

THE ROYAL SOCIETY OF NEW ZEALAND

PROFILING EXCELLENCE

the ROYAL
SOCIETY *of*
NEW ZEALAND
TE APĀRANGI

HIGHLIGHTS
FROM 2010

the ROYAL
SOCIETY of
NEW ZEALAND
TE APĀRANGI

Hūtia te rito
If you were to pluck out
o te harakeke,
the centre of the flax bush,
kei hea te kōmako e kō?
where would the bellbird sing?
Kī mai nei ki ahau.
If you were to ask me
He aha te mea nui
“What is the most important
ki tēnei ao?
thing in the world?”
Māku e kī atu.
I would reply,
He tangata,
“That it is people,
he tangata,
people, people.”
he tangata.

MESSAGE FROM THE PRESIDENT AND THE CHIEF EXECUTIVE



Welcome to *Profiling Excellence* for 2010. We are very pleased to present this publication highlighting the key activities of the Royal Society of New Zealand during 2010.

The stories we have chosen to showcase here provide a snapshot of the broad scope of our activities.

Our theme for the year was 'knowledge and the mind', in keeping with 2010 being the first year of the Humanities' inclusion in our academy. In particular, we celebrated this through our public lectures, including the establishment of the new Aronui Lecture Series with Baroness Onora O'Neill as our inaugural lecturer.

2010 featured several other new initiatives for the Royal Society of New Zealand – the Rutherford Discovery Fellowships were awarded for the first time with 10 very deserving recipients; the new Jones Medal for a lifetime of mathematics achievement was awarded to Professor Emeritus John Butcher; and the spotlight shone on New Zealand science through a new television series called 'Ever Wondered?'

It has been our privilege to recognise and support the outstanding contributions of New Zealand researchers. The high calibre of applicants and nominations for funding and awards has been heartening and reflects the quality of New Zealand researchers and their work.

We believe targeted research funding and scholarships for individuals is vital to ensure New Zealand's research in science, technology and the humanities continues to remain internationally competitive and relevant.

It has also been heartening to see the successes of young New Zealanders involved in our student programmes as they aspire to understand and gain new knowledge. These students are tomorrow's leaders and their enthusiasm is infectious. It has once again been our privilege to help them on their path to success.

Finally, our sincere thanks to our many supporters and sponsors who continue to make our work possible – government, Fellows, Companions, members and, of course, our dedicated staff.

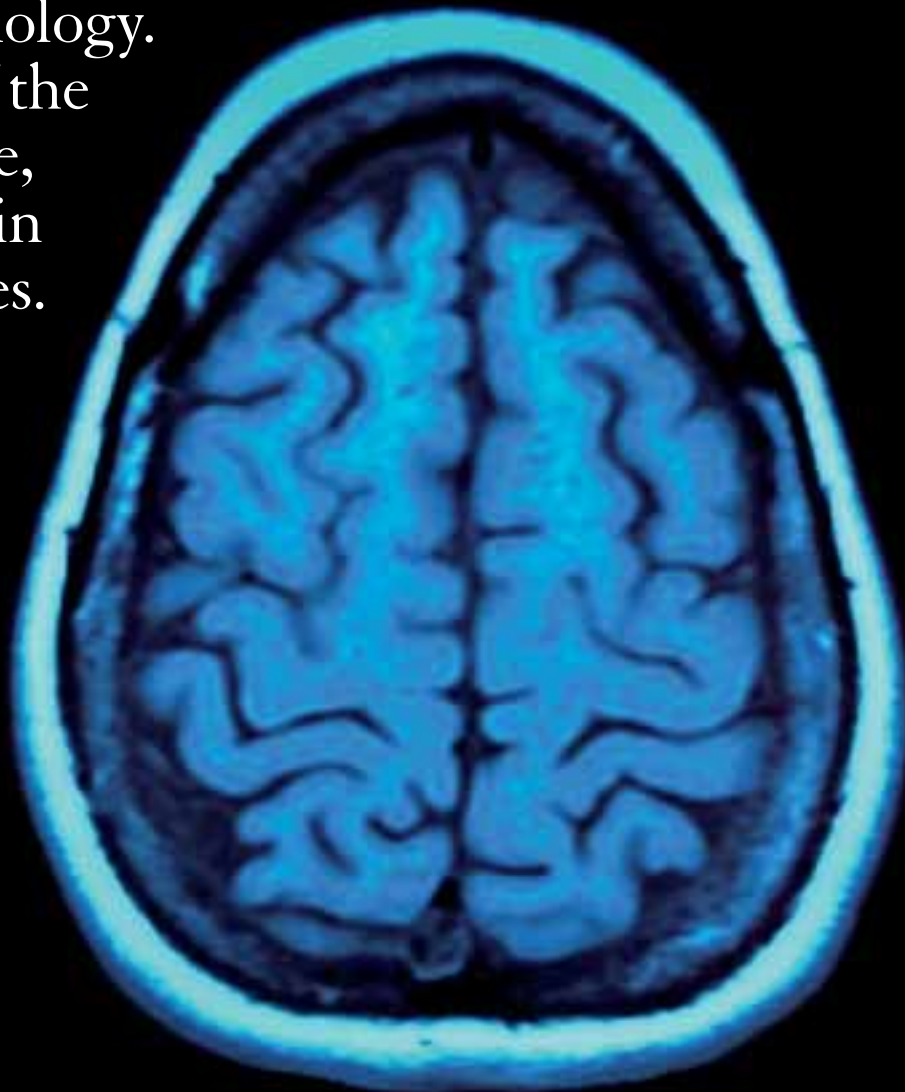
Dr Garth Carnaby MNZM FRSNZ
President

Dr Di McCarthy ONZM
Chief Executive

BRAINWAVES



At the beginning of 2010, the Royal Society of New Zealand expanded the scope of its academy to include the humanities, together with science and technology. Widening our view of the meaning of knowledge, Aronui, was reflected in our public programmes.





From left: Dr Donna Rose Addis,
'Talking Heads' lecturer • Professor Richard Faull
• Baroness Onora O'Neill
Background image: MRI scan of the brain

The mysteries inside our heads

The 'Talking Heads' lecture series in 2010 was a partnership between the Royal Society of New Zealand and Radio New Zealand. Recorded with live audiences around the country and broadcast in October/November 2010, the lectures were delivered by some of New Zealand's most distinguished experts on brain and behaviour. They explored the mysteries inside our heads – who we are, how we learn to talk and make memories, and why we act badly and things go wrong.

Prestigious new lecture series

To stimulate cross-disciplinary debate about the dynamic transfer of knowledge within a social and cultural context, we have established a new prestigious lecture series. The inaugural speaker of the New Zealand Aronui Lecture Series was Baroness Onora O'Neill of Cambridge University, past president of the British Academy and chair of the Nuffield Foundation. Baroness O'Neill is well-known for the outstanding contribution she has made to philosophy and her analyses of ethical issues in science. She visited New Zealand in September 2010 and delivered lectures on 'Two Cultures Fifty Years On', 'Grasping Freedom of Speech', and 'Perverting Trust'.

Writing on the mind

The mind is its own place, and in itself can make a Heav'n of Hell, a Hell of Heav'n (Milton, 1667)

The annual short story competition, the Manhire Prize in Creative Science Writing, is organised in association with the New Zealand Listener magazine and the International Institute of Modern Letters at Victoria University of Wellington.

In 2010 the judge was Dave Armstrong, successful screen and stage writer and science communicator.

The fiction category was won by Isobel Gabites with her piece 'Heaven in the Mind'. "It was Milton who taught me to watch, watch very closely the speck of dust that tries to settle in the sun's rays. It is trapped but it is a thing of beauty. A thing which transcends loneliness and takes all day to do it."

The non-fiction category was won by poet and fiction writer Alice Miller for her essay entitled 'Dark Energy Beyond the Reception Rooms'. "Our emotional brains, whether we consider them horses or elephants or Siberian tigers, are unpredictable creatures. Emotions can lead us closer to truth – but, as we probably all know too well, they can also wrench us into idiocy."

An original thought

Professor Richard Faull FRSNZ, leading world expert on neurogenesis and brain disease, was invited to tour New Zealand in September/October as the 2010 Royal Society of New Zealand Distinguished Speaker. Some years ago Professor Faull made the startling discovery that, contrary to popular dogma, the adult human brain contains stem cells and has the capacity to repair itself throughout life. Professor Faull's enthusiasm to bring researchers, clinicians and the community together in his pursuit of understanding the human brain made him a compelling speaker.

ACHIEVEMENTS HONOURED



Fellowship of the Royal Society of New Zealand is an honour given for distinction in research, or in the advancement of science, technology or the humanities. It is awarded to New Zealand's most eminent researchers.



From left: Professor Margaret Brimble

- Professor Lianne Woodward
- Associate Professor Parry Guilford



Fellows of the Royal Society of New Zealand are eminent researchers who regularly receive recognition and awards, both nationally and internationally, for their work. For example in 2010:

Professor Margaret Brimble MNZM FRSNZ from The University of Auckland was awarded the Royal Society of Chemistry Natural Products Award for outstanding contributions to the synthesis of biologically active natural products, their derivatives and analogues. She was presented with the medal at a symposium at Trinity College Dublin and subsequently delivered the Simonsen Lecture at universities in the United Kingdom.

The prestigious Günther Laukien Prize for Magnetic Resonance for 2010 was awarded to Professor Sir Paul Callaghan GNZM FRS FRSNZ of the MacDiarmid Institute for his work on magnetic resonance. Nobel Laureate Richard Ernst, who chaired the award committee, praised Sir Paul's ground-breaking work with radio waves to detect the motion of molecules. It has already helped improve MRI brain scans.

Airlines around the world will benefit from the work of Professor Philippa Gander FRSNZ of Massey University. She has been invited by the International Air Transport Association to write industry manuals to help airlines implement fatigue risk management systems that adhere to new international regulations. Professor Gander is director of the Sleep/Wake Research Centre, which specialises in research into the sleep and waking function as it applies to our everyday activities.

Research fellowships awarded

James Cook Research Fellowships are awarded to researchers who have achieved national and international recognition in their field. The Fellowships allow them to concentrate fully on their chosen research for two years. A small number of these prestigious Fellowships are awarded annually.

Associate Professor Parry Guilford from the University of Otago is researching the epigenetic approaches to cancer prevention and therapy. The programme aims to develop new strategies to characterise and treat the very earliest stages of cancer. Many very early cancers have undergone changes to their genetic structure that can potentially be reversed using carefully selected drugs. Professor Guilford's initial goal is to develop a chemoprevention strategy to reverse or prevent the early stages of stomach cancer, leading to clinical trials for people at greatest risk of this disease. Early intervention provides the greatest opportunity to achieve a cost-effective decrease in New Zealand's cancer burden.

Professor Lianne Woodward from the University of Canterbury is researching the neural and social pathways leading to neurodevelopmental risk. Each year in New Zealand more than 500 premature babies survive weighing less than 1500 grams. Research shows they are at high risk of neurodevelopmental problems including cerebral palsy, learning difficulties and attention-deficit hyperactivity disorder. A longitudinal study of 106 premature-born children and 106 comparison children has been examining the nature and causes of these problems. Findings have revealed abnormalities in the brain's developing white matter. The next study wave aims to understand the effects of these early abnormalities on brain development and function, and whether opportunities exist for change or repair in the developing brain.

Professor Peter Lockhart FRSNZ from Massey University is researching the adaptation of New Zealand flora. Predicting the evolutionary response of biota to environmental change is one of the outstanding challenges of our time. It requires an understanding of the constraints of evolution operating at the levels of species-environment interactions, genetic plasticity and adaptation. Professor Lockhart's work programme uses high throughput DNA and mRNA sequencing, automated analyses of gene function, and studies of environmental variation to identify alpine plant adaptations and the genetic determinants of these.

Professor Mike Steel FRSNZ from the University of Canterbury is researching the mathematical foundations for inferring large evolutionary trees. Statistical methods have revolutionised modern biology as they have allowed biologists to reconstruct large portions of the 'tree of life'. However, the mathematical properties of these new statistical methods are poorly understood for certain important evolutionary questions. For example, there is no good estimate of how much data is needed to infer an evolutionary tree accurately for a large set of species using Maximum Likelihood. This project will apply new mathematical methods to address fundamental questions concerning the inference of trees using modern statistical methods.

CELEBRATING KNOWLEDGE



From left: Professor Warren Tate, Rutherford Medal winner • Professor Frank Griffin, Pickering Medal winner • Professor Emeritus John Butcher, Jones Medal winner • Mr Shaun Coffey, Thomson Medal winner

Background image: The Jones Medal design includes binary expansions of mathematically fundamental numbers, the nautilus shell being a natural object which fits the 'golden ratio', and circles representing hyperbolic geometry.

The Royal Society of New Zealand hosts an annual Research Honours event to recognise and celebrate the work of some of New Zealand's top researchers, scientists and technologists through medals and awards.





Prestigious Rutherford Medal

New Zealand's highest science and technology honour, the Rutherford Medal, was awarded to internationally renowned molecular biologist Professor Warren Tate FRSNZ from the University of Otago for his outstanding achievements in molecular biology and molecular neuroscience. Together with the medal awarded by the Royal Society of New Zealand, he also received \$100,000 from the Government presented by Hon. Dr Wayne Mapp, Minister of Science and Innovation.

Professor Tate has had a stellar career with ground-breaking discoveries in understanding fundamental elements of cell biology. His work has made a huge contribution to health research with potential applications for preventing and treating HIV-1 and neurological diseases such as Alzheimer's.

His work has revolutionised our understanding of how proteins are synthesised in living cells. This has had important implications for research looking at how proteins contribute to memory formation and neurological disease. In very recent studies Professor Tate and his students have begun to investigate the molecular biology underlying chronic fatigue syndrome. Professor Tate's exceptional contributions extend well beyond the laboratory, with his teaching having inspired countless budding researchers.

Generating wealth for New Zealand

The Thomson Medal was awarded to Mr Shaun Coffey CRSNZ, chief executive of Industrial Research Limited, for his outstanding leadership in the management of science, and development and application of science and technology to generate wealth for New Zealand. He received \$15,000 from the Royal Society of New Zealand.

Mr Shaun Coffey has led and managed several significant organisations in the last decade. He has been chief executive of Industrial Research Limited since 2006 and reversed the negative fortunes of the organisation, expanding its technology transfer and commercialisation activities, managing the establishment and rebidding of many science projects and gaining a reputation as both a natural and inspirational leader.

Achievement in technology

The top award for achievement in technology, the Pickering Medal, and \$15,000 from the Royal Society of New Zealand, was awarded to Professor Frank Griffin from the University of Otago. For three decades Professor Griffin has led a research team devoted to solving animal health problems in the deer industry.

This award recognises the diagnostic tests and vaccine developed by Professor Frank Griffin and his team for the detection and prevention of the three major bacterial diseases affecting New Zealand deer, Tuberculosis, Yersiniosis and Johne's disease. These products and services are estimated to have saved the deer industry a conservative \$80-\$90 million worth of production that would otherwise have been lost to these diseases. Professor Griffin is widely sought after internationally for his advice on livestock diseases and their control and is very highly regarded by the deer industry in New Zealand.

New mathematics medal

The first recipient of a new award established this year, the Jones Medal, was Professor Emeritus John Butcher FRSNZ of The University of Auckland.

The medal recognises lifetime achievement in mathematics and was awarded to Professor Butcher for his exceptional work on numerical methods for solving differential equations, and for leadership in developing mathematical sciences in New Zealand. The new medal was presented by the person after whom the medal is named, New Zealander Professor Sir Vaughan Jones Hon. FRSNZ, a world-renowned mathematician.

Professor Butcher is regarded as the founder of the modern theory of Runge-Kutta methods, one of the principal classes of numerical methods for solving ordinary differential equations. His methods are used in computer simulations that have become a fundamental scientific tool in computational physics, chemistry, biology and engineering.

Social science research rewarded

The Dame Joan Metge Medal for social sciences was awarded to two recipients – Professor Richard Bedford FRSNZ of AUT University and the University of Waikato, and Professor Richie Poulton FRSNZ of the Dunedin School of Medicine at the University of Otago.

Professor Bedford has been an influential figure in the development of social sciences over a long period, and has made major contributions to new knowledge in the field of migration, particularly in the Asia-Pacific region.

Professor Poulton is well known for his work as director of the University of Otago longitudinal study which is following the health and development of more than 1000 babies born in Dunedin in 1972/73, providing substantial contributions to new knowledge.



The Royal Society of New Zealand administers the Marsden Fund on behalf of the Marsden Fund Council. This is New Zealand's prestigious research fund covering the physical and life sciences, mathematics, engineering, social sciences and humanities.

From left: Associate Professor Alistair Steyn-Ross and Professor Moira Steyn-Ross, University of Waikato • Dr Martin Reyners, GNS Science
• Brain scan

Background image: Brain tissue, with dark blue stain indicating areas of interaction with AMH



Here are some examples of Marsden-funded research.

Brain action

An intriguing feature of your brain is that it 'lights up' in different places at the same time, for example, when you are remembering where you left your jacket. Scientists track this with magnetic resonance imaging and can show that a crucial region for memory is the seahorse-shaped hippocampus, which integrates the information from around the brain.

Dr Donna Rose Addis and her team from The University of Auckland are investigating a recent idea that the brain uses memory to imagine the future. Already, they have shown that hippocampal activity during future event simulation is quite different for those events that are successfully encoded, relative to those that are later forgotten.

Professor Moira Steyn-Ross and Associate Professor Alistair Steyn-Ross and their team at the University of Waikato are investigating the physical mechanism by which separate regions of the brain light up. They are modelling the waves that drive this type of brain activity, homing in on the electrical activity as the main driver.

How do tectonic plates lock together?

Determining how and why tectonic plates lock together is of great interest to seismologists worldwide, because when plates unlock they produce large earthquakes. Dr Martin Reyners FRSNZ and his team from GNS Science have developed a novel, 3D seismic velocity model of New Zealand.

Based on studies in the southern North Island, the model suggests that plate coupling is controlled by the ability of fluid to cross between the plates. Where an impermeable rock type in the overlying plate prevents such fluid flow, plate coupling appears to be strong. Where fluid can pass relatively freely across the plate interface, plate coupling appears to be weak.

An implication of the model is that when plates unlock, fluid should migrate from the lower plate to the overlying plate. Dr Reyners and his team are now investigating whether this happened after the magnitude 7.8 Dusky Sound earthquake, which unlocked the plates in Fiordland in 2009.

A bob each way

All of us hedge our bets, perhaps recording telephone numbers in a notebook as well as on our phone. Nature adopts the same sophisticated strategy, one which biologists thought would take millions of years to evolve.

Professor Paul Rainey FRSNZ and his team at Massey University have caused a surprise by actually observing the real-time evolution of this strategy. By exposing bacterial populations to ever-changing conditions, they observed types emerging that had evolved the capacity to switch randomly but frequently between two different states. Professor Rainey and his team deconstructed the genetic details and were able to show that this 'bet hedging' strategy facilitates survival in an uncertain world. They suggested that risk-spreading strategies may have been one of the earliest adaptations to a changing world. Their result was first published as a cover story in *Nature*, in late 2009, with further publications to appear in 2011.

Male hormones and maturity

AMH is a key hormone in the development of the reproductive organs of men. Associate Professor Ian McLennan and Dr Kyoko Koishi from the University of Otago wondered why this hormone persisted once gender had been established. In 2005 they made the surprising discovery that AMH also acts on the brain. In following this up, they found that AMH levels affect how much male mice explore their environment, with lower levels promoting the less extensive exploration typical of female mice. Boys have high levels of AMH but little testosterone. Is the behaviour of boys also driven by AMH?

Teaming up with Dr Kirstie Morgan, Associate Professor Ted Ruffman and Professor David Bilkey, unexpectedly they have found that high levels of AMH may retard a male's rate of growth. This raises profound new questions. Why do the testes secrete a hormone to slow male development, when being mature has so many advantages? Is it a mechanism to prevent boys from outstripping the capacity of their parents to provide energy and nutrients? Is it also the reason why boys' brains are less emotionally and cognitively mature than girls of the same age? These are fascinating results with implications for health and wellbeing.

REFLECTING RUTHERFORD



From left: Martin Lord Rees (centre) visiting the University of Canterbury • Associate Professor Jennifer Hay, a Rutherford Discovery Fellow • Martin Lord Rees • Ben O'Brien, a Rutherford Foundation Fellow, holding an artificial muscle

Ernest Lord Rutherford was the first New Zealand scientist to win a Nobel Prize. As one of our greatest scientists it is fitting that he lends his name to some of our most prestigious activities and funding schemes.



Rutherford Discovery Fellowships

Ten talented researchers were chosen as the first recipients of a new Government-funded scheme designed to support early- to mid-career researchers. The Rutherford Discovery Fellowships provide each researcher with between \$160,000 and \$200,000 per year over five years, which includes a contribution to salary and research costs.

The new scheme is designed to develop and foster future leaders in New Zealand research, science and technology, and fill a major gap in support for researchers in the three to 10 year period after they complete their doctoral degree. It has been found that this is the time when many researchers can find it difficult to progress their careers, especially in areas with heavy competition for funding.

Receipt of a Rutherford Discovery Fellowship will enable researchers to investigate particular research topics, and help them establish their careers in New Zealand. The scheme also aims to attract top researchers with international research experience back to New Zealand.

The 2010 fellowship winners will be pursuing research ranging from improving brain function after strokes, to how species evolve in the face of infectious diseases, to how memories are constructed in the brain.

The world in 2050

The President of the world's oldest and most prestigious scientific institution, the Royal Society of London, visited New Zealand in March, as part of their 350th anniversary celebrations.

Martin Lord Rees was invited to New Zealand to deliver the 2010 Rutherford Memorial Lecture in Wellington and Christchurch at the invitation of the Royal Society of New Zealand.

His lectures proved very popular, attracting capacity audiences. In them he looked at the future of our civilisation and how things could be in 50 years' time, and what we can expect in the next 20 years in astronomy.

As President of the Royal Society of London, Lord Rees is a successor of Sir Isaac Newton and Ernest Lord Rutherford. He is also the UK's Astronomer Royal and Master of Trinity College, Cambridge. As a cosmologist, Lord Rees studies the universe and tries to understand its evolution on grand timescales in billions of years. But he is also concerned with the much smaller timescale of human life.

During his New Zealand visit he also met with students and staff at the University of Canterbury and the MacDiarmid Institute.

Support for emerging researchers

Talented emerging researchers receive support for their careers through the Rutherford Foundation, a charitable trust set up by the Royal Society of New Zealand. The work of the Foundation is supported by the Ministry of Science and Innovation, the Freemasons Roskill Foundation and the Cambridge Commonwealth Trust.

In 2010 the Rutherford Foundation awarded two post-doctoral fellowships to support two years of independent research carried out in New Zealand. The fellowships, valued at \$190,000 each, went to Dr Rose Turnbull, a geologist from the University of Canterbury, and bioengineer Ben O'Brien from The University of Auckland. Rose will study fossilised magma chambers that occurred in ancient Westland and she will be based at GNS Science in Dunedin. Ben will be working at the Auckland Bioengineering Institute for his research which draws inspiration from nature to make new devices such as artificial muscles.

Three university students were awarded scholarships from the Foundation to undertake their PhDs at the University of Cambridge in England, following in the footsteps of Ernest Lord Rutherford. The successful recipients were Jake Howe, Janina Voigt and Michael Price who will be undertaking studies in earth science, computer science and physics respectively. In 2011 they will join five other Rutherford Foundation PhD scholars at Cambridge, and a post-doctoral fellow sponsored by the Freemasons Roskill Foundation.

ENGAGING YOUNG NEW ZEALANDERS



From left: Albert Brantley, chief executive of Genesis Energy, Hon. Dr Wayne Mapp, Minister of Science and Innovation, and Bailey Lovett • Realise the Dream participants at the Liggins Institute

• Dr Garth Carnaby and Vathna Am • Allen Feng and Christian Jones *Photo: Eastern Courier*
Background image: Bailey Lovett, Genesis Energy Realise the Dream supreme award winner

Engaging young New Zealanders with science is a key objective. Learning occurs in many contexts and the Royal Society of New Zealand recognises this by working both with teachers in schools, and directly with students to foster a lifelong interest in science.





Realising the dream

“My passion for science was fuelled by the good teachers I had when I started high school. It’s not necessarily those that teach the content of the curriculum the best who make the difference, but the teachers who make the science in the topics interesting so the information becomes easy to learn and remember.”

Bailey Lovett, Genesis Energy Realise the Dream 2010 supreme award winner.

Bailey’s research project tracked faecal contamination in shellfish to gauge water quality after periods of high rainfall.

Realise the Dream is a prestigious competition for secondary school students who have undertaken outstanding science or technology research. In 2010, 23 students were selected to spend a week travelling through the North Island visiting science and technology organisations including the Liggins Institute, Dairy NZ, Genesis Energy, Massey University and NIWA. They participated in hands-on activities designed to foster their interest in science and experience science in action. At the end of the week, a panel selected the top students to represent New Zealand at international science events.

Designing solutions

The BP Challenge is a hands-on team competition where young students use simple materials to solve problems, encouraging them to think creatively. At the Wellington BP Challenge event 300 students had to develop a carrying device for a ‘radioactive’ package using just newspaper and tape. One team of students reported that “It was hard working together at first, because we all had different ideas. We voted on the best idea and worked as a team quickly. It was really fun”.

A Gold CREST award was presented in 2010 to Vathna Am, 18, from Manuwera High School for his science project investigating the anti-microbial potential of the fluid found in tropical pitcher plants. CREST is an international scheme designed to encourage students to be innovative, creative, and to problem-solve in science and technology. Every year students from all around New Zealand take part.

Working in the field

“Science involves real life problem-solving, challenges and unpredictability which makes any success that much more fulfilling. The BAYERBoost scholarship allowed me to gain insight into a continually expanding field and have access to experts enabling me to complete a project that will benefit the community.” Corinne Marti, a first year student at The University of Auckland, was one of six outstanding students selected in 2010 to gain practical experience in environmental research during their summer break. Her host organisation was Plant and Food Limited where Corinne worked on the relationship between carbon content and water holding capacity in soils.

At the movies

Christian Jones and Allen Feng from Pakuranga College won the inaugural Freemasons Reel Science Film Festival with their film *Immunity*. They were among 16 students chosen to learn the finer points of film-making at the University of Otago’s Centre for Science Communication for a week. They had just 36 hours to produce a five-minute film, including writing all the material, filming and editing. The resulting films covered topics ranging from epidemics to genetic engineering.

Science in primary schools

The Royal Society of New Zealand’s Advancing Primary Science initiative encourages primary teachers to place more emphasis on teaching science to younger students. It engages teachers in clusters of educators, and works with them to give them more confidence in teaching science. This includes connecting them with key science organisations in their community and providing them with a forum to share their resources and experiences.

Associate Professor Lindsey Conner from the University of Canterbury has been working with the teachers involved in the Advancing Primary Science initiative. “What is great is that teachers who have taken part are really excited about new topics and ways to teach science. We’re looking forward to how these new ideas will be shared with students and other teachers. There is no doubt that the teachers involved have gained confidence about science teaching.”

CONNECTING TEACHERS WITH INDUSTRY



From left: Gabrielle Nuthall holding a kiwi during her fellowship with the NZ Conservation Trust • Teacher fellows – Andrew Rapley, Marian Holman and Mark Meyburg

Background image: Barrel shrimp inside a salp
Photo taken by teacher fellow Len Doel during his fellowship hosted by NIWA

The Teacher Fellowship scheme is a unique opportunity for teachers to work with passionate and knowledgeable mentors, gaining experience in applied science and technology. Science teaching is enhanced when teachers can connect their students' studies with real world situations. This scheme highlights these connections for teachers in a supportive work environment.





Teaching leaders in primary science

After five months of being back teaching at Halswell Primary School, Gabrielle Nuthall said: "Science has become a much larger part of my everyday teaching since completing the Primary Science Teacher Fellowship. The fellowship gave me a greater insight into science in action in different jobs, and also opportunities to experience new things. I feel better equipped now to pass on that knowledge and enjoyment of science to my students."

During 2010, 45 primary school teachers from around New Zealand began an 18-month teacher fellowship programme designed to create curriculum leaders in science. They spent six months working in research organisations to see how science is applied in industry, and then undertook a leadership programme to help them to pass on what they learnt to others.

The programme aims to demystify science and encourage more teachers to champion science education in primary schools. Teachers on the fellowship programme examine the 'New Zealand Curriculum' document and work to establish effective ways of engaging students in science. A community of practice allows the teachers to share their ideas and experiences with current and past teacher fellows.

"Through the fellowship I have realised that children need time to explore and develop inquiry skills that allow them to see failure as part of the process, almost an expectation. From this they learn to change parameters and challenge their thinking to explain their world." Mike Wylde, Nelson Park School, teacher fellow.

Awarded Teacher Fellowships

"The fellowship was just what I needed to confirm my love for teaching, that I am in the right job, and to refresh my knowledge of what is happening in the world of science in New Zealand. It was a challenging year during which I saw cutting-edge techniques and met some amazing people. I can now enhance my lessons with interesting stories gleaned from a working laboratory, and make my lessons come to life." Treena Blythe, Nayland College, Awarded Teacher Fellow.

Treena was hosted by The University of Auckland in 2010 to work on understanding how diseases affect the body at a molecular level. She was among 33 primary and secondary school teachers who, in 2010, were hosted by research organisations around New Zealand, including universities, Crown Research Institutes and private sector companies.

These Awarded Teacher Fellows worked on research projects ranging from investigating sustainable practice in the fashion and textiles industries, to systems for controlling introduced species in the New Zealand bush. The teachers gained significant new knowledge and experience to take back to their classrooms.

Working alongside her hosts as an Awarded Teacher Fellow, Anwyl Minnaar, a primary school teacher from Kimbolton, has been able to develop and test programmes which teachers can run in reserves and ecosystems near their schools. Anwyl was previously a conservation education officer in South Africa. Her hosts in 2010 were the Horizons Regional Council and Massey University.

"I have grown so much in my knowledge and experience. Immersing myself in my passion of ecology has been the turning point in my teaching career and has given me the confidence to put my beliefs into action. During my fellowship I was given the opportunity to take the ideas out, dust them off and, with lots of input and help from my host organisations, put them to the test," says Anwyl.

CONNECTIONS



Science on our TV screens

A new television series was produced in 2010 showcasing the work of New Zealand scientists and the direct relevance of their work to people's lives.

The 10-part series, called *Ever Wondered?*, was commissioned by TVNZ 7, in partnership with the Royal Society of New Zealand who provided advice and expertise. The show was the jewel in the crown of a month-long focus on science and technology on the free-to-air television channel in August.

Each episode in the *Ever Wondered?* series examined a question such as – how can we meet increasing energy demands?, what is the future of food?, and what is New Zealand science doing to tackle air pollution?

The series was fronted by award-winning scientist Dr John Watt, who provided a young and authentic voice for New Zealand science. A second series has been commissioned for broadcast in 2011.



From left: Dr John Watt (centre), host of the 'Ever Wondered?' television series with Professor John Hearnshaw during filming

- Sea Level Rise Emerging Issues paper

Background image: The Speaker's Science Forum series was held at Parliament

Taking science into Parliament

During the year we ran a series of science presentations at Parliament for MPs and chief executives of government agencies, in partnership with Science New Zealand. The aim of the Speaker's Science Forum was to show key decision-makers the depth of talent within the New Zealand research community and provide an understanding of the science underlying issues being addressed in Parliament.

The presenters were from universities, Crown Research Institutes and industry. Their topics included geo-engineering, curbing methane emissions from livestock, deep sea exploration, responding to swine flu, bees and our bio-based economy, and translating science into economic gain.

The forum was hosted by Alan Peachey, Chair of the Education and Science Select Committee, who commented: "Where else in the world, in any parliament, would we have one-quarter of the members in one room during their dinner break listening to a lecture about science?"

Emerging issues examined

Each year we identify issues where policy will benefit from being informed by research, and produce information pieces using the expertise of our Fellows, members and the wider New Zealand research community. In 2010 the information pieces covered genetically modified forages, sea level rise, and the earthquake in Canterbury.

The technology of genetic modification is a contentious topic in New Zealand and the Society published a paper about this, providing evidence to inform the ongoing debate, particularly on farm animal forages. The research in this paper extended from the life sciences, through to social attitudes about genetic modification, as well as market research in our export destinations.

Rising sea levels is also a topic particularly applicable to New Zealand, with 12 of our 15 largest towns and cities being coastal. The past few years have seen increasing evidence of higher rates of melting in Greenland and the Antarctic ice sheet, and higher estimates of the rate of sea level rise. Rising sea levels will compound the hazards that coastal communities face. The Society contributed to the debate with a paper describing recent research developments to raise the public and media profile of this issue.

The earthquake which struck Canterbury in September 2010 caused substantial property damage in and around Christchurch, but resulted in no fatalities. We prepared an information paper describing how New Zealand's long history of research into seismology and earthquake engineering design work for buildings helped save lives in Canterbury.

Better science coverage

Journalists and scientists from around New Zealand benefited from the skills of the Science Media Centre in 2010 as it contributed to hundreds of science-related media stories, ranging from the debate around lowering the blood alcohol level for driving, to the Pike River mining disaster. Its brokering service between the media and the science sector is contributing to better coverage of science, more science-literate newsrooms and more media-savvy scientists.

Thirty briefings were held featuring scientists from Crown Research Institutes, universities and private research organisations. The centre also issued 120 Science Alerts quoting scientists from not only New Zealand, but also from overseas. Around 400 journalists have registered to receive these alerts. A "Desk Guide for Covering Science" was published to help general reporters and those new to the science round.

The Sciblogs.co.nz network of science blogs now attracts 50,000 visitors each month, with content also syndicated on the New Zealand Herald newspaper website. A book collecting 'the best of' Sciblogs and the best New Zealand science writing was published in early 2011.



The Royal Society of New Zealand
4 Halswell Street, Thorndon, PO Box 598, Wellington 6140, New Zealand
Tel: +64 4 472 7421, Fax: +64 4 473 1841, www.royalsociety.org.nz
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