



# 2016 ACADEMY ANNUAL REPORT

## Chair's Foreword

As Chair of the Academy Executive Committee since July 2016, I would like to extend my thanks to Professor Richard Le Heron, who preceded me during the first six months of that year. His efforts in guiding the Academy during that time gave further impetus to the Society's efforts to enhance the profile of the Academy as the intellectual focus of the Royal Society of New Zealand. Our profile has been further strengthened and supported by the Society's Council and its wonderful staff.

Many new and varied initiatives developed through Society processes continue to re-shape and re-invigorate the Academy while its activities in providing expert advice have garnered wide acclaim and greater international recognition. Membership of the Academy Executive Committee was enlarged to diversify disciplinary perspectives, and to strengthen the Committee's capacity to address its strategic priorities. This has resulted in the Academy, and indeed the Society, being in arguably the strongest position it has ever been as we move into the celebration of our 150<sup>th</sup> year in 2017.

In 2016 the Society, including the Academy, has made considerable progress advancing its Strategic Plan. Motivated by the aspirational goal of a New Zealand enriched by fostering science, technology and the humanities, four focus areas were identified: relevance; impact; engagement; and excellence. These focus areas not only inform our selection process for Fellowship, but also those topics chosen to advance our expert advice agenda, including our recent "Fact Sheets".

## Fellowship issues and the Fellows' Annual Forum

A highlight of the year must be success in our continuing commitment to diversifying the Fellowship. This year nineteen top New Zealand researchers and scholars with a range of research interests, backgrounds and places of work were announced. The 2015 Fellows' Forum indicated strongly that an increase in the allocated number of Fellows to be elected was specifically to address issues of diversity. This was achieved and the 2016 Forum gave further strong support to these initiatives and again agreed to election of up to 20 in 2017— again with a focus on improving diversity in our Fellowship. That Forum also strongly supported the procedural changes established by the Academy — such as blind electronic voting, randomisation of candidate order, and the establishment of the Academy Executive Panel — all designed to reduce unconscious and other biases. Combined, this led to what can only be described as an excellent outcome.

The Annual Forum, held in October, provided an opportunity for the Society to outline issues it is grappling with and seek Fellows' views through open debate. There was a very positive discussion on our diversity agenda as reported above. This was followed by a report from the Chief Executive, Dr Andrew Cleland, who gave an update on sesquicentennial planning and the Expert Advice Programme. The

Deliberative Panels active at the time include

- Climate change (implications and mitigation)
- Science technician workforce
- Implications of gene editing

And the Fact sheets, some still under discussion, included

- Sugar and health (now out)
- Gene editing techniques
- Anti-microbial resistance
- Health effects of climate change
- Medicinal cannabis

There is also a review of the Code of Professional Standards and Ethics under way which aims to “refresh and re-package” to achieve a substantially equivalent document but which includes a review of various sections, including

- Review of the content relevant to Māori research and working with Māori communities; and
- review of the genetic information section – perhaps no longer relevant.

Issues around “Big Data” and privacy will also need to be addressed and were a good part of the substantive discussion at the Forum.

The Annual Forum concluded by celebrating excellence in science, technology and the humanities with nine insightful presentations from the 2015 elected new Fellows, at the New Fellows’ Seminar. The presentations, which are open to the public, are certainly a highlight of the Forum and a chance to hear about some of the best research and scholarship in New Zealand from a truly diverse range of disciplines.

## Thanks

It has been a privilege to chair the Academy Executive Committee. I have been ably assisted by other members of the Committee, particularly the President, Professor Richard Bedford, who has sensitively guided and encouraged the Society’s revitalisation efforts and provided wise counsel. Special thanks also goes to Gill Sutherland, Director—Academy Operations, who manages the operations of the Academy. Dr Andrew Cleland as Chief Executive has been hugely supportive of the Academy and its activities.

Finally, it is always a pleasure to acknowledge pinnacle achievements of Academy Fellows outlined in the report. This year two deserve special mention, first the Crafoord Prize in Astronomy to Professor Roy Kerr whose fundamental work concerning rotating black holes remains an important tool in modern astrophysics and cosmology in the year that gravitational waves were discovered, and second, Professor Sir Peter Gluckman was awarded the American Association for the Advancement of Science (AAAS) Award for Science Diplomacy in February. His activities have vastly lifted New Zealand’s presence on the world stage.

Professor Gaven Martin FRSNZ, FASL, FAMS  
Chair, Academy Executive Committee Royal Society of New Zealand

## Annual Report

## Academy Executive Committee and Academy representatives on Royal Society of New Zealand Council

### Until June 2016

Chair:	Professor Richard Le Heron FRSNZ
Members:	Dr John Caradus FRSNZ
	Professor Barry Scott FRSNZ
	Professor Gaven Martin FRSNZ
	Professor Margaret Tennant FRSNZ
	Professor Richard Bedford QSO FRSNZ
	Dr Ian Brown FRSNZ <sup>a</sup>
	Professor Philippa Howden-Chapman QSO FRSNZ <sup>a</sup>

### From 30 June 2016

Chair:	Professor Gaven Martin FRSNZ
Members:	Professor Barry Scott FRSNZ
	Professor Dame Anne Salmond FRSNZ
	Professor Margaret Tennant FRSNZ
	Professor Richard Bedford QSO FRSNZ
	Dr Ian Brown FRSNZ <sup>a</sup>
	Professor Philippa Howden-Chapman QSO FRSNZ <sup>a</sup>

<sup>a</sup> Academy Executive Committee only

## Fellowship and Honorary Fellowship

There were 413 Fellows and 59 Honorary Fellows as at 31 December 2016.

### Deaths

- **Professor Boris Pavlov** FRSNZ, formerly of the University of Auckland, died on 29 January;
- **Professor Anne Smith** CNZM FRSNZ, formerly of the University of Otago, died on 20 May;
- **Professor David Hall** FRSNZ, formerly of Auckland, died on 15 June;
- **Dr Pat Suggate** CNZM FRSNZ, formerly of the Geological Survey, died on 18 June;
- **Professor Richard Norris** FRSNZ, formerly of the University of Otago, died on 30 June;
- **Dr Henry Connor**, formerly of Botany Division, DSIR, died on 26 July;
- **Professor Brian Robinson** FRSNZ, formerly of the University of Otago, died on 30 August;
- **Dr Roger Slack** FRSNZ, formerly of Crop and food Research, died on 24 October;
- **Dr Rod Bielecki** FRSNZ, formerly of Plant and Food Research died on 15 November; and
- **Professor Dick Dowden** FRSNZ, formerly of the University of Otago died on 20 December 2016.

Obituaries have been, or will be lodged on the Royal Society website as they are provided.

## Public Honours

### New Year Honours 2016

*Officer of the New Zealand Order of Merit (ONZM)*

**Professor Charles Higham**, of Dunedin, for services to archaeology

**Emeritus Professor Janet Holmes**, of Wellington, for services to linguistics

### Queen's Birthday Honours 2016

*Officer of the New Zealand Order of Merit (ONZM)*

**Professor Wei Gao**, of Auckland, for services to science and engineering

### Order of Australia, Companion to the Queen

Professor Michael Fellows Hon FRSNZ received Australia's highest honour---Order of Australia, Companion to the Queen in June, for eminent service to higher education, particularly in the field of theoretical computer science, as a leading academic, researcher and author, as a mentor, and through public outreach programs particularly for children.

## National Awards and Appointments

### Royal Society of New Zealand Medals and Awards

*Awarded at Research Honours Dinner*

Top New Zealand researchers were recognised for their work with the presentation of prestigious awards at the Royal Society of New Zealand 2016 Research Honours event held in Christchurch in November 2016. Several Fellows were among the winners.

The **Rutherford Medal**, the Society's premier science award, was awarded to **Emeritus Professor Michael Corballis** ONZM FRSNZ of the University of Auckland for his research into the human mind. His work includes understanding the differences in the two hemispheres of the brain, the evolution of language and the human capacity for 'mental time travel' where we can think about both the past and future. In addition to the medal, he received \$100,000 from the Government, presented by the Minister of Science and Innovation, the Honourable Steven Joyce.

The **Pickering Medal** was awarded to **Associate Professor Iain Anderson** for commercialising electroactive polymer technology that can mimic muscle action. He directs the Biomimetics Lab at the Bioengineering Institute of the University of Auckland and launched the highly successful StretchSense company with two of his former students, which has commercialised this research.

The **Thomson Medal** for science leadership was awarded to **Dr Bruce Campbell** of Plant and Food for his contributions to agriculture and horticulture, which has led to innovations in grazing crop, wine, kiwifruit and avocado sectors. The awarding of the medal also recognises how he has fostered both new science talent and beneficial linkages between science, business and the wider community.

**Professor Hamish Spencer** FRSNZ, University of Otago, received the **Callaghan Medal** for science communication for his leadership of successful partnerships engaging public in scientific activities

involving the Allan Wilson Centre and both Uawa/Tolaga Bay and Ngai Tāmanuhiri. The awarding of the medal recognises these self-sustaining projects as exemplars of future public participatory partnerships.

Professor Merryn Tawhai, Deputy Director of the Auckland Bioengineering Institute at the University of Auckland, was awarded the MacDiarmid Medal for her research to create anatomically detailed models of the respiratory system. The medal is awarded for outstanding scientific research that has the potential for human benefit, and the models created by Professor Tawhai provide new tools for diagnosis, prognosis and treatment of lung disease.

The Hector Medal for an outstanding advancement in the physical sciences was awarded to Associate Professor Stéphane Coen, University of Auckland, for his research into optical phenomena in optical fibre. He has observed pulses of light, called temporal cavity solitons, that can self-organise to travel around a loop of fibre optic cable and linked understanding of these to optical frequency combs. Frequency combs, heralded through the 2005 Nobel Prize in Physics, are fundamental new tools for high-precision scientific measurement.

Research into seaweeds earned Professor Wendy Nelson MNZM FRSNZ, of NIWA and University of Auckland, the Hutton Medal for plant sciences. She has significantly expanded knowledge of New Zealand seaweeds and the evolutionary relationships between seaweeds worldwide. She has also campaigned against seaweed pests and advanced understanding of the ecological importance of coral seaweeds and their vulnerability to climate change.

Professor Tony Ballantyne FRSNZ, University of Otago, was awarded the Society's Humanities Aronui Medal for reshaping scholarly thought on British imperial history. His research on the history of the British empire during the nineteenth century has shown how ideas about cultural difference (race, religion, language and gender) structured colonial power, and how these ideas influenced and continue to influence both colonised and colonising people. His idea of the 'web of empire' draws attention to the importance of both direct connections between Britain and its colonies and connections between colonies.

The Mason Durie Medal for social sciences was awarded to Distinguished Professor Viviane Robinson, University of Auckland, for her research and development work on educational leadership. She identified that school leadership styles effected student outcomes and has designed and evaluated interventions to increase school leader's skills to improve student learning and well-being. Her resources are being used in New Zealand, Australia and Scandinavia under licence.

Professor Stuart McNaughton ONZM, University of Auckland, was awarded the Dame Joan Metge Medal for excellence in research and capacity building in the social sciences. Professor McNaughton has pioneered techniques that allow schools to improve teaching outcomes by monitoring their own results, and adjusting teaching approaches accordingly, particularly in literacy and language development. His research has had a large impact on education policy nationally and internationally.

Emeritus Professor Alastair Scott FRSNZ, University of Auckland, was awarded the Jones Medal for his lifetime contribution to statistics. The medal recognises him as a world leader in the areas of survey sampling theory and analysis of case control studies. His methods are applied in a wide range of application areas and he has also contributed substantially to research in public health.

Professor Rick Millane, University of Canterbury, was awarded the T. K. Sidey Medal for his research into using electromagnetic radiation to image biological material. His theoretical and computational methods for imaging biological molecules and tissue using x-rays and optical radiation allow their structures to be determined, which is key to understanding disease for drug design and for non-invasive medical imaging.

Professor Richard Beasley CNZM FRSNZ, Medical Research Institute of New Zealand and Capital & Coast District Health Board, was awarded the Sir Charles Hercus Medal for his wide ranging contributions to advancing respiratory medicine and health science research in New Zealand, which

have had a major impact on clinical practice and public health.

Distinguished Professor Jane Harding ONZM FRSNZ, from the University of Auckland's Liggins Institute, was awarded **the** Beaven Medal from the Health Research Council of New Zealand for her research into treating babies with low blood sugar with a cost-effective dextrose gel massaged into the inside of a baby's cheek. This research is expected to change the way millions of babies are monitored and treated for low blood sugar around the world, given it also supports mother-baby bonding and breastfeeding.

#### *Other Royal Society of New Zealand Awards*

The 2016 Charles Fleming Award for Environmental Achievement was awarded to Professor Bruce Clarkson from the University of Waikato. For over three decades, Professor Clarkson has worked tirelessly to advance and communicate understanding of native plant ecology and vegetation pattern and process, inform conservation efforts in terrestrial, freshwater and urban environments, and support effective on-the-ground restoration practice. There is a lecture series attached to this award and Professor Clarkson will deliver his lecture series during 2017.

The 2016 Hamilton Memorial Prize was awarded to Dr Miro Erkintalo from the University of Auckland. Miro receives the prize for his outstanding contributions to nonlinear optics and laser physics, particularly for the unification of time- and frequency-domain models of optical frequency comb generation.

The 2016 Hatherton Award was awarded to Dr Jason Busby from the University of Auckland. Jason's paper entitled 'The BC component of ABC toxins is an RHS-repeat-containing protein encapsulation device', published in 2013 in the leading science journal *Nature*, brought spectacular new insights into a novel family of proteins that encapsulate toxins or other protein cargo.

The awards will be presented to recipients at appropriate local events around the country during early 2017.

#### **Prime Minister's Award for Literary Achievement**

Professor Atholl Anderson was recognised as the recipient of the non-fiction award as part of the Prime Minister's Awards for Literary Achievement in October 2016.

#### **Blake Medal**

Professor Sir Peter Gluckman was awarded the Blake Medal - premium award in the Sir Peter Blake Leadership Awards, for outstanding leadership achievement in New Zealand – in July 2016.

#### **Hochstetter Lectureship**

Professor Colin Wilson was awarded the Hochstetter Lectureship by the Geoscience Society of New Zealand in November 2015 and this has involved delivering lectures to 11 centres.

#### **Sir Geoffrey Peren Distinguished Alumni Medal**

Professor Graham Le Gros received the Sir Geoffrey Peren Distinguished Alumni Medal in March. It is the most prestigious award for Massey University Alumni.

### **Cancer Society Award**

Professor Brett Delahunt's exceptional, long-standing voluntary service and leadership to cancer research was acknowledged by the Cancer Society of New Zealand at the end of 2015. He received the Meritorious Service Award in recognition of the voluntary hours he dedicated to fostering the Cancer Society's goals in cancer research.

### **2015 AUT Medal for Academic Excellence**

Professor Nik Kasabov was awarded the 2015 AUT Medal for Academic Excellence in November 2015 for outstanding and sustained academic contribution to the University and for internationally acclaimed research.

### **Fellowships, Memberships and Lectureships**

Professor Mick Roberts received a Fellowship of the New Zealand Mathematical Society (FNZMS) in December 2015.

Distinguished Professor Paul Spoonley was made a Fellow of Tamaki Paenga Hira/Auckland War Memorial Museum and was awarded a Museum Medal in November 2015.

Professor Mark Cannell has been elected Fellow of the international Society for Heart Research (FISHR) in February.

Professor Charles Semple was elected a Fellow of the New Zealand Mathematical Society in December 2015.

### **Festschrift**

A Festschrift in celebration of Professor Robert Jackson's productive and successful career in arachnology, and marking his 70th birthday and retirement, was published in the *New Zealand Journal of Zoology* in March 2016.

Professor Peter Munro retired at the end of April after an illustrious career in both academia and industry and this occasion was marked with a Festschrift at Massey University in July.

### **New Zealand Association of Scientists' Medals**

The 2016 Marsden Medal was awarded to Distinguished Professor Margaret Brimble **in September**. Professor Brimble is internationally recognised for her world leading contributions to the synthesis of bioactive natural products and novel peptides with wide ranging applications across the life sciences industry.

The 2016 Shorland Medal was awarded to Professor Antony Braithwaite. Professor Braithwaite is a leading cancer researcher with a focus on the signaling pathways controlling cancer cell development and on p53 in particular.

### **New Zealand Writers Guild SWANZ Mentorship Award**

Professor Bill Manhire was awarded the New Zealand Writers Guild SWANZ Mentorship Award in September.

### **Book on Rebooting the Regions**

Distinguished Professor Paul Spoonley has edited a new book called *Rebooting the Regions: Why low or zero growth needn't mean the end of prosperity*, published by Massey Press.

### **Research Awards**

Professor Lisa Matisoo-Smith was awarded a University of Otago Distinguished Research Medal in September.

Professor David Schiel was awarded the 2016 University of Canterbury Research Medal in July.

Professor Warren Tate was awarded the Health Research Council Excellence Award 2016 to mark its 25th anniversary.

### **Hood Fellows**

Professor Eamonn O'Brien and Professor John Montgomery were awarded outgoing Hood Fellowships from the University of Auckland in July.

## **International Awards and Appointments**

### **Crafoord Prize in Astronomy**

In May, the Royal Swedish Academy of Sciences awarded The Crafoord Prize in Astronomy 2016 to **Professor Roy Kerr** and Roger Blandford, Stanford University, CA, USA, "for fundamental work concerning rotating black holes and their astrophysical consequences". Professor Kerr created one of the most important tools in modern astrophysics and cosmology early in his career, when he discovered a mathematical description of rotating black holes before anyone had even seen them.

### **Award for Science Diplomacy**

Professor Sir Peter Gluckman was awarded the American Association for the Advancement of Science (AAAS) Award for Science Diplomacy in February.

### **Fellowships and Memberships**

Professor Peter Watts was awarded a prestigious Leverhulme Visiting Professorship to the United Kingdom for the first half of 2016. A limited number of these are awarded by the Leverhulme Trust each year across all disciplines (other than medicine) and across all of the United Kingdom's universities. Peter's host was the University of Oxford and delivered three Leverhulme Lectures.

Professor Gaven Martin was awarded a Visiting Fellowship from the Japanese Society for the Promotion of Science in November 2015; Maclaurin Lectures of the American Mathematics Society and USA National Science Panel (Mathematics) in February; and elected Foreign Member of the Finnish Academy of Science and Letters in April.

In December 2015, Professor Richard Blaikie joined 76 other leading international optics and photonics researchers in being elected as a 2016 Fellow of the Optical Society. He is only the sixth New Zealand-based fellow to be elected to the US-based international society, and joins his retired departmental colleague Emeritus Professor Ian Hodgkinson in gaining this distinction. Richard's honour recognises his pioneering research in sub-wavelength optics, including the development of evanescent near-field optical nanolithography and a world-first demonstration of sub-diffraction imaging using silver superlenses.

Professor Estate Khmaladze was elected Foreign Member of the Georgian National Academy of Sciences, in January 2016.

Professor Philip Boyd, University of Tasmania, was awarded a prestigious Australian Laureate Fellowship from the Australian Research Council in May. Philip is evaluating the feasibility of boosting carbon dioxide removal by Southern Ocean microbes to offset climate change.

In September Professor Nik Kasabov was awarded Distinguished Visiting Fellow, The Scottish Information and Computer Science Alliance.

#### **CEAS Aeroacoustics Award**

In May, Professor Jeremy Astley was awarded a medal from the Council of European Aerospace Societies (CEAS) for 'Scientific and Technical Excellence' specifically for significant contributions to Aeroacoustics.

#### **Sir Louis Barnett Medal**

Professor John Windsor was awarded the Sir Louis Barnett Medal for outstanding contributions to education, training and advancement to surgery by the Royal Australasian College of Surgeons in May.

#### **American Society's Medicinal Chemistry Hall of Fame**

Distinguished Professor Bill Denny was inducted into the American Society's Medicinal Chemistry Hall of Fame in August 2016.

#### **Humboldt Research Award**

Victoria University Professor of Mathematics **Professor Rod Downey** received a distinguished Humboldt Research Award for his academic contributions in December 2016. Professor Downey is a leading expert

in theory of computation, particularly the relationship between algebraic and descriptive complexity versus algorithmic complexity.

## Academy activities

### Consideration of Diversity

The Society is committed to following best practice in being inclusive of diversity within its activities – this includes diversity of: gender, gender identity and sexual orientation; ethnicity; employment context (allowing equal opportunities for those employed at universities, CRIs, independent research associations and business organisations, and those doing voluntary work); and accessibility (ensuring access to people with disabilities).

The Society aims to ensure that there is no criterion that is intrinsically more difficult for any under-represented group to achieve than others. For example, we have recently removed a criterion for “sustained productivity” from our Fellowship criteria, replacing this with “progression of the research programme”. This allows for those who have taken a primary role in parenting, as well as other breaks during their career, not to be disadvantaged.

We aim to increase diversity by increasing the number of candidates from under-represented groups in the pool of nominees for both Fellowship election and medal and award selection. We are making efforts to ensure there is sufficient diversity in the pool, for example by establishing search mechanisms to bring forward candidates who might otherwise be overlooked.

We started this year by making our selection panellists aware of how to recognise unconscious bias and how to minimise the likelihood it is affecting decision making.

In respect to Fellowship selection, the Society introduced a process this year whereby nominations have been considered under four domains: science, technology and applied sciences; social sciences, and humanities. All of which have slightly different criteria and impact factors.

The Society will continue to refine its processes for selecting people for recognition.

### Fellowship

The confirmed Fellowship Selection Panels in 2016 were:

Animal and Plant Sciences;  
Biochemical and Molecular Biological Sciences;  
Chemical and Physical Sciences;  
Earth Sciences;  
Ecological and Environmental Sciences;  
Engineering;  
Human and Behavioural Sciences;  
Languages, Literature and Cultural Studies  
Liberal Arts  
Mathematical and Information Sciences;  
Medical and Health Sciences;

Social Sciences;  
Technology and Applied Sciences.

The Languages, Literature and Cultural Studies Panel and the Liberal Arts Panel were introduced in 2016 and have replaced the former Humanities Panel.

In 2016 there were 166 nominations for Fellowship, including 44 women scientists, and 48 new nominations. There were seven nominations for Honorary Fellowship, including one woman.

The breakdown of nominations considered (Honorary Fellowship in brackets) in 2016 was:

Animal and Plant Sciences	10 (1)
Biochemical and Molecular Biological Sciences	9
Chemical and Physical Sciences	9 (2)
Earth Sciences	15 (1)
Ecological and Environmental Sciences	10 (1)
Engineering	13
Human and Behavioural Sciences	11
Liberal Arts	16
Languages, Literature and Cultural Studies	10
Mathematical and Information Sciences	14
Medical and Health Sciences	19 (1)
Social Sciences	20
Technology and Applied Sciences	10 (1)

Eleven panels met by teleconference call and recommended candidates, in priority order, in both traditional and applied areas of research. The Academy Executive Panel assessed 13 nominations that had specific nature and these included nominations for 7 women.

As well as providing a supporting statement on behalf of each highly recommended candidate, each panel was asked to supply the names of independent referees for each candidate as a quality control measure.

The Fellowship Selection Committee, which was an expanded Academy Executive Committee of 25 to ensure that all areas of science, technology and the humanities are appropriately represented, received information, via the online portal, on each candidate highly recommended by the 13 discipline-based Panels plus the Academy Executive Panel (a total of 42 highly recommended fellowship nominations and six Honorary Fellowship nominations).

### **New Fellows**

Nineteen top New Zealand researchers and scholars with a range of research interests, backgrounds and places of work were announced as Fellows of the Royal Society of New Zealand at the Annual General Meeting of the Society's Academy in Auckland in October, an honour which recognises true international distinction in research and scholarship.

The new Fellows are:

**Professor Jacinta Ruru**, University of Otago and Co-Director of Ngā Pae o te Māramatanga, New

Zealand's Māori Centre of Research Excellence, whose work is at the forefront of defining the area of law on how the legal system of former colonies ought to recognise Indigenous peoples' interests in land and water.

Dr Judi Hewitt, Principal Scientist at NIWA whose interdisciplinary contributions have advanced fundamental knowledge of marine biology and advanced environmental science.

Professor Tony Merriman, University of Otago, who has made major contributions to the pre-clinical and clinical science of autoimmune diseases and gout in New Zealand, particularly amongst Māori and Pacific people.

Professor Donna Rose Addis, University of Auckland, who has pioneered the use of functional brain imaging to study how the brain stores and retrieves memories in healthy subjects and those suffering from disorders, such as amnesia, clinical depression, and dementia.

Professor Rod Dunbar, University of Auckland, whose studies of human cellular immunology, especially T cell responses to tumours arise and how these T cell responses can be stimulated in cancer therapy, have accelerated the advent of successful cancer immunotherapy.

Professor Hinke Osinga, University of Auckland, who is a specialist in dynamical systems theory, the mathematical analysis and prediction of behaviour that changes with time. She is at the forefront of developing and employing numerical methods for computing global objects known as invariant manifolds that are indicators of critical change or 'tipping points.'

Professor Hong Di, Lincoln University, who has led pioneering research into nitrate leaching and nitrous oxide emissions from intensive dairying systems, leading to mitigation technologies.

Professor David Craw, University of Otago, a geologist who has advanced knowledge of the relationship between plate tectonics and mineral deposits and latterly New Zealand fauna such as fresh water fish.

Professor Rosalind Hursthouse, University of Auckland, who has had a profound impact on the field of ethics in philosophy. She has been a leading figure in the development of the approach known as virtue ethics.

Professor Lynnette Ferguson, University of Auckland, who is a world leader in nutritional genomics with an international reputation in mutagenesis and in the causes and control of chronic disease.

Professor Stephen May, University of Auckland, who is regarded as a world authority on language rights and an international expert in the related fields of indigenous language and bilingual/immersion education and multilingualism.

Professor Peter Shepherd, University of Auckland, who has made important contributions to understanding how defects in a cell signalling pathway contribute to cancer and diabetes.

Professor Cris Shore, University of Auckland, who has developed new theoretical approaches and methodologies for analysing policy, power and organisations. He is internationally recognised for his work on the anthropology of policy, the EU and university reform.

Dr Skelte Anema, Fonterra Research and Development Centre, who is an expert in the interactions between milk proteins under different physical and chemical conditions. His work has led to solutions to difficult processing problems, new dairy products and six patents describing innovative dairy technologies.

Dr Jenny Juengel, AgResearch Invermay, whose research effort has focussed primarily on understanding how genetic mutations in sheep have influenced their reproductive outcomes. A major outcome of her research is the identification of a major cell responsible for advancing or inhibiting fertility.

Professor Linda Tuhiwai Smith, University of Waikato, who is an outstanding Māori scholar in the social sciences whose research on 'decolonising' research methodologies has reshaped inquiry across many domains in the sciences and humanities.

Professor Parry Guilford, University of Otago, who has made international contributions to the fields of cancer biology and cancer genetics, identifying the first known gene for inherited gastric cancer and developing a biomedical device to test for bladder cancer in urine.

Professor Annie Goldson, University of Auckland, who is an acclaimed documentary film maker who has

made a sustained contribution to humanities scholarship and film culture, forging a dialogue between these two domains.

Professor Kathleen Campbell, University of Auckland, who is at the forefront of unearthing evidence for past life in 'extreme' environments, thereby contributing to the search for life's origins and bio-signatures on other planets.

### **New Honorary Fellows**

The Society also announced the election of two Honorary Fellows, aimed at encouraging strong ties with leading international scientists and scholars and New Zealand's research community.

**Professor Grant Montgomery**, University of Queensland, has pioneered genomic methods for production trait identification in farm animals and contributed to worldwide genome mapping for complex diseases, leading to breakthroughs in important diseases like endometriosis. He completed a PhD from Massey University, held appointments at AgResearch and University of Otago and continues to collaborate with research groups in New Zealand.

**Professor Chris Simon**, University of Connecticut, uses the tools of molecular biology to answer questions related to the origin, spread and conservation of biological diversity, using cicadas as a model organism. Her research has allowed better understanding of the family tree of cicadas and relationships with past climates and landforms and even the role of song.

### **Donations**

The Royal Society has a designated Endowment Fund, into which non-specific donations to the Academy are placed. The Academy Executive Committee gratefully acknowledges the donations made by Fellows and Honorary Fellows to the Academy's activities.

### **Functions**

During the early part of 2016, Fellowship certificates and pins were presented to Fellows newly elected in November 2016 at functions in Auckland, Christchurch, Dunedin and Wellington.

### **Visits to other Academies**

The President, Professor Richard Bedford, and Dr Roger Ridley, Director –Expert Advice and Practice, visited the five National Academies in Australia and joined their Presidents and CEs in Melbourne for their ACOLA meeting in early August.

The highlight for the President was learning more about an impressive joint research effort across four of the academies on "Securing Australia's Future". This project, which was co-ordinated by ACOLA, commenced in 2012 and was supported by an A\$10 million investment by the Australian Research Council in a series of strategic research projects. The projects included: Australia's comparative advantage; STEM – country comparisons; Asia literacy (language and beyond); the role of RS&T in lifting Australian productivity; new technologies and their role in Australia's security, cultural, demographic, social and economic systems; engineering energy (unconventional gas production); Australia's agricultural future; sustainable urban mobility. Twelve substantive reports have been produced.

## Fellows' contribution to Society activity

Many Fellows continue to actively contribute to the Royal Society of New Zealand's activities through Fellowship Selection Panels and Fellowship Selection Committee;

Selection Committees for Academy Medals/Awards; Membership of Vice Presidents' Advisory panels and ad hoc RSNZ committees; preparation of scientific reports; review of scientific, technological and science education reports published by the Society; and Membership, via the Society, of government and non-government advisory committees.

The Society acknowledges the help of the following Fellows and Honorary Fellows:

Professor Atholl Anderson; Professor Tony Ballantyne; Professor Peter Barrett; Professor Laurie Bauer; Professor Richard Beasley; Professor Richard Bedford; Professor Dick Bellamy; Professor Mark Billingham; Professor Richard Blaikie; Dr Alan Bollard; Distinguished Professor Brian Boyd; Professor John Boys; Professor Antony Braithwaite; Professor Neil Broom; Dr Roland Burdon; Dr Ian Brown; Professor Linda Bryder; Dr Bob Buckley; Dr John Caradus; Professor Gerry Carrington; Professor Lionel Carter; Professor Geoff Chase; Professor John Chen; Dr Brent Clothier; Professor Jack Copeland; Professor Marston Conder; Dr Tony Conner; Professor Greg Cook; Professor Michael Corballis; Professor Clive Davies; Professor Catherine Day; Professor Brett Delahunt; Professor Peter Derrick; Professor Alison Downard; Professor Mike Draganow; Professor Alexei Drummond; Professor Geoff Duffy; Professor David Fergusson; Dr Steven Fischer; Professor Ewan Fordyce; Professor John Fraser; Professor Nigel French; Professor Wei Gao; Professor Ted Glynn; Professor Rob Goldblatt; Dr Stephen Goldson; Professor Keith Gordon; Professor Rod Gover; Professor Russell Gray; Dr Janet Grieve; Professor Frank Griffin; Professor Alistair Gunn; Professor Robert Hannah; Professor John Harvey; Dr Bruce Hayward; Professor Gary Hawke; Professor John Hearnshaw; Professor Mike Hendy; Professor Charles Higham; Professor John Hosking; Professor Philippa Howden-Chapman; Professor Manying Ip; Professor Geoff Jameson; Professor Jim Johnston; Professor Nik Kasabov; Professor Dave Kelly; Professor Wendy Larner; Professor Richard Le Heron; Professor Graham Le Gros; Professor John Leckner; Professor Thomas Lumley; Mr John McEwan; Dr Andrew McEwan; Dr Matt McGlone; Professor Robert McLachlan; Professor Jim McQuillan; Professor Bill Manhire; Professor Jim Mann; Professor Alan Mark; Distinguished Professor Gaven Martin; Professor Lisa Matisoo-Smith; Professor Alison Mercer; Professor Henrietta Mondry; Professor John Montgomery; Professor Paul Moughan; Dr Peter Minchin; Professor Peter Munro; Dr Wendy Nelson; Professor Robert Nola; Professor Les Oxley; Professor David Penny; Professor Keith Petrie; Professor Russell Poole; Professor Robert Poulin; Professor Richie Poulton; Professor John Pratt; Professor Raylene Ramsay; Professor Mark Richards; Professor Mick Roberts; Professor Dame Anne Salmond; Professor David Skegg; Professor Zoran Salcic; Professor Susan Schenk; Professor David Schiel; Professor Nic Smith; Professor Martha Savage; Professor Peter Schwerdtfeger; Professor Barry Scott; Professor Charles Semple; Professor Tim Stern; Professor Robin Smith; Professor James Sneyd; Professor Hamish Spencer; Professor Mike Steel; Professor Ken Strongman; Dr Max Suckling; Professor Rupert Sutherland; Professor Jeff Tallon; Professor Gerald Tannock; Professor Margaret Tennant; Professor Simon Thrush; Professor Jack Vowles; Professor Richard Walter; Professor Colleen Ward; Professor David Wardle; Professor Steve Weaver; Dr David Whitehead; Associate Professor Janet Wilmshurst; Professor Colin Wilson; Professor John Windsor; Professor Christine Winterbourn.

Fellows have also contributed to assessment panels and undertaken other roles for the various Government Contracts the Society runs.

The Society is grateful to all who contribute to Society activities; collectively they provide a major input to the work of the Society and the advice given to Government and other agencies.

## Chairs' activities

In addition to the activities mentioned earlier in this report, Professor Richard Le Heron (Chair of the Academy Executive Committee until 30 June 2016) and Professor Gaven Martin (Chair of the current Academy Executive Committee from 1 July 2016) have been active in the following activities:

- assessing nominations for Fellowship as part of the Academy Executive Panel;
- reviewing nominations for Fellowship as part of the Fellowship Selection Committee;
- providing feedback to Gill Sutherland, Director—Academy Operations, on various issues when required.

Professor Martin currently serves as the New Zealand representative on ICSU's *Committee on Freedom and Responsibility in the Conduct of Science (CFRS)*.