# The Royal Society OF VICTORIA

Promoting science since 1854

PATRON: The Hon Linda Dessau AC
Governor of Victoria

PRESIDENT: Mr David Zerman

## National Science Week with the RSV:

**8th August:** *Mind over Faecal Matter: Gut Biome & Mental Health*

*With **Associate Professor Elisa Hill-Yardin** & **Associate Professor Ashley Franks***

**9th August:** *Science at the Extreme (launch at Melbourne Museum)*

*With **Dr Darlene Lim, Dr Kate Selway, Dr Dianne Bray** & **Mr Nate Byrne***

**10th August:** *Extrasensory (main event at the Parliament of Victoria)*

**14th August:** *Stories from the Cosmos: what Indigenous storytelling can teach us about memory*

*With **Dr Simon Cropper, Ms Kat Clarke, Dr Lynne Kelly, Dr Duane Hamacher** & **Dr Meredith McKague***

**15th August:** *Young Scientist Research Prizes*

**17th August:** *The Alchemist: Turning Waste into Wealth*

*With **Professor Veena Sahajwalla***

**28th August:** *Let's Torque – Undergraduate Science Communication Competition Grand Final*

# August 2019 Newsletter

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The Royal Society of Victoria Inc.
8 La Trobe Street,
Melbourne Victoria 3000
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rsv.org.au

## September Advance Notice

**11th September: Public Lecture @ Government House**

*Victoria's Environment – How We're Adapting to the New Normal*

*With **Dr Pandora Hope, Professor Roslyn Gleadow**, **Associate Professor Anthony Boxshall and more***

**12th September:** *Communicating Astrophysics*

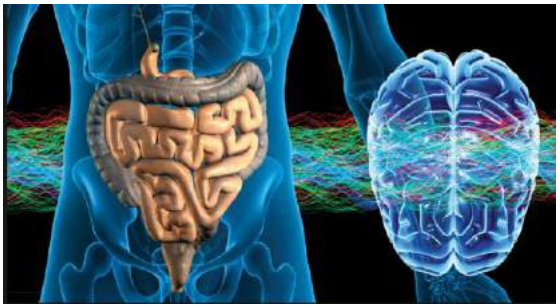
*With **Associate Professor Alan Duffy***

**19th September:** *Phillip Law Postdoctoral Award Lecture*

# Mind over Faecal Matter: Gut Biome and Mental Health

**Thursday, 8th August at 7:00pm**

**Speakers:**



## Associate Professor Elisa Hill-Yardin

**ARC Future Fellow & Vice-Chancellor's Senior Research Fellow, School of Health & Biomedical Sciences, RMIT University**

## Associate Professor Ashley Franks

**Director of Research, School of Life Sciences and Leader of Franks Lab for Applied and Environmental Microbiology, La Trobe University**

*Spoiler: we really do have gut feelings.*

Food is something we find ourselves always thinking about and there's a good reason for that. We have a 'second brain' in our gut that regulates the digestion and movement of our food from one end of the gastrointestinal tract to the other. Our gut brain and main brain are connected and influence mood, behaviour and mental health.

Our gut is home to trillions of microbes, making up one third of faeces. Over the last decade, scientists have realised that most of these bacteria are beneficial to both our brain and our gut, and without them our guts don't function properly.

People with autism often suffer from gut problems, but nobody has known why. Our speakers' work has discovered the same gene mutations – found both in the brain and the gut – could be the cause. These gene mutations cause changes in how the gut works as well as changing the balance of the bacteria in the gut. Different gut bacteria in turn alter gut function and worsen gut health via a detrimental feedback loop.

Associate Professors Elisa Hill-Yardin and Ashley Franks will discuss how changing the way neurons communicate in the brain can alter the gut and the microbial communities we need for health. They will explore how combining neuroscience, microbiology and advanced genetics allows us to provide a holistic view of the gut-brain axis, how it becomes unbalanced and how we can engineer changes to ease dysbiosis and gut dysfunction.

***About the speakers:***

**Associate Professor Elisa Hill-Yardin** is an ARC Future Fellow and Vice Chancellor's Senior Research Fellow at RMIT University. She leads the Gut-Brain Axis laboratory in researching how the nervous system interacts with microbes in health and disease including in autism-associated gut dysfunction. Dr Hill-Yardin regularly communicates research to the public including via mainstream media. She is a founding member and Chair of Frontiers in Neurodevelopmental Disorders (FiND), which enables leading international researchers to engage with scientists, clinicians and families.

**Associate Professor Ashley Franks** is the Director of Research for La Trobe University's School of Life Sciences, where he has established the Franks Lab for Applied and Environmental Microbiology, investigating microbial community structure and functions at interfaces. Together with colleagues and students, he has active research projects looking at the interactions of mixed microbial communities with plants, soils, microbiome, electrodes, sewer systems and submarines. For his research he has received a number of awards and funding from national and international sources.

**Places limited, bookings essential!** *Cocktail function from 6:00pm.* **Register online** now at https://rsv.org.au/events/mind-over-faecal-matter/, call or email the RSV office to secure your place: 9663 5259, rsv@rsv.org.au. Fully subscribed **RSV Members** can access discounted tickets by registering via their online profile, or entering their **promotional code** in the online ticketing window.

# Science at the Extreme

## Friday, 9th August at 7:00pm

### Join us for the 2019 Victorian public launch of National Science Week at the Melbourne Museum

**National Science Week** is a collection of events, large and small, staged by individuals and organisations that, when taken together, make up one of Australia's largest festivals.

Science has always been about exploration, discovering and expanding our understanding of the nature of things. Every day, scientists in the field balance the excitement and danger of collecting data from some of the wildest and most hostile environments on the planet in the pursuit of knowledge.

From the frozen tundra of Antarctica to the deserts of central Australia, from the lava flows of Hawai'i to the depths of the world's deepest abyss off the Eastern coast of our continent, we're bringing together a dream team of science adventurers to share their journeys and discoveries.

This very special night will bring to you a panel of incredible speakers exploring **Science at the Extreme**, after which you can see the science galleries, talk to research scientists from Museums Victoria and enjoy a drink to celebrate the launch of this incredible celebration of all things science!

**Speakers:**

**Dr. Darlene Lim** is a geobiologist based at the **NASA Ames Research Center** in California. She has spent 25 years conducting field research around the world, in both the Arctic and Antarctic, as well as in underwater environments where she has piloted submersibles as a scientist and explorer. Currently, Darlene leads several NASA-funded research programs that are focused on blending field science research with the development of capabilities and concepts for future human spaceflight into deep space and Mars. She is the Principal Investigator of the NASA-funded SUBSEA, BASALT and Pavilion Lake research programs, and the Deputy PI of the NASA FINESSE research program. Darlene is a passionate promoter of science and exploration education and outreach efforts, and founded the Haven House Family Shelter STEM Explorers' Speakers Series, which from 2012-2015 enabled NASA and academic researchers to conduct educational sessions with homeless children in the San Francisco Bay Area.

**Dr Kate Selway** is an Earth scientist who is passionate about understanding how our amazing planet works. She has led research teams in the deserts of central Australia, the savannas of East Africa, and the frozen expanses of the Greenland and Antarctic ice sheets. Like a doctor taking an x-ray, Kate makes measurements on the Earth's surface to peer deep inside it. She runs mathematical models of her data to understand why plate tectonics happens, and improve measurements of ice loss from ice sheets. Kate was awarded her PhD from the University of Adelaide in 2007, where she continued working in research positions, including an ARC Postdoctoral Fellowship, until 2012. She then worked abroad in postdoctoral research positions at Yale University (2012-2013), Columbia University (2013-2015) and the University of Oslo (2015-2016). In 2017 Kate returned to Australia to commence an ARC Future Fellowship at **Macquarie University**.

**Dr Dianne Bray** is an ichthyologist and Senior Curator of Vertebrate Zoology at **Museums Victoria**. Her job involves managing and developing natural history collections (mostly fishes and scientific artworks) so that people – including those not yet born – can answer all sorts of questions about our biodiversity now and into the future. Dianne joined the Museum's team aboard CSIRO's *RV Investigator* in 2017 to map the structure of the seafloor and collect samples of bizarre, deep sea creatures never before seen, contributing to our knowledge of abyssal biodiversity, including food webs, population connectivity, and evolutionary history, and help us understand potential changes caused by human activities.

**Nate Byrne (MC)** is a meteorologist and weather presenter on **ABC News Breakfast**. Prior to this, Nate spent 12 years working as a meteorologist and oceanographer in the Royal Australian Navy, and achieved a Master of Science Communication (Outreach) with the ANU and Questacon. A scholar of the Shell Questacon Science Circus, Nate toured the country delivering science shows to outback communities across Australia.

**National Science Week** is presented under the **Inspiring Victoria** program by the **Victorian Coordinating Committee**, managed by the **Royal Society of Victoria**.

The full Victorian Science Week program now features over 400 events across the state – see what's coming up for your community at: https://inspiringvictoria.org.au/programs/national-science-week-victoria/events-program/

**Places limited, bookings essential! Register online** now at https://museumsvictoria.com.au/melbournemuseum/whats-on/national-science-week-public-launch-science-at-the-extreme/tickets/.


# Parliament of Victoria

## Saturday, 10th August from 6:00 to 10:00pm

*See, hear, smell, taste, feel, more at this cornucopia for the senses.*

What are the possible futures of human perception? At this event combining performance, storytelling, and experimentation, make sense of the world of the senses, and find the limits to your own.


Augment your reality. AI, bionics and smart devices are here to extend and enhance your senses. See the unseen, and walk on the surface of a cell. Find your way with your fingers, and collaborate with an AI to create a musical masterpiece.

Tell a story about the patterns hidden in the night sky, and imagine what trees might have to say. Ponder the concept of common sense, and what animals can perceive that humans can't. Listen to the music of the elephants, the last moments of the Mars Rover, and the unfolding of the evolution of species.

Challenge your senses to work together, and become aware of senses such as kinaesthesia. Learn about how our senses mingle in synesthetic experiences, and sometimes fool us with hallucinations.

Can you maintain your appetite in the face of distinctly un-appetising pictures? Or avoid being tricked in our food sensory testing lab? Congratulate yourself with a drink from our bar, and discover why champagne is so bubblicious.

The world is full of new phenomena to explore, hiding just beyond the reach of your senses. So tune your ears, engage your nose, ready your tastebuds, and flex your fingers in preparation for an evening sure to be extra sensory, exploring the beautiful Parliament of Victoria.

***This event is recommended for a 16+ audience.***
Food and beverages will be available for purchase at the event.

*Extrasensory is presented under the **Inspiring Victoria** program by the **Victorian Coordinating Committee** for **National Science Week**, **The Royal Society of Victoria**, and the **Parliament of Victoria**. Bookings are available online at [https://inspiringvictoria.org.au/event/extrasensory/](https://inspiringvictoria.org.au/event/extrasensory/).*

## Appearing at ExtraSensory:

### EXHIBITS & EXPERIMENTS:

- Skunk Control (Victoria University) - 'Fractured Altar' (light installation)
- CBNS (Monash University) - Journey inside a cell
- Dr Dominic Orth (Swinburne University) - try the virtual balance challenge
- Dr Simon Cropper (University of Melbourne) - Star stories, can you find the pattern?
- Arup – Pop-up sound lab experience
- Science Gallery Melbourne - 'The Sewer Soaperie'
- Sensilab (Monash University) - Tactile treasure maps
- Rossjohn Infection and Immunity Lab (Monash University) - Immersion immunity
- CASS (Deakin University) - Can you taste it? The art of sensory marketing
- Tara Storey (Food Scientist) – The sound of sweetness
- Dr Simon Harrison (CSIRO Data61) - 'The Digital Human'
- Dr Frank Feltham (RMIT University) - Sonic Efforts: the expression of walking through sound
- Dr David Sly (Swinburne University) - Next Gen 3D audio and hearables

### QUEENS HALL MAIN STAGE

- Elissa Goodrich (composer / vibraphone), Adam Simmons (saxophones / shakuhachi / bass clarinet), Gideon Brazil (saxophones / flute) – 'Gene Tree Project' - music of the evolution of species
- Nicholas J. Johnson – 'Deceptology: the neuroscience of magic'
- Vicki Hallett (composer / clarinet) – 'Elephant Trail'
- Sam Colcheedas – (composer / piano) – 'It's getting dark' - music of the Mars Rover
- Dr David Farmer – 'Intrasensory' - science comedy

### WORKSHOP PROGRAM

- The Science of Champagne (Culinary Science)
- Beer Science (Jon Seltin, Brewer)

### CHAMBER TALKS PROGRAM

- Dr Darlene Lim (NASA) - Sensing beyond Earth: mission Mars
- Silverpond - Artificial Intelligence: the new sense?
- Dr Erich Fitzgerald (Museums Victoria) - Whale sense
- Dr Simon Cropper (UoM) - Slave to sense: hallucinations and synesthesia
- Prof Arun Ram (UoM) - The musical sensation of mathematical discovery
- Dr David Sly (Swinburne University) - Hearables: the augmented human
- Dr Kate Selway (Macquarie University) – Sensing the extreme
- Dr Luke Smillie (UoM) - Common sense and Pseudo-profound Bulls**t
- Dr Maddy Yewers (UoM) - Do you see what I see? Animal vision in a colourful world

# Stories from the Cosmos: What Indigenous Storytelling can Teach us about Memory

**Wednesday, 14th August at 6:00pm**


For over 65,000 years, the night's sky has served as a map for Indigenous peoples all around the world. Aboriginal Australians plotted the absence and presence of stars to develop celestial maps for navigation to survive the harsh Australian landscape. In doing so, Aboriginal Australians built complex knowledge systems using signals from the sky and the landscape to recall and pass on significant knowledge, cultural values and wisdom.

The oral tradition of dreaming and songlines are deeply tied to the Australian landscape and night's sky, and this form of communication has endured phenomenally with memories being passed down from generation to generation to safeguard an encyclopaedic memory of water holes, walking routes and thousands of species of plants and animals across Australia.

Cultures around the world have long grouped stars into familiar patterns. Curiously, many of these constellations are perceived in strikingly similar ways, despite the cultures being geographically and temporally separated. Could this have something to do with psychological pattern recognition? And can we use the same method to encode our own memories in the modern world?

***Speakers:***

***Dr Simon Cropper***
**Melbourne School of Psychological Sciences, University of Melbourne**

***Dr Lynne Kelly***
**Science Writer, Author of "The Memory Code" and "Memory Craft"**

***Ms Kat Clarke***
**Artist, Writer & Assistant Curator at the Australian Centre for the Moving Image**

***Associate Professor Duane Hamacher***
**Indigenous Astronomy & Science, School of Physics, University of Melbourne**

**Moderator: *Dr Meredith McKague***

A part of the 'PsychTalks' seminar series convened by the **Melbourne School of Psychological Sciences**, supported by the Royal Society of Victoria and sponsored by a grant from the Victorian National Science Week Coordinating Committee.

Eventbrite **Places limited, bookings essential! Register online** now at https://rsv.org.au/events/stories-from-cosmos/.

# Young Scientist Research Prizes – 2019 Competition & Prize Ceremony

**Thursday, 15th August at 6:30pm**

**To foster and recognise excellence in Victoria's early career scientists, the Royal Society of Victoria has established four prestigious competitive prizes open to Victorian students in their final year of doctoral candidature, in all areas of the Biomedical & Health Sciences, Biological Sciences (Non-human), Earth Sciences and Physical Sciences.**

Following assessment of applications across the categories, six finalists will be selected to present to our audience on the evening of 15 August, 2019.

Of the six finalists, only four will win the first prize of $1,000 for their respective categories, with the runners-up receiving $500. The award is based on demonstration of the applicant's excellence in scientific research, ability to communicate scientific information clearly and succinctly to an audience of scientists and members of the general public on their particular research field and to answer questions from the audience.

Each of the short-listed candidates will be required to give a 15 minute oral presentation (10 minutes presentation, 5 minutes discussion) before a general audience of scientists and members at the Society. In addition to the merits of the methodology and significance of their scientific work, finalists will be judged on their ability to make their work accessible and interesting to an audience uninitiated in their field of endeavour.

Winners will be announced at a special function following the presentations at the Royal Society of Victoria's Hall.

The presentations are open to fellow students, friends and families through invitation, as well as RSV Members and the general public through this registration service.

*The Biological Sciences (Non-human) prize and Earth Sciences prize are generously supported by donations from the families of previous Royal Society Presidents: Edmund D Gill and Neil Archbold respectively. We also gratefully acknowledge the generous support of Dr S Max Richards AM and Mrs Margaret R Richards across all categories.*

**Places limited, bookings essential! Register online** now at https://rsv.org.au/events/ysrp-2019/, call or email the RSV office to secure your place: 9663 5259, rsv@rsv.org.au.

# Saving Species with Citizen Science

**15th, 16th, 22nd August from 6:00pm**
**Monash Tech School**
**Level 1, 29 Ancora Imparo Way, Clayton**


Anyone can contribute to science, regardless of their age or experience.

Come and join **BioQuisitive** and **Science For All** at **Monash Tech School** for this hands on workshop about how everyday citizens are working to protect critically endangered species using DNA detection and other advanced technologies.

Science For All and BioQuisitive are currently monitoring three endangered species, one of which is the Leadbeater's Possum, the focus of this workshop. Using a variety of different technologies, they're training members of the public to work like a forensics team; going out into the field, collecting samples, and using their mobile lab to analyse the results. Working with partners such as the **Australian National University**, they're identifying where these possums live in order to help map out their homes and inform evidence-based policies for protecting these species and their habitats. These technologies include thermal imaging cameras, DNA thermal cyclers, centrifuges, and more.

Observation and data collection is the core of the scientific method. **Science for All** has values which recognise that knowledge takes many forms – this includes people who are subject area experts, people with traditional, indigenous or local knowledge, and those with big dreams and big ideas. All are welcome to this workshop, no matter how much lab experience you have!

In this workshop you will learn:

- How you can get involved in collecting data to inform evidence-based environmental management, which protects Victoria's unique biodiversity
- About the principles of biodiversity and monitoring techniques
- How DNA can be used to identify any living organism
- How to use pipettes and other basic lab equipment
- How to extract DNA, photocopy it, and analyse it using the special BentoBio portable lab unit.

Part of this event is a hands on workshop in the lab. Please bring closed toe shoes, and if you have long hair, a hair tie. Minors should be accompanied by an adult. Please arrive 15 minutes early to ensure the workshop commences on time.

## *Presenters:*

**Science For All** is a not-for-profit organisation which helps anyone get involved in shaping the future of human knowledge. They embrace openness, transparency, and have a community centric approach to their work. They work under the auspices of the **Royal Society of Victoria** and their projects are supported by grants from the **State Government of Victoria** and public donations. **Jack Nunn**, Director of **Science for All**, will be facilitating the session.

**BioQuisitive** is a charity running a community laboratory out of a renovated shipping container in Brunswick, democratising access to science. Also known as 'do-it-yourself biologists', they are a combination of everyday citizens, researchers, and professionals that work in mycology, microbiology, genetics, and more. At **BioQuisitive**, everyday people are put in the position of principle investigator for their own curiosity. **Andrew Gray**, Director of **Bioquisitive**, will be running the in-depth sessions on DNA in the lab.

Located within the City of Monash and hosted by Monash University, **Monash Tech School** is at the nexus of leading industry precincts, positioned close to excellent secondary schools, and supported by exceptional tertiary providers. The School provides real-world experiences through hands-on deep learning experiences, which complement and build on existing STEM and Humanities, Arts, and Social Sciences curriculums in the Secondary Education Sector.

A National Science Week event. Runs on 15, 16 and 22 August.

**Places limited, bookings essential! Register online** now at https://rsv.org.au/events/saving-species/, call or email the RSV office to secure your place: 9663 5259, rsv@rsv.org.au.

# The Alchemist: Turning Waste into Wealth

**Saturday, 17th August from 5:00pm**

**Speaker:**

## Scientia Professor Veena Sahajwalla

**Founding Director, Centre for Sustainable Materials Research & Technology, The University of New South Wales**

***Image:*** *Unknown Artist. Pieter Bruegel the Elder (after). The Alchemist (from the sepia drawing), photo reproduction, National Gallery of Victoria, Melbourne, Felton Bequest, 1928.*

Professor Veena Sahajwalla is revolutionising recycling science.

Rather than take up arms against a sea of pollution, Professor Sahajwalla approaches the global waste crisis as a commercial opportunity with real market value to help drive behaviour change. Last year her SMaRT centre opened the world's first e-waste micro-factory to process old computers, phones, televisions, and all the electronic junk that ends up in landfill. The waste is sorted and dismantled by robots, then mined for its precious elements. Circuit boards are stripped of metals such as gold, copper and tin, while glass and plastic are converted to industrial-grade ceramics and plastic filaments for use in 3D printing.

Join us to explore how repurposing the fundamental molecules and elements within post-consumer waste products is reinventing the way we treat – and perceive – these largely untapped commodities.

***About the speaker:***

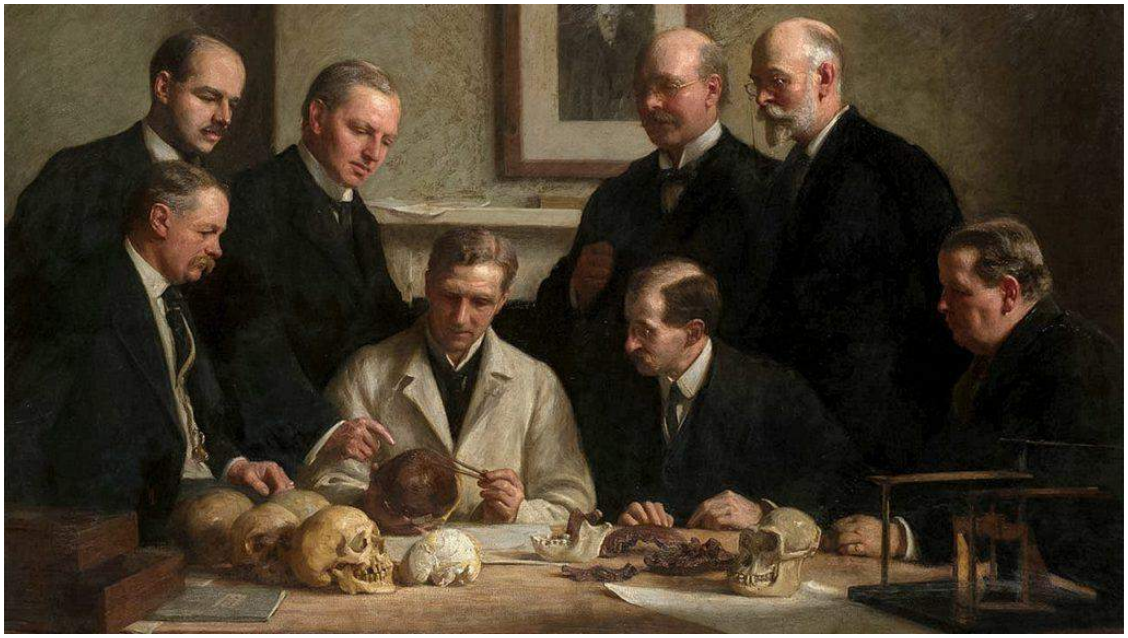
ARC Laureate Professor **Veena Sahajwalla** is enabling global industries to safely utilise toxic and complex wastes as low cost alternatives to virgin raw materials and fossil fuels. As Founding Director of UNSW's Centre for Sustainable Materials Research and Technology, Veena and her team are working closely with industry partners to deliver the new science, processes and technologies that will drive the redirection of many of the world's most challenging waste streams away from landfills and back into production; simultaneously reducing costs while alleviating pressures on the environment.

Veena will be familiar to many as an expert panellist on the ABC show *The New Inventors*. She became the first woman to be awarded the prestigious Jubilee Professorship by the Indian Academy of Sciences in 2017. In 2016, she was named one of Australia's Most Innovative Engineers by Engineers Australia. These were the latest in a long list of honours that included, in 2015, Innovation Winner of the Australian Financial Review–Westpac 100 Women of Influence awards and Veena's inclusion on the list of Australia's 100 Most Influential Engineers (Engineers Australia). In 2012, Veena won the Australian Innovation Challenge (Overall Winner) as well as the GE Eco Innovation Award for Individual Excellence and a Banksia Award. Her 'green steel' technology was also named on the US Society for Manufacturing Engineers' 2012 list of 'innovations that could change the way we manufacture'. In 2011, Veena received the Pravasi Bharatiya Samman Award (outstanding achievement in the field of science) from the Government of India. She was elected as a Fellow of the Australian Academy of Science in 2017, a Fellow of the Australian Academy of Technology and Engineering in 2007 and a Fellow of the Institution of Engineers, Australia, in 2005.

**Places limited, bookings essential!** *Networking function from 5:00pm.* **Register online** now at https://rsv.org.au/events/the-alchemist/, call or email the RSV office to secure your place: 9663 5259, rsv@rsv.org.au. Fully subscribed **RSV Members** can access discounted tickets by registering via their online profile, or entering their **promotional code** in the online ticketing window.

# Spot the Bull S…cience

**Sunday, 18th August from 2:30pm**



The Science Nation is celebrating National Science Week with a contest of intelligence, interrogation and deceit. The premise is simple – Australia's best and brightest scientists will present three scientific 'facts'; the catch is, only two are correct! Your job is to discern the truthful statements from the fiction while the scientists do their Oscar-winning best to fool you into believing the latter. Spot the Bull S…cience is 90 minutes of science & laughs that promises to be fun for everyone.

Trying to fool Melbourne is: immunologist and begrudging Pokemon enthusiast, **Dr Jess Borger**; animal physiologist, neuroscientist and backyard orchardist, **Dr Angelina Fong**; biomedical engineer who believes diamonds really are a girl's best friend, **Dr Kate Fox**; immunologist and singer-in-the-shower, **Catriona Nguyen-Robertson**; and engineer of novel materials, writer of non-fiction and bow tie enthusiast, **Dr Mohammad Taha**.

**Places limited, bookings essential! Register online** now at https://rsv.org.au/events/spot-the-bs/, call or email the RSV office to secure your place: 9663 5259, rsv@rsv.org.au. **RSV Members** can access discounted tickets by entering the **promotional code "RSV"** in the online ticketing window.

# Darkness Visible Down Under

**Thursday, 12th September at 7:00pm**

## Speaker: Associate Professor Alan Duffy

***Astrophysicist, Centre for Astrophysics and Supercomputing, Swinburne University***
***Lead Scientist, Royal Institution of Australia***

Decades of research have led astronomers to a staggering conclusion, that there exists a new, invisible type of mass that outweighs everything we can see five times over. Join Associate Professor Alan Duffy, who will explain how we know so much about the properties of a particle we have yet to discover, and how Australia is playing a leading role in uncovering the nature of this mysterious dark matter with SABRE, the world's first dark matter detector at Victoria's Stawell gold mine.

***About the speaker:***

Associate Professor Alan Duffy is an astrophysicist creating universes on supercomputers to understand how galaxies form and to probe the nature of dark matter. He often gets to explain this work to as wide an audience as possible on TV, radio and public events.

He is currently based at the Centre for Astrophysics and Computing at Swinburne University. Previously he was a postdoctoral researcher at the University of Melbourne, and a postdoctoral research associate with ICRAR at the University of Western Australia. Alan obtained his PhD from the Jodrell Bank Centre for Astrophysics at the University of Manchester and spent time as a postgraduate at the Sterrewacht, Leiden Observatory in The Netherlands.

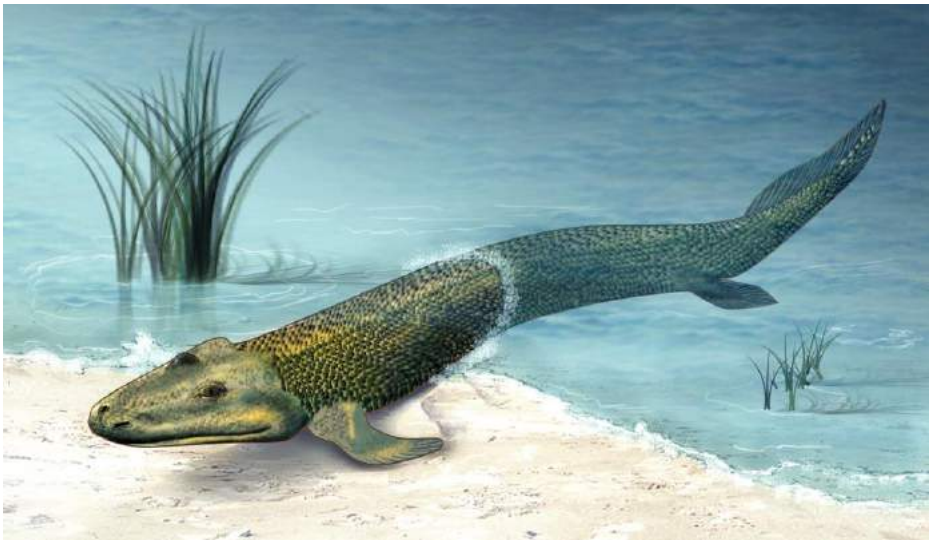
Alan is a member of SABRE, the world's first dark matter detector in the Southern Hemisphere, based at the bottom of a gold mine at the Stawell Underground Physics Laboratory in Victoria, Australia.

As a member of two leading surveys on the next-generation Australia Square Kilometre Array Pathfinder telescope he creates local universe simulations that can be used to test our galaxy formation and dark matter theories when compared with observations from the WALLABY and DINGO surveys.

**Places limited, bookings essential!** *Cocktail function from 6:00pm.* **Register online** now at https://rsv.org.au/events/darkness/, call or email the RSV office to secure your place: 9663 5259, rsv@rsv.org.au. Fully subscribed **RSV Members** can access discounted tickets by registering via their online profile, or entering their **promotional code** in the online ticketing window.

# Evolutionary Transformations in Vertebrate History

**2 – 4th October, Melbourne Museum**



This **Boden Conference** is a two-and-a-half-day symposium, bringing together top Australian and international scientists, students, and early career researchers to present the latest advancements in investigating the evolutionary dynamics of these profound events, with an emphasis on methods for integrating modern and palaeontological data.

Evolutionary transformations during the 500-million year history of vertebrate life include the colonisation of land by tetrapods, the secondary invasion of water by whales, feathered flight in dinosaurs, and live mammalian birth, to name but a few. These shifts involve fundamental changes in ecology, behaviour, physiology and development that underlie the origins of major clades and have lasting consequences in modern vertebrate forms.

The conference will end on Friday evening, 4 October, with a catered social event held at the **Royal Society of Victoria**, where esteemed Australian palaeontologist **Professor John Long** will give an informal talk on the significance of Australia's fossil record in reconstructing the history of vertebrate life.

**Keynote Speakers:**

**Professor Michael Coates,** University of Chicago, USA
*All change? The Devonian-Carboniferous boundary and the origin of modern vertebrate clades*

**Assistant Professor Graham Slater,** University of Chicago, USA
*Paleo-phylogenetic perspectives on morphological and ecological diversification in Cetacea*

**Dr. Daniel Thomas,** Massey University, NZ
*Towards resolving an adaptive landscape for penguins*

**Dr. Emma Sherratt,** University of Adelaide, Australia
*Reconstructing morphological evolution from complex phenotypes and Big Data*

**Professor Anjali Goswami,** NHM/University College London, UK
*From development to deep time: the consequences of phenotypic integration for vertebrate evolution*

**Dr. Hélène Morlon,** CNRS, France
*Phylogenetic approaches for understanding how biodiversity is distributed in space and time*

**Registrations: $220 standard, $200 RSV members, $190 student/concession. Register online** now at https://rsv.org.au/events/evolutionary-transformation/.

## Nominations for RSV Membership

Nominations for membership of the Society have been received on behalf of:

Professor Rodney Daniel **SINCLAIR**, Professor of Dermatology, The University of Melbourne
Mr Guy **HODGKINSON**, Technical Director, Middleton Group
Ms Vanessa **WILLIAMS**, Strategic Communications, Jesuit Social Services

Unless Members request a ballot, these will be considered for election by Council and if elected, will be announced at the Ordinary Meeting of the Royal Society of Victoria to be held on 12th September 2019. Recently elected members who have not yet signed the Society's membership book are warmly invited to attend the 8th August meeting to be formally welcomed as members. **Please inform the office if you plan to attend, so we can prepare your membership certificate and welcome pack for collection.**

## Girls in Physics Breakfast – Monash University, Clayton Campus

**7:30 – 10:00am, 28th August,**
**Banquet Rooms**

### *How Neutrons Can Save the World*

Speaker: **Dr Helen Maynard-Casely**

Neutrons are small, neutral and often in a spin, and so much more than 'just' part of the atom. They are made up of three quarks: two 'Up' quarks and and one 'Down' quark. Neutrons are the sub-atomic particles that are here to save the world. Whatever the challenge facing the world, this trusty particle can be called on to discover the details that no other can fathom. From the shape of a virus and how a drug can disable it, to keeping electrons flowing in the next generation of batteries - neutrons are here to shed light and solve the grand challenges we face today.

This event is sponsored by The Laby Foundation, Vicphysics Teachers' Network, the Victorian Branch of the Australian Institute of Physics and supported by the Royal Society of Victoria.

**Registrations for students and teachers:**
https://www.trybooking.com/book/event?eid=504100

**About the speaker:**

**Dr Helen Maynard-Casely** is a Planetary Scientist based at the Australian Nuclear Science and Technology Organisation (ANSTO) where she uses neutrons and synchrotron x-rays to investigate the materials that make up our solar system.

She has a PhD in high-pressure physics from the University of Edinburgh and has been lucky enough to have collected data in facilities all over the world, blowing up a few diamonds along the way. Always keen to tell anyone who'll listen about neutrons she tweets @Helen_E_MC. She currently writes 'The shores of Titan' column for *The Conversation*. She also holds the Guinness World record for the longest glow-in-the-dark necklace (326.44 m).

**Call for Table Guests**

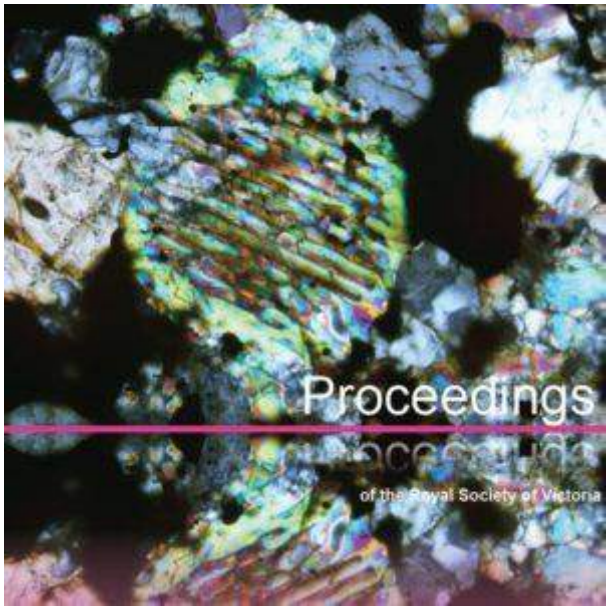
This is the final Girls in Physics Breakfast for 2019. The **VicPhysics Teachers Network** aims to encourage girls in Years 10 to 12 to appreciate the diversity of careers that studying physics enables, to appreciate the satisfaction that comes from a challenging career in science and to be aware of the success that women can achieve in the physical sciences.

The speakers at these breakfasts are compelling, but the real key to student engagement is the opportunity to share a table with young women studying or working

in physics and engineering fields. At the table, discussion ensues about what the women do, what they like about it as well as their training, future prospects, etc. As a student at one of early breakfasts told her teacher, '*I was talking to a guest at my table and her career sounded so amazing. Then I realised that in 8 years that could be me. I got so excited.*' If this guest could be you, and you're interested in supporting the next generation of women in engaging with STEM literacy (and meeting other women in STEM fields), then please register your interest at:

https://www.vicphysics.org/breakfast.html .

## Proceedings of the Royal Society of Victoria – Volume 131, Part 1




Volume 131, Part 1 of the *Proceedings of the Royal Society of Victoria* is now online at http://www.publish.csiro.au/rs, featuring a new species of calcareous **sponge** discovered in Geelong, a spectacular new H5 **meteorite** uncovered in Maryborough, an account of Indigenous meteorological knowledge using **stellar scintillation**, a reclassification of fossil **graptolites** from the early Bendigonian, a case for regulated investment in a **resilient electricity network**, an account of the Bureau of Meteorology's new extreme **heatwave event forecasting service**, and a discussion on whether a similar service might be required for **cold extremes** on public health grounds.

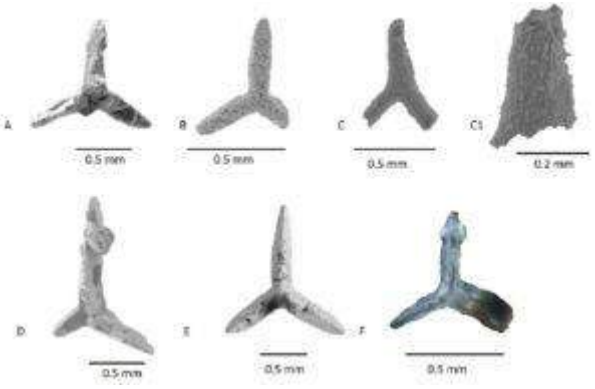
For those who have ordered hard copies, we will be printing both Part 1 and 2 in a single volume this year, for distribution over the December – January period.

- ***Porifera (Calcarea: Lithonida) from the Lower Miocene Batesford Limestone, Victoria, Australia, including a new species Monoplectroninia malonei sp. nov.***

*Authors: Fearghus McSweeney, John Buckeridge and Michelle Kelly.*Paper: http://www.publish.csiro.au/rs/pdf/RS19001

**Location of the outcrop in the Batesford Limestone, Batesford Quarry. Satellite Source DigitalGlobe © 2017. Inset F. McSweeney.**

The Batesford Limestone is a fossiliferous Miocene calcarenite exposed in the Australian Portland Cement Quarry, at Fyansford, about 8 km northwest of Geelong, Victoria. The limestone formed off the flanks of a granitic inselberg known as Dog Rocks, with preferential accumulation of skeletal carbonate, recording a transgressive sequence, as the island slowly submerged in the Port Phillip Basin of Victoria.



**Loose spicules from sediment analysis. Micrograph images (A–E) taken on Philips XL30 SEM and light microscopy image (F). A, E, F: triactine spicules and B as suspected triactine spicule; C1 close-up of C, and D (parasagittal) show epitaxial growth of calcite on the rays; F: triactine with inception thread, visible as darkened central canal.**

Sponge body fossils have been collected from the Batesford Limestone for many years but not formally identified or published. This project was undertaken to evaluate the sponge fauna present and determine the diversity of that group.

Four species have been recognised from this biofacies by the authors: *Tretocalia pezica* Hinde, 1900, *Bactronella australis Hinde*, 1900, *Plectroninia halli* Hinde, 1900 and a new species, *Monoplectroninia malonei* sp. nov., described and named in this paper.

- ***Maryborough, a new H5 meteorite find from Victoria, Australia***

**The Maryborough meteorite prior to cutting. Museums Victoria specimen E19297.**

*Authors: William D. Birch, Dermot A. Henry and Andrew G. Tomkins.* Paper: http://www.publish.csiro.au/rs/pdf/RS19002

In May 2015, Mr David Hole discovered a 17 kg single mass of a stony meteorite while fossicking for gold, using a metal detector, in Maryborough Regional Park, Victoria. The meteorite was found on the surface, resting on a yellowish brown clay, in open box–ironbark forest.

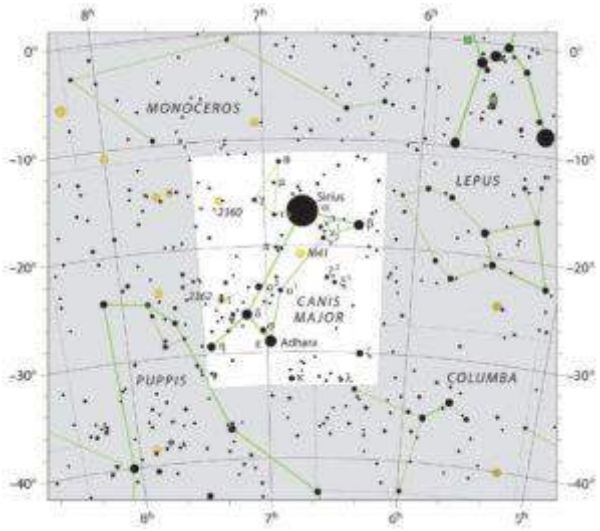
**Cutting the Maryborough Meteorite for analysis at Crystal World. *Photo: Thomas Kapitany***

The Maryborough meteorite is a new H5 ordinary chondrite, a single stone with a mass of 17 kg. There is no evidence for any shock-inducing event and the meteorite shows incipient weathering in the form of thin iron-oxide mantles around the Fe–Ni grains.

A terrestrial age of less than 1000 years is estimated from C14 dating. While there are a number of historic reported meteor sightings in the Maryborough district, none can be tied to the meteorite's find site. To date, Maryborough is the third H5 ordinary chondrite and the second largest single chondritic mass, after Kulnine (55 kg), found in Victoria.

- **Indigenous use of stellar scintillation to predict weather and seasonal change**

*Authors: Duane W. Hamacher, John Barsa, Segar Passi and Alo Tapim.*Paper: http://www.publish.csiro.au/rs/pdf/RS19003

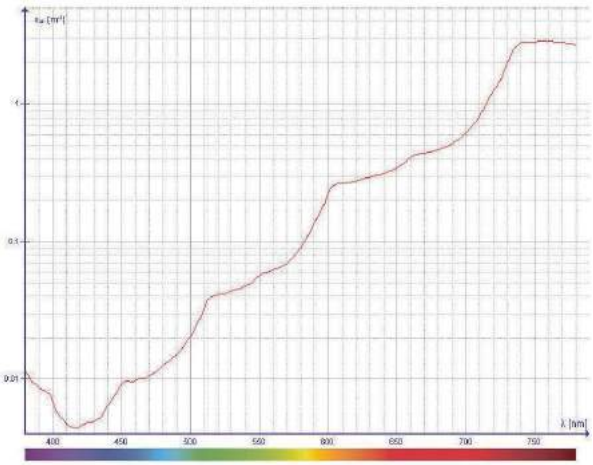



**The constellation Canis Major, featuring the star Sirius. Image: IAU.**

Indigenous peoples around the world observe the motions and positions of stars to develop seasonal calendars. Changing properties of stars, such as their brightness and colour, are also used for predicting weather. Combining archival studies with ethnographic fieldwork in Australia's Torres Strait, the authors explore the various ways Indigenous peoples utilise stellar scintillation (twinkling) as an indicator for predicting weather and seasonal change, and examine the Indigenous and Western scientific underpinnings of this knowledge.

By observing subtle changes in the ways the stars twinkle, the Meriam people of the

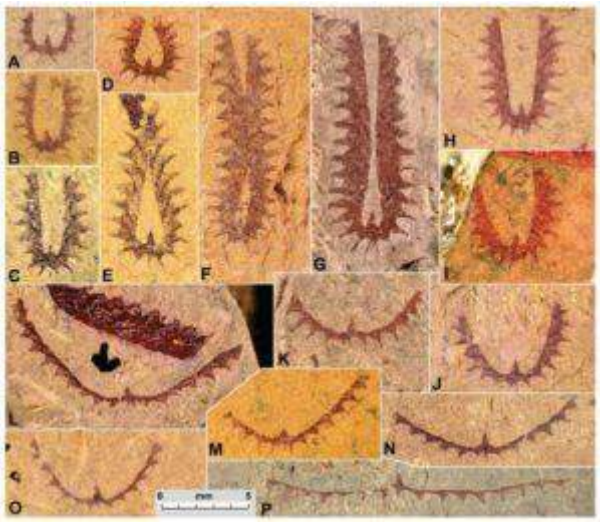
Torres Strait gauge changing trade winds, approaching wet weather and temperature changes. The authors also examine how the Northern Dene of Arctic North America utilise stellar scintillation to forecast weather.



**The absorption coefficient of water in the visible spectrum (using data from Pope & Fry 1997, and Kou et al. 1993). Wikimedia Commons.**

- ***Extraordinary dimorphism in the Phyllograptid Harrisgraptus n. gen. from the early Bendigonian (Early Floian, Early Ordovician) of Victoria, Australia***

Author: A.H.M. VandenBerg. Paper: http://www.publish.csiro.au/rs/pdf/RS19004



**Photographs of tubaria of *Harrisgraptus eocaduceus* showing the extraordinary variation in habit and morphology. Alphabetical ordering follows steps in the transition from slender-stiped U-shaped (A) to wide-stiped U-shaped (G), after which stipes gradually become more divergent and slender (H–P), until they are fully extensiform (P).**

This paper analyses two samples of graptolite collected and classified in 1933 by one of Victoria's foremost researchers, Dr William John Harris and maintained in the research collections of Museums Victoria. Graptolites are fossils of small, aquatic invertebrates that lived during most of the Palaeozoic era (542 – 251 million years ago). Previously classified as two distinct species, the author identifies the two samples as members of a single population with extraordinary dimorphism, placing them in the new genus *Harrisgraptus* in honour of Dr Harris, and in the family *Phyllograptidae*.

Several authors have illustrated and described graptolites ascribed to Harris' earlier classifications. All are superficially similar to the Victorian species but none can be assigned to *Harrisgraptus* with any confidence, as all lack the elongated proximal rutella typical of the genus. Most are from much younger strata. It therefore seems that *Harrisgraptus* is endemic to Victoria.

- ***Resilience and reliability for electricity networks***

*Author: Jill M. Cainey.* Paper: http://www.publish.csiro.au/rs/pdf/RS19005

**Uprooted tree damaging electricity network equipment (Credit: Nycshooter/E+/Getty Images).**

The ability of any system to be ready for and recover from a major event is described as resilience, but resilience is not an incentivised activity for electricity networks and the impact of climate change means that major event days are increasing in number, leading to higher costs for customers.

Without a regulatory focus on resilience, a network may meet or exceed reliability standards, while still not being resilient in major events. Investing in reliability does not always deliver resilience, but investing in resilience is demonstrated to deliver

significant improvements in both resilience and reliability, resulting in beneficial performance outcomes for customers using cost-effective and efficient network investment approaches.

- ***A heatwave forecast service for Australia***

*Authors: Lynette Bettio, John R. Nairn, Steven C. McGibbony, Pandora Hope, Andrew Tupper and Robert J.B. Fawcett.*Paper: http://www.publish.csiro.au/rs/pdf/RS19006


**BoM Twitter post showing the issuance of a heatwave forecast for the three-day period 27 to 29 December 2018.**

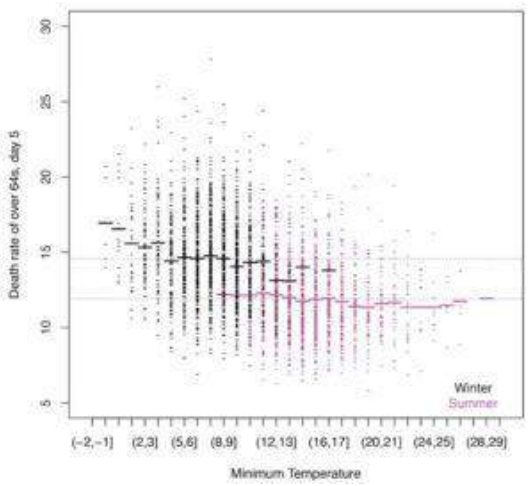
Australia's mean temperature has risen by over 1°C since 1910, leading to an increase in the frequency of extreme heat events. Extreme heat can profoundly impact human health, infrastructure and the environment. Research conducted at the Bureau of Meteorology and elsewhere shows that climate change is impacting the intensity and frequency of extreme heat events. One way that the Bureau has responded to this challenge is by providing a forecast service specifically targeted at identifying heatwaves.

A heatwave service has been developed with clear impact-based categories of heatwave severity and identifies areas expected to be impacted by three or more consecutive days of unusually high maximum and minimum temperatures on a national map. This service is now available operationally on the Bureau's website during the heatwave season (nominally November to March) and is proving a valuable tool for engaging the community, including emergency services, with forecasts and warnings of extreme heat.

- ***Do heat alerts save lives?***

*Author: Neville Nicholls.* Paper: http://www.publish.csiro.au/rs/pdf/RS19007

Short-term heat events (e.g. heat waves) and cold events cause more loss of life in Australia than any other weather or climate extreme. They are also, relative to other extremes, easier to predict, exhibit larger spatial scales and thus affect more people, and responses that can reduce the excess mortality associated with them are better understood and more readily actionable.




**Daily death rate (per 100,000 in affected population) of Melbourne residents aged 64 years and above, plotted against overnight temperature in one-degree boxes. Summer (magenta) and winter (black) are plotted separately. Data are from 1978–2001. Individual dots are the results for an individual day. The short bars indicate the average daily death rate for the two seasons, in the indicated temperature range, five days after the specified overnight temperature. The two thin dotted lines indicate the mean seasonal mortality for all temperatures — the upper line is the mean daily winter mortality while the lower line shows the summer mean mortality.**

There is evidence that the heat-event alert system introduced in Victoria in 2009, and subsequently enhanced, saves lives. Improving and further enhancing heat-alert systems will reduce the costs, both human and financial, associated with heat events. This paper discusses whether a cold alert system is required, along with the possible reasons why the excess mortality after a hot event is of shorter duration than after a cold event, and why winter mortality typically exceeds summer mortality even for similar temperatures.

## Publishing in the *Proceedings of the Royal Society of Victoria*

We are always interested in hearing from authors. Papers, Reviews and Reports of experimental or descriptive research, submitted for publication by The Royal Society of Victoria, should not have been published hitherto, nor should they be under consideration for publication elsewhere.

There is no cost involved. Papers are published online, open access with CSIRO Publishing.

Those interested in submitting papers should review the **Instructions for Authors** at https://rsv.org.au/publications/proceedings/. All enquiries and manuscript submissions should be forwarded via email to editor@rsv.org.au .

## Let's Torque 2019 Grand Final

**Wednesday, 28th August at 6:00pm**
**Royal Society of Victoria**


The Let's Torque Grand Final returns to the Royal Society of Victoria for another night of top quality presentations by the next generation of STEM communicators. Come along to learn about some of the most exciting, emerging STEM solutions and mingle with members of the STEM communication community!

**Drinks and canapes provided on the night. General admission $15: registrations from** https://rsv.org.au/events/lets-torque-2019/

## 1 Victoria Street - Update

It has been awhile since we've updated members on our proposed development of the Society's site and facilities, particularly the tower proposed for the vacant land formerly leased by the Bureau of Meteorology until 2014, currently titled "1 Victoria Street."

The challenge of the moment is distilling all of the various functions and principles explored in our members' forum of February into a design that also conforms to an envelope set by the planning scheme, the constraints of structural engineering and the guidance of our heritage advisors. It is a highly considered process involving a variety of expert partners and, given the result we are seeking is far from "business as usual," there's quite a lot of new ground being broken (metaphorically, at this stage).

Design proposals are nearing completion for due consultation with planning authorities and heritage bodies, and will be further amended to reflect their feedback and direction. We aim to have a more complete vision to share with everyone by the end of this year.

- **Mike Flattley, CEO**

national science week

It's here! Share in, discover, and contribute to the excitement during National Science Week this August. The future is for everyone to create, and scientific work is helping to build the future, so engage and get involved. Discuss, create and invent with us, because science is for everyone.

The Week includes a jam-packed schedule of science festivals, music and comedy shows, expert panel discussions, interactive hands-on displays, exhibitions, laboratory open days and online activities held by individuals, universities, schools, research institutions, museums, science centres, and libraries. These events attract a wide audience from children to adults, and citizen scientists to professionals, encouraging a broader interest in scientific pursuits, and inspiring younger people to be fascinated by the world we live in.

At the time of writing there are over 400 events registered across Victoria, so head online to see what's happening in your community – just type in your location at https://www.scienceweek.net.au/. All listings for our state are helpfully compiled at our site: https://inspiringvictoria.org.au/programs/national-science-week-victoria/events-program/.