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2012 Academy Annual Report

The 2012 Academy Annual Report details the accomplishments of the Academy of the Royal Society of New Zealand throughout the year.

Chair's foreword

It is now nearly three years since the Royal Society of New Zealand took the bold and progressive step of adopting a new structure following the integration of the Te Whāinga Aronui The Council for the Humanities into Te Apārangi the Royal Society of New Zealand (RSNZ).

At the time the Society's President Dr Garth Carnaby FRSNZ described the step as a landmark decision for both organisations:

"For the first time there will be an organisation in New Zealand that promotes excellence in research and scholarship across all the disciplines and areas of knowledge."

Three years on, it is appropriate to reflect on how the Academy and its work have emerged in this new framework and the nature of the increasingly distinctive international presence that has ensued from the historic commitment to a broad Academy in New Zealand.

The new map for the Society reaffirmed the Academy as the intellectual heart of the Society acknowledging the mana it reflects on the Society, and the part it plays in celebrating and rewarding excellence in our leading researchers and scholars across the sciences, technology and the humanities.

This was cemented by a re-design of the Academy Executive Committee and its relationship to Council. The Academy Executive Committee now consists of three disciplinary Vice Presidents (embracing Biological and Life Sciences; Physical Sciences, Mathematics, Engineering, and Technology; and the Te Whāinga Aronui o Te Apārangi Humanities and Social Science) and up to three other Royal Society of New Zealand Councillors who must be Fellows.

The Academy Executive Committee can co-opt up to an additional three Fellows who do not serve concurrently on the RSNZ Council, to ensure representation across the Fellowship. Each Vice President is supported by

an Advisory Panel with members chosen from the relevant discipline-based Constituent Organisations that are members of the RSNZ. The new relationships implied by Academy-Constituent Organisation links have been integral to the direction the Academy has begun to take.

The spirit of the new arrangement is one of wider dialogue across disciplines in New Zealand and internationally. More targeted flows of information to and from the Academy Executive Committee within the RSNZ framework has made this aspiration more achievable.

The Academy has looked to strengthen its capacity to expand and focus on its "information pieces" (a notable feature of the 2000s) by developing forward-looking contributions on present and emerging debates and so encouraging wider discussion of the pressing issues that face the sciences, technology and the humanities. In this endeavour the Academy Executive Committee and Council have emphasised the exchange of information and views amongst Fellows and specifically across the three Advisory Panels and with the Fellowship.

A strong team of professional staff has extended the Society's ability to provide policy and expert advice on important public issues to the Government and the community. The policy paper process, for instance, spans a spectrum from responses to requests for information, to policies developed by Council. These processes vary in their approval, time consumption, and consultation. However, all resulting papers are intended to both inform policy-makers and be available for public attention.

Papers prepared in the new RSNZ framework have included those on 'Emerging Issues – Ecosystem Services', 'Land Use Competition', 'Earthquake Engineering', 'The Canterbury Earthquakes: Scientific answers to critical questions', and 'Future Marine Resource Use'.

As part of the delivery of papers the Society has sometimes run policy workshops to connect scientists and policy-makers, to allow discussion of key issues and to promote debate. An 'Ecosystem Services in Policy' workshop in Wellington and another on 'Competition for land and land use competition in New Zealand: dynamics, issues, policy' in Auckland complemented the initial statements prepared by the Society.

Growing understanding of media options has meant deeper engagement with issues as well as dissemination of information. The diversity of issues being handled is exemplified by the 2012 menu that included the conclusion of the 'Languages in Aotearoa New Zealand' paper that sprang from concerns amongst especially Humanities scholars and researchers about the paucity of knowledge on language questions in the country (due for release in March 2013); a 'Consultation on the 1996 HSNO Act' that formed a submission; and participation in the National Science Challenges

conducted by the Ministry for Innovation, Business and Employment late in the year.

The Academy Executive Committee has been pro-active in developing the Society's strategic approach to connecting into international bodies representing disciplines and major fields of knowledge.

An audit of New Zealand subscriptions to such bodies was conducted in 2011 and 2012. This mapping of connections led to identification of some gaps in New Zealand representation on pan-scientific organisations. It also prompted strategic thinking about how best to use the links to raise the visibility of New Zealand's knowledge community and its assets through the leadership of its scientists, social scientists and humanities scholars in such organisations.

A former Chair of the Academy, Emeritus Professor David Thorns FRSNZ is currently Vice President Information and Communications Outreach on the International Social Science Council.

Requests from the Interacademies Panel and the Royal Society of London on the public use of scientific data saw the preparation of a report on 'Science as a Public Enterprise', while another request from the International Council for Science (ICSU) Committee on Freedom and Responsibility in the conduct of Science (CFRS) resulted in a submission.

One measure of intellectual life in a country is public exposure to the insights of critical inquiry, imaginative lines of thought and pioneering explorations. The Academy's influence is notable, especially with regard to the Society's portfolio of four prestigious lecture streams, spanning and celebrating the sciences, social sciences, technology and the humanities, as the following summary of the past three years testifies.

- The annual Aronui Lecture is presented by an eminent international humanities researcher to stimulate cross-disciplinary dialogue: Baroness Onora O'Neill (2010) *Two cultures fifty years on*; Professor Norman Hammond (2011) *The Mysterious Maya: an ancient American civilisation*.
- Royal Society of New Zealand Distinguished Speaker features a prominent international scientist who is a strong communicator in his or her field of research: Professor Richard Faull FRSNZ (2010) *The Challenge of the Human Brain*; Professor Robin Clark FRS Hon FRSNZ (2011) *Science Meets Art – investigating pigments in art and archaeology*; Professor Sir Richard Friend FRS (2012) *Paper 2.0 – making smart paper from plastic molecules*.
- New Zealand Rutherford Medal recipient lecture: Professor Peter Hunter FRS FRSNZ (2010) *Maths, Maps and the Human Heart*; Professor

Warren Tate FRSNZ (2011) *How to make Life from the Primordial Soup*; Professor Christine Winterbourn FRSNZ (2012) *Life with Oxygen – a battle against free radicals*.

- Rutherford Memorial Lecture (triennial), in partnership with the Royal Society of London, where an eminent UK scientist is brought to New Zealand for a nationwide lecture tour: Martin Lord Rees FRS (2010) *The World in 2050*.

In another important respect 2012 was an historic year for the Academy. A record 90 Fellows gathered in Wellington in November for the first Academy AGM and New Fellows' Seminar in the newly opened RSNZ complex (Te Whare Apārangi).

Along with the formalities of electing 11 new Fellows and 2 new Honorary Fellows, the Society's President Professor Sir David Skegg FRSNZ initiated a strategic discussion on the future of the RSNZ. The vigorous, informative and constructive debate and discussion identified challenges that face the New Zealand knowledge system and aired options that might be pursued as the RSNZ seeks to manage its brand of standing for excellence in research and contributing to the reframing of key debates.

The main lecture theatre was a very fitting place to learn about the knowledge contributions of 2011 Fellows who were able to give presentations on their research. The premier status and facilities of the new complex should see it becoming the 'venue of choice' in the intellectual life of New Zealand.

The year saw an extensive review of the purposes, selection criteria and procedures connected with the Society's medals and awards.

A new annual medal was added to the Society's stable of major awards, the Mason Durie Medal, to be awarded annually to the nation's pre-eminent social scientist. It recognises an outstanding contribution to the social sciences that while originating in a New Zealand environment, has had an international impact. The inaugural recipient was Professor Russell Gray FRSNZ for his pioneering social science research on questions of fundamental relationships between human language, cognition and biology.

The MacDiarmid Medal for outstanding scientific research that demonstrates the potential for application to human benefit; the Callaghan Medal for outstanding contribution to science communication, in particular raising public awareness of the value of science to human progress; and the Humanities Aronui Medal for research or innovative work of outstanding merit in the Humanities have all been introduced into the Academy's suite of medals in the past 3 years and will each be awarded annually.

It has been a privilege to Chair the Academy through this year and to have been a member of the Academy Executive Committee over the previous two and a half years.

As Chair I have greatly appreciated the support of the President Professor Sir David Skegg, and my fellow members of the Academy Executive Committee.

During the transition since 2010 Professor Ken Strongman FRSNZ, who chaired the Te Whāinga Aronui the Council for the Humanities before its disestablishment, brought a sensitive understanding of the humanities into Executive discussions.

The professionalism, advice and enthusiasm of the Chief Executive Dr Di McCarthy and Corporate Affairs Manager Mrs Gill Sutherland and her assistant Mrs Judy Lyons have been vital to the work of the Academy and I have valued their unswerving commitment to the Academy's functioning and vitality.

I would also like to acknowledge the intensive and vital input of Fellows in New Zealand and international referees who assisted the 2012 Fellowship Selection Process.

Professor Richard Le Heron FRSNZ
Chair, Academy of Royal Society of New Zealand

2012 Academy Annual Report

Academy Executive Committee

Until 30 June 2012

Chair: Dr Stephen Goldson CRSNZ FRSNZ

Members:

Professor Geoff Austin FRSNZ
Dr Garth Carnaby MNZM FRSNZ
Professor Michael Corballis ONZM FRSNZ
Professor Richard Le Heron FRSNZ
Professor Keith Hunter FRSNZ
Professor Ken Strongman FRSNZ

After 30 June 2012

Chair: Professor Richard Le Heron FRSNZ

Members:

Professor Sir David Skegg KNZM OBE FRSNZ
Professor Geoff Austin FRSNZ
Dr John Caradus FRSNZ
Professor Michael Corballis ONZM FRSNZ
Dr Stephen Goldson CRSNZ FRSNZ
Professor Keith Hunter FRSNZ

Fellowship and Honorary Fellowship

There were 382 Fellows and 58 Honorary Fellows as at 31 December 2012.

Deaths

It is noted with regret that **Professor Andrew Pullan** FRSNZ, formerly of the Dept of Engineering Science, University of Auckland, and **Professor Sir Paul Callaghan** GNZM FRS FRSNZ, a former Director of the MacDiarmid Institute, and a former President of the Academy Council, died in March; **Professor Alister McLellan** FRSNZ, formerly of the Dept of Physics, University of Canterbury, died in July; and **Dr Gregor Yeates** FRSNZ, formerly of Landcare Research, died in August.

Their Obituaries are being lodged on the Royal Society of New Zealand website as they are received and edited.

Public Honours

New Years Honours 2012

Companion of the New Zealand Order of Merit (CNZM)

Professor Margaret Brimble MNZM FRSNZ, of Auckland for services to science.

Queen's Birthday Honours 2012

Companion of the New Zealand Order of Merit (CNZM)

Professor Christine Winterbourn FRSNZ, of Christchurch, for services to science.

Officer of the New Zealand Order of Merit (ONZM)

Emeritus Professor Peter Bergquist FRSNZ, of Auckland, for services to science.

National Appointments and Awards

Prime Minister's Science Prize

The 2012 Prime Minister's Science Prize was awarded jointly in November to **Distinguished Professor Paul Moughan** FRSNZ and **Professor Harjinder Singh** FRSNZ who are co-directors of the Riddet Institute, a Centre of Research Excellence based at Massey University in Palmerston North. Their fundamental research has driven innovation and export earnings in New Zealand's world-beating food and beverage industry and their contribution to advancing knowledge in food protein science is universally acknowledged. Professor Singh's expertise is in food protein structures and how they interact in food systems while Professor Moughan's work focuses on how proteins are broken down and absorbed in the digestive system and the resulting physiological benefits.

Prime Minister's Science Media Communication Prize

Professor Shaun Hendy FRSNZ, Professor of Computational Physics at Victoria University of Wellington, Deputy Director of the MacDiarmid Institute for Advanced Materials and Nanotechnology, and an Industry and Outreach Fellow for Industrial Research Limited, was awarded the

2012 Prime Minister's Science Media Communication Prize for his communication and commentary on the links between science and technology and economic prosperity.

2012 World Class New Zealand Awards

The late **Sir Paul Callaghan** GNZM FRS FRSNZ was named the Supreme Winner of the 2012 World Class New Zealand Awards posthumously at the World Class New Zealand Awards in Auckland in May 2012.

The annual Awards, a New Zealand Trade and Enterprise (NZTE) initiative delivered by Kea New Zealand, are a celebration of New Zealand innovators and entrepreneurs who have made significant contributions to the country's growth and development.

Plant and Food Research Chairman's Award

Dr Max Suckling FRSNZ, Plant and Food Research, Lincoln, with colleagues Dr Jim Walker and Mr Graeme Clare, was awarded the Plant and Food Research Chairman's Award in July 2012 for the commercialisation of a range of insect pheromone products in support of horticultural exports, including \$113M of apple exports.

Distinguished Professorships

Thirteen professors at the University of Auckland were appointed to the rank of Distinguished Professor effective from February 2012. Among them were **Professors Bruce Baguley** CNZM FRSNZ; **Debes Bhattacharrya** FRSNZ; **John Boys** FRSNZ; **Marston Conder** FRSNZ; **Stephen Davies** FRSNZ; **Bill Denny** ONZM FRSNZ; **Richard Faull** FRSNZ; **Jane Harding** ONZM FRSNZ; and **Ian Reid** FRSNZ. The title recognises professors who have achieved international eminence of the highest order in their fields of research and study.

Distinguished Professor Bill Denny ONZM FRSNZ also received the University of Auckland's Vice-Chancellor's Commercialisation Medal in April; and the NZ Society for Oncology's Translational Award for 2012 in May.

Mineral Named After Auckland Fellow

Professor Patrick Browne FRSNZ, the University of Auckland, has had a mineral named after him—browneite, which is a cubic manganese sulphide with a sphalerite structure. The name was approved by the International Mineral Association in April 2012 as number IMA 2012-008.

Chemeca Medal

Professor Barry Welch FRSNZ, formerly of the University of Auckland, was awarded the Chemeca Medal in September. This is the most prestigious award in the chemical engineering profession in Australia and New Zealand. It is awarded to a prominent Australian or New Zealand Chemical Engineer who has made an outstanding contribution, through achievement or service, to the practice of Chemical Engineering in its widest sense and who continues to serve the profession. The recipient of the Award is invited to present a plenary lecture at the annual CHEMECA conference. Professor Welch is only the second New Zealander to receive the award.

Fellow of APPITA 2012

Professor Geoff Duffy FRSNZ, the University of Auckland, was elected a Fellow of the Technical Association of the Pulp and Paper Industry of Australasia (APPITA) in April.

University Research Medals and Awards

In January, **Ron McLaren** FRSNZ was appointed Emeritus Professor in Environmental Soil Science at Lincoln University.

Professor David Lambert FRSNZ was awarded the Individual Senior Researcher Award at Griffith University, Australia, in June.

Professor Allan Herbison FRSNZ was awarded the Distinguished Research Medal of the University of Otago in February and **Professor Alan Musgrave** FRSNZ has been awarded the Distinguished Research Medal of the University of Otago for 2013.

Shorland Medal

Professor Mike Hendy FRSNZ, University of Otago, received the New Zealand Association of Scientists' Shorland Medal in November.

IPENZ Supreme Technical Awards

Distinguished Professor Debes Bhattacharyya FRSNZ and **Professor Bruce Melville** FRSNZ from the University of Auckland received Supreme Technical Awards from the Institution of Professional Engineers New Zealand (IPENZ) in March. Professor Bhattacharyya was awarded the John Cranko award in the mechanical and manufacturing category and Professor Melville was awarded the Dobson Award in the transportation infrastructure category.

IPENZ's biennial awards recognise those who have demonstrated excellence and leadership in engineering practice over their career to the benefit of the engineering profession.

James Cook Research Fellowships

In October, **Professor John Montgomery** FRSNZ, University of Auckland, **Professor Robert McLachlan** FRSNZ, Massey University, and **Professor Colin Wilson** FRSNZ, Victoria University of Wellington, were awarded James Cook Research Fellowships for 2 years starting in early 2013.

Marsden Medal

Professor Lionel Carter FRSNZ, Victoria University of Wellington, was awarded the 2012 Marsden Medal, the New Zealand Association of Scientists (NZAS) highest honour, in November. The award recognises Professor Carter's outstanding 40-year research career as a practising geoscientist making significant contributions to marine geology, palaeoceanography, and applied marine geology.

International Awards and Appointments

American Society for Horticultural Science Award

Professor Emeritus Ian Warrington CNZM FRSNZ, formerly of HortResearch Palmerston North, and colleagues were awarded the Outstanding Fruit Publication Award by the American Society for Horticultural Science at the Society's annual meeting in Florida in August. The award was for the paper: Van Hooijdonk, B.M., Woolley, D. J.; Warrington, I. J.; Tustin, D.S. 2011: Rootstocks modify scion architecture, endogenous hormones and root growth of newly grafted 'Royal Gala' apple trees. *Journal of the American Society for Horticultural Science* 136: 93-102.

Honorary Doctorate of Science

Professor Harlene Hayne ONZM FRSNZ, Vice Chancellor at the University of Otago, was awarded an Honorary Doctor of Science (*honoris causa*), Colorado College in September.

Einstein Medal

In December **Emeritus Professor Roy Kerr** FRSNZ, formerly of the University of Canterbury, became the first New Zealander to be awarded

the Einstein Medal. He will be presented with the medal at a ceremony at the University of Bern in May 2013. He was awarded the medal for his 1963 discovery of a solution to Einstein's gravitational field equations relating to black holes. Known as the Kerr Solution, it provides an exact description of the space outside a rotating black hole.

International Fellowships

Professor Tim Stern FRSNZ, Victoria University of Wellington, was elected as a Fellow of the American Geophysical Union in January.

Professor Gaven Martin FRSNZ, Massey University, was elected a Visiting Fellow of Magdalen College, Oxford starting in March 2013.

Professor Tom Barnes FRSNZ, University of Greenwich, was elected a Fellow of the Institute of Physics in June.

Professor Sik Hung Ng FRSNZ, City University of Hong Kong, was awarded Fellowship of the International Association of Language and Social Psychology in July.

Professor John Blunt FRSNZ, University of Canterbury, was elected as a Fellow of the American Society of Pharmacognosy in July.

Professors Marston Conder FRSNZ, University of Auckland; **Rod Downey** FRSNZ, Victoria University of Wellington; **Gaven Martin** FRSNZ, Massey University, and **Vaughan Jones** Hon FRSNZ, University of California, Berkeley, were selected to join the inaugural class of Fellows of the American Mathematical Society in honour of their distinguished contributions to mathematics. They will be officially inducted at the Joint Mathematics Meetings in San Diego in January 2013.

Flight Safety Foundation Award

At the Opening Session of the 24th annual European Aviation Safety Seminar on 29 February 2012, the Flight Safety Foundation presented the FSF-Airbus Human Factors in Aviation Safety Award to **Professor Phillipa Gander** FRSNZ, Director of the Sleep/Wake Research Centre in New Zealand.

Professor Gander was recognised for her critical work in promoting the benefit of taking a more comprehensive, systematic approach to managing the many factors that result in fatigue-related performance changes in aviation operations.

2012 EMBS Career Achievement Award

Professor Peter Hunter MNZM FRS FRSNZ, University of Auckland, received the 2012 EMBS Career Achievement Award for his pioneering contributions to multi-scale physical modeling of biological systems, especially the Physiome Project in August.

Awards for contributions to neural networks

Professor Nik Kasabov FRSNZ FIEEE, Auckland University of Technology, received the 2012 International Neural Network Society Prestigious Gabor Award for 'Outstanding contribution to engineering applications of neural networks' at the World Congress of Computational Intelligence in Brisbane, Australia, in June.

Professor Kasabov was also awarded the 2012 prestigious 'Outstanding Achievements Award' of the Asia Pacific Neural Network Assembly (APNNA) in November. This is the highest Award that APNNA gives once a year to a prominent scientist for his/her overall outstanding scientific contributions to the area of neural networks.

Grahame Clark Medal

Archaeologist, **Professor Charles Higham** FRSNZ, University of Otago, was awarded the Grahame Clark Medal for 2012 by the British Academy, the national academy for the humanities and social sciences, which awards the medal every two years. The medal recognises his excavation work in Southeast Asia where he has sought to understand the origins of civilisations over two decades, in particular, Angkor.

Himsworth Award

Professor Jim Mann FRSNZ, University of Otago, was awarded the Himsworth Award, European Association for the Study of Diabetes (EASD) and the Diabetes & Nutrition Study Group (DNSG) at the 30th International Symposium on Diabetes & Nutrition in Athens, Greece in June.

CMMSE Prize 2012

Professor Peter Schwerdtfeger FRSNZ, Massey University, was awarded the CMMSE Prize 2012 for important contributions in the developments of Numerical Methods for Physics, Chemistry, Engineering and Economics in July.

He has been elected into the International Academy of Quantum Molecular Science and is the first from New Zealand. The Academy is

composed of persons chosen amongst the scientists of all countries for the value of their scientific work, their role as pioneer or leader of a school, and their contribution to the advancement of quantum molecular sciences. There are about 100 members, including some Nobel Prize winners.

Journal of Physics A Best Paper Prize

Professor Ernie Kalnins FRSNZ, University of Waikato, is one of the three winners of the *Journal of Physics A* best paper prize for 2012.

He, together with Willard Miller Jr, University of Minnesota, and Sarah Post, University of Montreal, wrote the prize-winning paper "Coupling constant metamorphosis and Nth-order symmetries in classical and quantum mechanics".

Luigi Provasoli Award

Dr Wendy Nelson MNZM FRSNZ, NIWA, and colleagues have won a prestigious Luigi Provasoli Award. The Luigi Provasoli Award is presented annually to the author(s) of the three, or fewer, outstanding papers published in the *Journal of Phycology* during the previous fiscal year. The prize was for their work on the Bangiales that rocked the foundations of the Nori industry, putting the commercially important species *Porphyra tenera* & *P. yezoensis* in the new genus *Pyropia*. The paper was: Sutherland, J. E., Lindstrom, S. C., Nelson, W. A., Brodie, J., Lynch, M. D. J., Hwang, M. S., Choi, H. G., Miyata, M., Kikuchi, N., Oliveira, M. C., Farr, T., Neefus, C., Mols-Mortensen, A., Milstein, D. & Müller, K. M. 2011. A new look at an ancient order: generic revision of the Bangiales (Rhodophyta). *Journal of Phycology* 47: 1131–1151.

Visiting Fellowships

Professor Hamish Spencer FRSNZ, University of Otago, was David Parkin Visiting Professor at the University of Bath, England from March to June. He was appointed Director of the Allan Wilson Centre for Molecular Ecology and Evolution in August.

Royal Society Awards

The following Medals and Awards for 2012 were announced in October/November and will be awarded at a relevant local event in early 2013.

The **2012 Hamilton Memorial Prize** was awarded to **Dr Simon Greenhill**, a PhD graduate of the University of Auckland and now an ARC

Fellow at Australian National University. Dr Greenhill has an outstanding research record in the study of comparative linguistics. His work combines cutting-edge computational evolutionary methods with large-scale databases of language information. This approach, widely considered one of the most contemporary streams of comparative linguistics, has shown that the ancestors of the Polynesians originated in Taiwan around 5,200 years ago and uncovered a striking sequence of expansion pulses and settlement pauses through the Pacific. His work has helped infer that languages show 'bursts' of change after they diverge, resulting in the establishment of cultural group identity. He has investigated the 'tempo' of language change and has shown that word-order of languages co-evolves with other features. These findings have made significant and lasting contributions to linguistics and anthropology.

The **2012 Hatherton Award** for the best scientific paper by a PhD student at any New Zealand university in physical sciences, earth sciences, and mathematical and information sciences has been awarded to **Dr Dmitri Schebarchov**, a PhD graduate of Victoria University of Wellington and formerly of Industrial Research Ltd, for his paper entitled '*Capillary Absorption of Metal Nanodroplets by Single-Wall Carbon Nanotubes*' which was published in 2008 in the journal *Nano Letters*. Dr Schebarchov co-authored this paper along with **Professor Shaun Hendy** FRSNZ. This work is significant because it has led to a practical method for the manipulation of minute (nanoscale) volumes of fluids using carbon nanotubes, and by predicting how such miniscule volumes of fluid can be taken up, and later removed, from carbon nanotubes. Schebarchov's contribution was critical in the initial serendipitous discovery and in the subsequent extension to describe capillary uptake of non-wetting liquids. This work now has wide acceptance, and has been summarised in significant reviews of the area. The results have implications for carbon nanotube growth, nano medicine, microfluidics and solar cell fabrication.

At its 2012 Research Honours Dinner in Auckland on 21 November, the Society announced and awarded the winners of the following medals and awards: Rutherford Medal; Pickering Medal; Thomson Medal; Dame Joan Metge Medal; Hector Medal; Hutton Medal; Callaghan Medal; Cooper Medal; MacDiarmid Medal; Humanities Aronui Medal; the Pou Aronui Award; Sir Charles Hercus Medal; and the inaugural Mason Durie Medal.

The country's highest science and technology honour, the **Rutherford Medal**, was awarded to chemist **Distinguished Professor Margaret Brimble** CNZM FRSNZ, University of Auckland, for her world-leading contributions to the synthesis of bioactive natural products, including a new drug for traumatic brain injury funded by the US army. Together with the medal awarded by the Royal Society of New Zealand, she also received \$100,000 from the Government.

Professor Brimble is the second woman to be awarded the prestigious Rutherford Medal in its 21-year history, following biochemist **Professor Christine Winterbourn** FRSNZ from the University of Otago Christchurch who won the medal last year.

Professor Brimble also received the **MacDiarmid Medal** for pioneering the design, synthesis and clinical development of a small molecule drug candidate that shows promise for significantly reducing the impact of traumatic brain injury, and the **Hector Medal** for excellence in chemical sciences.

The top award for achievement in technology, the **Pickering Medal**, was awarded to **Professor David Williams** FRSNZ, University of Auckland, for his contribution to the development of biomedical and gas sensors, which have been commercialised.

The **Thomson Medal** was awarded to **Dr Richard Furneaux** FRSNZ, Distinguished Scientist and Group Manager of carbohydrate chemistry at Industrial Research Limited, for his outstanding and inspiring leadership of carbohydrate chemistry research and commercial application to biotechnology in New Zealand. He leads what is regarded as the largest carbohydrate chemistry team in the world.

The inaugural **Mason Durie Medal** for advancing the frontiers of social science was awarded to **Professor Russell Gray** FRSNZ, School of Psychology, The University of Auckland, for his pioneering social science research on questions of fundamental relationships between human language, cognition and biology.

The **Humanities Aronui Medal** was awarded to **Professor Alan Musgrave** FRSNZ, University of Otago, for his enduring and profound influence as a philosopher of science whose influence has ranged widely across the humanities and social sciences.

The **Hutton Medal** for earth sciences was awarded to **Professor R. Ewan Fordyce**, University of Otago, for his seminal contributions in New Zealand vertebrate paleontology, particularly for whales, dolphins and penguins.

The **Sir Charles Hercus Medal** for health sciences was awarded to **Professor John Fraser** FRSNZ, University of Auckland, for his pioneering studies on bacterial superantigens which have major implications for understanding and treating human infectious diseases.

The recipient of the **Pou Aronui Award** was **Professor Jonathan Mane-Wheoki**, Elam School of Fine Arts, University of Auckland, for his outstanding contribution in the development of the humanities in Aotearoa New Zealand.

The **Callaghan Medal** for outstanding contribution to science communication was awarded to **Professor Shaun Hendy** FRSNZ, Professor of Computational Physics at Victoria University of Wellington, Deputy Director of the MacDiarmid Institute for Advanced Materials and Nanotechnology, and an Industry and Outreach Fellow for Industrial Research Limited. The medal is for his outstanding work in raising public awareness of science and its role in increasing economic prosperity.

The **Cooper Medal** for research in physics or engineering was awarded to **Dr Mark Poletti**, Industrial Research Limited, for his world-leading development of the globally preferred method for tuning concert hall acoustics.

The **Jones Medal** for lifetime achievements in mathematical sciences was awarded to **Professor Robert Goldblatt** FRSNZ, Victoria University of Wellington, for his world-leading research in modal logic and category theory.

The **Dame Joan Metge Medal** for excellence and building relationships in the social science research community was awarded to **Professor Linda Tuhiwai Smith** CNZM, University of Waikato, for inspiring, mentoring and developing Māori researchers.

The **Dame Joan Metge Medal** was also awarded to **Professor Janet Holmes** FRSNZ, Victoria University of Wellington, for her outstanding contribution to linguistics.

Academy Representation on Royal Society of New Zealand Council

The Academy Executive Committee representatives on the Royal Society of New Zealand Council until 30 June 2012 were **Dr Stephen Goldson** CRSNZ FRSNZ (VP Biological and Life Sciences, Chair); **Professor Geoff Austin** FRSNZ (VP Physical Sciences, Mathematics, Technology and Engineering); **Professor Ken Strongman** FRSNZ; **Dr Garth Carnaby** FRSNZ (RSNZ President); **Professor Michael Corballis** ONZM FRSNZ; **Professor Richard Le Heron** FRSNZ (VP Social Sciences and Humanities); and **Professor Keith Hunter** FRSNZ (co-opted) .

Since 1 July 2012, **Dr John Caradus** FRSNZ (VP Biological and Life Sciences, Chair); **Professor Geoff Austin** FRSNZ (VP Physical Sciences, Mathematics, Technology and Engineering); **Professor Sir David Skegg** FRSNZ (RSNZ President); **Professor Michael Corballis** ONZM FRSNZ; **Professor Richard Le Heron** FRSNZ (VP Social Sciences and Humanities); **Dr Stephen Goldson** CRSNZ FRSNZ and **Professor Keith**

Hunter FRSNZ (co-opted) have been the Academy Executive Committee representatives on Council.

Academy Activities

Fellowship

The confirmed panels in 2012 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;
- Humanities
- Mathematical and Information Sciences;
- Medical and Health Sciences;
- Social Sciences;
- Technology and Applied Sciences;
- Interdisciplinary Panel.

In 2012, three nominations were submitted to the Interdisciplinary Panel but in the end these nominations were considered by three discipline-based panels.

In 2012 there were 105 nominations for Fellowship, including 21 women scientists, 13 from CRIs, and 38 new nominations.

The breakdown of nominations considered (Honorary Fellowship in brackets) in 2012 was:

- Animal and Plant Sciences 12
- Biochemical and Molecular Biological Sciences 5 (1)

- Chemical and Physical Sciences 7 (1)
- Earth Sciences 9 (2)
- Ecological and Environmental Sciences 9 (1)
- Engineering 6
- Human and Behavioural Sciences 6
- Humanities 10
- Mathematical and Information Sciences 10
- Medical and Health Sciences 11 (2)
- Social Sciences 8 (1)
- Technology and Applied Sciences 9
- Interdisciplinary 3 (reallocated to EES, Eng and T&A Panels)

Nominations for Fellowship remain eligible for election for five years.

Twelve panels met by teleconference call and recommended candidates, in priority order, in both traditional and applied areas of research. 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 independent referees were sent the candidates' curriculum vitae, publications list, background information about the Academy and the criteria for election to Fellowship, and asked to provide an evaluation of the quality of the scientific career, the excellence of research and international reputation.

The Fellowship Selection Committee, which was an expanded Academy Executive Committee of 26 to ensure that all areas of science, technology and the humanities are appropriately represented, received the following information on each candidate highly recommended by the 12 discipline-based Panels (a total of 33 highly recommended):

- nomination form;
- curriculum vitae;
- publication list;
- references from referees noted in nomination;

- panel supporting statement outlining the reason why the candidate is highly recommended;
- independent reference(s);

as well as a copy of the minutes of the Fellowship Selection Panel teleconference meetings where such meetings were held.

New Fellows

Eleven top New Zealand researchers and scholars in basic and applied science and the humanities were elected as Fellows of the Royal Society of New Zealand at the Annual General Meeting of the Society's Academy in October.

The new Fellows are:

- **Professor Tony Ballantyne FRSNZ**, Dept of History, University of Otago, whose work has generated new analytical models for the study of British imperial history and has offered substantial insights into the operation of British imperial culture.
- **Professor Laurie Bauer FRSNZ**, Linguistics and Applied Language Studies, Victoria University of Wellington, who is best known for his pioneering descriptive work in international varieties of English, with a particular focus on the description of New Zealand English, and linguistic morphology.
- **Professor Brett Delahunt FRSNZ**, University of Otago, Wellington who is acknowledged as an international authority in the field of urological pathology including prostate cancer.
- **Professor Juliet Gerrard FRSNZ**, School of Biological Sciences, University of Canterbury/Industrial Research Ltd, whose research interests are focussed on proteins and how they assemble and have been applied to the design of novel therapeutics, the assembly of novel materials and the alteration of food texture.
- **Professor Keith Gordon FRSNZ**, Dept of Chemistry, University of Otago, who is internationally recognised for his scholarship and scientific achievements in the area of molecular electronic materials, particularly on new materials that can be used in solar cells or as displays.
- **Professor Frank Griffin FRSNZ**, Dept of Microbiology and Immunology, University of Otago, who has inspired and led the development of diagnostic tests and a vaccine to combat three major bacterial diseases of deer, Tuberculosis, Yersiniosis and Johne's disease.
- **Professor Shaun Hendy FRSNZ**, Industrial Research Ltd/Victoria University of Wellington, who has made a significant, sustained contribution in the

application of mathematical and computational techniques to the chemical and physical sciences, with a particular focus on nanotechnology.

- **Professor Tony Kettle FRSNZ**, Dept of Pathology, University of Otago, Christchurch, who is internationally recognised for his research on myeloperoxidase, an enzyme in white blood cells (neutrophils) that produces free radicals and chlorine bleach (hypochlorous acid) to kill micro-organisms.
- **Professor Reinhard Klette FRSNZ**, Dept of Computer Science, University of Auckland, who is a world leader in computer vision, and who with his students, has improved the performance of computer vision algorithms by newly designed ways of data pre-processing.
- **Professor John Pratt FRSNZ**, Institute of Criminology, Victoria University of Wellington, who is internationally acclaimed for his research concentrating on the study of why penal policies change in modern societies and why the punishment of offenders takes particular forms at different times.
- **Dr David Whitehead FRSNZ**, Landcare Research Lincoln, whose research contribution on plant and soil processes and climate change are acknowledged internationally.

These new Fellows will be presented with their Fellowship certificates and sign the Fellows' Book at local functions around the country in early 2013.

Honorary Fellowship

In 2012 there were 8 nominations for Honorary Fellowship of the Royal Society of New Zealand and six were highly recommended to the Fellowship Selection Committee. Two Honorary Fellows were elected by the Academy Executive Committee on recommendation from the Fellowship Selection Committee and the new Honorary Fellows were announced at the Fellows' Annual General Meeting.

The new Honorary Fellows are:

- **Professor Jon Altman Hon FRSNZ**, from the Centre for Aboriginal Economic Policy Research, Australian National University, who is a world authority on indigenous economic development.
- **Dr Michael Murphy Hon FRSNZ**, from the Mitochondrial Biology Unit, Cambridge, United Kingdom who has pioneered the targeting of antioxidants and other bioactive molecules to mitochondria.

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

Fellowship certificates were presented during the year at functions in Auckland, Dunedin and Wellington.

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;
- James Cook Research Fellowship Assessment Panels and Selection Committee;
- Marsden Assessment Panels and Council; and
- Membership of standing and ad hoc RSNZ committees.

Fellows have also been actively involved in the 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.

These include the following:

Advisory Panel members

Dr Stephen Goldson CRSNZ FRSNZ– Biological and Life Sciences Advisory Panel;

Dr John Caradus FRSNZ– Biological and Life Sciences Advisory Panel;

Professor Richard Le Heron FRSNZ– Social Science and Humanities Advisory Panels;

Professor Ken Strongman FRSNZ– Humanities Advisory Panel;

Professor Geoff Austin FRSNZ– Physical Sciences, Mathematical Sciences, Technology and Engineering Advisory Panel;

Professor John Hearnshaw FRSNZ– Physical Sciences, Mathematical Sciences, Technology and Engineering Advisory Panel.

Expert Group members

Professor Peter Barrett NZAM FRSNZ – Royal Society Expert Panel on Antarctic Sciences;

Dr Clive Howard-Williams NZAM FRSNZ– Royal Society Expert Panel on Antarctic Sciences.

International Union – New Zealand Delegates

Professor Ted Baker CNZM FRSNZ– International Union of Crystallography, Asian Crystallographic Association;

Professor David Parry CNZM FRSNZ– International Union for Pure & Applied Biophysics;

Professor John Harvey FRSNZ- International Commission for Optics, International Union for Pure & Applied Physics;

Emeritus Professor David Thorns ONZM FRSNZ– International Social Science Council;

Professor Carolyn Burns CBE FRSNZ– International Union of Biological Sciences;

Dr Graham Weir FRSNZ– International Mathematical Union, International Union of Theoretical & Applied Mechanics;

Professor John Hearnshaw FRSNZ– International Astronomy Union;

Professor Peter Hunter MNZM FRS FRSNZ– International Union for Physiological Sciences;

Professor David Lowe FRSNZ– International Union for Quaternary Research;

Professor Keith Hunter FRSNZ– member of the ICSU Regional Committee for Asia and the Pacific.

International engagement

Professor Steve Wratten FRSNZ– submission on the Convention on Biodiversity and the Cartagena Protocol on Biosafety for a MFAT meeting;

Dr Max Suckling FRSNZ– Submission on the Convention on Biodiversity and the Cartagena Protocol on Biosafety for a MFAT meeting;

Dr Simon Thrush FRSNZ– Submission on the Convention on Biodiversity and the Cartagena Protocol on Biosafety for a MFAT meeting;

Dr John Caradus FRSNZ– Attended the MFAT meeting on the Convention on Biodiversity and the Cartagena Protocol on Biosafety;

Professor Paul Spoonley FRSNZ– Participated in the meeting of the International Human Rights Network of Academies and Scholarly Societies;

Professor Richard Le Heron FRSNZ– Participated in the Worldwide Universities Network conference in Bristol (UK);

Professor Stephen Goldson FRSNZ CRSNZ– led the Royal Society’s participation in New Zealand Week activities in Malaysia, organised by the NZ Embassy in Malaysia.

Advice Paper contributors

Dr Tony Conner CRSNZ FRSNZ – Consultation on the 1996 HSNO Act;

Professor Clive Ronson FRSNZ– Consultation on the 1996 HSNO Act;

Professor Barry Scott FRSNZ– Consultation on the 1996 HSNO Act;

Professor Janet Holmes FRSNZ– Languages in Aotearoa Paper;

Professor Philip Boyd FRSNZ– Marine Resources Emerging Issue paper and Submission on the Exclusive Economic Zone & Continental Shelf Bill;

Dr Janet Grieve ONZM FRSNZ– Marine Resources Emerging Issue paper and Submission on the Exclusive Economic Zone & Continental Shelf Bill;

Dr Wendy Nelson MNZM FRSNZ– Marine Resources Emerging Issue paper and Submission on the Exclusive Economic Zone & Continental Shelf Bill;

Dr Simon Thrush FRSNZ– Marine Resources Emerging Issue paper and Submission on the Exclusive Economic Zone & Continental Shelf Bill;

Dr Brent Clothier FRSNZ– Sustainable Carrying Capacity of New Zealand paper;

Professor Sir Alan Mark CBE KNZM FRSNZ–Sustainable Carrying Capacity of New Zealand paper;

Emeritus Professor David Thorns ONZM FRSNZ– Sustainable Carrying Capacity of New Zealand paper;

Dr Rowland Burdon FRSNZ– ICSU Freedom and Responsibility in the Conduct of Science;

Professor Michael Corballis ONZM FRSNZ– ICSU Freedom and Responsibility in the Conduct of Science;

Professor Richard Bedford QSO FRSNZ– ICSU Freedom and Responsibility in the Conduct of Science.

Workshop contributors

Professor Richard Le Heron FRSNZ– Chair of RSNZ workshop on Competition for land and land use competition in New Zealand: dynamics, issues, policy.

Access4EU project

Professor Peter Hunter MNZM FRS FRSNZ on the NZ Advisory Board for the Royal Society of New Zealand's Access4EU project.

Help with Media responses

Professor Steve Weaver FRSNZ, information on fracking

The Society is grateful to all who contribute to these 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, **Dr Stephen Goldson** CRSNZ FRSNZ (Chair of the Academy Executive Committee until 30 June 2012) and **Professor Richard Le Heron** FRSNZ (Chair of the current Academy Executive Committee from 1 July 2012) have been active in the following activities:

- reviewing nominations for Fellowship as part of the Fellowship Selection Committee;
- providing feedback to Academy Executive on various issues;
- Professor Le Heron has been developing the proposal for the RSNZ Development College.