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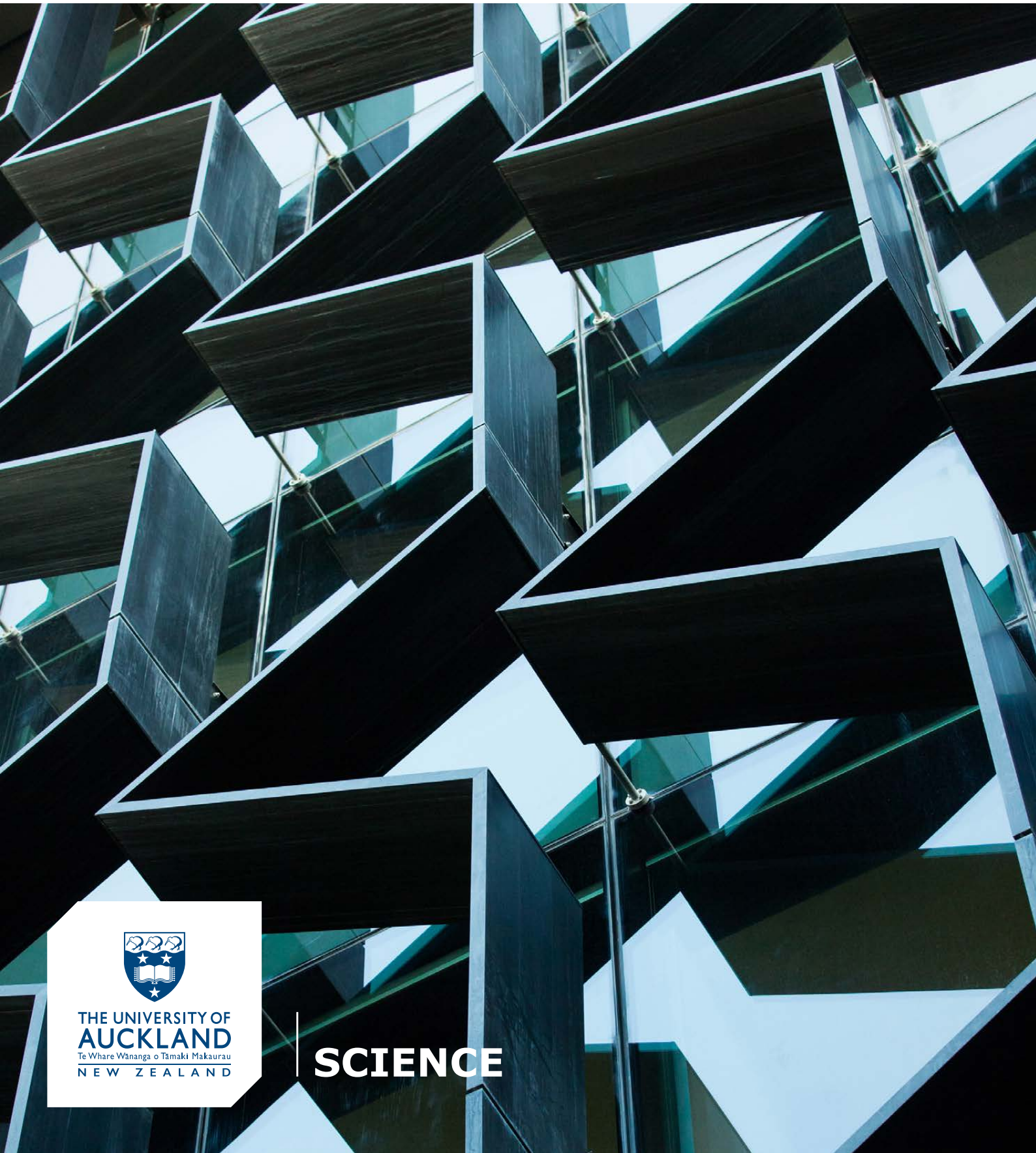
Faculty of Science Alumni Magazine

December 2016

InSCIght

In this issue



THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

SCIENCE

InSCight

The University of Auckland Faculty of Science alumni magazine 2016

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If you are a Faculty of Science graduate and have a story to tell about your experiences or achievements, or would simply like to re-establish contact, please get in touch.

We also welcome feedback and suggestions about this publication. If there's something you would like to see in the next issue, don't hesitate to contact us.

InSCIght is available electronically – please email us if you would prefer to receive the magazine in this format.

Contact: fos-marketing@auckland.ac.nz

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Cover page photo: The Science Centre

A word from the Dean

I am writing this in the comfort of my office in the new Science Centre building, which has been progressively filled over the second half of the year. As of now, the Faculty Office and the Schools of Chemical Sciences, Environment and Psychology are settling into their new spaces. The building is a major success with three dramatic atria flooding light through it, highly functional laboratories and office spaces throughout and including, for the first time, a very large student area on the ground floor. All a far cry from the 1960s brutalist architecture of the original Science buildings.

Further moves are afoot in the Maths, Statistics, Physics and Computer Science areas to accommodate their growth, including resumed occupancy of the podium area above the main lecture theatre area (the old Science Library space).

In addition, Exercise Sciences has just had a business case approved for new accommodation on the Newmarket Campus, and Biological Sciences is having a major renovation of the Thomas Building to cope with a long list of building issues. Changes to the University's Capital Plan propose the development of a large, new building directly opposite the Science Centre, which will become the long-term home of the School of Biological Sciences.

Unsurprisingly, the building moves have been a major focus for the faculty this year. However, along with the other faculties, we have been focused on the next 10 years by developing a new Faculty Academic Plan to help the University understand its priorities for the next decade. Strong features of the Science plan are a revision of the current approach to honours pathways, improved academic guidance for those entering our programmes to ensure students are set up to succeed, and a more focused approach to research strategy.

The University has launched a major fundraising campaign, *For all our futures*, aiming to support a broad range of activities across the University. With an ambitious target of $300 million, this will have a dramatic impact on the ability of the University to undertake quality research and education. I am very pleased to report that there have already been substantial donations in Science, including a very generous $5 million from the George Mason Trust to establish a Centre for the Natural Environment; $2 million from an anonymous donor, to support Marine Science research; and $1 million, also from an anonymous donor to support online tools for the STEM areas in order to mitigate the extreme shortage of science teachers. For more information about the campaign please see our Alumni News section on page 18.

PROFESSOR JOHN HOSKING
Dean of Science, the University of Auckland

Around the faculty

Science Centre

The Faculty of Science has a first-class building to call its own with the completion of the Science Centre in July 2016.

The Science Centre stands tall on the corner of Symonds Street and Wellesley Street. Students saunter along to and from classes and the many eateries and bus stops between here and the cultural centre of Karangahape Road.

From the outside, the newest building at the University of Auckland reflects the surrounding life in its glassy façade. The aesthetic is welcoming, and Science students can be seen making good use of the ground-floor plaza, sitting at the study-pods in the break-out spaces and socialising while waiting for lectures to begin.

The Science Centre is a multi-disciplinary space, purpose-built for the Faculty of Science and part of the greater Sector 300 project upgrade that began with the planning and design phase in 2009.

The project, managed by the Planning and Capital Projects team from Property Services at the University, encompasses the award-winning undergraduate Chemistry laboratory in building 303. Completed in 2014, the new lab won the Refurbished Laboratory category at the S-Labs award ceremony held in London that same year.

However, the driving purpose of the greater build was to create more space and better connect the set of three buildings which make up the main teaching hub for the faculty. Therefore changing what was formerly a collection of 'silos' into a connected state-of-the-art facility for students and staff alike.

The Science Centre component of the project was a particularly complex operation between faculty, Property Services, Architectus and Lab-works.

"The project has been very challenging and very technical in nature. We can look back on what has been achieved and be hugely proud."

"The project has been very challenging and very technical in nature," says Grant Johnstone, Senior Project Manager with Property Services. "This was not an easy build and at the end of the day the real test is the quality of the building and the lack of user issues on occupation. We can look back at what has been achieved and be hugely proud."

Due to the fact the centre is a large square footprint, the risk in the design was the absence of natural light in the many internal spaces. The dedication of the project team to emphasise not just quantity but quality of space resulted in the incorporation of three internal atria to allow natural light to penetrate the shared space therein.

The attention to open space and light is especially visible where levels six-through-ten hug the giant upper atria. The faculty and Schools of Environment and Chemical Sciences administration reside on the sixth floor, and it is here where you can find the break-out space being shared between faculty staff and postgraduate students enjoying their lunch or a cup of tea. If you look up, you can see students working in the labs where the atria extends through four levels of glass-fronted laboratories and break-out spaces to the skylights above.

Alongside the creation of improved infrastructure and much better interconnectivity between different departments and schools, the well designed and appointed undergraduate and postgraduate laboratories feature complex air handling technology, physical containment facilities, diagnostic panels and well equipped health and safety stations. Other features include multi-disciplinary teaching spaces, computer teaching labs and an information commons.

Due for its official opening in 2017, the Science Centre was blessed by Ngāti Whātua o Ōrākei Kaumātua in a dawn ceremony held in August this year. Later that month, the plaza was transformed into a one-stop shop for potential students to explore their options at the University's biggest event of the year, 2016 Courses and Careers Day.

New Zealand's leading and largest Faculty of Science* now has a flagship building with amazing facilities to match its reputation.

** science.auckland.ac.nz/excellence*

www.science.auckland.ac.nz/sciencecentre

The Science Centre is blessed (L-R): Faculty of Science Kaiārahi, Michael Steedman; Ngāti Whātua o Ōrākei Kaumātua, Taiaha Hawke; Vice-Chancellor, Professor Stuart McCutcheon; and Dean of Science, Professor John Hosking.

Key Strategic Initiatives

Multi-million dollar health partnership

Technology to deliver better health care and treatment for New Zealanders is the focus of a new multi-million dollar research partnership.

Launched in October, the Precision Driven Health research partnership is worth more than $37.8 million and includes the Ministry of Business, Innovation and Employment (MBIE), health software leader Orion Health, Waitemata District Health Board, the University and its commercialisation company Auckland UniServices.

Science and Innovation Minister Steven Joyce has announced MBIE will contribute $14 million in funding over seven years, with the partners expected to contribute $23 million over this time.

Dean of Science Professor John Hosking recognises the importance of the new partnership for New Zealand's ability to "keep pace with the rest of the world in a vital area of technological innovation and development."

As technology changes the way services are delivered across a wide range of sectors, ground-breaking data analysis and 'precision medicine' are likely to play an increasingly larger role in patient care.

Zero Tolerance for Discrimination

Equity at the University of Auckland means fairness and justice within a safe and inclusive learning and working environment that enables talented people to achieve their potential and the University to achieve its strategic objectives. The University is a vibrant, diverse community, and equity initiatives, policies and programmes are embedded in order to embrace this diversity.

This year, the Equity Office established its Zero Tolerance Campaign.

"Racism, sexism, homophobia, transphobia, ableism and other 'isms' share one key feature: they ascribe negative characteristics to a group, and assume that those characteristics apply to all members of the group," says Vice-Chancellor Professor Stuart McCutcheon.

"Discrimination has no place at the University of Auckland. I encourage anyone who experiences such behaviour to seek resolution via the appropriate processes, including – if necessary – complaints procedures, so the University can act appropriately," says the Vice-Chancellor.

Exercise Sciences on the move

The Department of Exercise Sciences has gone through many changes of late. Alongside the international accreditation for the taught postgraduate programme in Clinical Exercise Physiology, the department has changed its name and is preparing to move to a new location.

Although still a year away, the department is looking forward to the move to the University of Auckland's Newmarket Campus.

Departure from the department's current Tāmaki location will coincide with the completion of refurbishment to building 907 at the Newmarket site, planned for December 2017.

Building 907 has a fascinating history, from its origin as the Taupo Totara Timber Co Ltd timber warehouse, to its use by Lion Breweries as stables for Shire horses (used to pull the beer delivery wagon to selected taverns in the Auckland CBD), and now conversion to a world-class Exercise Sciences facility.

Tucked into the north-east corner of the Newmarket Campus, the department's space footprint will be smaller than at Tāmaki.

However, clever design and shared-space philosophy will facilitate a better integration of teaching, research and clinical practice.

While undergraduate laboratory teaching will take place in a new, fit-for-purpose facility, postgraduate students will enjoy the clinical teaching and adjacent research labs that are housed in a single building. All students can look forward to easier access to the City and Grafton Campuses where undergraduate teaching will continue.

Formerly the Department of Sport and Exercise Science, the Department of Exercise Sciences name change better reflects its academic focus on the broader study of exercise and its contribution to sustainable health through movement, sport, physical activity and rehabilitation.

New initiatives for Tuākana in Science

Now in its 26th year, the Tuākana in Science tutoring and mentoring programme has showcased one of the secrets of its success and longevity by developing several new initiatives in 2016.

Michael Steedman

This year, three of our Tuākana programmes – Chemistry, Environment and Psychology – are relocating to a new shared space in building 301. Gathering students together quickly is an important aspect of the programme, as they typically join the University in small numbers from their schools, so it's vital to facilitate socialisation.

"Having this 'hub' available to support our efforts is invaluable," explains Michael Steedman, the faculty Kaiārahi who oversees Tuākana in Science. "We see this as an opportunity to build a critical mass of our Māori and Pacific students in a central location – we're looking forward to it being a vibrant and active space."

Another new initiative – due for release in Semester One, 2017 – is the Tuākana in Science smartphone app. Developed in partnership with members of the Department of Computer Science and our Kaiārahi, the aim is to put Tuākana-related information in the pockets of students in an attempt to increase participation and engagement with each of the programmes.

"We see this as an opportunity to build a critical mass of our Māori and Pacific students in a central location."

"The focus for the app is to connect more readily with our students, and to provide important information about the academic support and advancement programmes we offer. As we look forward to future iterations of the app, I'm particularly excited about developing its functions and increasing its reach," enthuses Michael.

Most of the faculty's schools and departments have their own Tuākana programmes, crafted to suit specific curriculum areas and to respond to the individual needs of their students. The tutoring and mentoring programmes cater mainly for core Stage I courses, and occasionally Stage II and III, with some postgraduate support available.

Tuākana in Science works hard to respond to the needs and aspirations of a diverse group of students in order to have a positive impact on pass rates and engagement.

Te Pūnaha Matatini
Data ▪ Knowledge ▪ Insight

Data interns in demand

New Zealand companies and the public sector now have access to some of the brightest minds in data analytics thanks to a new summer internship programme established by Te Pūnaha Matatini, a Centre of Research Excellence in complex systems hosted by the University of Auckland.

In just its second year of operation, Te Pūnaha Matatini has already established a reputation for facilitating highly sought-after postgraduate and undergraduate internships. The paid internships are proving beneficial to participating students who gain workplace experience, and industry and public sector partners who can access the talent of some of New Zealand's up-and-coming data analysts.

Over 100 students applied for 2016-17 summer intern opportunities. Four undergraduate and three postgraduate students will soon be undertaking a 10-week internship in Auckland or Wellington with industry partners or government organisations such as the Social Investment Unit, Statistics New Zealand, or the Ministry of Business, Innovation and Employment.

"The students will be working in teams to help analyse and solve real-world problems such as evaluating the benefits to individuals of direct and indirect social investment," explains Professor Tava Olsen, Deputy Director of Te Pūnaha Matatini.

Te Pūnaha Matatini investigator Adam Jaffe with PhD student Catriona Sissons.

Tava has overseen similar internship programmes at the University of Michigan and is quick to point out the payoffs to all involved: "Having access to data analytics skills can help businesses identify cost savings, and it's great for students to be able to apply their skills in a workplace environment."

Want to get involved? Te Pūnaha Matatini welcomes queries from companies keen to participate. Contact Professor Tava Olsen at t.olsen@auckland.ac.nz.

MAURICE WILKINS CENTRE
FOR MOLECULAR BIODISCOVERY

Collaborative research tackles human disease

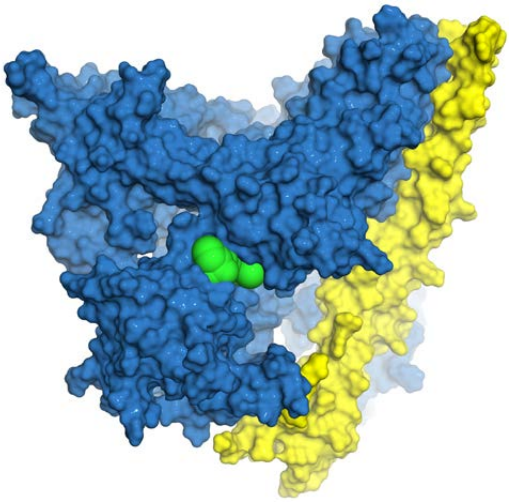
Through 14 years of collaborative research, the Maurice Wilkins Centre's 170 investigators have built a remarkable track record of inventing drugs and vaccines that progress to clinical trial. The Centre also encourages innovative fundamental science that has the potential for great impact on human health.

Since 2002, the Maurice Wilkins Centre, a Centre of Research Excellence hosted by the University of Auckland, has been harnessing New Zealand's biomedical expertise to target serious human disease.

As the national hub for molecular biodiscovery, the Centre brings together scientists from across New Zealand to research cancer, diabetes and metabolic disease, infectious disease and integrative biomedical technologies. Within these research themes Maurice Wilkins Centre investigators aim to develop drugs and vaccines, tools for early diagnosis and prevention, and new models of disease.

New Zealand has an outstanding reputation for biomedical research. The Maurice Wilkins Centre's collaborative nature and engagement with industry and the medical profession ensures that reputation continues to have impact.

www.mauricewilkinscentre.org



In 2011, a drug invented by Maurice Wilkins Centre investigators at the University of Auckland's Cancer Society Research Centre reached Phase I clinical trials in cancer patients. The drug (green molecule, above) fits into the active site of the PI3 Kinase enzyme (blue and yellow) which is an important cancer drug target. The drug blocks the enzyme's activity. Maurice Wilkins Centre investigators are currently developing next generation drugs targeting different forms of the enzyme for use in different cancers.

Image: Dr Jack Flanagan, Auckland Cancer Society Research Centre

Family and Fellowship

Entering Dr Erin Leitao's office on the tenth floor of the new Science building, I'm warmly surprised. Rather than the usual chemical equations and molecule diagrams, Erin's whiteboard displays a series of kids' scribbles.

Far from being research in the making, for Erin, these drawings represent the balance between work and family. A balance made possible by the support of the University of Auckland's equity policies, and her recent appointment as the 2016 New Zealand Fellow of the L'Oréal-UNESCO For Women in Science programme.

Erin has always been interested in science and how the world works. She first became interested at school, and decided to pursue a career path that has taken her from her native Canada, to England and now to New Zealand.

"Ever since my first taste of science I was fascinated by the subject. It wasn't until university that it became obvious that the questions I was most curious about were things that could be addressed through understanding chemistry," says Erin.

"In graduate school I realised that I wanted more control over the creativity and direction of my research. This is how I knew I wanted to continue into academia."

After completing her PhD at the University of Calgary, Erin spent four years in England where she held a Marie Curie post-doctoral fellowship at the University of Bristol. She moved to New Zealand just under a year ago with her husband, a visual effects artist, and her two children, aged three-and-a-half and one-and-a-half.

Today, as a lecturer within the School of Chemical Sciences, Dr Leitao is the only scientist in New Zealand working towards creating new polymeric materials with main-group elements comprising the backbone.

The vast majority of synthetic chemistry uses carbon atoms, whereas Erin's research makes use of other main-group, inorganic elements such as silicon, phosphorus, nitrogen and oxygen. These alternatives to carbon are not only highly abundant, they could produce materials with unexplored properties and reactivity. But, it's a challenge.

"You can't just mimic the same processes that are done with carbon systems. It's more difficult to synthesise [these new polymers] because, for example, the analogous double-bonded silicon building blocks are not stable, so we have to come up with new building blocks in addition to new ways to bring them together," she explains.

Erin's work has been described as 'blue-sky' and she admits it's still in its infancy, but researchers in the field have already discovered some interesting properties in the silicon systems.

"Silicon atoms, when they're in a chain, are semi-conductors and that's not something you find with the carbon system. I'm also interested in exploring ways to make bio-compatible polymers containing phosphorus and nitrogen."

The semi-conducting polymers could be used in electronic devices and solar cells, whereas the bio-compatible polymers have the potential to be used as a carrier to bring drugs into the body.

Dr Erin Leitao

"I knew in advance the support I would receive as an employee with family obligations – the University's flexible working policies and the on-campus childcare facilities made it feel doable."

"It's still explorative, but these are the possibilities we can envision."

"Erin's research is fundamental and time consuming so it is essential that we play our role to support new research solutions to help solve the world's most complex questions," says Martin Smith, Executive General Manager of L'Oréal New Zealand.

Erin believes that New Zealand offers an ideal environment in which to begin her independent academic research career.

"New Zealand is one of the places in the world where it is easiest to go from an idea to commercialisation. It's the first place I have lived that I've really felt that there is a lot of energy behind generating a new idea, collaboration to get it going, and the support to get it out to the public seems to be much higher than anywhere else.

"That attitude is now changing the way I view my research in terms of its potential."

Now that potential has been recognised.

In October, Dr Leitao became the 2016 New Zealand Fellow of the L'Oréal-UNESCO For Women in Science programme, receiving a $25,000 grant to assist her independent research at the University of Auckland.

For 18 years, the L'Oréal-UNESCO For Women in Science programme has supported women researchers around the world with the objective of recognising and rewarding their accomplishments whilst encouraging young women to enter the profession.

"With the For Women in Science Fellowship, L'Oréal have hit the nail bang on the head. This is the most critical time in a woman's academic career. You're in a minority, especially if you want to have a family. They're putting a system in place to give you some exposure, and to give you some financial support that you can use to take care of your family – it's very significant," says Erin.

"For women who are struggling, to have that money for childcare would be a game changer. For me, it's really going to help keep my international presence high. Next year, I'm attending two international conferences funded by the Fellowship."

Erin believes there are also steps that academic institutions can take to make things easier for women to balance motherhood with their career aspirations.

"There's no one-size-fits-all answer, but I would say information and supportive policies are key. If I was going to have a child now I would want someone who could run my lab while I went on maternity leave.

"In Chemistry in particular, it's very hard. I worked in the lab until I was eight months pregnant, but I had to be very careful about what I was exposed to. In Germany, for example, you're not allowed in the lab at all when you're pregnant."

One of the reasons that Erin chose the University of Auckland was its commitment to accommodating the work, life and family responsibilities of its staff.

"I knew in advance the support I would receive as an employee with family obligations because of the University's flexible working policies and the on-campus childcare facilities. I have no lectures timetabled before 9am and none after 4pm, so I'm not expected to teach when I have to be picking up the kids. It just felt really doable."

As our interview draws to a close, I notice a tiny handprint smeared on the floor-to-ceiling window in Erin's office. The window looks down onto one of the University's Early Childhood Education facilities.

"My kids know where I work. I can look down and see my daughter playing in the sandpit. And she knows that I'm up here, watching her!

"I'm always asked, 'You already have children? How did you do that?'" laughs Erin. "It's been hard, but I feel very fortunate to be starting my independent academic career with my family by my side."

www.science.auckland.ac.nz/erinleitao

News about our staff

New professors in the Faculty of Science

The Faculty of Science welcomes the appointment of nine new professors!

Professor Donna Rose Addis (School of Psychology) achieved her BA in History and Psychology, followed by her MA in Psychology from the University of Auckland, before heading to the University of Toronto to undertake her PhD in the role of the hippocampus in the retrieval of autobiographical memory.

Following a post-doctoral fellowship at Harvard University, she returned to the University of Auckland in 2008 and founded the Memory Lab where high-tech neuroimaging is used to investigate memory.

Donna Rose's research interests include the role of the hippocampus in memory, Alzheimer's disease, temporal lobe epilepsy and depression. Her current research is focused on how memory abilities change with advancing age and disease.

Professor Steven Galbraith (Department of Mathematics) studied for his Bachelor of Computing and Mathematical Sciences at the University of Waikato and his MSc at Georgia Institute of Technology, before completing his PhD in equations for modular curves at the University of Oxford in 1996.

Steven has held research positions at Royal Holloway University of London in the UK, University of Waterloo in Canada, the Institute for Experimental Mathematics in Essen, Germany, and the University of Bristol in the UK. He joined the University of Auckland in 2009.

Steven's research is in computational number theory, computational algebraic geometry and applications, and he is an internationally recognised leader in the mathematics of public key cryptography.

Professor Jo Putterill (School of Biological Sciences) studied for her BSc and MSc in Cell Biology at the University of Auckland, before going on to complete her PhD in Cellular and Molecular Biology in 1990. She held post-doctoral positions at MAF Technology and the John Innes Centre in Norwich, United Kingdom.

In 1994 Jo founded the Flowering Lab at the University of Auckland. Since then, she has worked in top research labs worldwide including the Salk Institute, the Scripps Research Institute, Ohio State University, and the Max Planck Society Institute for Plant Breeding Research in Cologne.

Jo's research involves the regulation of time in flowering plants using molecular genetics, molecular biology, biochemistry, and gene transfer techniques.

Professor George Perry (School of Environment) studied for his undergraduate and masters degrees at the University of Canterbury before completing his PhD at the University of Melbourne.

Having spent four years in the Department of Geography at King's College London, he joined the School of Environment at the University of Auckland in 2004 where he is now the Director of the Joint Graduate School in Biodiversity and Biosecurity.

George's areas of expertise include forest ecology, fire ecology, paleoecology and ecological modelling. In particular, his research arises from a curiosity for how human activity, especially alterations to disturbance regimes and extinction, influences forest dynamics.

Professor Jo Putterill

Professor Debbie Hay (School of Biological Sciences) studied for her BSc(Hons) in Sheffield and completed her PhD in molecular pharmacology at Imperial College London in 2002.

She worked in industry for GlaxoSmithKline before joining the University of Auckland in 2003. Debbie is involved in research at the Maurice Wilkins Centre and the Centre for Brain Research. She is also Academic Leader of the Cellular, Molecular and Organismal Biology group within the School of Biological Sciences.

Debbie's research focuses on G protein-coupled receptors (GPCRs), which are proteins crucial to the development of targeted drugs. The research aims to contribute to the treatment of migraine, cancer, lymphatic insufficiency, cardiovascular disease, obesity and diabetes.

Professor Andy Allan (School of Biological Sciences) completed his undergraduate studies at the University of Canterbury and received his PhD in plant physiology and biochemistry from the University of Cambridge in the UK before joining the University of Auckland.

Andy is the Director of the Joint Graduate School in Plant and Food Science, and the Science Group Leader of the Discovery for Impact group at Plant & Food Research.

His areas of expertise include plant responses to the environment, transcriptional regulation, biosynthesis and regulation of phenylpropanoids and plant genomes. Andy's current research involves increasing levels of healthy metabolites in fruit and vegetables using gene editing techniques.

Professor Christian Hartinger (School of Chemical Sciences) completed his education at the University of Vienna in Austria, where he worked as a research assistant before becoming an Erwin-Schrödinger-Fellow at EPFL in Lausanne, Switzerland. Professor Hartinger returned to the University of Vienna in 2009 before joining the University of Auckland in 2011.

Christian's areas of expertise include medicinal chemistry, biological inorganic chemistry, coordination and organometallic chemistry, development of anticancer compounds and bioanalytical chemistry (including mass spectrometry, capillary electrophoresis and hyphenated systems).

Professor Tom ter Elst (Department of Mathematics) completed his undergraduate studies in Mathematics and Physics in Nijmegen in The Netherlands, and received his PhD in 1989 from Eindhoven University of Technology.

He held research and teaching positions at the Australian National University and Eindhoven University of Technology before joining the University of Auckland in 2006.

Tom's areas of expertise include harmonic analysis, operator theory, geometric analysis, subelliptic and degenerate operators, and partial differential equations. His current research focus is on elliptic boundary problems and the mathematical analysis behind tomography and heat diffusion.

Professor Neil Broderick (Department of Physics) received his PhD in 1996 and joined the department in 2011 where he is now Deputy Director of the Dodd-Walls Centre for Photonic and Quantum Technologies.

Neil is an expert on the nonlinear propagation of light in optical fibres and periodic media. He has been working on photonic crystal fibres since they were first invented and has been involved in both developing new methods for analysing their properties and in novel fabrication methods.

Most recently, Neil has been looking at ways to taper photonic crystal fibres and how such tapers can be used to control the properties of optical pulses passing through them. He is also involved in examining other nonlinear periodic media such as fibre Bragg gratings, nonlinear photonic crystals and mode-locked fibre lasers.

Royal Society of New Zealand Fellowships

Four leading researchers from the Faculty of Science were elected as Fellows of the Royal Society of New Zealand. The honours, which recognise international distinction in research and scholarship, resulted in a diverse range of new Fellows at the University.

"We congratulate all of our new Fellows for this recognition of their standing. The number and disciplinary diversity of these Fellows again demonstrates the depth and breadth of leading research carried out by the University," says Professor Jim Metson, Deputy Vice-Chancellor (Research).

The new Science Fellows are:

Professor Donna Rose Addis (School of Psychology), 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 Kathy Campbell (School of Environment) 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.

Professor Rod Dunbar (School of Biological Sciences and the Maurice Wilkins Centre for Molecular Biodiscovery), whose studies of human cellular immunology, especially T cell responses to tumours and how these T cell responses can be stimulated in cancer therapy, have accelerated the advent of successful cancer immunotherapy.

Professor Hinke Osinga (Department of Mathematics), 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'.

The Royal Society of New Zealand offers expert advice to Government and the public, recognises excellence in research and scholarship in science, technology and humanities, promotes science and technology education, publishes peer-reviewed journals, administers funds for research and fosters international scientific contact and co-operation.

Dean's Teaching Awards

Congratulations to the Mathematics Teaching Collaborative from the Department of Mathematics, for winning a Faculty of Science Dean's Award for Excellence in Teaching in 2015.

The Mathematics Teaching Collaborative, comprised of **Professor Bill Barton, Dr Tanya Evans, Dr Julia Novak, Dr Greg Oates, Professor Mike Thomas** and **Associate Professor Caroline Yoon**, has a unique approach to teaching that "has piloted a new dimension in teacher performance, and the peer reviewed publication and invited addresses speak to its effectiveness."

Senior Tutor **Joe Fagan** from the School of Environment was also awarded a Dean's Award for Excellence in Teaching in 2015. Joe, who has been at the University of Auckland for 11 years, attributes his teaching award success to "sharing the teaching experience" with his students.

"I always try to be inclusive – I don't see the lecture as a vehicle to deliver content," says Joe. "Instead I want to create a space where students can question the material, re-think assumptions, consider other perspectives, express their own viewpoints and construct new knowledge."

Not content with winning a Dean's Award for Excellence in Teaching in 2015, Senior Lecturer – and now Associate Dean (Academic) – **Dr Duncan McGillivray** from the School of Chemical Sciences has also been awarded a University Teaching Excellence Award for Sustained Excellence in Teaching in 2016. We may have to put up an extra shelf in his office to house all these accolades... Congratulations Duncan!

Hood Fellowship

This year, the Faculty of Science would like to congratulate three of our professors as recipients of the Outgoing Hood Fellowship.

Professor Christian Hartinger from the School of Chemical Sciences will visit the University of Cambridge where he will be hosted by **Dr Paul Barker**. Dr Barker and Professor Hartinger share research interests in the development of metal-based anticancer agents, specifically organoruthenium anticancer agents.

Professor John Montgomery from the Institute of Marine Science will travel to Bristol University to reunite with University of Auckland graduate **Shane Windsor.** The Fellowship will enable John and Shane to explore the potential for on-going collaboration between their research areas – the role of the cerebellum in motor control and animal athleticism, and bio-inspired flight control, respectively.

Professor Eamonn O'Brien from the Department of Mathematics will visit the UK to collaborate with colleagues at Oxford, Cambridge, Warwick and Imperial College. Professor O'Brien will use the opportunity to conduct joint research on a number of challenging problems in group theory, including some long-standing conjectures and open problems.

The Hood Fund is a special fund that has been created to mark Dr John Hood's Vice-Chancellorship at the University of Auckland. The Fund provides travelling Fellowships for selected academics to undertake short-term research at prestigious international institutions, and enables overseas academics to challenge and inspire research at the University of Auckland.

Please join us in celebration of these other staff successes

Professor Russell Gray and **Associate Professor Quentin Atkinson** from the School of Psychology have won the University of Auckland Research Excellence Award.

Dr Miro Erkintalo from the Department of Physics has received the University of Auckland Early Career Research Excellence Award.

Research Lab Technician **Tim Layt** (School of Chemical Sciences), Technical Manager **Peter Mayne** and Technical Team Leader **Keith Richards** (both from the School of Biological Sciences) won the Vice-Chancellor's Excellence Award for their work with HazTRAC, a collaboration with the Faculty of Medical and Health Sciences to devise an inventory management and tracking system for all chemical and biological materials.

Professor Christian Hartinger from the School of Chemical Sciences was awarded the Society for Biological Inorganic Chemistry (SBIC) Early Career Award.

Associate Professor Cather Simpson of the School of Chemical Sciences and the Department of Physics, was the recipient of the Baldwins Researcher Entrepreneur Award at the 2016 KiwiNet Awards. As one of the founders of Engender Technologies, Associate Professor Simpson also won the agricultural technology sector of the third annual Silicon Valley Forum World Cup Tech Challenge.

Engender Technologies has also been named in this year's TIN100 technology awards in a new category, "Most Promising Early Stage Companies", which was created to recognise the achievements of select start-up companies.

Professor Clark Thomborson from the Department of Computer Science was awarded the iSANZ 2015 Best International Superstar award, for his international research and development work. The goal of iSANZ is to inspire, promote and reflect on the New Zealand Information Security industry and its people.

Professor Nicola Gavey, of the School of Psychology, was awarded one of only 50 Women of Achievement awards by Zonta. The women's advocacy group is celebrating 50 years in New Zealand by recognising, with this special one-off award, the contributions of 50 outstanding New Zealand women towards the empowerment of women in here, as well as around the world.

Margaret wins the Marsden

Distinguished Professor Margaret Brimble of the School of Chemical Sciences was awarded this year's Marsden Medal for a lifetime of outstanding achievement.

Margaret has dedicated her career to the advancement of the chemical and life sciences in New Zealand, including break through work in drug discovery and promotion of science both within the science community and to the wider public.

Her work on a drug treatment for Rett Syndrome, a neurodevelopment disorder that affects mainly girls, is set to provide the first-ever cure for a disorder that affects the child's development at around eighteen months of age.

"Margaret Brimble is an outstanding ambassador for women in science and science generally."

The drug, trofinetide/NNZ2566, has gained orphan drug and fast-track status from the US Food and Drug Administration and is also being developed for treatment of Fragile X Syndrome, an inherited cause of intellectual disability (particularly among boys), and as a potential treatment for traumatic brain injury.

The New Zealand Association of Scientists, which awards the Marsden Medal, called Professor Brimble's work on trofinetide "a unique achievement" and said she was an outstanding ambassador for women in science and science generally.

Vice-Chancellor Professor Stuart McCutcheon offered Professor Brimble his warmest congratulations.

"I am delighted Professor Brimble's scientific achievements have been recognised in this way – the Marsden Medal represents recognition by her peers of a career that has been truly outstanding," he said.

Dean of Science Professor John Hosking was particularly pleased to see Professor Brimble recongised for her involvement in a wide range of science activity.

"Her mentorship of younger scientists, her engagement with a wide range of communities, along with her support of women taking up science as a career, add up to a lifetime of dedicated service to science," he said.

Emeritus Professor Michael Corballis

Royal Society Research Honours for Top Scientists

Rutherford Medal

'Why is the left hemisphere of the brain different from the right hemisphere?', 'How did language evolve?', 'What is memory for?'

These questions have engrossed **Emeritus Professor Michael Corballis** for the best part of 50 years, and now his life's work has been acknowledged with the award of the Rutherford Medal – the highest honour bestowed by the Royal Society of New Zealand, for an exceptional contribution to the advancement and promotion of knowledge of science for the benefit of New Zealand Society.

After beginning his scientific career in the field of Mathematics, Professor Corballis switched to Psychology, gaining his masters degree at the University of Auckland before moving to Canada where he studied for his PhD at McGill University. He has been based in the School of Psychology for the majority of his academic career, becoming Emeritus Professor in 2008.

Professor Corballis has made significant contributions in the areas of evolution, linguistics and neuropsychology related to understanding the human mind. He is well known for his work on asymmetry and handedness, and has championed the theory that humans' capacity for complex verbal language evolved from the use of hand gestures to communicate.

Professor Corballis has also investigated the human brain's capacity for 'mental time travel', a phrase he coined to describe humans' ability to think about both past and future events.

In addition to his publications in the world's most prestigious academic journals, Professor Corballis has written seven popular books with the intention of making difficult concepts accessible to a wide audience. His most recent, *The Wandering Mind: What the Brain Does When You're Not Looking*, was nominated for the Royal Society's Science Book Prize in 2015 and rated a Book of the Week in the *Times Higher Education Supplement*.

Professor Corballis says one of the many satisfactions he has had over his long and successful career is the recognition of Psychology as a respected scientific discipline.

"Psychology has very much come of age as a science, which is quite different from how it was when I began my career, so that is something I'm very happy about."

Jones Medal

Emeritus Professor Alastair Scott from the Department of Statistics was awarded the Jones Medal in acknowledgement of his lifetime contribution to the field of Statistics.

Professor Scott's career as a statistician has spanned more than 50 years. He has contributed path-breaking research in survey sampling and biostatistics, and has been honoured for his service to the wider statistical profession in academia, Government and society.

On receiving the Jones Medal, Professor Scott said, "I feel very honoured to receive the Jones Medal named in honour of our most celebrated mathematician, Sir Vaughan Jones.

"This new connection with Vaughan also gives me personal pleasure. The best class I ever taught contained both Vaughan and his great friend Keith Worsley, my most successful PhD student."

Emeritus Professor Alastair Scott

Professor Scott joined the University of Auckland in 1972 and was head of the Department of Statistics for eight years. He has continued to work and advise in his retirement.

Hutton Medal

Professor Wendy Nelson from the School of Biological Sciences was honoured with the Hutton Medal for her contribution to expanding the knowledge and understanding of the diversity, biology and evolution of New Zealand's seaweeds, also known as macroalgae.

In her 35-year career, Professor Nelson has documented New Zealand ocean flora throughout the region from Te Rangitahua/Kermadec Islands to the Subantarctic Islands. Her work has demonstrated the importance of New Zealand in understanding the evolutionary relationships of macroalgae in the world's oceans.

In 2013 Professor Nelson made her extensive knowledge available to a wide audience when she published her popular guide to New Zealand seaweeds.

Professor Nelson is a member of the Joint Graduate School in Coastal and Marine Science, employed by both NIWA and the School of Biological Sciences.

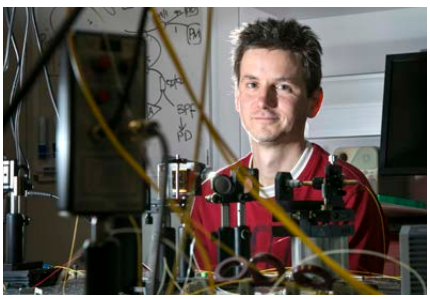
Professor Wendy Nelson

Hector Medal

Associate Professor Stéphane Coen from the Department of Physics received the Hector Medal for his fundamental research into optical phenomena in optical fibres and microresonators. In particular, his work focuses on temporal cavity solitons, pulses of light that can self-organise and 'talk' to each other.

"In the future, temporal cavity solitons might allow your cell phone to keep time accurately enough that it could be used as a precise scientific measuring device. You could then use your cell phone as a spectroscope to identify chemicals in the environment," said Associate Professor Coen.

Associate Professor Coen received his PhD from Université libre de Bruxelles (ULB) in Belgium and was employed as a post-doctoral research fellow at the University of Auckland in 2000. He joined the Department of Physics as a lecturer in 2003, and was awarded the Research Medal of the New Zealand Association of Scientists in 2015.



Associate Professor Stéphane Coen

Two heads are better than one

Dr Duncan McGillivray and **Associate Professor JC Gaillard** have been appointed Associate Deans (Academic and Postgraduate) for the Faculty of Science.

While Duncan and JC adjust to the combination of research and teaching commitments alongside their new leadership roles within the faculty, Associate Professor Gordon Miskelly is assuming the role of Associate Dean (Doctoral) and Margaret Goldstone is retiring after 17 years as Associate Dean (Academic).

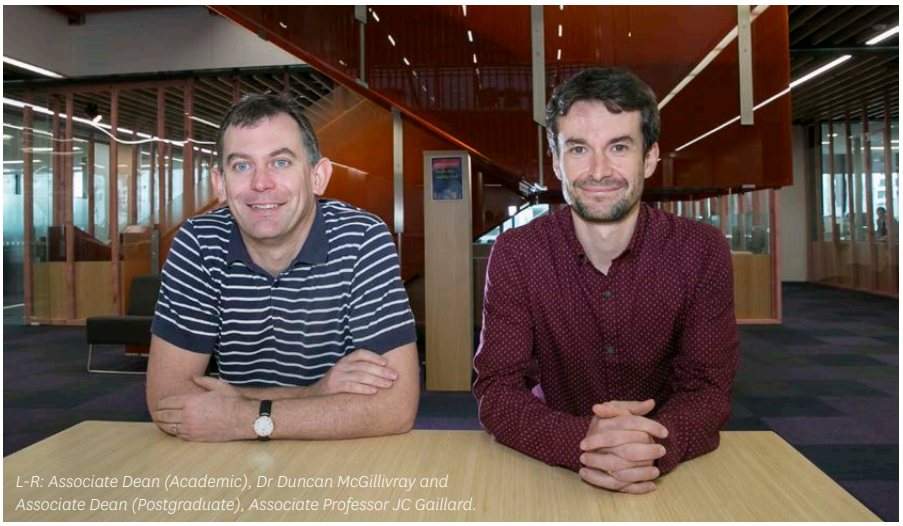
In his role as Senior Lecturer in the School of Chemical Sciences, Duncan studies how surface structures of biological systems use surface sensitive methods. As Associate Dean (Academic), Duncan's aim is to maintain the high quality of teaching in the faculty by reviewing the structure and delivery of undergraduate and postgraduate programmes.

As Associate Professor in the School of Environment, JC's research focuses on participatory mapping and community-based disaster risk reduction training for NGOs and other civil society organisations, communities and local government. Now JC is Associate Dean (Postgraduate), he is keen to encourage a larger cohort of stakeholders to design strategies to increase enrolment at the postgraduate level. He aims to encourage approach to teaching and learning at both classroom and policy levels.

Duncan and JC welcome their new roles as Associate Deans with much enthusiasm at a time of great change in the faculty.

"To be in this role when the faculty is in the process of looking closely at its portfolio of qualifications offered to students is a particularly exciting time," says Duncan.

To learn more about JC's research on participatory mapping, head to page 15.



L-R: Associate Dean (Academic), Dr Duncan McGillivray and Associate Dean (Postgraduate), Associate Professor JC Gaillard.

New Head of Department

Professor Bernd Krauskopf

We're very pleased to welcome **Professor Bernd Krauskopf as the new Head of the Department of Mathematics**. Professor Krauskopf became the new head of Mathematics in February 2016 after joining the University of Auckland in 2011. He earned his MSc in Mathematics from RWTH Aachen University in Germany, his PhD from the University of Groningen in the Netherlands, and he has held positions at Cornell University, Vrije Universiteit Amsterdam and the University of Bristol.

Professor Krauskopf's areas of expertise include dynamical systems; bifurcations of vector fields and maps; computational methods for dynamical systems; systems with delayed feedback; nonlinear dynamics of laser systems; and aircraft ground dynamics. His current research includes the emergence of chaotic dynamics; delay effects in climate models and control theory; slow-fast dynamics and isochrones; and pulsing lasers.

Science's marvellous Marsden Fund success

Research in the Faculty of Science at the University of Auckland has been awarded a total of $9.6 million over the next three years for a broad range of projects, from the timing of volcanic eruptions to computer software protection.

This year's Marsden Fund successes include a total of 17 research groups in Mathematics, Environmental Science, Psychology, Computer Science, Biological Sciences and Chemical Sciences.

Dean of Science Professor John Hosking said the number and range of research groups that had attracted funding this year showed that Science at the University continued to reach the highest standards.

"I'm extremely pleased that the quality of science right across the faculty has been recognised in so many areas," he said. "This is an outstanding result and I warmly congratulate all the research groups that have been successful this year."

"Science research at the University has been awarded a total of $9.6 million over the next three years."

A list of funding recipients from the Faculty of Science:

Dr Jodie Johnston and **Dr Ghader Bashiri** from the Maurice Wilkins Centre and the School of Biological Sciences

Professor Debbie Hay from the School of Biological Sciences

Dr Anne Gaskett from the School of Biological Sciences

Dr Christopher Walker from the School of Biological Sciences

Dr Erin Leitao from the School of Chemical Sciences

Professor Alexei Drummond, **Dr David Welch** and **Dr Timothy Vaughan** from the Department of Computer Science

Dr Miika Hannula and **Associate Professor Sebastian Link** from the Department of Computer Science

Professor Joel Baker and **Emeritus Professor Paul Williams** from the School of Environment

Dr Kevin Simon from the School of Environment

Dr Tom Baker from the School of Environment

Dr Simon Barker, **Dr Michael Rowe** and **Dr Daniel Hikuroa** from the School of Environment

Professor Steven Galbraith and **Associate Professor Giovanni Russello** from the Departments of Mathematics and Computer Science

Professor Hinke Osinga and **Professor Bernd Krauskopf** from the Department of Mathematics

Professor Rod Gover from the Department of Mathematics

Professor Neil Broderick and **Associate Professor Kasper van Wijk** from the Department of Physics

Associate Professor Tony Lambert from the School of Psychology

A very special mention must go to **Distinguished Professor Marston Conder**, **Associate Professor Jianbei An** and **Professor Eamonn O'Brien** from the Department of Mathematics. They are the only research group at the University to have had continuous support from the Marsden Fund since 1995.

News about our students

Well done ‘Etuate

Congratulations to **Computer Science student ‘Etuate Cocker**, the first successful Computer Science PhD student to come from the Kingdom of Tonga.

“It is a great feeling knowing that I am the first Tongan to receive a PhD in Computer Science. I have extended the level of Computer Science qualification for Tongans to another level,” says ‘Etuate. “My extended family are proud of my achievement.”

Even though ‘Etuate was very fortunate to be a recipient of a University of Auckland Doctoral scholarship, he was still required to engage in part time teaching to support his family, and Faculty of Science Kaiārahi Michael Steedman is full of praise for the show of determination and courage shown by ‘Etuate.

“It is a great feeling knowing that I am the first Tongan to receive a PhD in Computer Science.”

“We’re always very proud of the successes of our Tuākana team members and students, and particularly so with ‘Etuate,” says Michael. “He was a positive influence on the students he tutored and again so with his outstanding achievement. We’re very happy for him and his family.”

‘Etuate’s supervisor Senior Lecturer Dr Ulrich Speidel is in awe of ‘Etuate’s ability to fundraise throughout his study. “A lot of Etuate’s travel was paid for by fellowships or grants,” says Ulrich.

Currently an employee of Spark NZ Ltd, ‘Etuate, who has three children with his wife Keti, is excited to have passed the oral examination, the last step in order to attain his PhD. “This degree has been the most challenging work that I have done in my life and I am happy to be included in the list of individuals that have crossed the finish line.”

100% pass rate for Psychology’s ABA Programme

Graduates of the Applied Behaviour Analysis (ABA) programme at the School of Psychology achieved a 100 percent pass rate in the 2015 round of the Behaviour Analyst Certification Board (BACB) certification exams.

Out of over 200 course sequences approved by the BACB worldwide, the programme is one of the few in the world to perform at the top level. So, what is the key to the programme’s success?

“Applied behaviour analysis is a practical science,” says programme director Dr Javier Virues-Ortega, Senior Lecturer in the School of Psychology. “ I think students feel empowered by actually implementing behavioural interventions and observing real differences in the quality of life of vulnerable populations.”

Senior Lecturer Dr Angela Arnold-Saritepe highlights the dedication of the staff in “providing students with exceptional education opportunities within the scientist practitioner framework by way of hands-on first-year projects and intern experiences.”

Angela also emphasises the programme’s links with and support from the community, specifically the Sommerville Special School and Rescare Homes Trust.

As well as the hands-on experience, staff recognise that what makes the programme so attractive to potential students is the ranking of the programme and the international and domestic qualification achieved. However, the collegiality between the staff and students continues to be important for all.

Computer Science student ‘Etuate Cocker

Eliza McCartney celebrates with her parents at the Blues Awards.

Science cleans up at the Blues Awards

Pole vaulting sensation **Eliza McCartney** has topped off an incredible year by adding a University of Auckland Blues Award to her list of achievements.

"It's amazing that such a prestigious university with so many students goes to the effort to recognise achievements beyond studies. It is really positive for the students involved in sport and takes some of the pressure off balancing studies as well as sports commitments," Eliza says.

In the 2016 Blues Awards Ceremony on September 22, Eliza, who is studying toward a Bachelor of Science in Physiology, was honoured with a Most Meritorious (Sport) award.

"It's amazing that the University goes to the effort to recognise student achievements beyond studies."

It recognises Eliza's December 2015 achievement when she jumped 4.64m to break the world junior pole vault record.

Her bronze medal at the Rio Olympics was outside the eligibility period for the 2016 Blues Awards, which ended in August.

Record breaking hurdler **Joshua Hawkins** (Ngāti Tamatera) was named Māori Sportsperson of the Year 2016.

He joins the likes of Eliza (2015 Sportswoman of the Year) and Black Stick George Muir (2015 Sportsman of the Year) as the recipient of a prestigious University of Auckland Blues Award.

From Mt Wellington in Auckland, Joshua broke a New Zealand record in the 100m hurdles in 2015 with a time of 13.69 at the Australian Championships in Brisbane. He also represented New Zealand at the New South Wales Championships and Sydney Track Classic.

Hurdling has a very fine margin of error and there is a strong technical aspect, which Joshua has been finessing since he was 12.

Joshua completed his Bachelor of Science majoring in Geography and Environmental Science last year and is now pursuing an honours degree.

"It's really incredible to see everyone in this room who are at the top in their field and then to be acknowledged by the University," Joshua says. "One of the guys I used to train with actually got this award a couple of years ago, it's really cool to see the people that have gone before you and the places they have gone on to achieve in. It's a huge honour to get this award."

A University Blue is the highest accolade to be earned at a Tertiary level, traditionally awarded for excellence in a sporting code. The award originated from the rivalry of the Boat Race between Oxford and Cambridge universities in England, where the navy blue Oxford and light blue Cambridge flags displayed by the crews became a symbol of the competition between the two prestigious universities. The University of Auckland has extended the Blues Awards beyond sports to include exceptional achievement in the Arts and in Service and Leadership categories.

A total of 152 awards were bestowed at the event, hosted by Mike McRoberts from TV3. Eliza and Joshua join five Science students who received awards for their achievements in the Arts, six who were recognised for their contribution to Service and Leadership, and another 20 in the Sport category.


Joshua Hawkins at the starting line and below, accepting his Blues Award.

Three Minute Thesis winners (L-R): Robert Vennell (Masters Runner-up), Kate Riegle van West (Doctoral & People's Choice Award winner), Keith Sutherland (Citizen Watches), Sobia Mughal (Masters winner) and Sam Hitchman (Doctoral Runner-up)

Student success in three minutes

Pitching your PhD thesis in three minutes, using a single, static PowerPoint slide as a visual aid? Not a problem for two of our Science students.

We offer congratulations to Sam Hitchman and Robert Vennell for their outstanding presentations in the Three Minute Thesis competition.

Sam Hitchman from the Department of Physics won the runner-up doctoral prize for his thesis "Laser generated quakes: from Earth to apples", while Robert Vennell from the School of Biological Sciences won the masters runner-up prize for his thesis "A Damage Function for Wild Pig Rooting in New Zealand Forests".

Developed by the University of Queensland in Australia, the Three Minute Thesis (3MT®) competition is run in universities worldwide and is an academic competition that challenges doctoral and masters students to describe their research within three minutes to a general audience.

3MT® celebrates the discoveries made by research students and encourages their skill in communicating the importance of research to the broader community.

It's the ultimate "elevator pitch" challenge!

Potentia Scholarship

The 2016 Potentia Scholarship has been awarded to talented Computer Science student Ena Sun.

Ena, who is her final year of a Bachelor of Science and Bachelor of Commerce Conjoint Degree with a Computer Science and Finance major, applied for the scholarship last year and was unsuccessful. But the experience of meeting the heads of faculties and important figures in the field as part of the interview process - inspired Ena to "have another go."

Faculty of Science Dean Professor John Hosking, Professor Robert Amor (Head of Department, Computer Science), Dr Yun Sing Koh (Senior Lecturer, Computer Science) and Tim Pannabecker (Development Manager, Alumni Relations and Development), attended the event and helped Ena celebrate her milestone. They also inspired the young student further.

"We talked about the research going on in the faculty," says Ena. "I definitely feel more motivated for the coming semesters – there is a lot of room for improvement. I feel surprised but grateful that my efforts have been recognised and also determined to keep challenging myself."

Anna and the ants

Joint Gradate School in Biodiversity and Biosecurity PhD candidate Anna Probert has been appointed as one of four biosecurity champions by the Ministry of Primary Industries.

The role is to use their networks to help raise awareness of biosecurity and facilitate consultation on the recently released Biosecurity2025 discussion document. Biosecurity2025 is about reviewing and future-proofing New Zealand's biosecurity system, and the ministry is seeking feedback.

Anna's research on risk assessment using introduced ants as a model gives her an ideal background to engage on the importance of science to underpin our biosecurity system.

"It is essential that the information we gain through research is disseminated into the wider scientific and broader communities, to help reinforce our overall planning and prioritisation and deliver on our biosecurity actions," said Anna, in her speech at the launch in Parliament on 26 July, 2016.

Ankita sets the stage alight at the AMP IGNITE Award

PhD student Ankita Gangotra, from the Department of Physics, is the 2016 winner of the AMP IGNITE competition.

AMP IGNITE is a unique opportunity for PhD students to pitch their research as an entertaining performance piece in front of a live business audience.

Students have just 150 seconds to pitch an idea to a panel of esteemed judges and compete against their peers through storytelling, performance art, dance, comedy, music or even magic.

As part of her application for the award, Ankita was required to prepare a presentation to translate her research about testing the mechanics of cells and exosomes using nanopipettes to see how they are impacted by a disease, in an entertaining way.

In the lead-up to pitch night, participants have the chance to work with a team of mentors who help to transform students into stars.

"It was a privilege to pitch my PhD in front of so many people. Every one of the finalists was brilliant and I just feel so lucky to have won."

"I first went for the two mentoring workshops organised by AMP and Edge Creative, which were very useful," says Ankita. "It was a privilege to pitch my PhD in front of so many people. Every one of the finalists was brilliant and I just feel so lucky to have won."

AMP awarded Ankita $5,000 towards a personal scholarship and Ankita is 'thrilled' to have won IGNITE, especially because she is so early into her nanotechnology research.

"I'm really enjoying my project; having an encouraging and supportive supervisor like Senior Lecturer Geoff Willmott, helps every step of the way," says the talented scientist.

AMP IGNITE helps students to explore their creative side, think differently, gain confidence, and experience the rush and spontaneity of pitching.

From sea to sky

For Marine Science graduate Scott Kington, one of the most enjoyable aspects of his masters degree was having a reason to dive all the time – "What's not to like about that?" he asks.

Another benefit was the combination of practical and theoretical work, which has prepared him perfectly for his role as co-founder and managing director of Blunt™ umbrellas. By their own definition they're 'the world's best umbrellas – designed by New Zealand'.

"I was working in a business that was focused on the water and wastewater sector when I met an inventor and we embarked on a crazy journey to re-invent the umbrella industry – with a wild dream to create a globally recognised brand," says Scott.

Blunt™ umbrellas are the only umbrellas with a fully tensioned canopy, patented Blunt™ tips and telescopic ribs. The technology creates an unflappable aerodynamic structure that provides maximum control in the wind. Translation: umbrellas that won't blow inside out.

Blunt™ umbrellas are different from the bog-standard brollies of old; they are built to withstand extreme weather conditions and tested accordingly, in a series of mad scientist-appropriate experiments that use wind tunnels and high-pressure hoses to replicate a battering from the elements.

"Despite the science behind the design of Blunt™ umbrellas, there really is no direct link from a Marine Science degree to creating a global brand other than that it helps you to think outside the box.

"It leads me to question things more, and to really try to understand the environment we are operating in – both from a social and a business perspective. In an environment where change is so prevalent, that in itself is exceptionally important," he says.

Aside from these transferable skills, Scott's degree has given him the confidence to dive in to his various ventures:

"It also instils a confidence that I can find answers, which is a mindset that crosses over to business very well.

"As of today, we sell our umbrellas into 30-odd countries. Taking our product from start-up stage, covering everything from brand to manufacture to sales, and turning it into a growth business – it's been a great experience."

Of all his experiences at the University of Auckland, Scott really values the time he spent at the Leigh Marine Laboratory.

"The Leigh Marine Reserve is a piece of legislation we should all be proud of. It has allowed successive generations of students (as well as the public) to learn the value of protecting ecosystems. The Leigh laboratory was a highlight of my education. I can't speak of it highly enough as a place to study."

From being submerged in the sea to being sheltered from the sky, it seems Scott's career path since graduation has always involved H_2O.

Scott Kington completed a BSc Zoology and MSc(Hons) Marine Science at the University of Auckland.


LOS-OC
LABEY

Participatory Mapping

Living in a high tech world, the notion that someone would use papier-mâché, masking tape and push pins to create a working model for disaster risk reduction (DRR) seems almost primitive. But if you happen to live in a remote Philippines village, that model could mean the difference between life and death if disaster strikes.

Based in the University of Auckland's School of Environment, Associate Professor "JC" Gaillard is a recognised authority in Participatory 3-Dimensional Mapping (P3DM) which is designed to embrace a diversity of views on natural hazards and disasters – and bridge sometimes significant gaps between various stakeholders.

"Most of these gaps at the moment devolve around those who suffer most from disasters who are often at the margin of society" says JC, pointing to the likes of homeless people, ethnic minorities, children with disabilities, gender minorities and prisoners who are most vulnerable because of unequal or skewed power relations.

It's important, he says, to understand that minority groups are not helpless victims. On the contrary, they have certain capacities – including local knowledge – that's valuable in planning for DRR. "The point is to open up a space for all these stakeholders, to make the minorities tangible and credible and trusted within this kind of multi-stakeholder dialogue."

That's where the papier-mâché, polystyrene and other fairly simple materials come into play when minority groups, government officials and other stakeholders get round the planning table. "We encourage them to build maps in three dimensions because it's very tactile and it's very tangible. It's like a bird's eye view of their place so it works very well in places where you lack access to formal maps or technology."

In terms of DRR, the three main goals are to identify the hazards, whether it be earthquake, flood or diseases in the Philippines, and then establish the vulnerabilities of the local people and their capacities to deal with a disaster. External advisors such as scientists will also share their knowledge and georeference the data.

In addition to creating a map that is intelligible to all stakeholders, the process opens up a dialogue that enables them to conduct a disaster risk assessment and plan for DRR based on both inputs from the bottom up and actions from the top down – such as building a dyke for flood protection or developing an early warning system for tsunami.

By providing what's called 'participatory numbers' – such as counts, ranks and propor tions of houses, pregnant women, children, animals and vehicles identified by individual push pins – JC says this local knowledge helps with planning things like evacuation procedures.

"Then you have tangible numbers to actually discuss how to overcome this challenge with your government. There's a number behind it, it's not just 'oh we need a boat or we need an evacuation vehicle' because we have plenty of pregnant women in our village."

In an ideal world the maps should also be constantly updated to reflect changing circumstances. Indeed, one Filipino village has turned its map into a glass covered table located in the village hall where local councillors meet for planning purposes.

However scientists need to be realistic about what they can achieve. "We have to be realistic that it's about enhancing capacities towards preparedness, more than addressing the root causes of their vulnerability" says JC. "It's very difficult to address rooted problems like poverty at our level without having the government to step in."

"So when we talk about disasters and hazards, it's not only rare and extreme events. We look at people's everyday lives and what threatens their livelihoods."

Nevertheless, by identifying community vulnerabilities, participatory mapping for DRR has potentially longer term implications for countries like the Philippines where the data is now being used to improve health services such as food programmes for children. "If you improve access to health in your village then it reduces vulnerability in the long term."

First developed in Thailand in the early 1990s for country planning purposes, participatory mapping was then picked up by practitioners in Vietnam and the Philippines to assist with land conflict resolution and natural resources management.

However the tool can be tweaked to fit many purposes. For instance, the Australian Research Council is currently funding a project on a small island in the Northern Territory where underground and surface water sources such as aquifers and wells are being mapped to create a dialogue around water resources in order to improve water management with the local Aboriginal community.

The use of P3DM in a New Zealand context is far less likely, if only because most people are more familiar with mapping techniques based on topographical maps, aerial photographs and satellite images. Interestingly though, thanks to funding from the National Science Challenge, JC currently has PhD student Katherine Hore working on a DRR project in Franz Josef.

It's a multi-faceted exercise. In addition to sitting on top of an alpine fault with the attendant earthquake hazards, Franz Josef is also prone to flooding as evidenced by the destruction caused when the Waiho River bursts its banks in March 2016 and forced the evacuation of residents. But one of the most pressing issues for locals is the retreat of the glacier and the potential loss of tourism.

"So when we talk about disasters and hazards, it's not only rare and extreme events. We look at people's everyday lives and what threatens their livelihoods."

There are also places where JC has had to concede that participatory mapping is challenging. Overcoming unequal power relationships amongst castes in South Asia has been considered as a major step to sustainable DRR, and he says that conducting such projects is challenging when women are still being stoned in public in countries like Nepal.

"I've been to Nepal thrice and I still struggle to understand basic elements of culture, it's so complicated. It's even more complicated than in India in the sense that you've got ethnicity that overlaps with caste."

Privacy concerns can also raise issues. While the Philippines is fairly relaxed about identifying vulnerable people with health issues, that's not the case in countries like France. "If you put the push pin for a person with disabilities on your map then you break the law for disclosing information that should be kept quiet."

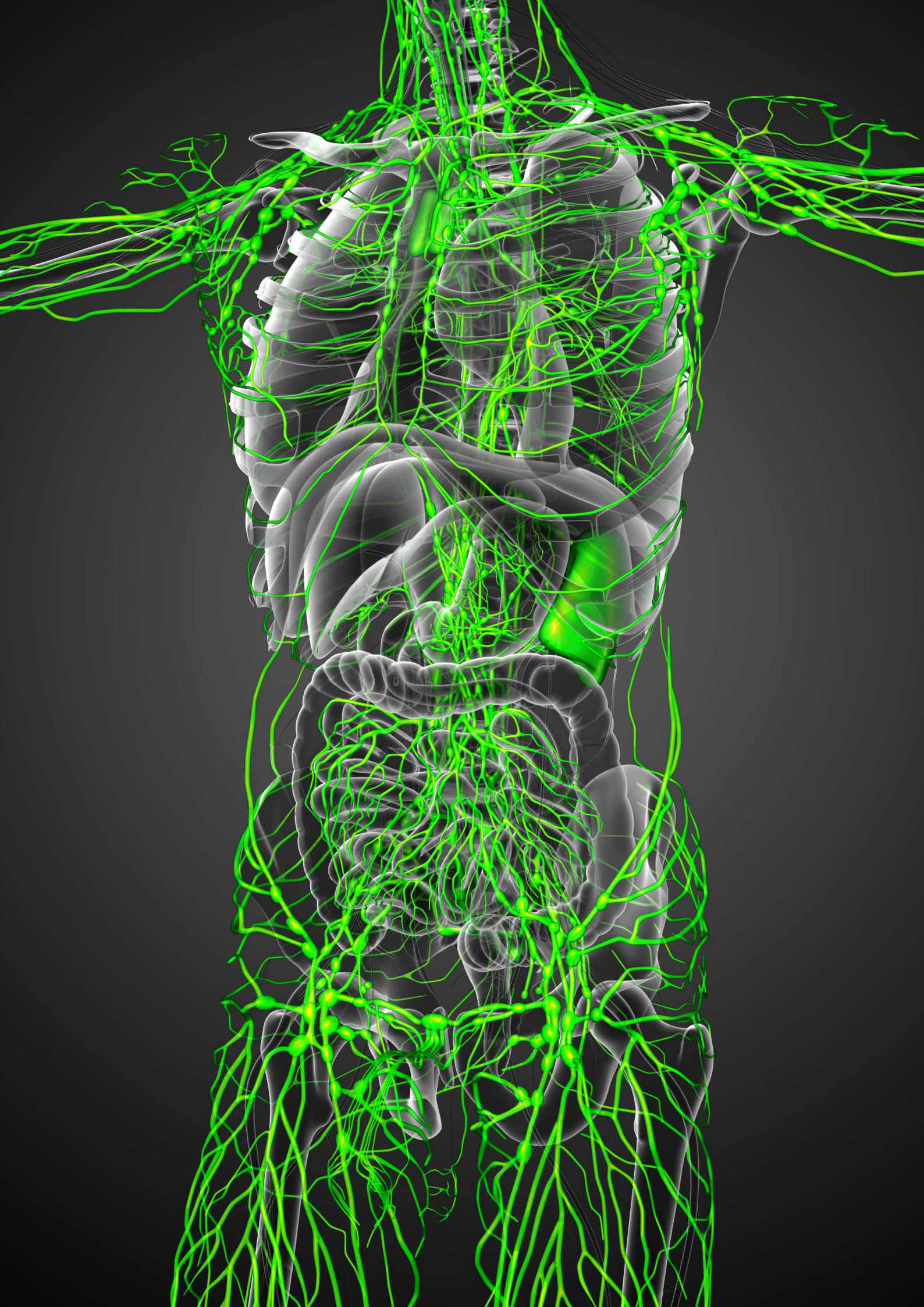
Some of the information gathered in the Philippines has also been considered sensitive for intelligence and military purposes, and JC says he faced an ethical dilemma in Cambodia where local women wanted to identify the victims of domestic violence. "Domestic violence was an issue for everyone, so they wanted to put that on the map and I was – as a Westerner – saying, let's think twice about it."

The biggest challenge though, is to convince locals to use participatory mapping. A field manual is freely available through CAFOD (see link below), the UK-based Catholic international development charity, but JC says it can be difficult to emphasise the benefits of DRR in a country like Cambodia when the major concerns are around WASH – water, sanitation and hygiene. "You have to make the tool relevant and that's easy because you can use the tool for anything."

Like any Boy Scout, it's also about being prepared. "I've always got masking tape with me. I never leave the office without masking tape. It's for teaching, it's for everything." ■

Link to Participatory Mapping field manual: www.preventionweb.net/educational/view/35534

A participatory map from a project in Tublay, Philippines in July 2015. Photo: JC Gaillard



Preventing organ failure in critical illness

It's a sobering thought. Every year an estimated 20 million people are admitted to Intensive Care Units around the world with critical acute diseases (AD) and up to thirty percent of them will die from multiple organ failure.

There is no specific treatment for this common mode of death, and the management is generic and supportive, including fluid resuscitation, antibiotics, ventilation and kidney dialysis. The organ systems that fail most commonly are the heart, lungs and kidneys.

Identifying the drivers of this often fatal failure of vital organs is one key focus of ongoing research at the University of Auckland's Applied Surgery and Metabolism Laboratory (ASML). The new paradigm that they are investigating is that the lymph – rather than the blood – derived from the intestine is the key driver of organ failure. This lymph bypasses the liver and empties into the systemic circulation immediately proximal to the vital organs that fail.

During AD, the intestine is injured because the body sacrifices intestinal perfusion to prioritise blood supply to vital organs. The injury results in altered lymph composition which can become toxic to cells and organ systems.

ASML research to date has been about understanding the anatomy of the lymphatic system and unravelling the changes in composition during AD. The long term objective "is to find lymph directed interventions that will disrupt that progression towards organ failure," says Dr Anthony Phillips, a senior lecturer who established the cross-faculty ASML based in the School of Biological Sciences (SBS) with Associate Professor Anthony Hickey (SBS) and Professor John Windsor (School of Medicine, Faculty of Medical and Health Sciences (FMHS)).

Several interventions are currently being investigated through the generous funding of the Health Research Council of New Zealand which recognises the significant clinical and economic burden of critical acute disease New Zealand – particularly in Māori who are over-represented in AD statistics.

One potential intervention is to drain thoracic duct lymph externally to prevent it reaching the systemic circulation. "If we put the lymph in a bucket instead of allowing it to circulate in a person then there should be some therapeutic benefit," says Dr Phillips. However that's easier said than done because the lymphatic vascular system sits very deep in the chest and the insertion of a drainage tube is potentially invasive and traumatic.

Nevertheless, progress is being made through both clinical and pilot studies with the next step being to transition into the human setting. "We've obtained funding to find a way that uses intervention radiology techniques, rather than surgery, to access the lymphatic system and divert it in a very ill person so those toxic factors can't enter their circulation."

A second longer term option is the use of drugs to alter the composition of gut-lymph. New research in collaboration with Dr Natalie Trevaskis at Monash University in Australia is looking at the development of new lymphatic drug delivery systems. This approach leverages off the clinical expertise in Auckland and the pharmaceutical knowledge at Monash. "It's going to be a very productive collaboration for us," says Dr Phillips.

The third approach is to protect the intestine from injury and thereby reduce the toxicity of intestinal lymph. This involves an international cross-cultural research collaboration between the Auckland Pancreas Research Group and the Department of Integrated Traditional Chinese Medicine and Western Medicine in West China Hospital in Chengdu, which has been ranked first in China over the past five years for scientific output.

Considered a unique opportunity to combine knowledge and expertise between New Zealand and China, the so-called 'gut-rousing' project will evaluate three promising treatment strategies to reduce gut injury; intravenous fluid resuscitation, specific drugs, and the use of a traditional Chinese herbal medicine which is known to reduce gut infections and improve clinical outcomes.

The discovery by the ASML of microRNAs in lymph has also provided a relatively new class of potential prognostic markers for diagnosis and prediction of outcome in AD. "We've used the lymphatic story which we developed in the laboratory first to then translate that through into finding markers of disease severity," says Dr Phillips.

According to Professor Windsor, these lines of research offer "real hope" and represent "a new paradigm" in the fight against multiple organ failure by targeting treatment to a previously unrecognised driver. And while lymphatic biology has enjoyed something of a renaissance globally in recent years, Dr Phillips believes that the University of Auckland "is developing international prominence for this type of research, particularly in the application to critical acute disease."

The leadership profile has been hugely aided by the establishment of the ASML. Kick-started by funding from the Vice-Chancellor's Strategic Research Fund, it is the outcome of a long-standing collaboration between SBS and the Pancreas Research Group in the Department of Surgery at FMHS.

The current vision is to formally join the ASML to a number of other University of Auckland surgical research initiatives including the Surgical Centre for Outcomes Research and Evaluation (SCORE), the Surgical Engineering Laboratory (SEL), and the Global Surgery Research Group (GSG) in order to form a new cross-faculty and world class Surgical Translational Research (STaR) Centre by 2020.

In practical terms, that involves creating a 'bench-to-bedside-to-community' research continuum that will help attract qualified doctors and surgeons back into the University to conduct basic surgical and scientific research in a dedicated, supportive and streamlined laboratory and applied setting.

Having languished for a variety of reasons, the resurgence of surgical research and the dramatic increase in the number of people wanting to train in 'academic surgery' has led to an unprecedented increase in postgraduate surgical students at the University of Auckland.

Increased funding is another significant measure of success. Over the past eight years, the laboratory has secured multiple external grants from the Health Research Council, Maurice and Phyllis Paykel Trust, National Heart Foundation, Auckland Medical Research Fund, Lottery Health and the Ministry for Business, Innovation and Employment.

The research is very much a collaborative arrangement which underpins the long standing co-primary supervision formula used by Professor Windsor and Dr Phillips for ASML activities and those undertaking doctoral research. Considered unique at the time it started, this approach has offered the advantage of a coordinated basic laboratory and clinical programme to trainee surgical researchers.

Bacterial communication is another current area of interest for the ASML given the problems associated with antibiotic resistance.

Bacterium-to-host signalling during infection is a complex process involving proteins, lipids and other diffusible signals that manipulate host cell biology for pathogen survival. The hypothesis that's being tested is that bacteria survive by modulating their host with messages sent by way of vesicles that contain ribonucleic acid (RNA).

The bacteria being put under the microscope in Auckland at the moment include *Escherichia coli* and *Staphylococcus aureus* that can cause a common range of infections. "Our work at the moment is trying to determine how the bacterial vesicle cargo can influence the host in a way that facilitates infection," says Dr Phillips. This knowledge may well provide a new mechanism for antibiotic development.

As Dr Phillips puts it, "at the ASML, we are able to take a range of important surgical problems and apply the latest basic science techniques in order to underpin new clinical solutions." ■

MovinCog

MovinCog Initiative

When it comes to child education, it's hardly surprising that some parents are willing to pay thousands of dollars for so-called 'brain training' programmes to help children with learning difficulties associated with neurological disorders such as ADHD or dyslexia. Unfortunately, there's been precious little scientific evidence to support the marketing hype. Until now.

Thanks to some new research at the University of Auckland, parents worldwide are about to be given access to a training programme that's not only based on robust scientific evidence – it will also be free.

Launched in January 2015, the MovinCog Initiative was born from the realisation that too few individuals and schools have access to the remediation programmes they need due to financial constraints or the lack of scientific evidence.

"Being scientists without financial incentives, we decided to implement a programme that would be free of charge and evidence-based" says Dr David Moreau, who jointly heads the project with Associate Professor Karen Waldie – an academic duo from the School of Psychology many years of experience through their respective interests in cognitive training and learning disabilities.

View of Cerebral Space. Features of the planet, such as oceans, trees and flowers provide direct feedback about cognitive performance. The eight mini games visible on the right side of the screen target different abilities critical to academic achievement.

At the heart of MovinCog is a clever software programme in the form of eight mini-games – known as 'Cerebral Space' – that have been designed to target specific learning disabilities associated with thinking, language and numeracy.

The computer games revolve around an initially unattractive grey and fragmented planet with lots of space junk. Children are free to explore whatever game they like and positive feedback is provided in the form of visual elements like flowers and oceans that help beautify the planet. In addition to being fun, the feedback incentivises participants to play different games in order to make the entire planet beautiful.

Different games address different conditions. For instance, Critter Count has been designed to target dyscalculia (dyslexia with numbers) by getting participants to count the number of eyeballs on a friendly-looking monster. Like any computer game, the degree of difficulty and speed increases as performance improves.

While the programme is potentially useful for anyone who plays the games, the intervention is designed to encourage the 'transfer' of general skills so that those children who may suffer from conditions like Attention Deficit Hyperactivity Disorder (ADHD) can pay attention can pay attention to the content that's being delivered to them inside or outside the classroom. As Dr Moreau explains, it's giving them a little boost at one point in time "to make sure that they can actually stay afloat and potentially use those new skills that we're training them on for other purposes."

It's clever, intuitive software which importantly doesn't require a diagnosis so that children don't need any potentially damaging labels. "The nice thing about the software is that it's still going to provide tailored content regardless of any pre-existing diagnosis. So we don't need to label those children," explains Dr Moreau.

The data can be tweaked to direct those who may be functioning above or below average, and because the individual games also involve a degree of overlap in terms of functionality (i.e. language and numeracy) the software can pick up on learning difficulties that may involve a cross-over between dyslexia and dyscalculia. "There might be children who are struggling in different abilities and might fall under the radar to a diagnosis, even though they still need help."

A critical component of the MovinCog Initiative is Physical Space which involves the provision of a high intensity workout as a pre-cursor to the intervention offered by the Cerebral Space. According to Dr Moreau, there's ample neurophysiological research to support the view that physical exercise stimulates the production of neurons that require subsequent cerebral activity for integration into neural networks.

Current trials involve a daily 10-minute workout followed by 20 minutes of computer games over a period of ten weeks. "The exercise is enough to give a boost in terms of arousal on the cerebral space, kids are more focused and more likely to perform well." Without the workout, evidence suggests that cerebral changes are less likely. And besides, David says "the physical exercise part is very general and leads to improvements for a lot of people."

In terms of the basic research, MovinCog has involved a combination of laboratory and field testing to measure different variables and validate the results. Participants undergo a battery of pre and post-test cognitive tasks for things like attention, memory and perceptual speed. Electroencephalograms (EEGs) in the lab look at differences before and after the training in terms of cognitive abilities.

"We want to know exactly what happens in the brain as you get better at a task, and what happens in the brain as you train on our intervention," says David. "We also want to make sure that those brain changes actually translate to what we call behavioural improvements."

The field trials have involved the voluntary participation of up to 500 children aged between 7 and13 years in schools across New Zealand who have been randomly assigned to either an intervention or control group.

Initial findings about the effectiveness of the programme are expected to be released in early 2017 and the early results show that it's promising, "It's working the way we think" says David. An app will then be made available to download online onto any device, along with appropriate guidelines which explain the conditions under which the findings were validated.

While MovinCog has taken almost two years to reach this point, in terms of its experimental design David believes that they've been very thorough in making sure that it's solid science "so that any inference that we make based on the results rests on solid foundations."

A lot of the disappointment around existing brain training programmes relates to overhyping the concept, and David says the US$2 million penalty paid earlier this year by the creators of the Lumosity brain training programme – for allegedly deceiving consumers with unfounded claims – is "a move in the right direction" to protect consumers from false advertising.

> ***"We're giving these kids a little boost where they need it so that hopefully they can then thrive in the school environment or outside of school."***

Given that one in five children are estimated to face learning difficulties, there's no doubting the need for suitable intervention tools. However, David points out that it's important for people to be realistic about what can be achieved through training. "We're not curing those kids, but we're giving them a little boost where they need it so that hopefully they can then thrive in the school environment or outside of school."

The MovinCog Initiative would not have been possible without generous philanthropic support from the Campus Link Foundation in conjunction with the Kelliher Charitable Trust and Perpetual Guardian (as trustee for the Lady Alport Baker Trust). That support has ensured that the training programme is free for anyone to use.

"We don't want financial means to be the difference between a child getting appropriate help and a child whose difficulties are unaddressed. Providing a valid tool to anyone who needs it is at the core of the MovinCog Initiative."

As for future initiatives, David believes that the enormous amount of data that will be gathered from the programme could help with the design of better diagnostic tools to identify learning disorders and also potentially answer different questions such as how the brain learns. ■

Centre for Computational Evolution

It's been almost 160 years since Charles Darwin published *On the Origin of Species*, but his theories on evolution are very much part of what drives the Centre for Computational Evolution (CCE), which was officially launched in April 2016.

Funded by the Vice Chancellor's Strategic Development Fund, the CCE is a multi-disciplinary unit that brings together a diverse group of researchers with a shared interest in developing software tools and mathematical models for understanding evolution and molecular ecology.

Take Dr Anna Santure, a lecturer in the School of Biological Sciences, who is on a mission to predict the adaptive potential of New Zealand's rare and endangered native stitchbird, the hihi.

Having come close to the brink of extinction in the late 1800s, hihi currently exist on a few predator-free islands and reserves including Tiritiri Matangi in the Hauraki Gulf where the entire population has been tracked since it was established 20 years ago.

"It's the gold standard in evolutionary biology that you know every individual in the population," says Anna, who considers herself privileged to be working with a data set of 2,500 birds that could help determine the future survival of the species.

Forecasts of a warmer and drier climate are considered to be unsuitable for hihi in their current northern range, so Anna and her group will be analysing blood samples, breeding histories and survival rates to identify genes that will theoretically maximise the evolutionary potential of new populations.

"We can use genetic information from these birds and all this information we have from the population history to pick out the best birds to be moving and establishing new populations."

Given that around half of the previous transportations have failed due to predators or other environmental factors like the climate, the challenge is to identify birds with the 'highest predicted fitness' for breeding programmes.

The study coincides with rising international interest in 'conservation genomics', though Anna says there's been a lot of talk and not much action. Translating genomic variation into conservation action is challenging and she's hopeful that her work will prove to be a test case on whether genomics can add value to conservation management for other endangered species.

The project is being funded by an $808,000 Marsden Fund grant which Anna recognises is a huge amount to spend on one species. "But that's what we're most excited about," she says, "that it could actually make a difference. Then we can measure whether that difference is enough to justify the cost of doing it."

Darwin's sketches of evolutionary trees are a source of inspiration for Department of Computer Science lecturer Dr Simone Linz.

Backed by a three-year Marsden Fund Fast-Start grant worth $300,000, Simone's Lost in Space project is exploring new mathematical and algorithmic tools to analyse and search spaces of phylogenetic (evolutionary) networks. Equipped with pen and paper, she's developing new theorems and algorithms to disentangle relationships between species.

Simone works on the theorems that kick-start the mathematical processes which lead to the development of algorithms and ultimately the software that biologists use to analyse genetic data to infer the history of life. It's a challenging task, especially when species have not only undergone speciation but also processes like hybridisation in which case a new species' genome is a mixture of two ancestral genomes. Another tough nut to crack is the lateral or horizontal gene transfer that's common in bacteria.

"It's the gold standard in evolutionary biology that you know every individual in the population"

While evolutionary trees are traditionally used to represent relationships between species, Simone is exploring phylogenetic networks that are now widely acknowledged to be better suited to represent evolutionary histories – and capture the evolutionary diversity created by speciation and hybridisation.

"When you try to reconstruct an optimal network from genetic data, at some point you often have to search the entire space of evolutionary networks. It is exactly this largely unexplored space and its properties that drive much of my current research. Together with collaborators from New Zealand and Europe, we are investigating questions like, 'What can we say about the size and structure of the space of phylogenetic networks and how many such networks are there?"

Originally from Germany, where she says there's less interest in such theoretical work compared to New Zealand, Simone thinks that New Zealand is unique in creating such a healthy environment to conduct research on theoretical as well as more applied evolutionary questions.

"That's also something that's really good about CCE. In the Centre we have people working at different stages: from the development of theorems and algorithms to the implementation of software and using the resulting tools to analyse data."

For School of Psychology Associate Professor Quentin Atkinson, the main focus is on the importance of culture, in particular language and religion, in the evolution of our species.

Along with Professor Russell Gray, Quentin co-leads a New Zealand-based international consortium called Glottobank which was initially established with a Marsden Fund grant to document and understand the world's linguistic diversity. Backed by some of the world's top linguists, Glottobank is scheduled to go live sometime next year as a global database of language variation that will be freely available to promote open science.

Like our genes, Quentin says our languages also get passed on from one generation to the next so historical linguists are interested in similar kinds of questions to evolutionary biologists. "For example, we use methods that have recently been used to trace the origin of virus outbreaks but applied it to languages to trace the origin of the Indo-European languages."

One goal is to create a tree of language, "a bit like the tree of life in biology," says Quentin. The challenge will then be to use this tree to understand human cultural and genetic diversity around the globe. "We can use information on how genes and culture co-vary to build up a detailed picture of human pre-history."

A major focus of the team's work is in the Pacific Islands where cultures are located on lots of different islands with different ecological and social conditions, and where there is a well studied family tree of Austronesian languages.

"They're like natural experiments that have been running for a few hundred years in different conditions. So if you're interested in explaining human cultural diversity the Pacific is a really neat place to study it."

The Pacific has also lent itself to the study of religious diversity, and how religious beliefs have evolved since the Austronesian people migrated from Taiwan five or six thousand years ago.

Recent research has traversed the influence of ritual human sacrifice and supernatural punishment in the formation of societies, with some interesting findings.

"Ritual human sacrifice seems to stabilise and build on any stratification in the society," says Quentin, "whereas supernatural punishment is linked to the emergence of greater political complexity."

While the research being conducted by Anna, Simone and Quentin may appear to be worlds apart, Anna says the collaboration being fostered by the CCE has to be beneficial for everyone involved. "The beauty of the Centre is that you start to hear all these new things and it's certainly given me new ideas of where to go."■

Photo: Mhairi McCready, hihi researcher on Tiritiri Matangi island

Alumni news

Dr George Mason meets with recipients of the George Mason Scholarship.

Scholarships and prizes

Three students who are supported by scholarships provided by Dr George Mason had the opportunity to meet the man himself when George visited the University in October.

Geoff Lerner, Carolina Lara Mendoza and Fraser Stobie thoroughly enjoyed the opportunity to thank George personally for their scholarships. George, an alumnus who studied a BSc Botany and Chemistry (1953) and an MSc Botany (1956), was equally delighted to meet the students and hear about their projects and goals for the future.

The George Mason Charitable Trust has supported 26 students since 2000, and will continue to support many more through the transformative gift of $5 million he has given to establish the new George Mason Centre for the Natural Environment.

www.science.auckland.ac.nz/georgemason

Read more about George and his philanthropy in the University of Auckland Ingenio magazine

For All Our Futures

The new University Campaign *For All Our Futures* was launched at the beginning of September. The goal to raise $300 million by 2020 is the most ambitious fundraising campaign in New Zealand.

As part of the greater campaign, the Faculty of Science will be working with our donors, alumni and other supporters to answer questions that will truly impact our future. For example, *Can we uncover the mysteries of the human brain? Can we bring back the dawn chorus? Can we build an economy based on what we know, not just what we grow?*

Science plays a vital role in addressing the key issues that confront us and future generations. Funds raised by the campaign will help our staff and students address the critical challenges facing our communities.

For more information about the campaign, please contact Kiri-Ann Olney, Development Manager, Science: k.olney@auckland.ac.nz

Alumni and friends events

December 2016

6 December	Society AGM and Christmas Function*

February 2017 to March 2017

17 February	Whangarei alumni and friends reception
9 March	Bright Lights*
10 March	DAA Dinner*
20 March	Melbourne alumni and friends reception
22 March	Sydney alumni and friends reception
23 March	Brisbane alumni and friends reception

**Auckland-based events*

Don't miss out on an invitation to network

For more information or to ensure you receive an invitation to an event being held in your area, please visit **www.alumni.auckland.ac.nz/update**

Getting involved

There are many ways you can contribute to the Faculty of Science, from volunteering as a speaker at our various alumni events, to making a donation to the Science Student Support Fund through our annual appeal. To find out about all the ways you can volunteer at the University, visit www.alumni.auckland.ac.nz/volunteering or www.givingtoauckland.ac.nz

ALUMNI PROFILE

Name: Rachel Nickerson

Position: Forensic Supervisor for the Auckland City District, New Zealand Police

Studied:

Bachelor of Science (Biology)

Postgraduate Diploma in Teaching

Master of Science (Forensic Science)

"An unexpected and unplanned career change now sees me combining my skills in crime scene examination, management and teaching with a dash of research.

"When I was a teacher I developed a forensic module for my students and during my research I ended up on the University website's forensic programme page. I read about the papers and research being done and was hooked.

"After completing my masters I joined the New Zealand Police, first as a Crime Scene Attendant, then I was promoted to Scene of Crime Officer, and I am now a Forensic Supervisor for the Auckland City District.

"The field of forensic science is highly competitive and nowadays very popular due to various TV programmes. Studying forensic science gave me an edge when I applied for the first (ever) civilian crime scene attendant positions within the New Zealand Police.

"My qualifications allowed me to have confidence in my ability to examine crime scenes through to giving evidence in court. My experience in a teaching environment has allowed me to mentor and deliver fit-for-purpose training to my staff and other work groups within the New Zealand Police.

"Forensics is a huge field with unlimited potential and options. The variety of topics covered, and the diversity of teachers and students at the University of Auckland, all helped make the course interesting and thought-provoking. The friends I made during my time at the University have ended up in a wide variety of fields within the forensic community. This makes for interesting conversations when we catch up."

Community links

Looking to the future with L'Oréal

Supported by the Faculty of Science, L'Oréal New Zealand held its third annual For Girls In Science forum in September. More than 180 aspiring scientists from 20 Auckland schools attended this popular event at the Science Centre, where year 11 and 12 girls had the opportunity to meet and learn from some of the most inspiring women scientists in New Zealand.

Dr Michelle Dickinson, aka Nanogirl, chaired the event alongside an address by Distinguished Professor Margaret Brimble from the School of Chemical Sciences, while Dr Zoë Hilton and Dr Christina Riesselman, recipients of the L'Oréal–UNESCO For Women in Science International Fellowship in 2012 and 2015 respectively, discussed their current research.

The girls were treated to a tour of some of the Science laboratories, including The Photon Factory and our award-winning undergraduate Chemistry lab, where some of our top women academics showcased their fascinating work.

L'Oréal New Zealand Group Corporate Communications Manager Tanya Abbott said there is still a gender representation gap in science.

"There are still myths, stereotypes and gender differences preventing girls from pursuing a career in science. Our aim is to inspire and demystify science as a profession for young women, to encourage more of them take it up as a career."

Judging from the buzz of voices and the beaming faces, we're one step closer. Helped surely, by the L'Oréal take-home gift toted by all!

Lighting the way for future physicists

As part of its commitment to community outreach, The Photon Factory regularly offers tours of its laboratories to a variety of visiting groups. In particular, the members of The Photon Factory are all passionate about engaging budding scientists, and the Remuera Intermediate Science Extension group visit in August provided an ideal opportunity to ignite the interest of some bright young minds.

Students from Remuera Intermediate are fascinated by The Photon Factory.

During the school's visit, organised by teacher Alaric Nicholls, PhD students Simon Ashforth and Andy Wang, and Director of The Photon Factory Associate Professor Cather Simpson, the Science Extension group had the chance to observe the Factory's current projects and participate in a range of exciting activities.

Of particular interest to the children was the Engender Technologies project, a sex sorting technology for the dairy industry.

"They were very interested in the way that the research we're doing here at the University of Auckland can benefit New Zealand's economy and primary industries," says Simon Ashforth.

The Science Extension group were also fascinated by the use of lasers to assist with orthopaedic surgery. Current research is investigating the use of ultrashort laser pulses as an alternative to mechanical tools for bone surgery. Femtosecond (one quadrillionth of a second) laser pulses have shown great promise as a high precision surgical tool for bone tissue.

But the tour wasn't all watch-learn-and-be-wowed – the children also participated in a range of interactive activities, planned by Simon and Andy.

A particular highlight was a 'guess the image' game using high magnification images taken with the Factory's scanning electron microscope, and the children were agog as Andy demonstrated how to build a homemade spectrometer using a cereal box and a CD – no doubt they'll raid their parents' old music collections in a race to create one themselves!

Light, lasers and curious little minds – what a brilliant combination.

Undergraduate Women in Science Network provides a community

Established this year, the Undergraduate Women in Science Network (UWIS) is a community for undergraduate students.

The network aims to increase awareness of issues surrounding gender diversity in Science, as well as to provide a network to support undergraduates pursuing Science. UWIS hopes to increase the visibility of female role models and mentors in Science, and to provide practical support to women pursuing careers in science.

In August, the UWIS presented the Women in Science and Industry panel discussion as a way to achieve these aims.

Featuring Erin Wansborough, Florina Halasan and ex-University of Auckland students Emily Harvey and Arti Patel, the event was very well attended and offered plenty of inspiration to undergraduates, postgraduates and staff alike.

Each speaker provided a brief overview of her education and work experience to date, including her path into industry. The panel also tackled questions from the audience and offered invaluable advice on everything from job applications and CVs, to how to stand out in a male-dominated workplace.

Dr Claire Postlethwaite and Anna Barry from the Department of Mathematics helped to organise the event, while Te Pūnaha Matatini provided sponsorship, which showcased the collaborative nature of UWIS within the Faculty of Science.

To find out more about the Undergraduate Women in Science Network, email UWIS@math.auckland.ac.nz.

Knitting + crochet + colouring in = Maths Craft Festival

In September, the Department of Mathematics and Te Pūnaha Matatini sponsored two days of crafts, chaos and calculus with the Maths Craft Festival.

Held at the Auckland Museum and attracting over 2000 visitors, the Maths Craft Festival was conceived to allow the general public to explore the connections between maths and craft.

Head of Mathematics, Professor Bernd Krauskopf, and Professor Hinke Osinga gave public talks on chaotic behaviour and the Lorenz manifold, while Dr Nicolette Rattenbury from the Department of Physics was on hand to demonstrate how the Menger sponge is created.

Most of the helpers were Mathematics students and Science Scholars from the Faculty of Science, and Dr Tanya Evans from the Department of Mathematics curated a series of interactive lessons (including mathematical origami!) designed to showcase the intricate links between maths and handicrafts.

"It is my personal view that Mathematics can be perceived as an art motivated by beauty. Mathematics can be discerned in music, dance, painting, sculpture, textiles and other art forms. The Maths Craft Festival allowed people the opportunity to explore this deep interconnection in a non-specialist forum. I was pleasantly surprised at the level of curiosity from the public," enthused Dr Evans.

If that doesn't encourage you to take up your needles, we're not sure what will!

For more information about the Maths Craft Festival, please visit www.mathscraftnz.org.

Students prepare for lift-off

This year, students throughout the University have embarked on a cross-faculty competition to design, build and eventually launch their own CubeSat-sized satellite.

The project, propelled by the Auckland Program for Space Systems, is designed to allow students from all fields of study to contribute to space research. The CHALLENG competition encourages inter-disciplinary teamwork, and sees students from Science working alongside those from Arts and Engineering in a situation that mimics the reality of the space industry.

Jim Hefkey, project manager for the Auckland Program for Space Systems, explains,

"It is critical that the approach we take within the University reflects the real world where space missions might include everything from astrophysics to archaeology."

Each team will propose a mission that may be accomplished with a CubeSat – a small, simple and versatile satellite designed for low Earth orbit. The winning team will qualify to build their satellite and prepare it for flight in an 18-month long project. Entries will be judged by a panel of academics and industry representatives.

With the near-completion of the Rocket Lab private launch site on the Mahia Peninsula near Gisborne, students can look forward to watching their winning satellite lift off alongside one of Rocket Lab's rockets. Rocket Lab founder Peter Beck has offered to launch the winning team's satellite with one of his company's Electron vehicles – specifically designed with the small satellites in mind.

Once launched, students will be able to operate their satellite from a 'mission control' centre at the University.

Connect with our researchers on Twitter....

@JacquelineBeggs
– Associate Professor Jacqueline Beggs, School of Biological Sciences

@ginnybraun
– Dr Virginia Braun, School of Psychology

@BrimbleM
– Distinguished Professor Margaret Brimble, School of Chemical Sciences

@MyPlasticBrain
– Professor Winston Byblow, Department of Exercise Sciences

@REasther
– Professor Richard Easther, Department of Physics

@astro_jje
– Dr JJ Eldridge, Department of Physics

@nickgantnz
– Dr Nicholas Gant, Department of Exercise Sciences

@nicgaston
– Associate Professor Nicola Gaston, Department of Physics

@hendysh
– Professor Shaun Hendy, Department of Physics & Te Pūnaha Matatini

@tslumley
– Professor Thomas Lumley, Department of Statistics

@LoraxCate
– Dr Cate Macinnis-Ng, School of Biological Sciences

@DrPaulRalph
– Dr Paul Ralph, Department of Computer Science

@NJRattenbury
– Dr Nicholas Rattenbury, Department of Physics

@TectonoFluids
– Associate Professor Julie Rowland, School of Environment

@IsldJames
– Dr James Russell, School of Biological Sciences

@ptolemytortoise
– Associate Professor Cather Simpson, Department of Physics, School of Chemical Sciences & The Photon Factory

@mc_stanley1
– Dr Margaret Stanley, School of Biological Sciences

@SiouxsieW
– Dr Siouxie Wiles, Faculty of Science and Faculty of Medical and Health Sciences

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