AUSTRALIAN ACADEMY OF SCIENCE

NEWSLETTER

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Science at the Shine Dome 2012

A cold autumn day in May saw the start of the Australian Academy of Science's annual flagship event, *Science at the Shine Dome*, which was warmed by the presence of about 250 participants, including Fellows, Award winners, early career researchers, teachers and the public. President Professor Suzanne Cory AC PresAA FRS formally admitted 21 new Fellows to the Academy, in a ceremony described by one Fellow as 'moving and inspiring'. The packed Shine Dome audience and dozens of online viewers were treated to highlights of each Fellow's groundbreaking research, some of which later featured in radio and television interviews. New Fellows described the latest portable devices for detecting explosives using light-emitting molecules, innovative designs for introducing rust resistance genes into agriculturally important cereal crops and new therapeutic targets for breast cancer being tested in preclinical trials.

Photo: Mark Graham

Suzanne Cory at this year's *Science at the Shine Dome*

The Macfarlane Burnet lecture marked the opening of the second day, dedicated to honorific award winners, with a stimulating talk by Professor Ruth Hall FAA on how bacteria acquire antibiotic resistance genes (see p 8). The morning offered a smorgasbord of the best Australian science by career and early career award winners, ranging from a discussion on the parallels between killer earthquakes and falling skyscrapers to new nanoscale light tools for detecting cancer. In particular, Dr Karen Black's research on the large wombat-like marsupial *Nimbadon* attracted intense media interest.

Later that day, each group was channelled into a specialised stream, with teachers participating in an interactive workshop and professional learning excursion to Questacon, early career researchers distributed among three career development workshops and Fellows attending the Academy annual general meeting.

The formal dinner was held for the first time in the newly built, beautiful Gandel Hall at the National Gallery of Australia, where the guest speaker, Antarctic historian Professor Tom Griffiths FAHA, entertained the audience with stories of the 1911–14 Australasian Antarctic Expedition. He described the gruelling conditions that Mawson's team had to endure and shared colourful recipes of their unusual diet.

The keynote speech set the scene for the next day's annual symposium on *100 years of Antarctic science*, celebrating the centenary of Mawson's Australasian Antarctic Expedition. The symposium brought together a host of national and international scientists who have continued Mawson's legacy of Antarctic research. Speakers covered aspects of Antarctic science ranging from locating the South Magnetic Pole, to terrestrial vegetation in the region, biodiversity in the Southern Ocean, and Antarctic climate and its implications for climate change.

To mark the event, the Academy created a display of Antarctic memorabilia and proudly launched its new publication *Still no Mawson: Frank Stillwell's Antarctic diaries 1911–1913*, edited by Dr Bernadette Hince. Members of Frank Stillwell's family were present for the launch to honour his contribution, and were also interviewed by television and newspaper reporters covering the symposium.

This year, for the first time, the Academy sought and was pleased to secure sponsorship for *Science at the Shine Dome*, enabling it to stage a world-class event. (See pp 3–6, 8 and 16–17 for more on the meeting.)

Message from the President

It was a real pleasure to see so many friends and colleagues at this year's *Science at the Shine Dome*, and to welcome 21 new Fellows. Thank you to all who attended, particularly those of you who travelled long distances to be there.

I am constantly amazed at the extraordinary science that is being done in Australia, across every discipline — it was a very special privilege to listen to presentations from the new Fellows and awardees. Congratulations once more to all of our deserving medallists and new Fellows.

Congratulations also, and welcome, to the new members of Council: the new Secretary for Physical Sciences Professor Chennupati Jagadish FAA FTSE, Professor Brian Schmidt FAA FRS NAS Nobel Laureate, Professor Ian Frazer AC FAA FTSE FRS, Professor Nalini Joshi FAA, Dr Michael Raupach FAA FTSE and Professor Rick Shine AM FAA. I look forward to working with you. A fond farewell and thank you to the outgoing council members who have served the Academy so well — Professor Michelle Simmons FAA, Professor Andrew Gleadow FAA, Professor Chris Goodnow FAA FRS and Professor Hugh Possingham FAA — and especially to the outgoing Secretary for Physical Sciences, Professor Peter Hall FAA FRS.

Our memorable annual dinner speaker Professor Tom Griffiths FAHA transported us to the raging winds and gastronomic delights of Commonwealth Bay a hundred years ago, before the wonderful Academy Symposium, *100 years of Antarctic science*. My sincere thanks go to the symposium conveners Dr Ian Allison and Professor Trevor McDougall FAA FRS. Thanks also to the Academy's secretariat staff, who worked for many months to ensure *Science at the Shine Dome* 2012 ran smoothly across its three days.

The air of celebration continued in the days after *Science at the Shine Dome*. After a period of great uncertainty, I am glad to be able to share some good news arising from the Federal Budget.

We were pleased to learn that, following the recent review, the supplementary funding component of the Australian Government's core funding has been reinstated. From 2013 the Learned Academies and the Australian Council of Learned Academies will receive an indexed total of $4.4 million to continue to foster understanding of the importance of science, technology and innovation, and promote research and scholarship in these areas.

In addition, a gratifying $54 million over four years was allocated to a range of science education initiatives — including $5 million for our *Primary Connections* and *Science by Doing* programs. This is particularly welcome at a time when Australian school students' interest and participation in science is in steady decline. While it is not nearly enough to complete the nationwide implementation of these proven programs, it will help in advancing our efforts to support the professional development of science teachers and improve student learning outcomes.

The Academy warmly welcomed the protection of the block grant funding to universities, and to the Australian Research Council and National Health and Medical Research Council budgets. However, we noted that funding for strategic research infrastructure via the National Collaborative Research Infrastructure Strategy remains uncertain. We were also disappointed that the government did not take the opportunity to put in place a new program to promote international science engagement. The Academy intends to remain engaged in the government's ongoing consideration of both issues over coming months.

Suzanne Cory

The positive Budget outcomes owe much to the determined efforts and influence of the Minister for Tertiary Education, Skills, Science and Research, Senator Chris Evans and the Chief Scientist, Professor Ian Chubb AC.

The funding comes in addition to the recently announced allocation of $10 million over three years to the Australian Council of Learned Academies to provide evidence-based interdisciplinary advice to the Prime Minister's Science Engineering and Innovation Council on issues of national and/or global importance.

I commend the government for protecting its investment in science education, research and innovation, and its strong leadership in recognising their importance to the future prosperity of the country.

Finally, it is my sad duty to inform you of the deaths of Professor Bruce Chappell FAA on 22 April 2012, Professor Stephen Angyal OBE FAA on 14 May 2012, and Professor Peter Bishop AO FAA FRS on 3 June 2012. (Their obituaries appear in this issue.)

Professor Suzanne Cory AC PresAA FRS

THE 2013 AGM AND SYMPOSIUM WILL BE HELD ON 29–31 MAY The theme for the 2013 symposium is 'Power to the people — the science behind the debate'. Check our website soon for further details.

Election and admission of new Fellows

Twenty-one new Fellows who were elected to the Fellowship on 23 March 2012, along with Fellows elected in 2007, 2010 and 2011, signed the Charter book on 2 May 2012, formalising their admission to the Academy. Short biographies for each of the Fellows are available at www.science.org.au/sats2012.

Professor Michael Alpers AO FAA FRS

Michael Alpers has made pivotal observations on the epidemiology, pathogenesis and aetiology of the prion disease kuru, showing that kuru was a transmissible disease. His many other major contributions to tropical medicine in Papua New Guinea include pivotal field studies on pneumonia and malaria. Through his leadership, the Papua New Guinea Institute of Medical Research has achieved world renown.

Professor Joss Bland-Hawthorn FAA

Joss Bland-Hawthorn has the rare distinction of making influential contributions to experimental physics (instrumentation) and astrophysics. He pioneered the field of astrophotonics, developing key devices that are revolutionising astronomical instrumentation enabling astronomers to observe much clearer images of distant stars and galaxies. His broad contributions to astrophysics include the creation, with Ken Freeman, of the fields of galactic archaeology and near-field cosmology.

Professor Paul Leslie Burn FAA

In the field of organic semiconducting materials, Paul Burn has been fundamentally involved in discovering and developing a world leading position for two new classes or materials, new characterisation techniques and device technologies. His discovery of light-emitting polymers and dendrimers has led to worldwide interest in organic semiconductors across a broad range of applications.

Dr John Church FAA FTSE

John Church resolved discrepancies between observation and models and the long-standing conundrum about the causes of sea-level rise in the 20th century, pioneering what is now the standard way of making observations. He has elucidated the dynamic balances at work in some of the major current systems around Australia, and his multidisciplinary work remains a model of the application of oceanographic information.

Professor Patrick De Deckker AM FAA

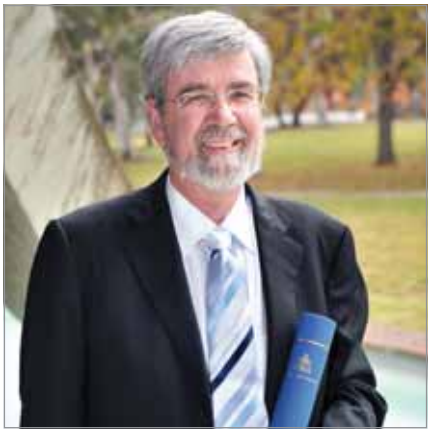
Patrick De Deckker has pioneered the study of Quaternary history of the oceans around Australia, using principally microfossils and their chemical composition to reconstruct past changes. He was the first to link patterns of environmental change on land and at sea. His findings show that glacial oceans have become progressively warmer as aridity increased in Australia. He is now studying microbiological and geochemical fingerprinting of airborne dust, with the aim of linking dust events with changes in the oceans.

Michael Alpers

Joss Bland-Hawthorn

Paul Burn

Photos: Mark Graham



John Church

Patrick De Deckker

Peter Dodds

Election and admission of new Fellows (continued)

Dr Peter Dodds FAA

Peter Dodds' innovative discoveries are internationally recognised for the rational design of synthetic rust resistance genes to protect the world's most important food crops from rust diseases. Peter isolated the first rust avirulence protein and showed that it is secreted into the host plant during infection and that the pathogen protein triggers immunity by direct protein to protein interaction with a host resistance protein.

Professor John Arthur Endler FAA

John Endler is one of the world's leading evolutionary biologists. He achieved international recognition for showing how geographically varying environments can cause divergent evolution and speciation. His studies of sexual and natural selection on colour patterns of guppies in the wild spawned a generation of research into selection in natural populations. He pioneered the new science of sensory ecology. His work on colour vision is revolutionising our understanding of how animals perceive the world.

Professor Timothy Fritjof Flannery FAA

Tim Flannery is a powerful public advocate for science. A well known author, broadcaster and speaker, he has raised awareness of science in the Australian community. His books have increased public debate on major issues relevant to the impact of society on the environment. As a researcher, he has made significant contributions to our knowledge of both living and extinct marsupials and mammals.

Professor Johannes Thieo Lambers FAA

Johannes Lambers is an outstanding international leader in plant physiological ecology. His recent focus on Australian plants and their interactions with the predominantly phosphorus-limited ecosystems of Australia was based on his novel understanding of the causes and consequences of variation in growth rate amongst plant species and its impact on nutrient transport and respiratory metabolism.

Professor Stephen William MacMahon FAA FAHA

Stephen MacMahon is a leading international authority on the risks associated with high blood pressure and the benefits resulting from blood pressure reduction. He was the first to demonstrate in epidemiological studies that there was no lower threshold, within the normal range of blood pressure, below which cardiovascular risks did not continue to decline. He has proven that blood pressure reduction would benefit high-risk patients irrespective of their initial blood pressure level. These findings have changed clinical guidelines and patient care worldwide.

Professor James McCluskey FAA

James McCluskey has contributed extensively to our understanding of the biology of the human leukocyte antigens of the major histocompatibility complex

John Endler

Tim Flannery

Johannes Lambers

Photos: Mark Graham

James McCluskey

Graeme Moad

Tanya Monro

(MHC). He has made critical discoveries underpinning the biochemical basis for peptide selection, the structural basis for antigen recognition and the immunogenetics of MHC-linked drug hypersensitivity.

Dr Graeme Moad FAA

Graeme Moad's outstanding work has contributed substantially to the development of new synthetic methods for the controlled synthesis of polymers with defined architecture and molecular weight distribution. This research has revolutionised the field, the most notable tangible outcome being polymerisation with reversible addition fragmentation chain transfer ('RAFT').

Professor Tanya Mary Monro FAA FTSE

Tanya Monro is one of the Australia's leading photonic scientists and a world leader in the field of optical fibres and optical communications. She created the world-recognised Institute for Photonics and Advanced Sensing. She has made exceptional scientific contributions of international significance to optical glass materials and fibres, photonics and optical physics, most notably in nanophotonics for nonlinear optics and sensing.

Professor John Edward Norris FAA

John Norris has forced major revision of several basic concepts in astronomy, including changing the concept of how the Galaxy formed. John's discovery of the most metal-deficient stars has illuminated the complexity of chemical evolution in the early Universe. John's work on globular cluster chemistry has opened up major new areas of research and initiated significant changes in the current theory of stellar evolution.

Professor Stephen Bruce Powles FAA FTSE

Foreseeing that herbicide resistance would become a great problem, Stephen Powles pioneered studies of resistance mechanisms and was the first to document resistance to glyphosate. He integrated molecular and agronomic initiatives in Australia, becoming the international authority on herbicide resistance. He has communicated approaches to industry, crop consultants, farmers and scientists worldwide.

Dr Louise Marie Ryan FAA

Louise Ryan is a leading biostatistician who has made important contributions to developing and applying statistical methods in environmental and public health research. She has made important methodological contributions in survival analysis and the analysis of correlated multivariate data.

Professor Frances Separovic FAA

Frances Separovic is a pioneer in the structural studies of antibiotic peptides in model cell membranes. She developed the technique of using nuclear magnetic resonance (NMR) to study peptides in aligned lipid bilayers (layers two molecules thick), which is being used worldwide to study both the structure of membrane proteins and their effects on the membrane.

John Norris

Frances Separovic

Greg Stuart

Photos: Mark Graham

Michael Tobar

Jane Visvader

Robert Williamson

Election and admission of new Fellows (continued)

Professor Greg John Stuart FAA

Greg Stuart has made formative contributions to understanding how information is processed by individual nerve cells in the brain. A world expert on the physiology of dendrites, Greg developed techniques for making electrical recordings from their fine processes. These techniques are now used throughout the world and have enhanced understanding of information processing in the brain.

Professor Michael Edmund Tobar FAA FTSE

Michael Tobar has pioneered the invention, creation and applications of devices in the field of precision frequency generation and measurement, including providing the most stringent tests of Einstein's theories of relativity. Michael has been invited to develop the only southern hemisphere user group of the European Space Agency's 'Atomic Clock Ensemble in Space' mission.

Professor Jane Visvader FAA

In a remarkable discovery, Jane Visvader and her team identified and isolated the stem cell that generates the entire breast. Jane's work has defined the cellular hierarchy within the breast, and led to the discovery that certain types of breast cancer originate from specific progenitor cells, resulting in profound implications for understanding the cellular origins of both normal and cancerous epithelial tissues.

Professor Robert Charles Williamson FAA

Robert Williamson has developed scientific theory and widely used practical algorithms to solve machine learning problems. His best known work is in the field of 'kernel machines', and the development of three widely used support vector machine algorithms which are popular because they are effective, efficient and the adjustable parameters are readily interpretable.

Francis Carbone (elected 2010)

David Cooper (elected 2007)

Michael Goddard (elected 2011)

Photos: Mark Graham

New Corresponding Members

The Academy is delighted to welcome two new corresponding members to the Fellowship. **Professor Brian Lawn FAA** is the world's leading researcher on brittle fracture and a pioneer in ceramic sciences. He has a broad reach into biological materials and collaborates extensively with researchers at the University of Western Australia and Curtin University.

Professor Bruce Stillman AO FAA FRS is internationally recognised as a leader in the fields of DNA-replication and chromatin inheritance, and advises a number of Australian universities and research institutes. He has an ongoing collaboration with a Sydney-based biotechnology company.

Brian Lawn

Bruce Stillman

Fellowship welcomes New Council members

Photo: Sandy Spiers

Chennupati Jagadish

Photo: Ted Sealey

Nalini Joshi

Photo: Heinz Buettikoffer, CSIRO

Michael Raupach

In 2012, four new Council members were elected to replace Professor Peter Hall, outgoing Secretary, Physical Sciences, ordinary members in the physical sciences Michelle Simmons and Michael Gleadow, and ordinary members in the biological sciences Chris Goodnow and Hugh Possingham.

Professor Chennupati Jagadish's election to Secretary, Physical Sciences, resulted in a vacant ordinary member in the physical sciences position on Council, known as a casual vacancy. To fill this position, Council elected Professor Brian Schmidt to this position for a period of 12 months.

Professor Chennupati Jagadish FAA FTSE — Secretary Physical Sciences

Professor Jagadish was elected to the fellowship in 2005 and has been an ordinary member in the physical sciences on Council since 2010. An Australian Laureate Fellow and Distinguished Professor at the Australian National University, Jagadish has pioneered novel delta doping and wavelength-shifting processes in III-V compound semiconductors that have led to innovative quantum well, quantum wire and quantum dot lasers.

Professor Nalini Joshi FAA

Professor Joshi is a new ordinary member in the physical sciences. Elected as a Fellow in 2008, Nalini has taken an active role in the Academy's work both as Chair of the National Committee for Mathematics (2011) and on Sectional Committee 1. Nalini is Professor of Applied Mathematics and Associate Head of the School of Mathematics and Statistics at the University of Sydney. She is a specialist in the field of mathematical structures on nonlinear integrable systems.

Dr Michael Raupach FAA FTSE

Dr Raupach was elected as a Fellow in 2009 and is a new ordinary member in the physical sciences. A CSIRO Fellow, Michael works in the area of Marine and Atmospheric Research. Recently a member of Sectional Committee 4 (Earth and Planetary Science), Michael also participated on National Committees before his election as a Fellow. As well as many other specialties, Michael is currently interested in the added global carbon cycle and its anthropogenic perturbations, and in carbon-climate-human interactions.

Professor Rick Shine AM FAA

Professor Shine has been elected to Council as a new ordinary member in the biological sciences. Elected to the Fellowship in 2003, he holds the Personal Chair in Evolutionary Biology at the University of Sydney. As well as many other national prizes, he was the winner of the Academy's Honorific Macfarlane Burnet Medal and Lecture in 2008. He has won the Eureka Prize twice, in 2006 and 2007. Of specific interest to Rick is the evolution, ecology and reproductive biology of animals.

Professor Ian Frazer AC FAA FTSE FRS

Professor Frazer is a new ordinary member in the biological sciences. He was elected as a Fellow in 2004 and is the Chief Executive Officer and Director of Research of the Translational Research Institute Pty Ltd. Ian has served on Sectional Committee 9 (Applied Biology and Clinical Sciences — 2004 to 2008). In 2006 Professor Frazer was Australian of the Year in recognition of his work towards, and creation of, a world-first vaccine against human papillomavirus (HPV) to protect against cervical cancer. Ian became a Fellow of the Royal Society in 2011 for his work on the vaccine, and his particular interests are in immunology, medicine, pathology, and clinical immunology.

Professor Brian Schmidt FAA FRS

NAS Nobel Laureate

Professor Schmidt was elected as a Fellow in 2008 and is on Council as an ordinary member for physical sciences (casual vacancy). Brian is an ARC Federation Fellow and Professor at the Research School of Astronomy and Astrophysics. Australia's most recent Nobel Laureate (2011), and a recent awardee of Fellowship to the Royal Society (2012), Brian has taken a keen interest in the Education programs developed by the Academy. He is presently on the Academy's National Committee for Astronomy and has interests in cosmology, physics of supernovas and gamma ray bursts and dark energy.

2012 Macfarlane Burnet Medal and Lecture

The Macfarlane Burnet Medal and Lecture is the Academy's highest award in the biological sciences, and is presented every second year, alternating with the Matthew Flinders Medal and Lecture for the physical sciences. It is awarded in recognition of research of the highest standing in the biological sciences, and commemorates the contributions to science by Sir Macfarlane Burnet, Nobel Laureate OM KBE FAA FRS. The 2012 recipient is **Professor Ruth Hall FAA**, School of Molecular Bioscience, University of Sydney. Professor Hall presented the Macfarlane Burnet Lecture on acquired antibiotic resistance in bacteria at *Science at the Shine Dome* in Canberra on 3 May 2012.

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

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

Having discovered integrons and gene cassettes in this way, she went on to characterise the way gene cassettes carrying the antibiotic resistance genes are incorporated into integrons and to show that gene cassettes are a major source of the antibiotic resistance genes found in difficult to treat gram negative bacteria. A second quite different gene acquisition system was also found sitting next to the gene cassettes in some cases. Professor Hall continues to work on novel antibiotic resistance gene acquisition systems. More broadly, her work now underpins our understanding of how genes of all types are mobilised by bacteria and hence how bacterial genomes evolve.

Photos: Mark Graham

Suzanne Cory and Macfarlane Burnet Medal recipient Ruth Hall; Ruth Hall giving the Macfarlane Burnet Lecture

Honours to Fellows

Trevor McDougall

Hugh O'Neill

Stephen Rintoul

Theo Murphy international scientific meeting

In May 2012 **Professor Jan Anderson** FAA FRS and **Professor Barry Osmond** FAA FRS were invited speakers at a Theo Murphy international scientific meeting 'Structure and dynamics of the thylakoid membrane', hosted by the Royal Society. The residential meeting was held at historic Chicheley Hall in Buckinghamshire, home of the Kavli Royal Society International Centre.

Professor Anderson spoke on the topic 'Dynamic lateral heterogeneity of plant thylakoid protein complexes'. This event was followed by another special event for Professor Anderson when she celebrated her 80th birthday on 12 May 2012.

Professor Osmond spoke on the topic 'From ecophysiology to phenomics: some implications'.

The Theo Murphy international scientific meetings are two-day scientific meetings of up to 90 participants. They bring together the top international scientists and engineers in a field, selected by the Hooke Committee through an open call for proposals, to ensure the highest scientific calibre.

Fellows of the Royal Society

The following Fellows of the Academy have been elected to the Royal Society:

Professor Trevor McDougall FAA FRS — for his outstanding research in the field of oceanic mixing and its role in climate models.

Professor Hugh O'Neill FAA FRS — for his outstanding research of mineral equilibria and their application to understanding planetary processes.

Professor Brian Schmidt FAA FRS NAS Nobel Laureate — for his discovery of the accelerating expansion of our Universe.

Other awards

Professor Stephen Rintoul FAA has been awarded the 2012 Martha T Muse Prize for Science and Policy in Antarctica for his outstanding research on the Southern Ocean. The prize is awarded by the Tinker Foundation and administered by the Scientific Committee on Antarctic Research.

Professor George Paxinos AO FAA has been elected to the Academy of Athens, Greece's national academy and the chief scientific body of George's birthplace. He is based at Neuroscience Research Australia and is widely known for his extensive work exploring and mapping the structure of the brain in humans and other animals. His explorations in this field have led to him being likened to the 15th century explorer Ferdinand Magellan.

The Academy of Athens admits very few scientists in any year. Because of this, and because of George's emotional and cultural connections to Greece, he sees the infrequently awarded honour as the most significant recognition his work has received.

Professor Ross Taylor AC FAA NAS has won the 2012 Shoemaker Distinguished Lunar Scientist Award, given to scientists who have significantly contributed to the field of lunar science throughout their scientific careers. Ross is a pioneer of lunar science, carrying out the first analysis of the first lunar sample returned to earth by the *Apollo* mission in July 1969, and has worked on lunar samples since then. As a NASA principal investigator for 20 years, he worked on models for lunar composition, evolution and origin. He has greatly influenced a generation of lunar and planetary scientists through his many books, which include *Lunar science: a post-Apollo view*.

Professor Ken Campbell FAA has won the US Society for Sedimentary Geology's 2013 Moore Medal for outstanding contributions in palaeontology. The Moore Medal is awarded to scientists who have worked during their career to promote the science of stratigraphy through research in palaeontology and evolution, and the use of fossils for interpretations of palaeoecology. Professor Campbell was nominated for the breadth and international significance of his research, his collaborations worldwide and his exceptional scientific legacy through teaching. He is the first Australian scientist to win this prestigious award working in this country.

Science and maths education recognised in Federal Budget

The Academy has been active in offering evidence to the Australian Government to help ensure that the budget will help research and support new initiatives in science education. Here is a brief overview of the 2012–13 Federal Budget measures and initiatives affecting science, research and higher education.

Summary

In what was a tough budget for other areas, the government avoided making cuts within the areas of science, research and higher education. The university research sector has done relatively well, with a boost to the Sustainable Research Excellence program. Both the Australian Research Council (ARC) and the National Health and Medical Research Council received small increments in their funding. CSIRO received its expected appropriation increase of 1.6 per cent. The government has committed ongoing indexed support to Australia's four learned academies, and in response to the Chief Scientist's recommendations will provide $5 million over four years for the Academy's schools science education programs.

Academy funding

The Government has announced that there will be ongoing indexed support totalling $4.4 million each year from 2012–13 for Australia's four learned academies.

BRIEFING FOR MINISTER PENNY WONG

Finance Minister Penny Wong joined Suzanne Cory AC PresAA FRS, Bob Williamson AO FAA FRS, Marilyn Renfree FAA, Chennupati Jagadish FAA FTSE and Brian Schmidt FAA FRS NAS Nobel Laureate for discussions over dinner at the Shine Dome on 2 April 2012. The meeting was an opportunity to provide the Minister with the Academy's big-picture perspective on the status and future of Australian science. Ms Wong was interested in the Academy's perspective of the effectiveness of the Government's annual $9 billion+ science and research expenditure. Discussion topics included science communication issues — such as climate change science — and the role of science in informing Australia's future and driving productivity. The example of CSIRO's wi-fi technology was described as a way of illustrating the dynamics of scientific research and consequent public benefits. The Academy later provided the Minister's office with a summary of the wi-fi story to help increase awareness of this outstanding Australian innovation. The 2012 Federal Budget was relatively favourable for the science sector (see account above).

(From left) Sue Meek, Chennupati Jagadish, Marilyn Renfree, Brian Schmidt, Penny Wong, Suzanne Cory, Mandy Fitzpatrick and Bob Williamson

Science education

A $54 million science and maths education package was announced in the Budget in response to the Chief Scientist's recent report *Mathematics, engineering and science in the national interest*. Of key interest to the Academy is the commitment of $5 million over the next four years for the Academy's *Primary Connections* and *Science by Doing* programs. Of this funding, $1.5 million will be allocated to *Primary Connections* and $3.5 million to *Science by Doing*.

A total of $4.3 million has been allocated for a new National Mathematics and Science Education and Industry Adviser. The post will be located within the Office of the Chief Scientist to champion the role of mathematics, science and statistics across education and industry.

Other initiatives within the package include:

- $10.9 million to improve maths and science teaching programs for prospective teachers
- $20 million to establish the Australian Mathematics and Science Partnerships Program to support innovative partnerships between universities, schools and other organisations.
- $6.5 million to expand CSIRO's Scientists and Mathematicians in Schools Program
- $2.4 million to support the international Science and Mathematics Olympiads.

Research block grant for universities

The research block grant for universities has been protected with overall spending increasing by 7.9 per cent to $1.72 billion in 2012–13. Future increases are to be linked to new indexation arrangements.

Research

- $656 million for the Research Training Scheme, an increase of 3.9 per cent
- $233 million for Research Infrastructure Block Grants, an increase of 3.9 per cent
- $345 million for Joint Research Engagement, an increase of 3.9 per cent

- $219 million for Sustainable Research Excellence, an increase of 32.0 per cent.

Postgraduate support

- $248 million for Australian Postgraduate Awards, an increase of 13.5 per cent. The number of postgraduate awards available remains at 3500.
- $22 million for International Postgraduate Research Scholarships, an increase of 3.9 per cent. The number of scholarships available remains at 330.

National Collaborative Research Infrastructure Strategy

Funding for infrastructure projects through the National Collaborative Research Infrastructure Strategy amounted to $542 million for the period 2004–05 to 2010–11. However, no funding was allocated to the continuation of this important program, an issue of serious concern to the Academy.

Australian Research Council

The competitive grants program of the ARC has been allocated $879 million, an increase of 6.2 per cent on the previous year. This funding is set to rise moderately in 2013–14 to $889 million, before falling in 2014–15 to $856 million. This decrease can be attributed to the winding-down of the Future Fellowships and Super Science Fellowship schemes.

National Health and Medical Research Council

Funding for medical research has increased from $746 million in 2011–12 to $760.5 million in 2012–13, up 1.9 per cent. Further small increments are planned for the forward estimate period 2013–14 to 2015–16.

Commonwealth Scientific and Industrial Research Organisation

CSIRO has received a small increase of $11.9 million in its appropriation, consistent with its Quadrennial Funding Agreement. In addition, $6.5 million has been confirmed for the Scientists and Mathematicians in Schools Program administered by CSIRO (see above). A further $29.8 million has been provided to establish a Manufacturing Technology Innovation Centre with which CSIRO is expecting to engage.

The government's appropriation is only part of the overall CSIRO budget, with funds coming from other sources such as the sale of CSIRO goods and services. Total expenditure for 2012–13 will be $1263 million, an increase on the previous year of $32 million or 2.6 per cent.

Cooperative Research Centres

In the previous budget there was a budget measure to redirect $33.4 million away from Cooperative Research Centres (CRCs) over the forward estimates. There has been no additional redirection of funding away from CRCs within this year's budget.

Student contributions for mathematics, statistics and science units

The most significant saving announced has been to increase the annual student course contribution for mathematics, statistics and science units. This measure removes these units from the special 'National Priority' rate. It was announced by the Government in the *Mid-year economic and fiscal outlook 2011–12* but was to be applied only to new students starting from 1 January 2013. This measure has now been extended to all students irrespective of when they commenced.

International linkages

Unfortunately no replacement of the 'International Science Linkages' program has been announced. There remains an allocation of $7 million over the next two years for the Australia–China Science and Research Fund.

INNOVATION REQUIRES GLOBAL ENGAGEMENT

Nobel Laureate Brian Schmidt FAA FRS NAS and Foreign Secretary Australian Academy of Science Andrew Holmes AM FAA FTSE FRS were in public conversation on 30 March 2012 at the University of Melbourne, in a meeting jointly organised by the Academy and the university. Robyn Williams AO FAA of the ABC Science Show moderated the evening, 'Innovation requires global engagement', which began with a welcome from Suzanne Cory. Speakers discussed the need for strategic engagement and collaboration with international science. The event built upon the Academy's 2011 position paper *Australian science in a changing world*, available at **www.science.org.au/reports/documents/Innovationrequiresglobalengagement.pdf**.

The speakers and members of the audience discussed how to address the lack of strategic national coordination to engage and collaborate effectively with the 98% of science that occurs outside Australia. Professors Schmidt and Holmes agreed that a new program is necessary to maximise Australia's technology-based opportunities in the 21st century by providing strategic guidance and support to make best use of past and future investment in Australian science and our international collaborative efforts. Such a program would ensure that the national science budget is responsibly spent. About 250 attended the conversation, whose highlights were broadcast on the Science Show on 5 May.

The broadcast is available at **www.abc.net.au/radionational/programs/scienceshow/the-value-of-international-scientific-collaborations/3992270**.

Douglas and Lola Douglas medical scholarships

Kim Hare recording *Streptococcus pneumoniae* antibiotic sensitivity results in the lab at Menzies

The Academy's Douglas and Lola Douglas Scholarship in medical science was made possible through a generous bequest from Lola Rachel Maude Douglas, a philanthropist with a keen interest in medical research. The scholarship's purpose is to help support a PhD researcher with a National Health and Medical Research Council Training Scholarship in the Indigenous or primary health care areas.

Researching chronic lung disease

Kim Hare, winner of the 2012 Douglas and Lola Douglas Scholarship, started her career in Namibia (formerly South West Africa) after receiving a BSc (Hons) from the Australian National University. She worked for a number of years in veterinary microbiology (parasitology and bacteriology) before branching into database management and programming to analyse data and produce reports for the Namibian veterinary department. Kim returned to Australia in 1996 and worked for a number of organisations in Darwin, including Territory Health Services, CSIRO, the Tiwi Health Board and Batchelor Institute of Indigenous Tertiary Education, before joining the 'Ear Team' at Menzies School of Health Research in 2000.

Kim has worked on the microbiological aspects of many different projects relating to ear disease and, more recently, lung disease in Indigenous children. These projects investigate the role of vaccines and antibiotics in preventing or reducing respiratory bacterial infections in Indigenous children. In 2009 Kim began a part-time PhD on the bacteriology of the chronic lung condition bronchiectasis in Indigenous children. She later received a National Health and Medical Research Council scholarship to enable her to pursue this research full-time.

Fighting strongyloides and scabies

The 2010 Douglas and Lola Douglas Scholarship winner Therese Kearns reports on the research facilitated by her scholarship.

The parasitic infections *Sarcoptes scabie*i (scabies) and *Strongyloides stercoralis* (strongyloides) have high levels of endemicity in many Northern Territory Aboriginal communities. Scabies commonly underlies skin sores infected with Group A streptococcus which is associated with Acute Post Streptococcal Glomerulonephritis and Acute Rheumatic Fever. These infections contribute to the fact that Indigenous Australians have one of the highest rates of heart and kidney disease reported in the world. Strongyloides in children causes malabsorption, diarrhoea and growth faltering, and is life-threatening unless adequately treated. Hyper-infection with strongyloides, although rare, has a high fatality rate (87%) in immunosuppressed people.

The study implemented a mass drug administration program aimed at reducing the prevalence of both scabies and strongyloides. Under this program, strongyloides (diagnosed from faecal or blood specimens) dropped from 21% at month 0 to 6% at month 12. For scabies, there was an initial reduction in prevalence from 4% at month 0 to 2% at month 6, but a scabies outbreak linked to a crusted scabies participant at month 12 resulted in an increase in prevalence across the community. Scabies increased from 4% at month 0 to 9% at month 12 in those who had been seen previously and for those seen for the first time at month 12, the prevalence was 12%, three times higher than the prevalence recorded in other members of the same community 12 months beforehand. Our local study team responded to the outbreak by identifying and following-up 13 priority houses, screening and treating 80% (n=153) of participants who were home at the time.

The mass drug administration using predominantly ivermectin was an effective public health measure to reduce the prevalence of strongyloides. While there was an initial reduction in the prevalence of scabies this was complicated by the introduction of a crusted scabies person into the community. The increase in scabies prevalence at month 12 highlights the high transmissibility of scabies infections and the effect that scabies can have on population prevalence in a short period of time.

Caring for the Australian countryside

The challenges of global food security and climate change have refocused public and political attention on agriculture in Australia, **Dr John Kirkegaard** of CSIRO Plant Industry told a diverse Shine Dome audience at the Academy's March public lecture.

'Images of dusty ploughed fields and dying sheep and trees have generated a public perception of an inappropriate "European" agriculture in Australia that belies the innovative, efficient and productive farming systems that have developed during the last 30 years,' he said.

Dr Kirkegaard's lecture, *From dust bowls to food bowls: the conservation farming revolution*, was the second in the 2012 series *Caring for the Australian countryside: lessons from the past and present*.

Dr Kirkegaard explained how Australia's innovative farmers now grow a diversity of crops and pastures without tillage. 'They retain stubble to protect the soil, and use satellite-guided precision seeding, spraying and harvesting to provide highly efficient production with reduced environmental risk,' he said.

Innovation continues apace, Dr Kirkegaard said, with rapid soil and plant sensing to guide management, better forecasting of weather and crop yields, and novel physiology and genetics to provide better crop varieties.

At the April lecture, **Dr Anna Roberts** examined the question of *Trade-offs between agriculture and environment: how do we decide what to protect?*

'Most people want to know that "the environment" is being protected, including water quality, habitat, threatened species and specific environmental assets,' she said. 'A focus on process, including making plans, and setting targets, helps create a sense that outcomes will be achieved, but often they are not. In addition, many programs are based on an implicit assumption that largely voluntary adoption of improved agricultural practices will be sufficient to deal with environmental problems, but often this is not the case.'

April's public lecture speaker Anna Roberts with series chair John Passioura

To attend the lectures, held from 6 to 7 pm on the first Tuesday of every month, please email **rsvp@science.org.au** or watch the live broadcast on the internet at **www.science.org.au/events/publiclectures/ac/index.html**.

UNCOVER — a vision for Australian exploration geoscience

During May a series of workshops was held around Australia on an exposure draft report of *Searching the deep earth: a vision for Australian exploration geoscience*. The report was released by UNCOVER, a committee established under the aegis of the Australian Academy of Science. The committee represents researchers, government and industry sectors and is working to implement the recommendations of the Academy's 2010 Theo Murphy High Flyers Think Tank, which was dedicated to the important national issue of declining mineral exploration success. The think tank proposed an ambitious and integrated deep earth mapping program to assist in uncovering Australia's mineral wealth. The new exposure draft puts forward a coordinated, cross-sector approach that requires Australian earth scientists to cooperate in innovative ways to produce a series of maps and products that will enable the discovery of Australia's next generation of economic mineral deposits. The report and details of the workshops can be found at **www.science.org.au/policy/uncover.html/**

UNCOVER
AUSTRALIAN EXPLORATION GEOSCIENCE RESEARCH

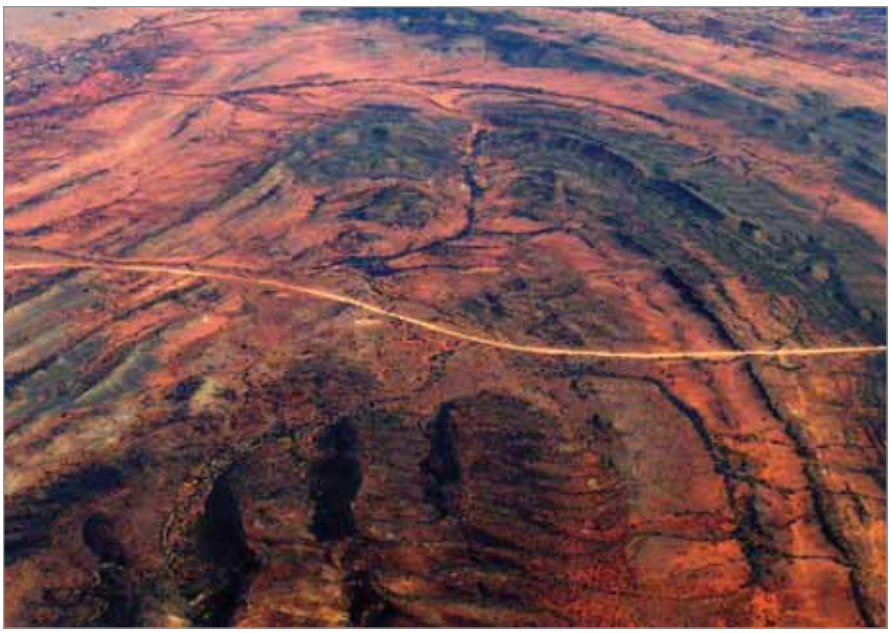


Photo: Dietmar Müller

Australia's red interior: aerial view of the Simpson Desert

International news

Participants of the Australia–Malaysia Green Growth Think Tank outside the Shine Dome in May 2012

Australia–Malaysia Green Growth Think Tank meeting

The Academy received funding from the Australia–Malaysia Institute of the Department of Foreign Affairs and Trade for an Australia–Malaysia Green Growth Think Tank held at the Shine Dome on 15 May, with site visits in Canberra and Sydney on 16 and 17 May 2012. Three Malaysian researchers selected by the Malaysian Academy of Sciences attended the meeting — Associate Professor Ahmad Fariz and Professor Abdul Hadi from the Institute for Environment and Development (LESTARI), Universiti Kebangsaan Malaysia, and Dato' Ghazali, Executive Chairman of Nusantara Technologies. The researchers were interested to know how Australia is implementing green growth policies in the areas of science and innovation, business and industry as well as environmental economics and skills training. Australian participants included the Department of Innovation, Industry, Science, Research and Tertiary Education, the Department of Resources, Energy and Tourism, CSIRO, the CO2CRC, the Australian National University, and Dyesol. The think tank showcased excellence and encouraged further research exchanges between Australia and Malaysia.

Chinese Commission visits Academy

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

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

IIASA director here

Professor Chennupati Jagadish FAA FTSE and Dr Michael Raupach FAA FTSE met with the Director of the International Institute for Applied Systems Analysis (IIASA), Professor Pavel Kabat, at the Academy on 2 May 2012. IIASA is an international research organisation that conducts policy-oriented research into problems too large or too complex to be solved by a single country or academic discipline, such as climate change problems that have a global reach and can be resolved only by international cooperative action, or problems of common concern to many countries that need to be addressed at the national level, such as energy security, population ageing, and sustainable development.

IIASA currently has 18 country members. Professor Kabat was in Australia to gauge Australia's level of interest in joining the Institute. Professor Kabat noted that Australian researchers are very highly regarded around the world and have expertise in areas such as water and food security. Professor Kabat also met with CSIRO and the Department of Innovation,

Industry, Science, Research and Tertiary Education.

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

The Australian Academy of Science invites applications from Australian researchers for the Australia–India Early Career and Senior Visiting Fellowships. The fellowships aim to increase the uptake of leading-edge science and technology and facilitate Australia's access to the global S&T system by supporting bilateral relations with India. Indian researchers interested in travelling to Australia should apply through an equivalent program administered by the Indian National Science Academy (**http://insaindia.org/index.php**).

The Australia–India Early Career and Senior Visiting Fellowships are supported by the Australia–India Strategic Research Fund, a platform for bilateral collaboration in science jointly managed and funded by the governments of Australia and India (**www.innovation.gov.au/science/internationalcollaboration/aisrf/Pages/default.aspx**).

The fellowships are open to Australian researchers from the public, not-for-profit and commercial sectors to support research and initiate or consolidate collaboration with a leading-edge Indian host organisation.

Closing date for submissions is **Friday 27 July 2012**. Guidelines, selection criteria and application forms can be found at **www.science.org.au/internat/index.html**.

Adam J Berry Memorial Fund

Expressions of interest are invited from junior scientists (30 years of age or under) to visit one of the National Institutes of Health in the USA. Proposals in any health-related field of natural science will be considered. Only citizens and permanent residents of Australia are eligible to apply. At the time of application, applicants should be either in the first two years of a PhD degree or equivalent, have completed a Masters or a Bachelors with Honours degree, or be in the final semester of a Masters or a Bachelors with Honours degree.

The deadline for expressions of interest is **Friday 27 July 2012 for travel in 2013**. Further information including the application form can be found at **www.science.org.au/internat/americas/berry.html**.

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www.science.org.au/news

YOUNG AUSTRALIAN RESEARCHERS TO ATTEND LINDAU NOBEL LAUREATES MEETING

A delegation of eight young Australian researchers will attend the 62nd Meeting of Nobel Laureates in Lindau, Germany, in July 2012. They join around 500 other students from all over the world to meet and talk with Nobel Prize winners in the field of physics, including Australia's newest Nobel Laureate in Physics, Professor Brian Schmidt FAA FRS NAS.

As part of their award from the Academy, which includes funding for travel to Lindau, they were sponsored to attend the Early Career Researchers program at *Science at the Science Dome*. All the Lindau participants were thrilled to be at the event. Of particular interest was a briefing provided to them by past delegation leaders Professor Bob Williamson AO FAA FRS, Professor Ron Ekers FAA FRS, Professor Andrew Holmes AM FAA FRS FTSE, Professor Marilyn Renfree FAA and this year's delegation leader, Professor Mike Dopita FAA.

The briefing provided the delegation with an opportunity to meet one another and Professor Dopita, and to organise ways in which they will make the most of the meeting, including engaging with other delegations and setting up meetings with the Laureates for one-on-one interaction.

Photo: Mark Graham

Young researchers for Lindau (from left) Melissa Ness, Minnie Mao, Andrew McCulloch, Jacinta Delhaize, Sarah Beavan, Adele Morrison, Grace Shephard and Andrew Casey

More from *Science at the Shine Dome*

100 years of Antarctic Science

Australia's scientific achievements in Antarctica began more than a century ago, but awareness of the continent has grown rapidly since issues like ozone depletion and global warming have become public concerns. The symposium *100 years of Antarctic Science* on 4 May 2012 showed that research fields as diverse as oceanic biogeochemistry, palaeoclimate and atmospheric physics have profited from the international scientific collaboration in the region.

Dr Charles Barton (Australian National University) described the 32 different measurements needed in order to establish the location of a magnetic pole. This is laborious enough in a laboratory, said Dr Barton — the only person ever to have been to both north and south magnetic poles — but far harder under Antarctic conditions.

Professor Sharon Robinson (University of Wollongong) talked about the terrestrial vegetation of East Antarctica. Carbon accumulated by non-vascular plants such as the centimetre-high moss 'forests' near Australia's Casey station allows us to detect (for example) a radiocarbon pulse from 1960s atmospheric testing of nuclear bombs.

The work of **Dr Jan Strugnell** (La Trobe University) has parallels to the work of Sir Douglas Mawson's 1929–31 British, Australian and New Zealand Research Expedition. We can study marine biodiversity in the Southern Ocean today, she said, by observing live specimens and studying them genetically.

In investigating the changing biogeochemistry of the Southern Ocean, **Professor Thomas Trull** (University of Tasmania) has experimented with seeding an area of ocean with iron to promote and track biomass (phytoplankton) blooms.

Dr Kate Selway (University of Adelaide) spoke of the links between the geology of Antarctica and Australia through two and a half billion years or more of shared Gondwanan history.

Photo: Mark Graham

Martin Siegert addressing the 2012 symposium

Professor Martin Siegert (University of Edinburgh) talked of the discovery of subglacial lakes in Antarctica, and of the significant but poorly acknowledged contribution of glaciologist Gordon de Quetteville Robin (longest-serving director of the Scott Polar Research Institute) to the continent's exploration.

Dr Phillip Reid (Bureau of Meteorology) gave a brief history of meteorological research in Antarctica by reading descriptions of the weather at Cape Denison in early 1912. Here Mawson and his men made meteorological measurements and analysed them for almost two years, a remarkable achievement.

ARGOS beacons in the Southern Ocean can float submerged rising to the surface at programmed intervals to measure temperature and salinity, and transmitting data by satellite at that time. The Southern Ocean is warming most strongly in the circumpolar current, said **Dr Steve Rintoul** (CSIRO Marine and Atmospheric Research). At the same time the currents and winds are shifting further southward, and the densest waters of the world's oceans, in the Southern Ocean, are becoming less saline. We do not yet understand the significance of such changes.

Dr Tas van Ommen (Department of Sustainability, Environment, Water, Population and Communities) said that ice cores spanning more than 800,000 years contain information about past temperatures, volcanic activity, solar variability, black carbon, and atmospheric concentrations of carbon dioxide, methane and nitrous oxide.

Professor Tim Naish (Victoria University of Wellington) compared conditions of the warm Pliocene interval 3.3 to 3 million years ago with those today, especially for sea level and CO_2.

Dr Ian Allison (Antarctic Climate and Ecosystems Cooperative Research Centre) summed up by highlighting the critical importance of securely archiving and sharing long-term polar data. Accelerating climate change in the Earth's polar regions is unequivocal and has global implications, he said. International Polar Years have allowed fundamental discoveries, but these periods of extraordinary international collaboration have yielded much data yet to analyse.

The day's proceedings are available at **www.science.org.au/events/sats/sats2012/symposium.html**.

Early Career Researcher Program

Science at the Shine Dome 2012 attracted 45 early career researchers from around Australia and New Zealand, from a diverse range of research disciplines. This group included seven Australian postdoctoral students who will be attending the 62nd Meeting of Nobel Laureates in Lindau in July, and 12 researchers sponsored by their research organisations (CSIRO, Antarctic Climate and Ecosystems Cooperative Research Centre — University of Tasmania, Antarctica New Zealand and the Universities of Waikato and Otago, Geoscience Australia, the Department of Environment and Natural Resources South Australia, and the Queensland Department of Environment and Resource Management).

The researchers rated several events as highlights. First, the three career-development workshops (Media and communicating science, Successful scientific collaborations and Grant writing skills — getting your research ideas funded) were a great success. The workshops were convened by a renowned media expert, four of the 2012 early career medallists and a New Fellow of the Academy. Many participants indicated they would have liked to attend all three workshops if time had not been such a limited resource.

The opportunity for early career researchers, teachers and Fellows to mingle during an informal dinner was greatly appreciated by all who attended. More than 30 Fellows participated. Early career researchers enjoyed the relaxed atmosphere and gladly discovered 'how easy it was to talk to the Academy Fellows'.

Participants were delighted with the breadth, scope and quality of the presentations by Awardees, New Fellows and symposium speakers. Many felt truly inspired and 'reinvigorated by science' when listening to and meeting such successful and passionate scientists. The event broadened their horizons and gave them a unique opportunity to 'sense the rewards of scientific discovery' and to 'fully appreciate all that is being done to promote and celebrate science in Australia'.

Science at the Shine Dome was described by one participant as 'by far the best conference I have been to yet'.

Teachers Workshop

Some of Australia's best science teachers came together at *Science at the Shine Dome* to talk teaching and learn about the latest scientific developments. A generous donation from Professor David Craig FAA once again enabled the Academy to sponsor a science teacher from each state and territory, the winner of the Prime Minister's Prize for Excellence in Science Teaching in Secondary Schools and the BHP Billiton Science Teachers awardee to attend the event.

The 2012 teachers workshop provided plenty of opportunity to share new ways to teach science. The day was opened by Professor Jenny Graves AO FAA (Secretary, Education and Public Awareness) and was followed by talks from the Academy's Professor Denis Goodrum (*Science by Doing*), Shelley Peers (*Primary Connections*) and Carol Conway (*Nova — Science in the News* and *Interviews with Australian Scientists*).

The Australian Science Teachers Association president, Stephen Zander, led a lively discussion of ways to engage science students with the Australian National Curriculum. The 11 teachers then gave short 'Wow! Science' talks about their best technology-free, no-fuss, high-impact demonstration of a science concept.

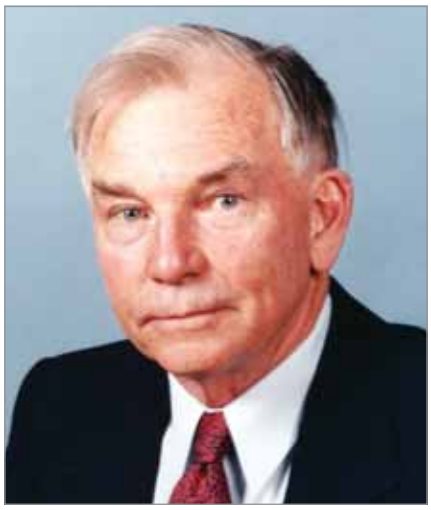
At the Questacon National Science and Technology Centre teachers participated in a science and technology workshop by the Shell Questacon Science Circus, and explored Questacon's exhibits. Feedback about the event was extremely positive and highlighted how useful the teachers found the experience:

- *An enriching experience. There were some amazing presentations that opened my eyes to the types of research being undertaken. It was also a great networking opportunity.*
- *The teachers workshop was a great session as it showcased new programs that can be implemented within the science classroom and gave the attendees some great ideas to take back to their schools and present to staff.*
- *Fantastic! I found it really valuable to be informed of such cutting-edge research and have already mentioned some of it in my classes.*
- *The Symposium on Antarctic Science was excellent. As a teacher I found this session very interesting and very useful.*

Photo: Mark Graham

Left to right: Jacquie Cleary, Stuart Sluggett, Lisa Nelson, Helen Silvester, Madiyantika Varma, Andrea Collins, Meg Saunderson and Liam Kirwan

Happy birthday to you!



Ian Mackay

Nancy Millis

Ken Cavill

Three Fellows have recently celebrated their 90th birthdays:

Ian Mackay AM FAA, who was 90 on 22 March 2012, is particularly interested in autoimmune disease and in 1963 with Macfarlane Burnet wrote the first text on the nature of autoimmune disease. He was elected as a Fellow of the Academy in 1991.

Nancy Millis AC MBE FAA FTSE turned 90 on 10 April 2012. She has a lifelong interest in applied microbiology, and promoted wastewater microbiology in Australia. In 2006 a new genus of bacteria, *Millisia*, and species, *M. brevis*, were named in her honour. Nancy was elected to the Academy by special election in 2004.

Ken Cavill FAA turned 90 on 23 April 2012. Professor Cavill's research interests at the interface of chemistry and biology have focused on the chemistry of insect venoms, and compounds with attractant and repellent properties. He was elected as a Fellow of the Academy in 1969.

A RESEARCH STRATEGY FOR NANOTECHNOLOGY

In mid-2011 the Department of Innovation, Industry, Science and Research provided the Academy with funding to support the development of a national strategy for nanotechnology. During the past nine months 60 nanotechnology experts have contributed to the preparation of a draft of the *National nanotechnology research strategy*. In early June an exposure draft will be released for comment. A series of workshops will be held around the country during July to give nanotechnology researchers the opportunity to discuss this new shared vision for their discipline. It is anticipated that a final version of the document will be ready for release during the last quarter of 2012. Details of the workshops and the exposure draft can be found at **www.science.org.au/policy/nanotechnology-strategy.html**

CARING FOR THE AUSTRALIAN COUNTRYSIDE

LESSONS FROM THE PAST AND PRESENT

The Australian Academy of Science's 2012 public lecture series will examine sustainable sociology, mining, agriculture, culture and environment in country Australia

All lectures 6–7 pm in the Shine Dome, Canberra and live-streamed on www.science.org.au/livestream/

Tuesday 3 July Professor Sue Golding
Coal seam gas issues

Tuesday 7 August Dr Richard Groves
Management of invasive plants

Tuesday 4 September Michael Looker
The role of philanthropy in nature conservation

IAP statement on population and consumption

The world's 105 science academies — including the Australian Academy of Science — have joined together to highlight the global challenges of population and consumption and call upon world leaders to take action.

Through the InterAcademy Panel on International Issues, academies from all over the world, including countries as diverse as South Africa, Latvia, Japan, Nicaragua, Bolivia, the UK and New Zealand, have come together to call for action on population and consumption. The academies' statement highlights that current patterns of consumption, especially in high-income countries, are eroding the planet's natural capital at rates that are damaging the interests of future generations, and should consequently and urgently be reduced. It also highlights that, if the right conditions are in place, reducing rapid population growth can stimulate and facilitate economic development, improve health and living standards, and increase political and social stability and security. Download the statement at **www.interacademies.net/10878/19191.aspx**.

Global population and consumption challenges

The houses that scientists built

Fellows of the Academy, particularly those who knew the scientists involved, will be interested in a new publication, Milton Cameron's *Experiments in modern living: scientists' houses in Canberra 1950–1970*.

This book explores the nexus between Australian architecture and science during a significant period in the nation's development. It looks at the homes of some of the brilliant young scientists brought to Canberra to take up leading roles in the establishment of national scientific institutions after World War II. Frank Fenner CMG MBE AC FAA FRS (whose house was built in 1954), John Zwar (1956), John Philip AO FAA FRS (1961), Ben Gascoigne (1969) and Otto Frankel FAA FRS (1970) commissioned Australia's leading architects to design their Canberra homes. All but one were Fellows of the Academy, and all were part of the extraordinary scientific and intellectual community which evolved in Australia's national capital in the post-war years. The houses that resulted from these unique collaborations rejected previous architectural styles and embraced modernist ideologies and aesthetics.

At the Fenner house in 1956, (from left) Carl Schreiner, Vicki Fenner, Mrs Schreiner, John Scollay, Frank Fenner, Marilyn Fenner and Bobbie Fenner

The book is published by the Australian National University's E Press, and is available free online. Printed copies can be ordered from the website. Further details are available at **http://epress.anu.edu.au/titles/experiments-in-modern-living**.

News from National Committees

For membership details of National Committees, see **www.science.org.au/natcoms/**.

Antarctic research

Chair: Dr Dana Bergstrom

The Chair, Dr Dana Bergstrom, convened a meeting of the committee at the Academy on 22 March 2012. Also in attendance was the newly appointed Chief Scientist of the Australian Antarctic Division, Dr Nick Gales, in his capacity as observer on the committee.

Committee Chair Dr Dana Bergstrom and Dr Tas van Ommen are Australia's voting delegates to the 2012 General Assembly of the international Scientific Committee on Antarctic Research (SCAR) in Portland, Oregon, in July. The committee discussed new SCAR programs and issues to raise at this assembly, including the future of the Standing Committee on Antarctic Data Management. Australia currently plays a leading role in this standing committee through Kim Finney (a member of the National Committee for Data in Science). The meeting noted the success of the Census of Antarctic Marine Life, an idea generated by the National Committee. It also discussed the need for regional infrastructure and human capacity, and the proposal for the Pure Antarctic touring cultural/science event. The Academy has provided $3000 in seed funding, and the Chair is seeking further sponsors and an underwriting organisation.

The Chair also has a position on the Antarctic Science Advisory Committee, and will advocate for science.

Astronomy

Chair: Professor Elaine Sadler FAA

The committee Chair, Professor Elaine Sadler FAA, has submitted a list of nominations for new International Astronomical Union individual memberships for presentation to the 2012 IAU General Assembly. The assembly will be in Beijing in August 2012.

Biomedical science

Chair: Professor Ian Dawes FAA

The Chair of the National Committee for Medicine, Professor Bronwyn Kingwell, attended a National Committee for Biomedical Science meeting at the University of New South Wales on 10 May 2012 to discuss overlaps in activities of the two committees and future interaction. Professor Philip Poronnik of RMIT University was an invited guest at the meeting. He reported on the success of last year's Forum on Education in Biomedical Sciences at the Shine Dome in December, organised by the committee, and on plans for a follow-up forum in late 2012. The 2011 forum served as a platform to launch CUBEnet, the Collaborative University Biomedical Education Network. Professor Poronnik secured more than $100,000 to support CUBEnet from the Australian Teaching and Learning Council.

Brain and mind

Chair: Professor Stephen Crain

The committee met at the Academy on 20 March 2012 and discussed how to address public perceptions of what brain imaging can achieve, and the need for a forum summarising high quality research and thinking on matters of public policy and discourse. The committee also discussed ideas for increasing the number of Academy Fellows in psychology and brain and mind science, and making a case for a new NHMRC panel on cognitive neuroscience. Professor Crain and Dr Cathy Foley, Chief of CSIRO Materials Science and Engineering, are working on issues surrounding investment in brain imaging research infrastructure, and a position paper is being drafted.

Crystallography

Chair: Emeritus Professor Mitchell Guss

A proposed International Year of Crystallography in 2014 would recognise the very significant contribution crystallography has made to a wide range of sciences over the past 100 years. The committee has made representations to the chief of the Australian mission to the United Nations General Assembly to support a resolution on this to be introduced by the delegation of the Kingdom of Morocco.

The committee met at the University of Sydney on 27 February 2012. Members are involved in organising the Bragg Symposium and the joint Asian Crystallographic Association/Society for Crystallography in Australia and New Zealand (SCANZ) conference in

Members of the National Committee for Biomedical science

Adelaide on 3–6 December 2012. The committee has provided sponsorship for the Bragg Symposium. Special blocks of the Australian stamp commemorating the 100th anniversary of the seminal contribution of the father and son team William Henry Bragg and William Lawrence Bragg will be available for sale at the meeting.

The Committee has asked SCANZ to undertake a feasibility study to see whether Australia should bid for the International Union of Crystallography Congress in 2017 or later, and if so to select a suitable bid team and host city. The congress has been held only once before in the southern hemisphere — in Perth in 1987.

Committee member Professor Ray Withers FAA successfully proposed that the theme for the Academy's 2015 *Science at the Shine Dome* symposium be crystallography, and the committee is considering ideas for speakers.

Data in science

Chair: Dr Rhys Francis

Meeting by teleconference on 13 February 2012, the committee discussed follow-up after a successful meeting of data stakeholders which it convened on 10 November 2011 following the e-Research Australasia 2011 conference. The committee is focusing on activities which promote the message to stakeholders that data which is well curated allows science to occur. The committee plans to work with organisers of the 2012 e-Research Australasia on possible speakers, and is considering holding a high profile activity around the time of this conference.

Earth system science

Chair: Dr Roger Gifford

The committee is hosting an Officers' Meeting of the International Geosphere–Biosphere Programme (IGBP) on 28–30 November. It is the first to be held in Australia since annual IGBP Officers' Meetings began in 1990. In association with that meeting the committee will hold its second Australian Earth System Outlook Conference on 26–27 November. The theme of the open conference, *Ticking time bombs in the human-managed Earth system: information, status, timing, significance, research needs*, is a large topic to cover in two days. The 'ticking time bombs' under consideration will therefore be confined to four topics

- repercussions of the mismatch between global investments in fossil fuels and climate change science
- polar deglaciation and sea-level rise
- the Great Barrier Reef under multiple interacting pressures
- long term food security.

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How much vitamin D is good for us?

History and philosophy of science

Chair: Professor Rachel Ankeny

At a very productive meeting at the University of Sydney on 28 March 2012, the committee began preparations for a workshop on the history and philosophy of science in late 2012, and discussed possible activities for the Academy's 60th anniversary in 2014.

Mathematical sciences

Chair: Professor Nalini Joshi FAA

The committee Chair is raising sponsorship for the committee to undertake a decadal plan for the mathematical sciences. The committee met on 8 February 2012 in conjunction with the forum *Maths for the future: keep Australia competitive* organised by the Australian Mathematical Sciences Institute five years after a forum organised by the committee in February 2007, *An investment in Australia's future: why the mathematical sciences matter*.

Professor Joshi was interviewed about maths in the classroom on Sydney radio on 15 February 2012. The podcast is available at **www.2ue.com.au/blogs/2ue-blog/maths-on-the-decline-in-classrooms/20120215-1t5qi.html**.

Nutrition

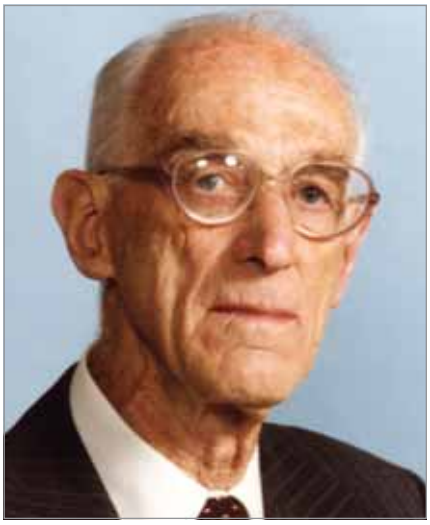
Chair: Professor Andrew Sinclair

The emergence of vitamin D deficiency in the Australian population is a major focus for the committee, which met by

continues on page 23

Obituaries

Stephen Angyal



Stephen Angyal

Stephen John Angyal was born in Budapest on 21 November 1914 and died in Sydney on 14 May 2012. He did his first degree at the Royal Hungarian University of Science and his PhD at the University for Technology and Engineering. In 1962 he became a Fellow of the Australian Academy of Science and received a DSc from the University of New South Wales.

He began his career in Hungary, where he worked on the synthesis of sulphonamides and oestrogens. In 1940 he migrated to Australia. With Dr Andrew Ungar he formed the Andrews Laboratories and did pharmaceutical work. The following year he moved to Nicholas Pty Ltd in Melbourne, where he worked on vitamins and the preparation of essential drugs. In 1946 he became a lecturer in chemistry at the University of Sydney, moved to the New South Wales University of Technology (later the University of New South Wales) in 1953 and became Professor of Organic Chemistry there (1960–79). From 1968 to 1970 he was head of the School of Chemistry and from 1970 to 1979 was dean of the Faculty of Science. On retirement he was made an emeritus professor.

Stephen's main work was on the chemistry of inositols and sugars and on conformational analysis. He was also active in the field of carbohydrate chemistry and published papers on the Sommelet reaction, heterocyclic amines and NMR spectroscopy.

He organised the Symposium on the Chemistry of Natural Products in 1960 where, with funding from Andrew Ungar, he initiated the Andrews Lectures. Stephen served on the Council of the Australian Academy of Science from 1967 to 1970.

Stephen's awards and honours included the HG Smith Medal of the Royal Australian Chemical Institute in 1958, the Archibald D Olle Prize of the Royal Australian Chemical Institute (NSW Branch) in 1966, Order of the British Empire in 1977, Haworth Memorial Lecturer of the Chemical Society in 1980, and Hudson Memorial Lecturer of the American Chemical Society in 1987. He was elected as an external member of the Hungarian Academy of Sciences in 1990. On his 80th birthday in 1994 the School of Chemistry at the University of New South Wales held a symposium in his honour and a research laboratory was named the Stephen Angyal Laboratory.

Stephen married Helga Steininger in 1942 and they had two children, Annette and Robert. All three survive him.

Peter Bishop

Peter Bishop

Peter Orlebar Bishop was born in Tamworth, NSW, on 14 June 1917 and died in Sydney on 3 June 2012. He was educated at the University of Sydney (MB BS 1940, DSc 1967, Hon MD 1983). He began his career as a resident in neurosurgery and psychiatry at Royal Prince Alfred Hospital, Sydney, becoming neurological registrar in 1941. After service as a surgeon-lieutenant in the Royal Australian Navy from 1942 to 1946, he spent four years in England as a Fellow of the Postgraduate Committee in Medicine, University of Sydney. He returned to Australia in 1950 as a Fellow of the National Health and Medical Research Council in the Department of Surgery, University of Sydney. He joined the Department of Physiology at the University as a senior lecturer in 1951, being promoted to reader in 1954 and professor and head of department in 1955, a position he held until 1967. He then moved to the Australian National University as professor and head of the Department of Physiology, retiring with the rank of emeritus professor in 1982.

His fascination with the brain began when he was a medical student and continued throughout his career. His research was on the properties of axons, neurone cell bodies and synapses in the brain, particularly those in the visual pathways and centres, and with the nature of the central organisation of vision. He also studied, in the visual centres, the successive transformations of the impulse-patterns that represent coded information transmitted from eye to brain. At the Australian National University he formed the Canberra Vision Group. Later in his career he worked mainly on the visual parts of the cerebral cortex. He was one of the pioneers of the major advances that have been made in our understanding of the neural mechanisms of binocular vision. Peter made a significant amount of his own equipment and his first seven papers were on electronics rather than physiology.

Peter was elected as a Fellow of the Australian Academy of Science in 1967 and the Royal Society in 1977. He was made an Officer of the Order of Australia in 1986 and won the Australia Prize in 1993. The University of Sydney honoured him by introducing the PO Bishop Medal, which was awarded annually to the top student taking the Bachelor of Science (Medical) degree.

Peter served the Academy as Chairman of the Board of *Historical Records of Australian Science* from 1982 to 1997. He was also a member of the National Committee for History and Philosophy of Science from 1984 to 1992 and the National Committee for Physiological Sciences (1956–65 and 1969–79). Wider committee service included the Research Advisory Committee of the National Health and Medical Research Council (1959–66) and Australian Research Grants Committee (1972–1976). He was treasurer of the Australian Physiological and Pharmacological Society 1960–1964 and president, Section 15, ANZAAS 1969 and 1972. He contributed to international science as a member of the council of the International Union of Physiological Sciences from 1968 to 1977. Peter was also on the editorial staff of several journals, including *Experimental Brain Research*.

Peter married Hilare Holmes (now deceased) in 1942 and they had three children, Phillippa, (Elisabeth) Clare and Roderick.

Bruce Chappell

Bruce William Chappell was born in Armidale, NSW, on 20 November 1936 and died in Canberra on 22 April 2012. He attended the University of New England, receiving a BSc and University Medal in 1959 and an MSc in 1961. He graduated with a PhD in 1967 from the Australian National University, which awarded him a DSc in 1990. Bruce travelled to the USA (United States Geological Survey and California Institute of Technology) and the UK (Cambridge, University of Liverpool, St Andrews) as a visiting research scientist, visiting fellow or scholar throughout his academic career.

Bruce spent his entire working life at the Australian National University, beginning as a lecturer in geology in 1960, with promotions to senior lecturer in 1968, reader in 1976 and professor in 1992. He retired in 1997 with the title of emeritus professor. During an active retirement he had the roles of adjunct professor at Macquarie University, visiting professor at the University of Bristol and honorary professor at the University of St Andrews.

His scientific interest and long-term research theme was the origin and evolution of granites which evolved in border areas of the geochemistry of the Earth's crust. He was extensively involved in the development and use of instrumental techniques of analysis, pioneering the use of X-ray spectrometry for trace element analysis, which led to his contributions in other geological fields, most notably in the analysis of lunar samples.

Bruce was elected to the Fellowship of the Academy in 1988 and served as a member and Chair of the Sectional Committee for Earth and Planetary Sciences, including the 2012 meeting, despite his failing health. He nominated the 2011 Corresponding Member, Professor John Dewey. With the Academy he organised the signing ceremony and dinner celebrations when Professor Dewey was in Australia in November 2011.

Bruce Chappell

Bruce was a Fellow of the American Geological Society (1994) and the Geological Society of London (1995), winner of the Geological Society of Australia's FL Stillwell Award (1988) and the Royal Society of NSW's Clarke Medal and Memorial Lecture (1993). In 1998 Bruce won the Academy's Mawson Medal and Lecture, recognising outstanding contributions to earth science in Australia. He was also an ISI Citation Laureate in 2001 and an ISI Highly Cited Researcher in 2003.

He is survived by his older sister, Mrs Connie Treloar.

All three Fellows were awarded the Centenary Medal, a government award which recognises citizens who have made a contribution to Australian society.

National committees (continued from page 21)

teleconference on 15 February 2012 and planned a symposium in conjunction with the International Life Sciences Institute. The symposium — *Should Australia and New Zealand allow more vitamin D into the food supply?* — was held on 12 June 2012 at Deakin City Centre, Melbourne. Further information is available at **www.science.org.au/natcoms/nc-nutrition.html**. The issue of vitamin D in Australia, including mention of the symposium and an appearance of committee member Dr Caryl Nowson, appeared on ABC TV's '7.30' on 22 March 2012.

The committee is discussing strategies to strengthen the science of nutrition in Australia, including the development of a decadal plan and the continuing sponsorship of early career researcher workshops. It is considering bidding for the 2025 International Union of Nutritional Sciences congress.

Physics

Chair: Professor Michelle Simmons FAA

The committee continued work on completion of the Decadal Plan for Physics, overseen by a working group of the committee and chaired by committee member Professor David Jamieson. The decadal plan will probably be launched early in the second half of 2012. Further information is available at **www.physicsdecadalplan.org.au**.

New book

Still no Mawson

At the annual symposium *100 years of Antarctic Science*, the Academy officially launched the recently published century-old diaries of Frank Stillwell. The diaries came to light in his papers when the present publications manager at the Academy, Bernadette Hince, was researching subantarctic island history in the Basser Library in 2002.

Stillwell was a young geologist on Douglas Mawson's Australasian Antarctic Expedition. He kept a diary from the time of his departure for Antarctica in December 1911 until his return to Australia in March 1913. His diaries reveal everyday life in the men's isolated hut in Antarctica.

In January 1913 all of the summer field parties had returned safely to the hut at Cape Denison except for Mawson's. 'Another day and no Mawson,' wrote Stillwell on 21 January. 'Still no Mawson,' he wrote five days later. 'The most optimistic among us are beginning to have fears not easily calmed.' By February he was sure the missing men had died.

Though he had no children, Stillwell himself was one of eight children. We were delighted to discover that his extended family maintains a keen interest in his antarctic undertakings. Thirteen family members attended the launching of the diaries on 4 May 2012 at the Shine Dome during the annual symposium of the Academy.

Further details, including how to order the book, are available at **www.science.org.au/publications/stillwell.html**.

Field parties in Antarctica, November 1912
Photograph by Archibald McLean, Mitchell Library (item ON 144/Q664), State Library of NSW

THE ELECTRONIC NEWSLETTER

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