www.science.org.au

AUSTRALIAN ACADEMY OF SCIENCE

Newsletter

JUNE 2017 NUMBER 108

INFLUENTIAL VOICE

Plan to future proof Australia's agricultural sector

Australia's leading agricultural scientists are calling on industry and government to establish a $100 million agricultural translation fund to help boost productivity and profitability, future-proofing Australian farmers against looming shocks like climate variability or major disease outbreaks.

The recommendation is one of five in a ten-year strategic plan for Australian Agricultural Sciences developed by the Australian Academy of Science.

The plan was launched at Parliament House in Canberra by the Assistant Minister to the Deputy Prime Minister, Luke Hartsuyker MP.

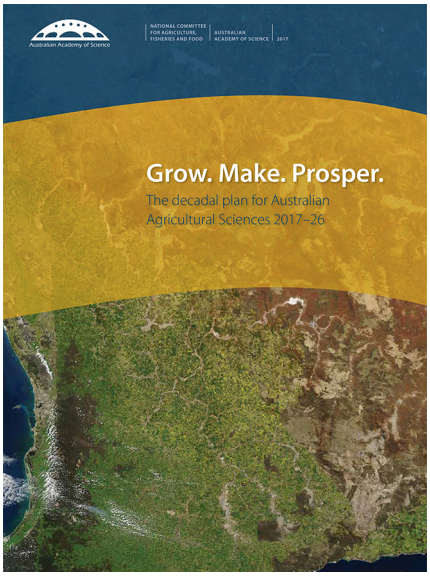
Developed by the Academy's National Committee for Agriculture, Fisheries and Food, the plan recommends a new research translation fund supported by public and private equity to fast-track investment in the development of applications for the most promising Australian research.

The fund would boost Australia's economy through new and improved agricultural products and services in domestic and international markets.

Assistant Minister to the Deputy Prime Minister, Luke Hartsuyker MP launching the Academy's ten-year strategic plan for Australian Agricultural Sciences.

The Academy's report has also identified opportunities to improve efficiencies in the sector by streamlining governance arrangements between Commonwealth, state and territory governments, research agencies and universities.

The Chair of the Academy's National Committee for Agriculture, Fisheries and Food, Dr Jeremy Burdon, said that the scientific and research community must form stronger partnerships across sectors and industries, focusing on better-integrated global data, modelling and analytical capacities, to better respond to new opportunities and prepare for major threats to agricultural production.



Read the Academy's media release (www.science.org.au/news-and-events/news-and-media-releases/plan-future-proof-australias-agricultural-sector).

10-year plan to advance taxonomy and biosystematics in Australasia

The Academy has announced the commencement of a new initiative to develop a 10-year strategic plan for biosystematics and taxonomy in Australasia.

Australasia is one of the world's most megadiverse regions, with large numbers of endemic and evolutionarily important species, and a high rate of discovery of new species. Biosystematics and taxonomy is used to discover, name and document new plant and animal species and their relationships. Every species of plant or animal known was named and described by a taxonomist or biosystematist.

Over the next three years, the Academy and its partners will consult extensively with the research sector and end-users of biosystematics and taxonomy information and capabilities, to identify opportunities and priorities for advancing these disciplines and their services in Australasia.

As well as being a foundational discipline for all of biology, knowledge and information infrastructure developed by biosystematics and taxonomy underpins the work of many industry sectors and public services, including biosecurity, agriculture, conservation and drug discovery, among others.

This initiative is supported by a grant from The Ian Potter Foundation and contributions from sector stakeholders including national councils representing herbaria and fauna collections, universities, professional societies and associations, the Atlas of Living Australia and Biosecurity Australia.

The project will be led for the Academy by Dr Kevin Thiele, a plant taxonomist, former Director of the Western Australian Herbarium and former Chair of the Council of Heads of Australasian Herbaria.

The development of the plan has just started, with an exposure draft planned for November and the plan to be finalised by early 2018. The agreement with the Ian Potter Foundation and sector partners will then allow the Academy to work with key stakeholders over the following two years to ensure that the strategies and recommendations included in the plan are implemented.

Photographing and identifying a specimen at the Australian National Insect Collection. Photo courtesy of CSIRO

2016 National Research Infrastructure Roadmap welcomed

The Academy has welcomed the 2016 National Research Infrastructure Roadmap and its recommendations (see www.education.gov.au/2016-national-research-infrastructure-roadmap).

It considers the nine focus areas for infrastructure development identified in the roadmap as the right priorities, and is looking forward to the release of the Government's research infrastructure investment plan.

Infrastructure funding in the investment plan must be long-term, strategic and insulated from annual budgetary fluctuations, consistent with the long-term nature and nation-building capacity of research infrastructure investment—as most big infrastructure has a lifetime over decades, not months or years.

There is also a need to assess research infrastructure requirements

As well as planning for future developments, the roadmap recognises that existing landmark facilities such as the research vessel 'Investigator' will require ongoing investment. Photo: CSIRO/Sarah Tynan

not only for the present but also for the future. It is important to build in mechanisms to bring on new infrastructure that will support Australia's research programs in five to ten years' time, and these may well be areas that are in their infancy now or not yet known.

Science and research in the federal Budget

Science largely flew under the radar in a restrained Federal Budget released on 9 May, with no big spending measures and no major cuts apart from previously-announced university funding changes.

An astronomy partnership with the European Southern Observatory will receive support of $26 million, ensuring Australia's involvement in major astronomy initiatives around the world. Funding for advanced manufacturing will arrive under the CRC program, and the first real investments will start to flow from the Medical Research Future Fund.

The Academy also welcomes:

- investment in new medical research and treatment facilities, with $68 million invested in South Australia to develop the first Proton Beam facility in the Southern Hemisphere
- increased support for women to enter high-skilled STEM professions through the Australian Mathematical Sciences Institute internship program
- the commitment of $49.8m over 11 years to ensure year-round operation of the research facilities on Australia's sub-Antarctic Macquarie Island which lies between Tasmania and Antarctica
- funding of $14.3m over three years to establish a whole-of-government educational data framework that will allow better understanding of educational pathways and program efficacy in STEM as well as other disciplines
- a small increase in funding for Geoscience Australia, with a particular focus on realising the opportunities presented by satellite and other geographical data.

However, the Budget didn't include any of the recommendations of the Ferris-Finkel-Fraser review of the R&D Tax Incentives, particularly those which may have strengthened the engagement between research organisations and industry.

There will be small decreases in indexation of funding across the

forward estimates equating to savings of several million dollars per annum in agencies such as ANSTO, CSIRO and funding programs such as the ARC and NHMRC.

More investment could have also been made in a vision for future jobs and economic prosperity, driven by a world class STEM capability.

Read the Academy's Budget media release (www.science.org.au/news-and-events/news-and-media-releases/what-budget-means-science-and-research).

Gene editing technology a hot topic

The Academy has released a discussion paper on new gene-editing technologies that override natural selection.

'Gene drive' technology allows scientists to manipulate the DNA of small plants or animals in a way that forces or 'drives' inheritance of particular genetic traits and characteristics to successive generations. The technology could wipe out malaria-carrying mosquitos, cane toads or other pests and plant diseases within years, but like any new technology, has potential risks.

Before gene drives are used in Australia, and before they start being used at scale elsewhere in the world, it's important to consider the applications that are of most benefit and the risks associated with those applications. Once gene drives are released into wild populations in other countries, they will inevitably reach Australia.

This discussion paper will stimulate Australian governments and communities to consider the issues now.

The Academy's report, which includes six recommendations, was developed by an expert working group chaired by Professor Hoffman and involved broad consultation with ethicists, scientists, state and federal biosecurity and agricultural authorities, and the Australian Gene Technology Regulator.

More information

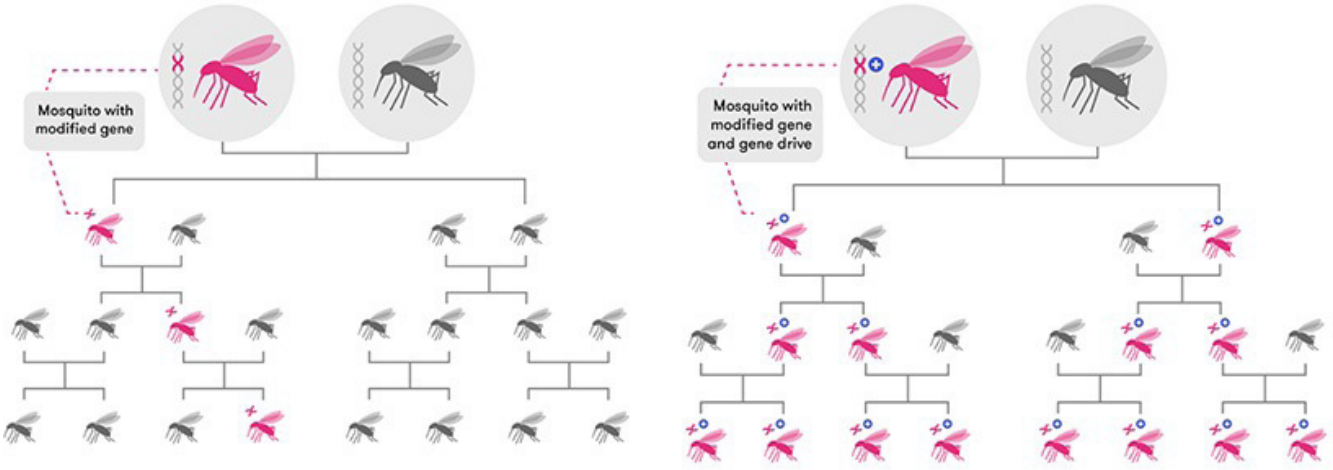
Gene drive discussion paper (www.science.org.au/support/analysis/reports/synthetic-gene-drives-australia-implications-emerging-technologies)

Academy's media release (www.science.org.au/news-and-events/news-and-media-releases/evolution-bending-gene-editing-technology)

Gene technology panel

Recent breakthroughs in gene editing technology have opened the door to a new era of genetic improvements that could improve animal and human health and agricultural yields, and reduce the impact of invasive species. A recent expert panel event held at the Shine Dome explored opportunities and challenges for next generation gene technology in Australia.

Speakers included molecular biologist Jeremy Brownlie, legal academic and Chair, Australian Gene Technology Ethics and Community Consultative Committee Judy Jones, agricultural biotechnologist TJ Higgins, lecturer in medicine Darren Saunders, and Raj Bhula from the Office of the Gene Technology Regulator.



An idealised illustration of Mendelian versus gene drive inheritance rates. Through standard Mendelian inheritance (left), offspring have a 50% chance of inheriting a modified gene carried by one of their parents. With a gene drive mechanism (right) the modified genes are eventually inherited by 100% of the offspring, allowing the gene to spread rapidly through the population. Images from Nova

The event was co-presented by the Academy and Science & Technology Australia.

Communique on nuclear fuel cycle

A symposium of energy experts, supported by the Academy, has called for a national discussion on nuclear options, including mining, power generation and waste storage, to help address Australia's energy security and climate change challenges.

The April symposium, hosted by The Australian National University (ANU) Energy Change Institute, was also supported by the Australian Academy of Technology and Engineering, and Engineers Australia.

A communique from the symposium urges governments to remove laws that may prohibit free and open discussions about the nuclear fuel cycle. The communique is based on a review of the report from the South Australian Government's Nuclear Fuel Cycle Royal Commission.

Read the full communique, including the findings from the symposium (www.science.org.au/academy-newsletter/jun-2017-108/communique-nuclear-fuel-cycle)

Academy welcomes changes to NHMRC grant funding

The Academy welcomed changes to the National Health and Medical Research Council's grant funding program announced in May (see www.nhmrc.gov.au/restructure).

The reforms should assist the NHMRC to fund and support health and medical research in a more targeted and equitable way.

The Academy considers that the changes will provide better opportunities for outstanding early- and mid-career researchers, and will address concerns about the potential for loss of creativity in research. Previously, funding applications for new ideas that pushed the boundaries may have had less prospect of success.

The new two-step review of applications will take pressure off both applicants and reviewers, freeing up researchers to get on with solving health and medical research challenges.

Assessment of some grants under the new arrangements will be blinded to gender, age, career stage and institution.

The reforms include replacing the longstanding Fellowship scheme and the Project and Program grants

Reforms should help the NHMRC to fund research in a more targeted and equitable way.

programs with three new streams, through which the majority of the NHMRC's research budget will be allocated.

Australia is a world leader in many areas of health and medical research, from the Nobel Prize winning discovery of the cause of gastric ulcers, to spray-on skin and the cervical cancer vaccine. Investments in health and medical research by the NHMRC have had direct, beneficial outcomes for Australians.

As the size and complexity of research required to improve health outcomes increases, these changes will help ensure the robustness of funding structures that support medical researchers.

INTERNATIONAL ENGAGEMENT

Academy represented at 2017 Commonwealth Science Conference

Thirty Australian researchers recently joined with hundreds of others scientists from around the Commonwealth at the 2017 Commonwealth Science Conference in Singapore (see https://royalsociety.org/science-events-and-lectures/commonwealth-science-conference-2017/).

The June conference brought together 450 scientists at different career stages and from 40 different states to celebrate excellence in science across the Commonwealth. The event aimed to inspire young scientists, provide opportunities for cooperation between researchers, build understanding about policy issues of common interest, and encourage scientific capacity building in Commonwealth countries.

The Academy was represented by Professor Andrew Holmes AC PresAA FRS FTSE, Professor Cheryl Praeger AM FAA, Professor Jim Williams AM FAA FTSE, Dr TJ Higgins AO FAA FTSE, Professor Jenny Graves AO FAA and Professor Martin Green AM FAA FRS FTSE.

The program included talks from eminent scientists and discussed common challenges including infectious diseases, the future of the oceans, low carbon energy and sustainable cities. There were talks on emerging new technologies and the implications for policy.

Professor Holmes and Professor Praeger participated in a meeting of presidents of academies to discuss opportunities to expand Commonwealth collaborations.

The conference was organised by the Royal Society and the National Research Foundation, Prime Minister's office, Singapore, and was opened by His Royal Highness Prince Andrew, the Duke of York. It was supported by the Queen Elizabeth Diamond Jubilee Trust. The previous conference took place in Bangalore in November 2014.

Leading scientist represents Australia in APEC ASPIRE Prize

An expert in optoelectronic engineering was the Australian nominee for the 2017 international ASPIRE Prize.

Professor Dayong Jin, from the University of Technology Sydney, was one of 16 international nominees in the running for the prestigious US$25,000 Asia–Pacific region science prize. The winner of the overall prize, Dr Yanwu Zhu of China, was announced recently in Vietnam (see www.apec.org/Press/News-Releases/2017/0512_ASPIRE).

The annual award recognises young scientists from APEC economies who have demonstrated a commitment to both excellence in scientific research and working closely with scientists from other APEC member economies. The 2017 ASPIRE theme was new material technologies, reflecting the importance of research into developing new and advanced

Australian researchers at the Commonwealth Science Conference in Singapore recently.

materials in driving scientific innovation.

Each member economy was invited to nominate one scientist under the age of 40 to be considered for this year's prize.

Professor Jin, a world-leader in his field, was nominated for his work in producing the world's brightest nanocrystals, called Super Dots. The low-cost, high-contrast, super-resolution microscopy technology is being utilised for personalised precision nanomedicine and super-capacity data storage. The Super Dots can also be made into an 'invisible ink' to protect pharmaceuticals, medical courier supplies, passports, banknotes and more.

Professor Jin also recently received the Academy's 2017 John Booker Medal for his Super Dots research, at Science at the Shine Dome (see www.science.org.au/opportunities-scientists/recognition/honorific-awards/honorific-awardees/2017-awardees#booker).

Dr Mohsen Rahmani from the Australian National University and Associate Professor Sharath Sriram from RMIT University were also recognised by the Academy as Australian finalists for this year's prize.

Dr Rahmani's recent work has led to the development of novel semiconductor nano-crystals that can be fabricated on any glass surface to allow human eyes to see in the dark.

Associate Professor Sriram's breakthrough work in nanoscale electronic memory technology mimics the way the human brain handles information. This allows the storage of multiple information states in a single memory cell, promising exceptional memory density and speeds on the scale of petabytes on a pinhead.

The APEC economies are Australia, Brunei Darussalam, Canada, Chile, China, Hong Kong-China, Indonesia, Japan, Republic of Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, Philippines, Russia, Singapore, Chinese Taipei, Thailand, the United States and Vietnam.

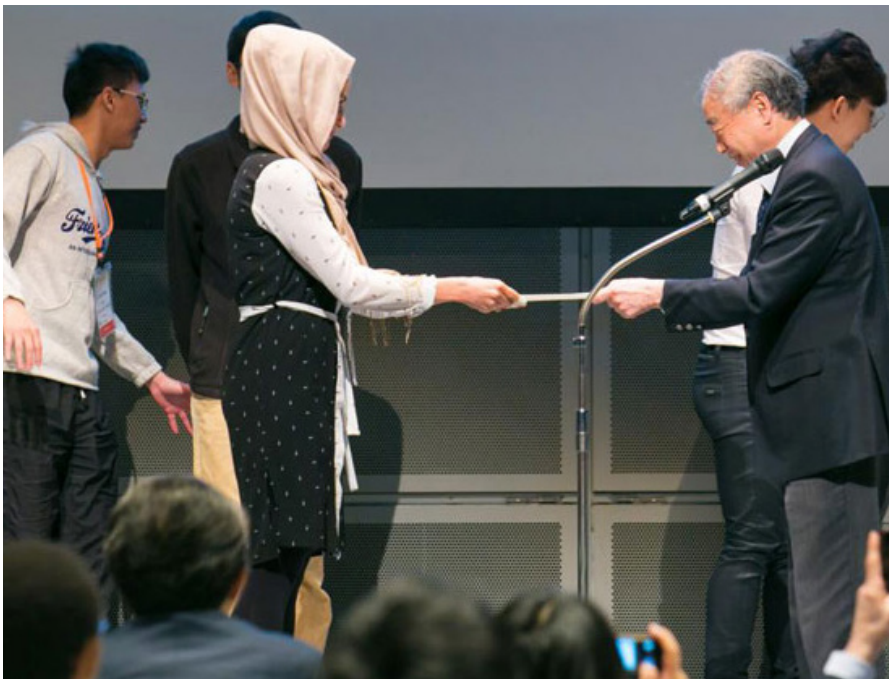
More about the ASPIRE Prize (see www.science.org.au/opportunities/travel/grants-and-exchange/apec-science-prize-innovation-research-and-education-aspire).

Australian researcher receives awards at HOPE meeting

Six Australian researchers attended the 9th HOPE Meeting in Japan earlier this year (see www.science.org.au/opportunities-scientists/travel-opportunities/nobel-laureate-meetings/hope).

They were:

- Dr Nathalie Bock, Queensland University of Technology



Dr El-Assaad won two awards for her poster presentations.

- Dr Fatima El-Assaad, UNSW Australia
- Mr Benjamin Fulcher, Monash University
- Mr Shuai Li, the Australian National University
- Dr Lidia Matesic, Australian Nuclear science and Technology Organisation (ANSTO)
- Ms Renee Webster, Defence Science and Technology Group

HOPE meetings, hosted by the Japan Society for the Promotion of Science, bring together Nobel Laureates and around 100 outstanding graduate students and young researchers, who are selected from countries in the Asia–Pacific region.

Dr El-Assaad won two awards for her poster presentations, continuing the success Australians have previously had at HOPE meetings. Dr Bianca Bernado from Baker IDI Heart and Diabetes Institute and Dr David McDonald from the University of Sydney received poster presentation awards in 2015 and 2016 respectively.

The next HOPE meeting will be in March 2018 in Tokyo, Japan. The Academy will call for applications closer to the date.

Collaboration the focus of Italy–Australia Science and Innovation Forum

A diverse range of areas for potential scientific collaboration between Italy and Australia were discussed at the Italy–Australia Science and Innovation Forum in May.

Hosted by the Academy, the event was opened by Academy President Professor Andrew Holmes AC PresAA FRS FTSE and the Ambassador of Italy to Australia, HE Pier Francesco Zazo.

Nine Italian researchers delivered presentations on topics including space, agriculture and food, medicine and marine science. Dr Margaret Hartley FTSE, CEO of the Australian Academy of Technology and Engineering, also delivered a presentation, which highlighted existing collaborations between researchers and SMEs from Italy and Australia supported through Australian Government funding schemes.

The program for the forum was designed by the Science Attaché from the Embassy of Italy, Professor Oscar Moze, whose eight-year appointment as Science Attaché ended in May. As well as being an excellent advocate for science and scientific links between Italy and Australia, Professor Moze has been a good friend and supporter of the Academy. He will be missed and we wish him well as he returns home to Bologna.

Sustainable Development Goals and Africa's challenges focus of international networks

Efforts to improve human impacts in countries across the world were the recent focus of the global network of science academies, the IAP for Science.

The Academy's Foreign Secretary, Professor Cheryl Praeger AM FAA, attended a meeting of the Executive Committee of the

Potential scientific collaboration between Italy and Australia was the focus of the Italy–Australia Science and Innovation Forum.

Representatives of world academies of science at the IAP meeting in Germany. Professor Cheryl Praeger (right of centre) represented the Academy.

International projects are harnessing science, engineering, and medicine to address Africa's challenges. *Image: Google maps/satellite view*

IAP for Science hosted by the German National Academy of Sciences Leopoldina.

IAP projects include strategies for attaining the Sustainable Development Goals (SDGs), and harnessing science, engineering, and medicine to address Africa's challenges. Professor Michael Barber FAA and Dr TJ Higgins FAA are on the working groups of these projects respectively.

The SDGs play an important role in many IAP member academies, and the Academy is considering ways to further support the SDGs in its work.

In addition to member academies, representatives of the Global Young Academy, the Association of Academies and Societies of Sciences in Asia, the European Academies Science Advisory Council, the Interamerican Network of Academies of Sciences, and the Network of African Science Academies also attended the meeting.

Australia and Korea strengthen science and innovation links

A recent meeting strengthened and developed collaboration in science and innovation between Australia and Korea, including establishing productive relationships and improving awareness of collaboration opportunities.

The Academy participated in the third Australia–Korea Joint Committee on Science and Technology meeting in Seoul at the invitation of the Australian Department of Industry, Innovation

The Australia–Korea Joint Committee on Science and Technology meeting aimed to strengthen and develop collaboration in science and innovation.

The Australian delegation at Knorr-Bremse in Munich, the world's leading manufacturer of braking systems for rail and commercial vehicles.

and Science. The Australian delegation was led by Mr Gino Grassia from the Department, with Professor Richard Hartley FAA representing the Academy.

Both countries presented their science and technology policies, with discussions on possible cooperation in the areas of Li-batteries, renewable energy, digital media design and computer vision, and 3D bio-printing.

The Academy was grateful for the opportunity to participate in this key meeting. The next joint meeting is expected to take place in Australia in 2019.

Australian innovation delegation visits Europe

Three Academy Fellows participated in an Australian Government innovation delegation to Germany, Switzerland and France in April.

Australia's Chief Scientist, Dr Alan Finkel AO FAA FTSE led the delegation, with Professor C. Jagadish AC FAA FTSE and Professor Hans Bachor AM FAA representing the Academy.

The visit provided an opportunity for leading Australians to learn from experience linking industry and research in each of these countries, particularly through clusters and other models for collaboration and commercialisation.

The program included workshops studying cutting edge practices, site visits and networking events to foster new partnerships.

The delegation also included representatives of CSIRO, the CRC Association, industry growth centres and industry.

Opportunities for scientists

Australia–China workshop on measurement challenges for electrical energy security

5-8 September 2017 | Canberra and Sydney, Australia

The electrical energy industries in Australia and China rely on measurement science and technology to solve current and emerging challenges. These needs are only expected to increase in the future.

An energy measurement roadmap will be one of the outcomes of the workshop.

This workshop will explore these challenges, showcase scientific achievements, and formulate a roadmap of future requirements for measurement research in electrical energy security. It is anticipated that the roadmap will inform future research project opportunities to address industry needs.

The workshop is co-organised by the National Measurement Institute, Australia (NMIA), the National Institute of Metrology (NIM), China and the Australian Academy of Science, and supported by the Australia–China Science and Research Fund (ACSRF).

Expressions of interest to attend the workshop should be submitted by 30 June.

More information about the workshop (www.science.org.au/news-and-events/events/international-events/australia-china-workshop-measurement-challenges).

Australia–India Early- and Mid-Career Fellowships for 2018–19

The Academy invites Australian early- and mid-career researchers to apply for the Australia–India Strategic Research Fund Early- and Mid-Career Researcher (EMCR) Fellowships 2018–19. These EMCR Fellowships provide support of up to $40,500 for Australian researchers

to travel to India and work with leading researchers at major Indian science and technology organisations for three to nine months.

The fund that supports the fellowships is a platform for bilateral collaboration in science jointly managed and funded by the governments of Australia and India.

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.

The closing date for submissions is Monday 11 September. More information on the fellowships (www.science.org.au/opportunities/travel/grants-and-exchange/fellowships-india).

Invitation to join the Japan Society for the Promotion of Science Alumni Association in Australia (JSPSAAA)

With support from the Australian Government the Academy has assisted in the establishment of the Japan Society for the Promotion of Science Alumni Association in Australia (JSPSAAA) with the purpose to engage Australian scientists with past, current or possible future collaborative links with Japan to enhance the strong bilateral science and research relationship between the two countries.

Regular membership is available to all Australian citizens and permanent residents who are or were recipients of JSPS Fellowships or other grants supported by the JSPS (for example, STA). Honorary membership may be granted to persons who have made significant contributions toAustralia's academic collaboration with Japan and JSPS activities in the AUSTRALIA. Honorary members must be nominated by a member of the JSPSAAA and approved by the Executive Committee.

More information on eligibility and how to join the alumni association (www.science.org.au/supporting-science/other-initiatives/japan-society-promotion-science-alumni-association-australia).

SCIENTIFIC LITERACY

Students to seek solutions to future challenges

How will we provide enough food, water and energy for the 9.7 billion people living on Earth in 2050? This will be one of the questions to challenge school students in National Science Week this August (see www.scienceweek.net.au), thanks to a new sustainability science resource by the Australian Science Teachers Association (ASTA) (see http://asta.edu.au/).

Filled with fun and engaging experiments, ASTA's 'book of ideas' is based on the global initiative Future Earth (see www.futureearth.org/). The resource highlights positive actions that can lead to a more sustainable future.

The Future Earth teacher resource book highlights positive actions that can lead to a more sustainable future. *Image courtesy of ASTA*

The educational resource follows the Academy's launch of the Australian chapter of Future Earth (www.science.org.au/supporting-science/future-earth-australia).

The global Future Earth program is the largest ever international research and development collaboration focused on long-term

sustainability solutions for the planet and human society.

ASTA based this year's theme for schools on this global initiative to engage teachers and their students in sustainability science in Australia and the surrounding region.

Teachers of students in years Foundation to 10 can use the new materials to stimulate, support and inspire their National Science Week activities.

Latest issue of Historical Records of Australian Science now online

The June issue of the Academy's journal, Historical Records of Australian Science (Volume 28 Number 1 2017), is now online.

Papers in this issue cover projects of Professor RW Home, CSIRO funding, Joseph Maiden and Eucalyptus taxonomy, the Proctor-Parkes incident, and changing ideas on the Australian environment (co-authored by Dr Max Day). Memoirs for Professor Ian Ritchie and Professor John Swan are published, along with book reviews, supplementary material and a bibliography of the history of Australian science.

Fellows can access the online journal for free by logging in to the Fellows' section of the Academy website.

Public access to articles is available on a paid basis, and printed copies can be ordered through CSIRO Publishing (www.publish.csiro.au/hr).

Biographical memoirs in the journal are published on the Academy's website (www.science.org.au/fellowship/fellows/biographical-memoirs) in due course, where they are available to the public at no cost.

National school mathematics program gathers momentum

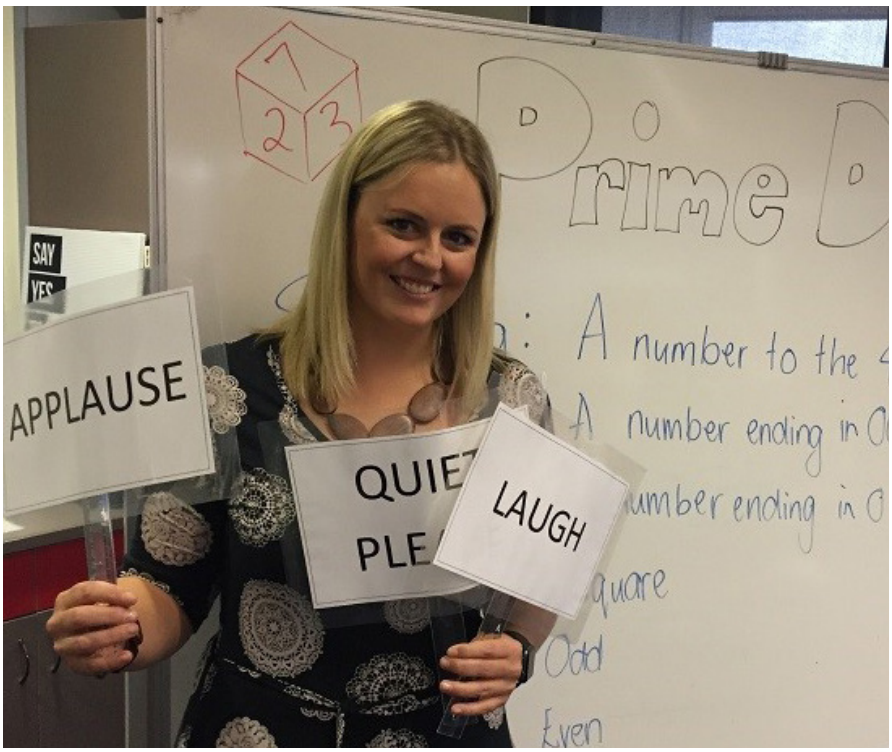
Development and implementation of the Academy's national school project, reSolve: Mathematics by Inquiry, is gathering pace with more than 200 expressions of interest received for its Leading reSolve Champions Program.

The aim of the Champions program is to promote the teaching of mathematics in years Foundation to 10 that is engaging, stimulating and challenging for all students.

Selected teachers and other educators will undertake a free professional learning program (online and face-to-face) that will provide thorough knowledge of project resources and approaches. Champions will promote the use of classroom lessons and professional learning modules with colleagues, helping to strengthen the teaching and learning of mathematics in schools and beyond.

In other news, a successful road show promoting reSolve was conducted at schools throughout Tasmania. The road show events were very well attended and there was a lot of positive interest shown in the project, with many teachers registering their intention to trial reSolve resources.

More news about the project (www.science.org.au/news-and-events/newsletters/resolve-newsletter/issue-4-may-2017).



One teacher turned the Prime Dice activity into a game show during the Tasmanian roadshow.

EXCELLENCE IN SCIENCE

Science at the Shine Dome lives up to its name

Solving complex problems with simple mathematical models, ocean circulation, bacterial superbugs, massive galaxies and pandemic influenza were some of the exciting topics covered at this year's Science at the Shine Dome, held from 22 to 25 May.

The Academy's annual flagship event saw 21 new Fellows inducted in to the Academy in recognition of their work in science. Each presented their research—ranging from atomic collisions and random networks to crop yields and endometrial remodelling. Day one also saw the delivery of the Matthew Flinders Medal and Lecture.

On day two, Professor Andrew Holmes AC PresAA FRS FTSE gave the annual President's address (www.science.org.au/news-and-events/news-and-media-releases/transcript-presidents-address-2017). Academy awardees were given the chance to share their research with the Academy's Fellows and members of the public. Award recipients spoke on subjects as diverse as tuberculosis, ocean basins, super dots and evolution. Of special note was the awarding of the inaugural Max Day Environmental Science Fellowship Award (www.science.org.au/academy-newsletter/jun-2017-108/first-max-day-fellowships-awarded).

More about the recipients of the Academy's 2017 awards (www.science.org.au/opportunities-scientists/recognition/honorific-awards/honorific-awardees/2017-awardees)

The red carpet was rolled out on Wednesday evening with the Academy's annual gala dinner. Minister for Industry, Innovation and Science, Senator the Hon Arthur Sinodinos AO, represented the Prime Minister and gave an inspiring address. Professor Barry Ninham AO FAA was presented with the Matthew Flinders Medal (www.science.org.au/academy-newsletter/jun-2017-108/2017-matthew-flinders-medal-barry-ninham).

The final day was an exploration of invasive species, titled 'Life on the loose: species invasion and control'. Leading Australian and international researchers shared the latest information on marine, plant and vertebrate invasions, and threats to human and animal health.

The new Fellows of 2017

All the event's inspiring presentations are available on the Academy's YouTube channel.

See and share photos of the events. Please credit Australian Academy of Science (http://files.bradleycummingsphotography.com.au/b/cxx01Jj25Tr4G3JyNUto).

The new Fellows of 2017

Twenty-one of Australia's best scientists have been elected to the Australian Academy of Science for their outstanding contributions to science.

The scientists' ground-breaking discoveries and contributions to research range from improving food security, women's reproductive health and mobile telecommunications, through to our understanding of the evolution of the Earth, the periodic table and massive galaxies.

Many of the new Fellows were inspired at an early age to become scientists.

Professor Dietmar Müller gathered billion-year old fossilised rocks along Baltic Sea beaches as a child, while Professor Lois Salamonsen read books about the universe.

Professor Branka Vucetic became fascinated with radio-engineering when her science teacher posed a question that she couldn't answer at the time, while former Chief Scientist, Professor Ian Chubb, would race to finish reading tasks in primary school so he could go outside and study nature as a reward.

The Academy's Fellowship now includes 522 esteemed scientists. The new Fellows are:

Queensland

Professor Philip Hugenholtz, University of Queensland

Professor Jennifer Martin, Griffith Institute for Drug Discovery

Professor Tim Ralph, University of Queensland

Dr Mark Smyth, QIMR Berghofer Medical Research Institute

New South Wales

Professor Dietmar Müller, University of Sydney

Professor John Patrick, University of Newcastle

Professor Branka Vucetic, University of Sydney

South Australia

Professor Jozef Gécz, University of Adelaide

Western Australia

Professor Igor Bray, Curtin University

Australian Capital Territory

Professor Ian Chubb, Australian National University (Special Election)

Dr Evans Lagudah, CSIRO

Victoria

Professor Thomas Davis, Monash University

Associate Professor Jane Elith, University of Melbourne

Dr Anita Hill, CSIRO

Professor David Gardner, University of Melbourne

Professor Karl Glazebrook, Swinburne University of Technology

Professor Cameron Jones, Monash University

Professor Melissa Little, Murdoch Children's Research Institute

Professor Lois Salamonsen, Hudson Institute of Medical Research

Professor Nicholas Wormald, Monash University

Tasmania

Dr John Volkman, CSIRO

2017 Matthew Flinders Medal and Lecture—Professor Barry Ninham

Recipient of the Academy's 2017 Matthew Flinders Medal, Professor Barry Ninham AO FAA, delivered his

Professor Barry Ninham caption to come...

award lecture during Science at the Shine Dome. The award is one of Australia's most prestigious honours for work in the physical sciences.

In his lecture, Professor Ninham discussed how the classical theories of physical chemistry that underpin our intuition about the deepest levels of biology, while initially useful, have become rigid and inhibiting to progress. By bringing together a number of advances in related fields, he gave an account of the complexities that are missing from classical theories of physical chemistry. When we include them, a different intuition and new vistas emerge that open up new technologies—for example in desalination, water purification and sterilisation.

Professor Barry Ninham's discoveries have had a revolutionary impact on the field of colloid science, a discipline that underpins chemical engineering, cell and molecular biology and nanotechnology. He developed the theory of amphiphilic molecular self-assembly that underlies modern materials science. Professor Ninham was founder and head of the Applied Mathematics Department at the Australian National University and currently works with a team at the Australian Defence Force Academy. They discovered simple new technologies for purification of recycled water, desalination, low temperature chemical reactivity, catalysis, and removal of pollutants such as arsenic.

More about the Matthew Flinders Medal and Lecture (www.science.org.au/opportunities-scientists/recognition/honorific-awards/career-awards/matthew-flinders)

First Max Day fellowships awarded

As a part of the Awards ceremony at Science at the Shine Dome 2017, Mr Nicholas Leseberg from the University of Queensland and Dr Marta Yebra from the Australian National University were announced as the first two recipients of the Academy's Max Day Environmental Science Fellowship Award (see www.science.org.au/opportunities/research-funding/max-day-environmental-science-fellowship-award).

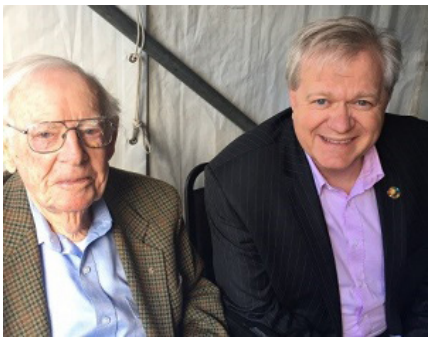
PhD student Mr Leseberg will use his Max Day Award to investigate the ecology of the elusive and endangered Night Parrot, while Dr Yebra will study the moisture content of Australian forests to create models that predict bushfires.

In addition to the awardees, three researchers were highly commended: Dr Hugo Harrison from the ARC Centre of Excellence for Coral Reef Studies at James Cook University, Dr Kerensa McElroy from CSIRO, and Mr Max Worthington from Flinders University.

A highlight of the ceremony was the attendance of Dr Max Day, who at 101 is the longest serving Fellow of the Australian Academy of Science and who has spent a lifetime championing entomology, conservation and forestry, and helping other scientists. Elected to the Academy in 1956—just two years after the Academy was founded—Dr Day still remembers the 1958 ceremony at which then Prime Minister Sir Robert Menzies officially laid the foundation stone of what is now known as the Shine Dome.

Nick Leseberg in the field in Western QLD where he's studying the elusive Night Parrot. *Photo Credit: Nick Leseberg*

Marta Yebra characterising the spectral response of grasses during a fire experiment in Braidwood. *Photo Credit: Carolina Luiz*



Dr Max Day and Professor Brian Schmidt caught up after the awards.

Following the Award ceremony supporters and guests gathered for lunch and joined Dr Day and members of his family in celebrating the special occasion.

Dr Day and his family are generously funding this fellowship to support scientists early in their careers, acknowledging the support that Dr Day himself received as a young researcher to travel overseas to gain his PhD at Harvard.

More than 110 award applications were received by the Academy, reflecting the great need for support among young researchers. We sincerely thank Dr Day for his generosity and invite you to become a valued supporter to enable this award to continue to assist additional young researchers for decades. Your support will ensure that together, we can make a significant impact on future research for Australia.

The Academy extends a special thank you to Doug Hooley PSM for his generous support to the Max Day Environmental Science Fellowship Award. Mr Hooley has pledged his ongoing support over the coming years.

For more information on supporting young scientists, please contact our Development and Stewardship Manager, Ms Isobel Griffin at the Australian Academy of Science. Email isobel.griffin@science.org.au tel 02 6201 9471

Invasive species spotted at National Arboretum

As a part of a busy program during Science at the Shine Dome 2017, the Academy's annual Black Tie Dinner was held on Wednesday 24 May at the National Arboretum. Sponsored by the Future Industries Institute, UniSA, the evening took on an extra dimension of excitement with the table centrepieces, a series of 3D-printed rabbits, cats, toads and foxes, skillfully converted into lamps and put up for adoption.

Usually these animals are considered invasive but on the night they were harmless. Designed and 3D printed using enviro-friendly materials by Academy staff member, Dr Alistair Usher, they were derived from 3D photogrammetric analysis of wooden or ceramic ornaments—unless they were a cane toad! In that case, they fell asleep peacefully in a freezer before having their 3D form preserved for research purposes.

By making a donation on the night to the Academy's Annual Giving Program, donors could adopt our invasive dinner guests and take them home. But people had to be quick as the creatures were limited in number and once a card was attached to them, they were spoken for and off limits to others!

It would appear that these creatures have landed on their feet. Reports of their new abodes are still coming in but one of them, 'Ross' as he is affectionately known, is comfortably housed at the Future Industries Institute, UniSA and proudly wears the 2016 ATSE Clunies Ross Medal for Innovation.

Thanks to all our adoptees, we raised over $3,700 on the night towards our Annual Giving appeal.

We acknowledge the support of our valued sponsors, whose contributions made Science at the Shine Dome 2017 such a great success.

Donors at the dinner could adopt an invasive dinner guest and take it home.

Honours and awards to Fellows

Queen's birthday honours

Companions (AC) in the General Division of the Order of Australia

- Professor Peter Colman AC FAA FTSE—for eminent service to medical research, particularly in the fields of structural biology and medicinal chemistry, as a leader in the commercial translation of scientific discoveries, to professional organisations, and as a mentor of young scientists.

(from left) Professor Susan Scott, Professor Ken Freeman, Professor Frances Separovic and Professor Gerard Milburn.

- Professor Ken Freeman AC FAA FRS—for eminent service to astronomy through pioneering contributions in the field of galactic archaeology, as a leading astrophysicist and researcher, to tertiary science education, to professional academies, and as a mentor of young scientists.
- Professor John Shine AC FAA—for eminent service to medical research, particularly in the area of biopharmaceuticals and molecular biology, to higher education as an academic, to professional medical organisations, and as a supporter of the advancement of innovation in science.

Officers (AO) in the General Division of the Order of Australia

- Emeritus Professor Geoffrey Fincher AO FAA—for distinguished service to science, and to education, in the area of plant genomics, as an academic, researcher and administrator, through scientific advisory roles, and to international professional societies.
- Professor Andrew Gleadow AO FAA—for distinguished service to the earth sciences, and to education, as an academic and researcher in the field of thermochronology and landscape evolution, and to professional geological and scientific societies.
- Professor Ian Hume AO FAA—for distinguished service to science in the field of biology, particularly through contributions to nutritional ecology and the conservation of Australian native animals, and to tertiary education.
- Professor Angel Lopez AO FAA—for distinguished service to medical and scientific research in the areas of immunology and cell biology, and through innovative developments in cancer treatment, particularly acute myeloid leukaemia.
- Dr Phillip McFadden AO FAA—for distinguished service to earth sciences as a geophysicist, through leadership of Australia's peak geoscience body, through collaboration and innovation in research, and to professional societies.
- Professor Stephen MacMahon AO FAA—for distinguished service to medical research at a national and international level, through advancements in the treatment of hypertension, stroke and diabetes, and to improving health outcomes for disadvantaged populations.

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

- Emeritus Professor Robert Vincent AM FAA—for significant service to science, and to education, particularly in the field of solar-terrestrial physics, as an academic and researcher.

More information on the Queen's birthday honours (www.science.org.au/news-and-events/news-and-media-releases/three-fellows-queens-birthday-honours)

Australian Laureate Fellowships

- Professor Michelle Coote FAA—Georgina Sweet Australian Laureate Fellowship
- Professor Edward Holmes FAA FRS
- Professor Geoff McFadden FAA
- Professor Feodor Sukochev FAA
- Professor Mathai Varghese FAA
- Professor George Willis FAA

Other honours and awards

- Professor Graham Farquhar AO FAA FRS—2017 Kyoto Prize in Basic Sciences
- Professor Susan Scott FAA—member of the LIGO Team awarded the Bruno Rossi Prize
- Professor Frances Separovic FAA—IUPAC Distinguished Women in Chemistry or Chemical Engineering

- Professor Jenny Graves AO FAA—Lorne Genome Conference Julian Wells Medal
- Emeritus Professor David Boger FAA FRS FTSE—Fellow of the National Academy of Engineering (USA)
- Professor Susanne von Caemmerer FAA FRS—Fellow of the Royal Society
- Professor Edward Holmes FAA FRS—Fellow of the Royal Society
- Professor Gerard Milburn FAA FRS—Fellow of the Royal Society
- Professor Ken Freeman FAA FRS—Foreign Associate National Academy of Sciences (USA)
- Professor Jonathan Sprent FAA FRS—Foreign Associate National Academy of Sciences (USA)
- Professor Jamie Rossjohn FAA—Fellow of the Academy of Medical Sciences (UK)

Academy Fellow awarded prestigious Kyoto Prize

Academy Fellow Professor Graham Farquhar AO FAA FRS has become the first Australian to win a Kyoto Prize—the most prestigious international award for fields not traditionally honoured with a Nobel Prize.

Professor Farquhar has won the 2017 Kyoto Prize in Basic Sciences for his life's work in plant biophysics and photosynthesis, which has involved research on water-efficient crops and the impacts of climate change.

He has helped develop new water-efficient varieties of wheat, improved global food security, and found evaporation and wind speeds are slowing as the climate changes.

Academy Fellow Dr Graham Farquhar is the first Australian to win the prestigious Kyoto Prize. Photo: Stuart Hay, ANU

Professor Farquhar will receive $600,000 as part of the award.

Kyoto Prizes have been awarded annually since 1985 in three categories—Advanced Technology, Basic Sciences, and Arts and Philosophy—to people 'who have contributed significantly to the scientific, cultural, and spiritual betterment of mankind'.

More information Professor Farquhar's prize (www.kyotoprize.org/en/)

Internationally renowned scientists admitted to Academy

The Academy has admitted two internationally renowned scientists as Corresponding Members, Dr Raghunath Mashelkar (India) and Professor Rüdiger Wehner (Switzerland), who are recognised for their outstanding scientific contributions to their fields.

Dr Mashelkar is a highly successful polymer chemist and an influential leader in shaping innovation within India's science and technology policies. He has driven international collaborations between India and Australia through his work in education, research and innovation partnerships with Monash University, Swinburne University of Technology, RMIT University and the Australia–India Institute.

Professor Wehner, from the University of Zurich, Switzerland, has been recognised for his world-leading research on animal navigation (neuroethology).

Spending over 40 years studying the Saharan desert ant Cataglyphis, Professor Wehner was the first scientist to show how ants, despite their tiny brains, are capable of performing extraordinary feats of navigation through desert landscapes.His research has increased scientists' understanding of the evolution of nervous systems and their role in controlling animal behaviour.

Professor Jim S Williams, Dr Raghunath Mashelkar, The High Commissioner of India Dr AM Gondane, and Academy President Professor Andrew Holmes.

Professor Rudiger Wehner

From the Saraha desert to the Australian outback, Professor Wehner's lifelong interest in insect navigation has also seen him team up with Macquarie University's Dr Ken Cheng to study the navigation patterns of the red honey ant, Melophorus bagoti.

Dr Mashelkar and Professor Wehner join the Academy's 29 other Corresponding Members, comprising leading international researchers and science advocates with strong links to Australia.

Registrations open for 2017 gender equity symposium

Following the success of 2016, the Science in Australia Gender Equity (SAGE) 2017 symposium will focus on practical solutions for implementing change in the STEMM (science, technology, engineering, mathematics and medicine) sector. This includes bringing experts together to identify mechanisms to address the barriers for women of Aboriginal and Torres Strait Islander or culturally and linguistically diverse backgrounds, share views and inputs to support best practices for on the ground action, and continue the dialogue on national policy enablers to support continuous improvement through measurement.

The 2016 SAGE symposium stimulated lively discussion on gender equity in STEMM issues.

The event, consisting of presentations and workshops, will be held at the Brisbane Conference and Exhibition centre on 5 and 6 September 2017. Tickets are on sale now.

Information on the agenda and how to purchase tickets (http://www.sciencegenderequity.org.au/2017-symposium/)

Supporting research to improve the health of Indigenous children

The Academy has awarded the Douglas and Lola Douglas Scholarship (see www.science.org.au/opportunities/research-funding/douglas-and-lola-douglas-scholarship-medical-science) to Dr Bianca Middleton for her research on improving the health of Indigenous children.

Dr Middleton was awarded the scholarship for her PhD work on 'Strategies to reduce the burden of gastroenteritis in Aboriginal children'. She is jointly enrolled at the Menzies School of Health Research and Charles Darwin University.

Dr Middleton says she is honoured to be in the company of the many excellent researchers in the past awardees list. She is passionate about Aboriginal child health and works in both a clinical and research capacity.

The Douglas and Lola Douglas Scholarship in medical science is offered as a 'top-up' scholarship to a high-ranked PhD candidate awarded a National Health and Medical Research Council Training Scholarship in either Indigenous or primary health care, with preference given to Indigenous health research.

It is awarded initially for one year (currently $7,000 per annum) with funding available for a maximum of two years. The award covers costs of small items of equipment, research

Bianca Middleton (second from left), with team members Clare McKay, Jane Nelson and Tom Snelling.

materials, travel, or research assistance.

The scholarship is made possible through a generous bequest made by Lola Rachel Maude Douglas, a philanthropist with a keen interest in medical research.

EMCRs involved in future of science

EMCR Forum submissions

The EMCR Forum recently made submissions on behalf of early- and mid-career researchers to two important national consultations.

The Australian Research Council's consultation on Research Opportunity and Performance Evidence (ROPE) (see http://www.arc.gov.au/consultation-research-opportunity-and-performance-evidence) sought the views of stakeholders on the effectiveness of the current system in facilitating fair access to competitive funding. Read the EMCR Forum's submission (www.science.org.au/supporting-science/science-policy/submissions-government/research-opportunity-performance-evidence).

Innovation and Science Australia held a consultation to assist in the development of a 2030 strategic plan for the Australia Innovation, Science and Research System (see https://industry.gov.au/Innovation-and-Science-Australia/Pages/2030-Strategic-Plan.aspx). The plan will aim to identify investment and infrastructure priorities for government. Read the EMCR Forum's submission (www.science.org.au/supporting-science/science-policy/submissions-government/2030-strategic-plan-innovation-science-research).

EMCRs participate in Science at the Shine Dome

Approximately 60 early- and mid-career researchers attended Science at the Shine Dome in May. They were exposed to talks across the breadth of science in Australia, thanks to our new Fellows and award winners. The program for EMCRs also included an exclusive EMCR–Fellow reception, generously sponsored by the College of Medicine, Biology and Environment and the College of Physical and Mathematical Sciences at the Australian National University.

The event gave EMCRs an opportunity to meet and network with Fellows of the Academy and

Professor Andrew Holmes introducing the international EMCRs, (from left) Dr Akhmad Rizali, Dr Berry Juliandi and Dr Lastus Kuniata.

Chairs of the Academy's National Committees for Science explored engagement and collaboration opportunities at their annual meeting.

was an enjoyable and lively evening for all involved. Academy President Professor Andrew Holmes AC PresAA FRS FTSE extended a special welcome to three international EMCRs who joined the EMCR program at Science at the Shine Dome: Dr Lastus Kuniata from Papua New Guinea, and Dr Berry Juliandi and Dr Akhmad Rizali from Indonesia.

The EMCRs also had the opportunity to attend one of four career development workshops on pitching to the media, story-telling skills, perfecting grant writing or fostering partnerships with industry.

The program gave EMCRs a chance to connect with other researchers who understand their challenges and share their enthusiasm, and the opportunity to be inspired by Australia's leading scientists.

National Committees for Science explore opportunities

The chairs of the Academy's 22 National Committees for Science met at the Shine Dome in April for their annual meeting. The committee chairs shared expertise on how to improve engagement with parliamentarians, policy makers and industry, and discussed all-inclusive topics of concern that might result in collaborative projects.

The meeting was chaired by Academy Vice-President and Secretary for Physical Sciences Professor Jim Williams AM FAA FTSE, Foreign Secretary Cheryl Praeger AM FAA and Council member Professor Sue O'Reilly AM FAA. The Academy's Executive Committee and senior secretariat staff participated in the lively discussion.

National Committees for Science aim to foster a branch or theme of natural science in Australia and to serve as links between Australian and overseas scientists in the same field.

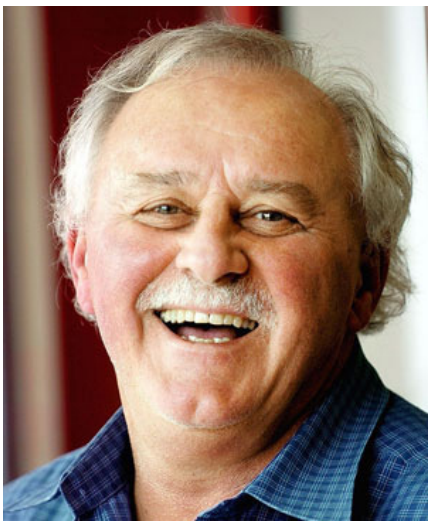
More about the National Committees for Science (www.science.org.au/supporting-science/national-committees-science) and their 10-year strategic plans for Australian science (www.science.org.au/support/analysis/decadal-plans-science).

Obituaries

Professor Brian Kay AM FAA FACTM

1944 to 2017

Professor Brian Kay was one of the pre-eminent entomologists from Australia dealing with a range of regional arbovirus problems, especially dengue. He published extensively on mosquito bionomics, diagnostics, vector competence,



Professor Brian Kay

epidemiology and innovative mosquito control, including a landmark strategy against dengue in The Lancet. He also made significant contributions to the understanding of arbovirus ecology in Australia, including the Ross River and Murray Valley encephalitis viruses. Professor Kay was honoured in the Queen's birthday list in 2005 with an AM for his work on the elimination of arbovirus diseases in northern Australia and Asia.

Professor Kay was an Emeritus Professor at the Queensland Institute of Medical Research. He was elected to the Academy in 2006, served on Academy sectional committees, and was a generous donor to the Academy.

Professor Ken Campbell FAA FGSAust

1927 to 2017

Professor Ken Campbell was distinguished for the breadth and depth of his research into vertebrate palaeontology, early evolution and Palaeozoic stratigraphy. Professor Campbell worked with fossils that are 300-400 million years old and had several named after him, including *Kenichthys campbelli* found in China. He received many prestigious awards and prizes for his work, including the Academy's Mawson Medal and Lecture (1986), the Geological Society of Australia WR Browne Medal (2006) and the Royal Society of NSW Clarke Medal in 2010. In 2013 he was the first Australian working in Australia to receive the prestigious RC Moore medal for Excellence in Palaeontology from the US Society for Sedimentary Geology.

Professor Campbell was elected to the Academy in 1983. He served on many Academy committees and on the Academy's Council from 1990 to 1993. Professor Campbell also contributed to the Academy's international engagement and served on the China Exchange Program.

Professor Ken Campbell. *Photo courtesy of The Canberra Times*

Professor Ian Cowan FAA

1931 to 2017

Professor Ian Cowan moved from CSIRO to join Dr Ralph Slatyer AC FAA FRS FTSE and Professor Barry Osmond FAA FRS in the newly formed Department of Environmental Biology, Research School of Biological Sciences at the Australian Natiounal University in 1968. His interests then moved towards plant physiology and ecology, particularly on the ways in which plants balance the competing requirements of conserving water and acquiring carbon. He was known for his outstanding theoretical and experimental contributions to knowledge of gas exchange in higher plants. His application of control theory led to a profound understanding of the system in which uptake of carbon dioxide and loss of water vapour are interrelated and regulated through the action of stomata in plant leaves.

Professor Cowan's PhD students (supervised or co-supervised) included Professor Graham Farquhar AO FAA FRS, Professor Marilyn Ball FAA, Professor Susanne von Caemmerer FAA FRS and Dr John Finnigan FAA.

He was elected to the Academy in 1984. He served on a sectional committee and on the Rudi Lemberg Travelling Fellowship Committee. Well after his retirement in 1993, Professor Cowan continued writing and intellectual pursuits focusing on the history and social implications of Darwinism.

Professor Ian Cowan.

OPERATIONAL EXCELLENCE

Annual giving program

A message from President Andrew Holmes as the Academy launches its 2017 Annual Giving Program

Imagine a world without science, a world without scientists striving every single day to understand the world around them. It's virtually impossible to contemplate such a reality. I often think about the collective impact on the world made by the Fellows of the Australian Academy of Science and remain quite awestruck at the difference their work has made to our wellbeing, the economy and our physical and designed environment. The world simply would not be as we know it today in the absence of their contribution.

Equally, it is hard to imagine where the Australian Academy of Science would be without the generosity and philanthropic support of many individuals and organisations.

Gifts and legacies enable the Academy of Science to create cutting edge science education in schools, hold scientific meetings, support public policy development, publish scientific reports, give early-and mid-career scientists the edge they need to advance their science and their careers, make awards and bestow Fellowships on outstanding scientists, and inspire generations of Australians with the wonder of science. Indeed, most of the things that make the Australian Academy of Science unique are supported by private gifts that help students, teachers, scientists and society.

All of us share a desire for science and scientists to prosper and for future generations to benefit from discovery and to be empowered by knowledge. Yet each person has a unique reason for supporting the Australian Academy of Science.

I invite you today to support the Australian Academy of Science through our Annual Giving Program so that together we can continue to build a strong and vibrant future for science in Australia.

The Annual Giving Program offers you the chance to support the Academy of Science through donations that are fully tax deductible. Enclosed is further information about the Program and how you can offer your support.

Should you wish to discuss ways in which you can support the Australian Academy of Science and how you would like your support directed, please contact Ms Isobel Griffith, Manager Development and Stewardship on (02) 6201 9400.

Your support is deeply appreciated.

Yours sincerely

Professor Andrew Holmes AC
PresAA FRS FTSE