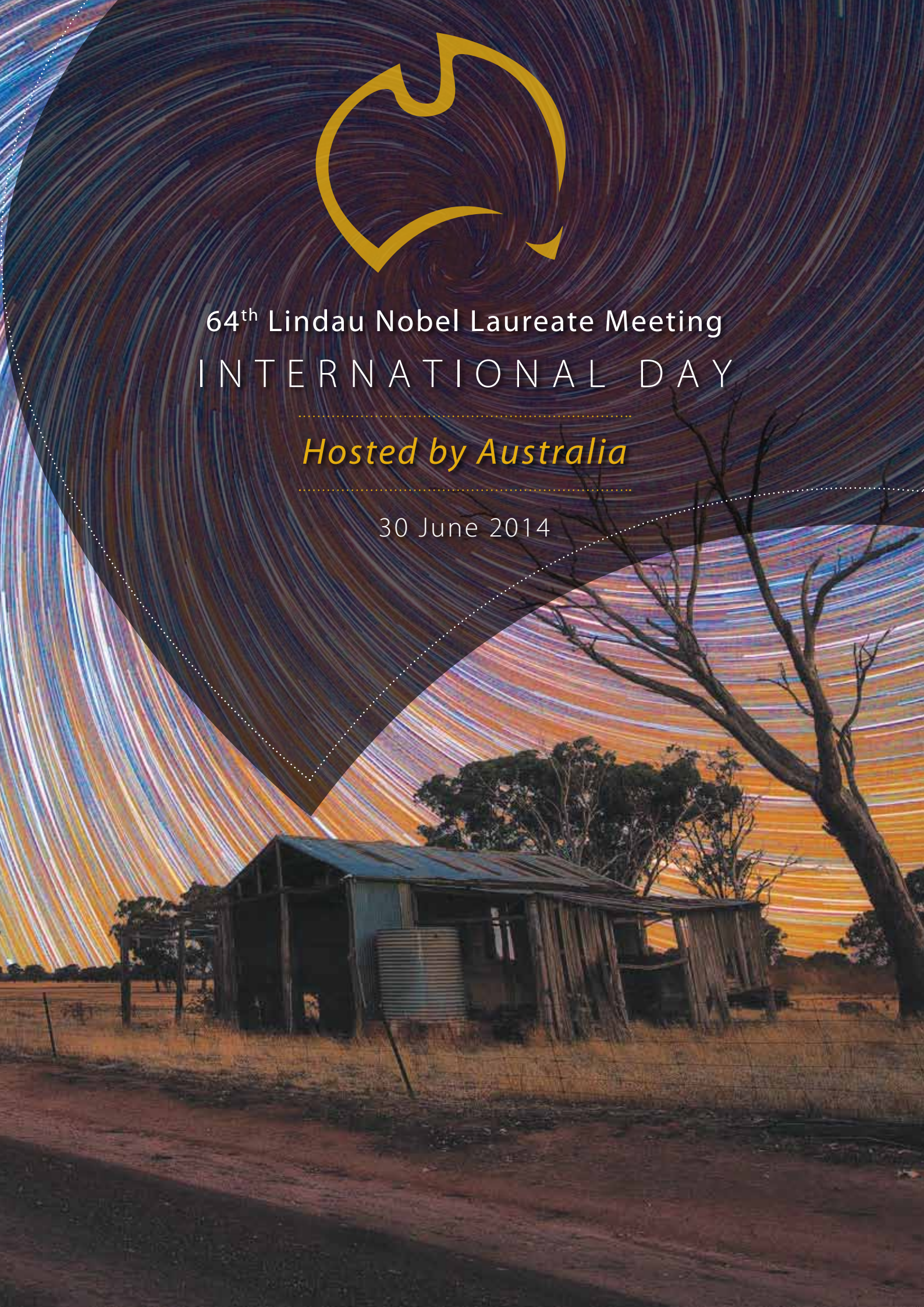




64th Lindau Nobel Laureate Meeting
INTERNATIONAL DAY

Hosted by Australia

30 June 2014



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Welcome



Dear Colleagues,

Australia is honoured to be hosting the International Day at the 64th Lindau Nobel Laureate Meeting (Physiology or Medicine) on 30 June 2014.

This event will provide an opportunity for the participants of the 2014 Lindau meeting to learn more about Australian education, science, innovation, as well as culture, food and wine.

Australia is well known for its unique biodiversity, geographic landscape, history and landmarks. The Indigenous cultures of Australia are the oldest living cultures in the world, having occupied the continent for at least 60,000 years. Our country has the largest living structure on the planet, the Great Barrier Reef, that stretches 2300 kilometres. The Sydney Opera House is one of the world's most instantly recognisable and iconic buildings.

What is perhaps less well known is that Australia is also an important participant in the global collaboration that underpins much of modern science. It has a relatively high scholarly output in science, producing more than 3.0% of world scientific publications yet counting for only about 0.3% of the world's population (23 million). Australian research also has high impact: it accounted for 4.0% of global citations in 2004 to 2008. Australia has an excellent education system, with seven Australian universities ranked in the top 100 in the world last year.

Australia is an innovative country due to the nature of its geography and isolation. Australians are responsible for inventions such as the plastic disposable syringe, the black box flight recorder, and the polymer banknote which is more robust than the paper version and is difficult to counterfeit. An Australian team of researchers developed aspects of the WiFi technology now used in over 3 billion 'smart' devices.

Australian innovators have contributed to the health and well-being of millions of people around the world. In the 1940s, Howard Florey, a scientist from Adelaide, developed a way for penicillin to be manufactured and processed so it could be used to treat infections in humans. More recently, Graeme Clark from Melbourne pioneered the development of the world's first bionic ear and, building on Harald zur Hausen's identification of the link between human papilloma virus and cervical cancer, the work of Ian Frazer in Brisbane has led to a cervical cancer vaccine. Australia has had 13 Nobel Laureates; eight in medicine, three in physics, one in chemistry and one in literature. Three of those Australian Laureates are here today. These Laureates, and all the Australian delegation, are delighted to be able to share some insights into our country's scientific achievements.

We thank the Council for the Lindau Nobel Laureate Meetings for inviting Australia to host this wonderful event, and for its outstanding support. We hope this event will Educate, Inspire and Connect everyone.

Andrew Holmes
President
Australian Academy of Science

Nobel Laureates

Australia is honoured to have produced 13 Nobel Laureates.

These Nobel Prize winners reflect Australia's strong record of innovation and scientific achievement.

The Nobel Laureates are proud examples of the great work being done by Australia's research community, whose commitment to excellence has the admiration and respect of our whole country.

Australia's Nobel Laureates

1915 Nobel Prize in Physics:	<i>William Henry Bragg and William Lawrence Bragg</i>
1945 Nobel Prize in Physiology or Medicine:	<i>Howard Walter Florey</i>
1960 Nobel Prize in Physiology or Medicine:	<i>Frank Macfarlane Burnet</i>
1963 Nobel Prize in Physiology or Medicine:	<i>John Carew Eccles</i>
1970 Nobel Prize in Physiology or Medicine:	<i>Bernard Katz</i>
1973 Nobel Prize in Literature:	<i>Patrick White</i>
1975 Nobel Prize in Chemistry:	<i>John Warcup Cornforth</i>



Elizabeth Blackburn AC FAA FRS FRSN Nobel Laureate 2009 Nobel Prize in Physiology or Medicine

In 2009 Elizabeth Blackburn became the first Australian woman to be awarded the Nobel Prize, for the discovery of how chromosomes are protected by telomeres and the enzyme telomerase. Professor Blackburn's Nobel Prize was shared with Carol Greider and Jack Szostak.

Her story began in Hobart on 26 November 1948, where both her parents, Harold and Marcia (Jack) Blackburn, were general practitioners. Blackburn developed a passion for science early, and as a young girl used to play outside collecting bugs and wanting to know how they all worked. After completing a PhD in molecular biology at Cambridge University in 1975, she did her postdoctoral research at Yale University. During this time she studied DNA structure and became curious about the ends of chromosomes, called telomeres.

In 1978 she joined the University of California at Berkeley in the department of molecular biology. Blackburn discovered that telomeres replicated in an unusual way and wanted to understand why. In the 1980s, with her student Carol Greider, she decided to hunt for the enzyme telomerase, and finally found it, on Christmas Day 1984.

Today Blackburn, along with her colleagues, is investigating the effect of stress on telomerase and also on telomeres. Recently they discovered that psychological stress may reduce telomeres and so accelerate ageing inside cells. As well as being a talented scientist, Elizabeth Blackburn is also a mother and a campaigner for recognition of women in science.



Peter Doherty AC FAA FRS Nobel Laureate *1996 Nobel Prize in Physiology or Medicine*

The year was 1973. From different corners of the globe came two scientists interested in how the body fights disease. Peter Doherty, a qualified vet from The University of Queensland, had completed a doctorate in Scotland and had returned to Australia. He had decided that he preferred to do research rather than be a practising vet. Rolf Zinkernagel, medically trained at the University of Basel in Switzerland, had just been given a scholarship to study in Australia.

Meeting in Canberra, the two men shared a lab at the John Curtin School of Medical Research, at the Australian National University. There, almost by accident, they came up with a discovery that was to change our understanding of the immune system – the body's internal defence force – and earn them the greatest scientific award of all, the Nobel Prize.

Today, medical researchers and doctors around the world regularly make use of their discovery – whether in designing vaccines, understanding AIDS and other virus diseases, or trying to unravel the mysteries of cancer.

Both scientists moved on to new research on the immune system, Peter Doherty in America (and subsequently back to Australia) and Rolf Zinkernagel back in Switzerland. But they came together again in Stockholm in December 1996 to receive the world's thanks in the form of the award from the Nobel Committee. And it all started 41 years ago in a small lab in Canberra, Australia.



Barry Marshall AC FAA FRACP FRS Nobel Laureate Robin Warren AC FAA Nobel Laureate *2005 Nobel Prize in Physiology or Medicine*

In 1979, Robin Warren, a pathologist with an interest in gastric ulcers, on the day of his birthday, noticed spiral shaped bacteria wherever he saw signs of inflammation in biopsies from patients with gastritis and ulcers. When Barry Marshall, who had recently completed his medical training, decided to find a research project, he talked to Robin Warren about his unusual observations.

Working together at the Royal Perth Hospital, over the following years their research showed that bacteria, not stress or lifestyle, caused the majority of gastric ulcers. It defied accepted wisdom that the stomach was too acidic to allow bacteria to survive, grow and cause disease. Their work was to rewrite the text books and go on to earn the greatest scientific prize of all, the Nobel Prize.

The discovery has led to a greater understanding of the link between chronic infection, inflammation and cancer. Doctors routinely treat patients world-wide who suffer from painful ulcers with a simple course of antibiotics.

Professor Warren is an Emeritus Professor at the University of Western Australia where Professor Marshall continues his research on the bacteria that causes peptic ulcer disease, *Helicobacter pylori*.

They travelled to Stockholm in December 2005 to receive the award from the Nobel Committee. And it all started as an interesting observation by Warren on his birthday.



Brian Schmidt AC FAA FRS FRSN Nobel Laureate *2011 Nobel Prize in Physics*

In 2011 – for the first time since 1915 – an Australian, Brian Schmidt, won the Nobel Prize in Physics, alongside two Americans, Adam Riess and Saul Perlmutter.

Brian, born in 1967 in Missoula, Montana, US, developed a passion for science and nature as a young boy as he collected insects with his father, a doctor of biology. At five, he knew he wanted to be a scientist, and his first choice was a meteorologist – but then he discovered astrophysics. Although he would have been happy to do astronomy for free, Brian chose to have a career in science and went to Harvard to study astronomy and physics, completing his PhD in 1993.

He moved to Australia in 1994 with his wife Jenny and began studying supernovae, explosions of tiny stars, at the Mount Stromlo Observatory near Canberra. Brian and his team, the ‘High-Z Team’, looked for the brightest objects in the Universe, including supernovae, to determine how bright they were and thus measure how fast they were moving away from our galaxy.

In 1998 Brian’s team discovered something unexpected: the expansion of the Universe was not slowing down, but accelerating, as Einstein predicted. In other words it was getting bigger at a faster and faster rate and as a result stars were moving away from us more quickly, instead of slowing down. Today, Brian Schmidt is working on a new telescope called ‘SkyMapper’ to map out the southern sky in an attempt to find large and rare objects like the first stars created in the Milky Way after the Big Bang, and the brightest and most distant supermassive black holes.

Brian Schmidt’s fascinating discovery raised new questions in the field of physics. It confirmed that 70% of the Universe was made of a mysterious source of energy called ‘dark energy’, which ripped the Universe apart and sped up its expansion. This suggested that the Universe would never end, but instead become faster and faster over time, leading to a Universe devoid of galaxies other than our own. Because of the importance of Brian’s discovery, many more scientists are now investigating his results to try to find out more about our expanding Universe.

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Australian Academy of Science

Educate

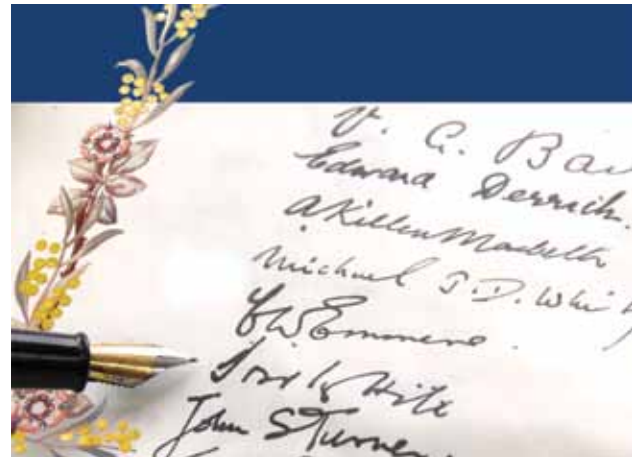
The Academy is committed to quality science education, both as a contribution to informed citizenship and to encourage young people to prepare themselves for careers based on science, technology, engineering and mathematics. It also produces a range of reports and conference proceedings and shares editorial responsibility with CSIRO (Australia's largest research organisation) for 11 Australian journals of scientific research.

Inspire

The Academy is a Fellowship of Australia's most distinguished scientists, elected for outstanding research that has pushed back the frontiers of knowledge. The Fellowship is a powerhouse of intellect and represents a national asset of significance. These eminent women and men are passionate about science and ensuring the future of science and technology in Australia, and work actively to mentor and develop the careers of young researchers.

Connect

The Academy has a range of programs and supports activities to promote public understanding of and engagement with science, and to foster greater awareness of science issues and science-related activities in government, industry, the media, academia and the community. As an independent body of top Australian research scientists, the Academy brings together world leading experts from universities, research institutes and government research agencies to consider and advise the nation on scientific issues.



The Australian Academy of Science Charter Book, signed by all Fellows since 1954.

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Educate

Contemporary Australia is a confident, creative and outward looking nation, with a strong economy and an abundance of talented people. Australia's reputation for research excellence and collaborative approach makes it a preferred partner for research institutes and industry.

Inspire

Australia is a leading global education powerhouse and has some of the world's best facilities and educators. It is the world's third most popular international student destination despite having a population of only 23 million. Seven of the top 100 universities in the world are Australian. Over a billion people around the world rely on Australian discoveries and inventions every day: penicillin, IVF, Ultrasound, WiFi, bionic ear, cervical cancer vaccine, black box flight recorder.

Connect

Global companies wanting to do business in Australia will find it easy to find high-skilled research collaborators. More than 270 international research institutions are connected with Australian research agencies, institutes and universities in the field of materials science, for instance. Particular opportunities for investment exist in advanced manufacturing, services and technologies – with a focus on medical and material sciences, and digital technologies.



Australian scientists are at the forefront of research into the bionic eye.

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Australian Nuclear Science and Technology Organisation

Educate

More than 10,000 students visit ANSTO every year for a unique opportunity to see scientists and engineers at work as well as providing free guided tours and workshops. ANSTO also reaches out to the community with support for science teachers and online information for the community.

Inspire

ANSTO seeks to inspire the next generation of scientists and engineers by maintaining world class scientific infrastructure, giving them the tools to create great work, and providing them with the freedom to find the discipline that inspires their passion. ANSTO was recently selected by the Australian Association of Graduate Employers as one of Australia's Graduate Employers of Choice.

Connect

ANSTO recognises that collaboration keeps us connected to the great scientific advancements and optimises opportunities for our scientists. ANSTO has collaborative agreements with several of the world's top science organisations including CERN (the European Organisation for Nuclear Research), Japan's High Energy Accelerator Research Organisation (KEK), the French Atomic Energy Organisation (CEA) and Shanghai Institute for Applied Physics (SINAP).



ANSTO researchers conducting groundwater testing at Rottneest Island, WA.

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Commonwealth Scientific and Industrial Research Organisation

Educate

CSIRO provides inspiration, training and opportunities for the next generations of Australian scientists at all levels – for primary school, secondary school, undergraduate, post-graduate and post-doctoral students. In addition, CSIRO, along with partners from the Australian government, builds capacity in other countries in a range of areas, from climate adaptation, agriculture and water management to mining, process technologies and e-health.

Inspire

CSIRO is driven by global challenges, and strives to inspire our stakeholders and partners to produce economic, social and environmental benefits for Australia and the world. Our dedicated and world-leading researchers provide the inspiration we need to ensure CSIRO continues to provide a positive impact.

Connect

As Australia's largest research organisation, CSIRO is well connected within Australia and around the world. CSIRO works closely with partners from government, higher education and industry to develop and share new research and technology, and provides trusted advice to our partners, to governments and to the general public.



CSIRO's expertise in determining protein structure, and therapeutic design led to the development of Relenza™, the first drug successful in treating the flu.

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Australian Government
Department of Defence
Defence Science and
Technology Organisation

Defence Science and Technology Organisation

Educate

The Defence Science and Technology Organisation (DSTO) is a national leader in safeguarding Australia by delivering valued scientific advice and innovative technology solutions for Australia's defence and national security. It educates the wider Australian community about the value of science to build such capabilities through its outreach and public awareness programs. These programs also help to develop science, technology, engineering and mathematics capabilities through initiatives such as cadetships, university scholarships and work experience for students.

Inspire

DSTO's track record of achievements has been an inspiration for scientists around the world. DSTO invented the black box flight recorder and the Nulka anti-ship missile defence system. It pioneered the science of fatigue testing to extend the operational life of aircraft. DSTO leads the world in over-the-horizon radar systems and hypersonics research to achieve high-speed flight at more than five times the speed of sound.

Connect

DSTO partners with Australian industry and the science and technology community at home and abroad through strategic alliances and collaborative research projects to deliver national security outcomes.



The ANZAC Combat System Integration Laboratory (ACSIL) used for modelling and simulation at the Defence Science & Technology Organisation.

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Educate

- Go8 universities are the most research-intensive of all Australian universities.
- Various international rankings rate Go8 universities as the top-tier institutions in Australia.

Inspire

- Go8 universities invest in world-class research in order to drive discovery and innovation.
- Go8 universities are leaders in medical and health research, and in translation of that research into teaching, learning and patient care.

Connect

- Go8 universities attract the highest levels of industry and competitive government grant funding for research.
- Go8 alumni take up senior positions in professional life, business and government in Australia and other countries.



Professor Sheena McGowan of Monash University is constructing a new weapon against malaria.

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Educate

From its establishment in 1926, SIEF has believed that Australia's future prosperity lies in the hands of its young scientists. For this reason, SIEF provides funding for Australia's annual delegation to Lindau. SIEF also funds the training of science students and early career researchers through a program of undergraduate scholarships, postgraduate scholarships and postdoctoral fellowships.

Inspire

The majority of SIEF's funds are derived from a gift from Australia's premier science organisation, CSIRO, acquired by CSIRO as a result of the commercialisation of its WiFi patent. This generous gift of \$150 million, to be used to fund scientific research and training, invests returns from one of today's great discoveries in the great discoveries of tomorrow, thus inspiring recognition of the value of breakthrough science and its potential to fund new technologies of the future.

Connect

SIEF recognises that the objective of science is to benefit the community in which it is undertaken. SIEF's purpose is therefore to fund science that assists Australian industry, furthers the interests of the Australian community or contributes to the achievement of Australian national objectives. SIEF funds projects and initiatives that bring together organisations capable of working together on solutions to these national challenges, connecting science to its community.



Ngara technology - Access Stage 2 Antenna Array.

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Emma Johnston

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Australian Research Council Fellow and Director, Sydney Harbour Research Program
Sydney Institute of Marine Science
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In Emma Johnston's dual roles she researches ecological effects of human activities in diverse marine environments from the tropics to the poles and is also a presenter for the television series 'Coast Australia'.

Adam Spencer

Ambassador for Science and Mathematics
The University of Sydney
www.adamspencer.com.au

Adam Spencer was midway through a PhD in Pure Mathematics when he won a nationwide stand-up comedy competition and became one of Australia's best known breakfast radio announcers... with a twist. A great champion of science and university education, Adam's TED talk on prime numbers has had over 1 million hits and he was recently appointed the Ambassador for Science and Mathematics for Australia's oldest university, the University of Sydney.

Genevieve Lacey

Recorder Virtuoso
www.genevivelacey.com

Genevieve Lacey is a recorder virtuoso, serial collaborator and artistic director who performs music spanning ten centuries. She has a substantial recording catalogue (ABC Classics) and a high-profile career as soloist with orchestras and ensembles around the world.

Marshall McGuire

Harpist
www.marshallmcguire.com

Marshall McGuire is acclaimed as one of Australia's finest musicians, and a leading performer of contemporary and baroque harp. He is Artistic Director of Ludovico's Band, and Music Programmer at Arts Centre Melbourne.

David Fisher

Producer, The Science Show, ABC Radio, Sydney Australia
www.abc.net.au/radionational/programs/scienceshow

David Fisher works with presenter Robyn Williams to produce the weekly radio program, The Science Show. The program covers scientific developments and ideas for the radio audience in Australia and the web audience everywhere with a mix of seriousness and fun.

Lincoln Harrison

Photographer
www.lincolnharrison.com

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[The University of Melbourne](#) for providing the video footage of Nobel Laureate Professor Peter Doherty AC and [Resolution Design](#) for providing the visual images that accompanied the musical performance of Ms Genevieve Lacey and Mr Marshall McGuire.

