ROYAL SOCIETY **TE APĀRANGI**

Highlights Te Tau 2023

Hāpaitia te ara tika pūmau ai te rangatiratanga mō ngā uri whakatipu.

Foster the pathway of knowledge to strength, independence, and growth for future generations.

Rārangi ūpoko

Contents

Message from our President

KIA ORA KOUTOU,

I'M DELIGHTED WITH HOW THE ROYAL SOCIETY TE APĀRANGI HAS CONTINUED TO DELIVER ON ITS STATUTORY ROLE TO ADVANCE AND PROMOTE SCIENCE, TECHNOLOGY, AND THE HUMANITIES IN AOTEAROA NEW ZEALAND.

In 2023, we also worked with our diverse members and stakeholders to agree on a long-term strategy that will further extend the impact of the Society. Over more than six months we gathered advice and insights through a series of meetings around the motu, several wānanga, an online survey, and many interviews. This input has helped us to reaffirm the strengths and values of the organisation, and to develop a clear statement of vision and purpose for the Society, along with the strategic priorities to underpin that purpose.

Our vision is an Aotearoa guided and inspired by science and research.

The purpose of the Society is growing pathways of knowledge to enable science and research to be shared for the benefit of all.

In this Annual Report, Te Tau, we present activities aligned to our four strategic priorities which will guide us until our 175th anniversary in 2042.

1. KNOWLEDGE PATHWAYS

The Society supports and empowers New Zealanders to pursue education and excellence. In this edition, we feature our Science Teaching Leadership Programme and initiatives for students that promote education in science and technology subjects. We also profile some of the vital research infrastructure that the Society provides, such as our scientific journals and the ORCID system.

The Society administers investments in research on behalf of the government, including the Marsden Fund and a range of awards to support talented researchers. In 2023, we awarded three James Cook Research Fellowships to researchers at the height of their careers, five Rutherford Foundation Postdoctoral Fellowships to early-career researchers, and 12 Rutherford Discovery Fellowships. Here we feature two innovative career grants, the MBIE Science Whitinga Fellowships which were introduced to support early-career researchers in 2021 through uncertainty caused by the Covid-19 pandemic, and Ngā Puanga Pūtaiao Fellowships for 17 early-career and three mid-career Māori and Pacific researchers working in science, technology, engineering, or mathematics.

The Society is also responsible for celebrating excellence in scholarship, and in this edition we recognise the winners of the Prime Minister's Science Prizes and of the medals presented at the annual Research Honours Aotearoa.

I'd like to personally congratulate all researchers who have been awarded research grants, scholarships, prizes, or medals in 2023. The standard of applications was again extremely high. I'd also like to offer thanks to the many people who contribute their time and expertise to reading and reviewing applications to select the recipients of funding and awards.

2. INFLUENCE AND IMPACT

One of the Society's most important roles is to inform solutions to complex issues by gathering expert advice for the government and the general public. In this edition we highlight expert consensus on the issue of data sovereignty, as well as the 'Data Aotearoa' work by the Science Media Centre. We also feature the Society's role in enabling government Ministers to meet leading experts on specific topics, and quiz them on evidence that is relevant to their policy decisions.

The Society also collaborates on complex issues at the global level, for example through its work to support the International Science Council's Committee for Freedom and Responsibility in Science.

We offered the general public a range of lectures and talks to raise awareness and understanding, and communicated on complex issues through a range of channels including print and social media. One example highlighted here is work to amplify the voices of New Zealand scientists sounding the alarm about reductions in Antarctic sea-ice.

Again, I'd like to thank the many experts who we called upon to speak about their research, to write and edit our journals, and to provide evidence-based independent advice to the government on issues of societal concern.

3. PEOPLE AND PARTNERSHIPS

A core strength of the Society is its diverse network of members and partner organisations. This includes an Academy of more than 500 Fellows, elected by their peers for distinction in research and scholarship, and more than 50 Companions, recognised for outstanding leadership and contributions to science, technology, or the humanities. In this volume, we profile 2023's selection of outstanding new Fellows and Companions.

I'd like to acknowledge the passing of several of our Members during 2023, and to mention two Fellows in particular. We were deeply saddened by the loss of Distinguished Professor Richie Poulton CNZM FRSNZ, a psychologist and Director of the Dunedin Multidisciplinary Health and Development Study, and of Professor Ewan Fordyce FRSNZ, a palaeontologist who was Senior Editor of the *Journal of the Royal Society of New Zealand* from 2016 to 2021.

The Society also has 60 Constituent and Affiliate Organisations, including eight Branches, and more than 800 other Members. In April 2023, the Society gathered over 250 early-career researchers from around the motu, to an event that was named 'He Pito Mata' to express the notion of the potential of these emerging leaders to share their knowledge for the benefit of all.

The Society values its close relationships with universities, schools, research institutions, businesses in the science and technology sector, and with iwi, whānau, and other community groups, as well as the work we do on behalf of Government. We also maintain active links with a global network of organisations with aligned goals, to promote collaborations for New Zealand

researchers. Here we profile a selection of the international activities enabled by our partnerships during 2023: the Falling Walls Lab pitch competition for innovative ideas, the Frontiers Planet Prize for research with the potential to address the global environmental crisis, and an Exchange Programme which enables ten scientists from China to work at various universities and Crown Research Institutes in New Zealand.

4. INDEPENDENCE AND GROWTH

The fourth strategic pillar is to strengthen the independence of our organisation, in line with our values. We will do this by building on our reputation as a trusted partner and by delivering innovative services that align with our goals and allow us to grow. We will also embed the spirit and intent of Te Tiriti o Waitangi into our culture, policies, and practices. We have created our first business plan, setting out detailed, actionable, and measurable objectives to deliver these four strategic priorities, and this process will continue on a three-year rolling cycle towards 2042.

Thanks to all our members and partners who have contributed to our successes this year. The work of the Society is more important than ever, and we are well prepared to increase our influence and impact for Aotearoa New Zealand.

Finally, I'd like to congratulate Distinguished Professor Dame Jane Harding on her election as the next President of the Society. I am proud to be handing over our organisation in such good health.

Nau mai, haere mai,

Dr Brent Clothier FRSNZ
President, Royal Society Te Apārangi

GROWING PATHWAYS OF KNOWLEDGE

We worked with an artist from Te Ātiawa iwi on the concept for our long-term strategy. Te Ātiawa had planted māra kai (food gardens) on the site where the Royal Society Te Apārangi now stands, in Pipitea, Wellington. Manukorihi Winiata (who also has whakapapa to Ngāti Raukawa, Ngāti Awa, and Ngāti Tūwharetoa) learned the art of whakairo (carving) from elders in his iwi and then studied modern Māori visual arts.

The tohu or design which Manukorihi has created for our long-term strategy represents the māra kai (food gardens) of Te Ātiawa, and the connections between the whenua (land), wai (water), and tangata (people). Our long-term strategy is based on growing pathways of knowledge to guide and support future generations, which links to the concept of kaitiakitanga – the need for people to protect and cultivate the land, so it can nourish future generations.

READ OUR LONG-TERM STRATEGY ONLINE
Bit.ly/2023HL-05

Our Council

The Society is governed by our Council. During the year we farewelled several Councillors and welcomed more. In particular, we offer thanks to Professor **Linda Waimarie Nikora** FRSNZ and to the outgoing Chair of the Academy Executive Committee, Professor **Charlotte Macdonald** FRSNZ. We also welcomed a new President Elect, Distinguished Professor Dame **Jane Harding** DNZM FRACP FRSNZ.

PRESIDENT

Dr Brent Clothier FRSNZ

PRESIDENT-ELECT

Distinguished Professor Dame Jane Harding
DNZM FRACP FRSNZ

ACADEMY EXECUTIVE COMMITTEE

Professor Charlotte Macdonald FRSNZ
(Chair)

Distinguished Professor Geoff Chase FRSNZ *(Chair, former Deputy)*

Professor Susy Frankel FRSNZ
(Deputy Chair)

COUNCILLORS

Dr Marie Bradley MRSNZ
Co-opted

Professor Te Kani Kingi MRSNZ
Ngāti Pūkeko, Ngāti Awa, Ngāi Tai
Interim Māori Electoral College

Professor Cate Macinnis–Ng MRSNZ
Elected by Constituent Organisations

Professor Jens Mueller MNZM MRSNZ
Elected by the Members

Dr Sereana Naepi
Elected by Early-Career Researcher Forum

Professor Linda Waimarie Nikora FRSNZ
Te Aitanga a Hauiti, Ngāi Tūhoe
Interim Māori Electoral College

Jenny Pollock CRSNZ
Elected by the Branches

Distinguished Professor Steven Ratuva FRSNZ *Co-opted*

Dr Erena Wikaire MRSNZ
Ngāpuhi, Ngāti Hine, Te Kapotai, Te Hikutu
Interim Māori Electoral College

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Knowledge pathways

Science Teaching Leadership Programme

ENHANCING THE TEACHING OF SCIENCE IN SCHOOLS

THE SCIENCE TEACHING LEADERSHIP PROGRAMME SUPPORTS PRIMARY AND SECONDARY SCHOOLS TO TRANSFORM SCIENCE TEACHING AND LEARNING WITHIN THEIR HAPORI (COMMUNITIES). THIS IS ACHIEVED THROUGH PROFESSIONAL DEVELOPMENT WORKSHOPS, AND A HANDS-ON SIX-MONTH PLACEMENT WITH A LOCAL SCIENCE ORGANISATION.

2023 participant Chris van Tonder says by putting into practice "everything that the Science Teaching Leadership Programme gave me," he saw a real change in his students.

"They're eager to be there. They can find success. They can ask questions. They can be like scientists. That's what it's all about. Seeing them all light up!"

Chris aims for all students to come to school with wonder and curiosity – "that's ultimately the foundation of science".

This programme is funded by the Ministry of Business, Innovation and Employment.

FIND OUT MORE
Bit.ly/2023HL-08

"They're eager to be there.
They can find success.
They can ask questions.
They can be like scientists.
That's what it's all about.
Seeing them all light up!"

International opportunities for talented students

The Society supported students to participate and compete in events in other countries including the London International Youth Science Forum in the United Kingdom; the European Space Camp in Norway; Youth-ANZAAS Forum and the International Science School in Australia; and the Vex Robotics Worlds Experience and the International Future Problem Solving Conference, both in the United States.

Kaita Jibiki from Tawa College, Wellington, was one of three students who the Society supported to attend the London International Youth Science Forum – a summer residential school that connects the world's brightest rangatahi with Nobel Prize winners and top UK universities.

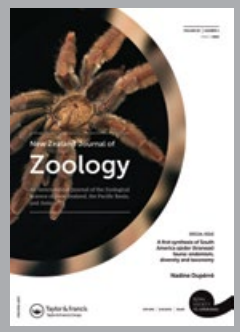
Kaita says the trip drastically changed the way he looks at his future career. He was swayed by a specialist lecture on stem-cell engineering and 3D-printed organs – so much that he is considering studying cellular biology.

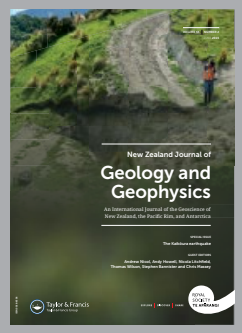
"It's amazing how universal science is, it's a language of unity and I think forums like this help foster this collaboration so much."

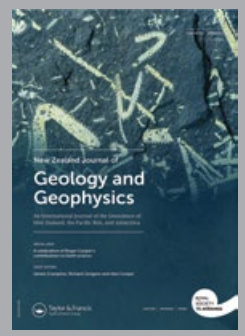
KAITA JIBIKI, TAWA COLLEGE

Journals now embrace open access

The Society publishes eight quality peer-reviewed research journals in partnership with our publishing partner Taylor & Francis. These journals are of particular importance to Australasia, the Pacific Basin, and Antarctica, with relevance to researchers worldwide.







Special issues

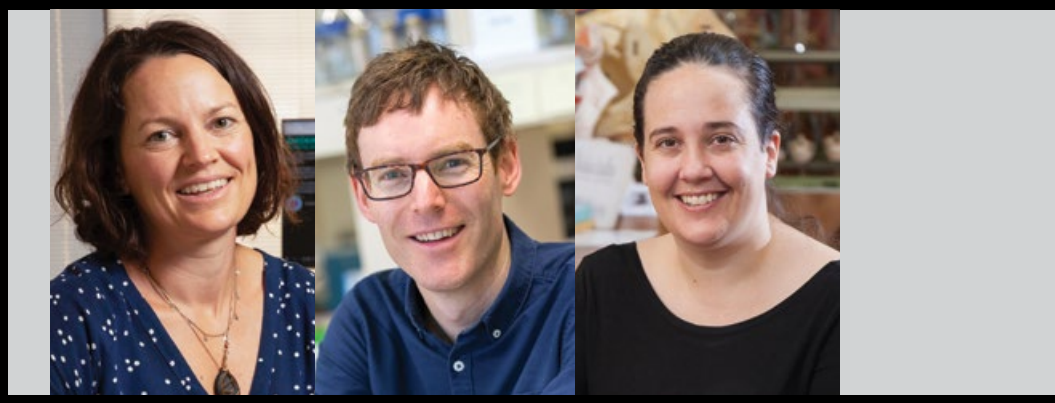
In addition to regular journal issues, each year we publish a number of special issues. These focus on specific research areas within the journal's scope, offering opportunities to review, propose new approaches, and encourage new lines of research.

In 2023, special issues focused on Aotearoa New Zealand included child health and wellbeing, the Kaikōura earthquake, longitudinal research, artificial intelligence, and the contributions from Dr Roger Cooper FRSNZ (1939–2020) to paleobiology and geology.

Open access

From 1 January 2023, authors affiliated with 47 institutions in Australia and New Zealand participating in the publishing agreement between Taylor & Francis and the Council of Australian University Librarians (CAUL) were able to publish Open Access in six of the seven hybrid Society journals, with no transactional Article Publication Charges (APC). Additionally, there remains to be no charge to publish open access in *Kōtuitui: New Zealand Journal of Social Sciences Online*.

Sustained research excellence



THREE RESEARCHERS AT THE HEIGHT OF THEIR CAREERS HAVE BEEN AWARDED JAMES COOK RESEARCH FELLOWSHIPS FOR TWO YEARS.

The James Cook Fellowships are awarded to researchers who have achieved national and international recognition in their area of scientific research. They allow them to concentrate on a major piece of research without the additional burden of administrative and teaching duties. The funding package annually is $100,000 plus up to $10,000 for expenses.

Associate Professor **Kelly Burrowes,** University of Auckland, is working at the interface of technology, engineering, and medicine to understand lung function. In her Fellowship she will study the poorly understood short- and long-term consequences of vaping on the lungs. This research will provide a holistic understanding of the vaping-related changes that occur in our bodies and the mechanisms that drive them.

Professor **Peter Fineran** FRSNZ, University of Otago, studies bacteriophages, which are viruses that infect bacteria. He will develop a novel method for generating random mutations in phage genomes to determine the genes which are important for phage function and allow them to evade bacterial defence systems. This fundamental research will facilitate the rapid generation of phages that can evade specific bacterial defence systems — an important step towards using phages for the treatment of antibiotic-resistant bacterial infections.

Professor **Siân Halcrow**, University of Otago, will conduct the first comprehensive survey of anatomical skeletal legacy collections in Aotearoa and the United States. She will also conduct a systematic assessment of stakeholder perspectives, including those of indigenous populations, on their use and curation. This will inform best practice and aid development of ethical guidelines and policy worldwide for use in museums, universities, schools, and other institutions.

Accelerating research careers

ESTABLISHED IN 2010, THE RUTHERFORD DISCOVERY FELLOWSHIPS HAVE SUPPORTED SOME OF OUR MOST PROMISING EARLY-TO MID-CAREER RESEARCHERS AS THEY SECURE AND ACCELERATE THEIR RESEARCH CAREERS.

In its final year, the Fellowship has awarded 12 outstanding recipients with $800,000 each over the next five years to carry out their specialist research programmes.

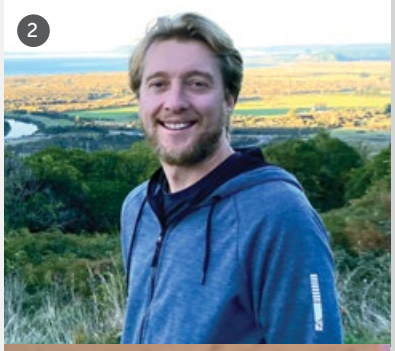
Chair of the selection panel, Associate Professor Marama Muru-Lanning, invoked a whakataukī to represent the importance of the Fellowships.

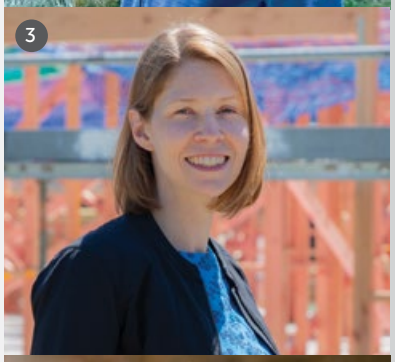
Whiria te tangata, ka puta he oranga. Whiria te mātauranga ka puta he tino rangatiratanga.

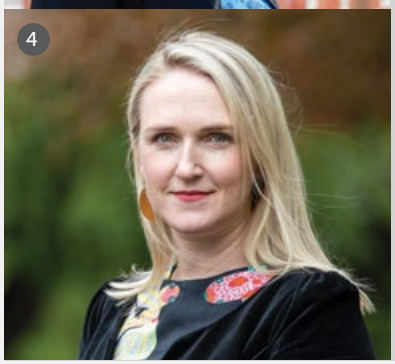
By weaving people, promote well-being. By weaving knowledge, promote excellence.

For 2023, the Rutherford Discovery Fellowship recipients were:

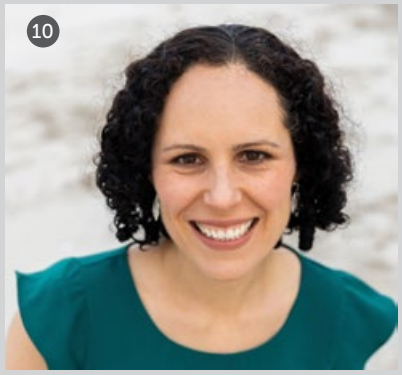
1. Dr **Natalia Yewdall**, University of Canterbury. Enhancing enzyme networks in condensates for carbon capture and sustainable synthesis.
2. Dr **Simon Barker**, Te Herenga Waka – Victoria University of Wellington. Magma forensics at New Zealand's volcanoes: understanding the magmatic systems and processes that drive eruptions.
3. Dr **Kimberley O'Sullivan**, University of Otago. HOusing, energy, and MEntal health and wellbeing (HOME) programme.
4. Associate Professor **Elizabeth Macpherson**, University of Canterbury. Blue carbon futures in Aotearoa New Zealand: Law, climate, resilience.

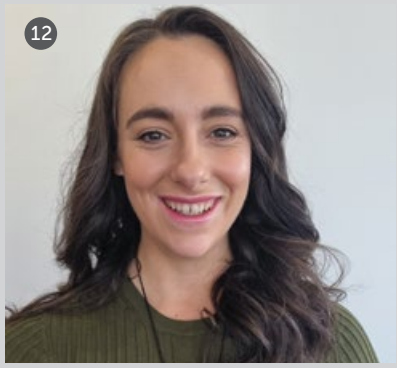






5. Dr **Rosemary Brown**, University of Otago. Wiring the brain for motherhood: The critical role of hormones in maternal mood and behaviour.
6. Dr **Megan Leask**, University of Otago. Omics and molecular strategies for precision medicine target discovery in Māori and Pacific peoples.
7. Dr **Emma Nolan**, University of Auckland. Tools for our future: Harnessing NZ-specific advanced cancer models to drive research discovery in Aotearoa.
8. Dr **Emma Sharp**, University of Auckland. Aotearoa New Zealand's diverse soil values: Examining the ontological politics of soil 'management' from the ground up.
9. Dr **Tom Logan**, University of Canterbury. Incorporating cascading risk and multiple uncertainties into climate adaptation planning.
10. Dr **Rebecca Lawton**, University of Waikato. Help for kelp in a warming world: A multi-disciplinary toolkit to identify resilience and improve heat tolerance of kelp for restoration and aquaculture.
11. Dr **Marta Rychert**, Massey University. Harm reduction industries or harmful corporations? Investigating digital and social media influence strategies of the emerging international legal cannabis industry and cannabis vaping sector.
12. Associate Professor **Lara Greaves**, Te Herenga Waka – Victoria University of Wellington. More than the 3 Ps: Enhancing participation in politics, policy, the public sphere, and political science.





Excellence in early-career research

FIVE RUTHERFORD FOUNDATION POSTDOCTORAL FELLOWSHIPS HAVE BEEN AWARDED TO OUTSTANDING EARLY-CAREER RESEARCHERS.

Fellowships provide a total of $400,000 (excluding GST) over two years for recipients to carry out full-time research, with allocations for salary, institutional overheads, and research expenses. These grants are meant to help promising young researchers build strong foundations for successful, independent careers.

Professor James Sneyd FRSNZ, Chair of the Rutherford Foundation selection panel, comments that "working for this scheme has been a real privilege".

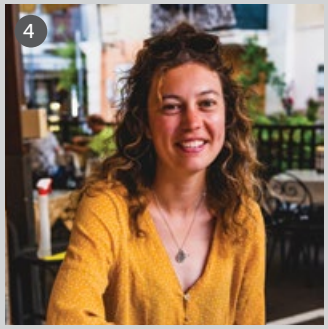
"Its recipients are truly Aotearoa's next leaders across academic lines and flavours. Their passion, hope, and future ambitions can inspire us all."

The recipients of the 2023 Rutherford Foundation Postdoctoral Fellowships were:

1. Dr **Akshata Anchan**, University of Auckland. Melanoma suspension particles and brain-metastatic extracellular vesicles in disruption of brain endothelial barrier integrity.
2. Dr **Preeti Cowan**, University of Auckland. Discovering distant worlds in our solar system with deep learning.
3. Dr **Marion Donald**, Manaaki Whenua – Landcare Research. A trait-based approach for predicting conservation status of Aotearoa New Zealand's pollinators.
4. Dr **Sarah van Eyndhoven**, University of Canterbury. Between the Clutha and the Kawarau – the threads of old and new identities shaping written language use among early Scottish immigrants to New Zealand.
5. Dr **Jean Power**, University of Canterbury. Solving microbial community function using Aotearoa New Zealand geothermal springs as model systems.

The Fellowships are managed by the Society on behalf of the New Zealand Government with funding from the Ministry of Business, Innovation and Employment (MBIE).

From 2024, MBIE will support future leaders in research, science, and innovation through the three Aotearoa New Zealand Tāwhia te Mana Research Fellowships, which will replace the James Cook Research, Rutherford Discovery, and Rutherford Foundation Fellowships.



NGĀ PUANGA PŪTAIAO
FELLOWSHIPS INVEST IN

Māori and Pacific STEM researchers

In 2023, Ngā Puanga Pūtaiao Fellowships were awarded to 20 early-career and mid-career scientific (Pūtaiao) researchers. The Fellowships were designed to provide career development opportunities and pathways for Māori and Pacific researchers in Aotearoa New Zealand.

1. Dr **Emily Afoa**, Pūrangakura. Tiakina te wai: Reimagining the delivery of water services by engineers.
2. Dr **Kendon Bell**, Scarlatti. Simulation modelling to support freshwater quality improvements and greenhouse gas emissions reductions.
3. Dr **Alan Cameron**, University of Auckland. Double trouble: Activating cancer prodrugs by leveraging a tumour selective oncolytic virus.
4. Dr **Rory Clifford**, University of Canterbury. Ngā hangarau ara: New technology pathways.
5. Dr **Tom Elliott**, iNZight Analytics. Data-driven web tools and Māori data sovereignty: building a data analytics platform for Aotearoa to share with the world.
6. Dr **Blaise Forrester-Gauntlett**, AgResearch. Stem cell ART: using stem cells to develop and improve assisted reproductive technologies.
7. Dr **Roseanna Gamlen-Greene**, University of Otago. Working together to build climate resilience of kaimoana.
8. Dr **Jasmine Hall**, Te Herenga Waka—Victoria University of Wellington. Untangling tangles: A new approach to the problem of community identification.
9. Dr **Mitchell Head**, University of Waikato. Ngā waiata o te wairoro.
10. Dr **James Hewett**, University of Canterbury. Characterising the biomechanical properties of blood clots.

The Fellowships are funded by the Ministry of Business Innovation and Employment.

11. Dr **Matthew Hughes**, University of Canterbury. Iwi/hapū-led infrastructure development, and landscape evolution in the Anthropocene.
12. Dr **Siuta Laulaupea'alu**, University of Waikato. Developing cybersecurity tools to combat mobile phone text-based scams in the Tongan Community.
13. Dr **Marjorie Lipsham**, Massey University. He Rau Tauwhiro: The place of kaitiaki in contemporary Māori realities.
14. Dr **Losa Moata'ane**, University of Otago. Tangi mei moana (cry from the ocean).
15. Dr **Acushla Sciascia**, Massey University. Toitū te marae, toitū te hapori - Building whānau resilience through physical and virtual marae.
16. Dr **Kim Southey**, University of Waikato. Māori data governance for housing, using mātauranga Māori to inform data systems.
17. Dr **Jamie Taka**, University of Auckland. Exploring the origins of protein allostery.
18. Dr **Alexander Trevarton**, University of Auckland. Leveraging AI to explore breast density and its implications on wāhine Māori health in Aotearoa New Zealand.
19. Dr **Essie Van Zuylen**, University of Canterbury. Ngā harore pōhewanga o Aotearoa - The psychoactive mushrooms of New Zealand, understanding our fungal taonga species.
20. Dr **Alexandra Winter-Billington**, Te Herenga Waka—Victoria University of Wellington. Integrating physically based modelling of debris-covered glacier melt and mātauranga Māori to improve the accuracy of projections of glacier change.

Strong support for ORCID

ORCID, the global Open Researcher and Contributor ID, has two main functions: to act as a trustworthy researcher identification registry and as a means of system-to-system communication for authenticated information. The Society works to encourage the use of ORCID identifiers across New Zealand's research system through the New Zealand ORCID Consortium, which allows organisations to gain the benefits of premium membership of ORCID with access to technical support through the New Zealand ORCID Hub.

New Zealand is now second globally for adding the most funded items to ORCID records.

More than 80% of publicly supported researchers in New Zealand have an ORCID record.

In 2023, the Consortium also gained three new members: Foundation for Equity and Research New Zealand, Moana Connect, and Toi Whakaari.

More than 80% of publicly supported researchers in New Zealand have an ORCID record.

Marsden Fund supports innovation and excellence IN NEW ZEALAND RESEARCH

The Marsden Fund, Te Pūtea Rangahau a Marsden, allocated $83.59 million (excluding GST) to 123 research projects led by researchers in Aotearoa New Zealand in the 2023 funding round. These grants support excellent research in the humanities, engineering, mātauranga, mathematics, science, and the social sciences for three years. The successful projects are of world-class standard, having made it through a highly rigorous selection process, including substantial international peer review.

Established researchers and their teams were awarded 76 Marsden Fund Standard grants, for a total of $66,671,000 (excluding GST), with a success rate of 12.8%. The projects address a wide range of issues of both local and international importance, including uncovering the molecular mechanisms of migraine, investigating the impacts of generative artificial intelligence on linguistic diversity, and investigating the effects of Tonga's food taxes on its public health and economy.

Up-and-coming researchers received 47 Fast-Start grants, for a total of $16,920,000 (excluding GST), with a success rate of 14.5% (up from 13% last year). Fast-Start grants are designed to encourage the development of independent research and build momentum for exceptional careers in Aotearoa New Zealand. Funded projects this year included the measurement of seismic activity in the Southern Alps, understanding fluid movement at a microscale for next-generation devices, and exploring how true crime podcasts inform our opinions about pressing social issues.

Marsden Fund is managed by Royal Society Te Apārangi on behalf of the New Zealand Government with funding from the Ministry of Business, Innovation and Employment.

"The Marsden Fund provides support for our leading and early-career researchers to carry out cutting-edge research. Some of these projects will make a transformational difference to how we think about the world and Aotearoa New Zealand's place within it."

PROFESSOR GILL DOBBIE FRSNZ
CHAIR MARSDEN FUND COUNCIL

Marsden Fund: Standard grant

DEVELOPING ALTERNATIVES TO HARMFUL 'FOREVER CHEMICALS'

Stable 'forever chemicals' like PFAS have had long-lasting impacts on the environment and on human health. Dr **Erin Leitao** from the University of Auckland aims to create safer alternatives with a Marsden Fund Standard grant.

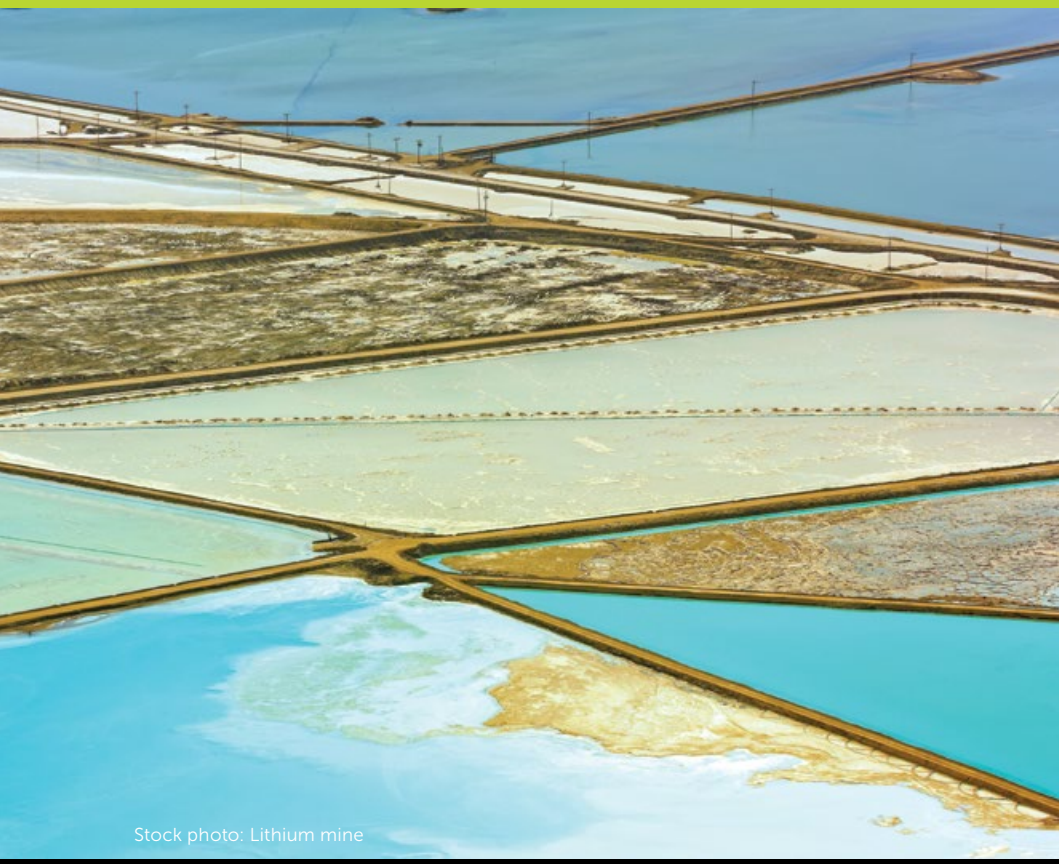
The chemical bond between carbon and fluorine is one of the strongest in chemistry. Because of this, chemical compounds containing carbon-fluorine bonds are highly stable and have long been prized for their commercial applications; for example, per- and poly-fluoroalkyl compounds (PFAS) have been used in a range of everyday products including contact lenses and non-stick pans.

After decades of use, PFAS have been detected in soil, water (including rain and drinking water), food, breastmilk, and human blood. When they become concentrated in our bodies they are toxic, causing cancer, developmental abnormalities, and infertility. Manufacture and use of some PFAS is now prohibited, and there is an urgent global need to develop alternatives to these 'forever chemicals'.

Dr Leitao has brought together a team with expertise in synthetic chemistry, engineering, and environmental science to design fit-for-purpose PFAS alternatives. The team will carry out laboratory-based tests to investigate how they behave across a range of controlled environmental conditions. They aim to design alternatives that are stable under normal conditions but can be triggered to degrade into harmless products.

Marsden Fund: Fast-Start

PREDICTING THE NEXT GENERATION OF BATTERIES



Stock photo: Lithium mine

Dr **Joseph Nelson** (Ngāti Tūwharetoa, Ngāti Raukawa) of Lincoln Agritech aims to use simulation to discover new compounds for use in improved rechargeable batteries.

Rechargeable batteries power everything from mobile phones and laptops to hybrid and electric vehicles. They are also a critical component in renewable energy networks, smoothing out fluctuations in energy supply. Of all battery classes, few have achieved the success of the lithium-ion battery. Better lithium-ion batteries with higher capacities and reduced environmental impact require new and improved materials. Traditional lab-based experimental studies are time-consuming and labour-intensive. Joseph will use his Fast-Start grant to investigate new methods in high-performance computing and quantum mechanical simulations to discover new lithium compounds based on prediction of chemical structure.

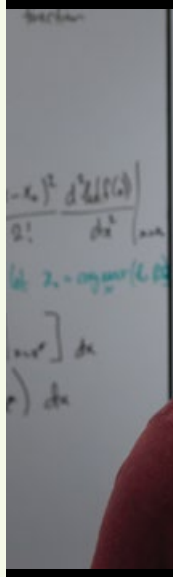
Using this state-of-the-art, large-scale approach, Joseph aims to produce a comprehensive database of promising compounds for lithium-ion battery synthesis, and to predict their effects on battery performance. This work will not only help to inform experimental synthesis efforts in the future but also model the use of structural prediction tools for discovering new compounds.

Te Whitinga mai o te rā
Digital series

The Covid-19 pandemic had a major impact on the research, science, and innovation workforce. In response to the reduced opportunities experienced by New Zealand early career researchers (ECRs), the Ministry of Business, Innovation and Employment (MBIE) provided one-off funding to support the retention and development of ECRs with the potential to excel in a research environment through the award of 30 MBIE Science Whitinga Fellowships with a total value of $320,000 per award.

Our digital series, *Te Whitinga mai o te rā*, featured 10 Fellows and was launched at the He Pito Mata conference. The stories raised awareness of the precarity of early-career research in the wake of Covid-19 and highlighted some of the excellent research made possible by the funding. The interviews shed light on this career-defining period for the ECR workforce and the myriad challenges of that time.

VIEW *TE WHITINGA MAI O TE RĀ* DIGITAL SERIES:
Bit.ly/2023HL-21



Dr **Paul Brown** (Tainui, Ngāti Hikairo), whose Whitinga Fellowship explores new research between the University of Waikato, School of Computing and Mathematical Sciences, and the Institute for Security and Crime Sciences.

Dr **Samantha Heath** who is reimagining nurse preparation for our rapidly aging demographic profile.

Dr **Rebecca Campbell** is researching plant diseases, including, European canker in apple, Myrtle rust in Myrtaceae plants, and Xylella fastidiosa a high-risk organism to New Zealand.

Dr **Mahonri Owen** (Ngāti Hine, Ngāti Tūwharetoa) is further exploring brain-controlled prosthetic hands, and inspiring Māori students into STEM.

Prime Minister's Science Prizes

The Government of New Zealand introduced The Prime Minister's Science Prizes in 2009 as a way of raising the profile of science among New Zealanders. The Society is the secretariat of the prizes, with funding from the Ministry of Business, Innovation and Employment. Five prizes are awarded every year, each judged by an independent selection panel.

The 2023 award ceremony was hosted by Sir Ashley Bloomfield KNZM at Wharewaka Events Centre, Wellington, on 1 May, with Hon Dr Ayesha Verrall as the keynote speaker.

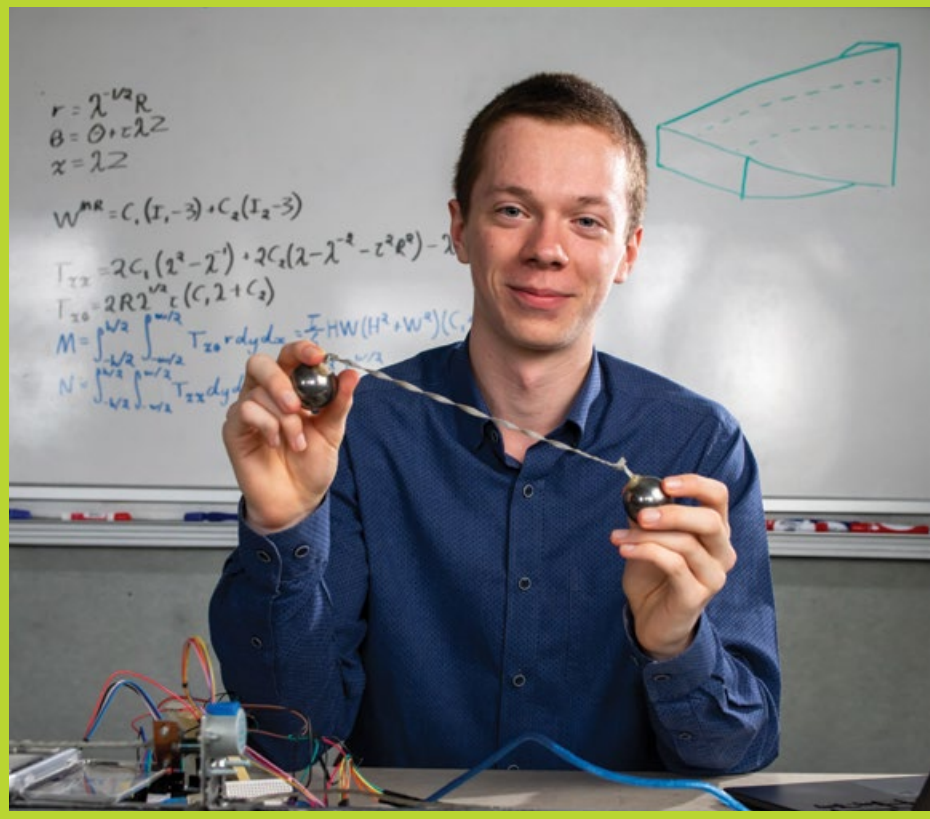
The Prime Minister's Science Prize was awarded to the **National Institute for Stroke and Applied Neurosciences** (NISAN) led by **Professor Valery Feigin** FRSNZ. Valery and his team at NISAN have spent more than 40 years uncovering the epidemiology of stroke and associated conditions and developing digital tools for patients and clinicians to reduce stroke risk worldwide. Their work has led to the insight that stroke has become the second leading cause of death and of disability in the world. The team has developed two world-first digital tools to assist people to lower stroke risk. The mobile app *Stroke Riskometer* calculates a person's stroke risk and guides them how to reduce it, and *PreventS-MD*, provides the same information via desktop computer software for clinicians to use during consultations.

The MacDiarmid Emerging Scientist Prize was awarded to Associate Professor **Jonathan Tonkin**, a leading fresh water ecologist, for work developing new ways to forecast how biodiversity might respond to environmental threats, including the rapid changes occurring due to climate change. The research seeks to predict the outcomes of management interventions, allowing changes to be made before issues arise.

The Science Teacher Prize was awarded to **Doug Walker** for building a large online following of students for his explosive experiments and exam paper tutorials. His teaching has encouraged more students to take science at a senior level and he has established a network of teachers providing online classes for ākonga (students) throughout Aotearoa.

The Science Communication Prize was awarded to Associate Professor **Dianne Sika-Paotonu** for her work communicating with the Pacific community to create better treatments for rheumatic fever and rheumatic heart disease. She was also recognised for being a leading voice during the Covid-19 pandemic, explaining the technical aspects of immunology, vaccines, and infectious diseases.

The Future Scientist Prize was awarded to **Benjy Smith** for mathematically modelling the behaviour of twisted elastic bands. This knowledge can be applied to many types of structural engineering, such as construction cranes, where being able to predict the behaviour of these materials could prevent fatigue or breaks.



2023 Research Honours Aotearoa

EXCELLENCE AND THE CONTRIBUTIONS OF INNOVATORS, KAIRANGAHAU MĀORI, RESEARCHERS, AND SCHOLARS WERE RECOGNISED AT OUR CELEBRATED AWARDS. THE ACADEMY OF ROYAL SOCIETY TE APĀRANGI ASSESSES THE NOMINATIONS AND SELECTS THE AWARD AND MEDAL WINNERS.

In 2023, we hosted three regional events in November. Our partner, the Health Research Council of New Zealand, also awarded three medals this year.

The Society would like to thank its Patron, Her Excellency The Right Honourable Dame Cindy Kiro, GNZM, QSO, Governor-General of New Zealand, for supporting the awards. We also acknowledge the support of the Ministry of Business, Innovation and Employment, the Royal Society Te Apārangi Endowment Fund, and the Marsden Fund Te Pūtea Rangahau a Marsden for their continued support and sponsorship, and the research community for championing and contributing to Research Honours Aotearoa.

TĀMAKI MAKAURAU AUCKLAND, 8 NOVEMBER

BOLD LEADERSHIP FOR EQUITY IN THE RSI SYSTEM

The **Thomson Medal** for outstanding contributions to the organisation, support and application of science or technology was awarded to Professor **Nicola Gaston** FRSNZ, MacDiarmid Institute for Advanced Materials and Nanotechnology. It was presented for leadership in New Zealand's research institutes and professional societies, and for the dedicated promotion of women in science.

A CAREER COMMITTED TO EMERGENCY RESPONSE AND MARAE RESTORATION

Te Rangaunua Hiranga Māori Award recognising excellent, innovative co-created research by Māori, that has made a distinctive contribution to community wellbeing and development in Aotearoa was awarded to Professor **Regan Potangaroa** (Ngāti Kahungunu ki Wairarapa), Massey University. Presented for his devoted career as an engineer and architect for humanitarian deployments, emergency response and restoring marae.

LANGUAGE RIGHTS AND INDIGENOUS LANGUAGE REVITALISATION

The **Mason Durie Medal**, awarded to New Zealand's pre-eminent social scientist, went to Professor **Stephen May** FRSNZ, University of Auckland. Presented for his interdisciplinary scholarship and his leadership as a world authority on language policy, language rights, Indigenous language revitalisation, and the multilingual turn in language learning.

RECLAIMING, RESTORING AND REVISIONING LIVING AS WĀHINE MĀORI

Te Kōpūnui Māori Research Award for an early career researcher with a promising trajectory who is delivering innovative Māori research was given to Dr **Hinekura Smith** (Te Rarawa, Ngāpuhi, Te Ati Awa), Unitec | Te Pūkenga. Presented for her PhD research titled *'Whatuora: Whatu kakahu and living as Māori women'*.

ADDRESSING BIG SOCIETAL ISSUES

The **Early Career Research Excellence Award** for Social Sciences went to Dr **Maria Armoudian**, University of Auckland. Presented for research, leadership and mentoring to advance interconnected goals of sustainability, human rights and good governance.

ŌTAUTAHI CHRISTCHURCH, 15 NOVEMBER

THE WORLD'S FIRST LOW-METHANE SHEEP

The **Pickering Medal** recognising excellence and innovation in the practical applications of technology was awarded to **AgResearch | Low Methane Sheep Breeding Team** (Dr Suzanne Rowe, Dr John McEwan, Dr Petrus Janssen, and Dr Graeme Atwood). Presented for breeding low methane-emitting sheep, determining the biological impact on New Zealand's methane emissions, and embedding this breeding solution in the national flock.

DISTINGUISHED WORK ON 'INDISTINGUISHABLE' PARTICLES

The **Hector Medal** for outstanding research in chemical, physical, or mathematical and information science was awarded to Professor **Niels Kjaergaard,** University of Otago. Presented for his outstanding contribution to scientific knowledge about fundamental particles, through experimental studies of atomic collisions and light-scattering using ultracold gases.

USING HISTORY TO CONNECT NEW ZEALANDERS TO THEIR PAST

The **Humanities Aronui Medal** for research or innovative work of outstanding merit in the Humanities went to Dr **Vincent O'Malley** FRSNZ, HistoryWorks. Presented for his contribution to the research, knowledge, and public understanding of New Zealand history, particularly the New Zealand Wars and Māori-Pakeha relations throughout the nineteenth century.

SUSTAINABLE CONSTRUCTION, LOW CARBON CEMENT AND CARBON CAPTURE

The **Cooper Award** for early career research excellence in technology, applied sciences or engineering was awarded to Dr **Vineet Shah**, Callaghan Innovation. Presented for pioneering research transforming concrete from demolition waste into a sustainable low-carbon cement additive, and fostering a circular economy in construction.

OUR HIGHEST HONOUR
Rutherford Medal

TRANSFORMING RESEARCH FOR INDIGENOUS PEOPLES

The **Rutherford Medal** presented for an exceptional contribution to the advancement and promotion of knowledge for the benefit of New Zealand society was presented to Distinguished Professor **Linda Tuhiwai Smith** CNZM FRSNZ (Ngāti Awa, Ngāti Porou), Te Whare Wānanga o Awanuiārangi.

Presented for her pre-eminent, groundbreaking scholarship and her profound and innovative contribution to transforming research for Indigenous Peoples globally. Linda's work spans more than 40 years in the areas of kaupapa Māori education, theory and research; mana wahine; Māori health; and historical and intergenerational trauma. Her influential publication *Decolonising Methodologies, Research and Indigenous Peoples* (first published in 1999) has been revolutionary for whānau, hapū, iwi, Māori, and Indigenous peoples across the globe.

TE WHANGANUI-A-TARA WELLINGTON, 23 NOVEMBER

A SUSTAINABLE FUTURE WITH NANOTECH CATALYSTS

The **MacDiarmid Medal** for outstanding scientific research that demonstrates the potential for application to human benefit was awarded to Professor **Geoffrey Waterhouse**, MacDiarmid Institute for Advanced Materials and Nanotechnology & Dodds-Walls Centre for Photonic & Quantum Technologies. Presented for discovering low-cost nanocatalysts critical to global decarbonisation efforts and creating energy infrastructures based around renewables.

INFORMING ABOUT DECLINE IN FRESHWATER ECOSYSTEMS

The **Callaghan Medal** for an outstanding contribution to science communication and raising public awareness of the value of science to human progress went to Dr **Mike Joy**, Te Herenga Waka — Victoria University of Wellington. Presented for his research and communications about the decline of freshwater ecosystems, drinking water, and sustainability challenges in food systems which led to changes in government policy and public awareness of the degradation of freshwater.

ANTARCTIC ICE SHEET MODELLING AND A VOICE FOR CLIMATE CHANGE

The **Hutton Medal** for significantly advancing understanding through work of outstanding scientific or technological merit was awarded to Professor **Nicholas Golledge** FRSNZ, Antarctic Research Centre, Te Herenga Waka — Victoria University of Wellington. Presented for his internationally recognised and cutting-edge contributions to Antarctic ice sheet modelling, climate change research, and for lead authorship of the recent Intergovernmental Panel on Climate Change (IPCC) Assessment Report.

PIONEER IN MĀORI PUBLIC HEALTH AND SUICIDE PREVENTION

Te Rangi Hiroa Medal for work in social history, cultural diversity, socioeconomics, or medical anthropology was awarded to Associate Professor **Clive Aspin** (Ngāti Maru, Ngāti Whanaunga, Ngāti Tamaterā), Te Herenga Waka — Victoria University of Wellington. Presented for his research into sexuality, HIV and suicide prevention leading to greater equity for Māori, and Indigenous peoples.

EXTRACTING HIGH-VALUE BIOACTIVES

The **Scott Medal** for engineering science and technology work of great merit went to Dr **Owen Catchpole** FRSNZ, Callaghan Innovation, for being a world leader in the development of 'supercritical' solvent-based processes to extract high-value bioactive chemicals from biological materials.

EFFICIENT MANUFACTURE OF DRUG CANDIDATES

The **Hamilton Award** for early career research excellence in science was awarded to Dr **Mark Calcott**, Te Herenga Waka — Victoria University of Wellington, for pioneering evolutionary approaches to the engineering of microbes to enable efficient and sustainable production of new drug candidates.

HEALTH RESEARCH COUNCIL AWARDS

PASSIONATE WĀHINE A TRUE COMMUNITY CHAMPION

The Health Research Council **Beaven Medal** for excellence in translational health research was awarded to Professor **Beverley Lawton** ONZM (Ngāti Porou), Te Herenga Waka — Victoria University of Wellington. Presented for work and advocacy in women's health with real-world impact into clinical practice, particularly in the areas of cervical cancer prevention and maternal health outcomes for wāhine Māori.

STRONG RELATIONSHIPS KEY TO HEALTH OUTCOMES

The Health Research Council **Te Tohu Rapuora Medal** for outstanding leadership and contribution to Māori Health went to **Te Tātai Hauora o Hine – The National Centre for Women's Health Research Aotearoa**, Te Herenga Waka — Victoria University of Wellington.

BREAKTHROUGHS IN RHEUMATIC FEVER AND STREPTOCOCCAL INFECTIONS

The Health Research Council **Liley Medal** for published research that makes a significant contribution to health and medical sciences was awarded to Professor **Michael Baker** MNZM and his team at the University of Otago Wellington for two companion papers in the *Lancet* that represent a breakthrough in our understanding of the causes of acute rheumatic fever and the role of Group A Streptococcal infections.

02

Influence and impact

MPs presented with latest in science and technology

In collaboration with the Speaker of the House of New Zealand Parliament, our annual Speaker's Science Forum gave Members of Parliament the opportunity to hear presentations on topical research areas. Topics were selected in collaboration with our Forum partners Science New Zealand, Universities New Zealand, and the Independent Research Association of New Zealand.

Photo credit: Trevor Mahlmann

FOOD SECURITY IN THE FACE OF GLOBAL CHALLENGES

Dr **Nicholas Cradock-Henry** and Dr **David Rankin** discussed the major risks to food security in Aotearoa and how we can prevent or mitigate these issues to ensure a food-secure future.

CLIMATE CHANGE AND WATER

Frederika (Frédérique) Mourot and Dr **Alex Macmillan** provided an overview of the risks of climate change in Aotearoa and its effects on our groundwater and health.

DATA SOVEREIGNTY AND AI

Professor **Tahu Kukutai** FRSNZ presented how Indigenous models could help create ethical, high-value, high-trust data ecosystems. Professor **James Mclaurin** discussed rapid change and artificial intelligence (AI), and the effects on data-use principles in New Zealand.

GENETIC TECHNOLOGY AND HEALTHCARE

Dr **Robert Weinkove** discussed the latest advances in CAR T-cell therapy to target blood cancers and Professor **Justin O'Sullivan** provided an overview of precision health and its capacity to prevent, diagnose, and treat disease with great accuracy.

SPACE RESEARCH

Dr **Sara Mikaloff-Fletcher** presented on the New Zealand government's first satellite mission, MethaneSAT, for precision sensing of methane emissions and Dr **Michele Bannister** shared recent data from the James Webb Space Telescope on the origins of our Solar System.

Expert Advice

DATA SOVEREIGNTY: WHAT IT IS AND WHY IT MATTERS

In this digital era, individuals, groups, and governments are continuously generating enormous amounts of data that are used to make decisions, drive innovation, and make profits. Data has become hugely valuable and a source of power. But who owns, controls, and protects our data?

Our report *Mana Raraunga Data Sovereignty* gives an overview of the concepts of data sovereignty, Indigenous data sovereignty, and Māori data sovereignty. These concepts are helping guide answers to complex questions about who owns, controls, and protects our data. The report also describes new data practices that are emerging to create a data future that benefits us all.

READ MORE
Bit.ly/2023HL-35

"This report from Royal Society Te Apārangi provides a timely overview of data sovereignty and why it is important. It is pleasing to see recognition of the huge contribution that Māori and Indigenous scholars and communities are making to theory and practice. Their innovative thinking and profoundly different way of thinking about data, and the risks and opportunities, is not only good for Māori but good for Aotearoa as we all grapple with the future implications of AI and other data-driven technologies."

PROFESSOR TAHU KUKUTAI FRSNZ

Supporting freedom and responsibility

IN INTERNATIONAL SCIENCE

The International Science Council (ISC) works at the global level to catalyse and convene scientific expertise, advice, and influence on issues of major concern to both science and society, and to advance the role of science as a global public good. These goals are underpinned by a priority commitment to the free and responsible practice of science, which the ISC holds as fundamental to scientific advancement and to the peaceful and sustainable development of humankind.

The Society plays a significant part in the ISC's work to uphold and promote the Principles of Freedom and Responsibility in Science by hosting the Special Advisor to the ISC's Committee for Freedom and Responsibility in Science (CFRS). Throughout 2023, this arrangement contributed to major international events aimed at raising awareness of declining scientific freedoms globally and at mobilising efforts to reverse this trend. This included:

- An ISC-UNESCO co-organised conference at UNESCO's Paris headquarters in May, which addressed the ethical challenges of emerging technologies, the uneven distribution of scientific resources worldwide, and the role of the multilateral system in finding solutions collaboratively.
- Representation at the Global Sustainability Science and Innovation Congress in Panama in June, where CFRS highlighted recent escalations in violence against environmental scientists in the Americas.
- A workshop in Kuala Lumpur in October, chaired by Society Chief Executive, Paul Atkins, which explored scientific freedom and responsibility concerns specific to the Asia-Pacific region.

Led by CFRS, the ISC continued its advocacy for equity, inclusivity, integrity, and freedom in science, and the role of the state in enabling these, by speaking out prominently in support of the scientists and science systems under threat in Afghanistan, Iran, Sudan, and Nicaragua.

FIND OUT MORE
Bit.ly/2023HL-36a

Science IN THE 21ST CENTURY

CFRS also produced a six-episode podcast series in collaboration with *Nature* on the critical role and precarious position of scientific freedom and responsibility in today's world, and what the global scientific community can do to promote these norms.

Explored through interviews with experts, the series exposed a large, new audience to the work of the ISC and CFRS, of which the Society is consistently acknowledged as an important contributor.

LISTEN TO THE SERIES
Bit.ly/2023HL-36b

International Science Council

SCIENCE MEDIA CENTRE

Data Aotearoa: Building the next generation of data journalists

IN A FIRST-EVER WĀNANGA PRESENTED BY THE SCIENCE MEDIA CENTRE AND *NEW ZEALAND GEOGRAPHIC*, EIGHTEEN JOURNALISTS CAME TOGETHER FOR AN INTENSIVE FOUR-DAY RETREAT TO LEARN HOW TO TURN DATA INTO POWERFUL STORIES THROUGH ANALYSIS AND VISUALISATION.

"It's improved my confidence around data reporting. It means I won't shy away from those stories!"

WORKSHOP PARTICIPANT

At Data Aotearoa, journalists were joined by Māori technology ethicist Dr **Karaitiana Taiuru**, Pulitzer-Prize winning data journalist Professor **Matt Carroll**, and Kontinentalist Co-Founder **Pei Ying Loh**. With the help of seasoned data journalists, **Farah Hancock**, **Chris Knox, Felippe Rodrigues,** and **Kate Newton**, participants worked on stories throughout the duration of the wānanga, and have since maintained a supportive data journalism community across different media outlets.

This initiative was made possible with the support of NZ On Air's Public Interest Journalism Fund.

SCIENCE MEDIA CENTRE

Scientists sound alarm over Antarctic sea ice lows

In October 2023, Antarctic sea ice levels were 20% below the norm for that time of year, with the missing ice equating to an area ten times the size of Aotearoa. Recognising the urgency, 50 New Zealand scientists convened at an emergency summit to discuss the impacts of these historic lows on Antarctica, the Southern Ocean, and New Zealand.

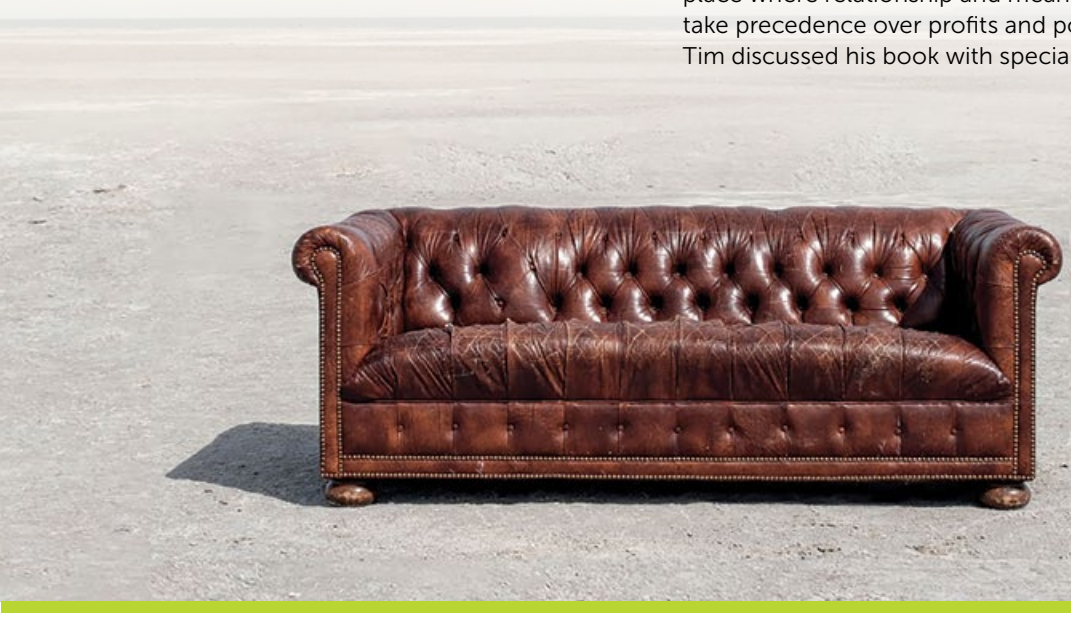
The summit's key message was clear: a dramatic and immediate reduction in greenhouse gas emissions is critical to combat the alarming sea ice decline. Researchers involved in the summit spoke to media in a Science Media Centre (SMC) briefing immediately afterwards to amplify their message and answer journalists' questions.

The SMC was at the forefront of Antarctic news throughout the year, collating commentary from local experts on new research about the toll of climate change on every aspect of Antarctica, and the slowing of the continent's deep ocean circulation.

READ MORE
Bit.ly/2023HL-39a
Bit.ly/2023HL-39b

Beyond Growth

The Society, alongside British Council New Zealand and the Pacific supported UK ecological-economist and writer Professor Tim Jackson to discuss his latest book *'Post Growth: Life After Capitalism'* on 6 July. In this talk, *Beyond Growth*, Tim dared the audience to imagine a world beyond capitalism—a place where relationship and meaning take precedence over profits and power. Tim discussed his book with specialist in disaster risk reduction Professor Christine Kenney MRSNZ (Te Āti Awa ki Kāpiti, Ngāti Toarangatira, Ngāi Tahu) and public policy expert Professor Jonathan Boston ONZM. Broadcaster and environmentalist Lynn Freeman chaired the conversation.



WATCH A VIDEO:
Bit.ly/2023HL-40a

WATCH A VIDEO:
Bit.ly/2023HL-40b

More Home Truths

In June and July, Distinguished Professor Philippa Howden-Chapman CNZM QSO FRSNZ held her Rutherford Lectures in Wellington, Nelson, Napier and Auckland on the impact of housing research on health and wellbeing policy. Philippa and the He Kāinga Oranga/ Housing and Health Research Programme, were awarded the 2021 Rutherford Medal for groundbreaking research that quantified the effects of housing interventions on occupants' health and wellbeing, and informed legislation and policy. In her lecture, Philippa focused on the priorities for housing at a time of cost-of-living pressure and stretched markets, and severe weather events in Aotearoa New Zealand.

Auckland Writers Festival

The Auckland Writers Festival is one of New Zealand's premiere cultural events and its largest and most successful literary event, hosting writers and leading commentators from New Zealand and around the world.

Post-Covid-19, the 2023 programme was reinvigorated by strong international representation and attracted upwards of 60,000 visitors. The Society and Marsden Fund Te Pūtea Rangahau a Marsden were silver sponsors, supporting three events.

But What Can We Do?

Simon Wilson, Jade Kake (Ngāpuhi, Te Whakatōhea, Te Arawa), Dr Max Harris, Professor Shaun Hendy FRSNZ, Dr Carisa Showden

Fresh thinking and radical action in the face of climate change.

Can AI Write A Book?

Sarah Daniell, Catherine Chidgey, Professor Toby Walsh, Associate Professor Te Taka Keegan (Waikato-Maniapoto, Ngāti Porou, Ngāti Whakaue)

A discussion on AI's usefulness and limitations, and the possible future for creative writing.

Te Rautakitahi a Tūhoe ki Ōrākau

Dr Sir Pou Tēmara KNZM, CRSNZ (Tūhoe), in conversation with Professor Rawhinia Higgins FRSNZ (Tūhoe)

An account of the battle of Ōrākau in the New Zealand Wars related through stories told to Tā Pou by his kuia and koroua.

At the Ockham New Zealand Book Awards, held the day prior to the festival, Marsden Fund recipient Dr Alice Te Punga Somerville (Te Āti Awa, Taranaki) won the Mary and Peter Biggs Award for Poetry for *Always Italicise: How to Write While Colonised* (Auckland University Press).

03

People and partnerships

Frontiers Planet Prize

THE INTERNATIONAL FRONTIERS PLANET PRIZE AIMS TO INCENTIVISE SCIENTISTS AND RESEARCHERS TO FIND INNOVATIVE SOLUTIONS TO THE GLOBAL ENVIRONMENTAL CRISIS. THE SOCIETY IS THE REPRESENTATIVE BODY FOR THE PRIZE IN AOTEAROA NEW ZEALAND AND SELECTS A NATIONAL CHAMPION TO ATTEND THE AWARDS CEREMONY IN SWITZERLAND.

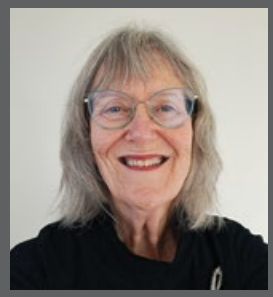
In 2023, Dr **Rebecca Gladstone-Gallagher** was selected to represent Aotearoa New Zealand in this international competition. Her research team has proposed new ways to manage the environment by coordinating efforts across land, water, and sea ecosystems.

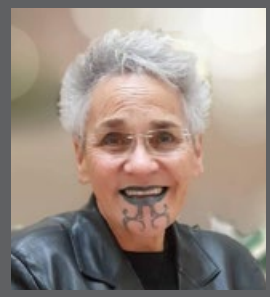
"Globally, the fracturing of environmental management and research into land, freshwater, and ocean domains, each with different scales and resolution of data acquisition, as well as distinct management approaches, is a key constraint to progress," Rebecca says.

READ MORE:
Bit.ly/2023HL-43

2023 Ngā Takahoa a Te Apārangi Companions

The Society elects Companions—Ngā Takahoa a Te Apārangi— to recognise outstanding leadership or sustained contributions to promoting and advancing science, technology, or the humanities in Aotearoa. In 2023, we were delighted to welcome three new Companions:





Dr **Liz Wedderburn** CRSNZ was elected for her significant contributions to sustainable agriculture, transdisciplinary research, and the advancement of science policy and agribusiness. With expertise in pastoral ecology, sustainable farming, collaborative processes, and systems-thinking, Liz has provided leadership in land-water interfaces and rural futures across Aotearoa and the world.

Dr **Prue Williams** CRSNZ was elected for her outstanding contribution to Aotearoa's research, science, and innovation (RSI) sector. Prue uses her significant knowledge of the New Zealand science system to ensure that government science policy and funding mechanisms are delivering benefit. Prue has a deep knowledge of the RSI sector and is passionate about ensuring it functions well and offers a great career path for researchers.

Emeritus Professor **Ngāhuia Te Awekōtuku** MNZM CRSNZ (Te Arawa, Tūhoe, Ngāpuhi, Waikato) was elected for her outstanding leadership and boundary-breaking work in the humanities. As an award-winning researcher, writer, activist, curator, and critic, Ngāhuia's leadership and contributions have been multifaceted, transformative, and enduring for Te Ao Māori and Aotearoa.

2023 Ngā Ahurei Fellows

THE ACADEMY OF ROYAL SOCIETY TE APĀRANGI WAS ESTABLISHED IN 1919 TO RECOGNISE SCHOLARS AND RESEARCHERS FOR DISTINCTION IN RESEARCH AND ADVANCEMENT OF SCIENCE, TECHNOLOGY, OR THE HUMANITIES. NEW FELLOWS AND HONORARY FELLOWS ARE ELECTED EACH YEAR TO ADD TO THE BASE OF EXPERTS THE SOCIETY CALLS UPON FOR ITS WORK.

The following Ngā Ahurei Fellows were elected in 2023:

Professor Frank Bloomfield FRSNZ, *University of Auckland.*

Frank Bloomfield is a neonatologist recognised internationally for his work in neonatal nutrition, the long-term consequences of altered foetal growth and nutrition, and leadership in neonatology perinatology for high-risk pregnancies. His work has led to global changes in practice and significantly advanced understanding of refeeding syndrome in preterm babies. Nationally, he is known for his work on critical congenital heart disease, and neonatal hypoxaemia (low blood oxygen).

Professor Judy Brown FRSNZ, *Te Herenga Waka – Victoria University of Wellington.*

Judy Brown initiated research into dialogic accounting, pluralism, and democracy. She is internationally recognised as a leader in critical accounting, and social and environmental accounting. Her work challenges the emphasis in conventional accounting on finance capital and seeks to develop pluralistic accounting and accountability theory and practices.

Dr Kevin Davies FRSNZ, *Plant & Food Research.*

Kevin Davies has made a distinguished contribution to advancing understanding of plant pigmentation and the stress-tolerance mechanisms of plants, including the discovery of a new class of plant pigments. Kevin is the international authority on how plants control the production of specialised metabolites to provide colour to flowers and fruit and to withstand environmental challenges such as UV-B light.

Dr Kenneth Dodds FRSNZ, *AgResearch*

Kenneth Dodds is a leader in statistics and bioinformatics. Globally, he is known for developing and implementing statistical tools for genetics and breeding, especially in livestock. Kenneth has been a global leader in combining new statistical tools with genetic analysis. These tools are used in breeding programmes for diverse species across the globe, as well as in the conservation of endangered species.

Professor Nicholas Golledge FRSNZ, *Te Herenga Waka – Victoria University of Wellington*

Nicholas Golledge led the establishment and subsequent development of Antarctic ice sheet modelling capability in New Zealand, becoming a global leader in this field. He has made profound advances in understanding how the Antarctic Ice Sheet will respond to a warming climate, and the impacts that ice sheet melting will have on global sea-level change, ocean circulation, and climate variability.

Professor David Grattan FRSNZ, *University of Otago.*

David Grattan is a world leader in the field of neuroendocrinology and is considered the foremost expert investigating the actions on the central nervous system of the anterior pituitary hormone prolactin – a hormone primarily responsible for lactation and breast development. Studies from his laboratory have led the way for understanding prolactin's actions in the central nervous system.

Professor Nicola Gaston FRSNZ, *University of Auckland.*

Nicola Gaston is an eminent theoretical physicist who studies materials through advanced computational simulations. Her research is internationally recognised for providing important insights into the behaviour of low-temperature liquid metals. She also co-directs the MacDiarmid Institute for Advanced Materials and Nanotechnology, leading its vision of fostering and supporting world-class materials research for the key sustainability challenges of our times.

Professor Michelle Glass FRSNZ, *University of Otago.*

Michelle Glass is an internationally leading pharmacologist whose research has provided new understanding of the role of cannabinoid receptors in human brains. Michelle has not only undertaken revolutionary basic biomedical research, but has also informed and influenced drug policy and education in New Zealand and internationally. She has been a critical contributor to the recent debate on medicinal and recreational cannabis.

Professor Justin Hodgkiss FRSNZ, *Te Herenga Waka – Victoria University of Wellington.*

Justin Hodgkiss has developed ultra-fast optical tools that reveal how different materials, from skin to solar cells, respond to light. His team has discovered design rules for more effective solar photovoltaic materials for a new class of organic solar cell materials, which now display record efficiencies and are nearing commercial viability. Justin is also recognised for his leadership as Co-director of the MacDiarmid Institute that seeks to support sustainability through such discoveries.

Professor Anthony Hōete FRSNZ, *University of Auckland.*

Anthony Hōete (Ngāti Awa, Ngāti Rānana) has advanced New Zealand and Māori architecture worldwide. His transdisciplinary research into the built environment is holistic and unique, embracing disciplines including architecture, archaeology, structural engineering, property, planning, and climate change. He negotiated the return of Hinemihi – a marae that was taken to England in 1892. He has taught at two of the world's top three architecture schools.

Professor Rod Jackson FRSNZ, *University of Auckland.*

Rod Jackson is a global leader in advancing the field of epidemiology. He played a key role in identifying a New Zealand epidemic of asthma deaths in the 1980s and, with colleagues, identified its cause. Rod led development of the world's first national guidelines on treatment decisions based on multifactorial prediction of the risk of cardiovascular disease, influencing clinicians prescribing for blood-pressure-lowering and lipid-lowering medications around the world.

Professor Lynda Johnston FRSNZ, *University of Waikato.*

Lynda Johnston's innovative and challenging scholarship on space, place, and sexuality has transformed the way that human geographers and those in related disciplines understand people's relationship with place. Through her books and articles, published in leading international journals, Lynda has established a new field often referred to as 'queer geography.' Here in Aotearoa, she is revered for playing a pivotal role championing the rights of the LGBTQ community.

Dr Carwyn Jones FRSNZ, *Te Wānanga o Raukawa.*

Carwyn Jones's (Ngāti Kahungunu ki te Wairoa) Indigenous legal and constitutional research has been groundbreaking in the way it places tikanga Māori as the first law of Aotearoa New Zealand. His research has contributed to transformative change in Aotearoa, impacting the way that legal arguments guide and create legislation and public policy. His research is having a significant impact in inspiring new generations of scholars to follow his approach.

Professor Joanna Kidman FRSNZ, *Te Herenga Waka – Victoria University of Wellington.*

Joanna Kidman (Ngāti Maniapoto, Ngāti Raukawa) is a Professor of Māori education, and one of the few Indigenous sociologists worldwide. Her research centres on indigeneity and its role in economic, political, and cultural development, both locally and internationally. Her research has addressed Māori and Pacific youth marginalised or excluded from education and other economic and political structures, and how young people establish a sense of belonging and place within society.

Adjunct Professor Martin Manning FRSNZ, *Te Herenga Waka – Victoria University of Wellington.*

Martin Manning is a world-leading physical scientist, who has made influential contributions to fundamental research and communication of climate science. In the 1970s he led the first team in New Zealand reporting on greenhouse gas emissions to make advances in atmospheric gas measurements. In the 1980s, he used that research to set current international standards. He is also recognised for his work on the Intergovernmental Panel on Climate Change and for addressing the causes of methane emissions.

Professor Peter O'Connor FRSNZ, *University of Auckland.*

Peter O'Connor is internationally recognised for his research and his utilisation of the arts for social transformation. He pioneered the field of applied theatre in New Zealand and expanded his interests to encompass arts-based research projects worldwide. In 2020, he founded the Centre for Arts and Social Transformation (CAST) at the University of Auckland, where he leads cross disciplinary teams in directing research projects on the arts and social change.

Dr Vincent O'Malley FRSNZ, *HistoryWorks.*

Vincent O'Malley is an acclaimed historian, recognised locally and internationally for transforming how New Zealanders think about and relate to the history of their own country. He is renowned for his work on the New Zealand Wars and was one of the main public figures behind the successful campaign to ensure New Zealand history is taught in all schools. His outstanding scholarship and impressive public engagement is matched by a long history of working with and for many Māori communities across Aotearoa.

Professor Mary Sewell FRSNZ, *University of Auckland.*

Mary Sewell is a marine biologist who is at the forefront of research on impacts of human-caused change to ocean life. Through her research on the early life stages of marine invertebrates, she has made key discoveries about factors which affect reproduction and development, such as temperature, salinity, ocean acidification, microplastics, and disease. Her expertise is internationally recognised, and she has had significant leadership roles in international and national research committees.

Professor Claudine Stirling FRSNZ, *University of Otago.*

Claudine Stirling is recognised as a world-leading expert in isotope geochemistry and oversees scientific programmes of global significance. She is a Professor of Geochemistry and Director of the Centre for Trace Element Analysis – a multimillion-dollar laboratory suite for precise isotopic and concentration analysis of trace metals. The Centre is one of only a few around the world with combined expertise in the transition-metal and heavy-metal isotope systems, facilitating new research directions. Her discovery of uranium isotope variations in nature has led to the inception of a brand-new research discipline.

Professor William Jeffrey Tatum FRSNZ, *Te Herenga Waka – Victoria University of Wellington.*

William (Jeff) Tatum is a classicist at the forefront of Roman history, the poetics of Latin literature, Greek literature in imperial Rome, and Greco-Roman reception studies, including classical reception in New Zealand poetry. He is the author or editor of six influential books and close to eighty frequently cited papers or chapters. Jeff wrote the authoritative scholarly account of Rome in the fifties BCE, the final decade of the republic, shifting theorising about its fall.

Professor Dan Zhao FRSNZ, *University of Canterbury.*

Dan Zhao has made essential contributions to combustion engineering, addressing key issues in low-emission, safe, and efficient engine design. He has conducted innovative research on the prediction and control of thermoacoustic instabilities, which are a barrier to improvements in engine efficiency, and has been developing CO_2-free combustion technologies using hydrogen and ammonia fuels. As a science communicator, he has served as the chief, or senior editor, for seven top-tier journals, and has founded the first New Zealand-based chartered branch of the American Institute of Aeronautics and Astronautics, remaining as its academic advisor.

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HON FELLOW

Professor Sheng Quan (Shane) Xie HON FRSNZ.

Sheng Quan Xie is renowned for his scientific contributions to medical robotics. His innovative work in reconfigurable exoskeletons, human–robot interaction, and sensing and learning control has significantly advanced the field. His exoskeletons have been tested on over 5,000 patients and are being commercialised by Hocoma, which aims to bring affordable robots to patients' homes. Shane's research successes were primarily in New Zealand, and his local engagement continues strongly through the world-first Medical Devices and Technologies programme that he established with Fisher & Paykel Healthcare in 2010.

Falling Walls Lab Aotearoa

FALLING WALLS LAB IS A WORLD-CLASS PITCH COMPETITION AND NETWORKING FORUM. IT BRINGS TOGETHER A DIVERSE AND INTERDISCIPLINARY POOL OF STUDENTS AND EARLY-CAREER PROFESSIONALS BY PROVIDING A STAGE FOR BREAKTHROUGH IDEAS.

On 5 September, New Zealand held the regional event with presenters from around the motu and the Pacific. This year, two presenters won the opportunity to compete at the Falling Walls Lab Global Finale in Berlin.

- Dr **Debashree Roy**, Riddet Institute, Massey University, won the Falling Walls Lab Aotearoa New Zealand competition with breakthrough technology for creating plant-based cheeses that have nutritional and sensory properties like dairy cheeses.
- Second place was awarded to **Tejesvi Patel**, University of the South Pacific in Fiji. His breakthrough is for a biodegradable, biocompatible sticking-plaster that has added functionality to treat skin infections.

The event was hosted by the Society, and supported by the German Embassy in Wellington, the Ministry of Business, Innovation and Employment, and through Catalyst:Leaders.

As part of Debashree and Tejesvi's prizes, EURAXESS Australia & New Zealand offered mentoring and science communication training ahead of their presentations in Berlin.

He Pito Mata Conference for Early-Career Researchers

Following the successful event in 2021, a much anticipated second He Pito Mata hui took place, 18-19 April, at Museum of New Zealand Te Papa Tongarewa, Wellington.

Driven by the Early Career Research (ECR) Forum with support by the Society, 279 ECRs from across the science, innovation, and research sector came together to discuss challenges, engage in conversation about future prospects, and to create opportunities for collaborations and research pathways.

Minister for Research, Science and Innovation, Hon Dr Ayesha Verrall opened the conference. Fifty guest speakers, including representatives from the Ministry of Business, Innovation and Employment, Fellows and Council Members from the Society, Rutherford Discovery Fellows, and Te Whitinga Fellows provided insights on three main themes.

- **Wellbeing:** precarity, navigating politically charged research, intercultural collaborations, and mentoring.
- **Research pathways:** opportunities and funding, career development, pathways in industry and Crown Research Institutes, and self-employment.
- **Professional development:** impact on policy, communicating for impact, Māori data sovereignty, audience engagement.

The conference offered a platform to amplify the kōrero of early career researchers through 'on the couch' discussions, Q&A panels, parallel opt-in sessions on different topics, and networking.

Throughout the conference, Science Media Centre (SMC) ran a well-received SAVVY Express programme, giving ECRs on-camera interview skills in 15-minute one-on-one sessions. The SMC also presented on science communication and media engagement for impact, and facilitated an interactive workshop with journalists so researchers could gain tips on promoting their research through the media.

HE WĀNANGA MŌ NGĀ

Early Career Researchers Māori, Pasifika

The day before He Pito Mata, the Society hosted a gathering attended by 60 Māori and Pacifika early-career researchers. This was an opportunity for Māori and Pasifika ECRs to make connections, listen to kōrero about moving between both worlds and success in indigeneity, and discuss the future of research in Aotearoa and strategies for positive change. Māori and Pasifika members of the ECR Forum Committee designed and delivered the programme and acted as kaiwhakataki (MCs) and facilitators.

NEW ZEALAND-CHINA SCIENTIST

Exchange programme resumes

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In 2023 the New Zealand-China Scientist Exchange Programme resumed after a three-year hiatus, with the Society hosting an orientation day in October. The exchange programme supports the development of research linkages with New Zealand, enabling Chinese researchers to visit New Zealand research organisations. The ten researchers were hosted around the motu for six weeks at various universities and CRIs.

At the welcoming mihi whakatau, Dr **Loveday Kempthorne** said a few words on behalf of the Ministry of Business, Innovation and Employment:

"China is one of New Zealand's most important science and innovation partners and it is remarkable to think formal collaboration between our two countries only really began around forty years ago. Since that time, scientific collaborations between New Zealand and China have grown significantly, and China continues to be our fastest growing science partner."

Indigenous research summit

CLIMATE CHANGE

Since 2017, the Society has partnered with Ngā Pae o te Māramatanga on a range of activities, including Te Takarangi, a celebration of 150 non-fiction publications of Māori scholarship. In 2023, the Society supported Ngā Pae o te Māramatanga to host an International Indigenous Climate Change Research Summit. This innovative online tikanga-led event was designed to enable Indigenous researchers to connect across countries and cultures, and share evidence-based actions to mitigate the impacts of climate change on Indigenous peoples and cultures.

04

Independence and growth

Our financials

For the financial year to 30 June 2023, the Royal Society of New Zealand group, combining Royal Society Te Apārangi and its associated Endowment Fund Trust, generated a surplus of $0.615m (excluding net revaluation losses on investment property, land and buildings). Total revenue (excluding net losses on investment property) for the group was $8.707m. The Endowment Fund Trust generated a surplus for the year of $0.172m as a result of unrealised gains on investments held.

The total assets of the group, however, decreased by around $3.2m during the year to a value of $27.595m at year end. The physical land and buildings on our Turnbull Street site were revalued at year-end and decreased in value by $3.8m to a net value of $16.5m at 30 June.

The Society remains reliant on professional services provision to government for more than 75% of cash income. Royal Society Te Apārangi managed eight contestable funds on behalf of the Government during the year, with around $114m being paid out in the twelve months to 30 June 2023 – approximately $2m more than the previous, 2022, financial year. (Refer Note 14 of the Financial Statements).

Our appointed auditors are Grant Thornton and their Independent Auditor's Report is included in the financial statements.

VIEW 2022 AUDITED FINANCIAL STATEMENTS
Bit.ly/2023HL-55

Pathways of knowledge

Every year, the Society provides opportunities for Kaimahi staff and Council members to enhance their knowledge and learning of mātauranga, te reo, tikanga Māori, and Te Tiriti.

A FOCUS ON THE MARSDEN FUND

In October, the Marsden Fund Council and kaimahi staff of the Society met in Kirikiriroa Hamilton to deepen their understanding of mātauranga Māori. This day-long wānanga included a visit to Te Parapara – a traditional Māori garden which has been designed and planted using traditional knowledge from local hapū and iwi.

They were guided by Wiremu Puke, an ethnographer and a Māori carver trained in the use of traditional pre-steel tools, Chris Koroheke from the NZ Agricultural Greenhouse Research Centre, Te Rerekohu Tuterangiwhiu from the Cawthron Institute in Nelson, and TeUrikore Biddle, who is Pouārahi Māori at Wintec, with members of her Kaihautū team. They presented their whakaaro thoughts on research and impact from a Māori perspective.

Stock image: Te Parapara

Neonatologist Dame Jane Harding

TO BE NEXT PRESIDENT OF THE SOCIETY

IN SEPTEMBER, THE SOCIETY WAS DELIGHTED TO ANNOUNCE THAT DISTINGUISHED PROFESSOR DAME JANE HARDING DNZM FRACP FRSNZ WAS ELECTED AS OUR NEXT PRESIDENT.

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Dame Jane joined the Society's Council as President-Elect, to succeed the current President, Dr Brent Clothier FRSNZ, at the end of his 3-year term.

Distinguished Professor Dame Jane Harding DNZM FRACP FRSNZ is an academic neonatologist with more than 35 years of experience in research, teaching, and practice in clinical medicine. Her work on growth and development around the time of birth has led to new understanding and therapies that have changed the standard of care and improved outcomes for mothers and babies around the world.

Dame Jane is held in the highest regard internationally, both as a scholar in the field of perinatal research, and for her collegiality. Her research, scholarship, and contributions to the field have been recognised by a number of national and international bodies and awards. In New Zealand, these have included the Rutherford Medal, the Prime Minister's Science Prize Te Puiaki Pūtaiao Matua, and Supreme Winner of the 'Women of Influence' Awards. Further afield, she has received awards from the American Pediatric Society, the US Perinatal Research Society, the European Society for Paediatric Research, the International Fetal Medicine and Surgery Society, and the British Association of Perinatal Medicine.

In addition to her clinical research achievements, Dame Jane has held a number of strategic leadership roles. Overcoming considerable resistance, she led the merger of the Australian and New Zealand Perinatal Societies into a single organisation, which she is proud to say is still going strong 25 years later.

As the New Zealand Secretary for the Rhodes Scholarships, over the past 10 years she has completely revised the selection process and established advisors in each of New Zealand's universities to support potential candidates and facilitate outreach. This has resulted in an increasingly diverse applicant pool and engagement of a much larger community both locally and internationally.

Her core mission, she says, aligns very closely with that of the Society.

"My entire career has been dedicated to the pursuit and sharing of knowledge, to supporting a diverse research ecosystem, and to the recognition of excellent research. I am deeply committed to ensuring that Royal Society Te Apārangi continues to deliver on that core mission, as a fundamental underpinning of civil society."

The Royal Society Te Apārangi is a not-for-profit organisation, with a statutory responsibility to advance and promote science, technology, and the humanities in New Zealand.

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