



Science stars gather to launch exciting new school resources

National and international luminaries of science gathered at the Shine Dome in November to launch the Academy's new junior secondary school science education program, *Science by Doing*.

Four years in the making and fully aligned to the national science curriculum, the program makes the most of cutting-edge digital technology to deliver free, online, fully interactive curriculum resources for students and teachers in years seven to 10.

Nobel Laureate Professor Brian Schmidt AO FAA FRS and Academy President Professor Suzanne Cory AC FAA FRS joined students and teachers and *Science by Doing* Executive Director Professor Denis Goodrum to launch the program at a breakfast held by the Academy in honour of the 2013 winners of the Prime Minister's Prizes for Science (see story page 4).

Professor Goodrum led the group in a short hands-on activity – making a helicopter out of a strip of paper – before the program was officially opened by Professor Schmidt.

Guests were also treated to live demonstrations of the units by eight students from New South Wales, the ACT, South Australia and the Northern Territory. The students had participated in trials of the units, and travelled to Canberra with their teachers to take part in the launch.

As well as electronic teacher handbooks and student e-textbooks, *Science by Doing* brings to students a fully interactive, rich digital portal, using animations, games, videos, quizzes and live online experiments to fully engage students throughout junior secondary school in a way that has never been done before.

In the short time it has been available, 1500 teachers have signed up to use *Science by Doing*, along with almost 1000 pre-service



Top: *Science by Doing* Executive Director Denis Goodrum and students. Above: Guests at the launch have a hands-on *Science by Doing* experience

teachers, university educators, home-school parents and students.

The *Science by Doing* team is working to complete the full suite of curriculum resources by the end of 2014. It is also developing the important peer support and professional learning components of

the program for teachers, to enable schools to fully implement the national science curriculum.

Science by Doing was made possible with the support of the federal Government. www.science.org.au/sciencebydoing/index.html

Message from the President

Fostering and nurturing the young minds of today to create the thought leaders of tomorrow has been core business for the Academy for more than 40 years now.

We've come a very long way from our early forays into education with the fondly-remembered *Web of Life* biology texts: our newest educational tools are rich, interactive and digitally-focused, and bring science and the world alive in the classroom in a way that has not until now been possible.

Science education

I was thrilled recently to stand beside Professor Denis Goodrum and Nobel Laureate Professor Brian Schmidt – and students from around Australia – as we officially launched the Academy's junior secondary school science education program, *Science by Doing*. Four years in the making and free to use, this program reaches into science classrooms around the nation to inspire students with the wonder of curiosity and discovery, whether they are in metropolitan Sydney or in remote communities. It has already been taken up with enthusiasm, with more than 2500 subscribers at the time of newsletter publication.

Education has formed quite the theme of late: I've also had the privilege of speaking about education, collaboration and nurturing our best and brightest, at science, technology, engineering and mathematics (STEM) education forums in Sydney and Melbourne. Attended by the Governor-General, the US Consul General, the federal Parliamentary Secretary for Education, the Victorian Education Minister, senior public servants and the New York Academy of Sciences, these high-level discussions were an excellent opportunity to hear about the latest in Australian STEM education and explore possible new collaborations.

It has been heartening to hear the new federal Government reiterate its support for the Academy's education programs on these and other occasions.

In late November, the Government indicated it could not deliver the Gonski school funding, a worrying development as the Review of Funding for Schooling detailed a transparent, equitable and

financially sustainable scheme to provide excellent education for all. Notably, Gonski recommended an injection of about \$5 billion per year across all schooling sectors to lift Australian students to a respectable national standard. Fortunately, the Government revised its position and committed to the funding for the next four years.

The Academy continues to work constructively with governments and departments of education.

Prime Minister's Prizes for Science

Warm congratulations to Professor Terry Speed FAA FRS on receiving the 2013 Prime Minister's Prize for Science, and to the other four prize winners, who we were pleased to welcome to a breakfast in their honour at the Shine Dome. Details of Professor Speed's award – and recent honours bestowed upon a number of other Fellows – are to be found in this newsletter.

Science and Government

The Academy has been working to strengthen its relationships with all new Ministers with a responsibility for science within their portfolios, following the change in government in September.

We have been briefing Ministers and their advisers, highlighting major issues for science in Australia, and informing them of the role of the Academy and the assistance it can provide.

While the Government's Climate Commission – established under the previous Labor Government – was abolished by the current Government following the September election, it is heartening to see the donation-funded Climate Council take its place. The Council is an indication of strong public appetite for advice regarding climate science and economics. The community-funded organisation is headed by Chief Councillor Professor Tim Flannery FAA.

Women in science

I am pleased to report that the Parliamentary Friends of Women in



Suzanne Cory

Science and Engineering has persisted beyond the election; I had the pleasure of speaking recently at that group's second meeting in Melbourne.

Closer to home, the Academy has announced a new annual award – the Nancy Millis Medal – to recognise outstanding achievements by young Australian women of science. Nominations are now open for the new medal, which honours the legacy of the much-admired and much-loved late Professor Nancy Millis AC MBE FAA FTSE. Recipients of this award will have established an independent research program and demonstrated exceptional leadership. I encourage you to nominate candidates. The inaugural medal will be presented during next year's celebratory week for our 60th anniversary.

International science collaboration

It's been a busy period, too, on the international front. The Academy has played host to many visiting VIPs, including the Executive Committee of the IAP: the global network of science academies, the European Research Council, the Indian Department of Science and Technology and the Japan Society for the Promotion of Science. We also hosted the third European Union–Australia workshop on research infrastructure. Recently I was privileged to join some of Australia's premier

...continues on page 3

Australia 2050 – living scenarios

Australia 2050: towards an environmentally sustainable and socially equitable way of living entered Phase 2 of its work with a meeting held at Government House, Canberra, on 18 October.

Her Excellency Professor Marie Bashir AC CVO, Governor of New South Wales, attended on behalf of the Governor-General, who launched the Phase 1 report in February (see www.science.org.au/news/media/21february13.html).

The project is funded by an Australian Research Council–Learned Academies Special Project. The organising committee and 20 other participants from a range of organisations and industries used the 18 October meeting to develop materials

and a running program for a workshop held at the Shine Dome, 23–24 October.

At the two-day workshop, 60 participants from diverse fields including health, higher education, Indigenous groups, women's organisations, agriculture, defence and the media, discussed possible scenarios for science and society envisaged for Australia in 2050.

To help present outcomes of the process, a short documentary capturing key elements and aspects of both events is now in production.

For more information go to www.science.org.au/policy/australia-2050



NEW ACADEMY MEDAL FOR WOMEN RESEARCHERS

The Academy is pleased to announce the creation of a new Academy Honorary Award.

The Nancy Millis Medal will recognise research in any branch of the natural sciences of the highest standing achieved by early- to mid-career women researchers in Australia who have demonstrated exceptional leadership, including establishing an independent research program.

It honours the contributions made to science by the late Professor Nancy Millis AC MBE FAA FTSE and recognises her importance as a role model for aspiring female scientists in Australia.

The first medal will be awarded in 2014 and the deadline for nominations is 10 February 2014. For more information go to www.science.org.au/awards/awards/millis.html

ACADEMY BRIEFS NEW GOVERNMENT ABOUT ISSUES IN SCIENCE



The Academy has been working to strengthen its relationships with new Ministers with a responsibility for science within their portfolios, following the change in government in September.

This has involved briefing Ministers and their advisers on the big issues on the horizon for science in Australia. The Academy also prepared an *Incoming Government Brief* document for the Ministers, their advisers and senior departmental officials, highlighting key areas where science underpins the Government's agenda, and informing them of the role of the Academy and the assistance it can provide.

Message from the President continued from page 2

astronomers and astrophysicists in Nanjing, China, for the 10th annual Australia–China Symposium.

Vale

I am sorry to report the passing of Professor Alan Walker FAA, on 27 October 2013. On behalf of the Academy I offer my deepest sympathies to his family and friends.

On 20 November we also lost one of our most distinguished Corresponding

Members: two-time Nobel Laureate, Professor Frederick Sanger CBE FRS. To all who were privileged to know him, Professor Sanger was a scientific hero. His revolutionary procedures for 'reading the codes' for proteins and nucleic acids laid the foundation for the genetic revolution and transformed biology.

Farewell 2013

The Academy has acquitted itself admirably during a politically tumultuous year. My deepest thanks

to all Fellows and staff who have worked hard through 2013 to ensure we continue to meet our objectives of promoting excellence in scientific research, developing and sustaining our national scientific culture, and providing independent advice to assist policies and programs.

I wish you and yours a peaceful festive season and a happy and healthy new year. May it be filled with Eureka moments!

Professor Suzanne Cory AC PresAA FRS

PM's Prize recognises key role of statistics



Richard Johnson, Sarah Chapman, Andrea Morelo, Suzanne Cory, Angela Moles and Terry Speed at the breakfast held in their honour

Academy Fellow **Professor Terry Speed** was awarded the Prime Minister's Prize for Science for his work as a statistician and mathematician, at a gala dinner hosted by Prime Minister The Hon Tony Abbot at Parliament House on 30 October.

A Fellow since 2001, Professor Speed is Head of Bioinformatics at the Walter and Eliza Hall Institute of Medical Research, where he provides biologists with statistical tools to help them cope with the genetic revolution.

Twenty years ago biologists looked at one or two genes in isolation. Today they can track the activity of thousands of genes in

a single cell, but to understand the results they need tools such as those developed by Professor Speed.

At a breakfast at the Shine Dome the following morning, Academy President Professor Suzanne Cory congratulated Professor Speed for his significant contribution to many fields of biology, using his insights from mathematics and statistics, adding that his work highlighted the importance of collaboration.

The Academy also congratulated other winners of the 2013 Prime Minister's Prizes for Science:

- **Dr Angela Moles**, winner of the Frank Fenner Prize for Life Scientist of the Year and previous winner of the Academy's JG Russell Award
- **Professor Andrea Morelo**, winner of the Malcolm McIntosh Prize for Physical Scientist of the Year
- **Sarah Chapman**, winner of the Prime Minister's Prize for Excellence in Science Teaching in Secondary Schools and previous winner of an Academy Teacher Award
- **Richard Johnson**, winner of the Prime Minister's Prize for Excellence in Science Teaching in Primary Schools. ▲

IAP Executive meets in Canberra

The Academy hosted the IAP: the global network of science academies (IAP) Executive Committee meeting in Canberra from 30 October to 1 November.

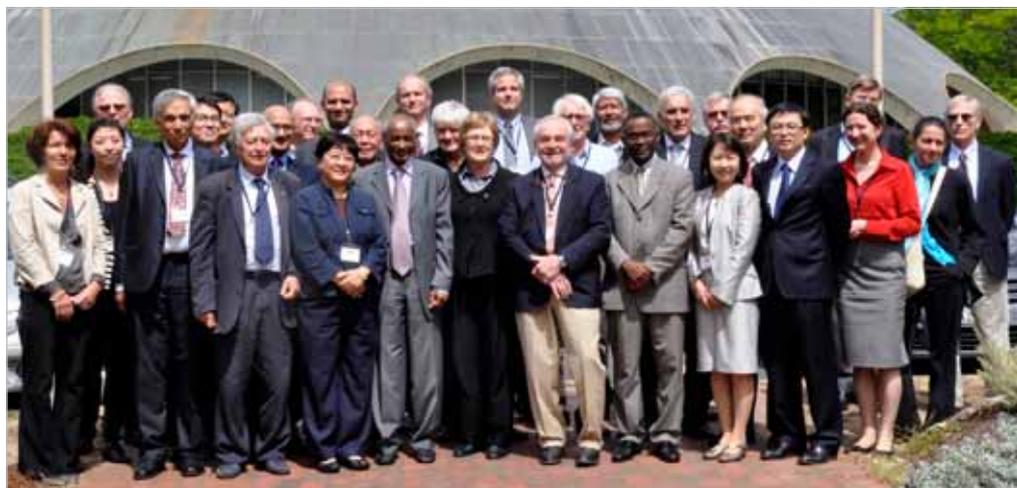
The meeting participants represented 21 international science academies and other international and regional scientific bodies. The delegation attended the 2013 Prime Minister's Prizes for Science gala dinner and congratulated the prize winners again at a breakfast at the Academy the following day.

Participants also visited Fadden Primary School in Canberra to see the Academy's science education program *Primary Connections* in action.

The IAP is made up of 106 international science academies and is represented by an Executive Committee of 13 members.

The Australian Academy of Science completed two terms on the Executive Committee in 2012.

For more news about international visits see page 11. ▲



IAP participants at the Shine Dome, in November

Research Alliance calls for strategic support

Earlier this year Australia's research and science community formed the Research Alliance, a broad group of science and research bodies, of which the Academy is a founding member. Since the group's formation and initial launch at Parliament House in June, the group has grown to include more than a dozen organisations and peak bodies in the science, higher education, social science and humanities sectors.

The Research Alliance held a second meeting on 18 September and issued a call for the new Government to commit to delivering a strategic and stable plan for science and research.

The Alliance noted that Australia should rightly aspire to be in the top half of OECD nations in terms of its investment in research as a proportion of GDP, but that the stop/start nature of funding in

the recent past had meant it had started to slide backward in terms of its investment in research.

A copy of the Research Alliance's media release is available at: www.science.org.au/news/documents/Mediarelease-Scienceresearchandinnovationneedssteadyandpurposefulsupport.pdf



2014 ACADEMY SPEAKER SERIES

The first talk in the series is on Tuesday 4 February with Professor Bryan Gaensler ^{FAA} speaking about cosmic magnetism. Refreshments from 5.30 pm. Talk and live streaming from 6 pm – 7 pm

www.science.org.au/events/speakerseries/rs/

Sponsorship opportunities still available. Contact Mitchell Piercey at mitchell.piercey@science.org.au

Lecture series draws crowds to Shine Dome

The Academy's 2013 public lecture series *Australian science: global impact* continued to attract strong audiences throughout October, November and December at the Shine Dome.

The series celebrated the contribution of Australian science to the world. The

development of wi-fi technology was showcased by Dr John O'Sullivan ^{FAA} in October, who described leading a team of researchers and engineers with experience in radio astronomy, physics and mathematics, as well as hardware and software engineering, to invent

technology that is now in about two billion devices worldwide.

November's lecture featured Professor Thomas Maschmeyer ^{FAA}, who demonstrated how his work in chemistry can be used for waste reduction, optimising power generation and increasing the use of sustainably renewable resources.

Academy Foreign Secretary Professor Andrew Holmes ^{AM FAA FRS FTSE} capped off the series with his lecture on 3 December titled *Seeing the light with polymers – printed solar cells as a commercial reality*.

In 2014, the Academy celebrates its 60th anniversary with a new speaker series featuring some of Australia's rising stars of science. It will be chaired by three prominent public friends of science, broadcaster Professor Robyn Williams ^{AM FAA}, former Climate Commissioner and author Professor Tim Flannery, and long-time ABC journalist Louise Maher. *Science stars of tomorrow* will showcase young scientists whose work offers new insights into outer space, inner space and the world around us.



Andrew Holmes demonstrates luminescence during his lecture

Fenner Conference highlights population impact

The effects of population growth, diminishing resources and climate change on Australia's future was discussed by scientists at the 2013 Fenner conference on the environment, *Population, resources and climate change: implications for Australia's near future*, held at the Shine Dome from 10–11 October.

The keynote speaker was Bing Professor of Population Studies from Stanford University, Professor Paul Ehrlich FRS, a pioneer in alerting the public to problems of overpopulation and in raising issues of population, resources and the environment as matters of public policy.

Member of the Wentworth Group of Concerned Scientists, Professor Hugh Possingham FAA, Professor David Lindenmayer FAA from the Fenner School of Environment and Society at the Australian National University, and Professor of Terrestrial Ecology at the University of Sydney, Chris Dickman, spoke of the severe impact of population growth on biodiversity.

Dr Michael Lardelli from Adelaide University presented on peak oil, and mining engineer Dr Simon Michaux spoke about peak mining and the economic ramifications for Australia. ▲

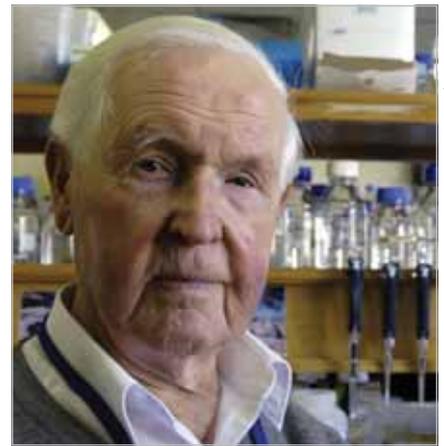


Photo: AAP/Alan Porritt

Frank Fenner

EMCRs consider industry engagement at Science pathways



Science pathways participants in Melbourne

The Academy's Early to Mid Career Researcher Forum hosted its second national meeting, *Science pathways: engaging with industry and innovation*, in Melbourne last month. The meeting focused on how early- and mid-career researchers (EMCRs) could more effectively engage with industry and apply a more innovative approach to their research.

The main aim of the meeting was to provide delegates with the skills and know-how to connect, collaborate and innovate. EMCR delegates were also exposed to a range of career paths in industry and introduced to some of the leading professionals in Australia's highest-performing industry groups. In addition to facilitating cross-fertilisation of ideas, skills and knowledge, the event also aimed to extend the professional networks of the delegates.

Academy Secretary Physical Sciences, Professor Chennupati Jagadish FAA FTSE, welcomed the delegates and highlighted

their potential to contribute to the future of Australian science. Chief Scientist, Professor Ian Chubb AC, opened the meeting and emphasised the importance of developing a long-term, strategic policy platform for research funding, to capitalise on Australia's scientific talent and contribute to the nation's economic and social future. He stressed that the onus was also on EMCRs to be more strategic and innovative in the way they worked.

President of the Australian Academy of Technological Sciences and Engineering, Professor Alan Finkel AM FTSE, advised the delegates to know their audience, understand their needs, attend multidisciplinary conferences, and reach out to companies relevant to their research.

Based on discussions at the meeting, the Forum is now prioritising issues and developing medium- and long-term goals for the next 12 months. ▲

Celebrating Australian science
PAST PRESENT FUTURE
SCIENCE AT THE SHINE DOME 2014 WILL BE
HELD ON TUESDAY 27 TO THURSDAY 29 MAY.
CHECK OUR WEBSITE FOR FURTHER DETAILS
WWW.SCIENCE.ORG.AU/EVENTS/SATS/SATS2014
REGISTRATIONS NOW OPEN!

Thank you for your support

This year the Academy took a major step towards securing its future and independence as a leading voice for science and scientific excellence in Australia and beyond.

The Academy has been working with Fellows and Xponential Philanthropy to develop and implement both *The Enlightening* campaign to raise capital for science education, outreach and advocacy, and The Australian Futures Science Fund, a perpetual fund to be supported through bequests from Fellowship. This fund will ensure the Academy's financial independence and sustainability and enable the Academy to continue to promote and inspire scientific excellence in Australia for generations to come.

There has been a strongly positive response to both campaigns. The Academy thanks the following donors for their generous support of *The Enlightening* campaign:

Science Circle

Professor Jerry Adams
Dr Eldon Ball
Professor Marilyn Ball
Professor Suzanne Cory
Ms Jenny Gordon
Dr TJ Higgins

Academy Supporters

Ms Cynthia Anderson
BodyCare Injury Management

Professor Tony Bacic
Professor Mike Dopita
Professor Andrew and Dr Roslyn Gleadow
Dr Marshall Hatch
Dr John Jake Jacobsen
Professor Frank Larkins
Professor John Lovering
Professor John McKenzie
Professor Fred Mendelsohn
Professor Don Metcalf
Dr Rana Munns
Sir Gus Nossal
Professor Jim Peacock
Professor Frances Separovic
Professor FA Smith
Dr Colin Ward

The Academy also thanks all Fellows who have met with our acting bequest manager, Sarah Thyssen, and given their endorsement and support for this aspect of the philanthropic campaign. The support of the Fellowship, as ambassadors and leaders of the Academy, is invaluable. Those who have indicated their support include:

Professor Marilyn Anderson
Professor Mark Burgman
Professor Martin Bennett
Professor Suzanne Cory
and Professor Jerry Adams

Professor Alan Cowman
Professor Mahananda Dasgupta
Dr Peter Dodds
Professor Michael Dopita
Professor Chris Easton
Professor Tony Guttman
Professor Peter Hall
Professor Adrienne Hardham
Professor Stephen Hyde
Professor Pauline Ladiges
Professor Trevor Lithgow
Professor Charles Mackay
Professor James McCluskey
Professor William Moran
Professor Michael Parker
Professor Steven Prawer
Professor David Smyth
Professor Greg Stuart
Professor Raymond Volkas
Professor Xu-jia Wang

For more information about *The Enlightening* campaign please contact Alan Le May, alan.lemay@science.org.au or 02 6201 9400. For more information about the Academy's bequest program please contact Sarah Thyssen, bequests@science.org.au or 02 6201 9400.

www.science.org.au/support-us ▲

FOUNDATION FELLOW OSCAR TIEGS HONoured AT KANGAROO POINT

Kangaroo Point, one of Brisbane's earliest suburbs, was once the home of several of Queensland's pioneering scientists and researchers. One of these was zoologist Professor Oscar Werner Tiegs, a Foundation Fellow of the Academy.

In recognition of the local scientists' contributions, Brisbane City Council has created a series of interpretive and botanical signs in the local park, with the sign for Professor Tiegs containing material supplied by the Academy's Adolph Basser Library.

The Council also commissioned a work by an artist, Mel Robson. The result, 'Preservation', is a series of four stylised tree forms in cast aluminium, designed to complement the existing cluster of Queensland Kauri trees that were part of the original park design. Applying imagery by C. White, Silvester Diggles and Oscar Tiegs, 'Preservation' draws connections between the past and present, encouraging people to rediscover both the existing nature of the park, as well as its heritage.





Indonesian teachers participating in PRAISE workshop conducted by *Science by Doing*

Fostering Indonesian–Australian relations in science education

An important Indonesian–Australian pilot project was initiated in high school science education in 2013. The project ‘Promoting Real Australian–Indonesian Science Education’ (PRAISE), is funded by the Australian Government and implemented by the Southeast Asian Ministers of Education Organization (SEAMO) for Quality Improvement of Teachers and Education Personnel (QITEP), located in Bandung, Indonesia.

The project is developing a chemistry curriculum unit for Indonesian high school students, and during its development Indonesian writers travelled to Canberra to work with the *Science by Doing* team, and also held frequent teleconferences.

In September Professor Denis Goodrum, Dr Kerrie Wilde and Jef Byrne from *Science by Doing* visited Indonesia to assist in an initial workshop with 50 Indonesian teachers trialing the curriculum unit. At the end of the trial in November Dr Wilde and Mr Byrne returned to Bandung for a final reflection and evaluation workshop.

Assuming the pilot is successful, it is anticipated the PRAISE program will be extended to further curriculum units that will be implemented across Indonesia. ▲



Dr Kerrie Wilde conducting an Indonesian teacher workshop session

I like to hear something of the official opening of
at Canberra last Wednesday. I went by train,
number flying affects my hearing quite badly. I took
notes of help in the main lectures, but gave a con-
cept of many conversations afterwards. Also the cells
only 1/- a day each, but I may be using it too loosely
at across the road from the Anatomy Building - a fine
lecture. The Academy is a great contrast - for it
jellyfish, 40 feet high, with a copper roof. In the
are out from the sixteen arches, it looks like some
to grab one.
a high central hall, and two storeys of rooms
most is floored with boulders, and the 16 copper
and they think my kill the goldfish? They have
t of gravel surrounding the moat. Inside you
can reach a large assembly room with a fountain.
lovely paired seats with cushions so that one
are so comfortably. The inside of the hall is
s, and mushrooms hang from the roof - both to pre-
s. A huge screen is over the blackboards, and
enough, so that there is no need to dim the hall.

Did you know?

On 6 May 1959, the building constructed by the Australian Academy of Science as its first home (now known as the Shine Dome) was opened by then Governor-General, Field Marshal Sir William Slim. However, apart from records of the opening speeches, little is known about this day and scientists' first impressions of the building.

Former Academy Publications Manager and writer, Dr Bernadette Hince, has recently uncovered a letter from Professor T Griffith Taylor FAA, a well-known geographer and population/climate commentator, and survivor of Scott's ill-fated Antarctic expedition.

In his letter he relates the Dome opening to his friend, geologist and author Charles Laseron, describing it as like a 'jellyfish' which, during the night 'when light pours out from the sixteen arches', 'looks like some huge hand reaching down to grab one'. The 'copper legs', he said 'dip into the moat' as if they might 'kill the goldfish'.

And in a humorous aside, Professor Taylor laments his colleagues' tea-drinking obsession: 'I was just going to talk about human variation and climatic control when the folk all trooped out for the tea break and my chance passed. The Academy folk would make good union material - since they believe in breaks for tea at 11 and at 3 ...'

Primary Connections



Andrew Holmes meets children from Fadden Primary School, Canberra

International interest in *Primary Connections*

Academy Foreign Secretary Professor Andrew Holmes hosted a visit to Fadden Primary School in Canberra on 31 October to see *Primary Connections* in action. The committee was shown the program in action by the school's Principal Mr Daniel Zobel and Deputy Principal Mr John Manders, and visited classrooms from Kindergarten to Year 6. The students demonstrated how they were investigating growth of mould on bread, the life cycle of meal worms, how night and day occur, and the different ways things move on different surfaces.

Ms Shelley Peers – Director *Primary Connections* Development – was an invited speaker and workshop presenter at the *Seventh international conference on inquiry based science education in elementary schools* held in Mexico City, 13–15 November. The theme was 'Science learning assessment: trends and challenges'. Major organising groups included the Mexico Ministry of Education, Innovation in Science Education (INNOVEC) and FUMEC University, and the conference was attended by 540 delegates. Many

attendees were pedagogical leaders in Mexico's regional science education programs and lecturers from teacher training universities.

Ms Peers described the extensive assessment of use of *Primary Connections*' 5Es teaching and learning model in Australian schools (see www.primaryconnections.org.au/research-and-evaluation). She also conducted a half-day workshop for teacher-leaders on implementation of an evaluation system for the *Primary Connections* program to monitor its impact on improving the quality of primary science education. Particular interest was shown in the independently commissioned research conducted to evaluate and verify the impact of the program. Other countries are keen to find out more about how the program is helping to improve teacher capacity and scientific literacy in schools.

Professional learning

Professional learning for primary teachers in inquiry-based science continues to be one of the core objectives for raising the standard of primary science teaching around the country. In late October, *Primary Connections* ran a successful continuing

professional development workshop in Sydney with more than 100 teachers attending. The workshop provided support for teachers and schools already teaching with *Primary Connections* units. In early November a curriculum leader workshop was held in Melbourne to train teachers in the program's methodology. *Primary Connections* also ran a three-day workshop for the Victorian Department of Education and Early Childhood Development to help train newly-appointed science specialists, who then go back into primary schools to improve the quality of science teaching in primary schools.

Interactive whiteboard resources

Primary Connections' first truly digital resources will be released early in 2014. Most primary schools have interactive whiteboards, and market research has confirmed that schools would welcome resources to help use them with *Primary Connections* units. The new resources will provide interactive versions of materials in the units, allowing teachers to work with the whole class, or in groups, to enhance learning and make the teaching of science come alive.

Features will include:

- Interactive versions of literacy tools (e.g. a digital glossary and word wall)
- Interactive activities to bring science alive (e.g. interactive branching key)
- Easy-to-use structure and navigation
- Digital class science journal for students and teachers to build on throughout each unit. ▲



IAP representatives at Fadden Primary

Awards and honours to fellows



Photo: Walter and Eliza Hall Institute

Alan Cowman

Prime Minister's Prize for Science

Professor Terry Speed, for his work with statistics and mathematics

NSW Scientist of the Year 2013

Professor Graeme Jameson AO FAA FTSE

2013 Mahathir Science Award

Professor Alan Cowman, awarded for outstanding contributions to understanding and defeating malaria



Photo: Mark Graham

Mathai Varghese

Victoria Prize for Science and Innovation in the Life Sciences

Professor Alan Cowman FAA FRS, in recognition of his outstanding contributions in the quest to eradicate malaria

2013 Ramaciotti Medal for Excellence in Biomedical Research

Professor Doug Hilton FAA FTSE, awarded for outstanding contributions to clinical or biomedical research



Photo: Michael John Hood

Chennupati Jagadish

Royal Society of South Australia

Professor Mathai Varghese FAA, elected as a Fellow on the basis of past accomplishments for the advancement of science

The World Academy of Sciences

Professor Chennupati Jagadish, elected as Associate Fellow for his outstanding contributions to the advancement of science in developing countries. ▲

Interviews with Australian Scientists



Robert May and Robyn Williams

An interview with Professor Lord Robert McCredie May of Oxford OM AC Kt FAA FRS, in conversation with Robyn Williams, was recently posted on the Academy website at www.science.org.au/scientists

Lord May's childhood interests in puzzles, problem-solving games and debating served as excellent groundwork for a highly successful and interdisciplinary career spanning physics, mathematics, chemical engineering and ecology. In his interview, Lord May – who describes himself simply as a 'scientist with a short attention span' – reflects on how he 'accidentally' became a physicist and revolutionised ecology, was elected to the House of Lords and became one of the most valued advisers to the British Government and some of the world's largest banks.

Lord May lives in Britain where he holds a Professorship at Oxford University and serves as a Fellow of Merton College, and continues to research how dynamical systems are structured and respond to change, particularly with respect to infectious diseases and biodiversity. His previous appointments include President of The Royal Society, Chief Scientific Adviser to the UK Government and Head of the UK Office of Science and Technology.

The full interview can be seen on the Academy's YouTube channel, available at www.youtube.com/watch?v=qEboMbl_Wwc

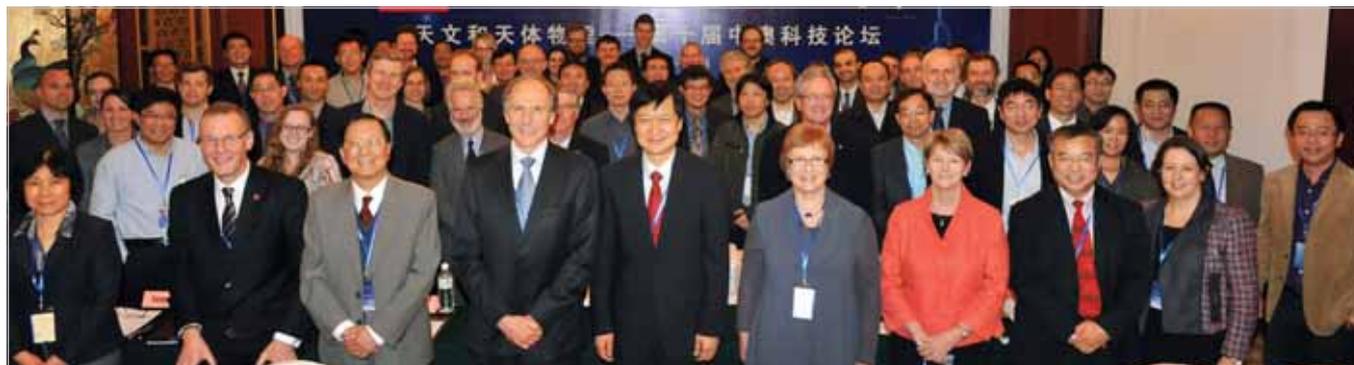


Photo: Feng Lifen, China Science Daily

Participants in the 10th *China–Australia symposium* in Nanjing, China

International workshops

See www.science.org.au/international/bilateral-activities.html

China–Australia symposium on astronomy and astrophysics

Fifty years ago, in 1963, Professor Chris Christiansen ^{FAA} visited China for the first time, and ultimately visited more than a dozen times, bringing valuable astronomical information and guidance with every visit. So astronomy and astrophysics were fitting topics for the 10th annual *China–Australia symposium*, held in Nanjing, China, from 10–12 November. This milestone event was supported by the Australian Government Department of Industry and organised by the Academy in collaboration with the Academy of Technological Sciences and Engineering (ATSE) and the Chinese Academy of Sciences (CAS).

Nineteen senior experts participated from each country, and the Academies also supported the attendance of eight early-to mid-career researchers. The Australian co-convenors were Professor Brian Boyle ^{FAA} and Professor John O’Sullivan ^{FAA FTSE}.

The symposium was opened and attended by Professor Jinghai Li, Vice-President of CAS, Academy President Professor Suzanne Cory, President of ATSE, Dr Alan Finkel ^{AM}, and Ms Patricia Kelly ^{PSM}, Deputy Secretary of the Department of Industry. This was a very successful symposium, cementing and advancing existing collaborations between Australian and Chinese astronomers, and forging a number of new collaborations.

Third European Union–Australia workshop on research infrastructure

The Academy helped organise the third European Union–Australia workshop on

research infrastructure, on behalf of the Australian Government Department of Education, at the Shine Dome from 5–6 November. More than 60 participants took part in discussions on healthy ageing, clean energy and sustainable cities. Following the two-day workshop, participants travelled to Melbourne to attend a one-day meeting on ‘big data’ and visited the Australian Synchrotron, the Melbourne Centre for Nanofabrication and the New Horizons Centre at Monash University’s Clayton Campus.

Australia–Japan neutron science workshop: Sharing science with neutrons

Thirty-three senior experts from Australia and Japan and 12 Australian early- to mid-career researchers attended the Australia–Japan neutron science workshop on 5–6 November. The workshop was held at the Australian Nuclear Science and Technology Organisation (ANSTO) at Lucas Heights, Sydney. Professor Chennupati Jagadish, Vice-President of the Academy, officially opened the workshop. The meeting was an initiative arising from a Japan–Australia Joint Committee Meeting on Science and Technology (JSTC) in 2012, and was the second to be held this year. The first was in Tokyo in July, on marine science (a summary statement of this meeting is available at www.innovation.gov.au/science/internationalcollaboration/Documents/MEXT-DIICSRTEStatement.pdf)

Both workshops were part-funded by the Australian Government Department of Industry and the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT). The Academy



The Australia–Japan neutron science workshop was held at Lucas Heights, Sydney



Andrew Holmes and Donald Dingwell

organised the workshop in collaboration with ANSTO and the Japan Proton Accelerator Research Complex (J-PARC).

International visits

Visit by Secretary General of the European Research Council

Professor Donald Dingwell, Secretary General of the European Research Council (ERC), Dr Gordana Popovic, Scientific Officer at the European Research Council Executive Agency (ERCEA) and Associate Professor Gemma Solomon, an Australian ERC grantee from the University of Copenhagen, visited Canberra in October. The group joined Academy Foreign Secretary Professor Andrew Holmes, Academy Vice President Professor Chennupati Jagadish, and Professor Graham Farquhar AO FAA FRS for a working lunch. Professor Dingwell gave a presentation outlining the aims, features, funding and assessment processes of the ERC, and statistical information on Australians receiving support from the ERC.

Visit by the Executive Director of the Japan Society for the Promotion of Science

Professor Dr Makoto Asashima, Executive Director of the Japan Society for the Promotion of Science (JSPS) and Mr Takanori Suzuki and Ms Sayaka Iwamura from the International Programs Department at JSPS, met with Professors Holmes and Jagadish at the Academy on 3 October for a roundtable discussion. Professor Asashima was accompanied by Dr Sarah Boyd and Mr Silvio Tiziano from Monash University and by Mr Mitsuyasu Otsuki, First Secretary of the Embassy of



L–R back: Takanori Suzuki, James Llewelyn, Silvio Tiziano, Andrew Holmes; front: Sarah Boyd, Makoto Asashima, Chennupati Jagadish, Sayaka Iwamura

Japan, and Mr James Llewelyn from the Department of Industry. The meeting focused on the future of exchange programs between JSPS and the Academy, the annual HOPE Nobel Laureates meetings organised by JSPS, and establishing a JSPS alumni group in Australia.

Visit by delegation of Indian scientists

Dr Inderjit Singh, Joint Secretary Administration of the Department of Science and Technology (DST), India, and Shri Prithwi Nath Prasad, Director of Administration and Central Assistant Public Information Officer at DST, and 19 other Indian scientists met on Tuesday 15 October with Professor Jagadish, Professor John White CMG FAA FRS, Professor John Oakeshott FAA FTSE and Professor Andrew Blakers of the Australian National University. The delegation was keen to learn about links between the research sector and the private sector in Australia.

Visit by the Secretary General of the Alexander von Humboldt Foundation

The 2013 Humboldt Colloquium – *Looking to the future: international research in a changing world*, was held in Sydney,

17–19 October, as part of the 60th anniversary of the Alexander von Humboldt Foundation and the Ludwig Leichhardt Bicentennial. The colloquium was attended by Professor Helmut Schwarz, President of the Alexander von Humboldt Foundation, and Dr Enno Aufderheide, Secretary General of the foundation. During the visit Dr Aufderheide and Dr Katrin Amian met with Ms Nancy Pritchard, Director International Programs, and Mr Martin Callinan, Director Science Policy, at the Academy on 22 October. Dr Aufderheide was interested in the Australian election outcome and how it would impact on spending for science and R&D in Australia.

Grants and awards

Adam J Berry Memorial Fund

Ms Emma Beckett from the Department of Applied Sciences at the University of Newcastle has been awarded the 2014 Adam J Berry Memorial Fund award. The award will help her undertake research on the role of nutritional status in modulating microRNAs and DNA methylation: comparisons between cohorts (maternal, elderly and disease specific) and cell culture models, at the



A delegation of Indian scientists visited the Academy in October



Adam J Berry award winner, Emma Beckett

National Institute of Environmental Health Sciences in the US for 12 weeks. The fund is co-managed on behalf of the Berry family by the Academy and the Foundation of the National Institutes of Health. For more details go to www.science.org.au/internat/americas/berry-participants.html

German–Australian Mobility Call 2013–14

In November 2013, 13 researchers from universities, CSIRO, the Australian Institute of Marine Science, and the Queensland Institute of Medical Research, were awarded grants under the German–Australian Mobility Call for Collaboration in Science and Technology in Biodiversity and Preventative Health. The call was administered on behalf of the Department of Industry. The grants of up to \$15 000 each will assist the researchers to establish or enhance collaborative projects with their German counterparts for up to a year from 1 December 2013. The list of successful participants, their project titles and hosts can be found at www.science.org.au/internat/europe/index.html

AASSA activities

Gender equity workshop in Delhi

The Academy’s Secretary Education and Public Awareness, Professor Jenny Graves AO FAA, attended an Association of Academies and Societies of Sciences in Asia (AASSA) regional workshop on gender equity, in New Delhi, on 24 September.

AASSA international symposium and Executive Board meeting

The first meeting of the Executive Board of the Association of Academies and Societies of Sciences in Asia (AASSA) was held in Manila, in conjunction with the *International symposium on emerging technologies for a greener Earth*, organised by the Philippines National Academy of Sciences and Technology, from 22–24 October. The Academy’s Secretary Education and Public Awareness and Member-at-Large of the AASSA Executive Board, Professor Jenny Graves AO FAA, presented a paper on genomics at the symposium. ▲

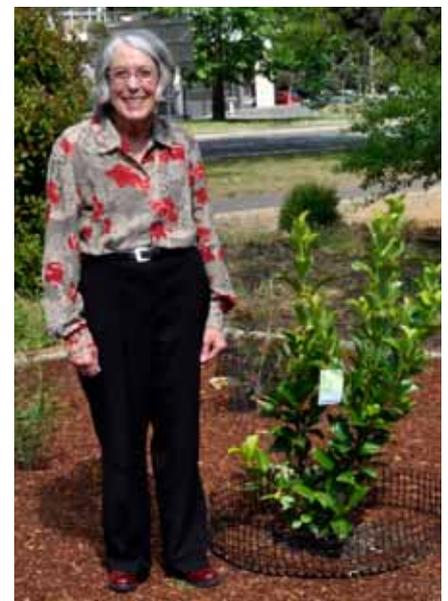
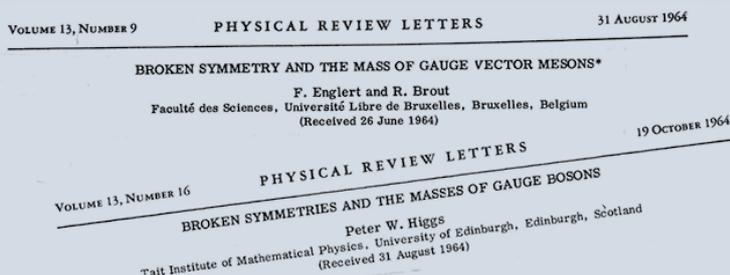
One more piece in the puzzle of the universe – a Higgs-shaped one

A new *Nova: science in the news* topic was posted in October: What is the Higgs boson? For that matter, what is a boson? Why is this Higgs one so important?

Professors Peter Higgs and François Englert were recently awarded the 2013 Nobel Prize for Physics, nearly 50 years after their 1964 publications that described the mass of bosons and broken symmetries, and predicted the existence of a particle now known as the Higgs boson.

In 2012, experiments at the Large Hadron Collider at CERN, Switzerland, led to the discovery of the Higgs boson. Find out more about the search for the elusive Higgs boson, a particle that exists for only a zeptosecond (that’s 10⁻²¹ seconds!) but plays a profound role in the world of particle physics and our Universe.

To see the Higgs topic go to www.science.org.au/nova/128/128key.html



FAREWELL Last month the Academy farewelled much-loved staff member, Rosanne Walker, who retired after 29 years service as librarian and archivist. A verbena bush was planted in the Academy garden in her honour.

National Committees for Science

ICSU review

The International Council for Science (ICSU) has commissioned an external review into its mandate and structure and will report the findings to the 31st ICSU General Assembly in New Zealand in August 2014. The Academy's Foreign Secretary Professor Andrew Holmes is a member of the panel, which is chaired by Professor Sir Peter Knight FRS, of the Imperial College London.

The panel is surveying major stakeholders on issues including the visibility and influence of ICSU within the scientific community, the effectiveness of historic ICSU programs, and the adequacy of the current ICSU strategy against the overall mission statement. The Academy, as Australia's adhering body, is preparing a response to the ICSU in consultation with the International Advisory Committee established following the recent review of the National Committees for Science.

Committee updates

Antarctic research

Chair: Dr Dana Bergstrom

In addition to considering making a submission to the Minister for Environment regarding the \$24 million allocated to a new Antarctic Research Institute by the federal government, the committee is developing a submission to the Antarctic and Southern Ocean Horizon Scan. This aims to develop a collective vision of future research directions and is being conducted by the ICSU's Scientific Committee on Antarctic Research. The committee discussed creating a not-for-profit Pure Antarctic Foundation to be responsible for the Pure Antarctic project. A document of operational principles and planning is being drafted.

Data in Science

Chair: Dr Rhys Francis

The National Committee for Data in Science conducted a workshop titled *How many global data initiatives do we need?* at the eResearch Australasia 2013 conference, held in Brisbane from 20 to 25 October. This included a keynote paper titled 'Global research data management and sharing', presented by Dr Mustapha Mokrane, Executive Director ICSU World Data System.



John Booker

Chemistry

Chair: Professor Curt Wentrup FAA

The committee has begun work on a decadal plan for chemistry. The incoming Chair (from January 2014), Professor Paul Mulvaney FAA, will drive the decadal planning process.

Geography

Chair: Professor Alaric Maude

The committee is preparing to undertake a discipline review and future plan for geography. The committee is also actively seeking engagement with the Academy of Social Sciences in Australia (ASSA) regarding joint activities in 2014 and beyond. ASSA's Executive Director Dr John Beaton joined the November meeting.

Mechanical Sciences

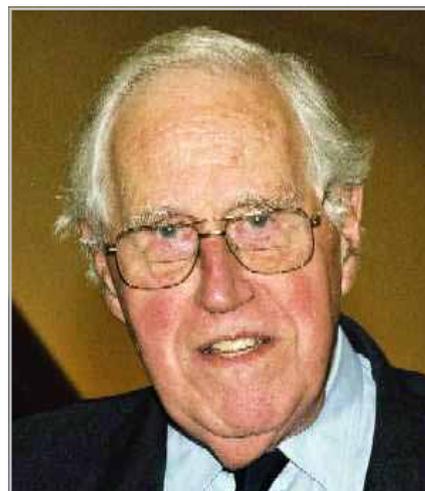
Chair: Professor Ivan Marusic

The committee considered a number of issues regarding the revised scope of the committee, which now includes many aspects of engineering science following the recent review of the National Committees for Science. The proposal for a new early career award, the John Booker Medal for Engineering Science, has been approved by the Academy's Executive Committee and Council, and will be sponsored by the Deans of the Group of Eight and Associates.

Nutrition

Chair: Professor Andrew Sinclair

Professor Basil Hetzel was awarded a 'Living Legends' award at the 20th meeting of the International Union of Nutrition Sciences meeting in September this year, in Granada, Spain. The nomination was made by the committee. Professor Hetzel has made a major contribution to



Basil Hetzel

combating iodine deficiency, a major cause of goitre and cretinism worldwide.

Physics

Chair: Professor Hans Bachor

The committee has been engaged in implementing the *Physics decadal plan 2012–2021: building on excellence in physics*, and will release several follow-up documents in 2014.

Young researchers nominated for Lindau

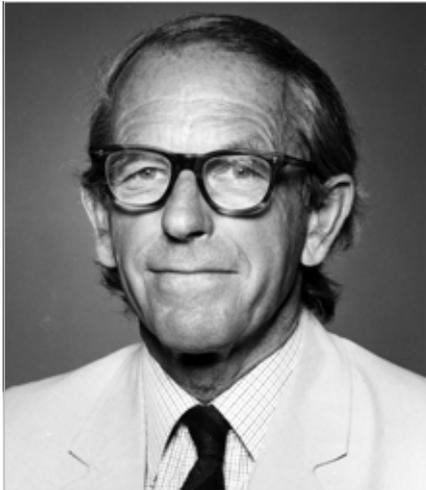
The Academy has nominated 10 outstanding young researchers to attend the 64th Lindau Nobel Laureate Meetings, dedicated to medicine or physiology, in June – July 2014, who will be funded by the Science and Industry Endowment Fund (SIEF).

The National Committees for Medicine and Public Health, Cellular and Developmental Biology, and Biomedical Sciences helped assess the applications. Results of the assessment process will be announced in early 2014.

CUBEnet forum

The Collaborative Universities Biomedical Education Network (CUBEnet), a network supported by the Academy through the National Committee for Biomedical Sciences, is holding its third *National forum* this month to present and discuss achievements of the network since its launch in December 2011 and consider future activities. More information is available from www.cubenet.org.au/news-and-events/events/

Fred Sanger



(b 13 August 1918, d 19 November 2013)

Last month the Academy lost one of its most distinguished Corresponding Members: British biochemist Professor Fred Sanger OM CH CBE FAA FRS, who twice won the Nobel Prize for Chemistry. Only three other scientists have been awarded two Nobel prizes.

In 1958, Professor Sanger won his first Nobel for determining the amino acid sequences of the two polypeptide chains of the hormone insulin. This work provided the first conclusive evidence that proteins had a defined sequence. The groundbreaking technology he developed involved partial acid hydrolysis or enzymic proteolysis followed by fractionation of the oligopeptides using newly developed paper chromatography and electrophoresis.

In 1962, Professor Sanger moved from the Department of Biochemistry at the University of Cambridge to become one of the founding leaders – together with Professor Max Perutz OM CH CBE FRS, Professor Francis Crick OM FRS, Professor Sir John Kendrew CBE FRS, Professor Hugh Huxley MBE FRS and Professor Sydney Brenner CH FRS – of Cambridge's legendary MRC Laboratory of Molecular Biology. There he became fascinated by nucleic acids, and developed novel procedures for sequencing small RNA molecules labelled with ³²P, exploiting the same '2D fingerprinting' principles he had developed for sequencing labelled proteins.

Inevitably this work led Professor Sanger in the early 1970s to take on the immense challenge of sequencing DNA, then considered intractable because of its immense size, the presence of (essentially) only four types of nucleotide and the lack of enzymes to cleave it into defined small fragments (restriction enzymes were not yet in use). He devised elegant enzyme copying approaches and his 'dideoxy' technique led in 1980 to his second Nobel Prize, shared with Wally Gilbert and Paul Berg. Professor Sanger's methodology laid the foundation for the automated procedures that made possible the Human Genome Project.

Professor Sanger had a great affection for Australia and many Australians trained with him, including Professor EOP ('Ted') Thompson, who contributed importantly to the insulin work in the early 1950s, and Dr Geoff Grigg, who worked with him in 1972 on DNA sequencing. Other Australians who learned at Professor Sanger's feet included Denis Shaw, Professor Jerry Adams FAA FRS, Nobel Laureate Professor Elizabeth Blackburn AC FAA FRS, Professor Gillian Air and myself. Professor Sanger spent a three-month sabbatical in 1968 at the then CSIRO Division of Animal Genetics in North Ryde. In 1974, he returned for three months, as Centenary Professor to the Department of Biochemistry at the University of Adelaide.

He was accorded many honours including becoming a Fellow of the Royal Society in 1954 and receiving its Royal Medal in 1969 and Copley Medal in 1977. He was elected as a Foreign Associate of the US National Academy of Science in 1967, and became a Corresponding Member of the Australian Academy of Science in 1982.

The impact of Professor Sanger's discoveries for all the life sciences has been incalculable. Despite his immense scientific stature, he remained a gentle and modest man. He was accorded high civil honours but declined a knighthood because he did not wish to be referred to as Sir. When asked if the UK's genomics institute at Cambridge could be named after him, in recognition of his enormous contribution to the DNA revolution, Fred reluctantly agreed, adding that 'it had better be good'. He loved nothing more

than to work at the bench himself, devising new methods. He said 'Of the three main activities involved in scientific research, thinking, talking and doing, I much prefer the last and am probably best at it. I am all right at the thinking, but not much good at the talking'.

He retired in 1983 at the age of 65 to spend time with his family and 'gardening and messing about in boats'.

Suzanne Cory AC PresAA FRS

Alan Walker



(b 12 December 1929, d 27 October 2013)

Norman Alan (Alan) Walker FAA was born in Brisbane and died in Sydney. He was educated at the universities of Queensland (BSc 1953) and Tasmania (PhD 1959) and held positions in the CSIRO Division of Plant Industry (1955–64), the Physiological Laboratory, Cambridge (1960–62) and the School of Biological Sciences, University of East Anglia (1964–67). He returned to Australia as Associate Professor (Biology) at The University of Sydney (1967–85) and subsequently was Professor of Biology (1985–91) and Challis Professor of Biology (1991–93) at the same university. He served on the University Senate from 1986 to 1987. After retirement he held a Visiting Professorship in the Department of Biophysics, School of Physics, University of New South Wales.

Alan won the Syme Prize in 1982. In the same year he was elected to the Australian Academy of Science and served the Academy in several different capacities including Ordinary Member of Council

(1984–87) and Vice-President of Council (1986–87). He also sat on the Plant Sciences Sectional Committee (1989–92).

In 1975–76 Alan was Chairman of the committee that founded the Australian Society for Biophysics and in 1977 he was the NSW Representative of the newly formed Society. In 1981 he became Convener of the biology subcommittee of the science examination committee for the NSW Board of Senior School Studies.

Alan made important contributions to the understanding of the electrical and ion-transport properties of plant cell membranes. He was a pioneer in the use of microelectrodes for studying plant cells

and his experiments provided a basis for modern electrophysiological studies. In 1955 he published the first studies that clearly distinguished the electrical properties of the plant cell plasma membrane from those of the tonoplast. With Professor Alex Hope, he pioneered a quantitative explanation for the plant plasma membrane potential difference, and he and Professor Andrew Smith made the first chemical measurements of pH in the cytoplasm of a plant cell. He enjoyed many other collaborations that addressed transport problems in giant algal cells, in seedcoats and in roots of crop and water plants. Alan used modelling approaches to clarify

the processes involved in solute transport through intercellular junctions in plant cells, in the epidemiology of mycorrhizal colonisation of roots and the dynamics of root growth. More recently his research broadened to modelling the processes that influence nitrogen movement in grazed arctic ecosystems, from the cyanophytes (N_2 fixers) to the geese that graze on the swards.

Alan is survived by two daughters (Mandy and Judith) and two granddaughters. He will be sadly missed.

Professors Sally Smith FAA and Andrew Smith FAA



VISITORS TO THE ACADEMY

GARDENS at Ian Potter House and the Shine Dome have been treated to a riot of colour this spring, with good growing conditions promoting a magnificent display of both native and exotic plants. Academy Groundsman Mark Troth carefully planned for blooms to flower in a colour-coded sequence, beginning with a yellow carpet of Desert Pride (*Eremophila Kalbarri*) in June, through to a crimson *Crowea* in January. In between were blue flowers for September, purple for September/October, white and red in October, and pink and white from November through to January. The Academy gardens are in their best condition for years, with the Marcus Clarke Street side of Ian Potter House now redesigned and replanted, after being badly damaged by drought.

Academy officers

President Professor Suzanne Cory AC PresAA FRS

Secretary Physical Sciences Professor Chennupati Jagadish FAA FTSE

Secretary Biological Sciences Professor Marilyn Renfree FAA

Secretary Science Policy Professor Leslie Field AM FAA

Foreign Secretary Professor Andrew Holmes AM FAA FRS FTSE

Secretary Education and Public Awareness Professor Jenny Graves AO FAA

Treasurer Dr Oliver Mayo FAA FTSE

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If you would like to make a gift or a bequest to the Academy, please contact the Chief Executive, Dr Sue Meek, on (02) 6201 9400 or ce@science.org.au

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