ROYAL SOCIETY **TE APĀRANGI**

Highlights
Te Tau

ROYAL
SOCIETY
TE APĀRANGI

Arotakenga

Our year in review

Tēnā koutou katoa. He mihi tēnei ki te whānau whānui. As we reflect on 2020 – an unprecedented year during which the world had to face the challenges posed by the COVID-19 pandemic – we are heartened and grateful that we could continue in most aspects of our mahi under the different 'alert levels' to support New Zealanders to tūhura explore, torohē discover and tohatoha share knowledge. We share many of our activities during 2020 in this publication.

Rārangi ūpoko
Contents

Alert Level 0: Before

COVID-19

Early in 2020 news bulletins began to cover a 'novel influenza-like illness' that was spreading rapidly in Wuhan, China and then in other countries. The first confirmed case of corona virus in New Zealand was in February. While stock markets began to fluctuate due to the uncertainty of whether this disease would become a pandemic, life continued as normal for many in Aotearoa through to the end of February, including for Royal Society Te Apārangi whānau. The World Health Organization declared COVID-19 a pandemic on 11 March, by which time New Zealand's health specialists, scientists, advisors and science communicators were ramping up their efforts to shape New Zealand's response to COVID-19. Mathematical modelling by Professor Shaun Hendy MNZM FRSNZ and the larger Te Pūnaha Matatini team showed a rapid and full lockdown was the best approach for New Zealand.

"The longer you wait before you take it seriously, the more intense the spread of the virus across society … Go hard, go early."

PROFESSOR SHAUN HENDY MNZM FRSNZ

WĀNANGA AT

Tirorangi Marae
Ohakune

THE SCIENCE TEACHING LEADERSHIP PROGRAMME IS COMMITTED TO GROWING THE CAPACITY OF KURA AND SCHOOLS TO PROVIDE TAUIRA STUDENTS WITH MEANINGFUL AND RELEVANT PŪTAIAO SCIENCE EXPERIENCES IN THEIR LOCAL COMMUNITIES. THE WORLD OF TE AO MĀORI IS CENTRAL TO THIS KAUPAPA.

In Hui-tanguru February, the 2020 cohort of participant teachers travelled to Tirorangi Marae, beside the sacred maunga of Ruapehu, to work alongside tangata whenua to experience pūtaiao science through the lens of mātauranga Māori. Local kaumātua shared their knowledge through pūrākau legends and explored the local whenua from multiple perspectives.

The wānanga resonated deeply with kaiako as they built whanaungatanga relationships, mahi ngā tahi worked together and supported each other.

“The Wānanga at Tirorangi Marae was an immersion into mātauranga Māori. In this experience I explored what it means to be connected. As the week unfolded, I stepped into a way of thinking of how I am connected to the world. Mātua Keith, Craig and Hikoa shared their wisdom on how observing Papatūānuku can give us information about what has happened in the past and what will happen in the future. The key question that resonated with me was ‘How am I connected to this awa?’ and therefore ‘What can we do for the awa, not what can the awa do for us?’ Bringing this question back home, I am looking at the school physical environment with a new lens and how I can promote science with support from the concept of Ngā Atua. On our school property we have a bush area that I would like to explore with the idea of ngahere, that we are connected with the forest.”

SHARON GIBSON, PAUATAHANUI SCHOOL

VIEW MORE ON THE SCIENCE TEACHING LEADERSHIP PROGRAMME
bit.ly/2020HL-5

Haere rā
Gill Sutherland

HAERE RĀ, NOHO AKE ME TE AROHA
FAREWELL, WE LEAVE YOU WITH OUR LOVE

In late Hui-tanguru February, after 28 years working for the Society, Gill Sutherland retired. Gill recounted that being Director – Academy Operations was her sixth job title. She also worked with four Chief Executives, 10 Society Presidents, and 14 Academy Chairs. She was also the editor of our weekly *Alert* newsletter from its beginnings in 1997 until 2012.

At her farewell function, staff spoke of her friendly and accommodating nature, and her high integrity and output. President Wendy Larner noted her longstanding work to support the Fellowships and Medals and Awards processes. "She has made important contributions to ensure that diverse forms of excellence are better recognised by the New Zealand research community."

"When Gill left her desk at Royal Society Te Apārangi's headquarters in Turnbull Street for the last time on 27 February 2020, a great deal of the Society's institutional memory walked out the door with her."

PROFFESSOR RICHARD BEDFORD ONZM QSO FRSNZ, PAST PRESIDENT, ROYAL SOCIETY TE APĀRANGI

VIEW MORE ON GILL'S FAREWELL
bit.ly/2020HL-6

JOURNAL ISSUE CONTEXTUALISES

Christchurch terror attacks

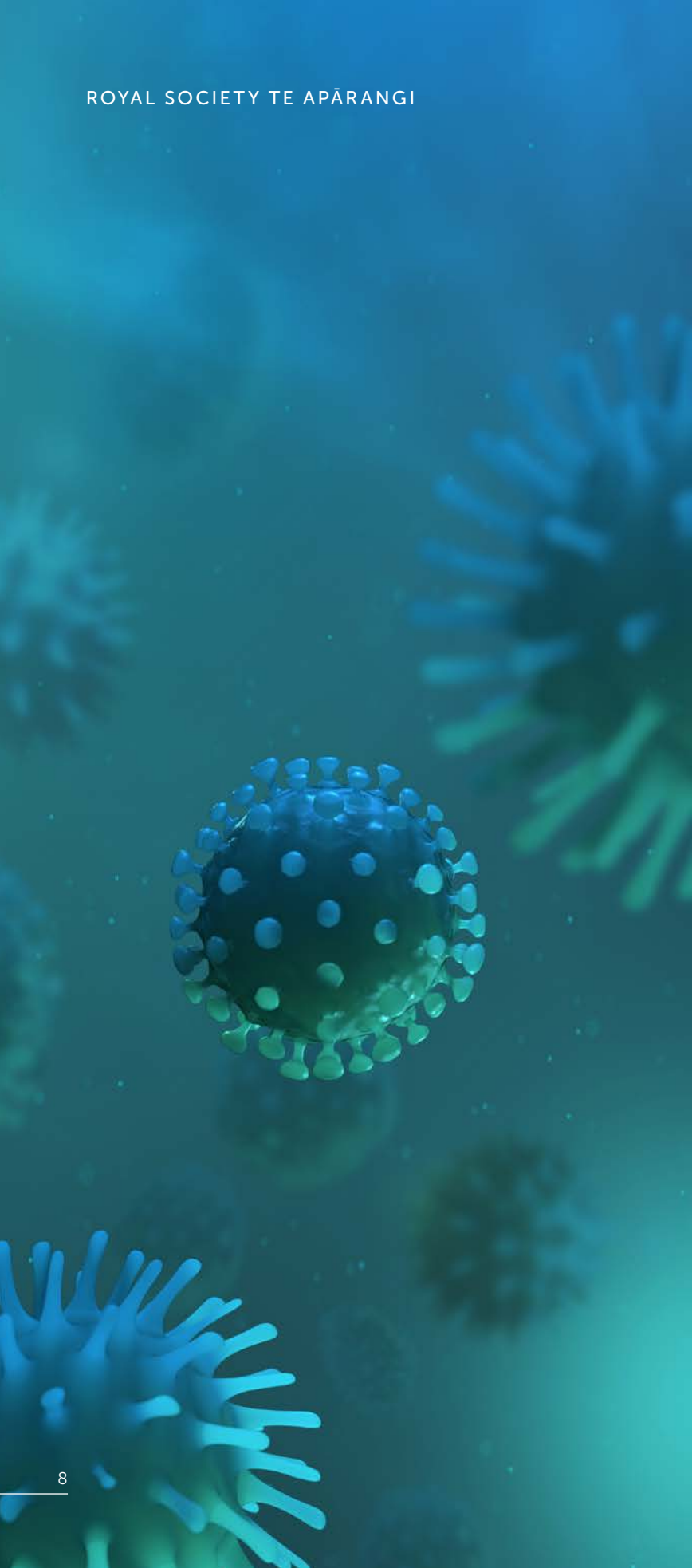
The date 15 March 2020 marked the first anniversary of the terrorist attacks that occurred at the Al Noor Mosque and the Linwood Islamic Centre in Christchurch. A special issue of Kōtuitui: New Zealand Journal of Social Sciences Online was published, reviewing the deeper issues underlying the Ōtautahi Christchurch terrorist attack from a social science perspective.

The seven contributions to the special issue draw on various discourses (including social media), content analyses, ethnography, interviews and survey data. They examine right-wing extremists, key media personnel and their strategies, security agency personnel and their strategies, the identities of Muslims in New Zealand and the attitudes of the New Zealand public. Disciplinary approaches include communication studies, social psychology, sociology and security studies.

The issue was edited by Professor Charles Crothers (Auckland University of Technology) and Dr Thomas O'Brien (University of York).

> "New Zealand was shattered by the brutal massacre at two Christchurch mosques in March 2019. Systematic social science analysis of this event seemed a worthwhile task for Kōtuitui, given considerable national and international interest. The social sciences are not always effective in explaining certain events, but their study does provide insight towards better explanations and guidance for interventions."
>
> CHARLES CROTHERS AND THOMAS O'BRIEN

VIEW SPECIAL ISSUE
bit.ly/2020HL-7

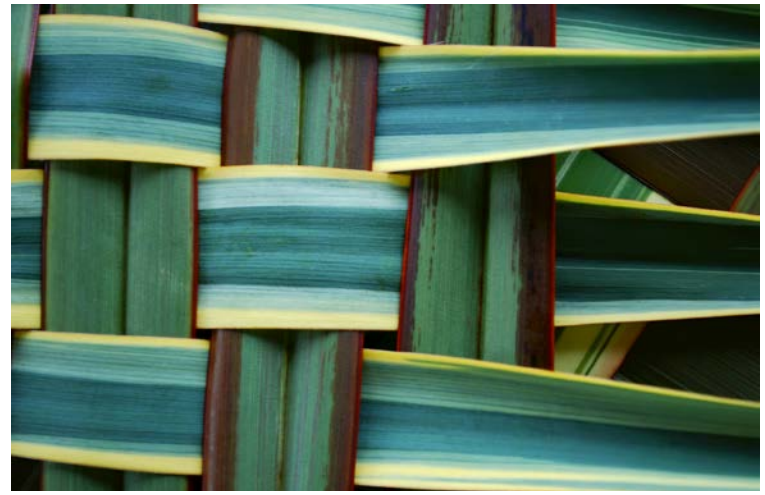


LATEST INFORMATION ON

science and technology for MPs

IN COLLABORATION WITH THE SPEAKER OF THE NEW ZEALAND PARLIAMENT, SCIENCE NEW ZEALAND, UNIVERSITIES NEW ZEALAND AND THE INDEPENDENT RESEARCH ASSOCIATION OF NEW ZEALAND, WE RAN OUR ANNUAL SPEAKER'S SCIENCE FORUM SO THAT MEMBERS OF PARLIAMENT HAD THE OPPORTUNITY TO HEAR KŌRERO PRESENTATIONS ON TOPICAL RESEARCH AREAS. UNFORTUNATELY, THE SERIES WAS TRUNCATED DUE TO THE DISRUPTION FROM COVID-19.

LEARN MORE ABOUT THE SPEAKER'S SCIENCE FORUM
bit.ly/2020HL-8



In 2020, the topics presented were:

Cannabis and health – current research on the positive and negative health impacts of cannabis and cannabinoids and the analytical challenges associated with medicinal cannabis, with Associate Professor Giles Newton-Howes and Dr Helen Poulsen.

COVID-19: Towards vaccine development – how New Zealand researchers can support global efforts to develop a vaccine for this extremely contagious and deadly disease, with Dr Sue Huang, Professor John Fraser FRSNZ and Professor Graham Le Gros FRSNZ.

Future stars: Showcasing New Zealand's rising research talent – featuring Dr Nancy Garrity on the 'trials and tribulations' of aligning mātauranga Māori within a western science framework in her research on high-value materials and Dr Matthew Cowan on his work to revolutionise how we manufacture basic materials to reduce energy consumption, to slow climate change and enrich lives.

Alert Level 4: Eliminate

COVID-19

New Zealand entered Alert Level 4 at 11.59pm on 25 March 2020 after the Government introduced the 4-tiered Alert Level system on 21 March. With a few days' notice, kaimahi prepared to work from home and stay in their 'bubble' – avoiding contact with anyone outside their own household, wherever possible. The Wellington Region Civil Defence Emergency Management Group accepted our offer to use Whare Te Apārangi as its centre of operations over this period.

"You are in a bubble – our own household is our bubble and you need to stay in your bubble and if you go out of your bubble you're going to pop that bubble and that's going to put us all at risk."

ASSOCIATE PROFESSOR SIOUXSIE WILES MNZM

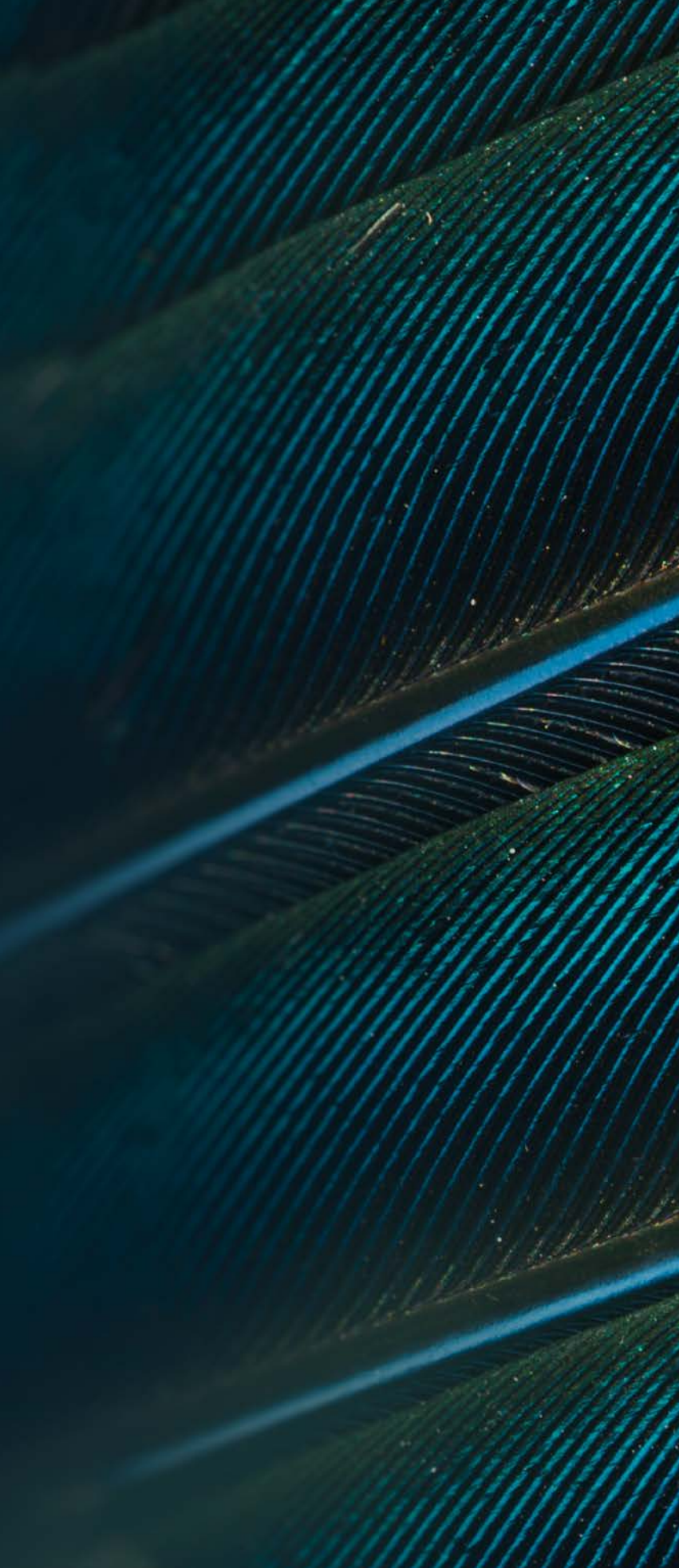
Zui – hui

Under Alert Level 4 lockdown, Society kaimahi staff quickly adapted to working from home. Zui (Zoom hui) meetings became commonplace and the 5-minute quiz – an institution of morning tea at Whare Te Apārangi – was soon being conducted over a special Slack messaging channel, with many kaimahi answering the quiz questions entirely in emojis. A follow up survey of kaimahi on the lessons from the COVID-19 lockdown showed a solid majority felt that their work-from-home situation and productivity was good and the Society was fortunate enough to be able to continue much of its mahi.

Science Media Centre

RISES TO THE CHALLENGE OF COVID-19

COVID-19 PROVIDED BOTH ENORMOUS CHALLENGE AND A MAJOR VALIDATION OF THE IMPORTANCE OF THE SCIENCE MEDIA CENTRE'S ESSENTIAL ROLE IN PROVIDING TRUSTED INFORMATION AND EXPERTISE ON COMPLEX TOPICS TO THE MEDIA AND WIDER PUBLIC IN AOTEAROA.



An independent unit of Royal Society Te Apārangi, the New Zealand Science Media Centre mobilised rapidly to meet unprecedented demand for resources and support from journalists and scientists alike. It rolled out a number of new initiatives between March and June, supported by an injection of emergency COVID-response funding from the Ministry of Business, Innovation and Employment. The initiatives aimed to anticipate the media's needs across the news cycle and proactively manage pressures on key experts and staff. These included:

Online media briefings on COVID-19 topics – offered weekly from April-June with excellent uptake from media throughout.

COVID-19 expert panel – the panel sought to diversify the experts quoted in the media by bringing together over 70 experts to raise issues and tautoko each other to engage more effectively with the media in a wide range of fields. These included mental health, epidemiology, tourism impacts, genomics, rural, Māori and Pacific health and vaccine development.

Emerging research tracker – a weekly email service launched in May, providing both experts and journalists with brief summaries and analysis of new coronavirus research and emerging trends.

Aotearoa Science Journalism Fund special round – six completed projects funded as part of an expedited COVID-19 themed round in April.

Te Pūtahi – a 12-episode podcast series created for broadcast on iwi radio in partnership with Te Hiku Media in Northland. Launched in May, Te Pūtahi featured interviews with researchers and mātauranga experts focused on perspectives and concerns of Māori communities.

Dedicated resources for Māori media – improved navigation to relevant content on Scimex – a dedicated breaking science news website for Australia and New Zealand – supported by new arrangements with journal publishers.

Aotearoa Science Agency webcast with Siouxsie Wiles – a weekly livestream during lockdown launched in April. Regularly reached audiences of over 10k across platforms.

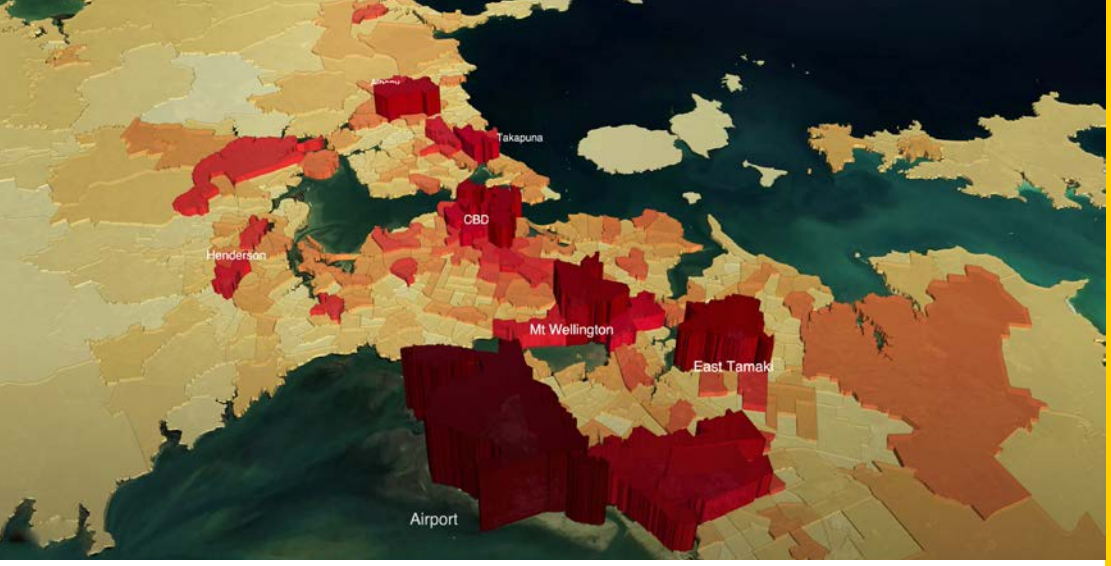
SAVVY online – the Science Media Centre worked with the New Zealand Health Research Council to offer a special online media training session for researchers awarded emergency COVID funding ahead of the public release of funding round results.

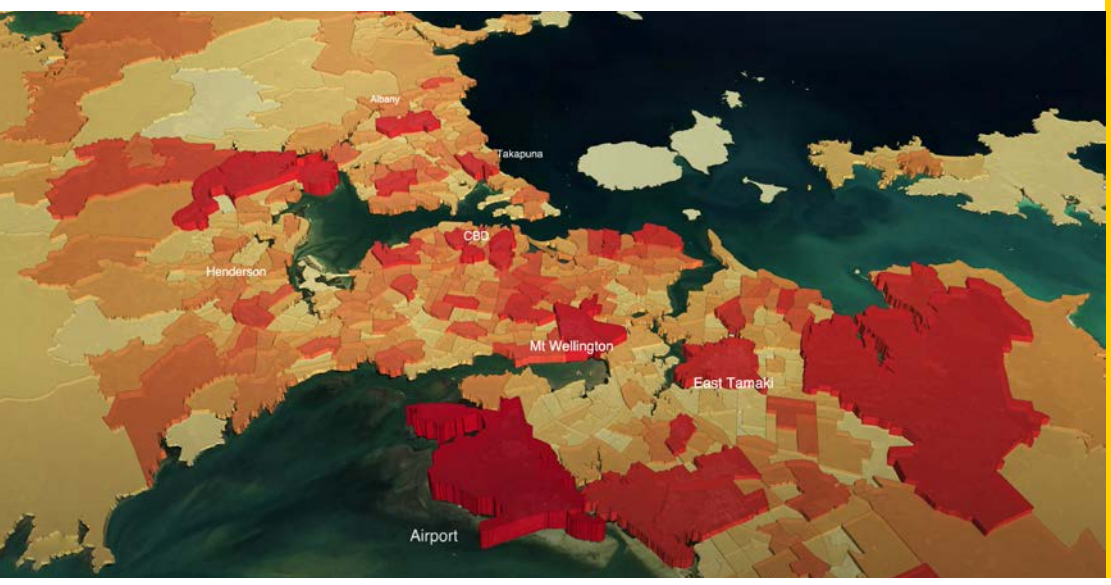
Graphics and data visualisation – the Science Media Centre focused efforts on linking data journalists across multiple media organisations (Stuff, RNZ, Newsroom, Spinoff, NZME) to provide resources and support.

VIEW MORE ON COVID-19 AND THE SCIENCE MEDIA CENTRE
bit.ly/2020HL-13

"I cannot underestimate the value of the Science Media Centre and their Australian colleagues. The service they provided in not only helping us reach out to experts and suggesting experts, but also sending updates on the latest science was remarkable and extremely appreciated."

EUGENE BINGHAM, JOURNALIST





DATA MAPPING SHOWS OUR CITIES

going into lockdown

"It looks like a heartbeat, which is really cool. Specifically for COVID-19, what it actually allows us to get a handle on is less of an anecdote – in terms of, we kind of think that people are behaving themselves, we kind of think people might not be moving around. This actually shows us that, broadly speaking, people are being well behaved and listening to the key messages that we've all been hearing. And that's actually quite a good news story from my point of view."

ASSOCIATE PROFESSOR MALCOLM CAMPBELL, UNIVERSITY OF CANTERBURY, WHO SPOKE ON A SCIENCE MEDIA CENTRE Q&A ON THE VISUALISATIONS

As part of the Science Media Centre's COVID-19 response, it commissioned freelance geographer Chris McDowall to create visualisations of key COVID-19 data. In these videos, Chris used information provided by Data Ventures – the commercial arm of Stats NZ – to show how our three main centres moved in early stages of lockdown. The animations used cell phone tower data that roughly shows where people (and their phones) were moving in the weeks leading up to Easter 2020.

VIEW DATA VISUALISATIONS
bit.ly/2020HL-14

Special COVID-19 journal supplement

As the flagship title of Royal Society Te Apārangi, the *Journal of the Royal Society of New Zealand* rapidly planned an Open Access supplement on the latest scientific findings and knowledge across disciplines on the COVID-19 pandemic, especially focusing on Aotearoa. This project has a dual purpose: to elucidate our understanding of the disease and its control measures, and to call on the Aotearoa research community to jointly explore, manage and understand the pandemic's significance and impacts on our society, economy and people. The call for papers was made in late April and 15 papers were selected in mid-June. The selected papers will cover New Zealand's response to COVID and the varied impact of 'lockdown' on our 'team of 5 million' through many lenses including health, legal, philosophical, psychological, educational and te ao Māori. The Society is grateful for the considerable mahi of all those who submitted an expression of interest and for the selection committee.

READ MORE ON SELECTED PAPERS
bit.ly/2020HL-15

Cutting-edge technology

AGAINST LIVESTOCK PARASITES

Through the Catalyst Leaders Fund, Manaaki Whenua Landcare Research was able to bring Dr Felix Guerrero (United States Department of Agriculture), a world-leader in anti-tick vaccine development, to New Zealand. He has worked alongside New Zealand researchers to initiate a programme for using cutting edge 'reverse vaccinology' technology to develop a vaccine against the only tick found in Aotearoa that is a parasite of livestock – the New Zealand cattle tick, *Haemaphysalis longicornis*.

Ticks are blood-sucking external parasites. The New Zealand cattle tick favours cattle but is not completely host specific and can infest deer, sheep, goats, horses, rabbits, hares, domestic pets and even humans! Tick-borne diseases such as Theileriosis (a protozoan that infects white and red blood cells of cattle) already cause large impacts to livestock in New Zealand.

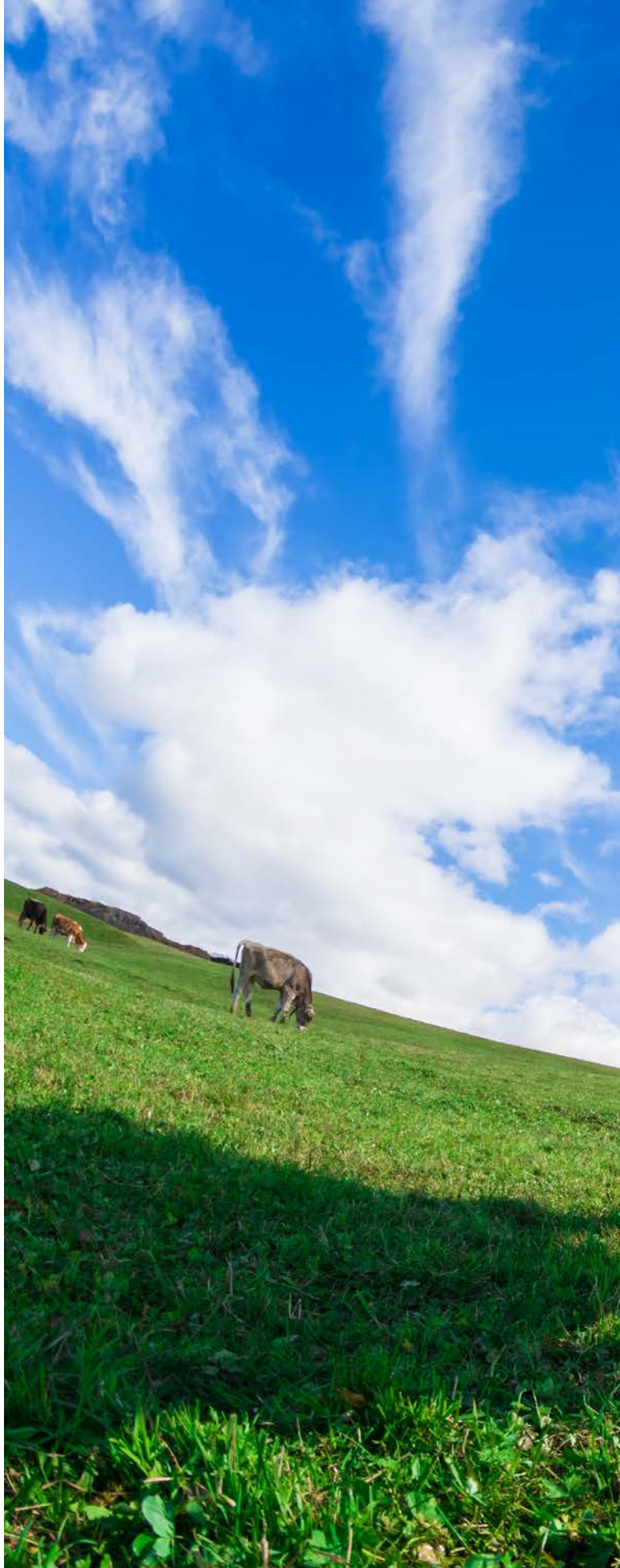
The risk of new tick-borne diseases in New Zealand is high due to greater trade levels increasing the risk of their introduction. Climate change is also likely to increase impacts, as it has the potential for increasing the geographic range for particular parasitic species.

VIEW MORE ON CATALYST:LEADERS
bit.ly/2020HL-16

The fact that there is only a single tick in the country that infests livestock provides an elegant and efficient solution to both current and potential future disease impacts: manage the tick, rather than specific diseases. Using 'reverse vaccinology' technology would allow vaccines to be developed against ticks and tick-borne diseases and, by vaccinating livestock, reduce or eliminate the impacts of these diseases upon New Zealand livestock industries.

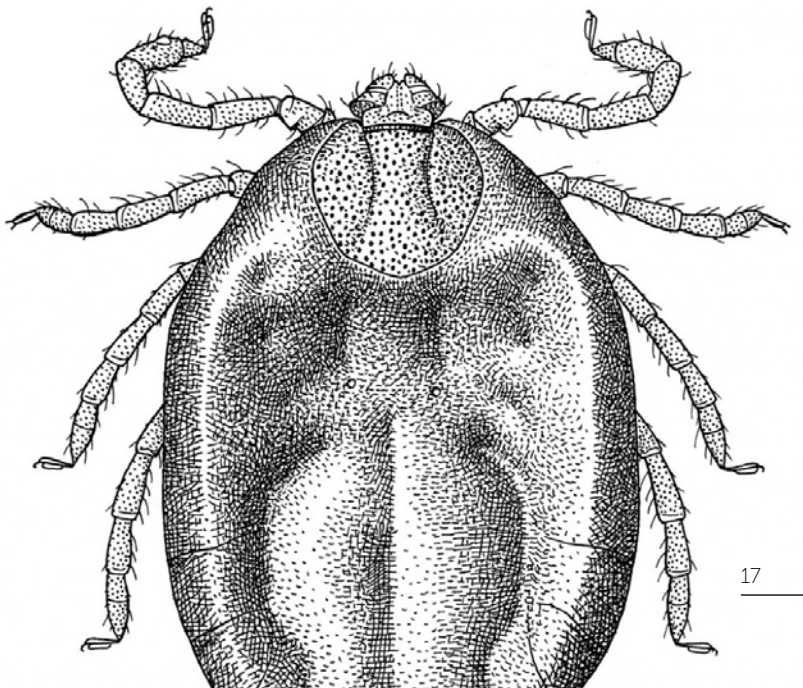
Dr Guerrero had travelled to New Zealand several times, trained New Zealand technical staff and directed the sequencing of the tick's genome, the first step towards vaccine development. The complete sequence of the tick genome was published in October 2019, a momentous milestone. A consortium has been set up with scientists from Manaaki Whenua Landcare Research, Massey and Otago Universities, AgResearch, United States Department of Agriculture and private consultants to seek research funding to continue the development. A further visit by Dr Guerrero was planned for April 2020 but has been on hold due to COVID-19 travel restrictions.

The Catalyst: Leaders scheme supports incoming and outgoing targeted international fellowships for exceptional individuals that cannot be supported through other means. It is administered by the Society with funding from the Ministry of Business, Innovation and Employment.



"Using cutting-edge 'reverse vaccinology' technology to develop a livestock vaccine against the NZ cattle tick represents a 'step-change' in the approach to managing livestock external parasites, as it will reduce the reliance on chemical-treatments, and has potential to be applied to other parasite-host associations such as blow-flies and sheep."

MANAAKI WHENUA LANDCARE RESEARCH



Alert Level 2: Reduce

On 13 May 2020, New Zealand moved to Alert Level 2 at 11:59pm. The State of National Emergency expired at 12:21pm. Most Society kaimahi continued to work from home and waited until after Queen's Birthday weekend in early June to return to Whare Te Apārangi.

COVID-19

"Our team of five million has united to beat the virus and must keep doing so ... Kiwis from all walks of life were resolute and determined – determined that this was a war we could eventually win, but only if we acted together... The battle is won, but the war is not over."

RT HON JACINDA ARDEN, PRIME MINISTER OF NEW ZEALAND

Aroha

Prime Minister's Science Prizes

Aroha was the theme for the virtual presentation of the 2019 Prime Minister's Science Prizes, awarded at the end of Pipiri June 2020. These prizes recognise the impact of science on New Zealanders' lives, celebrate the achievements of current scientists and encourage scientists of the future. Groups of people around ngā motu formed 'digital bubbles' to watch the livestreamed presentation via Zoom hui with pre-supplied kai and wai packages. Broadcast hosts Māni Dunlop and Dan Henry presented the five prizes:

THE PRIME MINISTER'S 2019 SCIENCE PRIZE

The premier award for science that is transformational in its impact was awarded to the **Melting Ice and Rising Seas team**, a group of more than 20 geologists, glaciologists, climate and social scientists from Victoria University of Wellington Te Herenga Waka, GNS Science and NIWA, led by the university's Antarctic Research Centre Te Puna Pātiotio. The scientists are behind the break-through discovery that Antarctica's ice sheets melted rapidly in the past, and could have a significant impact on global sea level rise over the next 80 years. The team's discovery began with work 15 years ago by New Zealand scientists who drilled and analysed ice and sediment cores in Antarctica's Ross Sea sector. They found that Antarctic melt due to climate change could contribute to global sea level rise of 1.4 metres by the year 2100, rather than the 1 metre predicted back in 2013 by the Intergovernmental Panel on Climate Change (IPCC), the United Nations body charged with keeping the world up-to-date on the effects of climate change. When the effect of land subsidence is taken into account, the rise could be as much as 2 metres for some places in New Zealand. They also found that Antarctica's ice sheet has a stability threshold of 2°C of global warming, and that there is still a pathway to mitigate the impact of sea level rise around the world.

The team members are Timothy Naish FRSNZ, Robert McKay, Richard Levy, Nancy Bertler, Nicholas Golledge, Peter Barrett FRSNZ, Lionel Carter FRSNZ, James Renwick, Brian Anderson, Darcy Mandeno, Rebecca Priestley CRSNZ, Gavin Dunbar, Andrew Mackintosh, Dao Polsiri, Rob Bell, Ruzica Dadic, Warren Dickinson, Huw Horgan, Liz Keller, Alex Pyne, Michelle Dow, Shaun Eaves and Judy Lawrence.

THE PRIME MINISTER'S 2019 MACDIARMID EMERGING SCIENTIST PRIZE WINNER

The prize for an outstanding emerging scientist was won by world-leading University of Auckland physicist Dr **Miro Erkintalo**, who has made pioneering contributions towards the development of new laser technologies. Miro researches and develops new kinds of laser devices that could enable many new and improved applications, including faster and cheaper internet. He has introduced a theoretical model for the description of a new technology that can convert a single laser beam into hundreds or thousands of beams of different colours, known as a microresonator frequency comb. Nominator Professor Roberto Morandotti, of Montreal's Institut National de la Recherche Scientifique, says 'micro-combs' are projected to have a big role in many future technologies and "therefore quite likely to have wide societal impact as well".

THE PRIME MINISTER'S 2019 SCIENCE COMMUNICATION PRIZE

Professor **Rangi Matamua** FRSNZ (Tūhoe), an astronomer who has raised awareness about the significance of Matariki, won the Prime Minister's Science Communication Prize. Rangi didn't realise the significance of the manuscript crafted by his ancestor when first given it, but came to fall in love with Māori astronomy. Through his research, he has gained understanding and highlighted the importance of the Matariki star cluster for te ao Māori. Rangi has drawn a large following on social media with podcasts and videos in English and te reo Māori. His web series reached 1 million views in four months and more than 20,000 people follow his *Living by the Stars* Facebook posts. In 2019, Rangi presented his work to more than 10,000 people in a roadshow at 21 events in Aotearoa and Australia.

“The Prime Minister’s Science Prizes recognise transformative science discovery and achievements from our best scientists and our emerging science leaders. They recognise our passionate science teachers, students and very importantly, communicators. As a nation, we are extremely fortunate to be supported by our science experts and science communicators, and I’d like to make a special mention of our science communicators. Without our communicators – who publicly inform, explain, teach, decode, counter misinformation and debate science matters – many would remain in a space where they don’t have information they need, leading to poor choices being made at really crucial times … I want to acknowledge and thank all our science experts and communicators for making a difference for our team of 5 million, particularly during difficult times, and to those who will lead us into an exciting future … Congratulations to all the prize winners and thank you to all those who have contributed to their success. Ngā mihi ki a koutou katoa.”

RT HON JACINDA ARDERN

VIEW DIGITAL PRESENTATION
bit.ly/2020HL-22

THE PRIME MINISTER’S 2019 SCIENCE TEACHER PRIZE

Christchurch teacher Dr **Michelle Dalrymple** was the first maths teacher to win the Prime Minister’s Science Teacher Prize. Michelle, Mathematics and Statistics Faculty Head at Cashmere High School, says every student deserves a champion and is devoted to sharing her research and knowledge with other teachers around the country. She uses engaging and novel ways to connect her students and other teachers into mathematics and statistics, and says a fundamental part of her teaching is incorporating whanaungatanga, or teaching through relationships. Her nominator says her teaching stands out because it is strongly based on cutting-edge mathematics and statistics education research, while providing creative and fun strategies that are inspiring for her students.

THE PRIME MINISTER’S 2019 FUTURE SCIENTIST PRIZE

A robot designed to take wheelie bins to and from the kerb for the elderly and people with disabilities won Christchurch school student **Thomas James** the Prime Minister’s 2019 Future Scientist Prize. A student at Burnside High School, Thomas designed ‘Wheelie Drive’ after noticing his elderly neighbour and grandparents struggled to use their wheelie bins. For a student who doesn’t study technology or design, Thomas showed great tenacity in researching and problem solving. He used Lego models for his first prototype before learning about micro-processors, programming, autonomous navigation and sourcing the many intricate components he needed to build a full-size, self-navigating robot. His nominator says he is a very talented engineer who has developed and produced a system that adult technologists would struggle to design and make.

The Society is the secretariat of the prizes on behalf of the government. Prime Minister Rt Hon Jacinda Ardern provided a digital video message for the awards.

New Zealand ORCID Hub certified

IN EARLY HŌNGONGOI JULY, THE NEW ZEALAND ORCID HUB WAS ONE OF THE FIRST SERVICES IN THE WORLD TO BECOME A CERTIFIED ORCID SERVICE PROVIDER.

ORCID is a global organisation that provides researchers with a unique digital identifier, which they link with their chosen professional activities. The Society is the lead agency of the New Zealand ORCID consortium that supports ORCID adoption in Aotearoa, supported with funding from the Ministry of Business, Innovation and Employment.

New Zealand ORCID Hub is software that was developed in partnership with the University of Auckland, with main developers Radomirs Cirskis and Roshan Pawar, which facilitates the writing of information to ORCID records.

The New Zealand ORCID Hub was recognised by ORCID as satisfying the requirements for certification, becoming only the fifth integration to be so recognised. Consequently, users of the Hub can be confident that it meets all of ORCID's best practices to authenticate ORCID IDs and update ORCID records. This recognition supports the vision of the New Zealand ORCID Consortium for:

- all researchers being recognised for their contributions to New Zealand's research, science and innovation system
- institutions populating and reusing data from ORCID records, improving data quality and reusing and reducing the reporting burden
- use of ORCID improving the performance of our research system for the benefit of all New Zealanders and the rest of the world.

VIEW MORE ON ORCID CERTIFICATION
bit.ly/2020HL-23

Top kairangahau elected as Ngā Ahurei a Te Apārangi Fellows

Twenty-seven new Ngā Ahurei a Te Apārangi Fellows and Ngā Ahurei Honore a Te Apārangi Honorary Fellows were elected to the Academy of the Royal Society Te Apārangi for their distinction in research and advancement of science, technology or the humanities, following the 2020 fellowship selection round. They are world leaders in their area of research and scholarship.

The Academy of Royal Society Te Apārangi runs the fellowship nomination and selection process.

“The newly-elected Fellows have made outstanding contributions to knowledge in their fields and across disciplinary boundaries. Their election adds significantly to the breadth of knowledge held within the Academy; they will help support the purpose of Royal Society Te Apārangi to engage with and inform New Zealanders on topics important to all. On behalf of the Academy and Society, I heartily congratulate all the new Fellows. The election process is rigorous and new Fellows can be rightfully proud that their outstanding achievements have been recognised by their peers in this way.”

PROFESSOR CHARLOTTE MACDONALD FRSNZ,
ACADEMY EXECUTIVE COMMITTEE CHAIR

Professor **Doug Armstrong** FRSNZ, Massey University, is recognised as a key player behind New Zealand's reputation as a world leader in the field of restoration ecology and reintroduction biology. He is internationally renowned for his expertise in conservation and wildlife management. His research focuses on improving methods for understanding population dynamics of threatened wildlife. His most notable impact has been on reintroduction programmes, specifically bird reintroduction. This work directly influenced the New Zealand government's goal of Predator Free New Zealand by 2050. Not only is his work helping to save many species in Aotearoa from extinction; he has created conceptual models that have been applied to organisms at-risk across the globe. In addition, he is dedicated to supporting early career researchers to become the next generation of conservation leaders.

Professor **Helen Moewaka Barnes** FRSNZ (Te Kapotai, Ngāpuhi-nui-tonu), SHORE & Whariki Research Centre, has had a significant international impact in the field of Indigenous people's health and wellbeing. Her work is at the forefront of creating new knowledge in the determinants of health, wellbeing and mātauranga Māori, particularly in human and environmental relationships. She co-founded the Whariki Research Group and has worked tirelessly with allied researchers to shift the research surrounding Māori health to focus on rangatiratanga and hauora rather than what makes people sick. These ideas about Māori advancement rather than development are now widely taken up. She has tackled significant issues to Māori communities such as environmental degradation, the importance of spirituality, alcohol harm and racism. Throughout her research career, Helen has demonstrated strong leadership and a sustained contribution to advancing mātauranga in social research.

Professor **Deidre Brown** FRSNZ (Ngāpuhi, Ngāti Kahu), University of Auckland, is the founding researcher of Māori architectural history and design. Her leading research has been used as a framework in the field of Māori architecture within Aotearoa and internationally. While working to recover histories and taonga in her own Taitokerau (Northland) region, she challenged earlier scholars who argued that the region's woodcarving traditions died out with Pākehā arrival. She discovered what were previously deemed 'lost' collections of Māori art, leading to the repatriation of a significant taonga (Te Pahi medal), which enabled her hapū to return to their tūrangawaewae tribal lands. She is an internationally-renowned and recognised scholar of Māori and Pacific art history, cultural property rights and Indigenous digital humanities, and one of the first researchers to develop scholarship and kaupapa Māori methodology for investigating Indigenous digital culture.

Professor **Charles Eason** CNZM CRSNZ FRSNZ, Lincoln University and Wakatū Incorporation, is internationally recognised as a leader in toxicology and biotechnology. He has successfully delivered new drugs and safer pest control. Charles pioneered 'red blood cell toxicants', now a lead compound for stoat control in Aotearoa. This was the first of its kind and was explicitly designed with humaneness as a focus. This and other products have made a material difference nationally in the creation of predator-free zones. They are also having a lasting impact on how rodenticides can be used more carefully to protect threatened species across the globe. His initiatives have led to the advancement of novel classes of drugs, frequently inspired by natural compounds, targeting cardiovascular and infectious diseases, pain and depression. His ability to innovate and see beyond challenging impediments has led to various technological breakthroughs.

Dr **Susan Gardiner** FRSNZ, Plant & Food Research, is internationally renowned for her research and contributions to fruit breeding. In the 1990s, she became recognised internationally for her research into the growing field of marker-assisted fruit breeding. From this, she established a high-throughput technology platform that advances the targeted development of new apple and kiwifruit varieties, faster and more precisely. This platform is capable of delivering cultivars and rootstocks with a range of very specific characters desired by consumers and growers, benefitting both the consumer and reducing impacts of horticultural production. Her leading research in genetics and genomics of fruit crops has been the driving force in implementing molecular breeding practices in New Zealand's horticultural research and breeding programmes. Her research is a major factor in New Zealand's leading status in international apple and kiwifruit breeding and genomics.

Distinguished Professor **Neil Gemmell** FRSNZ, University of Otago, is internationally renowned and awarded for his contribution to genomics, evolutionary biology, conservation biology and reproductive biology. He has pioneered genetic approaches that have produced new tools to control the world's most invasive species and enhance the conservation of some of the world's rarest species, like whio and kakī. His novel observation that mutations in the maternally inherited mitochondrial DNA affect only males and are not subject to natural selection, termed 'Mother's Curse', helped spawn the new field of mitonuclear ecology and promising new forms of biocontrol. Neil's work has also revealed the molecular orchestration of socially-controlled sex change in fish. More recently, he successfully led the sequencing of the tuatara genome in partnership with Ngātiwai.

Professor **Gail Gillon** FRSNZ (Ngāi Tahu), University of Canterbury, is a world-leading expert in spoken and written language development. In particular, she studies the critical importance of phonological awareness (the ability to recognise and manipulate sounds within words) in facilitating reading and spelling success. Her work in the area of early speech, language and reading development has made a substantial and lasting impact on the discipline of communication sciences and disorders. Her book *Phonological Awareness from Research to Practice* remains a leading text internationally in this area. Her research has resulted in transformation of both speech-language therapy and class teaching practices throughout the world. Her research, together with that of her colleagues, has culminated in the development of 'Better Start Literacy Approach Te Ara Reo Matatini' being rolled out as part of the Ministry of Education's Early Literacy Initiative.

With 37 years of research leadership, **Garth Harmsworth** FRSNZ (Te Arawa, Ngāti Tūwharetoa, Ngāti Raukawa), Manaaki Whenua Landcare Research, is renowned for his work building Māori research capability nationally, and advancing mātauranga-based kaupapa Māori and collaborative research practice. Garth's research has directly unlocked the potential of Māori land, ensuring culturally relevant approaches and information-systems to support legislation, policy and statistics, and improve land management across Aotearoa. His knowledge and understanding of catchment management from the tangata whenua has been ground-breaking in establishing sustainable development approaches. He has brought a te ao Māori perspective to a conventionally 'biophysical' science discipline, which now serves as a best-practice guide for future land use within Aotearoa and across the globe.

Professor **Andrew Hill** FRSNZ, University of Auckland, has established an internationally recognised research group in surgical peri-operative care (before, during and after surgery) and has made leading contributions to understanding the metabolic response to surgery. He is internationally renowned for his surgical specialty of colorectal surgery and gastrointestinal diseases. His innovative 'two-wound hypothesis' has shown that in abdominal surgery, two wounds are made and both influence postoperative recovery and provide separate therapeutic targets. This has led to the use of intraperitoneal local anaesthetic (IPLA) which improves outcomes for patients after major surgery. His work with IPLA and preoperative steroids has now been incorporated into international surgical guidelines. He is currently leading the G4 global alliance taskforce, seeking to establish minimum standards for surgical care internationally, which is helping to optimise outcomes in resource-poor communities.

Professor **Jarrod Haar** FRSNZ (Ngāti Mahuta, Ngāti Maniapoto), Auckland University of Technology, has an international reputation as one of the foremost Māori scholars in business and management. Jarrod uses highly complex statistical methodologies to provide robust understandings of mātauranga Māori in contemporary New Zealand workplaces. This work has influenced national and international understandings of Indigenous cultural wellbeing in the modern workplace. Throughout his research career, he has demonstrated the advantages of incorporating Māori worldviews and practices into organisations that would typically exclude such suggestions. Jarrod highlights the role of cultural wellbeing and collectivism in explaining Māori experiences of the workplace. His work on families and how to balance job and family demands is not only ground-breaking in a scientific sense, but of large practical importance to New Zealand and globally.

Professor **Rawinia Higgins** FRSNZ (Tūhoe), Victoria University of Wellington Te Herenga Waka, is highly esteemed for her work in Māori language revitalisation, particularly language planning and policy. Her research has advanced legislative change, public policy, government investment and strategy development in Aotearoa. She co-designed the Zero Passive Active (ZePA) Māori language revitalisation model, which identifies effect areas that allows planners, funders and deliverers of Māori language initiatives to be more specific and targeted in their approach. She chaired the Review of the Māori Language Bill, leading the extensive nationwide consultation process for Te Ture mō Te Reo Māori (The Māori Language Act 2016). The resulting legislation was ground-breaking and reframed the policy landscape for the whole Māori language sector. Her scholarly contributions have made a significant impact in sharing new discourse, insights and understanding of mātauranga Māori and challenging cultural norms.

Professor **Patria Hume** FRSNZ, Auckland University of Technology, is an international leader in sports performance and injury prevention. She is renowned for her work using evidence-based interventions to influence best-practice policy development that aims to reduce injury and improve sports techniques for athletes around the world. In 1999, Patria started SportSmart, a nationwide sports injury prevention programme for the Accident Compensation Corporation (ACC). This was later developed into sport-specific programmes, such as RugbySmart, which was adopted as an annual compulsory programme for players and coaches, and resulted in a significant reduction in severe neck injuries. Her team pioneered the use of novel instrumentation to collect data on player head impacts during games and training in contact sports. The results from these research projects have captured global attention and have helped transform concussion injury awareness and management in New Zealand and internationally.

Professor **Robert Jahnke** FRSNZ (Ngāi Taharora, Te Whānau a Iritekura, Te Whānau a Rakairo o Ngāti Porou), Massey University, is Aotearoa New Zealand's most influential Māori visual arts educator and is a tireless ambassador for Māori and Indigenous art and culture. He is an internationally recognised artist, sculptor and designer. Robert has fundamentally altered national and international understanding of Māori art through his contributions to Māori visual culture and Indigenous arts scholarship. Robert's work is recognised as a key part of the contemporary Māori art movement, which explores the complex past, present and future implications of colonialism on Māori society. He is the founder and leader of the Toioho ki Āpiti programme at Massey University, recognised as a pioneering teaching programme integrating te reo Māori and tikanga Māori, supporting the growth of the Māori art movement in New Zealand.

Professor **Robin Kearns** FRSNZ, University of Auckland, has been a pioneer in the growing field of health geography that has increasingly embraced the wider contexts of health, health services and wellbeing. This field of geography links human wellbeing to the characteristics of place, such as how everyday practices such as walking, exposure to natural areas, and the character of health clinics, can all influence wellbeing. He has worked at different scales, including the home, neighbourhood and community, and has also interpreted various perspectives on place-based health experiences, ranging from new settlers, people with disabilities, older people and children in both urban and rural settings. Robin's research has been internationally influential for both his new methodologies and theories. Through employing innovative qualitative methodologies, Robin's case studies research has made visible the complexities of health-place relationships here in Aotearoa New Zealand.

Professor **Rangi Matamua** FRSNZ (Tūhoe) is a pioneering Māori scholar who has revolutionised understandings of Māori astronomy, and in particular Matariki. His research has been ground-breaking in terms of its contribution to mātauranga Māori; he has enlightened both national and international populations on the mātauranga of astronomy. He is renowned for his role communicating his research in an accessible and engaging way, and reaching both academic and non-academic audiences. Rangi is both the author of the bestselling book *Matariki: The Star of the Year* (published both in English and te reo editions) and presenter of the award winning te reo Māori web series *Living by the Stars*. He has challenged widespread misconceptions about Māori astronomy and has enhanced our understandings of a Māori worldview of the stars.

Professor **Janet McLean** QC FRSNZ, University of Auckland, is recognised across the British Commonwealth for her multidisciplinary and incisive investigations of the powers and accountabilities necessary for good government. Interweaving public law, historical analysis and philosophical thought, Janet has transformed colonial and contemporary understandings of the nature of the Crown in the United Kingdom and Aotearoa New Zealand, including in Te Tiriti o Waitangi. She has acted as an advisor and expert witness to the New Zealand and Canadian governments, scrutinising the techniques by which human rights instruments have been given effect. Janet's latest research reveals how government use of contractual mechanisms can undermine core constitutional principles while expanding executive power, and examines the constitutional underpinnings of the public service.

Professor **Julian Paton** FRSNZ, University of Auckland, is a world-leading physiologist who has made outstanding contributions to knowledge in the area of cardiovascular and respiratory control. He has pioneered new technical approaches surrounding neural control of circulation and breathing. His unique technical research and contribution of new scientific concepts in cardio-respiratory diseases has resolved a major controversy surrounding respiratory complications. Julian's discoveries have had a significant impact on understanding how hypertension, heart failure and sleep apnoea develop and progress. This impact of his research has been recognised by technology transfer to partners who are working to create new therapeutic strategies for the treatment of these diseases, including a novel pacemaker called 'brain on a chip'. Julian has seen his pioneering preclinical research studies progress into clinical trials, demonstrating his impact as a scientific leader in the search for new treatments and understanding of blood pressure control and heart disease.

Professor **Steven Ratuva** FRSNZ, University of Canterbury, is at the forefront of interdisciplinary research globally on race relations, global security, social protection for vulnerable groups, climate change and affirmative action for minorities. His leadership of international research teams and networks (such as the International Political Science Association research on global security, among others), as well as various applied projects, has contributed to redefining global security thinking and helped reshape understandings of ethnicity and conflict. Steven's authoritative research on affirmative action in countries like Fiji, South Africa and Malaysia has provided a critical perspective on how affirmative action can be manipulated by elites to serve their economic and political interests at the cost of the poor. He is at the cutting-edge of interdisciplinary research by breaking down knowledge barriers and publishing in different disciplines such as sociology, anthropology, politics and development studies.

Dr **Poia Rewi** FRSNZ (Tūhoe, Ngāti Manawa, Te Arawa, Te Mātāwai), is celebrated as one of the most active research specialists in Māori culture, language revitalisation, oral history and performing arts. With his background being in second language teaching, he takes a socio-linguistic approach to teaching and aiding Māori language revitalisation. This involves the use of information technology, kapa haka practices and the adaptation of Western and Indigenous approaches to create transformative research outputs including publications, haka compositions and te reo Māori language apps. He co-designed the Zero Passive Active (ZePA) Māori language revitalisation model, which identifies effect areas that allow planners, funders and deliverers of Māori language initiatives to be more specific and targeted in their approach. His research outputs have brought forward new knowledge in Aotearoa New Zealand that reflects Māori world-views and has generated new practices in linguistics for Indigenous people internationally.

Professor **Caroline Saunders** ONZM FRSNZ, Lincoln University, has made outstanding contributions to the advancement of science by creating new knowledge in her research field of agriculture and economics. She initiated a transdisciplinary study that contributed to the 'food miles' debate, which argued that long-distance food transport is unsustainable due to greenhouse gas emissions. This work has helped to inform other scientists, policy advisors and the public. In Caroline's later work, she created a pilot survey to test if overseas consumers in developing markets are willing to pay a premium for attributes associated with New Zealand agri-food exports such as animal welfare, environmental sustainability and cultural authenticity. This work has led to a sustained and expanding research programme that has transformed New Zealand's global agri-food value chains. Throughout her work, she has been devoted to communicating her research.

Professor **Michelle Thompson-Fawcett** FRSNZ (Ngāti Whātua), University of Otago, is a world-leading expert in advancing contemporary mātauranga Māori and fostering Indigenous approaches to culturally sustainable environmental futures. She is at the forefront of crafting Indigenous theories of power and space. Her research has demonstrated that settler-colonial planning systems persistently erase Indigenous procedures, cultures, values and science. The research has a provocative conceptual nature, a commitment to Indigenous methodologies and a focus on issues of self-determination. Michelle's work with Indigenous communities has generated pathways for holistic, integrated, intergenerational Indigenous approaches that recognise relationships, environmental interactions and treaty obligations. This valuable contribution has created space for opportunities in evolving Indigenous planning fields such as plan making, impact assessment, cultural landscape protection and papakāinga development.

Associate Professor **Toeolesulusulu Damon Salesa** FRSNZ, University of Auckland, is renowned for his outstanding interdisciplinary contribution to Pacific Studies. His research examines the cultural, political and socio-economic obstacles Pacific peoples and cultures face, and he also highlights their creative and innovative responses. This has significantly contributed to interdisciplinary scholarship on the Pacific and public understanding of Pacific peoples' issues. Damon is at the forefront of the analytical scholarship that positions Aotearoa New Zealand as a Pacific Island nation, rather than one separated historically, socially and politically. This work has radically challenged the idea that the Pacific is marginal rather than central to understanding New Zealand's past, present and future. His research also contributes to different research areas that have failed to include the Pacific, such as Atlantic Studies and global history. He strives to make his work accessible, especially for Pacific youth audiences.

Distinguished Professor **Graham Hingangaroa Smith** CNZM FRSNZ (Te Aitanga a Hauiti, Ngāti Apa, Ngāti Kahungunu, Ngāi Tahu), Massey University, is a prominent Māori and Indigenous scholar who has been at the forefront of initiatives in education and Māori development. His research and practice have been foundational to the development of kaupapa Māori theorising and 'transforming praxis'. As such, his research is centred on developing theoretical and practical strategies that contribute to the political, social, economic and cultural advancement of Māori and Indigenous communities. For example, he has made significant contributions to alternative schooling initiatives, including Te Kōhanga Reo, Kura Kaupapa Māori and Whare Wānanga. The impact of his contribution is seen in the large number of public entities that now utilise kaupapa Māori structures and practices. Graham's work has created transdisciplinary research methods and theories that are being used extensively with other Indigenous peoples across the world.

Professor **Denise Wilson** FRSNZ (Ngāti Tahinga), Auckland University of Technology, is a world-leading academic who is contributing new knowledge to support a positive transformation in wellbeing outcomes in Aotearoa, particularly for Māori. Focused on addressing low healthcare engagement and family violence, Denise's interdisciplinary research, rooted in nursing, uses Māori-centred methodologies to enhance the quality of care that Māori people receive. Her work draws on traditional and contemporary mātauranga Māori knowledge, as well as Western research methods, to challenge existing practices and inspire new solutions. Denise's research has been influential in reinvigorating cultural safety in the health and social sectors as it recognises the unique socio-historical contexts, consistent marginalisation and discrimination that contribute to detrimental social and health outcomes. Her work is greatly contributing to efforts to reduce health disparities of Māori and other Indigenous people globally.

Professor **Zhi-Qiang Zhang** FRSNZ, Manaaki Whenua Landcare Research and University of Auckland, has made outstanding contributions to taxonomy. He has significantly advanced global taxonomy by founding and leading two of the largest international journals in biodiversity research: Zootaxa and Phytotaxa. These pioneering journals have greatly reduced barriers to global biodiversity description and changed the way taxonomy is communicated globally. Zhi-Qiang is a world-leading authority on the systematics and ecology of mites and has made outstanding global contributions to acarology. He has discovered and named over 150 species of mites and wrote the first monograph on mites of greenhouses. He has developed a series of identification keys and expert information documents for major groups of mites. Due to the high frequency of mites existing in exported and imported produce, his work has greatly eased trade barriers and facilitated the import and export of fresh and stored produce.

NGĀ AHUREI HONORE A TE APĀRANGI HONORARY FELLOWS

Professor **Penelope Brothers** FRSC Hon FRSNZ, Australian National University, has achieved high distinction in chemistry research through fundamental discoveries that have had significant positive impacts in energy capture, toxic metal encapsulation, chemical sensors and drug discovery. In particular, her research has shifted fundamental understanding of how an important class of biological molecules, porphyrins and their chemical cousins, form bonds and drive chemical reactions. These naturally-occurring complexes contain iron or magnesium, but Penny has expanded this chemistry to explore complexes with other elements, such as light non-metals (lithium, boron, phosphorus) and heavy metals (gold, antimony, bismuth). In particular, her work on boron porphyrins is unique and known for the unexpected structures and chemical reactivity she discovered. Following 30 years at the University of Auckland, she relocated to Australia in 2019 but continues to have a strong connection with New Zealand.

Laureate Professor **Ravendra (Ravi) Naidu** Hon FRSNZ, University of Newcastle and CRC CARE, has been revolutionary in the field of environmental contamination and remediation. He has achieved scientific breakthroughs on how contaminants threaten the health and wellbeing of hundreds of millions of people and ecosystems globally. His pioneering work on contaminant bioavailability (the ability of contaminants to be absorbed by the body) led to the first issue of Geoderma (1997), an international journal dedicated to contaminants. These findings have led to new analytical methods in research and policy guidelines surrounding the management of contaminated soils. He has opened up many avenues for higher levels of multidisciplinary research and has revolutionised the way policymakers in Australia and New Zealand approach contamination and remediation. Ravi has been a global leader in bringing industry, government and research together to tackle the issue of contamination to protect future generations.

VIEW MORE ON THE LATEST FELLOWS
bit.ly/2020HL-29

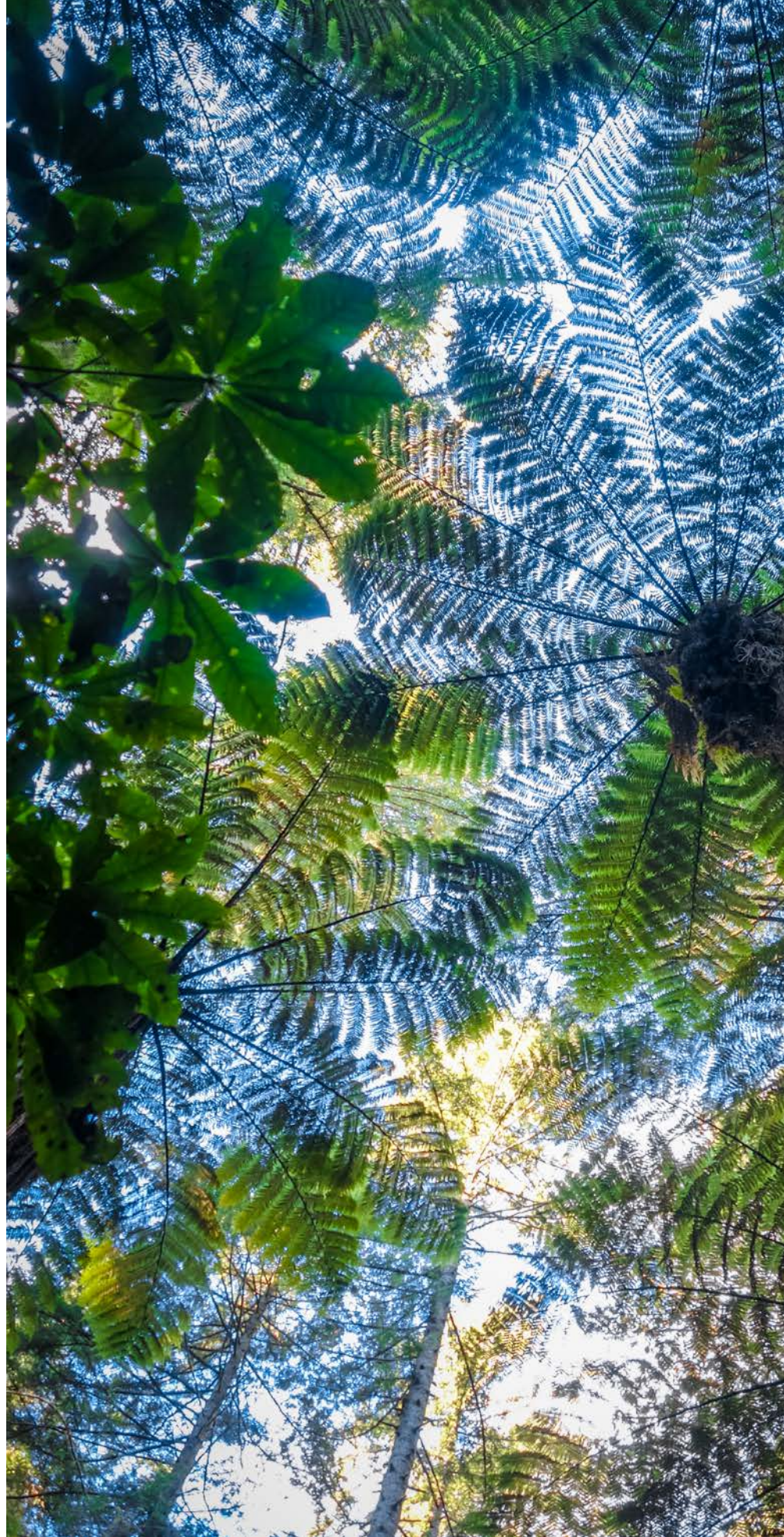
Forum: newsletter for Fellows

In Pipiri June, the Society launched a new seasonal newsletter for Ngā Ahurei a Te Apārangi Fellows, allowing for news about the Academy to be shared, as well as relevant news from overseas research academies. In addition, its intention is to provide a platform for Fellows to share and seek feedback on their research or issues of interest. Discussion prompts and updates have been submitted on topics including how New Zealand should support data sharing for improved research integrity and public value, how to pay for COVID-19, and understanding the needs of bees.

> "Reproducibility and replicability are cornerstones of integrity in modern science. The web of interdependencies in research means it is essential to find error or weakness at the earliest possible stage, so that future investment is not wasted. It is difficult to find error or weakness because research is highly technical and few people have the time or competence. That is why the broader community has to be given a chance. Quality assurance is underpinned by integrity of data, completeness of metadata, and full documentation of methods."

PROFESSOR RUPERT SUTHERLAND FRSNZ IN HIS SUBMISSION ON IMPROVING DATA SHARING

VIEW PAST ISSUES OF FORUM
bit.ly/2020HL-30



Wellington Region Emergency Management Office recognition

In mid Hōngongoi July, the Society received an Award for Service from the Wellington Region Civil Defence Emergency Management Group. This was for recognition and appreciation of service to the Wellington Region's Emergency Coordination Centre during the COVID-19 Response 2020. The Society had offered Whare Te Apārangi to be used as their coordination centre, which they had gratefully accepted. In particular, the award honoured Laura Dobson, Kaimanaaki ā Te Whare Apārangi Facilities Hire Coordinator, and James Henry, Tumu Ōhanga Chief Operating Officer, who supported their stay while other Society kaimahi were working from home during the lockdown period.

Plastic factsheets

FOLLOWING ON FROM THE RESOURCES WE RELEASED IN JULY 2019 ON THE TOPIC OF PLASTICS IN THE ENVIRONMENT, FOR #PLASTICFREEJULY 2020 WE RELEASED A SET OF EIGHT FACTSHEETS THAT SET OUT INFORMATION ON PLASTICS AND IDEAS TO TAKE ACTION! KIA KAHA TE MAHI!

The topics were:

TAHI: Te whakamahi i te kirihou – Our plastic use

RUA: Te parakino kirihou me te taiao – How plastic gets into the environment

TORU: He aha ngā kirihou moroiti ā kei whea rā? – What and where are microplastics?

WHA: Ko te pāpātanga o ngā kirihou ki a tātou – How do plastics affect us?

RIMA: Ko te hangarua i ngā kirihou – Recycling plastics

ONO: He aha ngā kirihou pōpopo? – What are biodegradable plastics?

WHITU: I te parakino kirihou? – How can we reduce plastic waste?

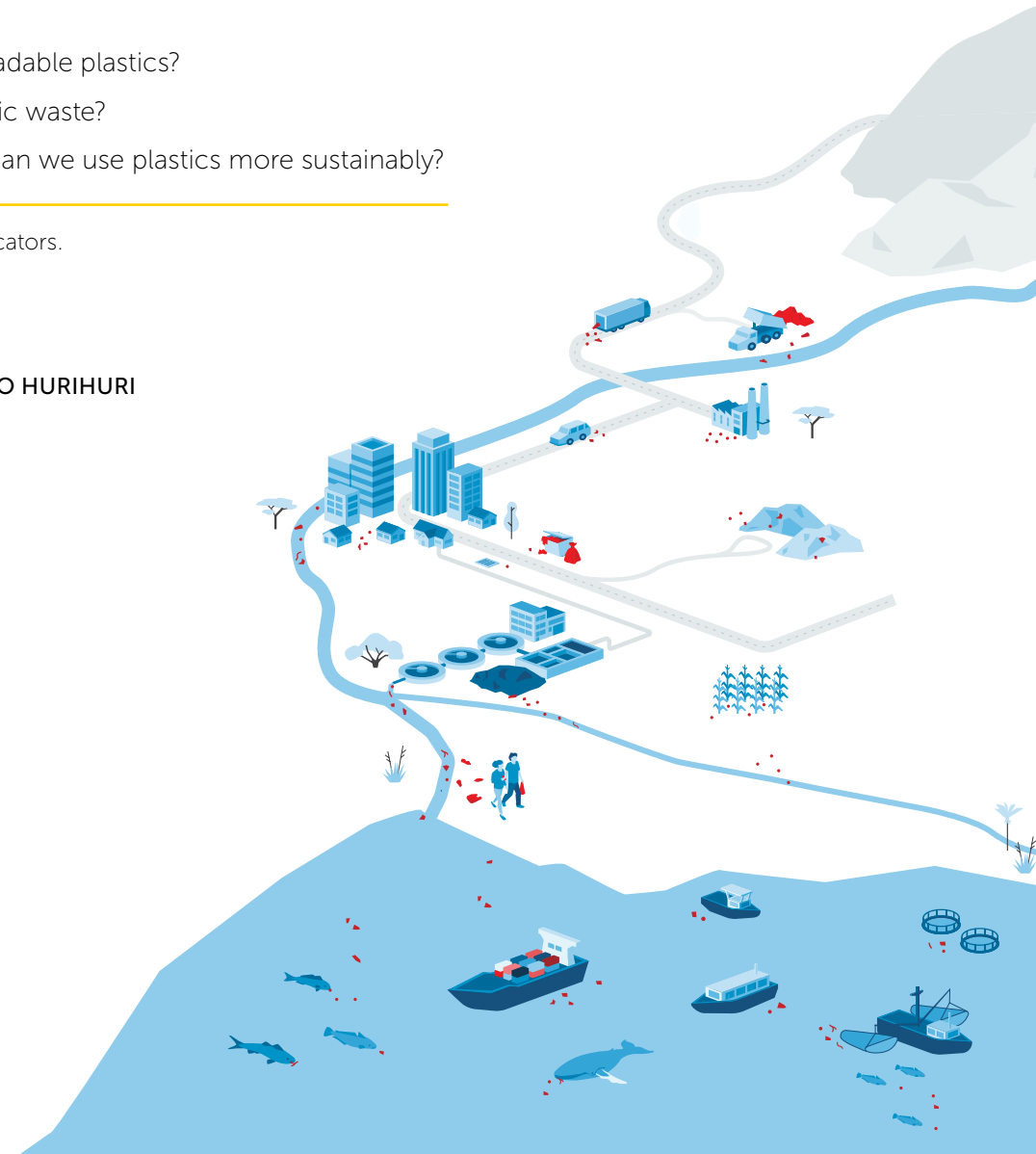
WARU: He pēwhea te whakamahi i ngā kirihou? – How can we use plastics more sustainably?

The factsheets have been well-received, particularly by kaiako educators.

SEE PLASTICS IN THE ENVIRONMENT FACTSHEETS: TE AO HURIHURI
bit.ly/2020HL-33

MANAAKI WHENUA
MANAAKI TANGATA
HAERE WHAKAMUA

CARE FOR THE LAND
CARE FOR THE PEOPLE
GO FORWARD



Our financials

For the financial year to 30 June 2020, the Royal Society of New Zealand group, combining Royal Society Te Apārangi and its associated Endowment Trust Fund, generated a surplus of $0.858m (excluding net gains on investment property, land and buildings). Total Revenue (excluding net gains on land and buildings) grew by 9.1% to $9.578m. The Total Assets of the group increased by around $1.8m during the year to a value of $23.531m at year end. The physical land and buildings on our Turnbull Street site were revalued at year-end and increased in value by $1.7m to a net value of $13.8m at 30 June.

Our appointed auditors are Grant Thornton.

VIEW OUR 2020 AUDITED FINANCIAL STATEMENTS
bit.ly/2020HL-34

SAFEGUARDING AND STRENGTHENING OPPORTUNITY FOR

he kāhui rangahau

In Here-turi-kōkā August, the Early Career Researcher Forum published a paper Early Career Researchers in Aotearoa: Safeguarding and strengthening opportunity after COVID-19. This discussion paper outlined facts about the early career researcher population in Aotearoa, highlighted some of their key issues and concerns and provided discussion points for how to safeguard roles and support he kāhui rangahau in the current COVID-19 situation.

The discussion paper drew from several sources of data (including data from the Census, website educationcounts.govt.nz and a survey of early career researchers conducted by the Forum). It also collated the views and ideas of participants at an event convened by the Early Career Researcher Forum in May 2020.

The preparation of this discussion paper was led by Dr Sylvia Nissen (Lincoln University), Dr Sereana Naepi (University of Auckland), Dr Darren Powell (University of Auckland), Dr Tom Baker (University of Auckland), Dr Annette Bolton (ESR) and Dr Lucy Stewart (Toha Science).

The Early Career Researcher Forum seeks to represent the national voice of Aotearoa's early career researcher community. It is dedicated to engaging he kāhui rangahau in Aotearoa on the issues important to them and fostering a collaborative, communicative and respected community under the auspices of Royal Society Te Apārangi.

> "Early career researchers are critical to an innovative, connected and equitable research sector in Aotearoa New Zealand. It takes a long time to grow research capability and significant investment. Yet it can also be lost abruptly. To ensure we do not lose this research capacity, it is vital that we safeguard roles and support for early career researchers in the current COVID-19 situation."
>
> FROM DISCUSSION PAPER

VIEW DISCUSSION PAPER
bit.ly/2020HL-35

Alert Level 3: Restrict

Following four new cases of COVID-19 recorded in the community in South Auckland, Tāmaki Makaurau moved from Alert Level 1 to Alert Level 3 at noon on 12 Here-turi-kōkā August and the rest of New Zealand to Level 2. Kaimahi adjusted to a mix of working from home and in the office to allow social distancing.

COVID-19

"The latest COVID outbreak is a wake up call for New Zealand after the country relaxed a little too far into Alert Level 1."

PROFESSOR PAPAARANGI REID

LOCKDOWN RESEARCH-DELAY LEADS TO

possible COVID-19 treatment

COVID-19 upset research plans at the start of a Catalyst: Seeding grant led by Associate Professor Kathleen Mountjoy, University of Auckland, but the research delay led to serendipitous findings and promising new research avenues on the link between age, hormones, obesity and inflammation as well as a possible COVID-19 treatment.

The NZ-USA team of experts were studying the effect of disrupting melanocortin hormones (melanocyte stimulating hormone) on mouse body weight when COVID-19 upset research plans. At the start of lockdown when the experiments on the mice were stopped, none of the mice were obese, but at the end of the lockdown, only the male mice were obese and had developed diabetes. This serendipitous finding was doubly fortuitous because, during lockdown, Kathleen had been in discussions with US collaborator Dr Joel Elmquist (University of Texas Southwestern Medical Center) on why obesity and diabetes are two of the biggest risk factors for COVID-19 complications.

Thus, the aged male mice that developed obesity and diabetes were a good model to research this question. Earlier work by others had shown that melanocortin hormones could have anti-inflammatory effects. Their follow-up pilot studies showed that mice that lack melanocortin hormones appeared more susceptible to inflammation-induced sickness. They are now pursuing more research into whether melanocortin hormone drugs (which are already approved for use by the US Food and Drug Administration) could be used as a treatment for COVID-19 and other diseases.

Catalyst: Seeding grants support new small and medium pre-research strategic partnerships that cannot be supported through other means. They are administered by the Society with funding from Ministry of Business, Innovation and Employment.

VIEW MORE ON CATALYST: SEEDING
bit.ly/2020HL-38

> "We propose that our mouse model, and the additional models we are making, are critical for the first experiments testing FDA-approved drugs as potential therapeutic options for patients suffering from COVID-19 and other diseases."
>
> KATHLEEN MOUNTJOY

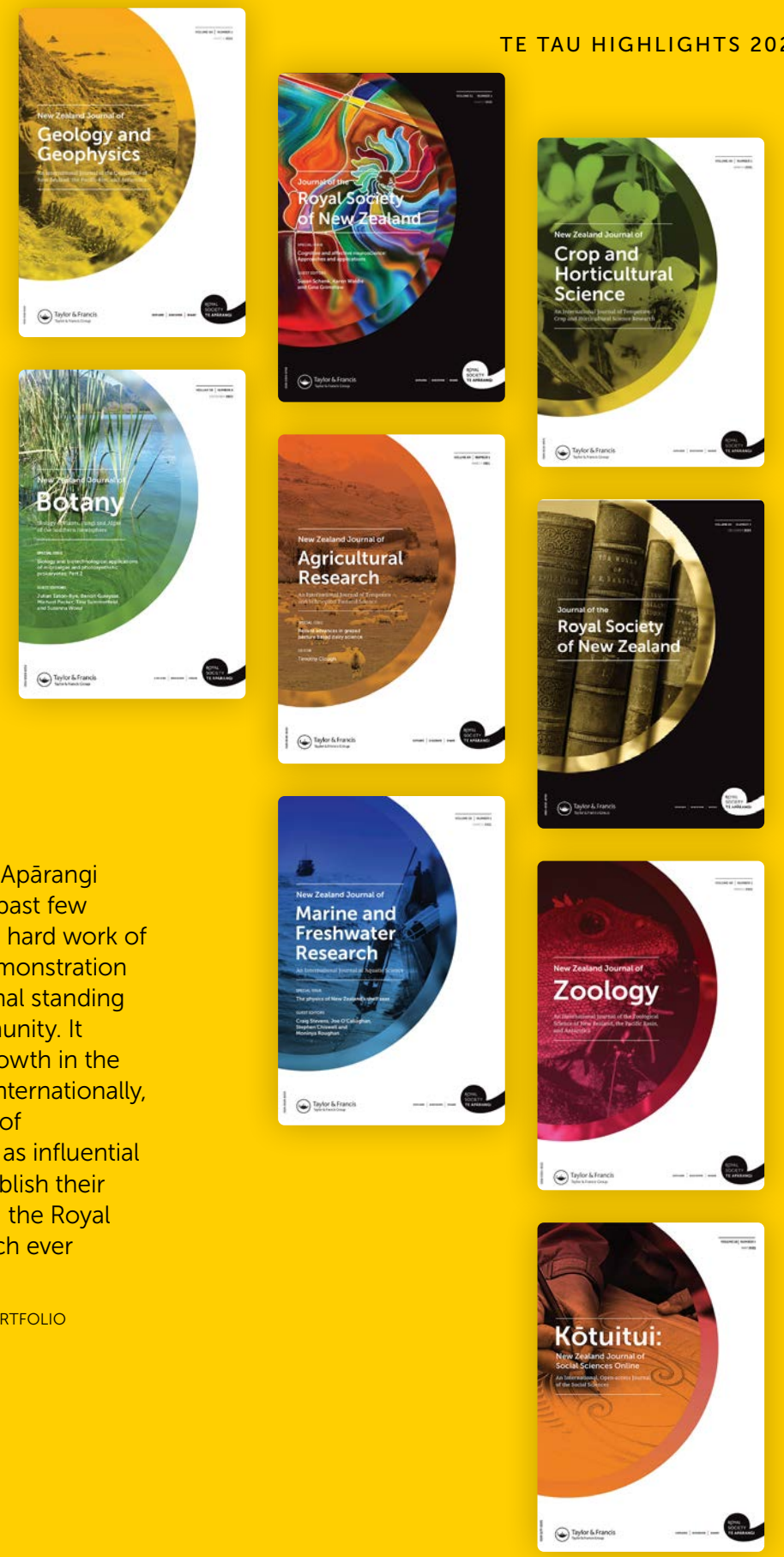
LARGE GROWTH FOR

Society journals

The Society publishes eight peer-reviewed journals with our publishing partner Taylor & Francis. These titles are:

- Journal of the Royal Society of New Zealand
- New Zealand Journal of Agricultural Research
- New Zealand Journal of Botany
- New Zealand Journal of Crop and Horticultural Science
- New Zealand Journal of Geology and Geophysics
- New Zealand Journal of Marine and Freshwater Research
- New Zealand Journal of Zoology
- Kōtuitui: New Zealand Journal of Social Sciences Online.

Comparisons over the last few years show substantial and rapid increases in submissions of papers to the journals, papers published and readership. Initial submissions of research papers by authors has increased by 55% from 2016 to 2020 and the number of accepted manuscripts has increased by 17% over the same period. The growth in readership is shown by an increase in full text downloads of 104% between 2017 and 2020.



"The journals of Royal Society Te Apārangi have grown remarkably over the past few years, which is a testament to the hard work of the Society and Editors, and a demonstration of the high quality and international standing of New Zealand's research community. It has been rewarding to see the growth in the journals' readership, particularly internationally, as well as the increasing number of researchers who see the journals as influential and highly-regarded places to publish their research. I look forward to seeing the Royal Society Te Apārangi Journals reach ever greater heights in coming years."

CHRIS FREEMAN, TAYLOR & FRANCIS GROUP, PORTFOLIO MANAGER, SCIENCE AND TECHNOLOGY

BROWSE JOURNAL TITLES
bit.ly/2020HL-39

Kia ūkaipō anō te reo

AT 12PM ON 14 MAHURU SEPTEMBER OVER A MILLION NEW ZEALANDERS ALL AROUND THE WORLD CELEBRATED MĀORI LANGUAGE MOMENT.

This moment was the largest, single celebration of te reo Māori in history, and a step towards meeting the goal of Te Taura Whiri i te Reo Māori Māori Language Commission to have 1 million Māori language speakers by 2040. Royal Society Te Apārangi joined in as an organisation. Staff members gathered at 12pm to waiata while others participated through kōrero, ako or pānui.

Professor Rawinia Higgins FRSNZ (Tūhoe), Te Tumu Ahurei Māori Deputy Vice-Chancellor of Māori at Victoria University of Wellington Te Herenga Waka and the Māori Language Commissioner, sat down to have a kōrero with ngā tumu directors Kahu Hotere and Tarah Nikora, discussing the opportunities for Royal Society Te Apārangi to help contribute to and support language revitalisation both within the organisation and the wider community.

KIA KAHA TE REO MĀORI

"As an organisation, it is important for people to use te reo in the office and whare because language is 'caught and not taught', so it's important to focus on using kupu that relate to everyday life so that others around you can catch and use these kupu too."

RAWINIA HIGGINS

READ MORE ON KIA KAHA TE REO MĀORI
bit.ly/2020HL-41

VIDEO COMPETITION:

180 Seconds of Fascination

IN HŌNGONGOI JULY ENTRIES OPENED FOR THE 2020 EARLY CAREER RESEARCHERS VIDEO COMPETITION. THIS COMPETITION PROVIDES A CHANCE FOR NEW ZEALAND-BASED RESEARCHERS WHO ARE ENROLLED OR WITHIN 10 YEARS OF A POSTGRADUATE QUALIFICATION TO SHARE THEIR RANGAHAU FOR THE CHANCE TO WIN ONE OF FIVE PRIZES.

The Kaiarataki Achiever Award in the professional video category, with a $2000 prize, was won by **Anna Walsh**, a materials scientist at BRANZ. Anna's research supports the understanding and development of innovative materials that offer the potential to raise the quality of New Zealand's buildings. She and her team are working to use structural insulated panels, or SIPs, as a potential solution to New Zealand's need for fast, affordable housing.

The Kaiarataki Achiever Award in the non-professional video category, with a $2000 prize, went to **Subin Jeon**, a plant molecular biologist from Plant & Food Research. Subin's work consists of characterising genetic changes arising from CRISPR/Cas9 editing, as part of a project developing fast-flowering plants that are smaller and flower earlier to create crops previously considered too large for indoor farming.

Te Ao Māori Award, with a $2000 prize, was awarded to **Wanda Ieremia-Allan** (Vaie'e, Matautu-Falealili, Safotulafai, Sapapali'i, Lalomanu) and **Ammon Apiata** (Ngāpuhi, Ngāti Toa, Ngāti Koata) from the University of Waikato. Wanda and Ammon are working to draw attention to early 20th century Indigenous textual archives as contested sites of investigation, celebration and innovation. Their research aims to reawaken Indigenous writing, knowledge and histories.

The Moana Oceania Award, with a $2000, has been won by **Emma Powell** of Victoria University of Wellington Te Herenga Waka. Emma's research focuses on the genealogical practices of Cook Islands Māori people. She studies the everyday lives of Cook Islands Māori people to explore how 'akapa'anga, or genealogy, is used and understood.

The People's Choice Award, with a $2000 prize, went to Dr **Fahimi Ali** of Weltec. Fahimi studies how people with disaster experience assess and decide the accuracy of information they receive and to whom the information is relevant.

The competition is sponsored by the Ministry of Business, Innovation and Employment and Royal Society Te Apārangi.

VIEW WINNING VIDEOS
bit.ly/2020HL-42

NEW ROLE SUPPORTS

freedom and responsibility in science

THE SOCIETY IS THE NATIONAL MEMBER OF THE INTERNATIONAL SCIENCE COUNCIL (ISC) AND PROVIDES EXECUTIVE SECRETARIAL AND ADVISORY SUPPORT FOR THE ISC'S COMMITTEE ON FREEDOM AND RESPONSIBILITY IN SCIENCE (CFRS). THE COMMITTEE PROMOTES THE RIGHTS OF RESEARCHERS TO ENGAGE IN SCIENTIFIC ACTIVITIES AND THEIR CORRESPONDING DUTY TO PRACTISE SCIENCE RESPONSIBLY AND SHARE KNOWLEDGE IN A PUBLIC SPACE.

The Society has increased its support for this work by creating a new role of Special Advisor to CFRS. The work will be a combination of monitoring and advising on global situations where scientific freedom is being denied, and providing guidance and support for researchers worldwide in understanding their responsibilities to science as a global public good.

Alert Level 1: Prepare

All of New Zealand moved to Alert Level 1 at 11.59pm on 7 October 2020. The country remained at Level 1 for the remainder of 2020, allowing the Society to resume almost all of its activities and have a busy last quarter. Internationally, advances were being made quickly on vaccine development.

COVID-19

"There are no new cases of COVID-19 to report in New Zealand today."

DR ASHLEY BLOOMFIELD, DIRECTOR-GENERAL OF HEALTH

Te Tapeke
Fair Futures in Aotearoa

THE MAJOR WORK FOR THE SOCIETY'S EXPERT ADVICE TEAM IN 2020 WAS SUPPORTING THE TE TAPEKE: FAIR FUTURES EXPERT PANEL. THIS DIVERSE, MULTIDISCIPLINARY PANEL WAS CONVENED TO EXAMINE ISSUES OF FAIRNESS, EQUALITY AND EQUITY IN AOTEAROA NEW ZEALAND. THE PANEL'S TASK IS TO IDENTIFY AND HIGHLIGHT SOME OF THE IMPORTANT CHOICES NEW ZEALANDERS FACE IN DETERMINING HOW TO SHAPE TE TAPEKE FAIR FUTURES IN OUR COUNTRY. THE NAME 'TE TAPEKE' COMES FROM 'KA TAPEKE KATOA TE IWI' AND EMBRACES THE CONCEPT OF INCLUDING EVERYONE, LEAVING NO-ONE BEHIND.

In Whiringa-ā-nuku October, an introductory document that sets out some key concepts when thinking about fairness in Aotearoa was published, alongside profiles of the 14 panel members.

One of the important concepts to consider is the difference between equality and equity.

Additionally, two of the panel members released expert commentaries on aspects of fairness in Aotearoa: Panel co-convenor Associate Professor Andrew Erueti 'A fair go for Māori' and Professor Emerita Barbara Brookes 'A fair go'.

Also published in Whiringa-ā-nuku, in the lead up to the 2020 Election, was data on voting in New Zealand viewed through the lens of fairness. This set out differences in the age distributions of different populations in Aotearoa and how this impacts on voting power in different electorates.

The panel's overall intention is to raise public awareness of data and evidence that points to questions of fairness in Aotearoa, and to encourage New Zealanders to think about their own views on fairness and what a fair future would look like for them. Many more papers and expert commentaries will be published in 2021 on topics including housing, hauora health, economics, refugees, disabilities and more.

"We have a generally well-educated society, a developed economy, and there is a strong democratic model at its heart and much that is exemplary in contemporary New Zealand society. We have, in the main, a huge amount of compassion and support for people who require it. We also value our global reputation as a nation of fair, open-minded, and innovative people. But while there is much to celebrate, we cannot afford to be complacent. The issues with which this panel is concerned are real and there is scope for a great deal more work at every level. Recognising that there is a growing number of New Zealanders for whom life is not naturally a level playing field, and working in earnest to address this, is absolutely critical."

DAME LOWELL GODDARD DMNZ QC, TE TAPEKE FAIR FUTURES CO-CONVENOR

SEE MORE ON TE TAPEKE FAIR FUTURES
bit.ly/2020HL-47

New Ngā Takahoa Hou a Te Apārangi Companions

Three people were recognised in Whiringa-ā-nuku October for their outstanding hautūtanga leadership or sustained contributions to promoting and advancing pūtaiao science, hangarau technology and aronui humanities in Aotearoa by being made Ngā Takahoa a Te Apārangi Companions by Royal Society Te Apārangi. The honour is reserved for those who have made a contribution to society far above and beyond what might be expected of them from the roles they have held. Companions can use the post-nominal 'CRSNZ' after their name to indicate this honour. Three people were made Companions of Royal Society Te Apārangi:

Rauru Kirikiri (Te Whānau-ā-Apanui) was recognised for his groundbreaking work in embedding mātauranga Māori into science across the Crown Research Institutes and universities and for bringing te ao Māori perspectives into tertiary education and beyond. In 1992, Rau joined the newly-established CRI, Manaaki Whenua Landcare Research as the first senior manager in the science system reporting directly to the CEO for ensuring commitments to Te Tiriti were honoured, establishing partnerships with Māori and building capability in tikanga and te reo Māori. Rau held this responsibility until 2006. Rau's leadership and mentoring has now seen Treaty responsibilities elevated to senior roles across the CRI sector and beyond. His skilled diplomacy, fluency in te reo Māori and all aspects of te ao Māori has influenced science through governance and review in many organisations.

Professor **Christine Jasoni** was recognised for her efforts to improve public engagement with science and for championing better recognition and a voice for early career researchers. Christine's governance role on the Royal Society Te Apārangi Council (2009–17), Presidency of the Otago Institute for Arts and Sciences (2009–15) and Directorship of the Brain Health Research Centre (2016–20) are key areas where she has driven significant change for the benefit of New Zealand science. As a member of the Society's council, Christine co-led the formation of the Society's Early Career Researcher Forum, which has provided a much needed voice for the next generation of scientists in New Zealand. Notable activities to raise public awareness and understanding of scientific issues that she has been involved with include the International Science Festival, Brain Awareness Week, Genetics Otago and Lab-in-a-box.

Dr Sir **Tīmoti Kāretu** (Tūhoe, Ngāti Kahungunu) was recognised for his supreme efforts in revitalising te reo Māori. Such is the high esteem that he is held in as a leader, he has been called a 'tipua' (supernatural being). Sir Tīmoti is the pre-eminent scholar and foremost exponent of te reo Māori. He has been at the forefront of Māori language revitalisation for 40 years – as an academic, language policy commissioner, language teacher, and via a range of key senior Māori language governance roles. One of his most significant ongoing contributions here has been his establishment and leadership of Te Panekiretanga – a Māori Language Institute of Excellence – through which now multiple generations of Māori language speakers have progressed. Sir Tīmoti has also been widely influential in Māori performance, particularly kapa haka, and most recently, in the translation of contemporary Māori waiata.

VIEW MORE ON THE LATEST COMPANIONS
bit.ly/2020HL-49

Days of Ice:

ANTARCTICA THROUGH FRESH EYES

Tauira from Te Kōmanawa Rowley School in Ōtautahi Christchurch were among the five winning teams and individuals in the Days of Ice: Antarctica through Fresh Eyes 3-minute video competition. The competition was to encourage the conservation of Antarctica by exploring the continent through unique perspectives. The five tauira – La-Sharney Sefo, Easter Maka Samasoni, Mjade Tusa Faalili, Caziah Gali and Dasiy Fili – have whānau who originate from the Pacific Islands. In their video, they raised awareness of the taonga that is Antarctica and highlighted the impacts of climate change on their Pacific Island heritage, including their culture. Their video was one of only two selected by the International Antarctic Centre to screen in their high-definition theatre.

For the competition, the school was selected to receive mentoring from staff at Christchurch City Libraries and the five students were able to use library filming and editing tools to produce their video. To tautoko wider school learning about Antarctica, the entire school was supported by the Society to travel to the International Antarctic Centre for an educational visit. The video competition was part of the wider Days of Ice programme that included expert talks and a virtual reality experience of Antarctica. Senior students from the school gave feedback at the launch of the virtual reality experience.

The Society partnered with Te Pūtea Rangahau a Marsden the Marsden Fund, Antarctic Science Platform, GNS Science, Christchurch City Libraries, Victoria University of Wellington Te Herenga Waka, HITLabNZ at the University of Canterbury and the International Antarctic Centre to co-host four events during Days of Ice.

"Every-time I see the ākonga of Te Kōmanawa Rowley School either in real life or in these digital communications I feel very grateful for the mahi from everyone at Te Apārangi to make this a reality for those rangatahi. I am very fortunate to see the same crew on a regular basis (on the back of this project they are now coming into Te Hāpua Library for a continuation of 'film school') as they continue to build upon the skills that they learned throughout the competition. This has been such a positive experience for them and I am confident this will have made a very positive impact."

DANNY MCNEIL, TE RŌPŪ POUTAMA, PROGRAMMES, EVENTS & LEARNING TEAM, CHRISTCHURCH CITY LIBRARIES

SEE WINNING DAYS OF ICE VIDEOS AND HIGHLIGHTS
bit.ly/2020HL-51

10 YEARS OF **ACCELERATED RESEARCH CAREERS** WITH

Rutherford Discovery Fellowships

"Rutherford Discovery Fellowships mark a career turning point, as they allow the recipients to make a leap forward in their research. They also provide inspiration by witnessing the breakthroughs made by a whole community of fellows."

JASON TYLIANAKIS

Each year on behalf of the government we award Rutherford Discovery Fellowships to leading early-to-mid-career researchers, supporting them to accelerate their research careers in New Zealand.

In 2020, the 10th year of awarding the fellowships, the awarded Fellows' rangahau spanned a wide variety of interesting topics, including:

- developing greater understanding of the formation and evolution of our planetary system by using observations of distant small worlds to model those that are beyond the sight of telescopes
- finding out how viruses evolve to make the jump to a new host species by sequencing RNA from diverse animal species in Aotearoa and analysing any viruses present
- understanding to what extent transgender people have autonomy to choose which gender affirmation steps they wish to take in Aotearoa, using surveys and applying principles of self-determination and informed consent.

VIEW MORE ABOUT THE 2020 RUTHERFORD DISCOVERY FELLOWS
bit.ly/2020HL-52

2020 RUTHERFORD DISCOVERY FELLOWS

Dr **Siautu Alefaio-Tugia**, Massey University, for research titled: Redefining the humanitarian landscape: Pacific-diasporic disaster resilience.

Dr **Michele Bannister**, University of Canterbury, for research titled: Emissaries from the darkness: understanding planetary systems through their smallest worlds.

Dr **Nathaniel Davis**, Victoria University of Wellington Te Herenga Waka, for research titled: Pushing the limits on renewable energy technology through hybrid organic/inorganic nanomaterials.

Dr **Jemma Geoghegan**, University of Otago, for research titled: Ecological barriers and drivers of virus emergence.

Dr **Nathan Kenny**, University of Otago for research titled: Stretched mussels: tracing the genetic basis of resilience to climate change and ocean acidification in cultured green-lipped mussels (kuku) from genome to embryo.

Dr **Gabor Kereszturi**, Massey University, for research titled: Caught in action - volcano surveillance with hyperspectral remote sensing.

Dr **Libby Liggins**, Massey University, for research titled: Tohu of change for Aotearoa New Zealand's marine biodiversity.

Dr **Martino Lupini**, Victoria University of Wellington Te Herenga Waka, for research titled: Computing the shape of chaos.

Dr **Jaimie Veale**, University of Waikato, for research titled: Health inequities, social determinants of health, and gender affirmation: transgender health research guided by principles of self-determination and informed consent.

Dr **Adele Williamson**, University of Waikato, for research titled: In extremis: how bacteria replicate, repair and diversify their genomes in challenging environments.

The Rutherford Discovery Fellowships seek to attract, retain and develop New Zealand's most talented early-to-mid-career researchers and support their career development by helping them to establish a track record for future research leadership. A few of the awardees returned from overseas to take up these fellowships.

Looking back over 10 years of the fellowships, Professor Jason Tylianakis FRSNZ (University of Canterbury, Imperial College London) was one of the inaugural fellows, and his work has now been cited over 12,000 times, placing him among the top international ecologists. His research examines how communities of interacting species respond to environmental changes. He is currently a Principal Investigator for the Bio-Protection Research Centre CoRE (Centre of Research Excellence), which focuses on fundamental research into natural, sustainable ways of protecting New Zealand from plant pests, diseases and weeds. He was elected a Fellow of Royal Society Te Apārangi in 2018.

Ki te kotahi te kākaho ka whati, ki te kāpuia e kore e whati

Alone we can be broken. Standing together, we are invincible

KING TĀWHIAO

Research Charter for Aotearoa New Zealand

Following a two-year project involving a working group drawn from across the research community and supported by the Society, a research charter has been developed to underpin responsible research practice in Aotearoa New Zealand.

Finalised in late Whiringa-ā-nuku October, the charter is intended to be drawn on by research organisations and individual researchers to ensure that both organisational policies and research practices are of high quality, meet international standards and have the specific characteristics needed here in Aotearoa.

It sets out separate expectations for researchers, research organisations and research funders and includes a section on values and principles.

The charter is available in both English and te reo Māori as an online document and as posters in various formats.

VIEW MORE ON RESEARCH CHARTER FOR AOTEAROA NEW ZEALAND
bit.ly/2020HL-53

PRESIDENT'S ADDRESS ON

the rise of the 'precariat'

At the end of Whiringa-ā-nuku October, Royal Society Te Apārangi President Professor Wendy Larner FRSNZ FAcSS FNZGS gave an address looking at how the research system might better support early career researchers.

She spoke about how the experiences of the current generation of early career researchers is very different to the last. "This generation is different demographically, they are different socially, and they are entering a very different, and rapidly changing, labour market both nationally and internationally. However, these labour market changes are not simply a matter of our research organisations making blinkered decisions. To be blunt, there are now too many PhD graduates for too few academic jobs. What does this mean for our research sector and our collective research futures?"

She explained that this had led to the 'academic precariat': a situation where PhD graduates are competing for a smaller and smaller pool of academic jobs, resulting in many being unemployed and under-employed and often having to accept precarious short-term contract positions. While many must seek employment outside of universities, most PhD programmes do not prepare doctoral students well for this.

She explored the factors that are relevant to this situation: the international context, changes in universities, mismatch with employment opportunities outside universities, as well as data on New Zealand early career researchers and their subject choices.

In conclusion, she introduced some possible solutions such as collaborative PhD studies. These would be offered through a partnership between a university and a business or organisation. Doctoral students would be addressing real-world problems in their research, while at the same time learning practical skills and be introduced to a viable career path outside academia.

"Because the 'supply' of doctoral graduates far exceeds the 'demand' for traditional permanent positions available in universities, many early career colleagues find themselves moving from short term contract to short-term contract. We also know that those who are already under-represented in the academy (women, minority groups) are often over-represented in the academic precariat."

WENDY LARNER

VIEW VIDEO AND TRANSCRIPT OF PRESIDENT'S ADDRESS
bit.ly/2020HL-55

2020 Research Honours Aotearoa

In 2020, the Research Honours Aotearoa awards looked a little different. Due to COVID-19 and the need to restrict gathering size, we hosted three regional events across Aotearoa rather than one national event. These local gatherings were held during Whiringa-ā-rangi November. They focused on connecting and sharing with one another while celebrating the mahi of Aotearoa's leading scholars and kairangahau researchers. The first event at Government House was warmly hosted by our Patron, the Rt Hon Dame Patsy Reddy, Governor-General of New Zealand. The Academy of Royal Society Te Apārangi assesses the nominations for selecting the winners of these medals and awards.

"The event at Government House was tremendous; it was a sparkling occasion. People were there to celebrate science, to celebrate the humanities, to celebrate research, to celebrate kairangahau Māori and everybody had a great time… Many of the people working in these research areas, these areas of expertise, have been working away for a long time and very much often below the radar unless you happen to be in their field of expertise, but these awards are a moment when the light shines on them."

PROFESSOR CHARLOTTE MACDONALD, ACADEMY EXECUTIVE COMMITTEE CHAIR

TE WHANGANUI-A-TARA WELLINGTON, GOVERNMENT HOUSE

TOP HONOUR

The **Rutherford Medal** is a prestigious award instituted by Royal Society Te Apārangi, at the request of the Government. Awarded annually, it recognises pre-eminent research, scholarship or innovation by a person or team and comes with a $100,000 prize from the Government. 2020 was the first year it embraced the humanities and, fittingly, was awarded to preeminent literary scholar Distinguished Professor **Brian Boyd** FRSNZ, University of Auckland. The world's leading scholar on author Vladimir Nabokov, Brian's other main area of interest is in the intersection of science with the arts and humanities. He has argued convincingly that storytelling and art creation have given humans an evolutionary advantage, and he champions for scientific theories and methods to be applied to the arts. Indeed, he makes a compelling case for why the humanities are sciences and the sciences are humanities. In his work, he is interested in exploring how, as humans, we can extend our boundaries.

The **Te Puāwaitanga** award for an eminent and distinctive contribution to te ao Māori and Indigenous knowledge was awarded to Associate Professor **Maria Bargh** (Te Arawa, Ngāti Awa) from Victoria University of Wellington Te Herenga Waka. Maria has made an outstanding contribution to the discipline of political science in collaboration with Māori communities. Two interweaving strands of her work – political economy and the environment – are contributing to self-determination for Māori. They are also radically reshaping how Aotearoa New Zealand responds to environmental issues. Her ground-breaking iwi voting project and research leadership in the BioHeritage National Science Challenge are two highlights that show her drive to ensure a greater role for Māori in the governance of natural resources.

The **Pou Aronui** award for dedicated service to the humanities–aronui over a sustained period was presented to Professor **Rawinia Higgins** FRSNZ (Tūhoe) Victoria University of Wellington Te Herenga Waka. Rawinia has made esteemed and far-reaching advances in Māori language revitalisation. She jointly led a project that examined state and community responsiveness to Māori language revitalisation efforts. This project led to the development of a new theoretical model that identifies three 'effect' areas that allow Māori language initiatives to be more specific and targeted and, thereby, more effective. She then led changes to the new Māori language legislation and policy framework for the whole Māori language sector and helped implement these changes.

The inaugural **Tahunui-a-Rangi** award for invention and creation was awarded, with the support of Callaghan Innovation, to Professor **David Tipene-Leach** MNZM (Ngāti Kahungunu, Ngāti Kere, Ngāti Manuhiri), Eastern Institute of Technology, for the wahakura. The wahakura is an ingenious flax sleeping device designed to decrease sudden infant death while supporting bed-sharing. Designed for Māori infants who are six times more affected, its use has been shown to reduce infant mortality by nearly a third. The woven wahakura and sister pēpi pod now form part of the nation's safe sleep programme. David has led all aspects of the wahakura, apart from the weaving, advising on its safe use and gathering research evidence on its safety and effectiveness.

The **Thomson Medal** for leadership to support new knowledge and its application was awarded to Dr **John Caradus**, chief executive of Grasslanz Technology. John has spent his whole career focused on improving the value of grasslands for New Zealand farmers, from fundamental research through to commercialisation. As a plant breeder, he was involved in developing 16 white clover cultivars. He is also an expert in grass-fungi partnerships, which can offer grass protection from insect pests. In later years, his focus on commercialisation has ensured plant and microbial technologies have become available for use by farmers to improve pastoral sector productivity.

The **Hamilton Award** to encourage scientific research in Aotearoa by early career researchers was awarded to Dr **Nick Albert** of Plant & Food Research. A plant geneticist, Nick has made major contributions to understanding the compounds responsible for different colours in plants, their origins and how they are controlled. This knowledge is being applied to developing new fruits with novel colours and enhanced health-promoting properties. He has also made discoveries about when and how the earliest land plants acquired their 'sunscreen' properties to cope with environmental stress during evolution.

"As a humanist, you can choose to explore what humans have done wrong, and continue to do wrong, and there's no shortage of examples; but I prefer to show how some humans have extended the possibilities for us all, in art or in thought. If we aren't inspired by what humans at their best can do, we might despair of what humans at their worst can do. I especially like to work on people who cross the boundaries of the arts, the humanities and the sciences."

BRIAN BOYD

ŌTAUTAHI CHRISTCHURCH, TE PUNA O WAIWHETŪ CHRISTCHURCH ART GALLERY

The Society's oldest medal, the **Hutton Medal,** first awarded in 1911, was presented to Distinguished Professor **Neil Gemmell** FRSNZ, University of Otago, for fundamentally changing our understanding of animal ecology and evolution and driving the development of new approaches for conservation and management of the world's rarest species. Using the latest molecular genetic and analytical approaches, Neil brings together multidisciplinary teams that are shedding light on long-time enigmas such as the evolutionary basis of mutations that affect only males but are passed on by the mother, sex change in fish and, recently, mapping the genome of our unique tuatara.

The **Humanities Aronui Medal** for research or innovative work of outstanding merit in the humanities was awarded to Distinguished Professor **Jack Copeland** FRSNZ, University of Canterbury. Jack is a leading philosopher of artificial intelligence, computing and information, and a world-wide expert on Dr Alan Turing - the British mathematician, cipher code breaker and computer visionary. He has written six books on Turing with prize-winning TV documentaries by the Arte/History Chanel and the BBC based on these books. His research in computing and philosophy includes a revisionary history of the computer, and a rewriting of the early history of computer graphics and music. He is also an expert on New Zealand philosopher of logic Arthur Prior (1914–69), who is increasingly recognised as the greatest of all New Zealand philosophers.

Professor **Steven Ratuva** FRSNZ, University of Canterbury, was awarded the **Metge Medal** for research excellence and building relationships in the social science research community. He is an authority on ethnicity, racism and affirmative action, with expertise in conflict and social protection. He is inspired by the desire to address inequality and improve the situation of humanity. He leads a number of projects, including the Palgrave project on global ethnicity, the largest ethnicity project in the world. Recognising the need for research to cross disciplinary and cultural boundaries, he has built networks of researchers, policy thinkers and knowledge makers nationally, regionally and globally, while striving to give marginalised scholars a voice at every opportunity.

The **Hatherton Award** for the best scientific paper in the physical sciences written as a PhD candidate in New Zealand was presented to Dr **Georgia Grant**, of GNS Science. Georgia has developed a break-through method for determining past sea level rise. By analysing marine geological sediment cores from Whanganui, she has been able to determine water depths during warm periods in the geological past, similar to those projected for the coming centuries. This confirms New Zealand could experience up to 25 metres of sea level rise – due to extensive melting of the Antarctic ice sheets. Published in the leading science journal *Nature*, her paper has been extremely well received, including gaining attention from the International Panel on Climate Change.

The **Te Kōpūnui** Māori Research Award to recognise innovative Māori early career researchers with a promising trajectory was awarded to Dr **Michael Stevens** (Ngāi Tahu). Mike is one of a small group of Māori scholars who have moved out of university appointments and into iwi-centred positions in order to develop fresh perspectives on Indigenous histories. He has brought the southern New Zealand Ngāi Tahu history to international attention, particularly the importance of seafaring and maritime mobility. His richly detailed publications emphasise the individual as well as the widest national and transnational context. Through his scholarship, he is shifting the boundaries of Indigenous historical research both inward to the person and outward to interactions across Oceania.

TĀMAKI MAKAURAU AUCKLAND, TĀMAKI PAENGA HIRA AUCKLAND WAR MEMORIAL MUSEUM

The **Pickering Medal** for innovation leading to significant commercial success was awarded to **Rocket Lab's research and development team**, led by **Peter Beck**. Rocket Lab's research and development team have achieved technical breakthroughs that have allowed the company to become the world's leading dedicated-launch-provider for small satellites. Its competitive advantage derives from research and development that has achieved both a drastic reduction in the cost of dedicated launches and an increased launch frequency. Key innovative features from the in-house R&D include unique motor designs, 3D printing for manufacture and all carbon-composite construction. The launch vehicle's components are designed and manufactured in-house at Rocket Lab's facilities for quick turnaround times and increased efficiencies. Global uptake is significant and growing.

The **Hector Medal** for outstanding work in chemical sciences, physical sciences or mathematical and information sciences was awarded to Professor **Eamonn O'Brien** FRSNZ, University of Auckland. Eamonn has made world-leading contributions to the mathematical theory of groups, both through theoretical breakthroughs and his powerful algorithms. These algorithms are now incorporated into the computer algebra systems GAP and MAGMA that allow mathematicians world-wide to access these cutting-edge computational research tools. He has solved difficult and significant long-standing research problems, including a 40-year-old challenge posed by Alan Turing and the 50-year-old Ore Conjecture. As a research leader, he brings people together from different areas to work on new problems and has helped foster the University of Auckland as a strong research centre for algebra.

The **Callaghan Medal** for outstanding science communication that raises public awareness of the value of science or technology was awarded to Professor **Rangi Matamua** FRSNZ (Tūhoe), University of Waikato. Rangi is an outstanding science communicator whose pioneering work in Māori astronomy has engaged the public in the interface between western science and mātauranga Māori. His passion to share Māori scientific knowledge associated with the cosmos has resulted in television shows, online and print publications, social media blogs, more than 100 public lectures in New Zealand and Australia, a museum exhibition visited by more than 100,000 people, and a best-selling book on Matariki written in both English and te reo Māori. Like medal namesake, Sir Paul Callaghan, Rangi is championing a more open, inclusive and innovative view of science in Aotearoa, New Zealand and is inspiring the next generation.

The **Early Career Research Excellence Award for Humanities** was presented to Associate Professor **Ngarino Ellis** (Ngāpuhi, Ngāti Porou), University of Auckland. Ngarino is one of very few Māori art historians in Aotearoa. Her first book *A Whakapapa of Tradition: One Hundred Years of Ngāti Porou Carving, 1830-1930*, won four major awards. It provides a specific Ngāti Porou art history that significantly advances knowledge and promotes a century of work by carvers of the Iwirākau School. Informed methodologically by kaupapa Māori research principles and practices and other global-Indigenous understandings, her book also demonstrates her strong commitment to provide historical and visual research for practising artists. It is the first of her planned body of work on Māori art history.

Dr **David Moreau**, University of Auckland, received the **Early Career Research Excellence Award for Social Sciences**. David's research has demonstrated the benefits of high-intensity exercise. Physical exercise has long been known to benefit the body and the brain, but David's ground-breaking research shows that brain functioning benefits can be obtained from short bursts of high-intensity exercise. Benefits include improvements on our ability to plan, focus attention, remember instructions and juggle multiple tasks. Because high-intensity exercise is extremely time efficient, this research has the potential to impact schools, professional workplaces and disadvantaged communities, where opportunities to exercise may be limited. Beyond helping healthy individuals reach their full potential, this work also shows potential for alleviating neurological diseases such as dementia and developmental disorders.

The **Cooper Award**, for early career research excellence in technology, applied sciences and engineering, was awarded to Dr **Mallory Crookenden**, AgResearch. Mallory is recognised for her practical solutions to support immune function around calving to improve animal health on New Zealand dairy farms. She uses her expertise in biochemistry, immunology and molecular biology to design practices that can be readily applied on-farm. Roughly 90% of metabolic disease and 75% of infectious disease in cows occurs during the calving period, leading to yearly revenue loses in New Zealand of an estimated at $1.5 billion. Her research seeks to 'dampen' harmful inflammatory immune reactions and reduce metabolic issues. One example is to prevent low calcium with a feed additive prior to calving that improves calcium metabolism and modulates the cow's immune system.

VIEW MORE ON ALL 2020 RESEARCH HONOURS AOTEAROA WINNERS

bit.ly/2020HL-61

Research fellowships

ON BRAIN CANCER CELL COMMUNICATION, SELF-DETERMINED TOURISM AND PLANT STRESS TOLERANCE

WE AWARDED THREE ESTABLISHED RESEARCHERS WHO HAVE DEMONSTRATED SUSTAINED RESEARCH EXCELLENCE WITH PRESTIGIOUS JAMES COOK RESEARCH FELLOWSHIPS IN 2020. THESE PROVIDE FUNDING FROM THE GOVERNMENT TO ALLOW THEM TO UNDERTAKE STUDY OR RESEARCH IN THEIR FIELD OF ENDEAVOUR FOR TWO YEARS.

Dr **Kevin Davies**, Plant & Food Research, will work to understand the origin and current diversity of the metabolic stress-tolerance system of land plants. His hypothesis is that plants called hornworts are unique among land plants in that they lack the ability to produce protective metabolites called flavonoids. He will establish the physiological, metabolic and genetic status of the flavonoid pathway in hornworts to establish their vulnerability to environmental change.

Professor **Regina Scheyvens**, Massey University, will explore ways of achieving sustainable, self-determined tourism that supports Indigenous wellbeing in the Pacific region. The impact of COVID-19 on the tourism sector provides a unique opportunity to rethink how tourism can more sustainably benefit Aotearoa and the Pacific. She will analyse the policies and strategies being developed in response to the crisis, hold widespread discussions/kōrero/talanoa with affected people and, on the basis of these, re-imagine tourism using Indigenous voices and concepts.

Associate Professor **Charles Unsworth**, University of Auckland, seeks to understand communication pathways in the brain that can lead to GlioBlastoma Multiforme (GBM), the most aggressive and lethal primary brain cancer in adults. He will study the relationship between calcium ion-channels, changed calcium communication in the brain, and how this can trigger the transformation of normal cells into cancerous ones in GBM tumours. He will leverage his research group's transformative silicon brain-on-chip technology to map calcium channel communication and determine how GBM cancer talks at the network level. His research may discover new therapeutic strategies and approaches for treatment of GBM.

VIEW MORE ON THE 2020 JAMES COOK RESEARCH FELLOWS
bit.ly/2020HL-62

EARLY CAREER RESEARCHERS AWARDED

fellowships & scholarships

Our Rutherford Foundation awarded seven postdoctoral fellowships and two PhD scholarships with funding from government in 2020. The researchers will be exploring a diverse range of research topics, including:

- children's involvement in management of their asthma as a chronic illness
- improving models for how snow and glacier melt water affects water quality and quantity in Aotearoa
- how global warming affects New Zealand snapper populations
- tracking interactions between magma and geothermal activity in the Taupō Volcanic Zone.

TWO-YEAR NEW ZEALAND POSTDOCTORAL FELLOWSHIPS

Dr **Julie Spray**, University of Auckland, for research titled: Passive patients, active participants, or responsible self-managers? Children's involvement in chronic illness management in Aotearoa New Zealand.

Dr **Emily Greenbank**, Victoria University of Wellington Te Herenga Waka, for research titled: Refugee and migrant employable identities in action.

Dr **Alice Hill**, National Institute of Water and Atmospheric Research, for research titled: Improving New Zealand's long term water security through advances in water quantity and quality forecasting.

Dr **Tristan McArley**, University of Auckland, for research titled: Tolerance to climate warming in New Zealand snapper (Chrysophrys auratus).

Dr **Leighton Watson,** University of Canterbury, for research titled: Coupled seismic-acoustic-visual study of snow avalanche dynamics: a natural laboratory for understanding particle-laden gravity currents.

Dr **Shane Rooyakkers**, GNS Science, for research titled: Tracking Magmatic-Geothermal Interactions in the Taupō Volcanic Zone.

Dr **Alexis Marshall**, University of Waikato, for research titled: Unravelling the paradox of a globally invasive diatom.

THREE-YEAR CAMBRIDGE RUTHERFORD MEMORIAL PHD SCHOLARSHIPS

Jennifer Palmer, University of Otago, for research titled: Investigating novel regulators of autophagy in neurodegenerative diseases.

Amelia Cordwell, University of Auckland, for research titled: Astrophysical Fluid Dynamics: Planet-Disk Interactions.

VIEW MORE ON RUTHERFORD FOUNDATION 2020 AWARDEES
bit.ly/2020HL-63

Tūrama a series illuminating Aotearoa early career researchers

ON WORLD SCIENCE DAY (10 WHIRINGA-Ā-RANGI NOVEMBER) WE LAUNCHED TŪRAMA - AN INTERVIEW SERIES ILLUMINATING THE STORIES AND MAHI OF EARLY CAREER RESEARCHERS IN AOTEAROA WITH TWO INTERVIEWS:

Dr Jagadish (JT) Thaker witnessed the effects of climate change first hand while growing up in India. Now he is a senior lecturer at Massey University who is passionate about raising public awareness and understanding of the climate crisis.

Dr Sarah Moss has a passion for plants that stems from her high school years. Now she's a scientist at Plant & Food Research specialising in kiwifruit colouring, and is the co-chair of the Early Career Researcher Forum.

"I joke to my students that we 're-search' because something is always lost or is in the process of losing! In communication, what we want to say could be lost in our choice of words or the message is mangled in tone. Research is important because without evidence, your opinion is as good as mine and we would not know the best approach to take to solve our common problems. Research helps identify robust parameters, analyse our observations, test our ideas and develop an evidence-based approach that is more likely to succeed than intuition."

JT THAKER

"I really love plants, they provide us with oxygen, they feed us and they boost our mental health. I think it is important to do research which will directly benefit New Zealanders through boosting the horticultural industry and helping to supply us with high-quality fresh produce. I love working at a Crown Research Institute as we span the gap between doing really interesting science and having an impact on and for New Zealand."

SARAH MOSS

VIEW TŪRAMA PROFILES
bit.ly/2020HL-65

World-class research

SUPPORTED BY **MARSDEN FUND**

Te Pūtea Rangahau a Marsden, allocated $84.751 million (excluding GST) to 134 research projects led by researchers in Aotearoa in the 2020 funding round. These grants support excellent New Zealand research in the humanities, science, maths, social sciences and engineering. The grants are distributed over three years and are fully costed, paying for salaries, students and postdoctoral positions, institutional overheads and research consumables. This year one large interdisciplinary project received a Marsden Fund Council Award worth $3 million (excluding GST) to look at the link between asthma in young children in Aotearoa and biodiversity.

Marsden Fund Fast-Start grants support early career researchers to develop independent research and build exceptional careers in New Zealand. In 2020, there were 59 recipients of Fast-Start grants. Projects include topics such as the impacts of transracial adoption on identity and wellbeing for Māori adoptees and their descendants; how toxic metal accumulation affects the brain of honeybees and hive health; the causes of the dramatic decline of smoking, drinking and drug use among New Zealand teens; and what the patterns of trade and husbandry of domestic animals tell us about the interactions and movements of people throughout the Western Pacific.

Established research leaders and their teams were awarded 74 Marsden Fund grants. The research projects address a range of issues of both local and international importance including studying the impacts of Australian bushfires on New Zealand glacial environments; understanding the early universe through newly developed computational techniques; investigating whether 'upzoning' will make housing more affordable; using MRI to measure pressure on the brain; and transforming the Sport for Development field through the inclusion of Indigenous and feminist voices.

The engagement with mātauranga Māori was recognised across discipline areas. Some examples include investigating how Māori food realities and kaupapa (values and principles) can shape discussions about what we eat, how we obtain it and how we value it; finding out why Māori make their electoral roll choice and exploring Māori views on whether they see Māori electorates as a means of asserting Māori sovereignty or as a legacy of colonial rule; and developing a theory of anti-racism based on both kaupapa Māori theory and Western paradigms to address racism and Māori health inequities in New Zealand's health system.

"New Zealanders are world leaders in many research areas and the Marsden Fund plays a critical role in ensuring that we continue to have expertise available in these fields. Furthermore, Marsden Fund support enhances connectivity between researchers, both nationally and internationally, while also facilitating the engagement between researchers and their communities."

PROFESSOR DAVID BILKEY, MARSDEN FUND COUNCIL CHAIR

WHAT ROLE DOES BIODIVERSITY PLAY IN

children's respiratory health?

Could local plant diversity be key to understanding childhood allergies and asthma? Professor Jeroen Douwes, Professor John Potter, Associate Professor Andrea 't Mannetje, Dr Colin Brooks and Dr Marine Corbin (Massey University), Dr Caroline Shorter and Professor Julian Crane (University of Otago) and their wider team of researchers have been awarded a Marsden Fund Council Award to investigate the links between asthma in young children in Aotearoa New Zealand and biodiversity. Aotearoa has among the highest rates of asthma and allergy in the world, with Māori and Pasifika disproportionately affected. Asthma sufferers cannot be cured - only the symptoms can be managed. This is because we do not yet have a clear understanding of what triggers asthma development.

Studying a group of 50,000 children, this multidisciplinary team has discovered that tamariki exposed to more green space were less likely to develop asthma. This effect was even more pronounced in areas with high biodiversity containing native plant species. In this study, the team will build on these findings and explore in greater depth the role of local biodiversity in asthma and allergy, including looking at the children's gut microbiota and how this is affected by access to green space. Samples from asthmatic and non-asthmatic children in Aotearoa, Ecuador, Brazil and Uganda will determine whether there are differences in human microbiota between different countries, which could account for the high asthma rates seen here.

VIEW MORE ON THE BIODIVERSITY AND ASTHMA STUDY
bit.ly/2020HL-67

"The exciting bit for me is, if we can replicate those earlier findings, and we do find out what actually confers protection, then we can start applying it to the general population. There are various options here—and one is working with city councils to start making more high-quality green spaces that are more available to people, which would have a number of other benefits as well."

JEROEN DOUWES

Clean teens

WHY ARE FEWER YOUNG PEOPLE SMOKING, DRINKING AND USING DRUGS?

Dr Jude Ball of the University of Otago, Wellington, was awarded a Marsden Fund Fast-Start grant to investigate the dramatic decline of smoking, drinking and drug use among Māori and non-Māori adolescents to determine the drivers of this 'megatrend'.

Adolescent smoking, drinking and drug use have declined dramatically over the past 15-20 years in Aotearoa New Zealand and other OECD countries. This large and unprecedented decline is youth-specific and sits alongside almost universal declines in teen pregnancy, juvenile crime and dangerous driving. What is driving this trend is unknown. This leaves policy makers and researchers struggling to influence further positive change or prevent future reversals in the trend. Understanding the drivers of the declining substance use among Māori teens is particularly important as gaps between Māori and non-Māori remain stark.

Jude will work with Māori advisor Anaru Waa (University of Otago) along with a Māori Masters student to investigate the possible contribution of the changing functions and meanings of substance use in adolescents' lives, for both Māori and non-Māori.

This qualitative study will compare archival interview data collected at the peak of adolescent substance use 20 years ago, with contemporary data collected for this study. The interviews will cover friendships, lifestyle and perceptions about substance use and non-use. The research aims to address questions such as whether other practices (social media and gaming for example) are fulfilling the social functions that substance use once did (such as projecting a 'cool' or 'grown up' identity, bonding with friends and meeting new people).

READ MORE ON THE CLEAN TEENS PROJECT
bit.ly/2020HL-68

"Because we don't know what has driven substance use down, policy makers and researchers are poorly placed to predict future trends or influence further positive change. It's a complex interplay of factors. The glib answers that we might want to put forward – 'oh, its education' or 'oh, its digital media' – the qualitative and quantitative data don't really support those theories. This research will contribute to international efforts to understand why substance use has declined. It will also inform local efforts, including efforts by and for Māori, to reduce substance-related harm."

JUDE BALL

HOW MUCH IS ASH FROM

Australian bushfires melting our snow and ice?

Dr Phil Novis from Manaaki Whenua Landcare Research and Dr Lynda Petherick from Victoria University of Wellington Te Herenga Waka have been awarded a Marsden Fund Standard grant to lead a team of scientists to determine the effect of airborne particles on snow algae and the effect of both on snow and glacier melting in Aotearoa New Zealand.

The Australian bushfires in 2019–20 produced substantial quantities of black carbon and airborne contaminants over Aotearoa, dramatically changing the colour of snowfields and glaciers in the Southern Alps. Glacial microbial communities also darken glacier surfaces. A combination of these factors could increase melt rates of glaciers in Aotearoa by reducing the albedo, the amount of solar radiation that is reflected off the surface instead of being absorbed. However, the magnitude of these effects, as well as the interaction between microbial growth and black carbon deposition, are not well known, and current models for glacier melting do not take them into account.

Phil and Lynda will determine the effect of light-absorbing airborne contaminants from Australian bushfires and microbial communities on the melting of Aotearoa glacial systems – both individually and through their interactions. This study will provide the basis for future work on the effects of impurities on glacier melting.

> "I think it's fair to say that the kind of snow discolouration experienced here last summer was almost unprecedented. We initially estimated that 80 tonnes of ash had been deposited on the Fox Glacier neve for instance - and there is a lot of value in making a more accurate assessment of these quantities and their effects."
>
> PHIL NOVIS

READ MORE ON THE BUSHFIRE AND GLACIAL MELT STUDY
bit.ly/2020HL-69

Research workforce workshop

An important theme for the Society in 2020 was to begin to address research workforce issues, with an emphasis on issues that are having an impact on early career researchers and those from under-represented groups in the research workforce. In late Whiringa-ā-rangi November, the Society hosted a research sector-wide workshop to look at the factors contributing to a significant mismatch between the fields of study and aspirations of those seeking to enter the research workforce and the actual employment opportunities.

The 'Research Workforce of Aotearoa New Zealand' briefing paper and workshop outcomes document sets out the data and proposes a range of causative factors and some suggestions for change. It also includes a summary of outcomes from the workshop. Its overall objective was to stimulate new thinking about the overall research workforce of Aotearoa New Zealand and the associated research labour market for progression into long-term employment. The Society intends to keep working with other organisations in the research community to advance the workshop outcomes.

"Researcher career experiences show (outside engineering and related technologies) significant unemployment or under-employment, reliance on temporary roles in early career, shifting overseas to seek research work, and little income progression in the first decade post-graduation. In New Zealand there is a significant size precariat seeking to build a track record via temporary employment to win a permanent research role, and this precariat is largest in natural and physical sciences, health and medical sciences, and society and culture (social sciences and humanities) – the fields in which New Zealanders prefer to study. Women, Māori and Pacific researchers are strongly represented in the precariat – in part because they are more numerous in fields which have higher levels of precarious employment."

FROM RESEARCH WORKFORCE PAPER

VIEW RESEARCH WORKFORCE PAPER
bit.ly/2020HL-70

Lynmore Primary finalist

IN NEW ZEALAND BIODIVERSITY AWARDS

"I enjoy doing the trapping because you can see the difference it makes."

ELSIE BUTTON, 10, LYNMORE PRIMARY SCHOOL TAUIRA

Lynmore Primary School in Rotorua, a Science Teaching Leadership Programme participant, has taken its commitment to connecting with their local community seriously. Five years ago they began a series of projects in the community to protect their local environment. These projects have included predator trapping, removing invasive plant species and removing catfish from surrounding lakes. This mahi has been supported by local environmental organisations including Te Arawa Lakes Trust and the Bay of Plenty Regional Council. In 2020 their hard work was recognised as the school became one of three finalists in the New Zealand Biosecurity Awards Kura School Award section and pupils travelled down to Te Whanganui-a-Tara Wellington to attend the awards ceremony.

Developing scientifically literate tauira who have an active role in making a difference to their local communities is central to the kaupapa of the Science Teaching Leadership Programme. Having this mahi nationally recognised is a great achievement.

VIEW MORE ON LYNMORE PRIMARY SCHOOL'S RECOGNITION
bit.ly/2020HL-71

POWERING POTENTIAL

10 questions teams mentors

THE SIXTH POWERING POTENTIAL EVENT TOOK PLACE IN HAKIHEA DECEMBER WITH 40 STUDENTS FROM ACROSS NEW ZEALAND INVITED TO COME TO TE WHANGA-NUI-A-TARA WELLINGTON TO WORK IN TEAMS TO TACKLE SOME 'BIG PROBLEMS' POSED BY SCIENTISTS AND TECHNOLOGISTS. THIS YEAR, THE TAUIRA WERE MENTORED BY RUTHERFORD DISCOVERY FELLOWS AND THE QUESTIONS THEY POSED RANGED FROM NUTRITION AND GENETICS, TO CONSERVATION AND CLIMATE CHANGE.

Team Taīko (Hannah Matahaere, Erin Mckevitt, Maya Wells and Oscar Moriarty with mentor Dr Lisa Te Morenga) on the topic of whether we should promote replacement of sugar with artificial (non-nutrititve) sweeteners for prevention of obesity and obesity-related diseases?

Team Kakī (Maia Gasson, E Wen Wong, Kevan Lew and Tilak Patel with mentor Associate Professor Rob Mckay) on how we can prepare for sea level rise from ice sheet melt.

Team Whio (Libby Haywood, Lexi Trotter, Whetu Meihana and Andrew Sutcliffe with mentor Dr Damian Scarf) on the topic of the potential benefits and risks of social media for mental health.

Team Pīwakawaka (Ellen Tsai, Halle Findlay, Finn Cruickshank and Angus Henderson with mentor Associate Professor Logan Walker) on the topic of how we can utilise genetic data for better health outcomes.

Team Matuku (Alex Crampton, Maia Robertson, Aaron Li and Maxwell Busby with mentor Dr Michael Knapp) on current and future applications of environmental DNA (eDNA).

Team Kākāpō (James Zingel, Annaliese Zapata, Triyash Chetty and Lydia Palaiolgou with mentor Associate Professor Peng Du) on creating an app to better track and educate us on what we should be eating for our health.

VIEW HIGHLIGHTS REEL FROM POWERING POTENTIAL 2020
bit.ly/2020HL-72

Team Toroa (Eugene Bonot, Laura Morgan, Freddie Coleman and Ashlen Kaur with mentor Associate Professor Cate Macinnis-Ng) on threats of climate change on forest carbon storage.

Team Weweia (Tegan Gould, Veisinia Havilli, Kaliyana Haering and Olivia Charles with mentor Dr Jodie Hunter) on the mathematics Pasifika peoples used to successfully voyage around the Pacific without modern technology.

Team Ruru (Pearl Bir, Chante De Villiers, Nathan Chen and Meg Dunn with mentor Dr Alys Clark) on improving access to tools that can help detect problems in pregnancy.

Team Tawaki (Emma Kenney, Cynthia Zhang, Samantha Dryden and Caitlin Grosvenor with mentor Dr Emma Carroll) on how to prioritise spending on species or ecosystems.

Between research sessions, students also had the opportunity to explore the capital city and spend some time getting to know each other. They attended the theatre, sculpted monsters at Weta Workshop, played basketball with former professional basketball player Kenny McFadden and ate lots of kai.

The event wrapped up with a special presentation, where the tauira presented what they had discovered and how they think the issues can be solved. Thanks to all of the tauira and kaiārahi who participated in 2020 Powering Potential. Your innovative and engaging presentations made for an inspiring end to a challenging year!

Powering Potential is hosted by Royal Society Te Apārangi, in conjunction with the Ministry of Business, Innovation and Employment, Freemasons New Zealand and Rutherford Discovery Fellowships.

"My biggest take-away from the event was that there really are a lot of NZ students out there that think a lot like me – in the future, collaboration will be vital. The programme has really empowered and excited me to follow a career in engineering."

2020 POWERING POTENTIAL PARTICIPANT

On reflection
No te huri huringa

KO TE KAI A TE RANGATIRA, HE KŌRERO.
KO TE TOHU O NGĀ RANGATIRA, HE MANAAKI I TE TANGATA.

2020 was an extraordinary year. Together with the rest of the world, Aotearoa New Zealand confronted the challenges associated with the COVID-19 global pandemic. It was a year in which this country demonstrated to the world that research, science, technology, innovation, leadership, expert advice and communications matter. That by building on trusted knowledges we could stop and eliminate this new epidemic – a public emergency on a scale not witnessed in living memory. Our nation has developed the capabilities and built the systems to respond rapidly and effectively beat the virus. We also mobilised our experts to both imagine and help create the environmental, economic and social futures we need for the post-COVID world. Of course, we still have our challenges as a nation, and there are still many people managing and living with the consequences of COVID-19 in our hapori communities, but Aotearoa New Zealand and all who reside here are in a fortunate and privileged position.

Royal Society Te Apārangi is extremely appreciative of the work of the research, science, technology and innovation communities over the last year. The commitment and prioritisation – professional and personal – of our researchers in a period of many unknowns, shifting parameters and changing understandings was paramount to our nation's fight to eliminate this pandemic. We acknowledge all who stepped up to the challenge – those who became the public faces of science advice and communication, those who worked tirelessly behind the scenes on issues such as health policy, biosecurity and genomic tracing, those who 'pivoted' their established research to focus on the new challenges presented by COVID-19 and those who became trusted expert voices in their own communities. Siouxsie Wiles, Michael Baker, David Skegg, Juliet Gerrard, Shaun Hendy, Papaarangi Reid and Colin Tukuitonga are only a few of those in the long roll call of New Zealand researchers who are now household names. More broadly, we tautoko those who worked so hard to keep us all safe, including the Ministry of Health, Wellington Regional Emergency Management (who lived in our building for seven weeks during the Level 4 lockdown), our schools, our frontline workers and, of course, our Prime Minister Jacinda Ardern and Director-General of Health Dr Ashley Bloomfield.

More generally, it was not an easy year for New Zealand researchers, particularly those based in publicly funded organisations. COVID-19 took its toll on organisational budgets and challenged the international mobility we have taken for granted in recent decades. While closed borders did wonders for carbon footprints, it reinforced the fact that Aotearoa New Zealand is physically remote and distant from many major centres of research and expertise. The ability to recruit hard-to-fill research positions from an international labour market has been diminished. We are now becoming accustomed to participating in Zoom conferences at all hours of the day and night in an effort to keep up our international networks. Early career researchers have been particularly challenged by budget cuts and closed borders, as the labour market has become even more competitive and overseas opportunities less available and – perhaps – attractive. The issues confronted by Māori and Pasifika researchers have become more visible to others, as they have documented their labour market struggles and the institutional racism and cultural alienation that has too often been part of their experience. While there is change in the air, there is much mahi to do.

Heoi anō, on a more personal note, this is my final year as President of Royal Society Te Apārangi. I leave confident that Royal Society Te Apārangi has indeed made progress on the issues identified as the priorities for my term: enhancing diversity in all its forms; building stronger relationships with te ao Māori; and better supporting early career researchers. There has been genuine support for these three priorities from the Council members, Fellows, Companions, Members, Constituent Organisations and Branches, from the wonderfully hardworking staff within the organisation, and from the wider research community. Ngā mihi maioha ki a koutou thank you to you all. I also acknowledge the unstinting efforts of Dr Andrew Cleland, who has now finished his term as Chief Executive, and I warmly welcome Professor Dame Cindy Kiro as his successor. I am extremely proud that the Society is now positioned as a future-focused research organisation, confident of its historical legacy and standing, but more fully representative of Aotearoa and more deeply engaged with its diverse research and outreach communities.

He rā ki tua better days are coming.

Professor Wendy Larner FRSNZ FAcSS
Royal Society Te Apārangi President, March 2021

Kuputaka Glossary

aronui	humanities
arotakenga	evaluation, review
awa	river
hangarau	technology
hauora	health, wellbeing
hui	meeting
kai	food
kaiako	teacher
kaimahi	staff
kairangahau	researcher
kaupapa Māori	way of doing things, a Māori approach
kirihou	plastics
kōrero	talk, discussion
kura	school
mahi	work
manuhiri	visitors
mātauranga	knowledge, understanding, vision, wisdom
mauri	life force
moana	ocean
ngahere	forest, bush
Ngā Atua	the Māori gods
ngā motu	islands, from around the country
Papatūānuku	Earth mother
pūrākau	legend, story
pūtaiao	science
rangatiratanga	autonomy to make decisions
rangahau	research
rangatahi	youth
rōpū	group
taiao	environment, ecosystem
taiohi	youth
tangata whenua	local people, hosts
taonga	treasure
tau	year
tauira	student
tautoko	support
te ao Māori	the Māori world
te hiranga	excellence
tikanga	customs, traditional values
tohatoha	share
tono	demand, command
torohē	discover
tūhura	explore
wai	water
wānanga	learning seminar, discussion gathering
wero	challenge
whakapapa	ancestry
whānau	family
whenua	land

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