The Royal Society OF VICTORIA
Promoting science since 1854

PATRON: The Hon Linda Dessau AC
Governor of Victoria

PRESIDENT: Mr David Zerman

This Month's Events…

13th March:

"Victoria's Regional Forest Agreements: Conservation of Biological Diversity"
Professor David Lindenmayer, Professor Simon Jones, Dr Emma Razeng, Dr Peter Kriesner, Ms Vanessa Craigie

"Origins: How the Earth Made Us"
Professor Lewis Dartnell

14th March: Panel Presentations & Discussion

"The Future of Electronics: Beyond the End of Moore's Law"
Featuring: ***Associate Professor Meera Parish, Dr Carlos Kuhn, Ms Rebecca Orrell-Trigg***

16th March: Wild DNA in Cambarville – Campfires & Science

18th March: National Science Week Briefing

Presentations & Networking with ***Dr Amanda Caples, Dr Renee Beale and Geoff Crane***

21st March: Discover the Eucalypts of the Brisbane Ranges with Leon Costermans

28th March:

"The Marvels of Medicinal Plants"
Dr Tien Huynh

Advance Notice

11th April:

"Moneyball 2.0: Analytics and Technologies Improving High-Performance Sports"
Associate Professor Sam Robertson & Professor Damian Farrow

RSV Easter Close: 19 – 26 April

9th May:

RSV AGM*, followed by:*

"Gamble, Drink, Consume, Repeat: Why we need BrainPark"
Professor Murat Yucel

March 2019 Newsletter

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Melbourne Victoria 3000
Tel. (03) 9663 5259
rsv.org.au

Victoria's Regional Forest Agreements: Conservation of Biological Diversity

Wednesday, 13th March 2019 from 1:30 to 5:00pm

Join us for the second in this series of public lectures presented with the Department of Environment, Land, Water and Planning, looking at the scientific evidence base informing the modernisation of Victoria's Regional Forest Agreements.

Over the next four years, the Victorian Government will be partnering with Traditional Owners, and engaging with Victorian communities and stakeholders, to inform the modernisation of Victoria's Regional Forest Agreements (RFAs) and the forest management system they accredit.

The Victorian Government is investing in science and data to better understand the range of forest values in Victoria and the systems and processes which underpin forest management planning and decision making.

Hear from scientific experts leading the assessment of Victoria's public forest values. Speakers will include:

Professor David Lindenmayer

New insights into ecology, dynamics and management of ash-type eucalypt forests based on long-term research

David Lindenmayer is a Professor of Ecology and Conservation Biology at the Australian National University's Fenner School of Environment and Society. He has published over 740 peer-reviewed scientific papers, and 45 books on a wide range of topics associated with forestry, woodlands, wildlife and biodiversity conservation and ecologically sustainable natural resource management. His areas of expertise also include environmental management, forestry management and environment, terrestrial ecology, wildlife and habitat management, environmental monitoring, forestry fire management, natural resource management, zoology and forestry sciences, with a particular focus on the endangered Leadbeater's possum. His work on wildlife conservation and biodiversity has, for many years, led world research in this area. Lindenmayer's conservation and biodiversity research has been recognised through numerous awards, including the Eureka Science Prize (twice), the Whitely Award (11 times), the Australian Natural History Medallion by the Field Naturalists Club of Victoria, and the Whittaker Medal from the Ecological Society of America. He was appointed an Officer of the Order of Australia (AO) "for distinguished service to conservation and the environment in the field of landscape ecology, to tertiary education, and to professional organisations."

Professor Simon Jones

DELWP-RMIT: a decade of remote sensing science supporting forest policy

Simon Jones is the Professor of Remote Sensing at RMIT University in Melbourne, Australia. He has over 24 years' experience in the earth observation of terrestrial ecosystems and has held previous scientific appointments with the University of Melbourne and the European Commission Joint Research Centre.

Dr Emma Razeng and Dr Peter Kriesner

Forest fragmentation and genetic risk

Dr Emma Razeng is a research scientist at Monash University, working within the Persistence and Adaptation research team, led by Paul Sunnucks. Her research interests include conservation genetics, community ecology and dispersal ecology. Dr Razeng has recently completed her PhD, which focused on using using genetics to better understand evolution and population structure of aquatic insects in the Australian desert. She also has experience with on-the-ground conservation initiatives, having spent several years working in bushland management at the local government level.

Dr Peter Kriesner is a research scientist in genetics with environmental consultants cesar Australia and the University of Melbourne. His research interests include population ecology and symbiotic interactions involving insects, and he has a previous background in conservation and environmental policy development.

Emma and Peter are currently undertaking a broad ranging review of flora and fauna species native to Victoria. They are utilizing existing genetic and demographic data to assess population structure and connectivity, and the likely extent of genetic risk to populations that are isolated or fragmented. They will outline the purpose and aims of the current review, and discuss some of the findings to date.

Ms Vanessa Craigie

The Conservation Status Assessment Project – re-visiting threatened species in Victoria

Ms Vanessa Craigie is a Senior Policy Officer within the Threatened Species Policy section of DELWP's Biodiversity Division team. She has worked with threatened species and communities, notably native grassland ecosystems, for many years. She held the position of the Native Grassland Coordinator for Victoria, supported the Grassy Ecosystems Reference Group, and was a member of Technical Advisory Groups for the Victorian Volcanic Plans, Northern Plains and Gippsland grassy ecosystems. More recently she was involved in development of the Victorian Government's 2017 Biodiversity Plan. She leads the Conservation Assessment Project team, working with a wide range of threatened species experts both within and outside of government to re-assess the conservation status of all species that are currently considered to be threatened in Victoria, and represents Victoria on the National Common Assessment Method Working Group.

Ms Craigie will outline the background for the project, the Common Assessment Method for assessing all threatened species, and the process for undertaking Victorian assessments.

VICTORIA State Government | Environment, Land, Water and Planning

The Royal Society OF VICTORIA Promoting science since 1854

Eventbrite

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

Origins: How the Earth Made Us

Wednesday, 13th March 2019 at 7:00pm

Speaker: Professor Lewis Dartnell
Life Sciences, University of Westminster

As a species we are shaped by our environment. Geological forces drove our evolution in East Africa; mountainous terrain led to the development of democracy in Greece; and today voting behaviour in the United States follows the bed of an ancient sea. The human story is the story of these forces, from plate tectonics and climate change, to atmospheric circulation and ocean currents.

How are the Himalayas linked to the orbit of the Earth, and to the formation of the British Isles? By taking us billions of years into our planet's past, **Professor Lewis Dartnell** tells us the ultimate origin story. When we reach the point where history becomes science we see a vast web of connections that underwrites our modern world and helps us face the challenges of the future.

From the cultivation of the first crops to the founding of modern states, Professor Lewis Dartnell, author of the newly released book 'Origins: How the Earth Made Us', reveals the Earth's awesome impact on the shape of human civilizations.

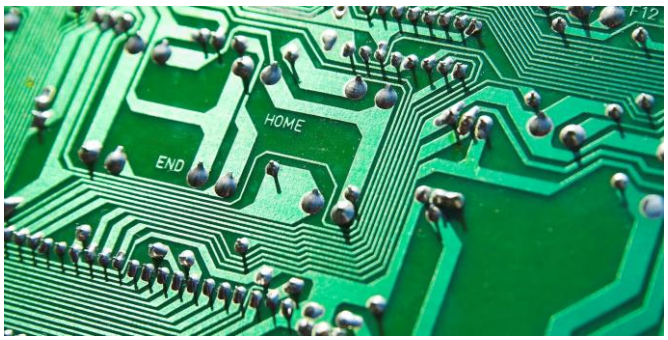
About the Speaker:

Lewis Dartnell is an astrobiology researcher and professor at the University of Westminster. He has won several awards for his science writing, and contributes to the Guardian, The Times and New Scientist. He has also written for television and appeared on BBC Horizon, Sky News, and Wonders of the Universe, as well as National Geographic and History channels.

A tireless populariser of science, his books include the bestselling 'The Knowledge: How to Rebuild Our World from Scratch', and the newly released 'Origins: How the Earth Made Us'.

Places limited, bookings essential! *Cocktail function from 6:00pm.* **Register online** now at https://rsv.org.au/events/origins/, 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 call the RSV office to access their **discount code**.

The Future of Electronics: Beyond the End of Moore's Law



Thursday, 14th March 2019 at 7:00pm

A joint presentation with the ARC Centre of Excellence in Future Low-Energy Electronics Technologies (FLEET)

Panel Presentations & Discussion

Computing has transformed the world, but there is a price: the huge amount of energy being consumed by massive, factory-sized data centres means that information and communications technology (ICT) already consumes about 8% of global electricity, and is doubling every decade. ICT now has the same global-warming contribution as the aviation industry.

At the same time, we are running out of achievable ways to improve the efficiency of existing, silicon-based (CMOS) electronics. 'Moore's Law', which for 60 years predicted ever-smaller, ever-more-efficient computer components, is expected to be declared officially dead in next ten years. Without a 'beyond CMOS' solution, energy will become the limiting factor on further computational growth in the next one or two decades, severely limiting our potential to expand Artificial Intelligence, an Internet of Things, and 'self-drive' vehicles. For computing to continue to grow, we need to develop new electronics that consume much less energy.

Join us for an electrifying panel where three scientists from **FLEET** will describe new fields of physics and new materials in which electrical current can flow with much lower energy wastage.

FLEET
ARC CENTRE OF EXCELLENCE IN FUTURE LOW-ENERGY ELECTRONICS TECHNOLOGIES

Featuring:

Associate Professor Meera Parish is a theoretical physicist at **Monash University**, where she investigates the fundamental behaviour of quantum particles and how they organise into exotic states of matter, such as superfluids. These states could form the basis of new ultra-low energy electronics.

Dr Carlos Kuhn studies ultra-cold atomic gases at **Swinburne University of Technology**, investigating the behaviour of atoms at a millionth the temperature of outer space. As a passionate science educator, Carlos has used water-powered rockets to inspire students to study science!

Rebecca Orrell-Trigg is a PhD student recently transferred to **UNSW** from **RMIT University**, where she has used liquid metals to synthesise two-dimensional materials for future electronic devices. This work allows her to apply her inorganic chemistry knowledge in a practical setting, and use her extensive experience with touch printing.

Eventbrite

Places limited, bookings essential! *Cocktail function from 6:00pm.* **Register online** now at https://rsv.org.au/events/future-of-electronics/, 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 call the RSV office to access their **discount code**.

National Science Week 2019: Community Briefing

Monday, 18th March from 10:00am – 12:00pm

Information & Networking

We are delighted to once again bring together the National Science Week program for Victoria in 2019, and warmly invite everyone interested in being a part of our state-wide celebration of all things Science to come along to our information and networking session at the Royal Society of Victoria.

Joining us will be Victoria's Lead Scientist, **Dr Amanda Caples**, and National Science Week Manager, **Geoff Crane.**

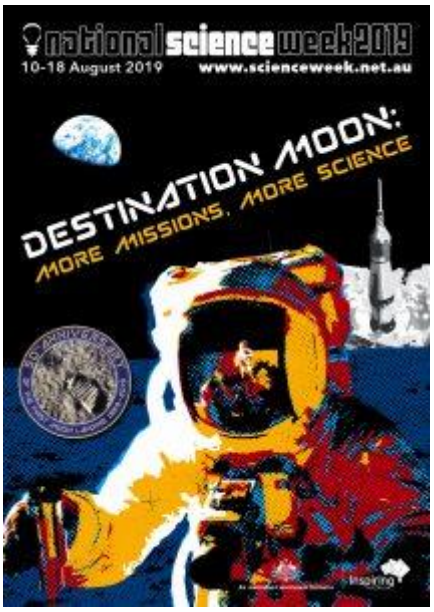
Victorian Science Week Lead **Dr Renee Beale** will provide information on our newly expanded **small grants program** for 2019, our very own Victorian international guest and public launch event, and how you can get involved in **National Science Week (10 -18 August).**

You'll also hear from several organisations about their planned events for 2019, and have the opportunity to network with colleagues over morning tea at the Royal Society of Victoria.

If you're thinking about hosting or supporting a Science Week event, or just want to know more about the planned Science Week activities in Victoria, please register to join us!

Places limited, bookings essential! Register online now at https://inspiringvictoria.org.au/event/national-science-week-networking/, call or email the RSV office to secure your place: 9663 5259, rsv@rsv.org.au.

National Science Week School Grants Now Open



The school grant round for 2019 is open for applications until 5 April. Grants can be for up to $500 and are for supporting school STEM activities in National Science Week. Any Australian school can apply, from preschool to senior secondary.

Destination Moon: more missions, more science is the school theme for National Science Week in 2019.

This theme is a way for teachers and their students to discover past missions to the Moon and space programs that have solved some of the seemingly unsolvable problems—and current and future space programs, operations and missions. Many of these use big picture thinking in science to solve problems, and technology, engineering and mathematics to design new solutions. This will help forge our future paths in the areas of space operations, space science, Earth observations, positioning systems and communications.

The 76 page 2019 Resource Book of Ideas for National Science Week offers teachers and students the opportunity to investigate the people, space agencies, universities, and science organisations that are all delivering solutions in space science. There are also an Australian Space Science Timeline and a Student Journal available to download.

Full details are available from https://www.scienceweek.net.au/schools/ .

Campfires & Science: Wild DNA in Cambarville

Saturday, 16th March 2019 from 2:00 to 8:00pm

Big River Camp, Marysville, Victoria

Campfires and Science is a new and growing community of people who head outdoors, light a campfire, and share knowledge. Auspiced by the Royal Society of Victoria, we lead regular, free events in wild places to support scientific fieldwork and provide hands-on training in the research methods that help us to best protect the environment. Welcome to citizen science!

Join us for our next environmental DNA (eDNA) collection and sampling field trip. We'll be working with the Australian National University (ANU) to teach people how to gather samples and look for the local presence of critically endangered tree dwelling vertebrates. We'll do this by testing soils beneath habitat trees and capturing mosquitos with portable traps. We'll have a special presentation by ANU researchers, telling us about their work – and will also hear from other experts who will share their knowledge around the campfire.

**Please note: a free vegan dinner is included. Unfortunately we cannot accommodate for any allergies; if you have any special requirements, please ensure you have catered for yourself.

Eventbrite

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

Discover the Eucalypts of the Brisbane Ranges

Thursday, 21st March 2019 from 9:00am to 5:00pm

Departing by bus from the Royal Society of Victoria

To celebrate National Eucalypt Day in 2019, the Royal Society of Victoria and Eucalypt Australia are offering a rare opportunity to explore the beautiful Brisbane Ranges National Park to the west of Melbourne with botanist, geologist and author of the iconic *Native Trees and Shrubs of South-Eastern Australia*, **Leon Costermans** MRSV.

Setting out by bus from the Royal Society of Victoria early in the day, a short hour's journey will have us exploring the unique geology of the Brisbane Ranges and learning to identify some of the area's indigenous eucalypt species, their ecological roles and habitat ranges. The excursion will incorporate a bus tour, a gentle bushwalk and a barbeque lunch at the Steiglitz Historic Park.

Join us on 21 March to make a deeper connection to country with one of Victoria's most respected botanists and geologists. This excursion is subsidised through the generous support of **Eucalypt Australia** as part of the week-long program of events planned around **National Eucalypt Day 2019** (23rd March).

Eventbrite

Places limited, bookings essential! Register online now at https://rsv.org.au/events/brisbane-ranges-2019/, 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 call the RSV office to access their **discount code**.

The Marvels of Medicinal Plants

Thursday, 28th March 2019 at 7:00pm

Speaker: Dr Tien Huynh

Senior Lecturer in Biosciences, RMIT University

Plants are the marvels of the earth and the unsung heroes of our planet. They provide the air we breathe, the houses we live in and the food we eat. In an era where we have an abundance of food, yet are starving for nutrients, what can we consume to be healthier?

In this talk, Dr Tien Huynh will delight both your brain cells and your taste buds. Discover Tien's recent research to unlock the secrets of medicinal plants revealing how plants can heal us from the inside out. Plants highlighted in the discussion will range from the familiar, like coffee, to those which many people have never seen or used before.

Taste-test a selection of these plants during this event, and be inspired to share your new knowledge of medicinal plants and their amazing properties with loved ones. Together we can eat well, live well and be well.

About the Speaker:

Dr Tien Huynh was born in Vietnam and immigrated to Australia, seeking asylum as a refugee from the Vietnam War with no English speaking skills and nothing but the clothes on her back. Tien found her passion in science at university under the tutelage of an amazing mentor, Professor Ann Lawrie.

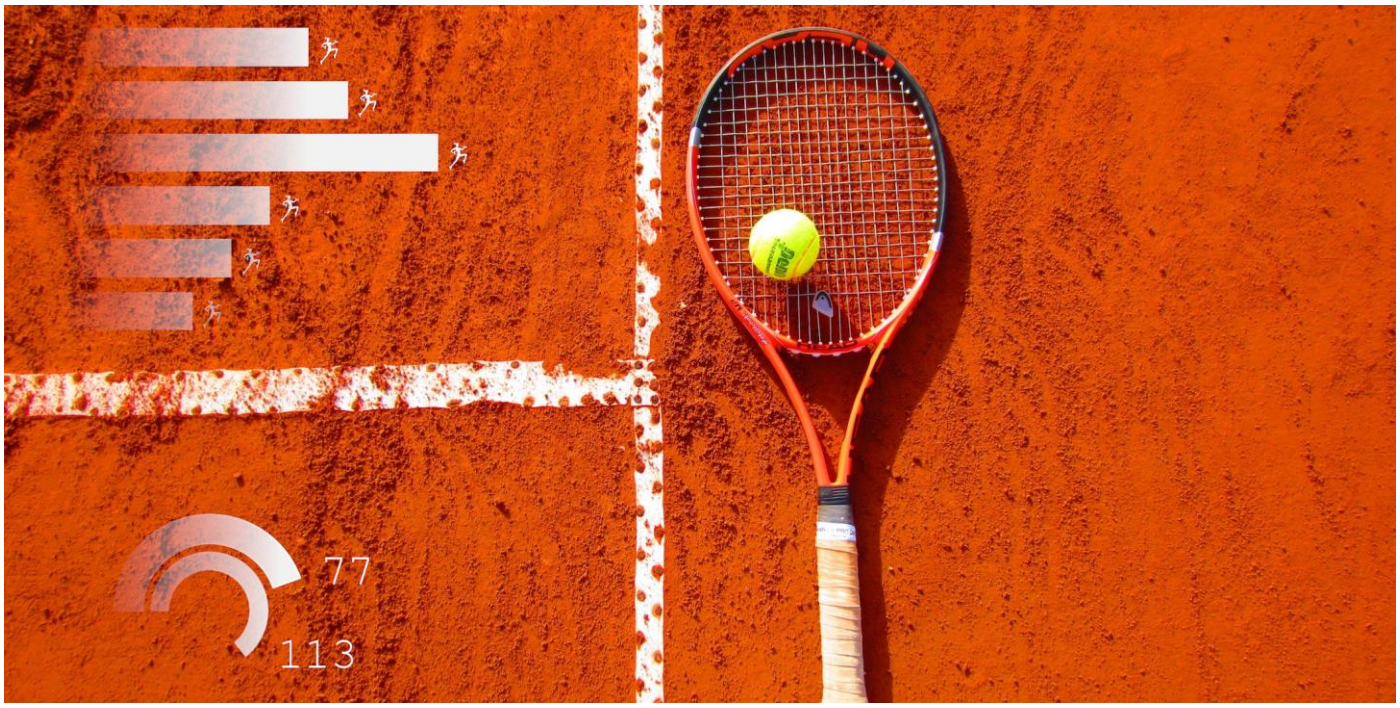
From there, Tien went on to complete her doctorate at the University of Melbourne and postdoctoral research overseas (England and Italy) in Evolutionary Phylogenetics and Conservation Biology before returning to Australia to specialise in Cancer, Tissue Repair, Neuropharmacology and Drug Discovery Technologies. Tien is now a Senior Lecturer in BioSciences at RMIT University.

Tien is passionate about environmental sustainability, medicinal plants and conservation. Recently, Tien was recognised as a Superstar of STEM as an ambassador and role model to inspire the next generation of scientists to bridge the gap between gender, age and cultural differences.

Places limited, bookings essential! *Cocktail function from 6:00pm.* **Register online** now at https://rsv.org.au/events/marvels-of-medicinal-plants/, 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 call the RSV office to access their **discount code**.

Moneyball 2.0: Analytics & Technologies Improving High-Performance Sports

Thursday, 11th April 2019 at 7:00pm



Speakers:

Associate Professor Sam Robertson
Head of Research & Innovation, Victoria University/Western Bulldogs

Professor Damian Farrow
Game Insight Group, Institute of Health & Sport, Victoria University/Tennis Australia

The release of the highly influential book *Moneyball* in 2004 marked an increase in interest in the use of analytics for operational decision-making in professional sport. Now, 15 years later, the use of data, technology and analytics to produce actionable insights for application in sport has diversified considerably.

Technology advancements are creating new types and sources of data available to both sports researchers and practitioners alike. Fast computing and algorithms are allowing for the high volume of data obtained via vision and sensors to be almost automatically converted into usable information, ready to be translated into sporting practice. Examples include: kick evaluation ratings in Australian Rules football using player GPS data, the Emotion Tracker – to understand the role of player facial expressions in tennis and real-time models to predict anything from player injury to the outcome of games.

In this lecture, Dr Sam Robertson (Victoria University and the Western Bulldogs) and Professor Damian Farrow (the Game Insight Group, joint initiative between Tennis Australia and Victoria University) discuss how the future of analytics will continue to change the way pro teams, broadcasters and fans enjoy and experience sport.

About the Speakers:

Associate Professor Sam Robertson oversees the sports science partnership between Victoria University and Western Bulldogs. Sam supervises co-appointed staff, PhD and Honours students, as well as implementing innovative performance strategies at the club.

Prior to arriving at the university, Sam worked as a sport scientist in various institute roles in both Australia and the United Kingdom. He returned to Australia to undertake multiple applied roles in Australian football and golf.

He completed his PhD at Edith Cowan University in skill acquisition & talent identification as part of his role in Research and Innovation with the Golf Australia High Performance program. Prior to commencing at VU, Sam also held an ongoing position as the Lecturer in Biomechanics at Deakin University.

Due to his multidisciplinary applied background, Sam maintains a variety of research interests related to improving sporting performance. These interests predominantly cover Performance Analytics & Technology, Talent Selection, Development & Coaching Practice themes in Australian football and golf.

Professor Damian Farrow is the AFL Umpiring Coaching and Innovation Manager. He also holds a fractional appointment within the Institute of Health and Sport at Victoria University where he manages the Game Insight Group (GIG), a joint initiative between Tennis Australia and Victoria University.

In 2002 he was appointed the inaugural AIS Skill Acquisition Specialist, then became the Discipline Head of Psychology and Skill Acquisition in 2009. In this position he was responsible for research and support of coaches seeking to develop the skills of Australian athletes.

He has worked with a range of AIS and National sports programs including the AFL, Cricket Australia, Tennis Australia, Swimming Australia, Netball Australia, Surfing Australia, the Australian Rugby Union and is currently National Lead of Skill Acquisition for Swimming Australia.

Damian publishes and presents extensively on his research interests, centred on understanding the factors critical to the development of talent and sport expertise, with a specific focus on perceptual and decision-making skill and practice methodology.

A former tennis coach and physical education teacher, he is passionate about community engagement through the translation of theory into practice via coach education and the publication of general interest sports science books including; *Run Like You Stole Something*, *Why Dick Fosbury Flopped* and *It's True: Sport Stinks.*

Places limited, bookings essential! *Cocktail function from 6:00pm.* **Register online** now at https://rsv.org.au/events/moneyball-2-0/, 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 call the RSV office to access their **discount code**.

Nominations for RSV Membership

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

Dr Gregory **CHAPMAN**, Retired
Professor Sally **MCARTHUR**, Professor of Biomedical Engineering, Swinburne University
Dr Nick **LEGGE**, Environmental Scientist
Dr Jodi **SITA**, Associate Deputy Head, School of Behavioural & Health Science, ACU
Emeritus Professor Neville **NICHOLLS**, Earth Scientist, Monash University
Mr Simon **STOREY**, Valuer, Scientific & Fine Art
Professor Stephen **ROBINSON**, Head of Psychology, RMIT University
Professor Christian **DOERIG**, Associate Dean (Biomedical Sciences), RMIT University

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 11th April 2019. Recently elected members who have not yet signed the Society's membership book are warmly invited to attend the 14h March meeting to be formally welcomed as members. **Please inform the office if you plan to attend, so we can prepare your membership certificate for collection.**

BrainSTEM – Call for Mentors

The Royal Society of Victoria is proud to partner with BrainSTEM, a not-for-profit **mentoring program** offering an opportunity for PhDs, postdocs, researchers and academics working in STEM fields to mentor a lively team of senior secondary school students. With a strong focus on encouraging more girls into STEM fields, BrainSTEM is helping foster the next generation of STEM leaders, changemakers, enthusiasts and innovators.

This is a great professional skills development opportunity for STEM researchers – particularly PhDs - to mentor school students undertaking research-based STEM innovation projects.

As a mentor, the time commitments are as follows:

- Attend a Kickstarter Morning on **8th March** (not compulsory, but recommended)
- Host the students at your place of work for mentoring sessions (between **9th March – 15th June**). This will be anywhere between 6 to 8 mentoring sessions of approx. 2 hrs each.
- Attend the Presentation Evening on **20th June** to showcase the work these students have been working on.

If you are interested, please contact BrainSTEM's Executive Director, **Sid Verma** MRSV at sverma@brainstem.org.au or visit http://brainstem.org.au/mentors.html.

Vale

Mr Robert Pyne MRSV

The Society's Council, Officers and staff mark with sadness the death of RSV member Rob Pyne. We had earlier missed his passing on 13 January 2017 and his partner Eileen Blake was very kind in bringing us up to speed, with the following dedication:

'Rob was very passionate about the natural world. He had so much information in his head about plant identification/biology, land management, species/habitat of Flora and Fauna, many aspects of Science/Science Fiction, History etc. etc.'

He was also a talented Welder/Boiler maker. In the last years of his life he made a prototype for a planting wheel for the Victorian Desal Plant, and 4x4 trailers to transport indigenous plants to sites for the company he worked for (Australian Ecosystems).

The most humorous thing that he constructed was a mobile, covered 4x4 trailer with a toilet

inside. He called it The 'Turdas' and wrote a little poem on the inside wall… something about 'carrying shit through time and space'! Which was a shout out to one of his favourite television shows, Dr Who.

He was funny, kind, generous of spirit, as evidenced by the fact he was the go to person in the workplace, for information on almost everything pertaining to restoration and land management and fixing almost anything. Some colleagues would refer to him as "Mr Funk and Wagnall."'

Our belated condolences to Eileen and Rob's surviving family and friends on the tragic loss of a clearly much-loved individual.

Honours

Professor Bruce Ernest Kemp AO MRSV

Our warm congratulations to Professor Bruce Kemp on his appointment as an Officer of the Order of Australia in this year's Australia Day Honours. Professor Kemp was appointed an AO in recognition for distinguished service to biomedical research, particularly to the study of protein phosphorylation.

Citizen Science Victoria – Call for Nominations

Australian Citizen Science Association | VIC

We need you!

We started something special in 2018 with the Victorian Chapter of the **Australian Citizen Science Association**. This year, we need you to help us to build a vibrant program for our state's community of practice (and interest) by joining our Management Committee!

We're looking for committed, capable, enthusiastic people to keep us all connected to and learning from each other. If you have a role in citizen science and have some time and energy to offer us, we'd be grateful to receive your application for one of the following roles:

- Chair
- Vice-Chair
- Secretary/Treasurer
- Engagement Officer
- General Committee Member (3 places)

Help lead our program. Descriptions of these roles and full details are available online at https://inspiringvictoria.org.au/2019/02/25/acsa-vic-call-for-nominations/.

Nominations close on Sunday, 31 March, 2019

Please Renew Your Membership

All members are prompted to ensure you are a financial member of the Society, particularly before attending members-only meetings as a voting member. Materials were mailed to all members due for subscription renewal in January; you can also call the RSV office on 9663 5259 to renew over the phone, or renew online by logging on to your membership profile at https://www.joinit.org/o/rsv/members, using your email address on file with the RSV as your username.

New members are always welcome! Details on becoming a member of the RSV are available from our website at https://rsv.org.au/how-to-join/ .

Slack for RSV Members

A reminder to RSV members that invitations to join the Society's Slack channel, an online discussion forum, will be coming your way over the coming days and weeks. Following our members' conference in early February, this will provide a platform for all members to have input to the Society's various programs and plans.

Keep an eye on your inbox for the invitation!

Hail to the Meteorologists

by **Catriona Nguyen-Robertson MRSV**
RSV Science Communications

This article follows a lecture presented to the Royal Society of Victoria by Dr Joshua Soderholm titled "Rain, Hail or Shine: The Secrets of Severe Weather" on Thursday, 14th of February 2019.

Hail can be beautiful as it taps your window pane, but once it starts to come battering down on your roof, it becomes powerful and catastrophic. It buckets down in variety of shapes and sizes that can wreak havoc to vehicles, houses, and crops, causing damages that cost the Australian economy hundreds of millions every year. Despite the devastation that hail can cause, little has been known about Australian hailstorms until relatively recently.

Dr Joshua Soderholm has always been intrigued by storms. As a boy, he would sit by a window in his house during the summer to watch storms approaching, and often watched them pass by, missing the house. He began asking why the brunt of the weather often didn't reach his house, and continued to question the weather. He wanted to better understand Queensland's hailstorms as a PhD candidate, and is now developing research-grade hail algorithms as an observational meteorologist and Research Fellow with the Bureau of Meteorology and Monash University's School of Earth, Atmosphere and Environment.

When he was young, Dr Soderholm couldn't predict exactly where the storm would hit as he watched from his window, and to this day there remain many challenges in observing and forecasting hailstorms. Hailstorm events account for greater than 30% of losses from 'catastrophic' events, and the ten largest hailstorms in Australia caused more than 17 billion dollars' worth of losses as it can be detrimental to agriculture, private property, and commercial businesses. Our current warning systems rely on surveillance and efficient communication, financial insurance, and a response strategy, but we still have poor ability to forecast large hailstorms or predict the size of hail stones with current radar technology.

To understand hailstorms, meteorologists first need to understand how they are created. Hail forms inside thunderstorm updrafts, currents of rising air within clouds that can drop to –60 °C at the highest point. As water droplets are swept upwards in the updrafts, they become super-cooled (colder than 0°C but remaining in liquid state). If the super-cooled water droplets come into contact with particles in the air (e.g. dust), they snap-freeze into small ice balls called 'hail embryos'. The hail embryos then continue to grow and develop into hailstones as they collide with other super-cooled water droplets, and once they become heavy enough, they begin to fall as gravity pulls them downwards. These hailstones range in size from 5 mm across to several centimetres long. When hail is larger than 5 cm, it is considered 'giant' and large enough to crack roofing tiles. The largest hailstone ever recorded was 875 g in weight, collected after it fell in Vivian, South Dakota (and it had already started to melt before it was measured!). It is the extremes of the physical processes (e.g. velocity, moisture flux, etc.) that create such diversity in hail, making it difficult to forecast, model, and predict the damage any given hailstorm might cause.

A highly-modified T-28 Trojan used by the South Dakota School of Mines and Technology for storm-chasing and measurement.

Our current knowledge of hail stems from *in situ* (direct) observations of hail or remote sensing with weather radars. Most *in situ* data comes from a single source: a 1949, T-28 Trojan aircraft that was modified by the South Dakota School of Mines and Technology for the purpose of penetrating

storms, but it has since been decommissioned. 'Hail pads' made of polystyrene boards covered in aluminium foil are also laid out on the ground to observe dents in the pad produced by falling hail, however these only cover small areas and hailstones melt in their trajectory to the ground, resulting in an underestimation of size. Another source of data stems from citizen science; photos sent in by the public. Dr Soderholm established a phone app, WeatherX, with his colleagues at Monash University and the Australian Bureau of Meteorology, allowing people from around Australia to contribute. Because hail pads and weather stations are sparsely located, photos and reports from the public on the severity, location and timing of hail help to fill in the gaps and contribute to a better understanding of the phenomenon.

In addition to observational data, single polarisation radars detect the scattering of polarised radar beams as they pass through precipitation, scanning the air for hail particles. The single beam can create confusion by detecting fewer large hailstones than many small ones; however, more recent "dual-polarisation" techniques use two simultaneous beams aligned horizontally and vertically, to improve confidence in detection.

Dr Soderholm provided physical representations of the range of hailstone sizes, from embryonic to catastrophic! Here they are sitting on a "hail pad," a polystyrene board covered in aluminium foil.

Using these methods, Dr Soderholm worked on the RELÁMPAGO ('flash of lightning') project late last year in Argentina, home to the most extreme thunderstorms in the world. He and a team consisting of investigators from the US and South America moved around the country based on the forecast – sometimes with only a couple of days' warning when a storm was coming. In each location, the team set up hail pads and weather radars over several kilometres. Sometimes they'd get lucky, when other times, like in Dr Soderholm's childhood, the storms would pass just out of reach. On the 26th of November, they set up radars along a road in San Rafael, where a storm hit and left 3-4 cm cover of hailstones on the ground. The hailstones completely stripped the aluminium foil off their hail pads – to an extent that they had never seen before. Interestingly, over the course of the ten kilometres that they observed, the characteristics of the hailstones dramatically changed – even from one side of the road to the other. There could be one field that was completely white, following dense, small hail fall, while the other side of the road only had a sparse scattering of larger stones, 5-6 cm big. In his four weeks in Argentina, Dr Soderholm recorded data from three storms, working towards a better understanding of extreme weather.

The ability of meteorologists to forecast and model hail is improving, but they still face many challenges - it is, in fact, more difficult to predict hailstorms than cyclones. Dr Soderholm is working to improve current algorithms and weather radar technology to better understand storms, and hail reports and photos supplied by you, as citizen scientists, will also greatly support research into creating the next generation of hailstorm warning systems. Together we can protect ourselves from the downpour!

Dr Joshua Soderholm (centre) with Acting RSV President Nicola Willams (right) and RSV Secretary Dr Peter Baines (left, vote of thanks).

Call for Applications

The Royal Society of Victoria has established four prestigious competitive prizes open to post-graduate, doctoral students in all areas of the Biomedical & Health Sciences, Biological Sciences (Non-human), Earth Sciences and Physical Sciences.

2017 finalists with RSV officers

The Biological Sciences (Non-human) prize and Earth Sciences Prize are also supported by the legacy of our previous Presidents, Edmund D Gill and Neil Archbold respectively.

The category of **Biomedical and Health Sciences** includes the fields of Endocrinology, Epidemiology, Genetics, Human Physiology, Human Anatomy, Immunology, Medical Parasitology, Microbiology, Neurology, Nuclear Medicine, Pathology, Pharmacology, Radiology and related human sciences apart from clinical trials.

The category of **Biological Sciences (Non-human)** includes the fields of Agriculture, Biochemistry, Botany, Cell Biology, Ecology, Evolutionary Biology, Forestry, Zoology, and related non-human science.

The category of **Earth Sciences** includes the fields of Geochemistry, Geochronology, Geology, Geophysics, Planetary Physics, Meteorology, Oceanography, Palaeontology, Physical Geography and related sciences.

The category of **Physical Sciences** includes the fields of Astronomy, Astrophysics, Chemistry, Mathematics, Physics, all branches of Engineering and related sciences.

Eligibility:

Application is open to candidates in the fourth* year of their doctoral candidature in Universities in the State of Victoria at the time of application, and who are members of the Royal Society of Victoria. Candidates who have submitted their thesis are ineligible.

In order to promote the interests of young people starting their careers, we are limiting applications to doctoral candidates under 40 years of age.

Applicants who are not already members are required to join the Society (see below). RSV student membership for eligible applicants in 2019 is free.

*For institutions with three-year doctoral programs, please read this as “final year.” Technically, you must be close to submitting your final research thesis for assessment in the year of award application.

Applications:

Applications will open for the 2019 round on 1 March and close at 5.00pm on 31 May.

Candidates should nominate themselves.

The application for a prize should consist of:

- **An application form** (incorporating your extended abstract) to be submitted electronically, then printed (from your confirmation email), co-signed by your Supervisor or Head of Department (to ratify your contribution to your doctoral research, particularly if it is a team research project) and submitted along with your RSV Membership Form (if required).
- **An extended abstract** presenting a succinct summary of your research work. This is incorporated in the body of the application form to guide structure and length, and includes a title, rationale for the study, aims, methods, results, conclusions and significance, indicating why your research is important and of scientific interest.

Submission:

Submission of the prize application form and abstract should be co-signed with your supervisor and received as a single file via email marked for the attention of the Chief Executive Officer at rsv@rsv.org.au.

Conditions:

If you are not already a member of the Royal Society of Victoria, please submit as a ***separate*** document a completed Royal Society of Victoria Membership Application form for 2019 Prize applicants. Student membership for all eligible Prize applicants will be free of charge for the remainder of 2019.

The Royal Society of Victoria may re-classify the field of an application if it fits best in a field other than the one nominated by the applicant.

The Society reserves the right not to consider applications that do not comply with the above requirements and not to make an award if there is no suitable candidate.

Judging:

On the basis of the written abstracts, the judges will select a short list of two candidates in each of the four fields of Biomedical and Health, Biological (Non-human), Earth Sciences and Physical Sciences.

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 on **Thursday, 15th August, 2019** commencing from 6:30 p.m. Finalists who are unable to present cannot be considered for an award. The order of speaking is decided by ballot on the night. The presentations are open to fellow students, friends and families as well as Members of the Society.

The winners will be judged and announced on the night, when the prize and a certificate will be presented by the Society's President.

The Awards:

The successful candidates will each receive a certificate and a prize of $1000. Winners will also receive free student membership of the Royal Society of Victoria for a period of two years and the opportunity to participate in the Society's programs and access our professional networks for mentoring and collaboration as desired. The runners-up each receive a certificate and a cash prize of $500 plus free student membership of the Royal Society of Victoria for a period of two years.

Enquiries:

Chief Executive Officer, The Royal Society of Victoria, 8 La Trobe Street, Melbourne 3000 Telephone: (03) 9663 5259 or email rsv@rsv.org.au . All online application and membership forms are available from https://rsv.org.au/awards-and-prizes/young-scientist-research-prizes/