

# Eureka Prizes winners combined releases

For more information about all the winners visit [australianmuseum.net.au/eureka](http://australianmuseum.net.au/eureka).

[And watch the finalists videos here.](#)

For media enquiries please contact the Australian Museum Eureka Prizes media team:

- Niall Byrne, [niall@scienceinpublic.com.au](mailto:niall@scienceinpublic.com.au), 0417 131 977
- Errol Hunt, [errol@scienceinpublic.com.au](mailto:errol@scienceinpublic.com.au), 0423 139 210

## List of winners

Looking beyond physics' Standard Model .....	2
3M Eureka Prize for Emerging Leader in Science .....	2
Nurturing the next generation of Australian researchers .....	3
University of Technology Sydney Eureka Prize for Outstanding Mentor of Young Researchers .....	3
Leading Australia's quantum future .....	4
CSIRO Eureka Prize for Leadership in Science .....	4
Melting salt to store solar power .....	5
ANSTO Eureka Prize for Innovative Use of Technology .....	5
Battle of the experts: inside the statin war .....	6
Department of Industry and Science Eureka Prize for Science Journalism .....	6
Speaking science underwater .....	7
Department of Industry and Science Eureka Prize for Promoting Understanding of Australian Science Research .....	7
Battlefield communication by mobile, wi-fi and satellites .....	8
Defence Science and Technology Group Eureka Prize for Outstanding Science for Safeguarding Australia .....	8
No need to shed tears over Australia's scientific future .....	9
University of Sydney Sleek Geeks Science Eureka Prize – Primary .....	9
Time to die: killing cells to save lives .....	10
Australian Infectious Diseases Research Centre Eureka Prize for Infectious Diseases Research .....	10
Vaccines for oysters .....	11
Rural Research and Development Corporations Eureka Prize for Rural Innovation .....	11
A global standard for environmental threats from coral reef to desert dunes .....	13
NSW Office of Environment and Heritage Eureka Prize for Environmental Research .....	13
The much-maligned appendix: not just for grass eaters .....	14
University of Sydney Sleek Geeks Science Eureka Prize – Secondary .....	14
Capturing coral's beauty .....	15
New Scientist Eureka Prize for Science Photography .....	15
Looking for the right face in a multidimensional crowd .....	16
Scopus Eureka Prize for Excellence in International Scientific Collaboration .....	16
Inventing a quantum industry for Australia .....	17
Macquarie University Eureka Prize for Outstanding Early Career Researcher .....	17
World's smallest, brightest nano-flashlights finding a diseased needle in a haystack .....	19
University of New South Wales Eureka Prize for Excellence in Interdisciplinary Scientific Research .....	19
Making blood on demand with stem cells? .....	20
University of New South Wales Eureka Prize for Scientific Research .....	20

# Looking beyond physics' Standard Model



## 3M Eureka Prize for Emerging Leader in Science

- Winner: Dr Phillip Urquijo.

The 600+ physicists competing for time on the Belle II particle accelerator experiment are looking for answers to questions our Standard Model of particle physics cannot answer:

- Why do fundamental particles have mass?
- Why is there more antimatter than matter in the Universe?
- And, what fundamental particles can we find beyond the Standard Model?

The physics coordinator on Belle II, helping decide how much time each experiment will get, is Melbournian Dr Phillip Urquijo.

For leadership on the Belle II project, including collaboration with 99 organisations from 23 different countries, Dr Urquijo of the University of Melbourne has been awarded the *3M Eureka Prize for Emerging Leader in Science*.

Belle II will run at the KEKB particle accelerator in Japan. KEKB consists of two rings of high-speed particles, just over 3 km wide, that crash positrons into electrons at 0.425 times the speed of light.

"I congratulate Dr Urquijo on his amazing achievements to date and for being a leader in international physics," Kim McKay AO, Executive Director and CEO of the Australian Museum said. "His fast track on such a major international project is a great credit to his talents, as this role would usually fall to a more senior scientist," she said.

His authority in juggling hundreds of different physics objectives is reinforced by his own impressive discoveries. He has been described as one of the best experimental particle physicists of his generation, and his contributions to the field were acknowledged by the International Union of Pure and Applied Physics (IUPAP) young scientist prize in 2012.

Dr Urquijo is helping build Australian's position in the field of particle physics, with the aim of making us a hub for particle physics in the Asian region. He is building a team of researchers to be leaders in the years to come.

**Established in 1827, the Australian Museum is the nation's first museum and one of its foremost scientific research, educational and cultural institutions. The Australian Museum Eureka Prizes are the most comprehensive national science awards, honouring excellence in Research and Innovation, Leadership, Science Communication and Journalism, and School Science.**

The other finalists were:

- Dr Sharath Sriram (RMIT University), who advocates for early-career researchers nationally.
- Dr Rita Henderson (University of New South Wales), who is leading water science research and informing water sustainability policy in Australia and internationally.

Further information:

- Dr Phillip Urquijo, [phillip.urquijo@unimelb.edu.au](mailto:phillip.urquijo@unimelb.edu.au), 0481 293 105

For media enquiries please contact the Australian Museum Eureka Prizes media team:

- Niall Byrne, [niall@scienceinpublic.com.au](mailto:niall@scienceinpublic.com.au), 0417 131 977
- Errol Hunt, [errol@scienceinpublic.com.au](mailto:errol@scienceinpublic.com.au), 0423 139 210

[Watch the video.](#)

# Nurturing the next generation of Australian researchers



## University of Technology Sydney Eureka Prize for Outstanding Mentor of Young Researchers

- Winner: Professor Marilyn Renfree.

What can wallabies tell us about our own reproduction?

Professor Marilyn Renfree's team at the University of Melbourne study marsupials such as wallabies to understand human reproduction and development.

For three decades of inspirational mentoring of young researchers, particularly women, Professor Renfree has been awarded the *University of Technology Sydney Eureka Prize for Outstanding Mentor of Young Researchers*.

She takes on the heavy lifting so that her researchers can concentrate on the science. In her own words she is "an umbrella to protect them from the day to day trivia that gets in the way of the exciting thing that is discovery of science."

"Professor Renfree's own research – into platypus and wallaby genes – and policy advice is extremely impressive," Kim McKay AO, Executive Director and CEO of the Australian Museum said. "However it is clear that she sees her students as her most enduring legacy in science," she said.

Professor Renfree's achievements as a mentor and leader include:

- Presented 27 plenary lectures in the last five years.
- Supervised 60 postdoc researchers and 56 honours students.
- Received Australian Learning and Teaching Council Award (2010).
- Brought 24 international researchers into her team, exposing Brazilian, Chilean, Chinese, Ethiopian, Indonesian, Mexican Singaporean, UK and US researchers to diverse Australian mammals.
- Professor Renfree's students have authored or co-authored 130 peer-reviewed papers, and are first authors on 72 per cent.
- Champion of women in science; many of her previous female researchers working in senior science roles.

**Established in 1827, the Australian Museum is the nation's first museum and one of its foremost scientific research, educational and cultural institutions. The Australian Museum Eureka Prizes are the most comprehensive national science awards, honouring excellence in Research and Innovation, Leadership, Science Communication and Journalism, and School Science.**

The other finalists were:

- Professor Robert Sanson-Fisher AO (University of Newcastle).
- Professor Hugh Possingham (University of Queensland).

Further information:

- Professor Marilyn Renfree AO, the University of Melbourne, [m.renfree@unimelb.edu.au](mailto:m.renfree@unimelb.edu.au), 0414 716 460

For media enquiries please contact the Australian Museum Eureka Prizes media team:

- Niall Byrne, [niall@scienceinpublic.com.au](mailto:niall@scienceinpublic.com.au), 0417 131 977
- Errol Hunt, [errol@scienceinpublic.com.au](mailto:errol@scienceinpublic.com.au), 0423 139 210

[Watch the video.](#)

# Leading Australia's quantum future



## CSIRO Eureka Prize for Leadership in Science

- Winner: Professor Michelle Simmons.

Australia's position at the forefront of the developing field of quantum computing is at least partly due to the leadership shown by Professor Michelle Simmons.

Professor Simmons is Director of the ARC Centre of Excellence for Quantum Computation and Communication Technology Centre, based at the University of New South Wales.

Under her leadership, the team has:

- Developed the world's smallest transistor, built of one single atom.
- Built the world's smallest silicon wires, a thousand times narrower than a human hair.
- Independently controlled quantum components only a few millionths of a millimetre apart.

For her leadership, passion, commitment and energy devoted to advancing the field of quantum computing in Australia, Professor Simmons has been awarded the *CSIRO Eureka Prize for Leadership in Science*.

"The 180 researchers of the Quantum Computation and Communication Technology Centre, which Professor Simmons established and leads, are ensuring Australia's success in what will become a multi-billion dollar industry," Kim McKay AO, Executive Director and CEO of the Australian Museum said. "Their success is a tribute to Professor Simmons' demonstrated passion, commitment and energy," she said.

Professor Simmons achievements are legendary in the Australian science community. She is:

- One of the youngest and one of the first female physicists elected as a Fellow of the Australian Academy of Science (2006).
- An Australian Research Council Laureate Fellow (2013).
- One of very few researchers to have won two Australian Research Council Federation Fellowships (2003 and 2008).
- A Foreign Honorary Member of the American Academy of Arts and Sciences (2014).

**Established in 1827, the Australian Museum is the nation's first museum and one of its foremost scientific research, educational and cultural institutions. The Australian Museum Eureka Prizes are the most comprehensive national science awards, honouring excellence in Research and Innovation, Leadership, Science Communication and Journalism, and School Science.**

The other finalists were:

- Professor Snow Barlow (University of Melbourne) for policy and research leadership in the field of climate change.
- Rosie Hicks (Australian National Fabrication Facility), for leading national collaboration in Australia's scientific infrastructure.

Further information:

- Professor Michelle Simmons, [michelle.simmons@unsw.edu.au](mailto:michelle.simmons@unsw.edu.au), 0425 336 756

For media enquiries please contact the Australian Museum Eureka Prizes media team:

- Niall Byrne, [niall@scienceinpublic.com.au](mailto:niall@scienceinpublic.com.au), 0417 131 977
- Errol Hunt, [errol@scienceinpublic.com.au](mailto:errol@scienceinpublic.com.au), 0423 139 210

[Watch the video.](#)

# Melting salt to store solar power

## ANSTO Eureka Prize for Innovative Use of Technology

- Winner: Associate Professor Frank Bruno, Dr Martin Belusko and Dr Steven Tay.

Fast-melting salts could solve solar power's big challenge: the mismatch between peak sunlight hours and peak, evening electricity use.

A University of South Australia team has developed a new phase-change system that provides energy storage at a tenth of the cost of batteries. By melting and solidifying an inexpensive liquid salt solution, energy can be stored and released quickly and cheaply.

As well as extending the potential reach of renewable energy, the system also allows Australian produce companies to reduce multibillion-dollar refrigeration electricity costs by 'charging' the system (freezing the solution) during inexpensive off-peak hours and 'discharging' (remelting) during expensive peak hours.

For their development of the low-cost energy storage system, Associate Professor Frank Bruno, Dr Martin Belusko and Dr Steven Tay of the University of South Australia have been awarded the *ANSTO Eureka Prize for Innovative Use of Technology*.

The phase-change system:

- Resolves the mismatch between generation hours and electricity use, so that solar and wind power can form an even larger slice of the national generation grid.
- Reduces refrigeration electricity costs by up to 50 per cent by charging during non-peak hours to discharge during peak-cost hours (Australia's refrigeration electricity costs are \$14 billion per year).
- Smooths out electricity use, reducing the need for expensive, peak-driven infrastructure, and for extra fossil-fuel generation of power during daylight hours.

"The potential this technology offers for renewable energy to form a much larger slice of Australia's electricity generation through low-cost energy storage is very exciting," Kim McKay AO, Executive Director and CEO of the Australian Museum said.

**Established in 1827, the Australian Museum is the nation's first museum and one of its foremost scientific research, educational and cultural institutions. The Australian Museum Eureka Prizes are the most comprehensive national science awards, honouring excellence in Research and Innovation, Leadership, Science Communication and Journalism, and School Science.**

The other finalists were:

- Associate Professor Kondo-François Aguey-Zinsou (University of New South Wales) for development of the Hy-Cycle low-temperature, low-pressure hydrogen storage that can power a motorised bicycle over 120km on a single, small canister.
- Professor Martin Green and Dr Mark Keevers (University of New South Wales) for splitting a single light beam to generate power from two different types of solar cell.

Further information:

- Associate Professor Frank Bruno, University of South Australia, [Frank.Bruno@unisa.edu.au](mailto:Frank.Bruno@unisa.edu.au), 0413 853 257
- Dr Martin Belusko, University of South Australia, [martin.belusko@unisa.edu.au](mailto:martin.belusko@unisa.edu.au), 0423 223 770
- Dr Steven Tay, University of South Australia, [Steven.Tay@unisa.edu.au](mailto:Steven.Tay@unisa.edu.au), 0432 553 916

For media enquiries please contact the Australian Museum Eureka Prizes media team:

- Niall Byrne, [niall@scienceinpublic.com.au](mailto:niall@scienceinpublic.com.au), 0417 131 977
- Errol Hunt, [errol@scienceinpublic.com.au](mailto:errol@scienceinpublic.com.au), 0423 139 210

[Watch the video.](#)

# Battle of the experts: inside the statin war

---



## Department of Industry and Science Eureka Prize for Science Journalism

- Winner: Dr Elizabeth Finkel.

Male and over 50? Take statins to stave off heart attacks and strokes, say health authorities in the UK and US. When the ABC's *Catalyst* program challenged this advice sparks flew.

The program triggered such a backlash from the medical community, and even from other ABC journalists, that it was eventually pulled from the ABC website.

Dr Elizabeth Finkel, writing for *Cosmos* magazine, boldly explored the controversy – looking at the experts on both sides of the conversation. Adjudicating between the camps was a major journalistic challenge.

For her article 'A Statin a Day' in *Cosmos* magazine, Elizabeth has been awarded the *Department of Industry and Science Eureka Prize for Science Journalism*.

"Dr Elizabeth Finkel has explored the issue of statin medication with great objectivity and has presented the story in a balanced and fair way," Kim McKay AO, Executive Director and CEO of the Australian Museum said.

**Established in 1827, the Australian Museum is the nation's first museum and one of its foremost scientific research, educational and cultural institutions. The Australian Museum Eureka Prizes are the most comprehensive national science awards, honouring excellence in Research and Innovation, Leadership, Science Communication and Journalism, and School Science.**

The other finalists were:

- Roslyn Lawrence, Geraldine McKenna, Dr Graham Phillips, Vaughan Smith, Ingrid Arnott and Matt Scully (ABC) who created the *Catalyst* program *Gut Reaction*, studying the link between diet, gut bacteria and diseases as diverse as asthma, depression and multiple sclerosis.
- Sally Ingleton and Tosca Looby (360 Degree Films) whose film *The Great Australian Fly* looked at the contribution this much-maligned insect has made to Australian culture, inspiring the creation of an entire pesticide industry and driving scientists to distraction.

Further information:

- Dr Elizabeth Finkel, *Cosmos* magazine, [ella@finkel.net](mailto:ella@finkel.net), 0400 004 422

For media enquiries please contact the Australian Museum Eureka Prizes media team:

- Niall Byrne, [niall@scienceinpublic.com.au](mailto:niall@scienceinpublic.com.au), 0417 131 977
- Errol Hunt, [errol@scienceinpublic.com.au](mailto:errol@scienceinpublic.com.au), 0423 139 210

[Watch the video.](#)

[Read the full article.](#)

For more information about all the winners visit [australianmuseum.net.au/eureka](http://australianmuseum.net.au/eureka).

## Department of Industry and Science Eureka Prize for Promoting Understanding of Australian Science Research

- Winner: Professor Emma Johnston.

Professor Emma Johnston describes Sydney Harbour as her laboratory. It's a laboratory that bears the impacts of four million people living nearby, not to mention a century of industry.

It's important that those human impacts are properly understood by governments and the public.

Professor Johnston uses a variety of channels to bring marine research to a broad audience and ensure that policy-makers and public understand the effects of their own actions.

For her work in educating the public on Australian marine science, Professor Emma Johnston of the University of New South Wales has been awarded the *Department of Industry and Science Eureka Prize for Promoting Understanding of Australian Science Research*.

"Professor Johnston speaks for our marine environment with great authority," Kim McKay AO, Executive Director and CEO of the Australian Museum said. "Her collaborative approach to working with public, government and industry is built on her own deep knowledge of marine science," she said. "She is undoubtedly one of Australia's leading science communicators."

Via her outreach program Run Off and Reach Out she has opened people's eyes to the effect their lifestyle and actions have on stormwater run-off and thus their impact on our immediate marine environment.

In sharing stories of marine science on the successful BBC/Foxtel history series *Coast Australia*, Professor Johnston has helped take Australian marine science to an international audience. She has also spoken on dozens of radio shows and TV programs, and been interviewed in print.

As well as educating Australians about marine science, she is determined to help inspire the next generation of scientists – work that has been recognised by the Australian Academy of Science, which awarded her the inaugural Nancy Millis Medal for Women in Science in 2014.

With over 85 per cent of Australians living beside the coast, she finds marine science useful to engage people with science more broadly.

**Established in 1827, the Australian Museum is the nation's first museum and one of its foremost scientific research, educational and cultural institutions. The Australian Museum Eureka Prizes are the most comprehensive national science awards, honouring excellence in Research and Innovation, Leadership, Science Communication and Journalism, and School Science.**

The other finalists were:

- Associate Professor Darren Curnoe (University of New South Wales) who has led public understanding of evolution and our origins.
- Dr Lisa Harvey-Smith (CSIRO Astronomy and Space Science), who works in outback towns, introducing young Indigenous Australians to astronomy.

Further information:

- Professor Emma Johnston, University of New South Wales, [e.johnston@unsw.edu.au](mailto:e.johnston@unsw.edu.au), 0423 236 411

For media enquiries please contact the Australian Museum Eureka Prizes media team:

- Niall Byrne, [niall@scienceinpublic.com.au](mailto:niall@scienceinpublic.com.au), 0417 131 977
- Errol Hunt, [errol@scienceinpublic.com.au](mailto:errol@scienceinpublic.com.au), 0423 139 210

[Watch the video.](#)

# Battlefield communication by mobile, wi-fi and satellites



## Defence Science and Technology Group Eureka Prize for Outstanding Science for Safeguarding Australia

- Winner: Northrop Grumman M5 Network Security.

Secure, handheld communication tools developed in Canberra simultaneously use multiple available mobile-phone networks, wi-fi and satellites to ensure the signal never drops out.

Yet despite using these easily accessible public networks, the tools remain secure enough for use by military or intelligence personnel.

For development of the Secure Communications System suite of tools, Northrop Grumman M5 Network Security have been awarded the *Defence Science and Technology Group Eureka Prize for Outstanding Science for Safeguarding Australia*.

Designed for situations when secure, reliable communications are paramount, the tools are part of a whole suite of secure communication tools.

The lightweight SCS-100 is the smallest of the tools –handheld and easily packed into carry-on luggage, but carrying everything needed for one person’s self-contained, secure communication.

At the other end of the range, the degree of miniaturisation is even more impressive. The SCS-400 field-deployable headquarters packs a roomful of equipment into a unit the size of two briefcases: portable enough to be carried in the field, and able to simultaneously access multiple private and public information systems, and to connect 150 users at once to a secure network.

“The Secure Communications System is significantly more compact and easier to use than existing technology,” Kim McKay AO, Executive Director and CEO of the Australian Museum said. “Already proving its worth here and internationally, the system highlights Australia’s strength in secure, mobile communications,” she said.

The system was developed by a small Canberra company – M5 Network Security – that became part of the Northrop Grumman global technology giant in 2012.

**Established in 1827, the Australian Museum is the nation’s first museum and one of its foremost scientific research, educational and cultural institutions. The Australian Museum Eureka Prizes are the most comprehensive national science awards, honouring excellence in Research and Innovation, Leadership, Science Communication and Journalism, and School Science.**

The other finalists were:

- Professor Paul Burn, Professor Paul Meredith and Dr Paul Shaw (University of Queensland), for development of a luminescence-based detector for explosive vapours.
- Associate Professor Charles Harb (University of New South Wales, Canberra), for development of an infrared spectroscopy system for rapid explosives detection.

Further information:

- Merik Karman, Northrop Grumman M5 Network Security, [merik.karman@au.ngc.com](mailto:merik.karman@au.ngc.com), 0477 990 402

For media enquiries please contact the Australian Museum Eureka Prizes media team:

- Niall Byrne, [niall@scienceinpublic.com.au](mailto:niall@scienceinpublic.com.au), 0417 131 977
- Errol Hunt, [errol@scienceinpublic.com.au](mailto:errol@scienceinpublic.com.au), 0423 139 210

[Watch the video.](#)

# No need to shed tears over Australia's scientific future

---

## University of Sydney Sleek Geeks Science Eureka Prize – Primary

- Winners: Georgia Souyave-Murphy and Ella Woods.

Georgia (Gigi) Souyave-Murphy and Ella Woods, fifth-graders from St Margaret's Anglican Girls School in Brisbane, have won the *University of Sydney Sleek Geeks Science Eureka Prize – Primary*.

Their entry, *Cry Stoppers*, explains the science behind the infamous, unpleasant effect that onions have on our eyes.

The ten-year-olds adopted the roles of detectives to solve the mystery of how onions make people cry, as well as some ways to avoid the tears.

Sponsored by the University of Sydney, the Sleek Geeks Science Eureka Prize is named in honour of Dr Karl (Kruszelnicki) and Adam Spencer.

The Prize recognises excellence in communicating scientific ideas 'painlessly' or, as the Sleek Geeks like to say, "help people to learn something without even noticing." It rewards the best of hundreds of submitted short films – each communicating a particular scientific concept in an accessible and engaging way.

"Gigi and Ella's short film is a lot of fun, but it's informative too," Kim McKay AO, Executive Director and CEO of the Australian Museum said. "Who knew onions were so complex?" Passionate, engaged schoolkids like these will form the next generation of Australian scientists," she said.

**Established in 1827, the Australian Museum is the nation's first museum and one of its foremost scientific research, educational and cultural institutions. The Eureka Prizes are the most comprehensive national science awards, honouring excellence in Research and Innovation, Leadership, Science Communication and Journalism, and School Science.**

Second prize in the primary section of the Sleek Geeks Science Eureka Prize went to sixth-grade student William Martin from Trinity Grammar Junior School (NSW) who created *Why is Seaweed Brown?* – an explanation of photosynthesis, including experiments to show how low underwater light explains seaweed's dark colour.

For media enquiries please contact the Australian Museum Eureka Prizes media team:

- Niall Byrne, [niall@scienceinpublic.com.au](mailto:niall@scienceinpublic.com.au), 0417 131 977
- Errol Hunt, [errol@scienceinpublic.com.au](mailto:errol@scienceinpublic.com.au), 0423 139 210

[Watch the winning video.](#)

# Time to die: killing cells to save lives

---



## Australian Infectious Diseases Research Centre Eureka Prize for Infectious Diseases Research

- Winner: Pellegrini and Ebert Team.

Melbourne researchers have found a new use for an anti-cancer drug. They're using it to eliminate hepatitis B cells by telling infected cells 'it's time to die' – switching off the cell's resistance to programmed cell death that is part of a cell's normal life cycle.

The new treatment has been developed by a team at the Walter and Eliza Hall Institute of Medical Research, led by Dr Marc Pellegrini and Dr Greg Ebert.

For research into the treatment of hepatitis B, Dr Pellegrini and Dr Ebert have been awarded the *Australian Infectious Diseases Research Centre Eureka Prize for Infectious Diseases Research*.

"This is important work addressing one of the world's most widespread deadly diseases," Kim McKay AO, Executive Director and CEO of the Australian Museum said.

"There is currently no cure for hepatitis B, which infects 2 billion people and causes 780,000 deaths a year," she said.

Previous hepatitis B treatments have encouraged immune cells to attack infected cells, but an over-active immune system carries its own health risks. Instead, by targeting a particular protein, whose job it is to inhibit programmed cell death, the new treatment selectively targets liver cells that are infected with hepatitis B, bypassing healthy cells.

If this broad approach is successful, there is the potential that it may pave the way for the development of similar treatments to tackle other major chronic infections such as HIV and tuberculosis, which kill millions of people around the world each year.

**Established in 1827, the Australian Museum is the nation's first museum and one of its foremost scientific research, educational and cultural institutions. The Australian Museum Eureka Prizes are the most comprehensive national science awards, honouring excellence in Research and Innovation, Leadership, Science Communication and Journalism, and School Science.**

The other finalist was a team comprising Professor Trevor Lithgow and Dr Hsin-Hui Shen (Monash University), Dr Denisse Leyton (Australian National University) and Dr Joel Selkig (European Molecular Biology Laboratory). The team used biochemical and microbiology techniques to understand the function of a key molecular machine that is required by bacterial pathogens to cause disease. The molecular machine represents a novel target for the development of new therapeutics to treat infections caused by antibiotic-resistant superbugs.

Further information:

- Pellegrini and Ebert Team, Walter and Eliza Hall Institute of Medical Research, [pellegrini@wehi.edu.au](mailto:pellegrini@wehi.edu.au), (03) 9345 2932

For media enquiries please contact the Australian Museum Eureka Prizes media team:

- Niall Byrne, [niall@scienceinpublic.com.au](mailto:niall@scienceinpublic.com.au), 0417 131 977
- Errol Hunt, [errol@scienceinpublic.com.au](mailto:errol@scienceinpublic.com.au), 0423 139 210

[Watch the video.](#)

## Rural Research and Development Corporations Eureka Prize for Rural Innovation

- Winner: Professor David Raftos.

Disease can wipe out an oyster population in a single day, which can mean ruin for small oyster farmers and hurt for the surrounding rural communities.

Now, research by Professor David Raftos and researchers at Macquarie University promises disease protection for entire populations of oyster.

Working with oyster farmers along Australia's east coast, Professor Raftos has already helped breed stronger, more disease-resistant oysters that promise a 10 to 20 per cent increase in yield for this \$200 million industry.

For work safeguarding and improving Australia's iconic oyster industry, Professor Raftos has been awarded the new *Rural Research and Development Corporations Eureka Prize for Rural Innovation*.

"The work of Professor Raftos and his team allows us to understand and prevent diseases that can kill millions of oysters in a single outbreak," Kim McKay AO, Executive Director and CEO of the Australian Museum said. "It's great news for industry and oyster lovers alike!"

The next step may be to immunise entire crops of oysters against a particular virus. The team's results show that immunising one oyster also protects its descendants. Potentially, immunising just a few oysters could create a population of disease-resistant offspring.

An unexpected result from the work was that the new disease-proofed oysters were also less susceptible to climate change. After initially filing this in the 'weird things happen' box, Professor Raftos has now determined that the oysters selected for their better capacity to switch on infection-fighting genes are also better able to cope with environmental stresses. By disease proofing Australia's oysters, the team is also protecting them against the warming climate.

It's a project that's seen Professor Raftos talking to oyster farmers up and down the east coast of Australia about what works and what doesn't, sharing yarns and the occasional beer with experienced oyster farmers.

The farmers' interest in the work is understandable. Past viral outbreaks have killed millions of oysters in a single day and led to the permanent collapse of oyster farming businesses, with an associated loss of jobs and income in the surrounding rural communities.

If his selective-breeding approach works for Sydney rock oysters, Professor Raftos expects it will also work for other farmed marine creatures, from other oyster varieties to abalone and prawns.

The *Rural Research and Development Corporations Eureka Prize for Rural Innovation* is new in 2015.

**Established in 1827, the Australian Museum is the nation's first museum and one of its foremost scientific research, educational and cultural institutions. The Australian Museum Eureka Prizes are the most comprehensive national science awards, honouring excellence in Research and Innovation, Leadership, Science Communication and Journalism, and School Science.**

The other finalists were:

- The FutureDairy team of Dr Cameron Clark, Professor Sergio Garcia, Associate Professor Kendra Kerrisk and Victoria Scott (University of Sydney), Rene Kolbach (DeLaval International), and Dr Nicolas Lyons (NSW Department of Primary Industries) for achieving voluntary cow traffic with robotic rotary plants.
- Dr Nadine Chapman and Professor Ben Oldroyd (University of Sydney) for their contribution to the fight against the varroa bee mite.

Further information:

- Professor David Raftos, Macquarie University, [david.raftos@mq.edu.au](mailto:david.raftos@mq.edu.au), 0405 206 940

For media enquiries please contact the Australian Museum Eureka Prizes media team:

- Niall Byrne, [niall@scienceinpublic.com.au](mailto:niall@scienceinpublic.com.au), 0417 131 977
- Errol Hunt, [errol@scienceinpublic.com.au](mailto:errol@scienceinpublic.com.au), 0423 139 210

[Watch the video.](#)



# A global standard for environmental threats from coral reef to desert dunes

## NSW Office of Environment and Heritage Eureka Prize for Environmental Research

- Winner: Professor David Keith and the IUCN Red List of Ecosystems Team.

How can environmental threats to coral reefs be compared with the threats to the plant-life of arid deserts? How can the effect of river flow on wetland health be compared with damage caused by introduced animals?

The answer seems to lie in a new system developed by University of New South Wales biologist Professor David Keith.

Working with the International Union for Conservation of Nature (IUCN), Professor Keith and his team have established a single global standard for assessing environmentally threatened ecosystems.

For their establishment of a universal standard for assessing ecosystem risks, Professor Keith and the IUCN Red List of Ecosystems Team have been awarded the *NSW Office of Environment and Heritage Eureka Prize for Environmental Research*.

Previous studies have established extinction risks in particular ecological communities, but the difficulty of comparing such risks across different ecosystems has made it more difficult to persuade politicians or public of the need for policy change.

“The Red List of Ecosystems is a powerful tool for scientists and policy-makers around the globe,” Kim McKay AO, Executive Director and CEO of the Australian Museum said. “International bodies are already looking at incorporating this system into their risk assessments,” she said.

**Established in 1827, the Australian Museum is the nation’s first museum and one of its foremost scientific research, educational and cultural institutions. The Australian Museum Eureka Prizes are the most comprehensive national science awards, honouring excellence in Research and Innovation, Leadership, Science Communication and Journalism, and School Science.**

The other finalists were:

- Associate Professor David Beattie (University of South Australia) for the development of environmentally safe flotation chemicals for the minerals industry.
- The Marine Debris Team (CSIRO), comprising Dr Denise Hardesty, Matt Lansdell, TJ Lawson, Dr David Milton, Tonya van der Velde and Dr Chris Wilcox. The Marine Debris Team has reduced the threat to marine ecosystems of plastic pollution through a clever combination of citizen science and interdisciplinary research.

Further information:

- Professor David Keith, UNSW, [david.keith@unsw.edu.au](mailto:david.keith@unsw.edu.au), 0412 856 498

For media enquiries please contact the Australian Museum Eureka Prizes media team:

- Niall Byrne, [niall@scienceinpublic.com.au](mailto:niall@scienceinpublic.com.au), 0417 131 977
- Errol Hunt, [errol@scienceinpublic.com.au](mailto:errol@scienceinpublic.com.au), 0423 139 210

[Watch the video.](#)

# The much-maligned appendix: not just for grass eaters

## University of Sydney Sleek Geeks Science Eureka Prize – Secondary

- Winner: Paige Bebee.

Paige Bebee, a ninth-grader from Ivanhoe Girls' Grammar School (Victoria), has won the *University of Sydney Sleek Geeks Science Eureka Prize – Secondary*.

Her entry, *The Secret of the Appendix*, explains the little-known organ and busts a few popular myths about its purpose in our body.

It explained not only the normal role of the appendix in our gut, but what can go wrong and how we can keep this important organ healthy.

Sponsored by the University of Sydney, the Sleek Geeks Science Eureka Prize is named in honour of Dr Karl (Kruszelnicki) and Adam Spencer.

The Prize recognises excellence in communicating scientific ideas 'painlessly' or, as the Sleek Geeks like to say, "help people to learn something without even noticing." It rewards the best of hundreds of submitted short films – each communicating a particular scientific concept in an accessible and engaging way.

"Scientific mythbusting to correct long-standing misunderstandings – as Paige has done in her film – is part of a building a scientifically-literate community," Kim McKay AO, Executive Director and CEO of the Australian Museum said. "She has revealed the truth about our appendix and also cameos her Grandfather, Nobel Prize winner Professor Barry Marshall. Not a bad talent score!" Kim said. "It's wonderful that our young scientists are so enthusiastic about communicating science."

Fortunately, Paige was able to bust this particular scientific myth without resorting to swallowing toxic bacteria – as Professor Marshall did to prove that the bacterium, and not stress, is the cause of stomach ulcers.

Professor Marshall has a cameo at the start of the video – eating grass rather than ingesting bacteria.

**Established in 1827, the Australian Museum is the nation's first museum and one of its foremost scientific research, educational and cultural institutions. The Eureka Prizes are the most comprehensive national science awards, honouring excellence in Research and Innovation, Leadership, Science Communication and Journalism, and School Science.**

Second prize in the secondary-school section of the Sleek Geeks Science Eureka Prize went to tenth-grade student Luke Cadorin-Taylor from St Aloysius' College (NSW) who created *Why are Concussions Bad for You?* – an animated exploration of brain injury.

Third place went to year-ten students Tom Downie and Harry Bebbington of Warrandyte High School (Victoria), whose video *Gravity Sucks* presents the science of falling apples, orbiting spacecraft and black holes.

For media enquiries please contact the Australian Museum Eureka Prizes media team:

- Niall Byrne, [niall@scienceinpublic.com.au](mailto:niall@scienceinpublic.com.au), 0417 131 977
- Errol Hunt, [errol@scienceinpublic.com.au](mailto:errol@scienceinpublic.com.au), 0423 139 210

[Watch the winning video.](#)

# Capturing coral's beauty

## New Scientist Eureka Prize for Science Photography

Queensland Museum photographer Gary Cranitch has been awarded the *New Scientist Eureka Prize for Science Photography* for his image *Soft Coral*.

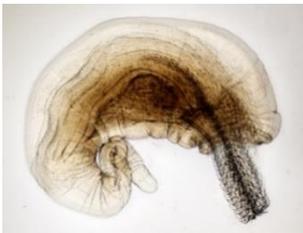
Soft corals are more diverse and widespread than hard corals, but known about their overall contribution to coral reef biodiversity. About world's soft coral species are found on the Great Barrier Reef, with knowledge of these species an indication of how much we still have to learn. Through his beautiful image, Gary Cranitch highlights this true 'indicator'



much less is one-third of the our limited learn. Through species.

"Gary's striking image highlights the need to understand the Great Barrier Reef's often-ignored soft corals" Kim McKay AO, Executive Director and CEO of the Australian Museum said. "I congratulate Gary on being a finalist for the second year in a row and now the winner of this prestigious prize," she said.

Taking out second place was Murdoch University's Aileen Elliot with her photograph *Thorny-Headed Worm*. Third was *Saltwater Crocodile* by NSW's Justin Gilligan.



*Thorny-Headed Worm*, Aileen Elliot, Murdoch University, WA

Seeing amazing life forms, such as this thorny-headed worm (phylum Acanthocephala), has the power to turn a mundane day in the lab into one of sheer brilliance. While dissecting a bland peritoneal cyst from an eel tailed catfish, *Tandanus tropicanus*, Aileen Elliot was surprised when out popped this incredible little worm. With this image, Aileen gets to share her modern day Darwinian moments of discovery with others and hopes to excite and inspire the next generation of budding parasitologists.



*Saltwater Crocodile*, Justin Gilligan, NSW

Exploring the coral reefs of Kimbe Bay in Papua New Guinea is like being caught in a literal time warp, where the hours pass by like fleeting moments. For Justin Gilligan, this juvenile saltwater crocodile presented the perfect opportunity for a close encounter on a glistening natural stage. When taking this stunning image, Justin focused on the raised eyes and nostrils and the camouflaged skin – all adaptations this crocodile needs to live a life both above and below the water surface.

**Established in 1827, the Australian Museum is the nation's first museum and one of its foremost scientific research, educational and cultural institutions. The Eureka Prizes are the most comprehensive national science awards, honouring excellence in Research and Innovation, Leadership, Science Communication and Journalism, and School Science.**

Ten images were highly commended by the judges, including the three above. All ten images are available at [www.australianmuseum.net.au/2015-new-scientist-eureka-prize-for-science-photography](http://www.australianmuseum.net.au/2015-new-scientist-eureka-prize-for-science-photography) and are available for publication in connection with the Eureka Prizes. High-resolution images are available on request.

Further information:

- Gary Cranitch, Queensland Museum, [gary.cranitch@qm.qld.gov.au](mailto:gary.cranitch@qm.qld.gov.au), 0428 748 228
- Aileen Elliot, Murdoch University, [A.Elliot@murdoch.edu.au](mailto:A.Elliot@murdoch.edu.au), 0405 362 918
- Justin Gilligan, [gilliganjustin@hotmail.com](mailto:gilliganjustin@hotmail.com), 0414 236 759

For media enquiries please contact the Australian Museum Eureka Prizes media team:

- Niall Byrne, [niall@scienceinpublic.com.au](mailto:niall@scienceinpublic.com.au), 0417 131 977
- Errol Hunt, [errol@scienceinpublic.com.au](mailto:errol@scienceinpublic.com.au), 0423 139 210

# Looking for the right face in a multidimensional crowd

---

## Scopus Eureka Prize for Excellence in International Scientific Collaboration

- Winner: Professor Dacheng Tao.

We ask a lot of our software systems.

We demand systems that can recognise a face in a crowd, identify one moving object in a crowd of pixels, or a group of diseased cells in a healthy eye that may indicate the presence of glaucoma.

A data analysis system that can efficiently locate and interpret such important information within massive datasets uses what is known as subspace learning: the picking apart of multidimensional data to find a phenomenon of interest.

For collaborative development of models that improve the use of big data across many scientific fields, Professor Dacheng Tao of the University of Technology Sydney has been awarded the *Scopus Eureka Prize for Excellence in International Scientific Collaboration*.

To develop these systems, Professor Tao works with biomedical researchers, security and intelligence authorities, law enforcement, smart-card operators, software developers and facial-recognition specialists.

“The work of Professor Tao and his international collaborators has improved scientific research across a significant number of scientific fields,” Kim McKay AO, Executive Director and CEO of the Australian Museum said. “From driverless car technology to sports science to cartoon development,” she said.

**Established in 1827, the Australian Museum is the nation’s first museum and one of its foremost scientific research, educational and cultural institutions. The Australian Museum Eureka Prizes are the most comprehensive national science awards, honouring excellence in Research and Innovation, Leadership, Science Communication and Journalism, and School Science.**

The other finalists were:

- Professor Stephen Stick (Telethon Kids Institute) for work with the Australian Respiratory Early Surveillance Team for Cystic Fibrosis.
- The FANTOM5 Project, which studies gene coding: Associate Professor Geoffrey Faulkner (Translational Research Institute), Professor Alistair Forrest and Professor Peter Klinken (Harry Perkins Institute of Medical Research) and Associate Professor Christine Wells and Professor Ernst Wolvetang (Australian Institute for Bioengineering and Nanotechnology).

Further information:

- Professor Dacheng Tao, University of Technology Sydney, [dacheng.tao@uts.edu.au](mailto:dacheng.tao@uts.edu.au), 0413 586 918

For media enquiries please contact the Australian Museum Eureka Prizes media team:

- Niall Byrne, [niall@scienceinpublic.com.au](mailto:niall@scienceinpublic.com.au), 0417 131 977
- Errol Hunt, [errol@scienceinpublic.com.au](mailto:errol@scienceinpublic.com.au), 0423 139 210

[Watch the video.](#)

# Inventing a quantum industry for Australia

---



## Macquarie University Eureka Prize for Outstanding Early Career Researcher

- Winner: Associate Professor Michael Biercuk.

For particular applications, quantum computers could be more powerful than any machine using current technology.

But functioning quantum computers may still be a decade away.

Associate Professor Michael Biercuk, a physicist at the University of Sydney, is bringing some of those quantum benefits forward. He has:

- Reduced information loss from quantum information systems.
- Built a simulated quantum computer of 300 atoms, each storing one 'quantum bit' (qubit) of information, and smashing the 30–40 qubit threshold at which quantum simulators exceed the capabilities of current supercomputers.
- Set the record for the smallest force ever measured.

For contributions at the leading edge of quantum science research, Associate Professor Biercuk has been awarded the *Macquarie University Eureka Prize for Outstanding Early Career Researcher*.

A particular quantum computing roadblock has been the systems' vulnerability, with even tiny environmental fluctuations corrupting the stored information. Associate Professor Biercuk and colleagues developed a method of error suppression that has been described as quantum computing's Rosetta Stone for the transformational effect it will have on the field.

"Quantum computing is a field with enormous promise for Australia, and Associate Professor Biercuk's research is capturing benefits right now," Kim McKay AO, Executive Director and CEO of the Australian Museum said. "As an early-career researcher, Michael's future is bright and indicates great opportunities for Australian science," she said.

Utilising quantum effects on trapped ions, Associate Professor Biercuk set the record for the smallest force ever measured: at the level of yoctoNewtons, or a million-million-billion times smaller than the force of a feather pressing down on a table. The technology has potential for mining exploration.

Using quantum simulation he is also looking for the key to room-temperature superconductivity. Among other applications this has the potential to eliminate the significant losses of transmitting electricity, which in Australia consumes 6 or 7 per cent of electricity generated.

**Established in 1827, the Australian Museum is the nation's first museum and one of its foremost scientific research, educational and cultural institutions. The Australian Museum Eureka Prizes are the most comprehensive national science awards, honouring excellence in Research and Innovation, Leadership, Science Communication and Journalism, and School Science.**

The other finalists were:

- Dr Sue-Ann Watson (James Cook University, ARC Centre of Excellence for Coral Reef Studies), who has shown that clear water and better sunlight help coral better cope with climate change and ocean acidification.
- Dr Lee Spitler (Macquarie University and Australian Astronomical Observatory), who studies the Universe in its infancy and has discovered the oldest known galaxy cluster.

Further information:

- Verity Leatherdale, Media and PR, University of Sydney, [verity.leatherdale@sydney.edu.au](mailto:verity.leatherdale@sydney.edu.au), 0403 067 342

For media enquiries please contact the Australian Museum Eureka Prizes media team:

- Niall Byrne, [niall@scienceinpublic.com.au](mailto:niall@scienceinpublic.com.au), 0417 131 977

- Errol Hunt, [errol@scienceinpublic.com.au](mailto:errol@scienceinpublic.com.au), 0423 139 210

[Watch the video.](#)



# World's smallest, brightest nano-flashlights finding a diseased needle in a haystack

## University of New South Wales Eureka Prize for Excellence in Interdisciplinary Scientific Research

- Winner: Professor Dayong Jin, Professor Tanya Monro and Professor Bradley Walsh.

The world's smallest flashlights may be able to light up diseased cells in our bodies. These infected or cancerous cells may be hiding among millions of healthy cells. The Super Dots team has created tiny crystals that can be implanted in the body to reveal the dangerous needle in a haystack.

The Super Dots team that developed the method for detecting these hidden, diseased cells has been awarded the *University of New South Wales Eureka Prize for Excellence in Interdisciplinary Scientific Research*.

The Super Dots team is led by Professor Dayong Jin from the University of Technology Sydney and Macquarie University; Professor Tanya Monro from the University of South Australia and University of Adelaide and Professor Bradley Walsh from Minomic International and Macquarie University. The work is being progressed by the ARC Centre of Excellence for Nanoscale BioPhotonics.

The Super Dots team has developed fluorescing nanocrystals that 'switch on' at different times, shining an intense, short burst of light – just tens of millionths of a second – that can reveal any diseased cells.

"By combining physics, chemistry and biology, this research should ultimately allow us to watch the interaction between drugs and cancerous cells at a molecular level within the patient's body," Kim McKay AO, Executive Director and CEO of the Australian Museum said.

As well as real-time diagnosis of disease, the technology has potential for creating invisible, lifetime-coded inks that could add 'uncrackable' security to banknotes and passports.

**Established in 1827, the Australian Museum is the nation's first museum and one of its foremost scientific research, educational and cultural institutions. The Australian Museum Eureka Prizes are the most comprehensive national science awards, honouring excellence in Research and Innovation, Leadership, Science Communication and Journalism, and School Science.**

The other finalists were:

- The BioCode team of Associate Professor Sean O'Donoghue (CSIRO and Garvan Institute for Medical Research) and Professor David James and Associate Professor Jean Yang (University of Sydney), which has described and visualised an insulin mechanism causing obesity and disease.
- The EVestigators team, comprising Dr Roger Edwards (Neural Diagnostics) and Professor Paul Fitzgerald, Dr Caroline Gurvich, Professor Jayashri Kulkarni, Adjunct Professor Brian Lithgow and Associate Professor Jerome Maller (Monash Alfred Psychiatry Research Centre). The EVestigators team have developed a diagnostic tool able to warn of potential mental health issues in real time.

Further information:

- Professor Dayong Jin, University of Technology Sydney, Macquarie University, [dayong.jin@uts.edu.au](mailto:dayong.jin@uts.edu.au), 0433 875 470
- Professor Tanya Monro, University of South Australia and University of Adelaide, [tanya.monro@unisa.edu.au](mailto:tanya.monro@unisa.edu.au), 0400 649 369
- Professor Bradley Walsh, Minomic International and Macquarie University, [Brad.Walsh@minomic.com](mailto:Brad.Walsh@minomic.com), 0413 231 296

For media enquiries please contact the Australian Museum Eureka Prizes media team:

- Niall Byrne, [niall@scienceinpublic.com.au](mailto:niall@scienceinpublic.com.au), 0417 131 977
- Errol Hunt, [errol@scienceinpublic.com.au](mailto:errol@scienceinpublic.com.au), 0423 139 210

[Watch the video.](#)

# Making blood on demand with stem cells?

---



## University of New South Wales Eureka Prize for Scientific Research

- Winner: Professor Peter Currie, Dr Georgina Hollway and Phong Nguyen.

Everyday medical procedures can require litres of donated blood. Could much of that blood be artificially created in the lab, reducing the pressure on blood banks?

A team of Melbourne and Sydney researchers has unlocked a mechanism that triggers stem cell production in blood, making the production of blood cells in the laboratory an achievable end goal.

The team comprises Professor Peter Currie and Phong Nguyen (Australian Regenerative Medicine Institute, Monash University) and Dr Georgina Hollway (Garvan Institute of Medical Research).

For identifying a mechanism that triggers stem cell production in zebrafish blood, they have been awarded the *University of New South Wales Eureka Prize for Scientific Research*.

“These Australian researchers have transformed our understanding of stem-cell development,” Kim McKay AO, Executive Director and CEO of the Australian Museum said. “Their work opens up a host of new research routes, with exciting potential to generate blood cells on demand for medical treatment,” she said.

The team identified a new family of cells – endotomal cells – that wrap themselves around nascent stem cells, signalling them via released proteins that it’s time to ‘switch on’.

The breakthrough is only the first step in what will be a lengthy scientific process, but it opens up a whole new line of inquiry within developmental biology: to find what other molecular signals are produced by these new cells to stimulate stem cell production.

The other finalists were:

- David Khoury and Associate Professor Mary Myerscough (University of Sydney) and Associate Professor Andrew Barron (Macquarie University) for solving the mystery of disappearing bees.
- Professor Rick Shine (University of Sydney) who has found a way to stop small mammals from being poisoned by toxic cane toads.

**Established in 1827, the Australian Museum is the nation’s first museum and one of its foremost scientific research, educational and cultural institutions. The Australian Museum Eureka Prizes are the most comprehensive national science awards, honouring excellence in Research and Innovation, Leadership, Science Communication and Journalism, and School Science.**

Further information:

- Professor Peter Currie, Australian Regenerative Medicine Institute, Monash University, [peter.currie@monash.edu](mailto:peter.currie@monash.edu), 0414 138 005
- Dr Georgina Hollway, Garvan Institute of Medical Research, [g.hollway@garvan.org.au](mailto:g.hollway@garvan.org.au), 0432 396 011
- Phong Nguyen, Australian Regenerative Medicine Institute, Monash University, [phong.d.nguyen@monash.edu](mailto:phong.d.nguyen@monash.edu)

For media enquiries please contact the Australian Museum Eureka Prizes media team:

- Niall Byrne, [niall@scienceinpublic.com.au](mailto:niall@scienceinpublic.com.au), 0417 131 977
- Errol Hunt, [errol@scienceinpublic.com.au](mailto:errol@scienceinpublic.com.au), 0423 139 210

[Watch the video.](#)