTARY ON EMERGING OR CONTENTIOUS SCIENCE ISSUES

#### Autologous stem cell therapies

Therapies involving the use of cells or their derivatives may come with many additional risks to patients, including tumour formation, unless stringent safeguards are in place.

The Academy's National Committee for Cellular and Developmental Biology identified a weakness in current regulations administered by the Therapeutic Goods Administration (TGA) that allowed proponents of unproven stem cell treatments, which have not been through a clinical trial process, to bypass regulatory constraints if they use cells extracted directly from a patient—so-called autologous cell therapy.

Following additional consultation with both the committee and Stem Cells Australia, a consortium of Australia's leading universities and research organisations in stem cell research, the Academy raised the issue with the then Minister for Health, the Hon Peter Dutton MP, providing detailed advice on both the nature of the problem and potential solutions. The Department of Health invited the Academy to provide a formal submission to a consultation paper subsequently released by the TGA on the regulation of autologous stem cell therapies.

The Academy's submission outlined the potential dangers of such unproven therapies and highlighted that Australia's current system falls short of both international expert opinion and the regulatory trends emerging in the United States and Europe. It concluded with a call for regulatory change to protect vulnerable patients from exploitation and risk at the hands of unethical practitioners (see Appendix 5).

#### Science Questions and Answers publications

The Academy's Questions and Answers (Q&A) publications aim to address confusion in the public domain created by contradictory information on science matters. They set out to explain the current state of knowledge, including where there is consensus in the scientific community and where uncertainties exist.



The Academy seeks funding from appropriate organisations to cover project management and publishing costs but retains complete editorial control of the publications. Panels of Academy Fellows and other leading subject matter experts provide their skills and expertise *pro bono* to produce comprehensive, authoritative and easy-to-read documents.

#### Updated science of climate change Q&A

In February the Academy released an extensively revised version of its 2010 publication that summarised the state of knowledge on climate change science at that time. Taking into account new data sources like the '5th report of the Intergovernmental Panel on Climate Change', the revised publication aims to explain the science, including its uncertainties and implications, to the Australian community in simpler terms than are generally found in such reports.

The report contains responses to eight questions about climate change and its impacts, and a ninth that discusses what the science says about options to respond to the consequences of future change.

**Table 18: Academy representation in Securing Australia's Future research program**

Committee / Expert Working Group	Representative
Program Steering Committee	Professor Michael Barber FAA FTSE (Chair) Professor James Angus AO FAA Professor Stephen Powles FAA FTSE
SAF 1 Australia's comparative advantage	Professor Graham Farquhar AO FAA FRS
SAF 3 Asia literacy—language and beyond	Professor Chennupati Jagadish FAA FTSE (also sought input via a survey of Fellows with strong links to Asia)
SAF 4 The role of science, research and technology in lifting Australian productivity (complete)	Professor Bob Frater FAA FTSE (Co-Chair)
SAF 5 New technologies and their role in our security, cultural, democratic, social and economic systems	Professor Rob Evans FAA FTSE (Co-Chair) Professor Bob Williamson FAA (Co-Chair)
SAF 7 Australia's agricultural future	Professor Graham Farquhar AO FAA FRS
SAF 8 Sustainable urban mobility	Professor Bruce Armstrong AM FAA FRACP FAFPHM
SAF 9 Translating research for economic and social benefit: Country comparisons	Professor Les Field AM FAA

## AUSTRALIAN COUNCIL OF LEARNED ACADEMIES

The Australian Council of Learned Academies (ACOLA) comprises the Presidents of Australia's four Learned Academies: the Australian Academy of Science, the Australian Academy of the Humanities, the Academy of Social Sciences in Australia, and the Australian Academy of Technological Sciences and Engineering. The ACOLA Secretariat Pty Ltd, established concurrently with the Council, is made up of the Chief Executive equivalents of the Learned Academies, and conducts projects and activities on behalf of the Council.

The Council met in July and October and held a strategic planning meeting in February. The Secretariat Board met in July, October, November (AGM) and March.

### Securing Australia's future with a strong evidence base

In June 2012 the Australian Government announced the allocation of \$10 million over three years through the Australian Research Council (ARC) Learned Academies Special Projects (LASP) scheme to provide research-based evidence for policy development to Australia's Chief Scientist, the Prime Minister's Science, Engineering and Innovation Council and, since October 2014, the Commonwealth Science Council.

ACOLA established a Program Steering Committee, made up of three Fellows from each Learned Academy, to oversee the research conducted within the overarching framework of Securing Australia's Future (SAF) program, including the work of the Expert Working Groups and peer reviewers appointed for each project.

Although the expertise of all four academies is represented on each working group, different academies have assumed responsibility for particular research projects. Of the six projects agreed initially, three have been complete and three are ongoing. An additional two projects were approved for commencement in July and a further two in November. The Academy is supporting SAF Project No. 5: New technologies and their role in our security, cultural, democratic, social and economic systems (see Table 18 for the Academy's representation on SAF projects).

More information on ACOLA and the SAF program is at [www.acola.org.au/index.php/projects/securing-australia-s-future](http://www.acola.org.au/index.php/projects/securing-australia-s-future)

### Strategic Plan for Future Earth in Australia

In March, ACOLA allocated funds to the Academy to support the development of a comprehensive strategy for Australia's engagement in the Future Earth initiative (see Strategy 4 and [www.futureearth.org](http://www.futureearth.org)). An inter-academy committee will consult widely with the research community, key decision makers from government, business and industry and other organisations at the interface of science and policy to seek input to the strategy.

### INTERACADEMY PANEL (IAP) STATEMENT

The work of the world's academies of science, medicine and engineering has resulted in lives saved, better education, and more effective policy approaches to a range of issues. In May the Academy endorsed an IAP Statement on 'Realising global potential in synthetic biology: Scientific opportunities and good governance' [www.interacademies.net/File.aspx?id=23974](http://www.interacademies.net/File.aspx?id=23974)

# Academy infrastructure

## THE SHINE DOME AND IAN POTTER HOUSE

The Academy is housed in two heritage-listed buildings: the purpose-built Shine Dome—opened in 1959 and the first Canberra building to be included on the National Heritage List—and the adjacent Ian Potter House, completed in 1927.

As well as housing the Basser Library and Fenner Archives (see Strategy 7) and offices for a number of Academy staff, the Shine Dome is a well-used meeting, lecture and conference venue for the Academy. It also remains a popular conference and meeting

venue for government and other organisations. An estimated 8400 people attended meetings, conferences, seminars and speeches there during the year (see Figures 6 and 7).

Information about hiring the Dome, including a 3D virtual tour, is at [www.science.org.au/hiring-shine-dome](http://www.science.org.au/hiring-shine-dome)

## IMPROVEMENTS

A range of capital works were completed during the year, including:

- upgrade to Marcus Clarke Street gardens
- replacement of Level 1 kitchen in Ian Potter House
- installation of heritage-compliant glass guard rails on Shine Dome moat bridges
- upgrade to audio visual equipment in the Shine Dome
- installation of an additional ladies toilet in the Shine Dome
- replacement of the Jaeger room, corridor and male cloakroom carpet in the Shine Dome.

The venue is beautiful and we will definitely be using the Australian Academy of Science in the future for our Canberra events.

CURRIE COMMUNICATIONS

Figure 6: Shine Dome use (days per month)

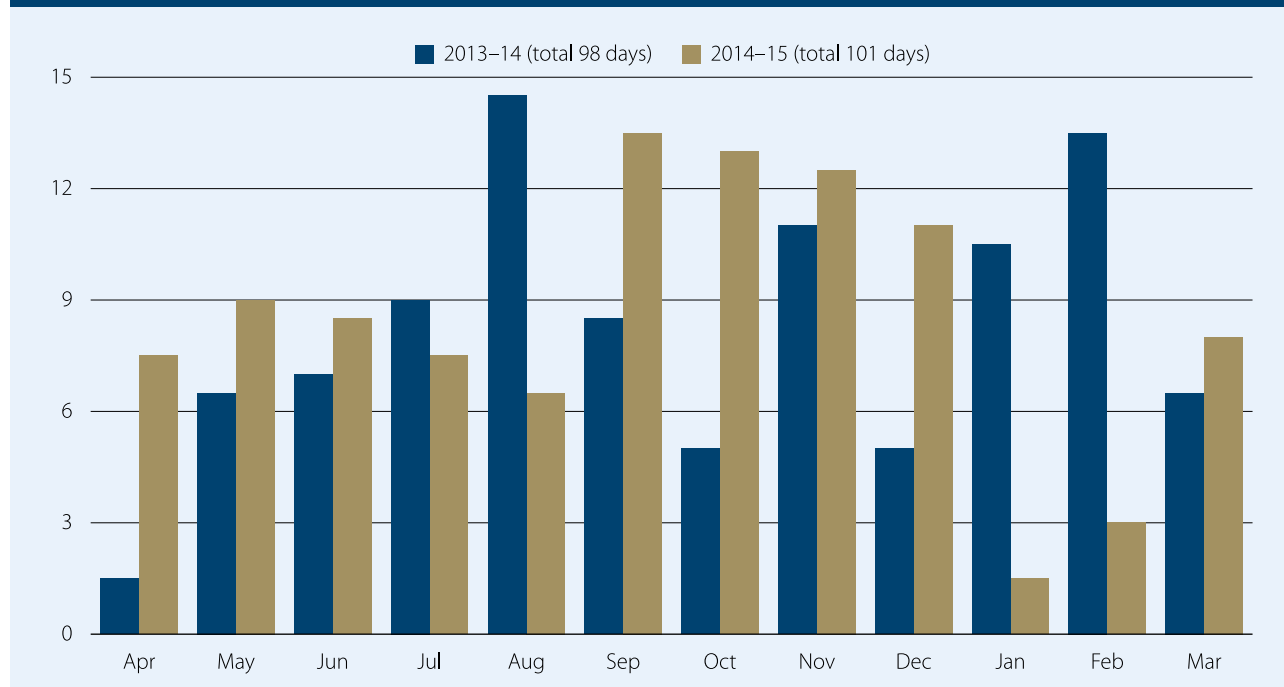
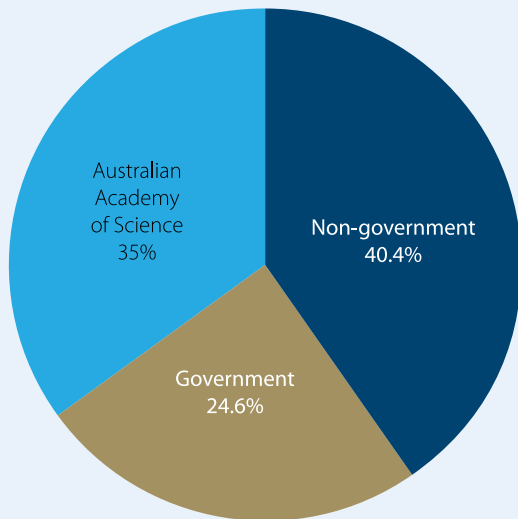




Figure 7: Shine Dome use (type of hirer)



'Thank you for the professional work . . . hosting our showcase this year. It was one of our best on record.'

'Once again, great result for NHMRC from hosting our briefings at the Shine Dome.'

SHINE DOME HIRERS



Heritage-compliant glass guard rails were installed on the Shine Dome moat bridges



# Abbreviations

<b>AASSA</b>	Association of Academies and Societies of Sciences in Asia	<b>FTSE</b>	Fellow of the Australian Academy of Technological Sciences and Engineering
<b>AC</b>	Companion of the Order of Australia	<b>HRAS</b>	Historical Records of Australian Science
<b>ACT</b>	Australian Capital Territory	<b>IAC</b>	InterAcademy Council
<b>ACOLA</b>	Australian Council of Learned Academies	<b>IAMP</b>	InterAcademy Medical Panel
<b>AEMASE</b>	African–European–Mediterranean Academies for Science Education	<b>IAP</b>	InterAcademy Partnership (previously the InterAcademy Panel)
<b>AM</b>	Member of the Order of Australia	<b>ICSU</b>	International Council for Science
<b>ANU</b>	Australian National University	<b>ISU</b>	international scientific union
<b>AO</b>	Officer of the Order of Australia	<b>JSPS</b>	Japan Society for the Promotion of Science
<b>ANSTO</b>	Australian Nuclear Science and Technology Organisation	<b>KBE</b>	Knight Commander of the Order of the British Empire
<b>ARC</b>	Australian Research Council	<b>LASP</b>	Learned Academies Special Projects
<b>ATSE</b>	Academy of Technological Sciences and Engineering	<b>NCRIS</b>	National Collaborative Research Infrastructure Strategy
<b>CAS</b>	Chinese Academy of Sciences	<b>NHMRC</b>	National Health and Medical Research Council
<b>CBE</b>	Commander of the Order of the British Empire	<b>NC</b>	National Committee for Science
<b>CEO</b>	Chief Executive Officer	<b>PresAA</b>	President of the Australian Academy of Science
<b>CMG</b>	Commander of the Order of Saint Michael and Saint George	<b>Q&amp;A</b>	question and answer
<b>CRC</b>	Cooperative Research Centre	<b>R&amp;D</b>	research and development
<b>CSIRO</b>	Commonwealth Scientific and Industrial Research Organisation	<b>RMIT</b>	RMIT University
<b>EAPSI</b>	East Asia and Pacific Summer Institutes	<b>SAF</b>	Securing Australia's Future
<b>EMCR</b>	early- and mid-career researcher	<b>STEM</b>	Science, technology, engineering and mathematics
<b>FAA</b>	Fellow of the Australian Academy of Science	<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organization
<b>FAHA</b>	Fellow of the Australian Academy of the Humanities	<b>UNSW</b>	University of New South Wales
<b>FRS</b>	Fellow of The Royal Society		

# Appendices



# Appendix 1

## Reports from regional groups

### AUSTRALIAN CAPITAL TERRITORY

**Chair: Professor John White** CMG FAA FRS

The annual meeting of the Canberra Academy Fellows on 1 May followed up our previous meetings' interest in ways to achieve further engagement of Fellows in the Academy's business. We were glad to have Professor Andrew Holmes AM FAA FRS FTSE as President-Elect with us to talk about the context of that discussion. Participation of the Fellows from the Canberra region in matters of policy has increased. The meeting discussed comparative advantages to secure Australia's future, contributions from Fellows to new technologies and their impact on Australia, and the quality appraisal processes in Australia. There was particular concern expressed at the extensive cancellation by the Federal Government of Australia's international scientific commitments. The annual welcome of new Fellows was again appreciated.

The frequent public lectures sponsored by the Academy and the CSIRO are appreciated by the Canberra community. The Jack Cusack Memorial Lecture on 'The intersection of Aboriginal and Torres Strait Islander ecological knowledge and science', Lisa Alexander's lecture on 'Will Australia continue to be land of droughts and flooding rains', the Malcolm McIntosh lecture by Iain McCalman on 'Why science history matters' and that by Professor Tim Kasser on 'Consumerism, Society and our Ecological Future: a psychological, empirical approach' were well attended.

At the end of the year, the previous two years' discussions on Fellows' participation in Academy business and Academy governance formed the basis of a verbal submission to the Academy Governance Review in November.

### NEW SOUTH WALES

**Chair: Professor Maxwell Crossley** FAA

The ATSE–AAS joint dinner on 2 July was an opportunity for Fellows of the two societies, and their guests, to meet each other in an informal setting. The dinner was held at the VIBE Hotel, North Sydney, with Professor Ron Trent from the University of Sydney speaking on the topic 'Personalised medicine and genetics: a revolution in health care'.

A cocktail function was held on 18 November at the Charles Perkins Centre at the University of Sydney, for NSW Fellows to meet with Academy President Professor Andrew Holmes AM PresAA FRS FTSE and to receive an update on the Academy's philanthropy program and strategic review process. Professor Holmes was accompanied by Director of Communications and Outreach, Kylie Walker, Director of International Programs, Nancy Pritchard and Fellowship and Awards Manager, Karen Holt. The event was very well attended (with some Fellows travelling long

distances) and the visit was well received. Professor Holmes then joined Fellows for the annual dinner.

### QUEENSLAND

**Chair: Professor Mark Blows** FAA

The Queensland chapter of the Academy welcomed Professor Georgia Chenevix-Trench FAA as a new Fellow in 2014. It was a pleasure to host a visit from Professor Holmes, accompanied by Director Communications and Outreach, Kylie Walker and Fellowship and Awards Manager, Karen Holt. The President joined a gathering of 12 Fellows hosted by Professor Perry Bartlett FAA at the Queensland Brain Institute to discuss future directions of The Enlightening Campaign. Professor Holmes then joined the Fellows for the annual dinner and went on to present a lecture at James Cook University in Townsville.

The Queensland chapter is particularly grateful to Professor Mark von Itzstein FAA for leading the Queensland Taskforce of The Enlightening Campaign.

### VICTORIA

**Chair: Professor Tony Klein** AM FAA

The annual New Fellows and Medalists' Symposium was held in June. As usual a varied range of fascinating topics were covered in brief talks. This year's speakers and their titles were:

- Dr Julie Arblaster, Australian Bureau of Meteorology, (2014 Anton Hales Medal): The ozone hole and climate change
- Dr Kieran Harvey, Peter MacCallum Cancer Centre (Gottschalk Medal): Control of organ size—lessons from the fly
- Professor John Bowman FAA, School of Biological Studies, Monash University: Evolution of the cycles of life
- Professor Barbara Howlett FAA, School of Botany, University of Melbourne: Controlling plant disease: From genome to paddock
- Professor Ivan Marusic FAA, Department of Mechanical Engineering, University of Melbourne: Order in the chaos: Towards taming turbulence
- Professor Margaret Reid FAA, CAOUS Centre, Swinburne University of Technology: Einstein versus quantum mechanics
- Professor Jamie Rossjohn FAA, School of Biomedical Sciences, Monash University: Immunity to vitamin B metabolites

- Professor Ingrid Scheffer AO FAA, University of Melbourne and Florey Institute of Neuroscience: Understanding the sacred disease—epilepsy.

As usual, the symposium was followed by cocktails and dinner at University House.

The very well attended Combined Academies' Dinner took place on 7 August, organised this year by ASSA and AAH, featuring Professor of Linguistics Kate Burridge of Monash University who gave a highly entertaining after-dinner address on 'Frequent coarse language'.

The biennial Lloyd Rees lecture, 'How Superconductivity has changed your life', was given on 11 September in the Wark Theatre, CSIRO, Clayton. The speaker, introduced by Professor Holmes, was Dr Cathy Foley FTSE, CSIRO Division Chief.

The Annual Christmas Dinner was again held at the Boulevard Restaurant, Kew, on Thursday, 27 November—enlivened by a Dixieland jazz trio, including some entertaining audience participation.

## Appendix 2

### Australians on international union executives

Scientific organisation	Office holder	Position
International Council for Science	Professor David Black AO FAA*	Secretary-General
	Professor John Buckeridge*	Member
International Astronomical Union (IAU)	Professor Matthew Colless FAA	Vice-President
International Commission on Mathematical Instruction (ICMI)	Professor Cheryl Praeger AM FAA	Vice-President
International Geosphere-Biosphere Programme (IGBP)	Professor Jean Palutikof	Vice-Chair
International Mathematical Union (IMU)	Professor Cheryl Praeger AM FAA	Member-at-large
International Union for Quaternary Research (INQUA)	Professor Allan Chivas FAA	Past President
International Union of Biological Sciences (IUBS)	Professor John Buckeridge	Past President
International Union of Crystallography (IUCr)	Professor Mitchell Guss	Member
International Geographical Union	Professor Iain Hay*	Vice-President
International Union of Geological Sciences (IUGS)	Dr Ian Lambert	Secretary General
International Union of History and Philosophy of Science / Division of Logic, Methodology and Philosophy of Science (IUHPS / DLMPS)	Professor Cliff Hooker	Second Vice-President
International Union of Immunological Societies (IUIS)	Professor Alan Baxter	Councillor
	Professor Nicholas King	Treasurer
International Union of Pure and Applied Chemistry (IUPAC)	Dr Robert Loss	Member
International Union for Pure and Applied Biophysics (IUPAB)	Professor Cris G Dos Remedios	Secretary General
International Union of Basic and Clinical Pharmacology (IUPHAR)	Dr John Miners	Councillor
	Professor Donald Birkett	Councillor (Chair of the Division on Clinical Pharmacology)
International Union for Pure and Applied Physics (IUPAP)	Professor Bruce McKellar AC FAA*	President
International Union of Physiological Sciences (IUPS)	Professor Caroline McMillen	Council Member
Scientific Committee on Oceanic Research (SCOR)	Dr John Volkman	Vice-President
International Union of Radio Science (URSI)	Professor Phil Wilkinson	President
World Climate Research Programme (WCRP)	Dr Helen Cleugh*	Member
Future Earth	Dr Mark Stafford Smith	Chair
	Professor Xuemei Bai	Member

\*Appointed in reporting period.



# Appendix 3

## Australian voting delegates for international scientific organisations

National Committee	Organisation	Date	Location	Delegate/s
n/a	International Council for Science (ICSU)	30 August – 3 September 2014	Auckland	Professor Cheryl Praeger AM FAA
Antarctic Research	Scientific Committee on Antarctic Research	22 August – 3 September 2014	Auckland, NZ	Dr Dana Bergstrom Dr Nick Gales
Biomedical Sciences	International Union of Pure and Applied Biophysics	3–7 August 2014	Brisbane	Professor Angela Delhunty A/Professor Brett Hambly
	International Union of Basic and Clinical Pharmacology	13–18 July 2014	Cape Town	Professor David Le Couteur A/Professor Peter Molenaar
	International Union of Microbiological Sciences 2014 Congresses	27 July – 1 August 2014	Montreal	Professor Paul Young Professor Liz Harry
Crystallography	International Union of Crystallography	5–12 August 2014	Montreal, Canada	Professor Alice Vrielink Professor Brendan Kennedy Dr Richard Garrett  <i>Alternates:</i> Professor Jennifer Martin A/Professor Christopher Ling Professor Stuart Batten Professor Mark Spackman
Data in Science	Committee on Data for Science and Technology (CODATA)	6–7 November 2014	New Delhi, India	Professor Lesley Wyborn
Earth System Science	Scientific Committee on Oceanic Research	15–17 September 2014	Bremen, Germany	Dr John Volkman Dr Bernadette Sloyan
Mathematical Sciences	International Mathematical Union	13–21 August 2014	Seoul, Korea	Professor Nalini Joshi FAA Professor Brendan McKay Dr Julie Clutterbuck Dr Michael Coons
Mechanical Sciences	International Union on Theoretical and Applied Mechanics	17–20 August 2014	Lyngby, Denmark	Professor Jim Denier
Physics	International Union for pure and Applied Physics	5–7 November 2014	Singapore	Professor Brian Schmidt AC FAA FRS Professor Tanya Monro FAA FTSE Professor Deb Kane
	International Commission for Optics	26–29 August 2014	Santiago de Compostela	Dr John Holdsworth
Space Science	Committee on Space Research	2–10 August 2014	Moscow	Professor Iver Cairns
	International Union of Radio Science	16–23 August 2014	Beijing	Professor Paul Smith

# Appendix 4

## National Committees for Science linkages with Australian professional science organisations

Note: the below linkages are not exhaustive and multiple links between committees and professional organisations may exist.

National Committee	Organisation
Agriculture, Fisheries and Food	Australian Society of Animal Production Australian Society of Fish Biology Soil Science Australia
Antarctic Research	Australian Institute of Physics Astronomical Society of Australia Australian Antarctic Division
Astronomy	Astronomical Society of Australia Astronomy Australia Ltd
Biomedical Sciences	Australian Physiological Society Australian Society for Biophysics Australian Society for Clinical and Experimental Pharmacology and Toxicology Australian Society for Immunology Australian Society for Microbiology Australian Society of Biochemistry and Molecular Biology Collaborative Universities Biomedical Education Network
Brain and Mind	Australian Psychological Society Psychology Foundation of Australia Australian Cognitive Neuroscience Society Australian Society for Psychiatric Research Biological Psychiatry Australia Australasian Neuroscience Society
Cellular and Developmental Biology	Australian Society for Stem Cell Research Australian Society of Cell and Developmental Biology Australian Society of Plant Scientists Society for Reproductive Biology Stem Cells Australian Society for Vascular Research
Chemistry	Royal Australian Chemical Institute
Crystallography	Society of Crystallographers in Australia and New Zealand Australian Microscopy and Microanalysis Society Australian Institute of Physics Royal Australian Chemical Institute Asian Crystallographic Association Asia–Pacific Microscopy Society Asia–Oceania Neutron Scattering Association Asia–Oceania Forum for Synchrotron Radiation Research
Data in Science	Australian National Data Service Research Data Storage Infrastructure National eResearch Collaboration Tools and Resources
Earth Sciences	Australian Geoscience Council Geological Society of Australia Geoscience Australia

Earth System Science	Australian Meteorological and Oceanographic Association Australian Academy of Technological Sciences and Engineering
Ecology, Evolution and Conservation	Australian Marine Sciences Association Australian Society for Microbiology Council of Heads of Australasian Herbaria Ecological Society of Australia Terrestrial Ecosystem Research Network
Geography	Academy of Social Sciences in Australia Australian Geography Teachers Association Australian Institute of Geographers Institute of Australian Geographers Royal Geographical Society of Queensland Royal Geographical Society of South Australia
History and Philosophy of Science	Australasian Association for the History, Philosophy and Social Studies of Science
Information and Communication Sciences	Computing, Research and Education Australian Computer Society Australian Telecommunications Society Engineers Australia National ICT Australia
Materials Science and Engineering	Australian Ceramic Society Australian Microscopy and Microanalysis Research Facility Australian Microscopy and Microanalysis Society Australian Nanotechnology Network Australian National Fabrication Facility Association of Molecular Modellers of Australasia Australian Vacuum Society Australian X-Ray Analytics Association Materials Australia National Computational Infrastructure Pawsey Super Computing Centre Society of Crystallographers in Australia and New Zealand
Mathematical Sciences	Australian Association of Mathematics Teachers Australian Council of Heads of Mathematical Sciences Australian Mathematical Society Australian and New Zealand Industrial and Applied Mathematics Australian Mathematical Sciences Institute Australian Mathematics Trust Mathematics Education Research Group of Australasia Incorporated Statistical Society of Australia Incorporated
Mechanical and Engineering Sciences	Australasian Fluid Mechanics Society Australian Academy of Technological Sciences and Engineering Australian Association of Computational Mechanics Australian and New Zealand Society of Biomechanics Group of Eight Engineering Deans Institution of Engineers Australia
Physics	Australian Institute of Physics Australasian College of Physical Scientists and Engineers in Medicine Australian Optical Society

# Appendix 5

## Submissions and representations to government

Background	Summary of submission
<b>Agricultural Competitiveness White Paper—April 2014</b>	
As part of the development of an Agricultural Competitiveness White Paper the Australian Government issued an Issues Paper for stakeholder comment.	The National Committee for Agriculture, Fisheries and Food put forward a response to the Issues Paper contending that the White Paper should give serious consideration to the current state of agricultural R&D with a view to strengthening its ability to take advantage of scientific opportunities that will improve productivity, profitability and competitiveness of agriculture well into the future.
<b>Establishment of the Entrepreneurs' Infrastructure Programme Discussion Paper—June 2014</b>	
The 2014–15 Federal Budget reduced support for industry related research and innovation by dismantling a number of support programs, winding back funding for others, and reducing funding to key science agencies. The Government's signature policy initiative to improve industry and science collaboration was the announcement of a new Entrepreneurs' Infrastructure Programme.	In response to a discussion paper on the development of the program the Academy outlined its concerns that the program's development was being rushed, and had not been sufficiently developed in collaboration with stakeholders. The Academy called on the then Department of Industry to take stock of the recently released ACOLA report, 'The role of science, research and technology in lifting Australia's productivity', to help inform the development of the program.
<b>Teacher Education Ministerial Advisory Group—July 2014</b>	
The Teacher Education Ministerial Advisory Group was established in February 2014 to provide advice on how teacher education programmes could be improved to better prepare new teachers with the right mix of academic and practical skills needed for the classroom.	In response to an issues paper released by the Advisory Group, the Academy put forward a submission outlining the characteristics of good graduate science teachers; ways to better prepare teachers of science; the need for science teachers to have a broad range of teaching skills; and the repeated concerns expressed in previous reviews of regarding inadequate funding for the preparation of teachers.
<b>Australian Research Council proposed funding rules changes—July 2014</b>	
The Australian Research Council commenced a program to streamline its funding rules and invited the Academy to comment on its draft proposed changes.	The Academy supported proposed changes to eligibility and cross-scheme limits to bring ARC Centres of Excellence into line with other similar initiatives. Concerns were expressed by the Academy regarding proposed changes to the Future Fellowship program, particularly regarding changes to the eligibility rules that would prevent researchers in continuing positions from applying to this prestigious program.
<b>Review of the Bureau of Meteorology's Space Weather Services—July 2014</b>	
As part of the Review of Bureau of Meteorology Space Weather Services, a discussion paper was released for comment.	In its submission the Academy outlined how the Bureau's Space Weather Services provide a vital service and research platform for Australia, and that support should be continued at a level commensurate with the expected growth in demand. The submission also advised that any reduction of the Bureau's Space Weather Services functions or increases to cost recovery would be counterproductive and detrimental to the national interest. The submission was developed with assistance from the National Committees for Space and Radio Science; Antarctic Research; and Earth System Sciences.
<b>Senate Economics References Committee Inquiry into Australia's Innovation System—August 2014</b>	
The Senate Economics References Committee established a wide ranging inquiry into Australia's Innovation System and invited the Academy to put forward a submission.	Key points of the Academy's submission included the need for Australia to invest in education and skills to have a comparative advantage if it is to attract investment in innovation to secure high-skill, high-wage jobs; the necessity for the Government to make a long-term financial commitment to building and operating national research infrastructure; the need to develop a coherent research workforce strategy; and the benefits that investing in international science collaboration can bring, and why this should be seen as an essential component of our existing science investment.



Background	Summary of submission
<b>Department of Education report on the status of national eResearch infrastructure in Australia—September 2014</b>	
In developing a report on the status of national eResearch infrastructure in Australia, funded under the National Collaborative Research Infrastructure Strategy, the Department of Education called for submissions from stakeholders.	The National Committee for data in Science put forward a submission outlining how NCRIS investment in eResearch had transformed the way that research is conducted in Australia.
<b>Draft Reef 2050 Long-term Sustainability Plan—October 2014</b>	
In response to recommendations by the UNESCO World Heritage Committee, the Australian and Queensland governments developed a draft Reef 2050 Long-Term sustainability plan, and invited comments on the draft plan from interested parties.	The Academy's submission concluded that the draft plan was inadequate and would not prevent the reef's decline as it failed to address key pressures affecting the Australian icon, including climate change, poor water quality, coastal development and fishing. Concerns regarding fundamental governance issues for the reef, such as conflicts of interest and a lack of oversight, were also raised.
<b>2015 Defence White Paper and First Principles Review—November 2014</b>	
As part of the preparation of a new Defence White Paper, a Defence Issues Paper was released for comment which included specific mention of future defence science and technology needs.	In its submission the Academy stated that short-term budget pressures should not be allowed to impact on Australia's long-term defence science requirements. The need for Defence Science Technology Organisation (DSTO) to maintain defence science capability and to continue making use of existing, successful science partnerships was outlined, noting that adequate funding is required so that their full benefits can be realised. In this context, ongoing access to US defence science was stated as being of far greater importance than any short-term economic benefits that might be realised through outsourcing DSTO activities. The submission also discussed a number of potential future areas where science has the potential to be disruptive, and the potential strategic threats that climate change will bring.
<b>2014 Cooperative Research Centres Programme Review—November 2014</b>	
At the 2014–15 Federal Budget the Government announced that there would be no new Cooperative Research Centres (CRCs) funded in 2014, and that a review would be undertaken to look at future options for the program. As part of the review process a discussion paper was issued for comment.	The Academy's response to the discussion paper highlighted the role of the CRC program in promoting public-good research that brings together end users and scientists to solve some of the pressing problems facing the nation. The Academy indicated its support for the continuation of the CRC or a similar program and provided recommendations on how the program could be improved.
<b>ARC Centres of Excellence 2017 Consultation—November 2014</b>	
In preparation for the 2017 round of the ARC Centres of Excellence, views and comments in relation to the past rounds were sought from stakeholders.	Separate submissions were put forward by the National Committees for Mathematical Sciences and Physics.
<b>Boosting the commercial returns from research discussion paper—December 2014</b>	
In October 2014 the Government released its Industry Innovation and Competitiveness Agenda and announced its desire to enhance the commercial returns from Australia's investment in research and development. The Department of Education and Training and the Department of Industry and Science released a discussion paper for comment that outlines a selection of proposals to achieve this.	The Academy put forward a comprehensive response to this wide-ranging discussion paper, responding to proposals to change university block-grant arrangements; incentives for industry to engage in research; the need for a long-term research infrastructure roadmap; potential changes to IP management; how to encourage open-access data; the importance of public-good outcomes from research; and the need for continued investment in basic science. The Academy called on the government to consult further with the sector to develop a well-considered plan that would help improve end-user outcomes from research.
<b>Review to strengthen independent medical research institutes—December 2014 and February 2015</b>	
In October the Government announced that it would undertake a review of independent medical research institutes. As part of the review an issues paper was released for comment, followed by a more detailed discussion paper where further comment was sought.	The Academy's response outlined ways in which efficiencies might be achieved in the sector and the need for collaboration in medical research. It argued for longer-term career support for researchers and called for clear recommendations with regards to properly funding the indirect costs of research.
<b>Pre-budget submission to Treasury—January 2015</b>	
The Treasurer invited public submissions in aid in the preparation of the 2015–16 Federal budget.	The Academy called on the Australian Government to safeguard the science budget and find an ongoing funding solution for research infrastructure, as well as implementing its previous budget measure to make the ARC Future Fellowship program an ongoing program. The Academy also urged the government to develop a funded international science collaboration strategy.

Background	Summary of submission
<b>Defence Trade Controls Act Amendment Bill—January 2015</b>	
<p>The <i>Defence Trade Controls Act 2012</i> is intended to regulate the supply, publication and brokering of controlled military technologies, including dual-use technology that could be used in chemical, biological and nuclear weapons. Following sector concerns that the Act places too heavy a regulatory burden on researchers and research organisations, the Government agreed to a two-year transition period before the Act's offence provisions came into force. During this transition period, the Strengthened Export Controls Group has been working with the sector to test the implementation of the Act. From this work a number of changes to the Act were proposed in a draft Amendment Bill published for comment.</p>	<p>The Academy's submission to the consultation on the draft Amendment Bill welcomed the proposed changes and the efforts made to ensure the Act focuses on those instances where the supply, publication or brokering of controlled military technology is likely to present a risk.</p>
<b>Targeted consultation on the draft principles for accessing and using publicly funded data for health research—February 2015</b>	
<p>The National Health and Medical Research Council sought feedback on the draft principles for accessing and using publicly funded data for health research.</p>	<p>The National Committee for Data in Science provided detailed feedback on data formats, availability, storage and accessibility.</p>
<b>Regulation of autologous stem cell therapies—March 2015</b>	
<p>The Academy's National Committee for Cellular and Developmental Biology identified a weakness in the regulation of the use of stem cells that effectively allows doctors to bypass regulatory constraints if they use cells extracted directly from a patient, so called autologous stem cell therapy. This loophole is exploited by some practitioners who are offering unproven treatment that comes with potential risks to patients. The Academy raised these concerns and outlined potential solutions to the Minister for Health, and the Department for Health subsequently invited the Academy to put forward a submission to a TGA consultation on the regulation of autologous stem cells.</p>	<p>The potential dangers of unproven therapies and the deficiencies in the current regulations were highlighted in the Academy's submission. The Academy made specific recommendations on the areas where improvements in the current regulations could be made, as well as calling for clarification of the responsibilities of different agencies responsible for the oversight and regulation of stem cell therapies (see page 62).</p>
<b>Ongoing scrutiny of the implementation of the Defence Trade Controls Act—March 2015</b>	
<p>Since the passage of the Defence Trade Controls Act 2012 the Senate Standing Committee on Foreign Affairs, Defence and Trade Legislation Committee has been providing ongoing scrutiny of the implementation of the Act. The Committee called for submissions on the sector's experience with the recent consultation process for the Amendment Bill, and whether the proposed amendments satisfy the issues of concern within the sector.</p>	<p>The Academy's submission noted that whilst the consultation process was tight, there had been substantial consultation, and that the substantive issues of concern had largely been resolved through the implementation and consultation process, and in the proposed amendments to the Bill.</p>
<b>Draft Science and Research Priorities for Australia—March 2015</b>	
<p>The Chief Scientist released the Draft Science and Research Priorities for stakeholder comment. The aim of the priorities is to focus Australian publicly-funded research efforts.</p>	<p>The National Committee for Physics provided specific comments on the transport and the environmental change priorities, with particular reference to fossil fuels. The National Committee for Information and Communication Sciences suggested that the cybersecurity priority be expanded to cover security of cyber infrastructure.</p>

Note: the Academy's public submissions are available at [www.science.org.au/reports](http://www.science.org.au/reports)

# Appendix 6

## Impacts of Academy submissions to consultations, reviews and inquiries

External document date	Impact on consultations, reviews or inquiries	Date of submission	Background
April 2014	Government decision to replace the Antarctic research vessel was consistent with submission on 20 Year Australian Antarctic Strategic Plan	January and March 2014	A public review and a subsequent Parliamentary inquiry—prepared by National Committees for Antarctic Research; Astronomy; Earth Systems Science; and Space and Radio Science
May 2014	The Academy's pre-budget submission to Treasury called for the ARC Future Fellowship program to be made an ongoing program, and for a replacement NCRIS program. At the Budget the Government announced its intention to make the Future Fellowship program an ongoing program with 100 Fellowships each year, and committed to undertake a review of national infrastructure funding.	March 2014	
May 2014	Many findings of the National Commission of Audit report relating to science in line with points in Academy's submission, particularly: <ul style="list-style-type: none"> <li>• need for strategic whole-of-government approach to Australia's research funding</li> <li>• importance of long-term stable funding for research infrastructure.</li> </ul>	November 2013	
August 2014	Submission to Joint Select Committee Inquiry into the development of northern Australia regarding the need for careful planning and management of water resources to support future development cited twice in the final report	February 2014	
October 2014	Invited to give evidence to Senate Foreign Affairs, Defence and Trade References Committee Inquiry into Australia's future activities and responsibilities in the Southern Ocean and Antarctic waters based on submission to 20 Year Australian Antarctic Strategic Plan (March 2014). Submission and subsequent evidence referenced seven times in final report. Recommendations positive and in line with Academy input.	March and September 2014	Evidence provided by Professor Kurt Lambeck AO FAA FRS and National Committee for Antarctic Research member Professor Steven Chown, and Professor Anthony Worby
October 2014	Report on Review of the National Curriculum mentions AAS submission three times, with sections quoted at length in the analysis of the Australian Curriculum: Science	February 2014	Prepared by Executive Director, Science by Doing
October 2014	The Defence First Principles Review recommendations regarding the Defence Science and Technology Organisation (DSTO) are in line with the Academy's submission to the 2015 Defence White Paper, including that DSTO's functions should not be outsourced, and that further collaboration between DSTO and other research organisations should be encouraged.	March 2015	Prepared by Fellows and other experts with diverse, relevant expertise
December 2014	Submission informed termination of Victorian Government trial on cattle grazing impact on bushfire fuel in the Alpine National Park	February 2014	Prepared by Fellows and other experts with diverse, relevant expertise
February 2015	The Department of Defence consulted on the Defence Trade Controls Amendment Bill 2015. The Academy, with others, suggested that a further 12 month delay before the offence provisions come into force be added to the Bill, and this suggestion was taken up. The Academy expressed support for the Amendment Bill as it would make the <i>Defence Trade Controls Act 2012</i> far less burdensome to researchers, and the amendments were subsequently passed by Parliament.	Mar 2015	Prepared by Fellows and other experts with diverse, relevant expertise

# Appendix 7

## Printed and digital publications

Publication	Month	Format	Link
Annual Report 2013–14	May	Book <ul style="list-style-type: none"> <li>• printed</li> <li>• online PDF</li> </ul>	<a href="http://www.science.org.au/publications/annual-report-2013-2014">www.science.org.au/publications/annual-report-2013-2014</a>
Academy Newsletter	June, September, December, March	Newsletter <ul style="list-style-type: none"> <li>• email with links to online HTML</li> </ul>	<a href="http://www.science.org.au/academy-newsletter">www.science.org.au/academy-newsletter</a>
Historical Records of Australian Science Vol 25 nos 1 and 2	June and December (Desert Science)	Scientific journal <ul style="list-style-type: none"> <li>• online</li> <li>• printed to order</li> </ul>	<a href="http://www.publish.csiro.au/nid/108.htm">www.publish.csiro.au/nid/108.htm</a>
Two posters of Nobel Laureates Professor Elizabeth Blackburn AC FAA FRS and Professor Brian Schmidt AC FAA FRS	June	Poster (A1) <ul style="list-style-type: none"> <li>• printed</li> </ul>	
EMCR Pathways newsletter	October, December	Newsletter <ul style="list-style-type: none"> <li>• email with links to online HTML</li> </ul>	<a href="http://www.science.org.au/emcr-pathways">www.science.org.au/emcr-pathways</a>
Financial report for the year ended June 2014	February	Booklet <ul style="list-style-type: none"> <li>• printed</li> <li>• online PDF</li> </ul>	<a href="http://www.science.org.au/publications/financial-report-2013-14">www.science.org.au/publications/financial-report-2013-14</a>
The science of climate change: Questions and answers (full revision of 2010 booklet)	February	Booklet <ul style="list-style-type: none"> <li>• printed</li> <li>• online PDFs (with and without references)</li> <li>• online HTML</li> </ul>	<a href="http://www.science.org.au/climatechange">www.science.org.au/climatechange</a>
Shine Dome brochure update	February	Brochure <ul style="list-style-type: none"> <li>• printed</li> </ul>	
Academy highlights 2014	February	Infographic <ul style="list-style-type: none"> <li>• online image and text</li> <li>• email</li> </ul>	<a href="http://www.science.org.au/news/academy-highlights-2014">www.science.org.au/news/academy-highlights-2014</a>

Public speakers series	
Video	Date
<b>2014—Science stars of tomorrow</b> (see <a href="http://www.science.org.au/public-speaker-series">www.science.org.au/public-speaker-series</a> )	
<b>Professor Mark Kendall:</b> 'Improving the reach of vaccines to the developing world with nanopatches'	April
<b>Dr Bridie Scott-Parker:</b> 'Young driver road safety: An innovative approach to a persistent problem'	May
<b>Associate Professor Bryan Grieg Fry:</b> 'Seeing the woods for the trees: Understanding venom evolution as a guide for biodiscovery'	July
<b>Dr Lisa Alexander:</b> 'Will Australia continue to be a land of droughts and flooding rains?'	August
<b>Professor Vipul Bansal:</b> 'Organic semiconductors: from environmental clean-up to flexible electronics and wound-healing antibacterial dressings'	September
<b>Dr Peter Enticott:</b> 'Brain stimulation and autism spectrum disorder'	November
<b>Dr Lisa Harvey-Smith:</b> 'Building the world's biggest telescope'	December
<b>2015—Science fiction becomes science fact</b> (see <a href="http://www.science.org.au/science-fiction-becomes-science-fact">www.science.org.au/science-fiction-becomes-science-fact</a> )	
<b>Associate Professor James Curran:</b> 'Artificial intelligence: Machines on the rise'	February
<b>Dr Annalisa Durdle:</b> 'A fly on the wall: Solving crime with fly poo'	March



Video	Date
Professor Ingrid Scheffer, epilepsy specialist	October
Professor Matthew England, oceanographer and climate scientist	October
Associate Professor Bryan Fry, venom expert	October
Dr Lisa Alexander, climate extremes expert	November
Dr Peter Enticott, autism expert	December
Dr Lisa Harvey-Smith, astronomer	February

## Appendix 8

### Academy–CSIRO Australian Journals of Science

Journal	Editor/s-in-Chief 2014
Animal Production Science	Professor Wayne Bryden
Australian Journal of Botany	Dr Dick Williams
Australian Journal of Chemistry	Professor Curt Wentrup
Australian Journal of Zoology	Professor Paul Cooper
Australian Systematic Botany	Dr Daniel Murphy
Crop and Pasture Science	Dr Sergio Atienza and Winthrop Professor Zed Rengel
Environmental Chemistry	Professor Kevin Francesconi
Functional Plant Biology	Professor Sergey Shabala
Invertebrate Systematics	Professor Andy Austin
Marine and Freshwater Research	Professor Max Finlayson
Reproduction, Fertility and Development	Professor Tony Flint
Soil Research	Associate Professor Balwant Singh and Professor Mark Tibbett
Wildlife Research	Dr Stan Boutin, Dr Andrea Taylor, Dr Piran White

# Appendix 9

## Support for Academy activities

General Academy grants		
Funding body	Project/program	Amount
Department of Industry and Science	Higher Education Research Promotion (Grant in Aid)	\$1 720 191

Special grants		
Funding body	Project/program	Amount
Australian Council of Learned Academies	Securing Australia's Future, Project No. 5 on New Technologies	\$303 091
Australian Research Council	Learned Academies Special Projects scheme	\$221 420
Defence Science and Technology Organisation	Future of Accelerator Science	\$25 455
Department of Education and Training	Science by Doing Stage 3	\$1 300 000
Department of Education and Training	Primary Connections—Linking Science with Literacy Stage 6	\$1 000 000
Department of Education and Training	Third European Union – Australia Workshop on Research Infrastructure	\$245 455
Department of Education and Training	Bilateral Researcher Exchange in Partnership with the JSPS Program	\$200 000
Department of Education and Training	2015 US Summer Program	\$165 000
Department of Education and Training	2016 US Summer Program	\$150 000
Department of Education and Training	11th and 12th Australia China Academies Symposia	\$100 000
Department of Education and Training	Primary Connections—Linking Science with Literacy Stage 5 (final payment)	\$100 000
Department of Education and Training	Australia – United States research collaboration project with the Air Force Office of Scientific Research	\$90 000
Department of Industry and Science	Increasing the Profile of Australia's International Education Sector	\$183 000
Department of Industry and Science	SAGE Forum	\$36 364
Office of the Chief Scientist	Science-based Australian Economic Sectors project	\$200 000
Science and Industry Endowment Fund	Fellowships to the Lindau Nobel Laureate Meetings	\$75 800
The Royal Society	Travel grants to the 2014 Commonwealth Science Conference delegates	\$28 800

Contributions to international union subscriptions		
Funding body	Project/program	Amount
Australasian Fluid Mechanics Society	International Union on Theoretical and Applied Mechanics subscription contribution	\$500
Australian Mathematical Sciences Institute	International Mathematical Union subscription contribution	\$6 632.90
Geoscience Australia	International Union for Geological Sciences subscription contribution	\$12 885.61
Royal Australian Chemistry Institute	International Union for Pure and Applied Chemistry subscription contribution	\$12 650



# Financials





# Financials

## Treasurer's commentary on Financial Statements 2014

The Academy has posted an accounting surplus of \$2 530 311 (2013 \$2 297 284) for the year ended 30 June 2014 with no impairment loss. It must be noted also that Academy investments have increased in value overall by \$2 235 756 (2013 \$1 176 100) which creates a comprehensive (but not realised) gain of \$4 766 067 (2013 \$3 473 384). Please refer to the below table that details the Academy's operating deficit and how it has been funded:

	<b>Consolidated Academy Operations</b>	<b>Untied Investments</b>	<b>Special Purpose Funds</b>	<b>Total per Accounts</b>
<b>Income</b>				
Operational Income	\$8,201,253			\$8,201,253
Investment Income		\$1,728,996	\$747,431	\$2,476,427
Write backs / Gain on Sale		\$1,016,492		\$1,016,492
Donations			\$2,035,352	\$2,035,352
Total Income	\$8,201,253	\$2,745,488	\$2,782,783	\$13,729,524
<b>Expenses</b>				
Operational expense	\$10,242,366			\$10,242,366
Fund expense		\$96,112	\$860,735	\$956,847
Total Expense	\$10,242,366	\$96,112	\$860,735	\$11,199,213
Result	-\$2,041,113	\$2,649,376	\$1,922,048	\$2,530,311

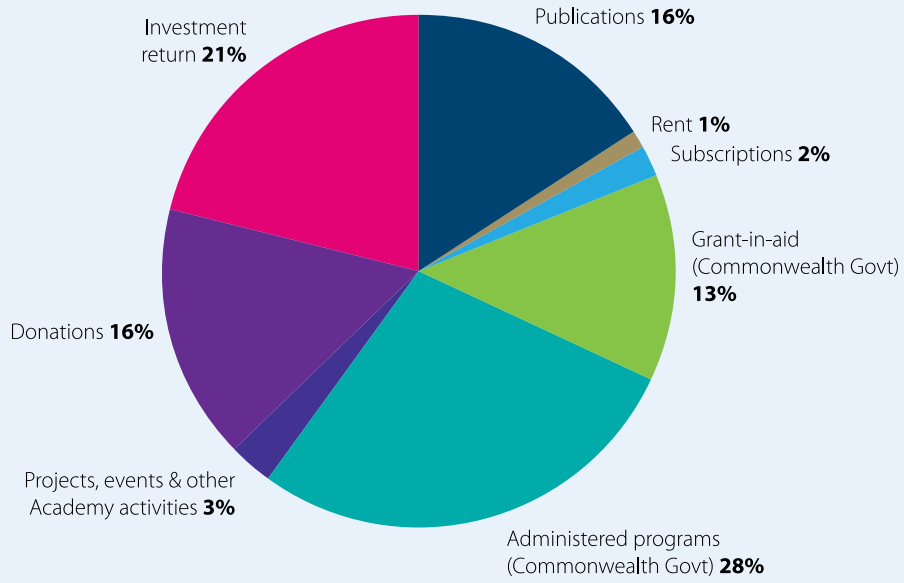
This shows that Academy operations lost just over \$2.04 million for the year. This was funded by untied investment income of \$1.72 million. Roughly three quarters of the gain on sale and write-back amount was an accounting entry that recognised a previous write-down, so not a real return to the Academy.

Performance to budget—The major positive variances can be attributed to donations for the year which were much higher than expected because the generous JG Russell bequest was received from the settlement of the estate. Like most Special Purpose Funds, this income has been applied to fund awards, i.e. the bequest itself has been incorporated into the Academy's capital stock, and can only be used for that purpose. Investment income (net of sales and brokerage) was also up on budget and a strong increase on the previous year of \$0.60 million or 34% due to the investment restructure, a move away from term deposits to fully franked blue-chip stocks.

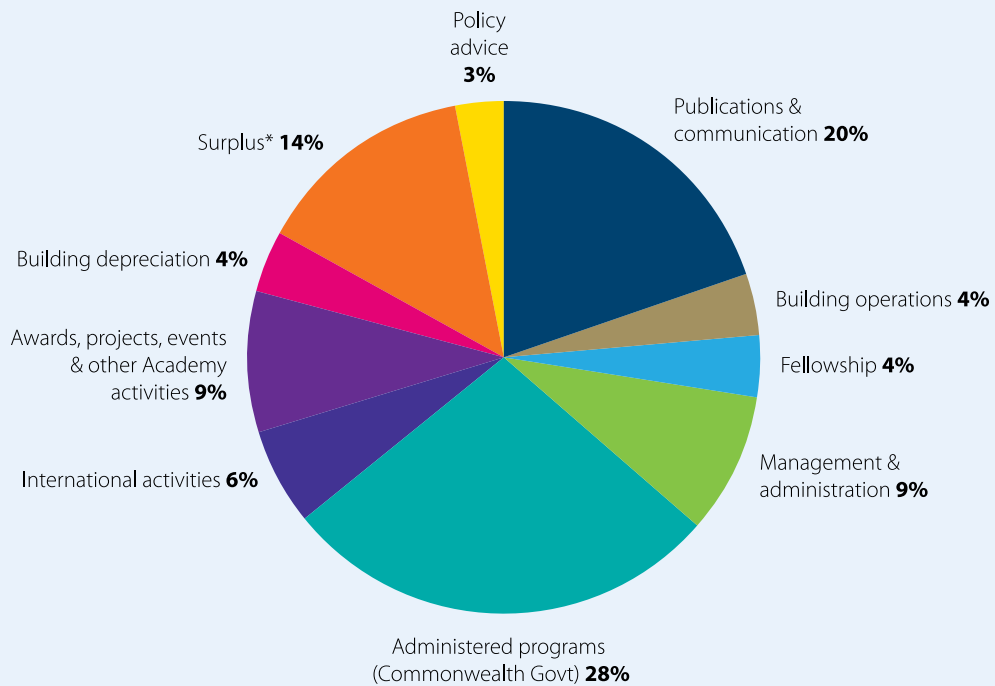
Negative variances can be attributed largely to reduced recoveries of salaries to external contracts. These contracts were down across a number of departments because we won fewer, smaller contracts. Ian Potter House rent was also down as we rented out less floor space. At the end of June 2014, the Academy employed 49 full time equivalent staff. The full audited accounts of the Academy are available on the Academy website (see [www.science.org.au/publications/financial-report-2013-14](http://www.science.org.au/publications/financial-report-2013-14)) and printed copies are available by calling the Academy Secretariat direct on 02 6201 9400.

**Dr Oliver Mayo** FAA FTSE  
Treasurer  
Australian Academy of Science

**2013–14 Income (net of write backs) \$ 13.0 million**

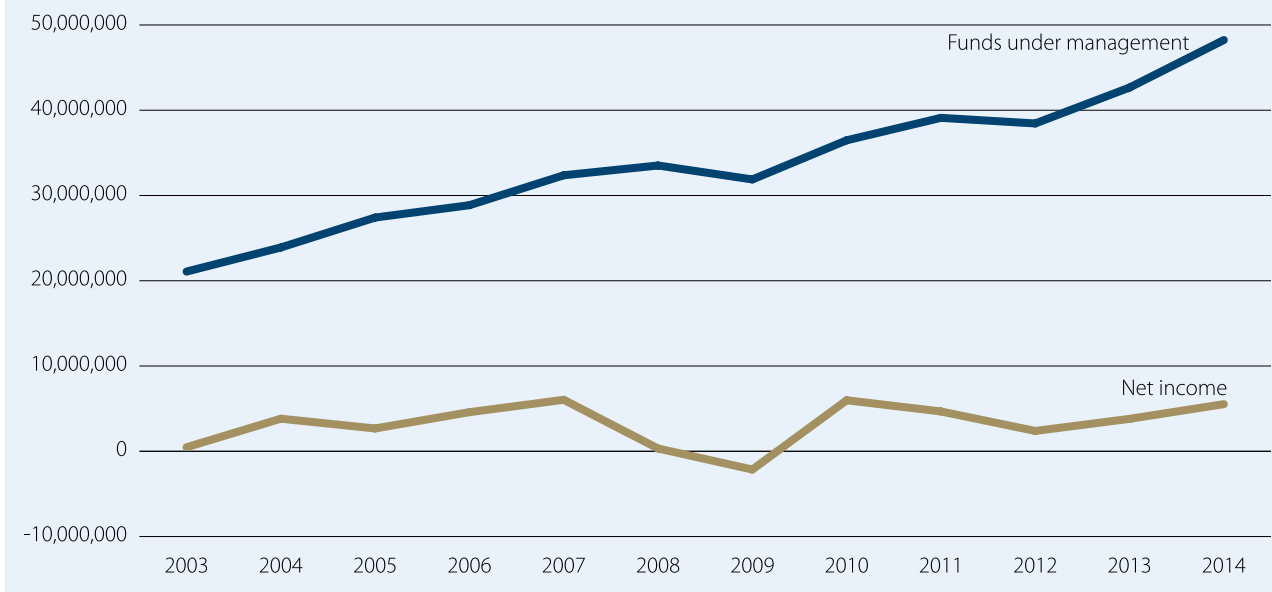


**2013–14 Expense and Surplus (net of write downs) \$13.0 million**



\*Surplus (14%) provides for future funding obligations mainly related to awards (16%)

## Investments 2003–2014



**NB. Funds under management** includes cash at bank. Due to contractual obligations the Academy must keep funds from certain grant(s) in a separate bank account. **Net Income** includes investment income, donations, write ups/downs and profit/loss on sale.

A considerable proportion of the Academy's investments are tied to special purpose funds that are kept in perpetuity to fund awards and various programs; as such these investments are not able to be used for other purposes.

The Academy's general purpose funds are used to create income that supports the working operations within the Secretariat.

## BALANCE SHEET AS AT 30 JUNE 2014

	Note	2014 \$	2013 \$
<b>Current assets</b>			
Cash and cash equivalents	18	2,920,735	2,570,461
Investments	3	8,800,000	12,850,000
Receivables	4	15,177	30,683
Interest receivable		837,284	536,405
Other receivables and prepayments	5	251,192	303,084
Inventories	6	203,896	316,612
<b>Total current assets</b>		<b>13,028,284</b>	<b>16,607,245</b>
<b>Non-current assets</b>			
Investments	7	36,515,050	27,241,809
Land and buildings	8	2,306,976	2,453,931
Furniture and fittings and equipment	8	552,542	562,960
<b>Total non-current assets</b>		<b>39,374,568</b>	<b>30,258,700</b>
<b>Total assets</b>		<b>52,402,852</b>	<b>46,865,945</b>
<b>Current liabilities</b>			
Payables	9	846,859	711,019
Employee benefit provisions	10	608,924	640,358
Unexpended grants—projects	11	3,292,063	2,621,594
<b>Total current liabilities</b>		<b>4,747,846</b>	<b>3,972,971</b>
<b>Non-current liabilities</b>			
Employee benefit provisions	10	21,859	25,894
<b>Total non-current liabilities</b>		<b>21,859</b>	<b>25,894</b>
<b>Total liabilities</b>		<b>4,769,705</b>	<b>3,998,865</b>
<b>Net assets</b>		<b>47,633,147</b>	<b>42,867,080</b>
<b>Academy funds</b>			
Capital accumulation funds		6,418,782	6,418,782
Special purpose capital funds	13 (a)	14,015,470	12,093,421
General purpose capital funds	13 (b)	24,448,806	23,079,601
Available-for-sale investment reserve	13 (d)	2,504,371	268,615
General funds	13 (c)	245,718	1,006,661
<b>Total Academy funds</b>		<b>47,633,147</b>	<b>42,867,080</b>

The balance sheet is to be read in conjunction with the notes to the financial statements set out on pages 7–21 of the *Australian Academy of Science Financial report for the year ended 30 June 2014* (see [www.science.org.au/publications/financial-report-2013-14](http://www.science.org.au/publications/financial-report-2013-14))



## STATEMENT OF COMPREHENSIVE INCOME FOR THE YEAR ENDED 30 JUNE 2014

	Note	2014 \$	2013 \$
<b>Revenue</b>			
Revenue			
Publication revenue	12	2,034,265	2,078,485
Government grants—grant-in-aid	19	1,689,775	1,640,558
Rent and building hire		195,772	271,884
Fellowship revenue		313,645	276,872
Academy special projects		262,188	400,218
Unexpended funds recognised in income		72,188	13,636
Grant income	17 (d)	3,568,694	4,257,325
Donations		2,035,352	654,885
Income			
Investment income	2 (g)	2,476,427	1,823,591
Profit on sale of investments		1,016,492	2,127,227
Other income		64,726	143,712
<b>Total revenue</b>		<b>13,729,524</b>	<b>13,688,393</b>
<b>Expenditure</b>			
Publication cost of sales		279,500	288,792
Primary Connections development		126,730	–
Publication—administration		2,086,490	1,135,224
Administration expenses	19	1,050,356	891,407
Building operations		459,040	489,523
Fellowship expenses		467,810	430,327
International and national relations		542,070	539,986
International exchange operations		221,708	134,855
Grant expenses	17 (d)	3,568,694	4,257,325
Library		76,145	94,365
Science policy		379,063	356,423
Awards and lectures administration costs		23,774	18,069
Events		109,625	100,151
Academy special projects		319,462	408,265
Other Academy funded activities		33,971	43,816
Loss on sale of fixed asset		–	2,483
Brokerage and management fees		96,112	51,482
Impairment loss	16	–	802,040
Depreciation	2 (b)	497,929	506,851
Projects, lectures, discussions, meetings, awards and administration fees		860,734	839,725
<b>Total expenditure</b>		<b>11,199,213</b>	<b>11,391,109</b>
<b>Total profit (loss) for the year</b>		<b>2,530,311</b>	<b>2,297,284</b>
<b>Other comprehensive income</b>			
Net change in fair value of available-for-sale financial assets		2,235,756	1,176,100
<b>Total comprehensive income/(loss) for the year</b>		<b>4,766,067</b>	<b>3,473,384</b>

The statement of comprehensive income is to be read in conjunction with the notes to the financial statements set out on pages 7–21 of the *Australian Academy of Science Financial report for the year ended 30 June 2014* (see [www.science.org.au/publications/financial-report-2013-14](http://www.science.org.au/publications/financial-report-2013-14))

## STATEMENT OF CASH FLOWS FOR THE YEAR ENDED 30 JUNE 2014

	Note	2014 \$	2013 \$
<b>Cash flows from operating activities</b>			
Income from grants and donations		6,322,179	4,729,190
Other receipts		3,787,381	3,493,585
Expenditure on grants and donations		(3,568,694)	(4,257,325)
Expenditure on customers		(6,648,522)	(5,869,668)
Goods and services tax net amount received		(374,897)	(467,017)
<b>Net cash flows from operating activities</b>	18 (b)	<u>(482,553)</u>	<u>(2,371,235)</u>
<b>Cash flows from investing activities</b>			
Investment income received		3,130,023	4,185,339
Proceeds from sale of property, plant and equipment		–	–
Proceeds from sale of investments		30,378,192	42,092,226
Acquisition of property, plant and equipment		(340,556)	(113,032)
Acquisition of investments		(32,334,832)	(44,246,468)
<b>Net cash flows used in investing activities</b>		<u>832,827</u>	<u>1,918,065</u>
<b>Net increase/(decrease) in cash held</b>		<u>350,274</u>	<u>(453,170)</u>
<b>Add: Cash at beginning of financial year</b>		<u>2,570,461</u>	<u>3,023,631</u>
<b>Cash at end of financial year</b>	18 (a)	<u><b>2,920,735</b></u>	<u><b>2,570,461</b></u>

The statements of changes in equity and cash flows are to be read in conjunction with the notes to the financial statements set out on pages 7–21 of the *Australian Academy of Science Financial report for the year ended 30 June 2014* (see [www.science.org.au/publications/financial-report-2013-14](http://www.science.org.au/publications/financial-report-2013-14))

**INDEPENDENT AUDITOR'S REPORT  
TO THE MEMBERS OF  
AUSTRALIAN ACADEMY OF SCIENCE**

We have audited the accompanying financial report of the Australian Academy of Science ("the registered entity"), which comprises the balance sheet as at 30 June 2014, and the statement of comprehensive income, statement of changes in equity and statement of cash flows for the year then ended, notes comprising a summary of significant accounting policies and other explanatory information and the responsible entity's declaration.

*Responsible Persons' Responsibility for the Financial Report*

The responsible persons of the registered entity are responsible for the preparation of the financial report that gives a true and fair view in accordance with Australian Accounting Standards and the *Australian Charities and Not-for-profits Commissions Act 2012* and for such internal control as the responsible persons determine is necessary to enable the preparation of the financial report that is free from material misstatement, whether due to fraud or error.

*Auditor's Responsibility*

Our responsibility is to express an opinion on the financial report based on our audit. We conducted our audit in accordance with Australian Auditing Standards. These Auditing Standards require that we comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance about whether the financial report is free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial report. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial report, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the registered entity's preparation and fair presentation of the financial report in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the registered entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by the responsible persons, as well as evaluating the overall presentation of the financial report.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

*Independence*

In conducting our audit, we have complied with the independence requirements of the Australian professional accounting bodies.

*Opinion*

In our opinion:

- (a) the financial report of the Australian Academy of Science is in accordance with the *Australian Charities and Not-for-profits Commissions Act 2012*, including:
  - (i) giving a true and fair view of the registered entity's financial position as at 30 June 2014 and of its performance for the year ended on that date; and
  - (ii) complying with Australian Accounting Standards and the *Australian Charities and Not-for-profits Commission Regulation 2013*.

**RSM BIRD CAMERON**



**GED STENHOUSE**  
Director

Canberra, ACT

Dated: 24 September 2014



# Australian Academy of Science

## STATEMENT BY COUNCIL

In the opinion of the Council of the Australian Academy of Science (the Academy):


(a) the statements of financial performance for the General Funds, General Purpose Capital Funds, Special Purpose Capital Funds and Grant Funds are drawn up to give a true and fair view of the results of the Academy for the year ended 30 June 2014;

(b) the balance sheet is drawn up to give a true and fair view of the financial position of the Academy as at 30 June 2014; and

(c) there are reasonable grounds to believe that the Academy will be able to pay its debts as and when they become due and payable.

Signed in accordance with a resolution of the council:

A. Holmes  
President



C. Jagadish  
Secretary Physical Sciences

CANBERRA  
24 September 2014

# Contacts





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

# Academy contacts

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