



AUSTRALIAN ACADEMY OF SCIENCE

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Science at the Shine Dome 2010 – a celebration of science



Photo: © Irene Dowdy

The annual dinner and award presentation was graced by the presence of Quentin Bryce, the Governor-General of Australia

The Academy held the annual *Science at the Shine Dome* event from 5 to 7 May. Academy Fellows and the President, Professor Kurt Lambeck, were joined by newly-elected Fellows, Academy award winners, early-career researchers and science teachers.

Seventeen scientists from all fields of science were admitted as new Fellows of the Academy and spoke about their ground-breaking research (see page 8). Winners of the Academy's 2010 career and early-career researcher awards were presented with their medals and discussed their latest work.

The inaugural 2009 Anton Hales Medal was presented to Professor Jeffrey Walker of Monash University for pioneering work in monitoring soil moisture from space in real time, leading to better prediction of weather, food production and water availability. The 2010 Fenner Medal was presented to Professor Robert Brooks from the University of New South Wales, for advancing the understanding of the evolution of sex differences, including insights into the evolution of sex chromosomes, the biology of ageing and longevity, risks of extinction and the genetic benefits of mate choice. The Ruth Stephens Gani Medal was awarded to Dr Stuart Macgregor of the Queensland Institute of Medical Research, for genetic association studies that has helped clarify



Photo: Dr Nicole Webster

Sponges and their microbial symbionts are sensitive to pollution and seawater temperature: Antarctic sponge, *Kirkpatrickia varialosa*

the genetic basis of diseases ranging from schizophrenia to cancer. Dr Nicole Webster of the Australian Institute of Marine Science received the Dorothy Hill Award for work on bacterial symbiosis in coral reefs and Dr Amanda Barnard of CSIRO received the Frederick White Prize for her research into predicting the environmental stability of nanoparticles and how they interact with

natural ecosystems.

This year's symposium featured nine speakers including international guest speaker, Professor Simon Tavaré of the University of Cambridge, who spoke about combining genomics and mathematics to learn about cancer. The symposium examined how the data explosion produced
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a bequest to the Academy, please
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Honours to Fellows



Hugh Durrant-Whyte

Three Academy Fellows have been elected
as Fellows of the Royal Society.

Professor Hugh Durrant-Whyte,

Australian Centre for Field Robotics at
the University of Sydney, was elected
for his major contributions to robotics,
in particular to the fields of sensor data
fusion and of autonomous vehicle
navigation.

Professor Malcolm McCulloch,

School of Earth and Environment at
the University of Western Australia,
was distinguished for his original
contributions to the understanding
of the early solar system, as well as
the development of innovative new
indicators of climate change preserved
in coral skeletons.

Dr Ezio Rizzardo of CSIRO Molecular
and Health Technologies was recognised
for his pioneering work relating to the
control of free radical polymerisation.

Professor Kurt Lambeck, has been elected
to the American Academy of Arts and
Sciences as a Foreign Honorary Member.

Emeritus Professor David Groves

has been awarded the 2010 Penrose
Gold Medal by the Society of Economic
Geologists, USA, for his outstanding
contribution to Earth sciences.

Professor Geoff McFadden has been
awarded the 2009 Ramaciotti Medal for
Excellence in Biomedical Research for his work
in developing new ways to combat one of
the world's major health problems, malaria.

Five Academy Fellows have been appointed
to the Fellowship of the Royal Society of
New South Wales. They are: **Professor
Michael Archer, Professor Gavin Brown,
Professor Bob Clark, Professor David
Craig** and **Professor Dick Stanton**.

Professor Chennupati Jagadish was
elected to the Fellowship of the Materials
Research Society.

Dr John O'Sullivan received the Academy
of Technological Sciences and Engineering's
Clunies Ross Award, for jointly inventing
and patenting the wireless local area
network technology. ■

Important dates

1 June: Public lecture in the water series,
*Recycling stormwater – new urban water
supplies using aquifer recharge*, by Peter
Dillon, CSIRO Land and Water, Water for
a Healthy Country Flagship. Shine Dome,
Canberra. Contact savita.khiani@science.org.au
or call 02 6201 9462.

6 July: Public lecture in the water series
by Dr Leith Bouilly. Shine Dome, Canberra.
Contact savita.khiani@science.org.au or
call 02 6201 9462.

3 August: Public lecture in the water
series by Dr Lin Crase, La Trobe University.
Shine Dome, Canberra. Contact savita.khiani@science.org.au or call 02 6201
9462.

19–20 August: High Flyers Think Tank,
Searching the Deep Earth: The Future of
Australian Resource Discovery and Utilisation.
Shine Dome, Canberra

7 September: Public lecture in the water
series by Dr Tom Hatton, CSIRO Wealth from
Oceans Flagship. Shine Dome, Canberra.
Contact savita.khiani@science.org.au or call
02 6201 9462.

25 September: Shine Dome open day.
Canberra.

9–12 October: UK–Australia Frontiers of
Science: Marine Science Meeting. Rendevous
Hotel, Perth.

Australia–China Next Step Initiative

The Australian Academy of Science, in conjunction with the Australian Academy of Technological Sciences and Engineering (ATSE), organised the Australia–China Next Step Initiative in Australia from 3 to 7 May. Funded by the Australia–China Council of the Department of Foreign Affairs and Trade, the Next Step Initiative provides an opportunity for Australian and Chinese researchers previously involved in the academies' symposia series organised with the Chinese Academy of Sciences, to meet with their counterparts and gain a greater knowledge of the collaborative opportunities that may lead to a series of bilateral relationships.

Six Chinese researchers travelled to Australia to meet with their potential research partners. At the roundtable debrief session organised in Canberra on the last day of the program, participants reported on a number of exciting collaborative outcomes such as:

- understanding the connectivity between marine environments in the South China Sea and Northern Australia;
- modelling for carbon accounting in forest and agriculture zones;
- comparative studies of planning and management for rapid growth and climate change in south-east Queensland and the Yangtze River delta;
- coastal management via monitoring decadal trends of algal blooms;
- a clean crops initiative to understand metal contamination and toxicological impacts in order to minimise risk;
- bioremediation of emerging contaminants in Australia and China;
- urban expansion; and
- regional vulnerability and resilience.

A dinner hosted by the Chinese Embassy concluded this successful program.

Second Singapore–Australia Joint Symposium on Stem Cells and Bioimaging

The Academy, in collaboration with A*STAR (Agency for Science, Technology and Research) in Singapore, organised the second Singapore–Australia Joint Symposium on Stem Cells and Bioimaging, held in Singapore on 24 and 25 May.

Dr Alan Colman of the Singapore Stem Cell Consortium and Professor Bob Williamson FAA co-convoked the symposium, which included 11



Australia–China Next Step Initiative participants in Canberra

Australian and nine Singaporean speakers. Participants took the opportunity to attend a program of technical visits to the Singapore Bioimaging Consortium. The first Singapore–Australia joint symposium was held in Canberra in 2009 on the topic of energy. It is expected that these meetings will foster greater collaborations between researchers from both countries.

COST training school on cyberbullying

The Academy manages on behalf of the Department of Innovation, Industry, Science and Research (DIISR) funding to support Australia's participation in COST (European Cooperation in Science and Technology) Actions. Australia was invited to host the first training school for COST in the area of cyberbullying in Melbourne from 11 to 16 April as it is seen as a leader in this area of research.

Thirty researchers from COST countries and 30 Australian researchers attended the training school, which included lectures, workshops, roundtable discussions and presentations. The Australian convener of the workshop was Professor Phillip Slee of Flinders University. Professor Tony Klein FAA spoke at the opening of the workshop on behalf of the Academy and noted the importance of international collaborations to tackle global problems including cyberbullying. The Manager of International Programs, Nancy Prichard, and Australian government officials met with COST Office

representatives to discuss the program. Since 2008, 43 Australian researchers have participated in COST Action activities with funding from DIISR's International Science Linkages program. More information about COST is available from www.science.org.au/internat/europe/cost.html.

Collaborative research grants with Germany

The Academy is managing, on behalf of DIISR, the Australia–Germany Solar Photovoltaics and the Australia–Germany Research Mobility calls for applications to facilitate bilateral research between the two countries.

A sum of \$200,000 has been allocated to establish or enhance collaborative research projects with German partners in the field of solar photovoltaics. An additional \$250,000 will be distributed towards the 'mobility call' as a one-off funding source that provides Australian researchers the opportunity to visit Germany to work on collaborative research projects with German counterparts. Funding supports international travel and living expenses only, not the direct costs of research. It is expected that the outcome of the applications will be announced by Minister Kim Carr in June, with applicants travelling in the next financial year.

International news continued

Submission to the House of Representatives Standing Committee

The Academy made a submission to the House of Representatives Standing Committee on Industry, Science and Innovation inquiry into Australia's international research engagement. The Academy submission is available from www.science.org.au/reports/documents/InternationalisationAustraliaScience.pdf.

The inquiry is looking into the nature and extent of existing international research collaborations, the benefits to Australia arising from international collaborations, the key drivers of international collaboration, the impediments faced by Australians while

collaborating with overseas researchers, and principles and strategies to support international research engagement.

Professor Kurt Lambeck was invited to appear at a public hearing for the inquiry on 12 May. In his introductory remarks Professor Lambeck noted that since its formation the Academy has been Australia's leading advocate for internationalisation of science, both in pursuit of excellence in scientific research and in the use of that research to the benefit of the nation. The transcript of Professor Lambeck's comments will be available from www.aph.gov.au/House/committee/isi/intresearch/hearings.htm. The report from the inquiry is expected to be available later in the year.

Embassy of France lecture: French innovative clusters

The Academy hosted a French Embassy lecture at the Shine Dome on 2 March on the topic of French competitiveness clusters and international cooperation. The French government has supported the creation of over 70 high-tech innovation clusters since 2005. The clusters are designed to boost innovation in France and to encourage international partnerships between industry and R&D organisations.

Mr Alain Moulet, Counsellor in the Prime Minister's Office in France, and Professor Murray Scott, CEO of the Cooperative Research Centre for Advanced Composite Structures, spoke at the event, and His Excellency Mr Michel Filhol, Ambassador for France, provided concluding remarks. ■

Funding for academies' research projects

The Australian Academy of Science will receive a share of \$1.4 million over three years from the Australian Government to undertake a research project on how to achieve an environmentally sustainable and socially equitable way of living in Australia by 2050.

The Minister for Innovation, Industry, Science and Research, Senator Kim Carr, announced the five projects to be funded under the Australian Research Council's Linkage Learned Academies Special Projects scheme saying, 'Members of the learned academies are esteemed scholars whose talent and unique experience allow us to tackle some of the more difficult issues facing Australia.'

The academies will conduct research projects to:

- understand the social consequences affecting our children as a result of the economic downturn (Academy of the Social Sciences in Australia);
- achieve an environmentally sustainable and socially equitable way of living by 2050 (Australian Academy of Science);
- raise the profile of interdisciplinary research, which is helping to achieve a sustainable Australia (National Academies Forum & Australian Academy of Technological Sciences and Engineering);
- improve collaboration and policy research in the humanities (Australian Academy of the Humanities); and
- learn how sustainable resource

management can enable environmentally responsible economic growth (Australian Academy of Technological Sciences and Engineering).

For more information on the Linkage Learned Academies Special Projects go to www.arc.gov.au/media/releases/media_28Apr10.htm ■

RESEARCH SUPPORT FOR 2011 OPEN

The Academy is calling for applications for funding from the Margaret Middleton Fund for endangered native Australian animals for research in conservation biology. The Academy is also delighted to be able to offer a new research support grant in 2011, the W H Gladstones Population and Environment Fund, to support empirical research into how the size, distribution, material aspirations and other characteristics of Australia's population are likely to affect our environment.

Closing date is 31 August 2010. Further information is available from www.science.org.au/awards/research-award.html

Population challenges to sustainability

The topic of the Academy's 2011 annual symposium will be Australia 2050: Population Challenges to Sustainability.

In 1994 the Academy of Science held a symposium entitled Population 2040: Australia's Choice. It concluded that an increase in Australia's population to 35 million, as currently predicted by 2050, would impact adversely on the quality of life of all Australians.

There is still considerable controversy about the number of people that Australia can sustain. Population growth does not merely lead to increased consumption of resources. The effects on the physical landscape, biological and agricultural heritage, and commitment to diversity and our social beliefs as a nation must also be considered. These effects will only be exacerbated by a changing climate.

The program of speakers will be organised by a committee chaired by Professor Bob Williamson, Secretary for Science Policy. It is envisaged that the symposium proceedings will contribute to evidence-based policy development to address the many challenges posed by increased population, particularly in regard to determining critical thresholds for environmental sustainability and social equity.

The proceedings of the 1994 symposium are available from www.science.org.au/events/sats/sats1994/index.html ■

New president for the Academy

Distinguished cancer researcher and Fellow of the Academy since 1986, Professor Suzanne Cory, has been elected as the new President, taking over the role from Professor Kurt Lambeck on 7 May 2010. Suzanne Cory is the second female to have served in this position, after Professor Dorothy Hill stepped into the role when Dr David Martyn died in 1970.

Professor Cory said of the appointment, 'I feel very honoured to have been elected as President. At the same time I am very conscious that it is a great responsibility.'

Professor Cory brings a wealth of experience. She was Director of the Walter and Eliza Hall Institute of Medical Research and Professor of Medical Biology at the University of Melbourne from 1996 until 2009. She was appointed to the CSIRO Board in 2002, becoming its Deputy Chairman in 2007. Her scientific achievements have attracted numerous honours and awards,

including the Australia Prize, the Charles S Mott Prize of the General Motors Cancer Research Foundation, the Royal Medal of the Royal Society and a L'Oréal-UNESCO For Women in Science Award.

Speaking of her role as the new President she said, 'We live in an increasingly challenging global environment and I believe that Australia's future will in large measure be determined by its capability in the sciences and engineering. The Academy must therefore play a major leadership role. We must ensure that Australian science grows even stronger and is well-linked internationally. We must stand ready to provide our policy-makers with sound independent scientific advice. And we must nurture the next generation of scientific leaders, by fostering high quality science education in our schools and universities and by inspiring our communities with the heady excitement of scientific discovery.' ■



Suzanne Cory

Photo: Walter and Eliza Hall Institute of Medical Research

Academy award for science journalist Peter Pockley

The Academy Medal was officially presented to science journalist Dr Peter Pockley by the Governor-General of Australia, Her Excellency Ms Quentin Bryce AC at the Academy's annual dinner held at the National Museum of Australia in Canberra on 6 May.

Peter Pockley is the pioneer of science communication in Australia and has been a tireless advocate for science for over 40 years. In 1964, Peter became the first scientist working full-time as a reporter and producer of science in the Australian media. As founding head of science programs for the ABC, he set up the Science Unit for TV and radio. From there, he presented or produced over a thousand programs. Many of these were the antecedents of programs we appreciate today. *The World Tomorrow* was the forerunner of *The Science Show* on ABC Radio National, and his *Insight* program on Sundays continues as *Ockham's Razor*.



(L to R) Kurt Lambeck, Quentin Bryce and Peter Pockley

Photo: © Irene Dowdy

Plans he developed for ABC TV led ultimately to *Catalyst*. He pioneered satellite TV for Australia, including the 'live' broadcasts of all Apollo missions to the moon.

Peter continues his life-long work as

senior correspondent for *Australasian Science*, this country's only monthly, local science magazine, and has recently established a 'living archive' of Australian science for the National Library of Australia. ■

Science at the Shine Dome 2010 – a celebration of science

(continued from page 1)

by biotechnology is dealt with and analysed through mathematics and statistics (see page 20).

Annual dinner

The social highlight for all Fellows and guests was the annual black tie dinner held at the National Museum of Australia in Canberra. The Governor-General of Australia, Her Excellency Ms Quentin Bryce AC, spoke at the dinner about being 'absolutely besotted by science' and paid tribute to the contribution made by Australian scientists. She went on to present the Academy Medal to renowned journalist Dr Peter Pockley (see page 5).

During the evening, the three career medallists were presented with their medals by President Kurt Lambeck. Professor David Vaux FAA of La Trobe University was awarded the 2010 Macfarlane Burnet Medal for his research in apoptosis, or programmed cell death, and his subsequent work on the development of a novel group of compounds currently undergoing clinical trials in humans for the treatment of cancer. Professor Robert Gilbert FAA of the University of Queensland was honoured with the David Craig Medal, for his original and substantial contributions in polymer science, which have influenced industrial polymer chemistry. Professor Patrick DeDecker of the Australian National University received the Mawson Medal for his pioneering work on trace element geochemistry to quantify past changes in lake water temperature and salinity and for his investigations into Australian dust storms.

Teachers' program

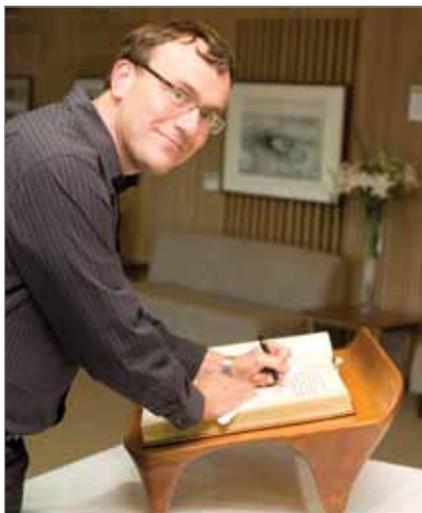
The teachers' program provided an opportunity for 18 teachers and curriculum consultants from around Australia to learn about the latest Australian scientific research at *Science at the Shine Dome*.

As part of the teachers' program, each year the Academy makes available an award for a science teacher from each state and territory to attend the event. The teachers who win the awards are very appreciative of the opportunity to hear about the latest developments in many different areas of science, and to mix with leading Australian scientists, young researchers and interstate colleagues.



Professor David Vaux delivers the Macfarlane Burnet lecture

Photo: © Irene Dowdy



New Fellow Peter Visscher signs the charter book

Photo: © Irene Dowdy



Frank Fenner with 2010 Fenner medallist Robert Brooks

Photo: © Irene Dowdy



The annual dinner was held at the National Museum of Australia

Photo: © Irene Dowdy



Photo: © Irene Dowdy

Career and early-career medallists at *Science at the Shine Dome*

This year the teachers' program included a workshop at CSIRO Discovery Centre. Aligning with the symposium topic *Genomics and Mathematics*, the group was able to gain hands-on experience in gel electrophoresis. This was followed by group discussions on the use of cutting edge science under the new Australian curriculum. Teachers also received posters, genomics resources and information on the Academy's education programs for use in their classrooms.

The feedback from the teachers about their experience at the event was positive. Comments included:

Great to hear about the science across Australia.

It was a wonderful opportunity to meet some interstate colleagues and exchange our thoughts on the Australian curriculum.

Great to meet the fellows. They are very eager to work with us.

A good snapshot of advances in Australian science... Full of quotes and enthusiasm that I could immediately apply in my classroom.

Thank you very much for organising this wonderful opportunity for teachers.

Early-career researchers

Science at the Shine Dome continues to attract over sixty enthusiastic early-career researchers from a diverse range of disciplines, who attend all the seminars as well as specific career development workshops. This year three workshops were offered. Dr Paul Willis from ABC TV's *Catalyst* presented the Science Communication and Media workshop, while Dr Darren Cundy from Australian Growth Partnerships of CSIRO and Tricia Berman from the Department of Innovation, Industry, Science and Research spoke on commercialising scientific research. The third workshop was conducted as a mock grant review to build skills for successful grant writing. It was facilitated by Professor Maria Makrides, Professor Bob Gibson, Professor Ian Petersen and Professor Hans Bachor.

Feedback about the early-career researcher program was positive:

This was the best networking opportunity I have experienced. I not only identified new areas of research, but identified job opportunities and two collaborators. ■



Photo: © Irene Dowdy

Members of the Australian delegation to attend the 60th Meeting of Nobel laureates at Lindau with Australian Nobel Laureate, Robin Warren



Photo: © Irene Dowdy

2010 teacher awardees from around Australia

Election of new Fellows to the Academy

Seventeen of Australia's leading scientists were honoured on 24 March by election to the Australian Academy of Science in recognition of their research that has significantly advanced the world's scientific knowledge.

Professor Vladimir Bazhanov
Professor, Department of Theoretical Physics, Research School of Physical Sciences and Engineering, Australian National University

Vladimir Bazhanov has made outstanding contributions to theoretical physics, gaining international recognition as a leading expert in the field of solvable lattice models in statistical mechanics and field theory. He has solved the chiral Potts model, thereby opening up a whole field of solvable three-dimensional models, and has found a fascinating correspondence between the spectral properties of integrable quantum systems and ordinary differential equations such as the one-dimensional Schrödinger equation.

Professor Jonathan Borwein
Professor Laureate in Mathematics, Faculty of Science and Information Technology, School of Mathematical and Physical Sciences, University of Newcastle

Jonathan Borwein has made seminal contributions to distinct mathematical disciplines that include optimisation theory and practice, number theory, classical analysis, theory of computation, and functional analysis. He is celebrated for his solutions such as the fundamental Borwein-Preiss smooth variational principle in optimisation theory, and his cubic analogue of Jacobi's seminal 19th century quartic theta function identity in number theory. Borwein is a world leader in the field of experimental mathematics using intensive computation for pure mathematical discovery

Professor Francis Carbone
Professor, Department of Microbiology and Immunology, University of Melbourne

Francis Carbone has made a number of critical discoveries on the nature of immunity, specifically defining the function and behaviour of key cells involved in the response against infection. He has identified mechanisms by which the immune system identifies pathogens and how effective immunity is generated to control these agents. Francis has developed a versatile range of biological tools for the study of



Photo: © Irene Dowdy

New Fellows, after being admitted to the Academy in recognition of their outstanding research

immune components that have proven indispensable to the field and are used worldwide.

Professor Allan Chivas
Professor of Geosciences, School of Earth and Environmental Sciences, University of Wollongong

Allan Chivas is a world renowned geologist and a geochemist who has made substantial contributions to the understanding of Earth-surface processes at the younger end of the geological time scale. His work covers a broad field relating to both atmospheric and mantle processes drawing from the biological and physical sciences. In several areas, his work has defined new geochemical and isotopic tools and methodologies, both conceptually and in analytical methods, which are now applied worldwide.

Dr Marianne Frommer
Honorary Researcher, School of Biological Sciences, University of Sydney

Marianne Frommer is internationally renowned for the invention of bisulphite genomic sequencing that enables accurate mapping of cytosine methylation, a critical epigenetic determinant. The technique is now used worldwide in mammalian developmental genetics and cancer diagnostics. Other contributions include results now used for search protocols of genome databases, and research on the problem of controlling Queensland fruit fly, through which she has provided major advances in the fly's control and in

understanding of molecular genetic bases for behaviours and speciation.

Professor Trevor Lithgow
Professor and ARC Federation Fellow, Medicine Health and Nursing Services, Department of Biochemistry and Molecular Biology, Monash University

Trevor Lithgow is one of Australia's leading yeast geneticists using yeast as a model to understand complex aspects of cell biology. His work on mitochondrial biogenesis, particularly the protein import pathway into mitochondria, places him amongst the top molecular microbiologists internationally. His development and use of bioinformatics has enabled the mechanics of protein transport to be characterised in bacteria, Giardia, trypanosomes and other microbes. This research has provided a significant understanding of how molecular machines evolved.

Dr John Oakeshott
Chief Scientist, CSIRO Entomology

John Oakeshott is an outstanding evolutionary biologist who has provided important new insights into the molecular basis of adaptation through his multidisciplinary studies on *Drosophila*; the molecular basis of insecticide resistance in blowflies; and the degradation of persistent organic pollutants by bacteria. John has gained international recognition for his work and has applied his research to practical problems that led for instance to the international commercialisation of a novel enzyme-based pesticide bioremediation technology.

Professor Scott O'Neill
Professor and Head,
School of Biological Sciences,
University of Queensland

Scott O'Neill is internationally recognised for his contributions to the field of insect symbiosis. He has shown that symbiotic bacterial infection of insects is ubiquitous and can generate major effects on the insect's reproductive physiology, developmental biology and ecology. He has revealed how insect symbionts exert their effects and the consequences for infected hosts. An applied focus of his work has been the use of insect symbiont systems to establish innovative approaches to control insect transmitted diseases of humans such as dengue fever.

Dr John O'Sullivan
Digital Systems Engineer,
Australia Telescope National Facility,
CSIRO Astronomy and Space Science

John O'Sullivan has made pioneering contributions to the field of digital signal processing relating to the application of Fourier transforms in the telecommunications, electro-acoustic and radioastronomy fields. He is more generally known as the primary inventor of a FFT chip that led to Lake Technologies and the technology that led to the 802.11a/g wireless LAN, where he solved problems considered intractable by the major global companies. John has a worldwide reputation for his significant contributions in radioastronomy.

Professor Michael Parker
ARC Federation Fellow and Associate
Director, Biota Structural Biology
Laboratory, St Vincent's Institute

Michael Parker has an international reputation in protein crystallography that derives from his outstanding research on the structures of membrane-associated proteins, especially pore-forming toxins and cytokine receptors, and of detoxifying enzymes such as the glutathione-S-transferases. His research on molecular structures has in all cases led to new insights into the biology of the system, and in some cases opened the way to pursue the discovery of new medicines for infectious disease, cancer, and Alzheimer's disease.

Professor Steven Praver
Professor of Physics, School of Physics,
University of Melbourne

Steven Praver is Australia's foremost authority on the physics of diamond and

related materials. His work has brought him international recognition and positioned Australia at the forefront in the field and the development of applications. In particular, he has pioneered the production of a new generation of nanoscale quantum devices based on diamond. His recent results are finding application in single photon sources for quantum cryptography for secure communications and in diamond-based devices for quantum computers.

Professor Robert Pressey
Professor, ARC Centre of Excellence for
Coral Reef Studies, James Cook University

Robert Pressey is recognised internationally for establishing the field of systematic conservation planning and continues to be one of its leading innovators. He led a worldwide shift towards practical applications, facilitated by his unique combination of scientific leadership and agency experience. His scientific contributions include new concepts and techniques that have increased the effectiveness of conservation planning across the world; innovations relating to the dynamics of biodiversity and human activities; and groundbreaking, intuitive software tools.

Professor Roger Reddel
Sir Lorimer Dods Professor and Director,
Children's Medical Research Institute

Roger Reddel has made major contributions to the understanding of cellular immortalisation: a hallmark of cancer and potential target for novel anti-cancer therapeutics. He is known worldwide for discoveries regarding the role of the tumour suppressor proteins in immortalisation, and for studies of telomerase. He is best known for discovering the alternative lengthening of telomeres (ALT) mechanism in human cell lines and tumours, and for a substantial body of work analysing its mechanism and significance in cancer.

Professor Jeffrey Reimers
ARC Professorial Fellow,
School of Chemistry, University of Sydney

Jeffrey Reimers is a theoretical chemist of great ability and originality, whose work receives wide international recognition. His work is almost unparalleled in its breadth and depth of the elucidation of electronic and vibrational structure of complex materials. His research covers such fields as fundamental chemical interactions; mutagenesis effects in

proteins; understanding single molecule devices: in-depth interpretation of photosynthesis; and organic solar cells. His work is underpinned by an ability to devise computational methods of great power.

Professor Elaine Sadler
ARC Professorial Fellow, School of Physics,
University of Sydney

Elaine Sadler is a world leader in the fields of astrophysics and galaxy evolution. Her fundamental contributions include the discovery that most bright elliptical galaxies have a weak central radio source powered by black hole accretion, and the first measurement of the cosmic evolution of low-power radio galaxies over the past 5 to 6 billion years. Her identification of a supernova which collapsed to a black hole rather than a neutron star is a groundbreaking contribution to the field of high-energy astrophysics.

Professor Peter Visscher
Professor and Head,
Queensland Statistical Genetics,
Genetics and Population Health,
Queensland Institute of Medical Research

Peter Visscher is a leading complex trait geneticist, who has made seminal contributions to quantitative and population genetic theory: with applications in medicine, evolutionary biology and agriculture. He has established a worldwide reputation for his research that includes the development of bioinformatics algorithms for gene mapping, and the use of genetic markers to obtain unbiased estimates of heritability. His developments include new methods on population dynamics and statistical methods for genetic risk prediction.

Professor Raymond Volkas
Professor of Physics, School of Physics,
University of Melbourne

Raymond Volkas has made seminal contributions to theoretical particle physics, early-universe cosmology and high-energy astrophysics. He is known internationally for a number of important achievements that include the invention of the mirror-matter model and its application to neutrino physics and the dark matter problem; studies in the persistence of quantal coherence despite strong system-environment coupling; a novel symmetry-breaking mechanism for brane-world models; and pioneering studies on neutrino emission from the galactic centre. ■

News from national committees

Chemistry

The National Committee for Chemistry met at Ian Potter House on 11 May. The committee discussed a number of issues including the International Union of Pure and Applied Chemistry, the national science curriculum, anomalies identified with the ERA Journal Ranking System and activities for the International Year of Chemistry in 2011. For further information go to www.chemistry2011.org/.

Data in science

The National Committee for Data in Science (NCDS) met at Ian Potter House on 31 March. Dr Ben Searle of the Office of Spatial Data Management briefed the committee on the Government 2.0 Taskforce final report. Input into the Australian Government Data Centre Strategy 2010–2015 was discussed, and Dr Ross Wilkinson updated the committee on activities of the Australian National Data Service.

The committee intends to produce a national state-of-play report on data management in science. This report will include recommended guidelines for policies and investments in scientific data management infrastructure in Australia. Interviews with key scientists concerned with data management within different scientific disciplines will be conducted, with national committee chairs being approached to nominate interviewees.

The voting delegates for the 2010 general assembly of the Committee on Data for Science and Technology to be held from 24 to 27 October in Cape Town are Dr Rhys Francis (chair of the NCDS) and Dr Ray Norris.

Earth system science

The National Committee for Earth System Science met on 28 April at CSIRO's Pye Laboratory at Black Mountain in Canberra. The major item discussed was the incorporation of comments on the post reference group workshop draft of the Decadal Strategic Plan for Earth System Science 2010–2020. For the first step towards implementation of the plan, the committee will hold the first Australian Earth System Outlook Conference at the Academy in December 2010.

A letter has been sent from the chair Dr Roger Gifford to Professor Margaret Sheil, CEO of the Australian Research Council, highlighting errors and anomalies identified with the ERA Journal Ranking System



(L to R) Mat Trinca, Luke Keogh and John Passioura

which would have a detrimental effect on atmospheric and oceanic science.

Identification of delegates to the general assembly and nominees for the executive of the Scientific Committee on Oceanic Research were also on the agenda.

History and philosophy of science

The National Museum of Australia Student Prize for History of Australian Science or Environmental Science has been awarded to Luke Keogh for his entry *Duboisia Pituri: A Natural History*. Luke was presented with his certificate and prize by Professor John Passioura FAA and Mr Mathew Trinca of the National Museum during the event entitled An Evening of Environmental History held at the Australian National University.

Mathematical sciences

The National Committee for Mathematical Sciences held a meeting at the Mathematics and Statistics Department of the University of Melbourne on 16 February. A major item for discussion was the National Strategy for Mathematical Sciences in Australia, and encouraging the implementation of the strategy. The Group of Eight's *Review of Education in Mathematics, Data Science and Quantitative Disciplines* was also discussed.

The general assembly and international congress of the International Mathematical Union will be held in Hyderabad in India during August 2010. Australia's delegates will be Professor Tony Dooley,

Professor Nalini Joshi FAA and Professor Brendan McKay FAA. The reformation of a national committee for the International Commission on Mathematical Instruction was also on the agenda for discussion.

Medicine

The National Committee for Medicine met at the Baker IDI Heart and Diabetes Institute in Melbourne on 30 April. This meeting was attended by Hon Mark Butler MP, Parliamentary Secretary for Health, and Professor Warwick Anderson, CEO of the National Health and Medical Research Council (NHMRC). The main topics discussed by the committee were indigenous health, NHMRC grants and the health and hospital reforms.

Nutrition

The National Committee for Nutrition held a teleconference on 16 February. The main topics of the meeting were continued planning for a workshop, Agriculture, Food and Nutrition – Health and Sustainability, to be held in Adelaide in late 2010, monitoring of iodine levels in the population, anomalies identified with the ERA Journal Ranking System and the emerging issue in Australia of vitamin D deficiency.

Plant and animal sciences

The National Committee for Plant and Animal Sciences met in the Shine Dome on 26 February. Professor John Buckeridge, immediate past-president of the



Photo: Jeanette Mill

National Committee for Space Science

International Union of Biological Sciences (IUBS) attended to discuss ways in which the committee's interactions with the IUBS could be improved. Also discussed were the Productivity Commission's inquiry into rural research and development corporations and future activities.

Space science

The National Committee for Space Science (NCSS) met on 16 April at the School of Physics at the University of Sydney. The finalisation of the *Decadal Plan for Australian Space Science: Building a National Presence in Space* was discussed. As a flow-on from the process, chairs of national committees, task forces and scientific organisations relevant to space science were invited to attend the meeting to provide reports and discuss matters in their respective sub-disciplines. Members of the committee also reported on national space science activities.

Plans are underway for the 10th Australian Space Science Conference, to be held at the University of Queensland in Brisbane from 27 to 30 September 2010.

Professor Iver Cairns, chair of the NCSS, will be the voting delegate at the Scientific Assembly of the Committee on Space Research in Bremen, Germany, from 18 to 25 July 2010. Professor Bob Vincent FAA, president of the Scientific Committee on Solar-Terrestrial Physics, reported that the next scientific assembly will be in Berlin, Germany, from 12 to 16 July, and that

Professor Brian Fraser will be the voting delegate. Professor Cairns reported on his attendance at the scientific assembly of the International Association of Geomagnetism and Aeronomy in Sopron, Hungary, in August 2009.

60th Meeting of Nobel Laureates in Lindau

The Academy is supporting the attendance of 14 of Australia's brightest young scientists to the 60th Meeting of Nobel Laureates in Lindau, Germany from 27 June to 2 July. The 2010 meeting is multi-disciplinary, being dedicated to physics, chemistry, medicine and physiology. Meetings of Nobel laureates are held every year and are an opportunity for young scientists from around the world to meet with their peers and Nobel laureates from their discipline. For more information on the Lindau meetings please visit www.lindau-nobel.de/WebHome.AxCMS.

The Lindau attendees were also invited to attend the Academy's annual meeting *Science at the Shine Dome*, where they participated in the early-career researcher program. A briefing was also held for attendees to meet each other and delegation leader, Professor Kurt Lambeck FAA. Also in attendance at the briefing were past delegation leaders Professor Ron Ekers FAA, Professor Philip Kuchel FAA and Professor Bob Williamson FAA, who provided insights on the Lindau meeting. ■

AWARDS FOR SCIENTIFIC EXCELLENCE OPEN

Nominations for the Academy's 2011 Honorary Awards for early-career and career researchers are now invited for the following:

Early-career awards

- **Anton Hales Medal** (Earth sciences)
- **Dorothy Hill Award** (Earth sciences, reef sciences, marine geology and taxonomy)
- **Fenner Medal** (biology, excluding biomedical sciences)
- **Gottschalk Medal** (medical sciences)
- **Christopher Heyde Medal** (mathematical sciences)
- **Le Fèvre Memorial Prize** (chemistry)
- **Moran Medal** (statistics)
- **Pawsey Medal** (physics)
- **Ruth Stephens Gani Medal** (human genetics including clinical, molecular, population and epidemiological genetics and cytogenetics)

Career awards

- **David Craig Medal** (chemistry)
- **Hannan Medal** (applied mathematics and computational mathematics)
- **Jaeger Medal** (Earth sciences)
- **Thomas Ranken Lyle Medal** (mathematics or physics)
- **2012 Macfarlane Burnet Medal and Lecture** (biological sciences – nominations from Academy Fellows only)

Nominations close 30 July 2010.

Information and nomination forms are available from www.science.org.au/awards

New councillors



Professor Jenny Graves is the new Secretary for Education and Public Awareness. Jenny was selected as the 2006 laureate for the Asia-Pacific region L'Oréal–UNESCO Award For Women in Science, is a Research Director at the ARC Centre for Kangaroo Genomics, and head of the Comparative Genomics Research Centre at the Australian National University. She is known for her work in mammalian genetics and comparative genomics on Australian marsupials and monotremes.



Professor Andrew Holmes, the new Foreign Secretary, is a Laureate Professor of the School of Chemistry at the University of Melbourne. In October, 2004 he was appointed ARC Federation Fellow and inaugural VESKI Fellow at the Bio21 Institute at the University of Melbourne and at CSIRO Molecular and Health Technologies. Andrew is interested in the synthesis of all kinds of compounds, from those used to probe signalling processes in cells to polymeric light-emitting diodes with potential applications in many fields.



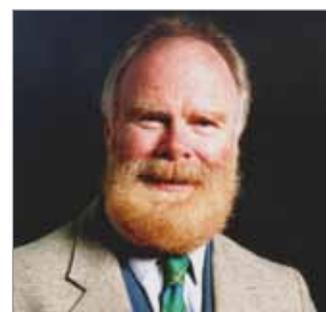
Professor Chennupati Jagadish is a new member in the physical sciences. He is an ARC Federation Fellow and Distinguished Professor in the Department of Electronic Materials Engineering at the Australian National University. Jagadish was born and educated in India and worked in India and Canada, prior to moving to Australia in 1990. His research interests include quantum dots, nanowires, quantum dot lasers, quantum dot photodetectors, quantum dot photonic integrated circuits and photonic crystals.



Professor Yiu-Wing Mai is a new member in the physical sciences. He is University Chair, Professor in Mechanical Engineering and Director of the Centre for Advanced Materials Technology at the University of Sydney. Yiu-Wing has a PhD and DSc from the University of Hong Kong and a DEng from the University of Sydney. His research interests include material science and the development of nanomaterials and nanocomposite materials to improve their mechanical strength and properties.



Professor Mark von Itzstein is a new member in the physical sciences. He has a background in organic chemistry, biochemistry and life sciences, and is an ARC Federation Fellow and Director of the Institute for Glycomics at Griffith University. Mark led a research group at Melbourne University which used computer modelling to develop anti-flu drugs based on the crystal structure of a surface protein of the flu virus. For this work he was awarded the 1996 Australia Prize.



Professor Richard Hobbs is a new member in the biological sciences who is an ecologist with experience in Australia, UK, Europe and US. He is an Australian Professorial Fellow at the School of Plant Biology in the University of Western Australia. Richard's interests are in vegetation dynamics and management, invasive species, ecosystem restoration, conservation biology and landscape ecology. His current research focuses on setting and achieving realistic restoration goals in a rapidly changing world. ■

A big, bold, simple concept book launch

The book *A big, bold, simple concept*, written to celebrate the 50th anniversary of the construction of the Academy's dome, was launched by architect Roger Pegrum at the Shine Dome on Tuesday 27 April. Other speakers included Professor Kurt Lambeck and Dr Alan Roberts, author of the book.

In 2008 the Academy asked historian Alan Roberts to write about the design, construction and history of the dome. Alan's extensive research revealed previously unknown or forgotten information about the dome from numerous archival collections. Features of the dome's architecture from its conception to construction and renovation are all shown in the book, providing insight into a remarkable building and the people who brought it to life.

The audio from the book launch is available from www.science.org.au/events/lectures-and-speeches/dome-book-launch.html. Copies of the book can be ordered from www.science.org.au/publications/history-and-biographies.html or by contacting the Publications Manager on 02 6201 9415. ■



Photo: © Irene Dowdy

(L-R) Architect Roger Pegrum, author Alan Roberts and Kurt Lambeck

Visit to Australia by Lord Martin Rees

Lord Martin Rees, president of the Royal Society in the UK, visited the Academy from 24 to 26 March, as part of his trip to Australia. He met with members of the Academy of Science Council, delivered a public lecture to a 260-strong audience at the Shine Dome, dined with Academy and Royal Society Fellows, and promoted science through a range of media interviews.

His lecture explored the challenges arising from the demands of the next 50 years, including population growth, climate change and space exploration. By 2050 world population is predicted to be two billion more than it is today. This rise, predominantly in the developing world, will engender major geopolitical shifts and tensions. He said that unless new and appropriate technologies are urgently adopted, rising demands for energy, food and water could irreversibly degrade the Earth's biosphere.

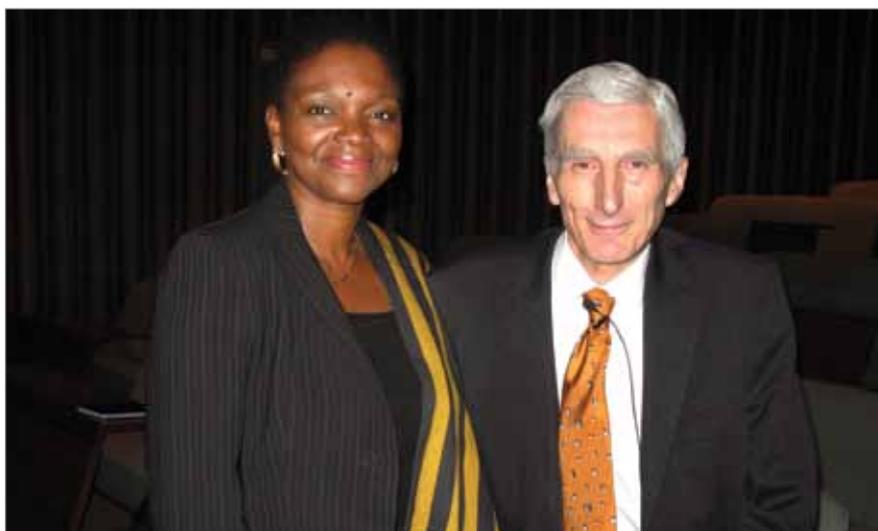


Photo: Cecily Oakley

British High Commissioner the Rt Hon Baroness Valerie Amos with Martin Rees

By mid-century, scientific understanding will have been greatly enhanced: science is the one truly global culture. He said that individuals will be increasingly empowered by technology that potentially offers huge benefits to the developing and the developed world. But these same advances

will pose novel ethical dilemmas, and render our ever more interconnected world vulnerable to new and disruptive threats.

The audio and transcript from the lecture *Challenges for the next 50 years* is available from www.science.org.au/events/lectures-and-speeches/rees.html ■

Nova: Science in the news

The following two topics have been posted on the Academy's education website, *Nova: Science in the news* (www.science.org.au/nova):

Dirty, rotten swine flu – and how to beat it

A potentially dangerous new flu has arrived, closely pursued by a new vaccine.

On 11 June 2009 the World Health Organisation declared that the 2009 influenza A (H1N1) virus, better known as swine flu, had become a pandemic. A new virus was stalking the globe, with huge potential consequences for the world's population.

Some people have called it a false alarm, but swine flu is not to be sneezed at. It is new, which means that few people have immunity to it, and it is highly contagious. So far the death rate seems to be comparable to 'normal' or seasonal flu; however, it is affecting younger people more. Although health authorities don't have the full picture yet, there are fears that the 2009 H1N1 virus will change into something more deadly. Since most people have low immunity to it, a more virulent form of the virus could be disastrous.

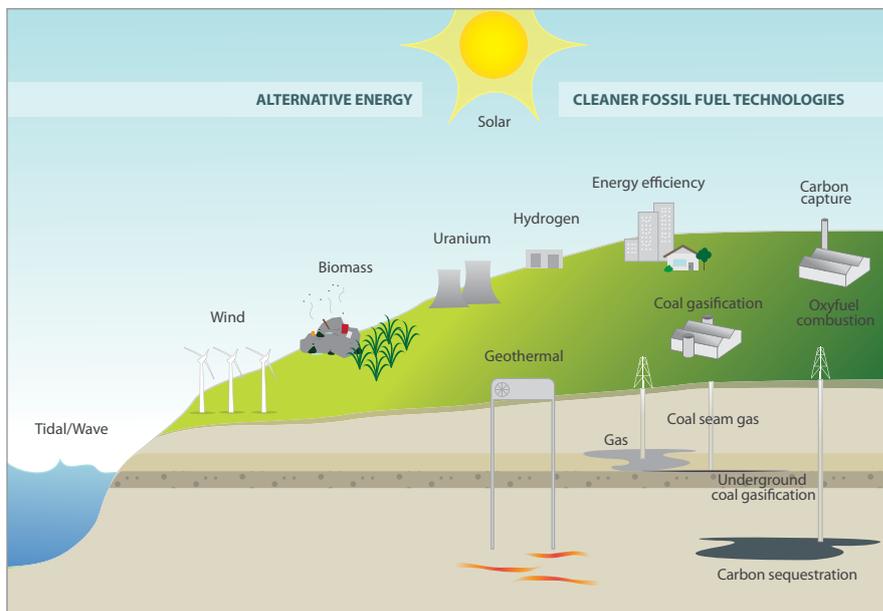
But pandemic need not equate to pandemonium or panic. Today's global travel might help diseases to spread with frightening speed, but our defences are better. Effective antiviral medicines, for example, are widely available today. Even more importantly, we have developed the ability to produce vaccines on a large scale to fight new viruses.

The making of a vaccine

Vaccines introduce weakened or killed microorganisms – such as viruses – into the body to stimulate the body's immune system to produce antibodies against them.

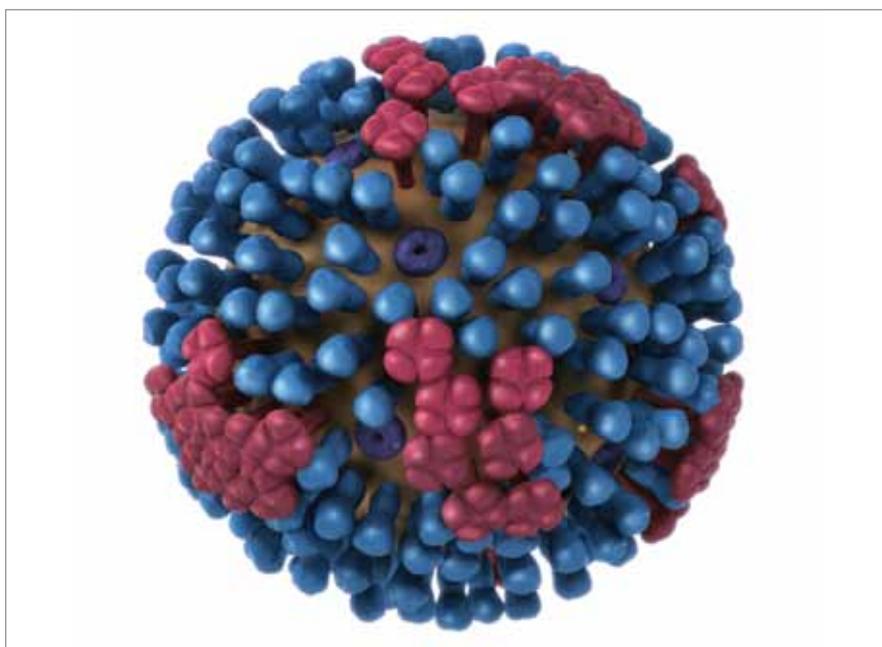
The most common technique for growing virus for a flu vaccine is more than 50 years old and can be traced to Sir Frank Macfarlane Burnet, one of Australia's most distinguished scientists. In the 1930s, Macfarlane Burnet pioneered the use of hens' eggs to grow and study viruses. These days hens' eggs are used to modify viruses to make them suitable for use in vaccines, as well as to scale up production of the final vaccine virus.

In Australia, CSL Limited has used this method to make millions of doses of a swine flu vaccine to be made available to



Low emission fossil fuel technologies and alternative energy sources will help reduce Australia's emissions from energy production

Image: Stephanie Kafkaris



Flu vaccines stimulate the body to produce antibodies against molecules on the surface of the virus

Image: Centres for Disease Control and Prevention

all Australians. One egg produces enough virus for around one shot of the vaccine, so to make enough vaccine for every Australian requires many millions of eggs.

This process of vaccine development and production although effective, has been described by some as old-fashioned and slow. Research is under way to develop faster, easier techniques. There is also hope that, eventually, a 'universal' flu vaccine will be developed.

This topic is sponsored by CSL Limited (www.csl.com.au).

Australia's low emission energy future

The Australian Government wants to reduce greenhouse gas emissions by at least five per cent of 2000 levels by the year 2020. But with a growing population, increasing energy requirements, and a past reliance on cheap energy sources how could this be achieved?

Like many countries, Australia is facing a dilemma in meeting its commitment to control greenhouse gas emissions beyond the Kyoto protocol. The Australian population is expected to swell from the

Interviews with Australian scientists

present figure of 21 million to around 35 million by 2056, and demand for energy is surging with it. So, how are we going to achieve the goal of a low emission, cost-effective energy future?

Well, there are four main strategies Australia could adopt, which involve:

1. developing the use of low emission fossil fuel technologies;
2. encouraging the use of low-emission sources of energy such as solar, wind and geothermal power;
3. improving the energy efficiency of Australian households and businesses, and;
4. placing a price on carbon through an emissions trading scheme.

Reducing emissions from fossil fuels

Around 94 per cent of Australia's energy requirements come from burning fossil fuels such as coal, oil and natural gas.

Although burning fossil fuels releases greenhouse gases, Australia is likely to continue relying on them for energy, at least in some capacity, because of their availability and relatively low cost. Developing low emission fossil fuel technologies is seen as one way to lower emissions, while still using our abundant fossil fuel resources. Several methods are being investigated or trialled around Australia, with the technology still developing and not yet competitive with conventional power generation.

Renewable and other low-emission energy sources

Renewable energy sources such as solar, wind, geothermal and ocean energy, currently account for only 5 per cent of Australia's total electricity. However, the government has legislated to increase this to 20 per cent by 2020. Emissions from renewables are minimal compared to fossil fuels, but their uptake has been limited by issues with cost, variability, location and the status of the technology. The technology is developing though with rapid growth in the use of some renewable sources of energy.

This topic is sponsored by the Queensland Resources Council (www.oresomerresources.com).

More information on both of these topics is available on the Academy's *Nova: Science in the news* website at www.science.org.au/nova. A glossary, student activities, further reading and annotated links to relevant websites are also available for each topic.

The Australian Foundation for Science is a supporter of *Nova*. ■



Photo: Cecily Oakley

William Blevin FAA (left) was interviewed by Neville Fletcher FAA (right) about a life's work in photometry and radiometry

The lives of Academy's Fellows are recorded for historical and educational purposes in the DVD series *Interviews with Australian scientists*. Over the last few months interviews have been conducted with Academy Fellows Professor James (Jim) Morrison, Dr William (Bill) Blevin and Professor John Newton. These interviews were generously sponsored by La Trobe University, the National Measurement Institute and the Australian National University (ANU), respectively.

In a career that tackled such diverse problems as cucumber-smelling fish, detecting forged currency and identifying flavours in wine and cheese, Professor Jim Morrison was at the cutting edge of mass spectrometry instrumentation and data analysis. Originally from Scotland, Morrison found his way to our sunny shores and a career firstly at CSIR and then at La Trobe University, where he was made emeritus professor in 1989.

Dr Bill Blevin made his career at CSIRO's National Standards Laboratory (now the National Measurement Institute) in the fields of photometry and radiometry. During his interview Blevin revealed that black cows are white in the infra-

red spectrum and that yellow gold can appear blacker than black paint in the right circumstances. As a standards scientist, Blevin was instrumental in redefining the SI unit of measurement for light intensity, the 'candela'. He moved this definition away from a biological idea of brightness to a physical measurement of power.

Nuclear physicist Professor John Newton started his scientific career developing methods for detecting enemy aircraft at the Malvern radar facility during WWII. In 1970 he moved to Australia and the ANU School of Nuclear Physics, where he was able to characterise continuum gamma-rays in heavy-ion reactions on the newly-acquired accelerator. Since retirement Newton has been a passionate advocate in the fight against global warming.

Five new interviews have been posted on the *Interviews with Australian scientists* section of the Academy's website (www.science.org.au/scientists). Interview transcripts, teachers' notes and DVDs are now available for Academy Fellows Professor David de Kretser, Dr Bruce Fraser, Professor Paul Korner, Professor George Rogers and Dr Robin Warren. ■

Chief Executive recognised as outstanding alumnus

Dr Sue Meek, Chief Executive of the Academy, was recently presented with an Outstanding Alumni award from James Cook University on the occasion of the university's 40th anniversary

celebrations. Dr Meek completed her PhD at JCU. Her doctorate on coral growth and regeneration was the first to be jointly supervised by the Australian Institute of Marine Science and JCU.

Primary Connections

Trialling of Primary Connections units in 2010

Trialling has now commenced for the first three of the next nine *Primary Connections* curriculum units. Over 400 applications were received from teachers Australia-wide who were interested in trialling a unit during 2010. Of these applications, 230 teachers have been selected, representing all states and education sectors.

These nine trial units will complete a suit of 28 units for Year K to Year 6. By mid 2011, teachers at each year level will have access to four units, one for each of the four strands: physics, biology, chemistry, and Earth and space science. The three units currently being trialled are: for Year 2 biology, *Growing and changing*; a Year 3 chemistry unit, *Runny or not*; and another biology unit for Year 6, *Life in the balance*. The units have been written to align with the draft *Australian Curriculum: Science*.

ACT curriculum leader workshop

On 15 and 16 April the ACT Department of Education and Training hosted a 2-day *Primary Connections* curriculum leader workshop. Participants rated their learning experiences highly and will begin the process of leading the implementation of

Primary Connections in their schools in Term 2. They were particularly pleased to see the alignment of the curriculum resources to the draft *Australian Curriculum: Science* and are eagerly awaiting the remaining nine units.

Unit distribution figures

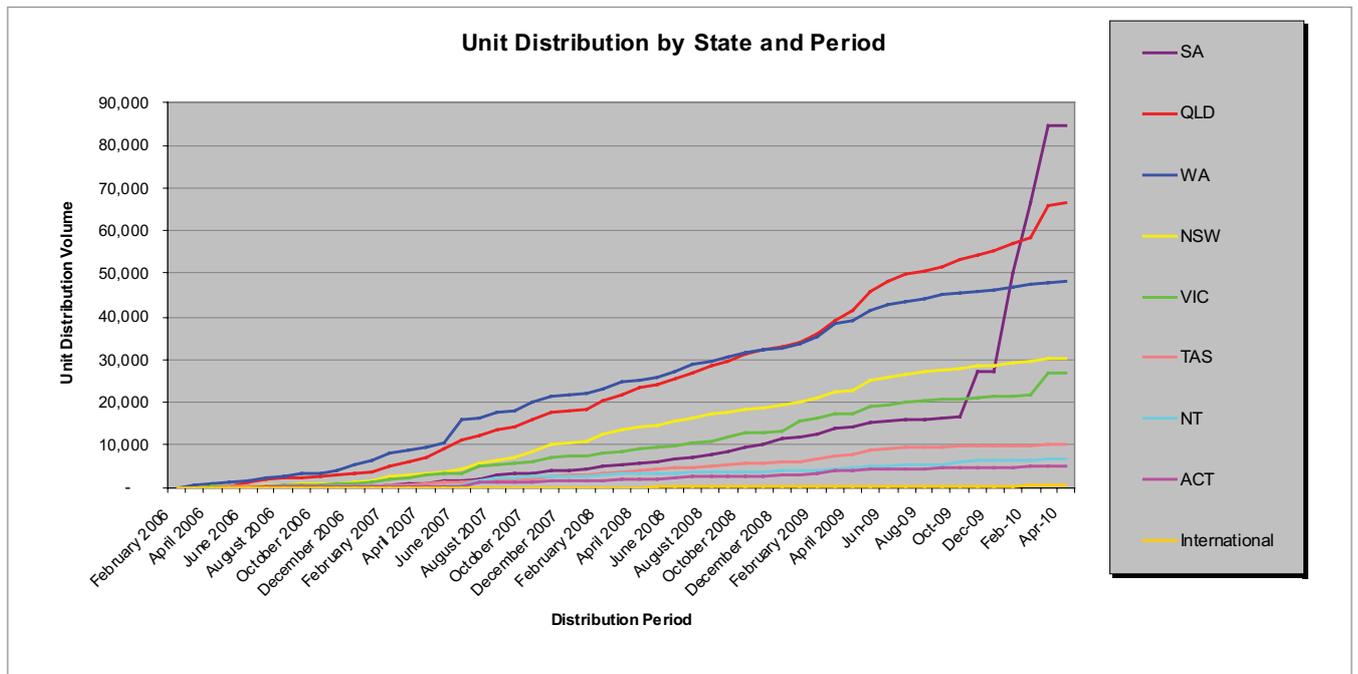
Earlier this year the South Australian Department of Education and Children's

Services purchased 58 000 units, with the intention of distributing one set of units to every government school in South Australia. Approximately 53 per cent of primary schools across Australia now have at least one unit of *Primary Connections*. This includes 59 per cent of state schools, 41 per cent of Catholic schools and 39 per cent of independent schools. ■



ACT teachers attending *Primary Connections* curriculum leader workshop

Photo: Primary Connections



Total units distributed to schools Australia wide as of April 2010 is 279,878

Science by Doing: The trial begins

The official launch of Stage 1 of *Science by Doing* and the opening of the first Science by Doing Coordinators Professional Learning Workshop took place at the Shine Dome on 7 to 9 April. Then-president Professor Kurt Lambeck welcomed guests and participants and spoke about the Academy's role in supporting science education. Deputy Secretary–Schools from the Department of Education, Employment and Workplace Relations, Dr Michelle Bruniges, officially opened the project with an address that inspired the science educators in attendance. She said the *Science by Doing* approach is 'consistent with ... much of the professional learning in high-achieving countries which focuses on developing reflective professional learning communities, whole school or faculty approaches and peer support for teachers entering the profession.'

The intention of the workshop was to assist science coordinators to develop a professional learning plan-of-action for their school, supported by the *Science by Doing* team and resources. The action plans are intended to:

- establish and support a professional learning community within the science department which is clearly focused on improving student learning; and
- engage students through an inquiry-based approach.

Teachers enjoyed opportunities to work together in groups and to build networks with a common purpose. Some of the comments from teachers about the workshop were:

'Excellent to discuss the professional learning community concept and become part of one beyond my workplace.'

'The workshop has given me a valuable framework to work with my staff and move the department further down the road to the inquiry-based model.'

Feedback about the resources indicated that they are easy to use and written in

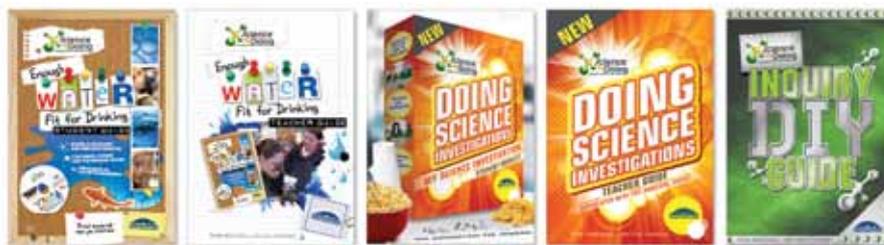


Photo: Science by Doing

An inquiry lesson in a high school

straightforward language, with the resources for professional development being particularly useful. The enthusiasm expressed by the science coordinators for *Science by Doing* was due to their recognition of the unique features of the project:

- the focus on student learning and engagement in science;
- an inquiry-based approach is good pedagogy, allowing students to find answers to interesting questions about science phenomena and their world;
- the approach to professional learning recognises that teachers make the difference. It ascribes responsibility for professional learning to teachers and provides them with quality resources to

support their learning; and

- the curriculum resources are based on the draft *Australian Curriculum: Science* and provide a model of quality teaching and learning in an exciting way which will engage students.

Between May and September in 2010, schools will trial both the professional learning and the curriculum resources with the support of members of the *Science by Doing* team. Extensive feedback on all the materials will be gathered from teachers. Already the *Science by Doing* team are receiving a warm welcome in schools and the professional learning resources are being utilised well beyond the walls of the science departments. ■

TRAVELLING FELLOWSHIP AND RESEARCH CONFERENCE FUNDING OPEN

The Academy is calling for nominations for the 2011 Selby Fellowship in all fields of science. Closing date is 31 August 2010. Further information is available from www.science.org.au/awards/awards/selby.html

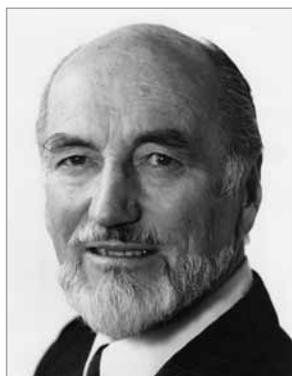
Expressions of intent to hold a 2011/12 conference are also invited for the following:

- Boden Research Conferences in the biological sciences
- Elizabeth and Frederick White Conferences in the physical sciences
- Fenner Conferences on the Environment

Closing date is 31 August. Further information is available from www.science.org.au/awards/research-conferences.html

Obituaries

Phil Law



Phillip Garth Law was born in Talangatta, Victoria on 21 April 1912 and died in Melbourne on 28 February 2010. After finishing school he taught in secondary schools, including Geelong and Melbourne, while studying part time at the University of Melbourne (MSc 1941).

From 1943 to 1948 he lectured in physics at the University of Melbourne. He made his first trip to Antarctica during the summer of 1947–48 as a senior research officer on ANARE (Australian National

Antarctic Research Expeditions). In 1949 he became a Director, Antarctic Division, Department of External Affairs, a position he held until 1966. During these years he continued his trips to Antarctica as ANARE leader, establishing bases in Mawson, Davis and Casey. He also led expeditions that explored more than 5,000 km of coastline and 1,000,000 sq km of territory. In all he made 28 trips to Antarctica and continued his involvement by chairing the Australian National Committee on Antarctic Research from 1966 to 1980.

From 1966 to 1977 he held the position of Vice-president, Victoria Institute of Colleges. During his tenure 16 colleges were upgraded from diploma to degree and higher degree level, seven new campuses were built and two new colleges, the Lincoln Institute of Health Sciences and the Victorian College of the Arts, were established.

Phil's service to science also included his roles as president of the Royal Society of Victoria 1967–69, president of the Victorian Institute of Marine Sciences 1977–80, and Assistant Secretary and later Acting Secretary, Optical Munitions Panel.

Among the large number of honours

and awards given to him were a CBE in 1961, an AO in 1975 and an AC in 1995. He was a foundation fellow of the Australian Academy of Technological Sciences and Engineering 1975 and elected as a fellow of the Australian Academy of Science 1978. Other awards were the Clive Lord Memorial Medal, Royal Society of Tasmania 1958, Founder's Gold Medal, Royal Geographical Society of London 1960, John Lewis Gold Medal, Royal Geographical Society of Australia 1962, James Cook Medal, Royal Society of New South Wales 1988, Gold Medal, Australian Geographic Society 1988, Foundation Fellow, Royal Society of Victoria 1995 and Clunies Ross National Award for Lifetime Contribution to Science and Technology, 2001.

Phil was an excellent all round sportsman with a boxing Blue from the University of Melbourne. He was also keenly interested in music, learning piccolo, drums and clarinet at high school. In 2004 he provided \$50,000 to the Victorian College of the Arts for the annual Dr Phillip Law Music Scholarship for a student of improvisation in music.

In 1941 Phil married Nel Allan, who predeceased him.

Ben Gascoigne



Sidney Charles Bartholomew (Ben) Gascoigne was born in Napier, New Zealand on 11 November 1915 and died in Canberra on 25 March 2010. He was educated at Auckland University College (MSc 1937) and the University of Bristol (PhD 1941).

He returned to New Zealand in 1940 to work on optical munitions for DSIR before moving to Australia a year later to join the Commonwealth Solar Observatory as a Research Fellow, continuing his work on optical munitions. In 1946 he became a

senior scientific officer at the Observatory and in 1951 a principal scientific officer. In 1957, when the observatory became part of the Australian National University, Ben became a Reader in the Department of Astronomy and in 1964 he took up a personal chair in the department. He was also Assistant Director, Research from 1960 to 1967. On his retirement in 1980 he had the title of emeritus professor conferred on him.

Ben made a significant contribution to astronomy through his work on establishing the distance from Earth to the Magellanic Cloud dwarf galaxies. He was an excellent designer and technician, creating an optical corrector plate that allowed wide field photography with telescopes previously unsuited to the task. When the British and Australian governments agreed to jointly build a large telescope, the Anglo-Australian Telescope, at Siding Spring, he became a member of the technical committee advising on its design and construction, was its commissioning astronomer, and took the telescope's first photograph.

His service to international astronomy included a six year term as president of

the International Astronomical Union Sub-Commission on the Magellanic Clouds.

Ben was the recipient of a number of awards. He was elected to the Fellowship of the Australian Academy of Science in 1966, was the first Australian to be elected as an Associate of the Royal Astronomical Society in 1979, was the first elected Honorary Member of the Optical Society of Australia in 1985 and made an Honorary Fellow of the Astronomical Society of Australia in 1986. Other awards included Officer of the Order of Australia in 1996, Distinguished Alumni Award, University of Auckland in 2002 and Centenary of Federation Medal from the Australian government in 2003.

After Ben's retirement he helped his wife Rosalie in her blossoming artistic career, learning to weld so that he could make her assemblages more secure and also cataloguing and curating her extensive works. Rosalie died in 1999 and Ben is survived by his children Martin, Toss and Hester and their families.

Athel Beckwith



Athelstan Laurence Johnson Beckwith was born in Perth, Western Australia on 20 February 1930 and died in a car accident in Canberra on 15 May 2010. He was educated at the Universities of Western Australia (BSc 1952) and Oxford (DPhil 1956), working as

a temporary lecturer at the University of Adelaide from 1953–54.

In 1957 he took up a position as research officer at CSIRO, moving to the University of Adelaide in 1958 as a lecturer in organic chemistry. He was promoted to senior lecturer in 1962 and reader in 1964. In 1965 he became professor and head of the Department of Chemistry and held this position until he moved to the Australian National University in 1981 as professor of organic chemistry, from where he retired in 1995 with the title of emeritus professor.

After retirement Athel continued his research as a visiting fellow in the Research School of Chemistry. His group was primarily concerned with the kinetics, mechanisms, synthetic utility, and biological significance of free radical reactions. This led them over a wide range of chemistry from the study of radical structure by computer modelling and electron spin resonance spectroscopy to the synthesis of natural products by biomimetic reactions.

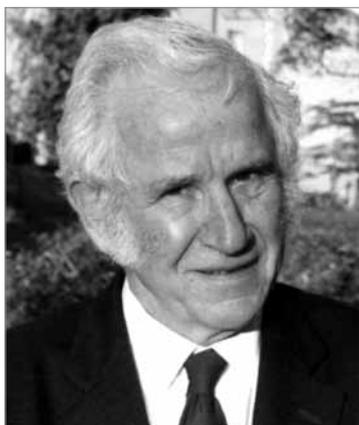
Athel received a number of honours and awards, including election to the Australian Academy of Science in 1974 and to the Royal Society in 1989. In 2004 he became an Officer of the Order of Australia (AO). He also received a Centenary Medal from the Royal Society of Chemistry in 1993 and the Australian Government in 2003.

However, the largest number of awards he received was from the Royal Australian Chemical Institute: the Rennie Medal (1960), H G Smith Memorial Medal (1981), the Organic Chemistry Medal (1992) and the Leighton Memorial Medal (1997). In 1996 he was made a Fellow of the Institute.

Service to the Academy included two terms on the Council, first from 1983 to 1986 (vice-president 1985–1986) and second from 1997 to 2001, when he was the Academy's treasurer.

Athel, an accomplished pianist and clarinettist, married Kaye Marshall in 1953. She survives him, together with their children Claire, Cathy and Paul and their families.

Wes Whitten



Wesley Kingston (Wes) Whitten was born in Macksville NSW on 1 August 1918 and died in Canberra on 24 May 2010. He was educated at the University of Sydney (BVSc (hons) 1939, BSc 1941 and DSc 1962).

From 1940–41 he was Fellow in Veterinary Science at the Walter and Eliza Hall Institute in Melbourne. He served in the Australian Army from 1941–45, first as Captain in the Veterinary Corps and subsequently as Officer-in-Charge of the Land Headquarters Food Laboratory.

In 1946 Wes joined CSIRO, where he studied the effects of nutrition on the reproductive fertility of sheep. In late 1949, he joined the then new Australian National

University (ANU) as Officer in Charge of Animal Breeding at the John Curtin School of Medical Research.

While at the ANU he discovered the synchronisation of the oestrus cycle of female mice exposed to the pheromones in male mouse urine - this is still known as the 'Whitten Effect'. He also developed the 'Whitten Medium' which facilitated culturing of mammalian eggs and developing embryos. The medium was a major breakthrough in understandings of oocyte maturation, fertilisation and embryo development and is still used worldwide.

In 1961 he took up a position as Assistant Director (Endocrine Products) at the National Biological Standards Laboratory in Canberra. In 1966 he moved to the US to the Jackson Laboratory, a leading institute for animal breeding, physiology and cancer research in mice, as a Senior Staff Scientist and later Associate Director. While there he developed techniques for freezing and transferring embryos and worked on chimaeric mice. His ground-breaking research in embryology, reproductive physiology and endocrinology and animal contraception was the forerunner of infertility treatment in humans.

Wes returned to Australia after retirement in 1980 and continued his research in a number of honorary positions.

He was an obvious choice for the Working Party established in 1988 to advise the Health Minister on cloning following the birth of 'Dolly' the sheep. He was also a stalwart advocate for Tall Girls Inc and sufferers of CJD and their families.

In 1982 Wes was elected as a Fellow of the Australian Academy of Science. Other awards included the prestigious Marshall Medal from the Society for the Study of Fertility (1993), the Pioneer Award of the International Society for Embryo Transfer (1996) and an honorary doctorate from Memorial University of Newfoundland for his work in reproductive physiology (2001). In 2009, in recognition of his contribution to ANU and to science, the ANU named their new purpose built world class animal breeding facility the 'Wes Whitten Building'.

Throughout his life Wes enjoyed the outdoors and the wonders of nature.

Wes married Enid Elsbeth Cay Meredith (Beth) in December 1941 and had four children (Gregory, Mark, Jane and Penelope). Beth died in 1999 and Wes married Mary Taylor, a longstanding friend and colleague, in March 2001, moving once more to the US. In 2008 he returned to Canberra to be nearer his family as his health faded.

He is survived by his four children, daughter-in-law, five grandchildren, two great grandchildren and four siblings. ■

Mining the wealth of genomic data

The 2010 symposium brought together scientists working on both genomics and mathematics, who looked at the data generated from genomic studies in a wide variety of fields including cancer research.

Professor Terry Speed FAA of the Walter and Eliza Hall Institute of Medical Research set the scene for a program that included three overseas speakers by explaining the fundamentals of the technology. The recent exponential increase in genomic data requires the co-evolution of computational, mathematical and statistical methods for its storage, analysis and interpretation. He emphasised the importance of mathematical sciences, digital processing and data storage capacities in areas such as cancer or malaria research, due to the nature and quantities of data now being collected.

Professor Susan Clark of the Garvan Institute of Medical Research continued by examining the layers of information generated from genetic and epigenetic studies. She detailed the recent findings on epigenetic gene deregulation in cancer. Professor Simon Tavaré of the Department of Oncology from the University of Cambridge, went further by outlining the experimental and mathematical underpinnings of tumour evolution, while Dr Jean Yang of the University of Sydney looked at statistical analysis in protein research.

The afternoon session began with Professor Lars Nielsen of the Australian Institute for Bioengineering and Nanotechnology who spoke on constraint-based models in the analysis of high throughput data produced by research into biological systems. Professor Sean Grimmond of the University of Queensland examined cancer genomes at single nucleotide resolution, while Professor Steven Evans of the University of California spoke on the effects of network topology on the reliability of transcriptional regulation. The symposium ended with Dr Iain Johnstone from Stanford University who compared the extremes of variation in high-dimensional data in genome-wide association studies.

Full transcripts, slides and audio files for speakers will be available from www.science.org.au/events/sats/sats2010/symposium.html ■



(L to R) Symposium conveners and speakers: Terry Speed, Simon Tavaré, Lars Nielsen, Peter Hall, Susan Clark, Iain Johnstone, Jean Yang, Steven Evans and Sean Grimmond

Photo: © Irene Dowdy



Photo: Queensland Centre for Medical Genomics, Institute for Molecular Bioscience

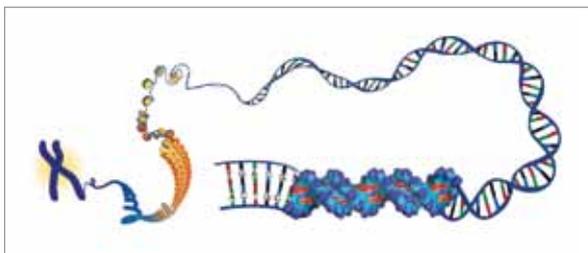


Image: Darryl Leja

Above: Automated sequencers generate an explosion of genomic data that requires analysis by mathematical methods

Left: Unpacking of chromosome showing DNA molecular topography