

DECEMBER 2020

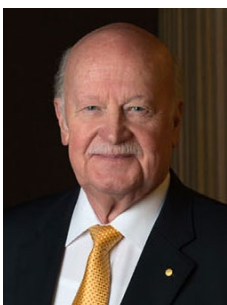
NEWSLETTER

NUMBER 145



Message from the President— December 2020

December 17, 2020



2020 will be remembered as a year that science came to the service of the nation in a significant way. The Australian Academy of Science has been able to draw on the expertise of its Fellows to respond quickly to the many challenges that

have arisen throughout 2020. From bushfires and extreme weather events to a global pandemic, it is clear that evidence-informed decision making strengthens our democracy and ability to build a society that is healthy, safe and free.

In this month's newsletter you can read about the many ways the Academy has responded this year—all made possible by the Fellowship of the Academy. During December, the 2020 Fellows are being recognised through our extensive social media channels in a series of videos and articles highlighting their contributions to science and to our nation.

I'm pleased that new support from Minderoo Foundation will provide the Academy with capacity to strengthen the operational capability of the Rapid Research Information Forum (RRIF). This highly successful model has provided timely expertise to government throughout COVID-19 and has the potential to become a model for scientific input to inform a wide range of policy decisions in the future.

The Academy continues to support science in a number of other ways. Thomas Davies grants are going to six recipients this year covering diverse topics including rare metal-hoarding plants, mangrove desalination and great hammerhead shark populations. Two scientific conferences have received funding, and the Geoffrey Frew and Selby fellowships have also been announced, bringing distinguished scientists to Australia for valuable meetings about optics and photonics as well as chemical engineering and sustainability.

You can also read about the talented winners of this year's scienceXart schools photographic competition, which showcases our next generation of scientific and creative thinkers.

If you are searching for a gift or something to inform, inspire and entertain you over the holidays, look no further than our fifth annual Fellows' Christmas reading and listening list.

It recommends books and podcasts for a wide range of ages and interests.

Thank you for your ongoing support through 2020 and I wish you and your loved ones a safe and happy holiday season.

John Shine

Celebrating science

December 01, 2020

2020: it's been big.

As we count down the final days of what has been an unexpected year, join us as we reflect on the challenges and successes experienced by the Australian Academy of Science over the last 12 months. And, as we look ahead to a better tomorrow, we will be **celebrating science** and the leaders who will guide us there.

Keep an eye on the Academy social media channels through December as we share videos and profile articles introducing the 2020 cohort of Fellows elected earlier this year. We will also revisit some of the biggest stories we covered through the year. You can follow the Academy on **Facebook**¹, **Twitter**², **Instagram**³ and **LinkedIn**⁴ or subscribe to our **monthly newsletter**⁵.

But for now, let's have a quick look back at the year that was:⁶

January

2020 started with much of Australia on fire, **prompting a clear statement from the Academy President**⁷ Professor John Shine on how human-induced climate change will continue to increase the frequency and severity of extreme weather.

It wasn't long before Canberra experienced another form of extreme weather, with a **severe hailstorm**⁸ causing catastrophic damage to the copper roof of our beloved Shine Dome, threatening the Academy's unique and valuable scientific archives. Ian Potter House, where most of the Academy's staff work, was also damaged to the point of being unsafe to occupy. For many staff members, this was the beginning of 'working from home'.

February

In February, the Academy co-hosted the **Catalysing Gender Equity conference**⁹ where hundreds from across the Australian STEM sector, including **twelve changemakers**¹⁰ from the STEM Women online community, travelled to Adelaide to discuss how to advance gender equity in Australia and how to realise the opportunities described in the **Decadal Plan for Women in STEM**¹¹. The **SAGE Athena SWAN awards**¹² were also held for the last time while SAGE was in its pilot phase. The Academy stands alongside co-founding partner, the Australian Academy of Technology and Engineering, in wishing SAGE Ltd a strong and successful future.

March

The **honorific awardees for 2020**¹³ were announced in March, with 18 talented scientists recognised for their significant contributions to Australian science. Keep an eye on our social platforms as we revisit these discoveries and careers over the coming weeks. March also saw the implementation of COVID-19 restrictions nationally, and the Academy responded by making a call for the data underpinning COVID-19 decisions **to be made public**¹⁴, and launching of

1 facebook.com/AustralianAcademyofScience

2 twitter.com/Science_Academy

3 instagram.com/ausacademyofscience

4 linkedin.com/company/the-australian-academy-of-science

5 science.org.au/academy-newsletter

6 player.vimeo.com/video/449150136

7 science.org.au/news-and-events/news-and-media-releases/statement-regarding-australian-bushfires

8 science.org.au/news-and-events/news-and-media-releases/canberras-iconic-landmark-damaged-hailstorms

9 science.org.au/news-and-events/news-and-media-releases/gender-equity-conference-demonstrates-progress-inspires-change

10 science.org.au/news-and-events/news-and-media-releases/meet-our-stem-women-changemakers

11 science.org.au/support/analysis/decadal-plans-science/women-in-stem-decadal-plan

12 scienceandgenderequity.org.au/news/media-release-australias-higher-education-and-research-sector-a-national-leader-in-eliminating-gender-and-diversity-bias

13 science.org.au/news-and-events/news-and-media-releases/academy-awards-reflect-excellence-diversity-australian-science

14 science.org.au/news-and-events/news-and-media-releases/australias-leading-scientists-call-data-underpinning-covid-19-decisions-made-public

a series of **factual videos**¹⁵ to support community awareness.



Watch on YouTube: Our first Latest From Science video responding to COVID-19.¹⁶

April

In early April, the **COVID-19 Expert Database**¹⁷ was launched providing access for decision-makers and journalists to key experts relevant to the pandemic. Later that month, along with Australia's Chief Scientist and other learned academies and partners, we also launched the **Rapid Research Information Forum**¹⁸ (RRIF) to provide the best available evidence to rapidly respond to pressing questions about COVID-19 thereby supporting government decision-making in response to the pandemic. RRIF has so far provided 13 briefs along with additional updates.

May

May would normally be one of the biggest months in the Australian science calendar with our annual Science at the Shine Dome event. This year we still announced **the 2020 cohort of Academy Fellows**¹⁹ and **Corresponding Members**²⁰—keep an eye on our social channels during December as we recognise each of the new Fellows individually for their contribution to science and Australia. In May we also warned decision

makers that the response to the pandemic risked wiping out many of the hard-won gains for **women in STEM**²¹.

June

On World Environment Day, the Academy joined 17 other academies to call on world governments to ensure a **sustainable recovery from the pandemic**²². June also saw the launch of a new outreach initiative, **Global Science TV**²³, a collaboration with the International Science Council that evolved from the science news capability developed at the Academy over the last three years.



Global Science TV host, journalist and clinical psychologist Nuala Hafner.

July

In July we revisited the bushfire season, with Fellows providing evidence to Government via senate estimates and evidence briefs on the effect of the fires on **soil health**²⁴, **biodiversity**²⁵ and later, the **health impacts**²⁶. A reminder was also issued by the **InterAcademy Partnership**²⁷ (IAP) that only a low-carbon recovery will provide for social equity, the environment, and human health. The Academy program, Future Earth Australia, also called for **local community**

¹⁵ [science.org.au/curious/people-medicine/covid-19-facts](https://www.science.org.au/curious/people-medicine/covid-19-facts)

¹⁶ youtu.be/GCUZ0Bg-k-0

¹⁷ [science.org.au/news-and-events/news-and-media-releases/academies-join-forces-launch-covid-19-expert-database](https://www.science.org.au/news-and-events/news-and-media-releases/academies-join-forces-launch-covid-19-expert-database)

¹⁸ [science.org.au/news-and-events/news-and-media-releases/research-sector-answers-governments-call-best-available-evidence-covid19](https://www.science.org.au/news-and-events/news-and-media-releases/research-sector-answers-governments-call-best-available-evidence-covid19)

¹⁹ [science.org.au/news-and-events/news-and-media-releases/australias-top-scientists-elected-fellows-of-academy](https://www.science.org.au/news-and-events/news-and-media-releases/australias-top-scientists-elected-fellows-of-academy)

²⁰ [science.org.au/news-and-events/news-and-media-releases/two-new-corresponding-members-admitted-to-academy](https://www.science.org.au/news-and-events/news-and-media-releases/two-new-corresponding-members-admitted-to-academy)

²¹ [science.org.au/news-and-events/news-and-media-releases/pandemic-risks-wiping-out-hard-won-gains-women-stem](https://www.science.org.au/news-and-events/news-and-media-releases/pandemic-risks-wiping-out-hard-won-gains-women-stem)

²² [science.org.au/news-and-events/news-and-media-releases/science-academies-around-world-call-governments-sustainable](https://www.science.org.au/news-and-events/news-and-media-releases/science-academies-around-world-call-governments-sustainable)

²³ [science.org.au/news-and-events/news-and-media-releases/global-science-tv-1st-episode-can-world-tackle-climate-change](https://www.science.org.au/news-and-events/news-and-media-releases/global-science-tv-1st-episode-can-world-tackle-climate-change)

²⁴ [science.org.au/news-and-events/news-and-media-releases/more-work-crucial-help-our-soil-recover-bushfires](https://www.science.org.au/news-and-events/news-and-media-releases/more-work-crucial-help-our-soil-recover-bushfires)

²⁵ [science.org.au/news-and-events/news-and-media-releases/leading-scientists-give-evidence-senate-inquiry-australias-bushfires](https://www.science.org.au/news-and-events/news-and-media-releases/leading-scientists-give-evidence-senate-inquiry-australias-bushfires)

²⁶ [science.org.au/news-and-events/news-and-media-releases/long-term-health-impacts-bushfires-still-unknown](https://www.science.org.au/news-and-events/news-and-media-releases/long-term-health-impacts-bushfires-still-unknown)

²⁷ [science.org.au/news-and-events/news-and-media-releases/academy-supports-iap-communique-global-green-recovery-after-covid](https://www.science.org.au/news-and-events/news-and-media-releases/academy-supports-iap-communique-global-green-recovery-after-covid)

needs²⁸ not to be overlooked as we adapt to climate change.

August

During August, we celebrated **National Science Week**²⁹ with two online webinar events on saving our oceans and fighting bushfires with science. We also co-hosted a discussion with the **Australian Academy of Law**³⁰ on the reception, quality and evaluation of scientific evidence in Australian courts. A **satellite selfie**³¹ was taken from space of the Shine Dome, and we took the opportunity to share more inspiring **stories**³² of the Academy's Fellows. We also took a look back at the past 12 months of **championing the vision for women in STEM**³³, applauding the successes and recognising where more work still needs to be done.



A drone image of our message for the Satellite Selfie, assembled by Academy staff.

September

In September, we made a call for **data governance standards in sport**³⁴, recognising the lack of oversight in how data is being collected and the associated impacts on athletes' rights and protections. We also held the Australian final of **Falling Walls Lab**³⁵ and recognised three winning ideas from early career researchers who then

represented Australia in the international finals held in Berlin, Germany.

October

October saw the release of **the delayed Federal Budget**³⁶, which signalled a significant response to the crisis facing Australia's scientists as a result of the pandemic. The Academy also contributed a policy brief to the parliament recommending the development of an **independent national biodiversity agency**³⁷, or 'biodiversity BOM', to be the custodian of biodiversity data in the same way BOM manages national weather data.

November

During November, we celebrated **NAIDOC Week**³⁸ with two inspirational webinars that explored how Aboriginal and Torres Strait Islander peoples have knowledge that stretches back thousands of years and have so much to contribute to Australia's future. We also announced the **repair work to the Shine Dome**³⁹, and a commitment towards net zero emissions at Australia's home of science. We have also begun **digitising the first of many collections**⁴⁰ in the Academy archives, which have already been accessed by researchers internationally.



A scan from our archives of Mawson, David and Mackay at the South Magnetic Pole. The camera was operated via a string.

28 science.org.au/news-and-events/news-and-media-releases/local-community-needs-must-not-be-overlooked-we-adapt

29 science.org.au/news-and-events/news-and-media-releases/academy-gears-national-science-week

30 science.org.au/news-and-events/news-and-media-releases/intersection-scientific-and-legal-proof-draws-big-audience

31 science.org.au/news-and-events/news-and-media-releases/academy-celebrates-value-science-satellite-selfie

32 science.org.au/news-and-events/news-and-media-releases/celebrating-stories-science-national-science-week

33 science.org.au/news-and-events/news-and-media-releases/year-championing-vision-women-stem

34 science.org.au/news-and-events/news-and-media-releases/experts-call-national-conversation-use-data-australian-professional-sport

35 science.org.au/news-and-events/news-and-media-releases/three-winning-ideas-australia-falling-walls-lab-goes-digital

36 science.org.au/news-and-events/news-and-media-releases/federal-budget-significant-response-pandemic-science-crisis

37 science.org.au/news-and-events/news-and-media-releases/academy-fellows-time-establish-independent-biodiversity-agency

38 science.org.au/news-and-events/news-and-media-releases/naidoc-week-events-explore-science-continuous-culture

39 science.org.au/news-and-events/news-and-media-releases/australias-home-science-shine-brighter-ever

40 hive.com/collections/200817/australian-academy-of-science

December

Finally, during December we will be Celebrating Science. Over the next four weeks we will share videos introducing the 2020 cohort of Fellows elected earlier this year. We will also revisit some of the biggest stories we covered through the year as we prepare for what 2021 will bring.

The Academy has so many to thank for their support throughout 2020. Partners and sponsors from the private, government, science and education sectors, along with many generous donors, have made it possible for the organisation to achieve what it has this year. We will continue to recognise our supporters' contributions in the second edition of Science Matters in the first half of 2021.

And we acknowledge the hard work of all our Fellows who make the Academy what it is. The Academy's Fellowship of brilliant minds makes major contributions to the success and prosperity of Australia.

Ground-breaking research forum set to expand with Minderoo Foundation commitment

December 17, 2020



Research Chair of Minderoo Foundation, Fiona David (left) and Australian Academy of Science Chief Executive, Anna-Maria Arabia. Photo: AAS.

The highly successful **Rapid Research Information Forum**⁴¹ (RRIF), tasked with providing the latest scientific evidence to the Australian Government's decision makers, will continue and expand with support from **Minderoo Foundation**⁴².

Australia's success in containing the COVID-19 outbreak, largely based on an evidence-based response, including the work of the RRIF, is the envy of the world.

In April, as the COVID-19 pandemic took hold globally, Australia's Chief Scientist Dr Alan Finkel together with the country's science, research and innovation sectors, began fielding questions from the Federal Government about the coronavirus, in what was a rapidly changing situation.

Chaired by Dr Finkel, the RRIF's operations are led by the Australian Academy of Science. The RRIF is an innovative model that provides the best and latest evidence to Government to help drive the country's response to the pandemic.

The RRIF and its impact on the nation has been **publicly recognised**⁴³ by the Prime Minister, Scott Morrison. Minderoo Foundation's commitment of \$400,000 to the Australian Academy of Science will strengthen the RRIF and help lay the foundations for the model into the future.

Australian Academy of Science Chief Executive, Ms Anna-Maria Arabia, warmly welcomed the commitment from Minderoo Foundation.

"This collaboration demonstrates a shared understanding of the need for evidence-informed decision making," Ms Arabia said.

"The strengths of the RRIF are its multi-disciplinary focus, independence, and ability to rapidly draw on Australia's best and most relevant experts on any given policy matter.

"The RRIF has demonstrated the critical value of independent evidence to inform social and economic policy and this has been recognised by the Minderoo Foundation.

"This grant sees the RRIF model strengthened for the immediate term. The RRIF will continue its remit to rapidly provide the scientific expertise needed to answer questions received from

41 science.org.au/covid19/rapid-research-information-forum

42 minderoo.org

43 youtu.be/yHsPsszyjM?t=626

Australian Government Ministers during the recovery phase of the pandemic.

“We are also working to encourage the adoption of the RRIF as a policy model in the long term to ensure that decision makers are drawing on the best evidence-base possible whatever the policy question.”

Research Chair of Minderoo Foundation Fiona David said the RRIF is fast becoming one of Australia’s greatest research assets, delivering clear evidence on key policy issues at the speed needed to help the country through crises.

“Now more than ever, Minderoo Foundation understands the importance of quality research

which can be used to transform and improve the lives of all Australians,” Ms David said.

“Back in May, the RRIF released a report which outlined COVID-19’s devastating impact on Australia’s research sector⁴⁴. In response, Minderoo Foundation launched a fellowship program⁴⁵ at the Forrest Research Foundation, to support some of the best and brightest early career researchers in Australia. Our new Prospect Fellowship Program aims to provide stable funding to Australian researchers during this challenging time.

“Minderoo is thrilled to be working with the Australian Academy of Science to be part of the Rapid Research Information Forum. We eagerly anticipate the publication of the next report.”



Forum member organisations:



44 science.gov.au/covid19/research-workforce

45 forrestresearch.org.au/fellowship

Fellows' favourites: your summer reading and listening recommendations

December 16, 2020



Academy Fellows Dr TJ Higgins and Professor Frances Separovic (and Gigi) with their favourite books of this year. Photos: supplied

The Australian Academy of Science's Annual Fellows' Christmas Book and Podcast List, released today, contains 37 favourite reads (and listens) recommended by the Academy's Fellows.

As we have for the past four years, we asked our Fellows to provide their top book and podcast suggestions for this year.

See the Fellows' book and podcast list.⁴⁶

Here's a small sample of this year's recommendations:

Books

Wonder, by RJ Palacio

Recommended by Emeritus Professor Frances Separovic AO FAA

'Wonder' is a delightful book recommended for children aged 8 to 12 but its themes of identity, bullying and acceptance apply to readers of all ages. It tells the story of a boy born with severe facial differences as he starts school. The power of the book comes from how normal and relatable each character is and the insight into how one person can affect the lives of others.

Bad Blood: Secrets and Lies in a Silicon Valley Startup, by John Carreyou

Recommended by Professor Georgia Chenevix-Trench FAA FAHMS

Everyone with an interest in biotech should read this. It is scary how gullible clever men are when faced with a charismatic young woman, and how many people were fooled. The court case is pending but the author tells a gripping story.

A Water Story: Learning from the Past, Planning for the Future, by Geoff Beeson

Recommended by Dr TJ Higgins AO FAA FTSE

Water is a precious chemical globally and is especially so in Australia. This very accessible book with its excellent illustrations tells of the use and importance of water from ancient times to the present. The focus is on Australia and it covers everything from aquifers to yabbies.

English Pastoral, by James Rebanks

Recommended by Dr Jean Finnegan FAA

A thoughtful account of how the quest for cheap food has changed farming practices and the effect that this has had on farmland in the Lake District. Rebanks tells of his efforts to return to more traditional farming practices and to restore parts of his farm to a 'wild' state with benefits for both flora and fauna.

Morality, by Jonathan Sacks

Recommended by Professor Steven Praver FAA

This book reassesses moral philosophy in the face of a society which seems to have lost its way. We in the Academy believe in evidence and truth as the basis for a society in which we want to live; but this notion is currently under threat in the era of post-truth and fake news. Sacks provides a vision of the moral basis for society in which the values which we hold dear can flourish.

⁴⁶ science.org.au/files/userfiles/events/news/documents/fellows-christmas-book-podcast-list-2020.pdf

Podcasts

13 Minutes to the Moon, hosted by Kevin Fong

Recommended by Professor Ivan Marusic FAA

Podcast on Nasa's missions to the Moon. Gripping interviews and original audio recordings of mission control, astronauts and partners who made the mission possible. Apollo program revised in a refreshing way with theme music by Hans Zimmer.

Terrible Lizards, hosted by David Hone and Iszi Lawrence

Recommended by Professor Andrew White FAA

This is the podcast about dinosaurs that you have been missing your entire life. It brings together each week paleontologist Dr David Hone, comedian and writer Iszi Lawrence, and an expert guest. Using the latest research, they answer listeners' questions with conversations that are equally entertaining and informative.

Maths and photography combine in the 2020 scienceXart schools competition

December 01, 2020



The Academy's scienceXart competition showcases the talent of our next generation of scientific and creative thinkers.

This year, to mark the 100th anniversary of the International Mathematical Union, the competition theme was 'spot the maths'. Students were encouraged to snap a photo of the maths they see in the world around them, and these entries came in thick and fast.

Today, we're announcing the winners of each age-group category. These were **selected by a panel**⁴⁷ of eminent members of the Australian mathematical science and art communities.

Over 850 individual students submitted entries in 2020, and we thank all of the students across Australia who took the time to participate and teachers who supported the competition.

Congratulations to all the winners. They will receive an exciting STEM-related prize pack for themselves and their class.

The winners

Foundation to Year 3

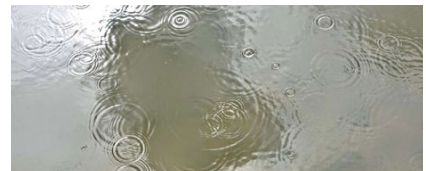


Image adapted from winner of the Foundation to Year 3 category, Aaron.

- First prize: Aaron for the photo of a snail on a leaf and spotting geometry in their garden friend.
- Second prize: Samuel for a photo of the terminus of a two-person chairlift and investigative recognition of its maths.

Year 4 to Year 6

Image adapted from winner of the Year 4 to Year 6 category, Setayesh.



- First prize: Setayesh for recognising the maths that causes overlapping concentric circles in rain drops that fall close together.
- Second prize: Eleanor for a photo of a passionfruit vine that they spotted in the shape of a helix.

Year 7 to Year 9



Image adapted from winner of the Year 7 to Year 9 category, Max.

⁴⁷ science.org.au/news-and-events/news-and-media-releases/sciencexart-spot-maths-judging-panel-announced

- First prize: Max for recognising that when bubbles merge, they form various shapes to maximise volume relative to surface area.
- Second prize: Niamh for a photo representing the theory of parallel lines meeting at infinity.

Year 10 to Year 12

Image adapted from winner of the Year 10 to Year 12 category, Natalia.



- First prize: Natalia for a photo of an island reflection, spotting symmetry in nature.

Statistics Prize



Image adapted from winner of the Statistics Prize, Otylia.

- Winner: Otylia for a photo describing a creative display of statistics in nature as the birds occupied boxes made by the fence.

scienceXart: spot the maths was developed in consultation with leading Australian mathematicians, including from the Academy's National Committee for Mathematical Sciences. It was tailored to align with Australian curriculum learning outcomes under expert guidance from the Academy's reSolve project.

The competition was supported by the Australian Mathematical Society and the Statistical Society of Australia. The collaboration of experts in mathematics, education and art has made scienceXart successful in showing the inherent creativity of mathematics and science.

See **all the winning and shortlisted photographs**⁴⁸ or find out more about the **scienceXart competition**⁴⁹.

Conferences to explore dynamics of the Southern Ocean and the conservation of Australian plants

December 15, 2020



The multiscale dynamics of the Southern Ocean will be the focus of the next Elizabeth and Frederick White Research Conference. Photo by 66 north on Unsplash

The Academy has contributed funding towards two scientific conferences focusing on the Southern Ocean and the conservation of Australian plants.

Elizabeth and Frederick White Research Conference—'Multiscale Dynamics of the Southern Ocean'

The multiscale dynamics of the Southern Ocean will be the focus of a workshop for the 2021–22 Elizabeth and Frederick White Research Conference.

The conference will accelerate Australian science advances in multiscale dynamics of the Southern Ocean: a crucially important water mass for the Australian climate, economy, environment, and security. The conference will promote knowledge transfer with New Zealand researchers and drive other international collaborations.

Funding for **Elizabeth and Frederick White Research Conferences**⁵⁰ are offered for research conferences in the physical and mathematical sciences related to the solid Earth, the terrestrial oceans, Earth's atmosphere, solar-terrestrial science, space sciences and astronomy.

Fenner Conference on the Environment—'Exceptional times, exceptional plants'

This conference will focus on ex situ conservation strategies for Australian plants

⁴⁸ science.org.au/sciencexart/spot-the-maths/sciencexart-spot-maths-2020-winners-gallery

⁴⁹ science.org.au/sciencexart/spot-the-maths

⁵⁰ science.org.au/node/118

that cannot be conserved by conventional seed banking methods.

The conference will provide an opportunity for scientists working on the conservation of Australia's diverse flora to evaluate methods for conserving plant germplasm (seeds, plants and other plant tissues), adding value to guidelines produced by the Australian Network for Plant Conservation. This is crucial to protect some of our most threatened species, particularly in the context of climate change and water scarcity challenges.

Funding for **Fenner Conferences on the Environment**⁵¹ is offered for conferences that bring together those with relevant scientific, administrative and policy expertise to consider current environmental and conservation problems in Australia, with the aim of contributing to the formation of policies that can alleviate some of these problems.

Both the White and Fenner conferences are funded annually, with applications for the 2022–23 rounds opening in early 2021.

Thomas Davies grants to support advancements in marine, soil and plant biology

December 03, 2020



Top row (left to right): Caitlin Byrt, Adam Frew, Bonnie Holmes. Bottom row (left to right): Jana Sperschneider, Antony van der Ent, Amelia Wenger

Uncovering rare metal-hoarding plants, mangrove desalination techniques and great hammerhead shark populations are the aims of some of the

researchers awarded the Australian Academy of Science's 2021 **Thomas Davies Research Grant for Marine, Soil and Plant Biology**⁵².

The grant is funded through a generous philanthropic bequest to the Academy from the estate of the late Thomas Lewis Davies. The fund offers annual research grants of up to \$20,000 each to early- and mid-career researchers in the fields of marine, soil and plant biology.

Six researchers are recipients of research grants this year.



Dr Caitlin Byrt (left) and Dr Antony van der Ent out on fieldwork.

Dr Caitlin Byrt from the Australian National University will study the mechanisms that allow mangrove species (*Avicennia officinalis*) to separate salt and water, which could potentially help to manage freshwater resources. Recent advances in desalination technologies have drawn inspiration from biological systems, such as mangroves, to make the processes more energy-efficient and cost-effective.

Dr Byrt's research will focus on the water and salt transport properties of mangrove aquaporins, a type of water channel protein embedded in leaf membranes. "This project will contribute to our understanding of how nature has solved the problem of separating salt and water," said Dr Byrt.

Dr Antony van der Ent from the University of Queensland will continue the search for undiscovered hyperaccumulator plants, which have the unique ability to accumulate metal and metalloid elements. Hyperaccumulators have great potential in the fields of phytomining (harvesting metals from crops), phytoremediation of soils for agriculture and environmental

⁵¹ science.org.au/node/119

⁵² science.org.au/supporting-science/awards-and-opportunities/thomas-davies-research-grant-marine-soil-and-plant-biology-0

management, and biofortification of crops to address human micronutrient deficiencies.

“Just 700 hyperaccumulator plant species have been identified globally, although it is expected that many more exist and await discovery,” said Dr van der Ent. He will use the innovative technique of x-ray fluorescence ionomics to extract elemental data from plant species held at the Queensland Herbarium.

Several hyperaccumulators have already been discovered in this collection in recent years, and the insights from this research will advance knowledge about their biology and physiology.



Dr Adam Frew (left) and Dr Jana Sperschneider.

Dr Adam Frew from the University of Southern Queensland will investigate how different communities of arbuscular mycorrhizal (AM) fungi can affect defence traits in their host plants. AM fungi are sometimes used in bio-fertilisers—they promote plant growth and stress resistance, and can enhance their host plants’ immune systems. They also play a key role in maintaining soil health.

Dr Frew will investigate the role of AM fungal diversity in plant resistance to herbivores. He will study how diverse fungal communities drive defence mechanisms against root-feeding insects in three important crops: sugarcane, wheat and sorghum. This is an important step forward since most research to date has focused only on a few commonly used AM fungal species.

Dr Jana Sperschneider from the Australian National University will help uncover the mechanisms behind how rust fungi infect plants. Rust fungi are a significant threat to major agricultural crops like wheat, as well as iconic Australian plants, such as tea tree and lemon myrtle.

There is currently a lack of understanding surrounding how rusts infect plants—their unusual genomic structure is believed to be a major contributor to their virulence. Dr Sperschneider aims to shed light on how the rust genome is organised during the distinct stages of plant infection. This will help develop durable and effective strategies to protect crops and native ecosystems from rusts.



Dr Bonnie Holmes (left) and Dr Amelia Wenger carrying out fieldwork.

Dr Bonnie Holmes from the University of the Sunshine Coast will carry out one of the first studies to explicitly assess the distribution of great hammerhead sharks (*Sphyrna mokarran*) across multiple ecosystems in QLD and NSW. Her research will collect detailed ecological information on great hammerheads, including seasonal movements, fishery interaction and population genetic dynamics, particularly in the face of climate change.

Numbers of hammerhead sharks have undergone significant reductions off the Australian east coast and the species was classified as critically endangered in 2019. As keystone predators, they play a critical role in influencing the marine ecosystem, and Dr Holmes’s work will provide data that is essential for Australian management strategies.

Dr Amelia Wenger from the University of Queensland aims to develop evidence-based wastewater pollution guidelines that will preserve ecosystem health. Wastewater treatment services tend to focus on removing pathogens harmful to humans, but may not address pollutants that can harm coastal environments.

Dr Wenger’s project will draw on ecotoxicology statistics to develop wastewater pollution guidelines for tropical coastal and marine ecosystems. These guidelines will be used by

conservation organisations, sanitation and health practitioners, and policymakers to implement ocean-friendly sanitation management.

Geoffrey Frew and Selby fellowships to bring distinguished scientists to Australia

December 10, 2020



Frew Fellow Professor Ania Bleszynski Jayich (left) and Selby Fellow Professor Matthias Wessling (Photos supplied)

Geoffrey Frew Fellow: Professor Ania Bleszynski Jayich, optics and photonics

Experimental physicist Professor Ania Bleszynski Jayich of the University of California Santa Barbara is the 2021 recipient of the **Geoffrey Frew Fellowship**⁵³. The fellowship is awarded to distinguished overseas scientists to participate in Australian spectroscopy conferences and visit scientific centres in Australia.

Professor Bleszynski Jayich leads the Quantum Sensing and Imaging research group at UC Santa Barbara. The group's current research includes spin-phonon coupling, magnetometry, and diamond growth and spin coherence, with applications such as quantum computing and magnetic resonance imaging.

Professor Bleszynski Jayich has made major research impacts, such as the development of a technique for magnetisation measurements of condensed matter systems using ultrasensitive micromechanical detectors. Prior to her physics career, she held a No. 1 singles tennis ranking in the United States for athletes 18-and-under.

The Australian and New Zealand Optical Society generously matches the Academy's funding support to this Fellowship.

Selby Fellow: Professor Matthias Wessling, chemical engineering and sustainability

Professor Matthias Wessling of RWTH Aachen University has been awarded the Academy's 2021 **Selby Fellowship**⁵⁴. The fellowship is awarded to distinguished overseas scientists to conduct public lectures and visit scientific centres in Australia.

Professor Wessling is one of the world's leading researchers in the field of membrane technology and is the coordinator of all energy transition programs at RWTH Aachen. His research focuses on technologies that enable the transition to zero emissions in energy and industry. Applications of his research include resource recovery and recycling, energy storage, water treatment and medical engineering.

Having given numerous international lectures on 'big picture' topics such as sustainability, Professor Wessling's Australian visit will further stimulate discussion among the community, industry, researchers and politicians.

"I am honoured and ready to go," said Professor Wessling. "The topics and challenges we have ahead of us need communication beyond national interests and borders."

The Selby Fellowship fosters the international exchange of scientific ideas and is financed through the generosity of the trustees of the Selby Scientific Foundation.

Dates and details of all tour dates and lectures will be published on the Academy website once confirmed.

Science policy update

The Academy has released a **position statement on international science collaboration**⁵⁵, saying modern science is built on partnerships and collaborations across national borders in pursuit of solutions to global challenges. The Academy

⁵³ science.org.au/supporting-science/awards-and-opportunities/geoffrey-frew-fellowship

⁵⁴ science.org.au/supporting-science/awards-and-opportunities/selby-fellowship-0

⁵⁵ science.org.au/supporting-science/science-policy-and-analysis/position-statements/position-statement-international

recognises the need to maintain national security protections to safeguard Australian science, and says such regulation must be evidence-based, proportional and designed to encourage the continuation of international scientific engagement. The Academy holds that all scientists should be free to go about their work, and promote their research in appropriate fora without fear of intimidation or violence from individuals, groups or governments.

National Committees update

The Academy congratulates Professor Alex Mazzolini of Swinburne University, who is the first Australian to be awarded the prestigious Physics Education Medal from the Commission on Physics Education of the International Union of Pure and Applied Physics (IUPAP). The award recognises Professor Mazzolini's 'outstanding contributions to physics teaching of a kind that transcends national boundaries' over 40 years of education practice, covering six continents and 40 countries. The Academy represents Australian physics at the IUPAP as the National Member for Australia, and is supported by the **National Committee for Physics**⁵⁶.

Opportunities for scientists—December 2020

December 17, 2020

External opportunity

Indigenous Media Mentoring Program

Indigenous STEM researchers from around Australia can register their interest in joining the Australian Science Media Centre at the SBS studios in Sydney for intensive media training on 8 and 9 April 2021.

More information on the Indigenous Media Mentoring Program⁵⁷

Expressions of interest close 21 December 2020

External awards

Order of Australia Honours

Nominations received from the public to recognise people who have contributed above and beyond to the Australian community or humanity at large. To encourage diverse representation of the community, nominations of women are being sought.

More information on the Order of Australia Honours⁵⁸

Rolling deadline—appointments in the Order of Australia are announced on Australia Day and on the Queen's Birthday public holiday in June.

Mahathir Science Award

Awarded to an individual or group in recognition of contributions and innovations towards solving problems in the tropics through Science, Technology, and Innovation. The call for nominations is now open for the Tropical Agriculture and Tropical Architecture and Engineering categories—US\$100,000

Applications close 30 December 2020

More information on the Mahathir Science Award⁵⁹

Volvo Environment Prize

Awarded for outstanding scientific discoveries or innovations within the area of environment and sustainability —SEK\$1.5 million (approximately A\$237,000)

More information on the Volvo Environment Prize⁶⁰

Applications close 10 January 2021

56 science.org.au/supporting-science/national-committees-science/national-committee-physics

57 smc.org.au/news/immpp

58 gg.gov.au/australian-honours-and-awards/order-australia

59 msa-foundation.org

60 environment-prize.com/the-prize/nominate

Lefoulon-Delalande Grand Prize

Awarded to scientists who have made a significant scientific contribution in physiology, biology or cardiovascular medicine—€600,000

More information on the Lefoulon-Delalande Grand Prize⁶¹

Applications close 11 January 2021

A.M. Turing Award

Technical award given for major contributions of a technical nature to the computing community—US\$1 million

More information on the A.M Turing Award⁶²

Applications close 15 January 2021

AOGS Axford Medal

Awards outstanding achievements in geosciences and unselfish cooperation and leadership in Asia and Oceania.

More information on the AOGS Axford Medal⁶³

Applications close 19 January 2021

Welch Award in Chemistry

Awards important chemical research contributions which have had a significant positive influence on mankind—US\$500,000

More information on the Welch Award in Chemistry⁶⁴

Applications close 29 January 2021

WISE Prize for Education

Recognises an individual or a team for an outstanding, world-class contribution to education—US\$500,000

More information on the WISE Prize for Education⁶⁵

Applications close 1 February 2021

The Royal Society Awards

Nominations for the Royal Society's medals and awards to recognise and celebrate excellence in science open on 30 November 2020.

More information on the Royal Society's medals and awards⁶⁶

Applications close 15 February 2021

See more external awards and prizes⁶⁷

Fellows update— December 2020

December 17, 2020

Honours and awards to Fellows

Professor Richard Bryant AC FAA FAHMS FASSA—awarded the James Cook Medal by the Royal Society of NSW

Professor Matthew England FAA—awarded the Morton Medal by the Australian Meteorological and Oceanographic Society

Professor Doug Hilton AO FAA FTSE FAHMS—named Melburnian of the Year by the City of Melbourne

Professor Nalini Joshi AO FAA—awarded the George Szekeres Medal by the Australian Mathematical Society

Professor Harry Poulos AM FAA FTSE—awarded the 2020 Peter Nicol Russell Career Achievement Memorial Medal by Engineers Australia

61 lefoulon-delalande.institut-de-france.fr/grand-prix-scientifique-2021

62 amturing.acm.org/call_for_nominations.cfm

63 asiaoceania.org/society/public.asp?view=axford_medal

64 welch1.org/awards/welch-award-in-chemistry

65 wise-qatar.org/wise-works/wise-prize-for-education

66 royalsociety.org/grants-schemes-awards/awards/nominations

67 science.org.au/supporting-science/recognition/external-sources-recognition