



Australia's future population Think Tank

The Academy held its annual High Flyers Think Tank in Adelaide on 26–27 July 2012. The topic, Australia's future population, is one of growing national relevance. Sixty outstanding early and mid-career scientists from across Australia and from neighbouring countries came together to engage in fresh thinking about how science can address the big population challenges that are facing us. Participants in the Think Tank explored a vision for Australia's future population, the demographic and social challenges that we face, and how we can use science to develop policy responses that will achieve national goals related to future population changes.

The Think Tank was opened by South Australia's Minister for Science and Information Economy, the Hon Tom Kenyon MP. In his opening discussion, Think Tank chair Dr Oliver Mayo FAA set out some of the key issues on population for participants to explore. After small group discussions centring on key questions to help shape a vision for Australia's future, each group presented its outcomes. Despite the diverse nature of the discussions a number of common themes emerged, particularly the need to take the discussion beyond the research community and out to the public through a national conversation.

The 2012 Think Tank was generously supported by the Theo Murphy (Australia) Fund courtesy of the UK Royal Society, and was attended by its Executive Director, Dr Julie Maxton. The full outcomes and recommendations of the Think Tank will soon be published by the Academy, and they will be used to guide future policy development and research prioritisation. The program is available at www.science.org.au/events/thinktank/thinktank2012/index.html.



Tom Kenyon and Suzanne Cory at the opening of the 2012 Think Tank



Oliver Mayo (centre front) with Think Tank participants

Message from the President

It is a very exciting time to be a scientist. The Mars landing of the Curiosity rover and the discovery of the Higgs boson-like particle have captivated and enthused a great many people from around the world. We can be proud that both of these endeavours were — in part — made possible with the involvement of Australian scientists and technology.

We sometimes wonder why more Australian students are not taking up science subjects, but when great moments in science are splashed across the nation's front pages and spark excited conversations in both the real and virtual worlds, I am reassured of Australia's thirst for science.

Women in science

It was wonderful, too, to experience the enthusiasm of many parliamentarians and women from across the sciences at the launch of the *Parliamentary Friends of Women in Science, Maths and Engineering* on 20 June 2012. The Mural Hall at Parliament House was abuzz as those in this group came to meet one another and hear from the Science Minister, the Opposition Leader, and Nobel Laureate Professor Elizabeth Blackburn AC FAA FRS. This friendship group, led by MPs Kelly O'Dwyer and Amanda Rishworth, aims to foster relationships between science and politics, promote careers in science, celebrate the achievements of women in the sector, and consider barriers to participation.

Professor Blackburn, Australia's first female Nobel Laureate, spoke of her childhood

forays into science and of her enduring love of inquiry, as well as her famous work on telomeres. She also conveyed her passion for science during her lecture tour of five Australian cities to speak with high school students, in which she was joined by local early career researchers.

Early career researchers

That passion for science in young people was evident also in the glowing reports of the group of undergraduates who were chosen by the Academy this year to attend the Lindau Nobel Laureate Meeting. All wrote excitedly of brushing shoulders with famous laureates, and of the wonderful opening address given by Professor Brian Schmidt FAA FRS Nobel Laureate.

I greatly enjoyed participating in discussions during the 2012 Theo Murphy Think Tank, held in Adelaide with about 60 early and mid-career researchers from Australia, Malaysia and Indonesia. The group was charged with considering the science that will help us examine issues around Australia's future population and answer the questions: who we will be, how we will live, how we will interact with our environment and what we will do? Another highlight was the dinner talk by RiAus Director, Dr Paul Willis. The recommendations of the Think Tank are now being developed.

Australia–China symposium

It was a great pleasure to host the President of the Chinese Academy of



Suzanne Cory

Sciences, Professor Chunli Bai, alongside Academy of Technological Sciences and Engineering Vice-President Professor Mary O'Kane for a bilateral symposium on healthy ageing at the Shine Dome from 22 to 24 July 2012 (see story page 7).

Changes at the Shine Dome

At the May AGM I foreshadowed changes in the way we occupy the Academy's buildings. You might notice a change the next time you visit the Shine Dome. Our upstairs tenants at Ian Potter House are growing and needed more floor space. At the same time the additional funding we received for *Science by Doing* in the May budget has necessitated the appointment of additional contract staff as the program moves into full-blown curriculum development. To accommodate both these needs we have moved *Science by Doing* into what was the Fellows' Room of the Dome, and leased their former upstairs Ian Potter House rooms to the existing tenant. We've also created a new 'breakout' room for conferences and workshops in the Basser Library. In honour of our much-loved late Fellow Frank Fenner, who was heavily involved with the library as both a benefactor and a researcher, the Library Committee has decided to name this new room the Fenner Room. I invite you to visit it next time you are at the Shine Dome.

Professor Suzanne Cory AC PresAA FRS



Kelly O'Dwyer, Cathy Foley and Amanda Rishworth with Suzanne Cory at the Mural Hall, Parliament House

Photo: Australian Parliament House

Honours to Fellows

Queen's Birthday Honours

The following Fellows received Queen's Birthday Honours in June 2012:

Professor Ian Frazer AC FAA FTSE FRS

Companion in the General Division of the Order of Australia for eminent service to medical research, particularly through leadership roles in the discovery of the Human Papilloma Virus vaccine and its role in preventing cervical cancer, to higher education and as a supporter of charitable organisations.

Professor David St Clair Black AO FAA

Officer in the General Division of the

Order of Australia for distinguished service to science in the area of organic and heterocyclic chemistry, through leadership roles within professional organisations, and as an educator and mentor.

Professor Tamarapu Sridhar AO FAA FTSE

Officer in the General Division of the Order of Australia for distinguished service to tertiary education, particularly the discipline of chemical engineering, as an academic and administrator, and for forging international strategic educational relationships.

an individual who has made an outstanding contribution, both nationally and internationally, to human health and wellbeing.

Professor Peter Hall FAA FRS awarded the 2011 Wilks Memorial Award, which recognises outstanding contributions to statistics. The award recognises his pioneering and influential contributions to statistics and probability, his outstanding service to the profession, and his promotion of statistical science to the wider scientific and educational communities.

Other awards

Professor Andrew Holmes AM FAA FRS

FTSE awarded the 2012 Royal Medal by the Royal Society in recognition of his work on polymeric light-emitting diodes. An internationally recognised honour, the Royal Medal is awarded by Her Majesty the Queen for the most important contributions in the physical, biological and applied sciences.

Sir Gus Nossal AC CBE FAA FRS FTSE

honoured with the David de Kretser Lifetime Achievement Award from Monash University. The award celebrates

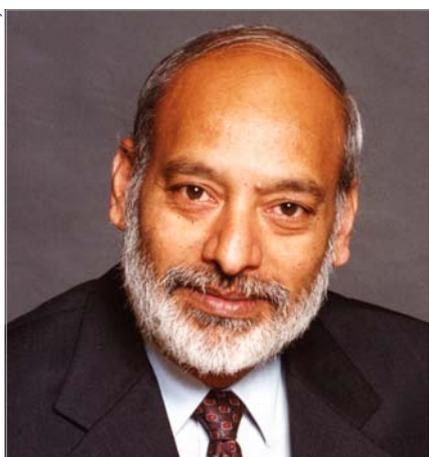
ARC Australian Laureate Fellowships 2012

Professor Frank Caruso FAA
Professor Terry Hughes FAA
Professor David Lindenmayer FAA
Professor Doug MacFarlane FAA FTSE
Professor Malcolm McCulloch FAA FRS
Professor Rick Shine AM FAA

Georgina Sweet Australian Laureate Fellowship

Professor Nalini Joshi FAA ▲

Photo: Irene Dowdy



Tamarapu Sridhar

VISIT BY NEW CORRESPONDING MEMBER

Professor Bruce Stillman AO FAA FRS, elected Corresponding Member in 2012, was guest of honour at an Academy lunch on 12 July 2012 hosted by Council.

Professor Stillman, who graduated from the Australian National University, is President of the Cold Spring Harbor Laboratories in New York. His discoveries have led to a deep understanding of how chromosome duplication is regulated. During his time in the United States of America he has maintained strong links with Australian science.

Following his formal admission he spoke of the extensive education programs of his organisation.



Watched by Suzanne Cory, new Corresponding Member Bruce Stillman signs the Charter Book

Margaret Middleton fund reports

Dr Adam Polkinghorne of Queensland University of Technology and Qamar Schuyler of the University of Queensland have provided the following reports on research conducted as part of their 2011 awards under the Margaret Middleton fund for endangered Australian native vertebrate animals.

A vaccine for koala chlamydial infection

Adam Polkinghorne writes:

Despite recent changes to the conservation status of the koala in Queensland and New South Wales, wild koala populations continue to decline. While many factors contribute to this, disease caused by chlamydial infection is a critical threatening process by contributing to serious illness, mortality and infertility. A chlamydial vaccine is still considered the best way to limit disease in wild populations. Our research team at the Institute of Health and Biomedical Innovation, Queensland University of Technology, has shown recently that a prototype recombinant protein-based vaccine is safe to deliver to both healthy and diseased captive koalas.

The vaccine's main component is the major outer-membrane protein (MOMP) of *Chlamydia pecorum*. This protein is highly immunogenic. Sequence variation in naturally occurring *C. pecorum* strains may mean that we need to include multiple MOMP proteins for effective protection against the various *C. pecorum* strains in wild koalas. The project investigated the genetic diversity of MOMP in geographically distinct koala populations in Queensland and New South Wales. This data was then used to inform the development of a novel *C. pecorum* MOMP-conjugate vaccine for koalas in south-east Queensland.

We screened wild koala populations in Queensland (St Bees Island, Brendale, Narangba, East Coomera, Lower Beechmont) and New South Wales (Port Stephens) using a specific polymerase chain reaction (PCR) assay to detect *C. pecorum* DNA. Our analysis revealed a moderate to high prevalence

of it in all populations tested, ranging from 23% (East Coomera; 87 koalas screened) to 50% in both Brendale (22 animals screened) and Narangba (16 animals). For each PCR-positive sample, the ompA-encoding MOMP sequence was determined following PCR amplification and sequencing. There were five ompA sequence genotypes across all populations screened. The sequence variation between each of these genotypes was 15–20%, and further analysis clustered these types into three main groups. Importantly, several of the populations screened were found to contain *C. pecorum* strains circulating with multiple, genetically distinct MOMPs. This implies that a *C. pecorum* vaccine for use in wild koalas in south-east Queensland would be likely to require multiple MOMP proteins.

We then selected a representative MOMP from each genetically diverse subgroup of MOMPs identified in the free-range koala populations to use as components in a new conjugate MOMP-based vaccine. The full length MOMPs (Genotypes A, F and G) were PCR amplified and cloned from positive clinical samples and expressed as polyhistidine-tagged proteins for purification. This strategy proved highly successful and sufficient quantities of protein have now been produced for immediate use in the next stages of our larger koala *Chlamydia* vaccine program that may include the first vaccinations of threatened wild koala populations in south-east Queensland. Such developments will provide us with a vital weapon in our efforts to conserve this important national fauna icon.

Sea turtles threatened by marine debris

Qamar Schuyler writes:

Marine debris is a growing problem for wildlife, and has been documented to affect more than 77 species in Australian waters alone. This project investigated the prevalence of marine debris ingestion in 115 sea turtles stranded in Queensland between 2006 and 2011, and assessed how debris ingestion rates differ by turtle



Photo: Qamar Schuyler

Turtles can ingest fragments of jellyfish-like balloons

size class (smaller oceanic feeders vs. larger benthic feeders). After 25 beach surveys to estimate the composition of the debris present in the marine environment, we modelled the debris preferences (colour and type) of turtles.

We also conducted in-water surface trawls to collect floating marine debris and compared this debris with that of the beach surveys, to determine whether beach surveys are an accurate representation of ocean-borne debris.

Our results show that curved carapace length in turtles was inversely correlated with the probability of ingesting debris; 54.5% of pelagic-sized turtles had ingested debris, whereas only 25% of benthic-feeding turtles were found with debris in their gastrointestinal system. Benthic and pelagic-sized turtles also exhibit different selectivity ratios for debris ingestion as compared to beach debris. Benthic phase turtles have a strong selectivity for soft clear plastic, lending support to the hypothesis that sea turtles ingest debris because it resembles natural prey items such as jellyfish. Pelagic turtles are much less selective in their feeding, though they show a trend towards selecting rubber items such as balloons. Most ingested items were plastic and were positively buoyant. This study highlights the need to address the increasing amounts of plastic in the marine environment, and provides evidence for the disproportionate ingestion of balloons by marine turtles. Additional research is required to elucidate the differences between beach and trawl surveys ▾

Hooked on Science

As a young child, driven by an innate thirst for knowledge, Elizabeth Blackburn spent her holidays searching for small creatures. Later, she transformed her passion into a highly successful career investigating DNA, leading to the Nobel Prize-winning discovery of the telomerase enzyme, its role in cell function and implications for ageing and disease.

Professor Blackburn's enduring excitement about discovery remains evident: her eyes were bright and her manner engaging as she spoke of her love of science to Australian school students on her recent five-city *Hooked on Science* tour.

Sponsored by Atlantic Philanthropies and state and territory governments, and coordinated by Professor Julie Campbell AO FAA, the tour captured the imagination of high school students at the Shine Dome in Canberra, and at research institutions in Brisbane, Sydney, Melbourne and Hobart.



Photo: Australian Parliament House

Elizabeth Blackburn (right foreground) at Parliament House

Professor Blackburn spoke of her early life and inspirations, then explained her highly complex science at a level that could be understood by the students.

In each city, two highly accomplished early career researchers joined Professor Blackburn to speak about their own work, ranging from the climate–ocean interplay

to epigenetics, chemistry and the Square Kilometre Array.

Students were thrilled to have met the internationally-renowned scientist. 'I was so excited to see a Nobel Prize winner,' said one, and another commented, 'It was fantastic. I learned a lot!'

Minister releases *Searching the deep Earth*

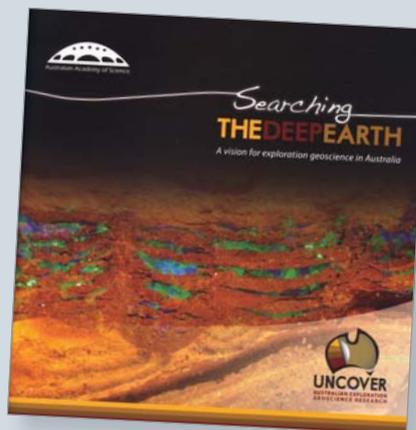
Minister for Resources and Energy the Hon Martin Ferguson AM MP has announced the release of *Searching the deep Earth: a vision for exploration geoscience in Australia*. The launch was on 8 August 2012 in Brisbane at the International Resource Ministers Forum, as part of the 34th International Geological Congress. This new vision statement, prepared by the UNCOVER implementation committee under the aegis of the Academy, reflects the contributions of researchers from universities, government research organisations and industry.

Minister Ferguson acknowledged the important contribution of the geoscience community to the mineral discoveries of the past two centuries. He highlighted the need for a coordinated research effort during the coming decades, to ensure the availability of the knowledge and data necessary to underpin ore deposit discoveries for the next century.

Searching the deep Earth emphasises the value of a systems approach in considering ore deposits. The large footprint of mineral systems provides the mineral exploration industry with better targeting. The document details four key research initiatives which provide a framework for Australian exploration geoscientific research.

'The Standing Council on Energy and Resources, which I chair, has agreed to develop a national exploration strategy to help Australia develop greenfields exploration capabilities. This strategy aims to unlock our resources through investment in a national geoscience research initiative inspired by *Searching the deep Earth*,' the Minister said.

Following the launch of the document, the UNCOVER implementation committee hosted a more detailed discussion on 9 August. Members of the research community are excited



by the initiatives proposed. The process of developing the national collaboration necessary to achieve the vision elaborated by *Searching the deep Earth* has already begun.

Further information about UNCOVER is available at www.science.org.au/policy/uncover.html/. To request copies of the publication please contact uncover@science.org.au.

62nd meeting of the Nobel Laureates

The 62nd Meeting of Nobel Laureates was held in Lindau, Germany, from 1 to 6 July 2012. Twenty-seven Nobel Laureates and more than 550 young researchers from around the globe attended the annual meeting, which this year focused on physics.

Professor Michael Dopita FAA led the delegation of seven young Australian scientists: Sarah Beavan (Australian National University), Jacinta Delhaize (University of Western Australia), Andrew McCulloch (University of Melbourne), Adele Morrison (Australian National University), Melissa Ness (Australian National University), Grace Shepherd (University of Sydney) and Minnie Mao (formerly of the University of Tasmania). Another young scientist, Andy Casey

(Australian National University), attended the meeting under the auspices of the Lindau Foundation and as a student of Professor Brian Schmidt FAA FRS, Australia's most recent Nobel Prize winner, whose attendance at the meeting was a highlight.

The meeting gave the delegates the opportunity to interact with their scientific heroes, exchange ideas, gain exposure to areas in their chosen discipline and establish new contacts and networks with their peers. During the week Professor Dopita organised private lunches with Laureates Professor Brian Schmidt, Professor John Mather, Professor George Smoot, Sir Harold Kroto, who was joined by his wife, and Professor Paul Crutzen. The delegation reported

that these three lunches were high points in an extraordinary week, and an unparalleled opportunity to meet and talk with the Laureates in a casual setting.

On behalf of the Academy, Melissa Ness and the student delegation presented Countess Bettina Bernadotte, President of the Council for the Lindau Nobel Laureate Meetings, with a small gift as thanks for her support for the Lindau Nobel experience.

Before the Lindau meeting the delegation attended the 2012 Science at the Shine Dome early career researchers program and took part in a pre-meeting briefing session with past delegation leaders.

More details are available from www.lindau-nobel.org.



Photo: Minnie Mao

Young Australian researchers at Lindau (left to right) Andy Casey, Adele Morrison, Andrew McCulloch, Grace Shepherd, Mike Dopita, Nobel Prize winner Paul Crutzen, Jacinta Delhaize, Sarah Beavan and Melissa Ness

Early career researchers on their way to France

In March this year, the Academy invited early career researchers to apply for the France–Australia Science Innovation Collaboration (FASIC) Grants Early Career Fellowships scheme. The scheme offers assistance to scientists wishing to collaborate with research institutions in France in the fields of medical science and biotechnology;

energy, including clean energy; sustainable infrastructure and transportation; and climate change and environment in the areas of marine science, land and water management and fire management.

As a result, 15 researchers will spend a minimum of two weeks in France

between 1 June and 31 December 2012. Their names are listed on the Academy's website at www.science.org.au/internet/europe/index.html.

Funding for this program was provided by the Department of Industry, Innovation, Science, Research and Tertiary Education.

Ninth annual Australia–China Symposium

The ninth annual Australia–China Symposium was held on 22–24 July 2012 in Canberra at the Academy’s Shine Dome. The symposium was jointly organised by the Academy, the Australian Academy of Technological Sciences and Engineering (ATSE) and the Chinese Academy of Sciences (CAS). Thirty Australian and Chinese researchers participated in the symposium, ‘Healthy ageing: new approaches from genomics, stem cells and smart technologies’. Nine early to mid-career researchers were supported to attend and observe the proceedings of the symposium.

The symposium coincided with a visit by Professor Chunli Bai. It was his first visit to Australia since becoming President of the Chinese Academy of Sciences in 2011. President Bai, together with Professor

Suzanne Cory and Professor Mary O’Kane, Vice-President of ATSE, jointly opened the event, at which the participants explored collaborative opportunities across the five session themes:

- the burden of disease and new strategies
- infectious diseases
- stem cells and regenerative medicine
- genomics and personalised medicine
- medical bionics and nanotechnology.

The Australian contingent of speakers included Academy Fellows Professors Perry Bartlett *FAA*, Frank Caruso *FAA* and Ian Frazer *AC FAA FTSE FRS*.

While in Canberra, Professor Bai met with Professor Ian Young, Vice Chancellor of the Australian National University, and

Dr Megan Clark, Chief Executive of CSIRO. He also took the opportunity to visit the National Arboretum Canberra. Senator the Hon Chris Evans, Minister for Tertiary Education, Skills, Science and Research, hosted a lunch for Professor Bai on 23 July.

Following the symposium, the Chinese delegation travelled to Melbourne to undertake a program of site visits to various institutions, including Stem Cells Australia, the Mental Health Research Institute, the Australian Regenerative Medicine Institute and CSIRO.

Next year will mark the tenth anniversary of the joint Academies symposiums, and plans are underway to appropriately commemorate this special occasion. ▲



Australia–China symposium participants (from left) Jie Xu, Embassy of the People’s Republic of China; Tieniu Tan, CAS; Andrew Holmes, AAS; Mary O’Kane, ATSE; Chunli Bai, CAS; Suzanne Cory, AAS; Jinghua Cao and Bolun Ning, CAS

Academy joins Facebook

Following the success of its Twitter account, **@Science_Academy**, the Australian Academy of Science has now opened a page on Facebook.

The page is updated daily with information about upcoming events, photos of past events, and news about Academy papers, announcements and activities. It also includes invitations to apply for Academy awards, fellowships and

exchanges, and announces national awards, prestigious appointments and other successes of Fellows.

The Facebook page has proved an early success, with more than 250 ‘likes’ and a reach of 7450 Facebook users in its first week. Those engaging with the Academy’s page come from all over the world, including the United States, India, the Netherlands, Germany, Canada, Brazil and Pakistan.

Almost all of them are aged between 25 and 44 years.

If you are a Facebook user, please visit and ‘like’ our page: **www.facebook.com.au/AustralianAcademyofScience**



Eureka finalists

Congratulations to the Academy Fellows shortlisted for 2012 Eureka awards:

Eureka Prize for Infectious Diseases Research

Professor Trevor Lithgow FAA, for the discovery of a machine of molecular scale in bacteria, the translocation and assembly module, which enables bacteria to cause disease.

www.eureka.australianmuseum.net.au/eureka-prize/infectious-diseases-research1/

Eureka Prize for Scientific Research

Professors Peter Visscher FAA and **Michael Goddard** FAA, for statistical methods which show that complex traits such as height and schizophrenia are due to thousands of genes, each with a tiny effect.

Professor Victor Flambaum FAA, for research which suggests that the laws of physics vary across the cosmos.

www.eureka.australianmuseum.net.au/eureka-prize/scientific-research7/

Eureka Prize for Leadership in Science

Professor Frank Caruso FAA, leader in developing and applying nanotechnology enabled materials for biomedical research.

Professor Suzanne Cory AC PresAA FRS, who promotes Australian science and education as the current President of the Australian Academy of Science.

Professor Mark von Itzstein FAA, leader in the chemical biology of carbohydrates and the discovery of new treatments for a range of medical problems.

www.eureka.australianmuseum.net.au/eureka-prize/leadership-in-science5/

Eureka Prize for Outstanding Mentor of Young Researchers

Professor Douglas Hilton FAA FTSE, for his mentoring of young researchers, many of whom have become leading researchers in their own right.

www.eureka.australianmuseum.net.au/eureka-prize/outstanding-mentor-of-young-researchers1/



Mark von Itzstein



Douglas Hilton

COMING EVENTS

Caring for the Australian Countryside public lecture series

www.science.org.au/events/publiclectures/

Dr Michael Looker

Buying biodiversity — the role of philanthropy in nature conservation

6 pm Tuesday 4 September 2012
Shine Dome, Canberra

Tony Windsor MP

Liverpool Plains: resolving the conflict between agriculture and mining

6 pm Tuesday 2 October 2012
Shine Dome, Canberra

Margaret Alston

Rural policy, people and place: sustainability in an uncertain future

6 pm Tuesday 6 November 2012
Shine Dome, Canberra

Out and about in the Universe

Professor Richard de Grijs

Academy 2012 Selby public lecture,
6 pm Monday 5 November 2012
Shine Dome, Canberra

Ticking time bombs in the human-Earth system: information, status, timing, significance, research needs

Second Australian Earth System Outlook Conference, organised by the Academy's National Committee for Earth System Science, 26–27 November 2012, Shine Dome, Australian Academy of Science, Canberra

www.science.org.au/events/conferences-and-workshops/earth-system-outlook2/index.html

Proteostasis and disease symposium

Australian Academy of Science
Boden Conference, 28–30 November 2012, Illawarra, Health and Medical

Research Institute, University of Wollongong

Celebrating 100 years of X-ray crystallography

Joint Meeting of the Asian Crystallographic Association, Society of Crystallographers in Australia and New Zealand, and the Bragg Symposium celebrating 100 years of crystallography, supported by the Academy's National Committee for Crystallography, 2–6 December 2012, Adelaide

www.sapmea.asn.au/conventions/crystal2012/index.html

Science in support of a transition to a green economy

2012 Frontiers of Science, 2–4 December 2012, Menzies Hotel, Sydney

www.science.org.au/events/frontiers/

News from National Committees

Antarctic research

Chair: Dr Dana Bergstrom

Australians were active at the Scientific Committee for Antarctic Research (SCAR) meeting in July this year in Portland, Oregon.

Committee Chair Dana Bergstrom and Tas van Ommen (Deputy Chair, National Committee for Earth System Science) were Australia's voting delegates.

Dr Graham Hosie (Australian Antarctic Division) was voted in as Chief Officer of the Life Sciences Standing Scientific Group and Rob Johnson (University of Tasmania) was voted in as the group's Association of Polar Early Career Scientists (APECS) representative. Joint activities between SCAR and APECS forge strong opportunities for early career scientists. The committee sponsored early career researcher Dr Robyn Schofield to present at the meeting and host a workshop. At the meeting Dr Ian Allison received the 2012 SCAR Medal for International Scientific Coordination for his distinguished career of service and leadership in Antarctic science. www.scar.org/awards/

Astronomy

Chair: Professor Elaine Sadler^{FAA}

The committee met on 4 July 2012 during the Astronomical Society of Australia's annual scientific meeting at the University of New South Wales, and discussed committee and member inputs into the current review of the national committees. The Chair and Professor John Dickey will share the role of National Representative

for Australia at the General Assembly of the International Astronomical Union in Beijing (20–31 August 2012). Following the 2011 Mid-term Review of the Astronomy Decadal Plan the Australian National Institute for Theoretical Astrophysics has now released the *Strategic Plan for Theoretical Astrophysics 2012–2015*. www.anita.edu.au/2012/07/02/strategic-plan-for-theoretical-astrophysics-released/

The committee received reports on developments with Astronomy Australia Ltd, the Australian Astronomical Observatory, the Square Kilometre Array, and the Giant Magellan Telescope.

Data in science

Chair: Dr Rhys Francis

The committee's Deputy Chair, Professor Jane Hunter (nominated by the Academy) and member Kim Finney have joined the International Council for Science (ICSU) World Data System Scientific Committee. Jane Hunter is Professor of eResearch, University of Queensland and Director of the eResearch Lab, School of Information Technology and Electrical Engineering. Kim Finney is manager of the Australian Antarctic Data Centre, and Chief Officer of the SCAR Standing Committee on Antarctic Data Management.

The World Data System aims to enable universal and equitable access to quality assured scientific data, data services, products and information; to ensure long term data stewardship; to foster compliance to agreed data standards and conventions; and to provide mechanisms

to facilitate and improve access to data and data products.

Earth sciences

Chair: Professor Brian Kennett^{FAA}

The committee met at the Australian National University on 26 July 2012, to prepare for the 34th International Geological Congress of the International Union of Geological Sciences held in Brisbane in August. The Chair organised award grants for 12 early career researchers from the 25th International Geological Congress Fund.

Earth system science

Chair: Dr Roger Gifford

The Chair attended two meetings in London in March. The first was the International Council for Science (ICSU) conference 'Planet Under Pressure'. About 3000 attended the meeting, with another 3000 online during plenary sessions. The meeting produced nine policy briefs directed at the Rio+20 Earth Summit on topics from water security to green economy.

At the second meeting, chairs of national committees for the International Geosphere-Biosphere Programme (IGBP) and for the global change sciences discussed the organisational transition occurring in ICSU's global change science bodies. In essence, these are being formed into a single initiative called Future Earth. The Academy's research plan for Earth system science — *To live within Earth's limits* — www.science.org.au/natcoms/nc-ess/documents/ess-report2010.pdf is wholly compatible with this approach.

The IGBP officers meeting will be held at the Academy on 28–30 November 2012, following the Second Australian Earth System Outlook conference (see page 8).

History and philosophy of science

Chair: Associate Professor Rachel Ankeny

With support from the Academy and the Centre for the Foundations of Science at the University of Sydney, the



STEVE RINTOUL RECEIVES MARTHA T MUSE PRIZE

Professor Stephen Rintoul^{FAA}, a physical oceanographer at CSIRO and the Antarctic Climate and Ecosystems Cooperative Research Centre, received the 2012 Martha T Muse Prize for Science and Policy in Antarctica at the SCAR meeting in July.

Steve Rintoul delivers the Martha Muse Lecture in Portland, July 2012



National Committee for Earth Sciences meeting, July 2012

committee is holding a workshop on 26–28 September 2012 at the University of Sydney. The workshop aims to bring together Australian history and philosophy of science scholars (defining the field broadly to include history, philosophy, and social studies of science/medicine/technology). The invitation-only workshop will have sessions on key themes in Australasian history and philosophy of science scholarship — early modern science, contemporary biological practices, uses of expertise in activism, time, colonial perspectives on the history of medicine, and narrative-based versus network-based methods. Details are available at www.sydney.edu.au/foundations_of_science/events/natcomm_hps_workshop.shtml, or from rachel.ankeney@adelaide.edu.au.

Mathematical sciences

Chair: Professor Nalini Joshi^{FAA}

Since February, the Chair has raised more than \$80 000 from mathematical and cognate societies, university departments of mathematical sciences, and organisations such as CSIRO and the Defence Science and Technology Organisation, for drafting a decadal plan in the mathematical sciences. Professor Peter Hall^{FAA} will chair a steering

committee for the decadal plan, with subcommittees on:

- mathematics and statistics education in schools and colleges (including TAFE colleges) — chaired by Associate Professor Kim Beswick (University of Tasmania)
- mathematics and statistics education and training in universities — Professor Barry Hughes (University of Melbourne)
- mathematics and statistics research (including interdisciplinary research) in universities and related institutions (such as medical research institutes) — Professor Nigel Bean (University of Adelaide) and Professor Andrew Hassell (Australian National University)
- mathematics and statistics (including education, training and research) in government instrumentalities, both state and federal (including government laboratories such as CSIRO and the Defence Science and Technology Organisation) — Geoff Lee (formerly Australian Bureau of Statistics)
- mathematics and statistics (including education, training and research) in business and industry — Nick Stavrou (Q-Risk Strategies)
- research centres, present and future, in mathematics and statistics — Professor Peter Forrester^{FAA} (University of Melbourne).

International Commission for Mathematical Instruction

The General Assembly of the International Commission for Mathematical Instruction (ICMI) was held in Seoul on 8 July 2012, in conjunction with the 12th International Congress on Mathematical Education. Professor Merrilyn Goos, endorsed by the Academy, was Australia's voting delegate. The assembly elected the 2013–16 executive committee, considered the quadrennial report and financial statement for 2008–12; and heard reports on the activities of affiliated study groups and organisations. Australia's strong international reputation in mathematics education was reinforced by the election of Professor Cheryl Praeger^{FAA} as vice-president for 2013–16. Australia was also well represented by organisations and groups affiliated with the commission. As presidents of the Mathematics Education Research Group of Australasia and the International Community of Teachers of Mathematical Modelling and Applications respectively, Merrilyn Goos and Dr Gloria Stillman reported on activities. There was lively discussion of issues surrounding the commission's capacity to involve school teachers in its programs supporting the teaching and learning of mathematics

at all levels, to improve communication between teachers, researchers, and mathematicians, and to better support its regional conferences and outreach to developing countries. Further information is available at www.mathunion.org/icmi/.

Plant and animal sciences

Chair: Professor Roger Leigh

The 35th International Union of Biological Sciences (IUBS) General Assembly was held on 5–9 July in Suzhou, China. The Australian voting representative at the

Assembly was committee member Professor John Buckeridge, immediate past president of IUBS.

Space science

Chair: Professor Russell Boyce

The committee met by teleconference for a preliminary annual meeting on 18 May 2012 and in person in Canberra in August. Professor Andrew Parfitt, Chair of the National Committee for Radio Science, also attended the May meeting.

The Australian Space Science Conference, run annually by the committee and the National Space Society of Australia, will be held on 24–27 September 2012 at RMIT University in Melbourne. This conference will be run in association with Engineers Australia National Space Engineering Symposium and the National Committee for Radio Science and its Workshop on Applications in Radio Science. Further information is available at www.nssa.com.au/ocs/index.php?cf=14/. ▲

US graduates visit Australia for summer science program



Students of the 2012 Summer Program. **Back row** (from left) Chris Rokicki, Anatoly Zlotnik, Gordon Ober, Craig Milroy, Jonathan Warnock, Kevin Miller, Emanuel Indrei and David Hondula. **Front row** (from left) Morgan Levy, Shay Mailloux, Nikki Nielsen, Garrett Hughes, Maija Sipola, Franne Kamhi, Amy Jordan, Mallory Barkdull, Allison McInnes, Jaylene Ollivierre, Karan Odom and Anna Herring

The Academy was pleased to welcome 20 American graduate students to Australia for the 2012 East Asia and Pacific Summer Institutes program, jointly funded by the Department of Industry, Innovation, Science, Research and Tertiary Education and the US National Science Foundation, and co-managed by the Academy and the US National Science Foundation.

Now in its ninth year, the program enables students who have specialised in science and engineering to visit

Australia for eight weeks during the American summer. While here, they undertake research in laboratories and build relationships with their Australian counterparts. Program participants come from a range of research areas and are hosted by various institutions including universities and government institutions. Professor Neil Trudinger ^{FAA} from the Australian National University was among the Australian hosts of this year's graduate students.

An orientation program in Canberra in June marked the beginning of the students' stay in Australia. The Academy organised a series of lectures and site visits to cultural institutions as part of the orientation program. The highlight was a visit to Tidbinbilla Nature Reserve, where the students saw Australian animals in their natural habitat and learned about life in Australia before European settlement.

Vitamin D symposium

The symposium *Should Australia and New Zealand allow more vitamin D into the food supply?* was held at Deakin University, City Centre, Melbourne, on 12 June 2012. It was organised by the Academy's National Committee for Nutrition and the International Life Sciences Institute Southeast Asia Region Australasia, in conjunction with the Nutrition Society of Australia, to raise awareness of vitamin D deficiency in Australia and New Zealand and highlight the need for the government to urgently consider allowing more vitamin D into the food supply. Eighty-three health professionals, academics, food industry representatives and dietitians attended the one-day meeting.

Vitamin D is a fat-soluble vitamin which our bodies make when skin is exposed to sunlight. At the symposium Professor Caryl Nowson, member of the National Committee for Nutrition and Chair of Nutrition and Ageing, Deakin University, outlined the progression of knowledge regarding vitamin D, from about 1920 when cod liver oil was used for rickets to the present day where there is Level 1 evidence for vitamin D deficiency relating to falls, fracture and all cause mortality, and weaker evidence for a relationship with numerous other diseases. We evolved as hunter-gatherers in Africa but modern indoor lifestyles and the wearing of clothing in cooler climates contribute to low sunlight exposure and hence low vitamin D status. Minor amounts of vitamin D can also be obtained from food. Professor Nowson concluded that only a small amount of dietary vitamin D is required to avert frank deficiency (rickets in infants and young children and osteomalacia in adults), and that this could be achieved using a wide variety of fortified foods.



Speakers at the Vitamin D symposium (Andrew Sinclair far right, Caryl Nowson second from left)

Photo: Christine Dowdall, Southeast Asia Region Australasia

Professor Rob Daly, Chair of Exercise and Ageing, Deakin University, spoke about vitamin D status and optimal levels and concluded that there is an urgent need to improve the vitamin D status of all Australians and New Zealanders.

Professor Rebecca Mason from the University of Sydney highlighted the need for a balance between skin damage and vitamin D production. While those at high risk of skin damage and disease need to avoid the sun, others can have short but frequent periods of exposure to sunlight. Another speaker indicated that mushrooms grown indoors can be flash-illuminated before sale to provide a dietary source of vitamin D2 which is bioavailable, shelf stable and cooking stable.

Dr Susan Whiting, Professor of Nutrition and Dietetics at the University of Saskatchewan, discussed the Canadian experience of mandatory vitamin D fortification of fluid milk and margarine since 1975. She noted that Canadians

have benefited from vitamin D fortified milk which has helped prevent childhood rickets.

Dr Andre Renzaho of Monash University indicated that vitamin D status is an urgent issue for migrant populations and Indigenous Australians. Dr Georgia Paxton from the Royal Children's Hospital in Melbourne said that vitamin D is a high priority issue for both children and pregnant women, and that there are about 250 cases a year of children from Victoria with vitamin D deficiency rickets.

Ms Janine Lewis from Food Standards Australia New Zealand estimated that voluntary vitamin D food fortification could take 9–12 months for approval, and that a best-case scenario for mandatory fortification could take two to three years. The closing panel discussion concluded that Australia should be adding vitamin D to the food supply. ▲

GOOD NEWS FOR COST ACTION FUNDING

The Academy has received funding from the Department of Industry, Innovation, Science, Research and Tertiary Education for the program 'Australian participation in European Cooperation in the field of Scientific and Technical Research' (COST).

Australian researchers travelling to Europe between July 2012 and June 2013 may receive a grant in aid of up to \$5000 to undertake a short-term scientific mission and/or attend a workshop or meeting of COST.

Applications are assessed on a first-come first-served basis, and applicants or their organisations must be a member of a COST Action before applying for funding from the Academy. Further details are available at www.science.org.au/internat/europe/cost.html.

Primary Connections

New Primary Connections units

Six *Primary Connections* curriculum units have been aligned with the Australian Curriculum: Science and released to Australian schools: *Earthquake explorers*, *Spot the difference*, *Staying alive*, *Smooth moves*, *Weather in my world* and *Push pull*.

The units link science with literacy and provide hands-on activities for students to explore relevant and interesting science concepts.

On 11 July 2012, Professor Keith Skamp and Program Director Shelley Peers launched *Teaching primary science* at CONASTA, the annual conference of the Australian Science Teachers Association.

Professor Skamp was commissioned by *Primary Connections* this year to undertake a detailed study of the implementation

of trial *Primary Connections* curriculum units in Australian schools.

According to Professor Skamp's report, *Primary Connections* has had a positive influence on most, if not all, teachers' thinking concerning the nature of inquiry-orientated learning. His findings reveal that the inquiry-based system enhances students' inquiry skills, conceptual development and enjoyment of science.

'We studied teacher responses to the program over more than six years and across different Australian demographics and found that in the vast majority of cases, teachers using *Primary Connections* were teaching more investigative science,' Professor Skamp said.

The value from the report's findings will be widespread. 'It is an important tool which we will use to inform the future

development of *Primary Connections* teacher training and curriculum resources,' Ms Peers said. Teachers, professional learning providers and curriculum developers will all benefit from this research. The data will also help inform future policy decisions about professional-learning initiatives and the development of curriculum-support materials.

The report is available at www.science.org.au/primaryconnections/research-and-evaluation/teaching-ps.html.

Primary Connections Director visits Indonesia

Following an invitation from the President of the Indonesian Academy of Sciences, Professor Sangkot Marzuki, *Primary Connections* Director Shelley Peers made a visit to Indonesia from 16 to 18 July 2012. The purpose of her visit was to provide detailed information about *Primary Connections* to ascertain the feasibility of developing a similar program in Indonesia. Shelley made a presentation on *Primary Connections* at the Australian Embassy Theatre in Jakarta as part of their Australia Indonesia Science Seminar Series. She also visited the Southeast Asian Ministers of Education Organization's science teacher training centre in Bandung. The information sharing will be valuable for further discussion if *Primary Connections* is trialled there in the future. ▲



The newly released *Primary Connections* units

DONATION

Former Professor of Organic Chemistry at the University of New South Wales, Professor Kenneth Cavill FAA of North Sydney has made a generous donation of \$20 000 to the Academy's *Primary Connections* program.

For information on how to make a gift to the Academy, please see page 16.

CHANGED YOUR DETAILS OR WON AN AWARD?

The Academy is committed to maintaining current and accurate information on our Fellows. If you have recently changed any of your contact or employment details or won an award for your work please contact Fellowship Coordinator Jen Nixon, jen.nixon@science.org.au.

FELLOWSHIP DATES

Council meetings

341 Thursday 1 November 2012

Sectional Committee meetings

Thursday 7 February 2013

Thursday 6 February 2014

Science at the Shine Dome, incorporating Annual General Meeting and symposium,

Wednesday – Friday 28–31 May 2013

Basser Library hosts 2012 Moran Fellows



Ailie Smith

Ailie Smith, from the University Library at the University of Melbourne, writes:

The library and the *Encyclopedia of Australian Science*

In April this year, as one of the two recipients of a 2012 Moran Award for the History of Australian Science, I spent two weeks in the Adolph Basser Library at the Academy. My aim was to improve information in the *Encyclopedia of Australian Science* on manuscript collections held by the library. I wanted to enable the encyclopedia to act as a gateway for researchers and to link descriptions of the library's manuscript collections with relevant published

resources and archival collections held by other institutions.

As a result, the online exhibition on the *Encyclopedia of Australian Science's* web site (www.eoas.info/basser_browse.html) now allows users to explore the library's contents in a variety of ways, and gives greater exposure to its collections. Material in the *Encyclopedia of Australian Science* is also discoverable through the main website search and browse functionality, placing it within the broader context of the history of Australian science, technology, engineering and medicine.

My visit and the additional work needed to compile results and put together the online exhibition were also supported by the University of Melbourne's eScholarship Research Centre. I thank Rosanne Walker, Academy librarian at the Adolph Basser Library, for her assistance and guidance with information about the manuscript collection, and for making me welcome during my visit.

Historian Dr Lachlan Clohesy, who teaches at Victoria University and Swinburne University of Technology, writes:

Atomic power and weapons in Cold War Australia

I am examining Australia's role in the atomic age, and the links between Australia's nuclear aspirations and a desire to develop an indigenous nuclear weapons capacity in Australia.

As recipient of a 2012 Moran Award at the Basser Library this year, I continued my work on Australia's interest in nuclear power during the late 1960s and early 1970s, particularly under the Gorton Government. This work will contribute to three peer-reviewed journal articles.

The library holds the papers of Sir Ernest Titterton, which contain correspondence with WC Wentworth MP, David Fairbairn MP and Senator John Gorton. Among the papers are notes for articles published by Titterton advocating the consideration of an Australian nuclear weapons program, and a speech to the Australian Army Staff College in which he noted that 'killing is effected at roughly £2 per head, man woman and child', compared with a cost of thousands per head in World War II.

I thank the Moran family for their generous support of the award, and the Academy's librarian Rosanne Walker, who freely provided guidance and assistance at the Shine Dome. ▲



Lachlan Clohesy

MEMORABILIA WANTED!

Science at the Shine Dome in 2013 is looking for memorabilia related to past, present and proposed power generation, demand and use in Australia. We are also looking for items of historical interest to help us celebrate the Academy's 60th anniversary in 2014. If you know of any relevant material, or have items you are happy to lend us for exhibition or photographing, we would be very glad to hear. Please contact Kylie Walker, Director, Communications and Outreach, kylie.walker@science.org.au.



NEW FELLOW VISITS CROATIA

During a visit to Croatia Professor Frances Separovic FAA was guest of honour at a dinner with the Secretaries for Science and Education of Croatia, hosted by Ms Susan Cox, Chargé d'Affaires at the Australian Embassy in Zagreb.

Frances Separovic on her visit to Croatia, with a statue of physicist Nikola Tesla

Obituaries

Bill Elliott

William Herdman Elliott was born in County Durham, England, on 5 June 1925, and died in Adelaide on 25 July 2012. He studied at Trinity College, Cambridge, where he was later elected a Fellow. After a PhD with enzymologist Malcolm Dixon, Bill worked with Nobel Prize winners Franz Lipmann at Harvard during a Rockefeller Fellowship and Hans Krebs at Oxford University.

In 1957 Bill took up a senior fellowship at the John Curtin School of Medical Research, Australian National University. He was appointed to a personal chair at the university in 1964.

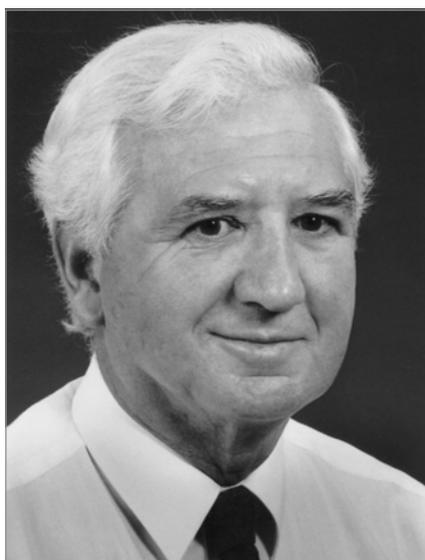
In 1965 Bill became Professor of Biochemistry at the University of Adelaide, a position he held for nearly 25 years. He was also Dean of Science for several years. He strongly supported molecular biology and brought Adelaide biochemistry to prominence nationally and internationally. He was greatly respected for his leadership and teaching, and in 1982 was awarded the first Centre of Excellence in which the research was devoted to gene technology.

In the early 1980s Bill worked with Bob Symons *FAA* to establish BRESA, a University of Adelaide biotechnology company and the first Australian company to market radioactive nucleotides for molecular biology research.

He made substantial contributions to biochemistry, including the discovery of glutamine synthetase, the enzyme system which synthesises taurocholic acid via cholyn-CoA, and the synthesis of nicotinuric acid by liver mitochondria.

After retirement in 1988, Bill and his wife Daphne (also a biochemist) wrote the textbook *Biochemistry and molecular biology* (published in 1997, 4th edition 2009).

Bill's contribution to Australian science has been widely recognised. He was elected as a Fellow of the Academy in 1965. Bill was active for more than 30 years in the Academy, including as a member of Council (1969–72), and as member and chair of the Molecular and Biological Sectional Committees (1966–93).



Bill Elliott

In 2003 he was awarded the Centenary Medal for service to Australian society and science in molecular biosciences. The University of Adelaide holds an annual WH Elliott Lecture.

Bill married Daphne Davison in 1952. She and their children Jane, Michael and David survive him.

Ralph Slatyer

Ralph Owen Slatyer, who died in Canberra on 26 July 2012, was born in Melbourne on 16 April 1929. He studied agriculture at the University of Western Australia, and was awarded the David Evans Memorial Prize. He joined CSIRO's Division of Land Research in 1951 as a research scientist, rising to associate chief. He received a Masters Degree in Agriculture (1955) and Doctorate of Science (1960) from the University of Western Australia. Ralph became professor of biology at the Australian National University in 1967, and Director of its Research School of Biological Sciences (1984–89).

He was Australia's Ambassador to UNESCO in Paris (1978–82), and then chairman of the Australian Science and Technology Council. As first Chief Scientist for Australia, he established the Cooperative Research Centre (CRC) scheme, a contribution commemorated by the CRC Association's annual oration,



Ralph Slatyer

the Ralph Slatyer Address on Science and Society.

Ralph's plant physiology and ecology research, initially on water use in plants and the effects of physical environmental factors and physiological control mechanisms within the plant, became increasingly focused on ecosystem science, an interest which continued after retirement with his appointment as chair of the Rainforest CRC.

Ralph's research achievements were widely recognised. He was elected as a Fellow of the Academy in 1967, of the Royal Society of London in 1975, and of the Australian Academy of Technological Sciences and Engineering in 1992. He became a Foreign Associate of the US National Academy of Sciences in 1976.

He was made an Officer of the Order of Australia (1982) and then Companion of the Order of Australia (1993) for service to Australian science, and received the Clunies Ross Award for Lifetime Contributions to Science and Technology (2001).

Ralph served on many Academy committees and on the Academy's Council (1969–72). He was founding chairman (1992–94) of the Academy's Australian Foundation for Science.

Ralph married June Wade in 1953. She and their children Tony, Beth and Judy survive him. ▀

Caring for the Australian Countryside public lecture series

Australia's red centre provides a disproportionate source of the country's wealth but also causes great concern over land degradation, species loss and social difficulties. The region is renowned for its variability, and lessons learned from understanding how to manage uncertainty in Australia's desert outback have implications for the rest of Australia and the world, according to June public lecture speaker **Dr Mark Stafford Smith** from CSIRO's Climate Adaptation Flagship.

In a talk entitled *Australia's desert heartlands: a vibrant future or a victim in decline*, Dr Stafford Smith explained that the desert system links climate variability with scarcity of resources and a sparse population. Remoteness and social uncertainty characterise the region.

'These desert drivers can be seen from a deficit view, but in reality desert Australia just functions differently from settled regions, creating as many opportunities as problems,' he said. 'One has to shift the mental model to manage for this system, making it resilient and capturing the opportunities that are in it.'

Dr Stafford Smith listed some of the opportunities that the desert system presents — mobile and remote education delivery, the Royal Flying Doctor Service, new communication technologies, business clustering to build critical mass and redesigning local government.

In the July public lecture, international expert on coal seam gas **Professor Sue Golding** from the University of Queensland gave an introduction to the



Photo: www.iStockphoto.com/Tobi

Central Australia's climatic variability holds lessons for the world

science of coal seam gas and explored the key issues and knowledge gaps in our understanding of the environmental impacts of coal seam gas extraction.

In her lecture entitled *Coal seam gas: alternative energy source or environmental hazard*, Professor Golding explained how the increased reliance on coal seam gas in the energy mix has raised concerns in regional communities about the environmental effects of its extraction, especially in Queensland's Bowen and Surat basins.

'Better management of the groundwater and surface water impacts of coal seam

gas production is the key to resolving the environmental concerns,' she said. She discussed various management options for dealing with the saline water by-product of coal seam gas extraction.

To attend the public lectures, held from 6 to 7 pm on the first Tuesday of every month, please use the online booking system on our web page. Live broadcasts and previous lectures are available on the internet at www.science.org.au/events/publiclectures/ac/index.html. ▲

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