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Using plants to mine minerals

ORIGINS
The peopling of Madagascar

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Helping to organise the London Olympics

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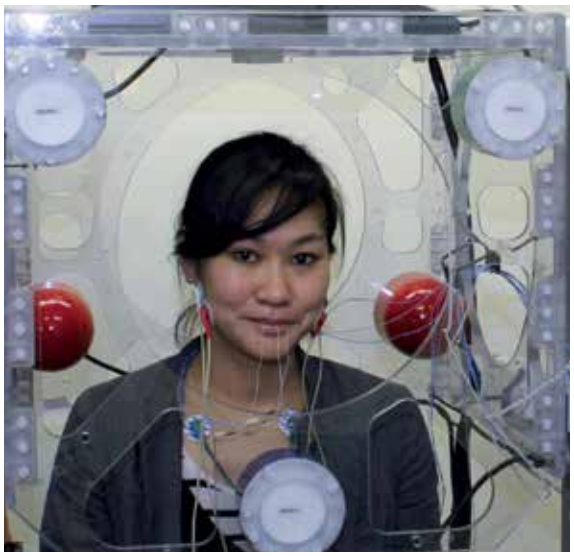
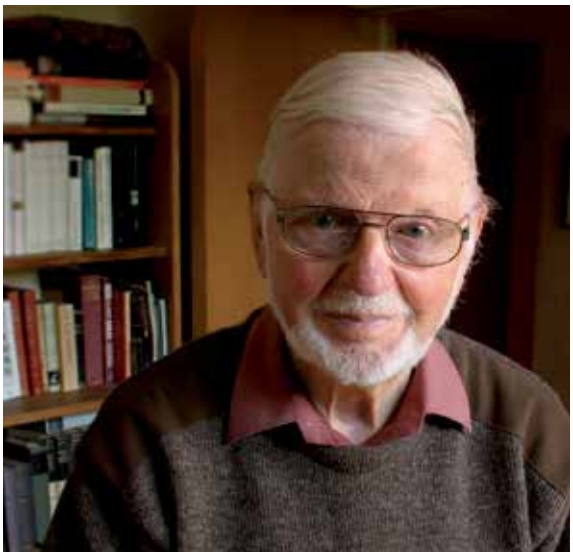




FEATURES

DEPARTMENTS

FIRST WORD

Vice-Chancellor Steve Maharey writes.

If we don't act, the outlook is grim: an epidemic of chronic preventable illnesses, an overstretched health system that relies more and more on user-pays or rationing, and a vast waste of human happiness and potential.

As I grow older, I become more and more aware that the past truly is a foreign country. I grew up in a land where cars didn't have seat belts, where asbestos was used in building products, where most buildings were un-insulated and where cigarettes were advertised in cinemas and on billboards. It was a place mistrustful of vegetables, except when boiled into submission, and so committed to the consumption of its own saturated-fat dairy products that the manufacturing of margarine was restricted by law – the Margarine Act of 1908 was only repealed in 1989.

It was a place where someone had had the bright idea that if you wanted to send the menfolk home to their wives tolerably sober, the best thing to do was to close the pubs at 6pm. The result: institutionalised binge drinking – the six o'clock swill, the pell mell rush for workers to drink as much beer as possible in the short period between the closing of the working day and those of the bars.

It was a place of crutches, wheelchairs, the iron lung and fear: the disease polio still periodically swept through New Zealand communities.

One by one, these things have changed, and along with them so has something else: life expectancy. According to the actuarial tables, when I was born my life expectancy was 67. Had I been a girl, it would have been 71. Today, a newborn boy can on average expect to reach 78, and a newborn girl to break 82. That bonus 10 years of life – if we can be sure that it is healthy – is a prize beyond price and there is no reason why life expectancy should not continue to rise.

No, not all of this is the consequence of public health measures – antibiotics and growingly sophisticated medical treatments have played a part – but much of it is. We live longer because we live better and we subject ourselves to fewer risks and hazards. But in terms of what might be achieved, we are only partway there.

A good university is a living institution, constantly in the business of remaking itself to meet the challenges of its time. Since it was founded by Act of Parliament in 1964, Massey has scarcely paused to take breath. There have been new campuses, new colleges and a stream of new initiatives. Now Massey is to take another major step forward with the formation of a College of Health.

To some of you this may come as a surprise. True, Massey has had a nursing studies programme since the early 1970s and it was the first university in Australasia to award a PhD in nursing back in 1989, but it is only in comparatively recent times that Massey has gathered the critical mass to contemplate forming a new college.

It began with the founding of the Wellington-based Sleep/Wake Research Centre in 1998, followed in 2000 by the formation of the also-Wellington-based Centre for Public Health Research, and in 2002 the creation of the Auckland-based SHORE Centre and the Whariki Research Group.

In a four-year period, Massey gained or consolidated expertise in a variety of health-related realms. Think of the relationship between sleep and occupational risk; of the understanding of such things as the survival rates for cervical cancer and the mechanisms governing the development of asthma; of the vexed relationship between New Zealanders and alcohol and drugs; of how urban design promotes or dissuades us from exercising; and of how ethnic and social inequality exerts an influence on health and longevity.

Alongside nursing, these centres and groups will form core components of the new College, but so too will a less expected entity, the Institute of Food, Nutrition and Human Health. Massey's extraordinary expertise in food, you might think, has far more to do with adding value to New Zealand's key export sector or with laboratory science and engineering than with health.

Yet, looking forward, the grouping makes sense. Diet has always been known to be key to health. You are what you eat. Up until recent times, the drive was to ensure that the food we ate was free of diseases, pesticide residues and adulterants. It was about preventing illness. Now a transformational shift is taking place, from preventing illness to promoting wellness.

Think of Fonterra's Anlene, a milk specially formulated for adults to help build strong bones, developed with the help of Massey's Professor




Marlena Kruger. Think of the work of Professor Bernard Brier, who has validated the benefits of omega-3 fatty acids in enhancing carbohydrate and fat metabolism in an ageing population, and of Professors Moughan and Harjinder Singh, who have developed an emulsion-based micro-encapsulation technology, so that omega-3 fish oils can be added to a variety of foods without any unwanted smell and taste – for much as we want to consume what is good for us, there is always going to be a limited market for fish-flavoured treats.

Nurses and epidemiologists. Food scientists and sleep experts. Urban designers and exercise physiologists. The new College of Health will offer a multidisciplinary approach to a multidisciplinary set of challenges, and it will reach out to the wider health community – to Centres of Research Excellence, such as the Riddet Centre sited on Massey's Manawatū campus; to medical schools and other universities; to district health boards; to local government; and to international organisations such as the World Health Organization, the World Bank and UNESCO.

For anyone who has looked at the numbers – the rising costs of medical care, the incidence of obesity and obesity-related conditions such as type 2 diabetes, or the projections for the greying profile of our population – the need for this new approach will be obvious. If we don't act, the outlook is grim: an epidemic of chronic preventable illnesses, an overstretched health system that relies more and more on user-pays or rationing, and a vast waste of human happiness and potential.

And if we are successful? I imagine the year 2050. According to Department of Labour projections, the ratio of the population aged 65-plus to the population aged 20-64 has risen to 50 percent. 500,000 New Zealanders are over 80. In Auckland, Coldplay, returning for its fourth or fifth reunion tour, is playing in the new stadium down by the waterfront. Chris Martin takes to the stage. At a sprightly 73, he is younger than many in the audience, yet they are overwhelmingly trim and healthy.

He strikes up the opening chords of the song Clocks and, as one, the crowd rises easily to its feet and begins to dance. ■

$3.8 million for health research

Does unpasteurised milk provide some defence against asthma and allergies? Does mobile phone use increase the risk of brain cancer in children? What can be done to make Māori housing less hazardous for its occupants? What has been the upshot of the various public policy endeavours that have been launched to moderate the consumption of alcohol in New Zealand? Funded by the Health Research Council (HRC), as part of its 2012 funding round, four projects led by staff from the university's new School of Public Health are setting out to answer these questions.

Professor Jeroen Douwes, who heads the Centre for Public Health Research on the Wellington campus, is leading a $1.2 million, three-year study to assess whether drinking raw milk is associated with a lower prevalence of allergies and asthma and with improved lung function. Beginning in July, he and his team will survey 300 non-farming families who regularly drink raw milk, and 150 families who have never done so. The families will come from urban areas, most in the Wellington and Auckland regions, and a subset of them will undergo laboratory tests. As well as testing the strength of any association between raw milk and the incidence of allergies and asthma in a general population, the study will set out to identify which components of raw milk are beneficial. One in four New Zealand children suffers from asthma, which constitutes the most common cause of childhood hospital admissions.

Dr Andrea 't Mannetje, also from the Centre for Public Health Research in Wellington, is leading a $466,148 project investigating the risk factors associated with the incidence of brain cancer in children and adolescents. In the course of two and a half years, the study will interview 63 New Zealand children and adolescents, aged between 10 and 24, who have brain cancer and 126 others who do not. The children and adolescents together with their caregivers will be interviewed about their mobile phone use and a range of other environmental risk factors. The research is part of a multinational MOBI-KIDS study of mobile phone use and the risk of brain cancer.

A project led by Professor Chris Cunningham, Director of the Research Centre for Māori Health and Development, also in Wellington, is leading a $787,000 project to quantify the home hazards affecting Māori health, these including everything from heating and ventilation to the risk of falls.

Professor Sally Casswell, Director of the Centre for Social and Health Outcomes Research and Evaluation, in Auckland, is leading a $1.2 million project to assess the effects of alcohol policy interventions in New Zealand,

The four projects were not the only Massey HRC funding recipients. Mikael Boulic, from the School of Engineering and Advanced Technology in Manawatū, has been given a $150,000 emerging researcher grant to trial low-cost solar ventilation systems in classrooms in 10 low-decile schools to see if this leads to healthier children.

The HRC funding for Massey-led projects amounts to $3.8 million.

From left: Sally Casswell, Chris Cunningham, Jeroen Douwes and Andrea 't Mannetje

Flexible design: a new building opens

With a surprise cascade of foil confetti in Massey blue and gold, the ceremonies marking the opening of the new College of Creative Arts building on the Wellington campus came to a close. Doing the honours was the college's most celebrated alumnus, New Zealander of the Year Sir Richard Taylor, who placed a specially designed time capsule in the building's foundations, with both his partner, Tania Rodger, and his father proudly watching.

The new building, completed on time and under budget, employs massive timber framing tensioned using steel cables; a world-first innovation allows it to flex, sway and right itself in the event of an earthquake.

Associate Professor Claire Robinson, the college's Pro Vice-Chancellor thanked mana whenua (Tenths Trust, Te Ātiawa and Taranaki Whānui) for their gift of the name of the building Te Ara Hihiko. And she paid tribute to the design and construction team, notably Athfield Architects, Dunning Thornton Consultants (engineering) and Arrow International (project management).

Above: Massey Wellington Students' Association President Ben Thorpe, who compèred the opening, presents a gift to Sir Richard Taylor while College of Creative Arts Pro Vice-Chancellor Claire Robinson applauds. Background image: ceiling panels by architectural designer and artist Jacob Scott. Inset images: Stills from a video by students Leo Chida, Nikko Hull and Ly Nguyen using a push-puppet analogy to show how the building flexes. Their video can be seen at www.definingnz.com/cocabot.

Goal oriented

Football Fern and Massey student Anna Green is footing it with the world's best, writes Kelly Burns.

Anna Green was just 17 at the Beijing Olympics. She was the Football Ferns' youngest player – and remembers being overwhelmed playing on the world's biggest stage. Now 21, Green is a professional footballer, confident in her own abilities and looking forward to London 2012.

Green was born in England and raised in Palmerston North. She was eight when she started playing football for Hokowhitu, spurred on by her father. "My dad is English and just loves football. I just loved being out and about and bonding with my dad," she says.

As a 14-year-old schoolgirl she played for Massey University's XI and two years later moved to Auckland to pursue the sport, debuting for the Football Ferns at 16.

Then came the Olympics, two Under-20 FIFA World Cups – in Chile in 2008 and Germany in 2010, when she captained the New Zealand U20 team – and the FIFA Women's World Cup in Germany in 2011.

Green, a left back, also played for Auckland's Three Kings United and Adelaide United and in February joined German club Lokomotiv Leipzig – all while studying for a Bachelor of Business Studies majoring in accounting and human resources.

She started her degree at Massey's Albany campus in 2009, then switched to extramural study to fit her football schedule. "I've sat two exams in Switzerland, three in Adelaide and two in America," Green says. "It's really challenging to keep a perspective on what's important, but Massey is really accommodating with extramural study."

She admits it's tough having to sit exams when teammates shop or sightsee, but she's committed to seeing it through; her professional football career won't last forever.

But for now the talented defender is paid to play, and she couldn't be happier.

"I love being a professional athlete focusing on soccer," Green says, adding she hopes to return to the German club next season.

"In New Zealand, football's not a main sport – not like rugby and netball – but Europe lives and breathes football."

On 29 June Green was named in the Football Ferns squad for London, and the team left for Switzerland on 7 July to begin its Games build-up.

Green is ready. "Beijing was really exciting but I was a little overwhelmed doing it at 17. I was a bit too young, so this time around I'm looking forward to focusing on football rather than being caught up in the Olympics.

"I'm very excited about being in England, it's got a different feeling to it."

The Football Ferns is one of 12 women's football teams competing at the Games, but Green is upbeat.

"It's going to be hard to make it through pool play – but we can. We can go out there and make it. On the day, anyone can turn up and win."

definingnz.com/category/olympics-2012

On the Massey team

Athletics
Adrian Blincoe
Sarah Cowley

Canoe slalom
Michael Dawson (graduate)

Canoe/Kayak flatwater
Lisa Carrington
Erin Taylor

Cycling – road
Linda Villumsen

Cycling – track
Rushlee Buchannan
Joanne Kiesanowski
Jaime Nielsen
Simon van Velthooven

Men's football
James Musa
Marco Rojas

Women's football
Anna Green
Sarah Gregorius
Hayley Moorwood
Rebecca Smith
Erin Nayler (Reserve)
Holly Patterson (Reserve)

Men's hockey
Ryan Archibald (graduate)
Simon Child
Blair Hilton
Hugo Inglis
Richard Petherick
Nick Wilson
Arun Panchia (Reserve)

Women's hockey
Samantha Charlton
Gemma Flynn
Krystal Forgesson
Katie Glynn
Ella Gunson
Emily Naylor
Kayla Sharland

Rowing
Michael Arms
Louise Ayling
Hamish Bond (graduate)
Fiona Bourke
Julia Edward
Sarah Gray
Chris Harris
Eric Murray
Sean O'Neill
Anna Reymer
Rebecca Scown (graduate)
John Storey
Peter Taylor
Storm Uru

Sailing
Jo Aleh

Swimming
Daniel Bell
Dylan Dunlop-Barrett
Amaka Gessler
Natasha Hind
Penelope Marshall
Hayley Palmer
Glenn Snyders
Matthew Stanley

Tennis
Marina Erakovic

Games plans

Just as Olympic athletes require discipline, organisation and cool heads, so too do the organisers of the Games themselves. Andrea O'Neil talks to London 2012 events organiser, Aucklander and Massey Master's student Lara Middleditch.

When the grand opening ceremony for the London Olympics begins on 27 July, Lara Middleditch will have many things on her mind. Foremost will be the 11 million spectators for whom she is responsible during the Games. But somewhere in the back of her mind will be another commitment: her latest Massey Master's degree paper, which commenced the week before.

Aucklander Middleditch, 45, is the Central Planning Manager for Event Services at the Olympic and Paralympic Games, a team responsible for ensuring that Olympic spectators have a safe and enjoyable Games. It is an extraordinarily complex and demanding role.

The figures rattled off by Middleditch bring this home: her division, events services, is one of 50 organising the Games, their combined budget totalling £2 billion. A staggering 200,000 people are working to stage the Games, and Middleditch's division is responsible for 21,000 of them, among them 15,500 volunteers, who need to be trained to the highest standards of hosting. "This is the largest event on the planet," Middleditch says. "I feel enormously privileged to be part of the team."

Middleditch began her journey to the Olympics in 1993 helping to organise the Ellerslie Flower Show. She event-managed the Auckland-hosted APEC (Asia-Pacific Economic Cooperation) summit in 1999. Meanwhile, with an eye to future opportunities, Middleditch had started working towards a Massey Graduate Diploma in Business Studies extramurally, choosing a number of sports papers. "When I first started working in events, sport certainly had the lion's share of funding. It seemed that if you were wanting to work, and particularly work globally, sport was the right vehicle," she says.

She was right on the money. In 1999 Middleditch became Planning Manager for the New Zealand Rugby Union, working towards the 2003 Rugby World Cup in Australia (originally to be co-hosted by New Zealand). A stint managing New Zealand Trade and Enterprise's export awards was followed by a move to Qatar to head spectator services for the 2006 Asian Games. Middleditch managed to squeeze in a contract for the New Zealand Government creating a legacy and leverage plan for last year's Rugby World Cup before she took up her Olympics role in 2010.

As if it isn't enough to work for a team overseeing the training of 15,500 Olympic volunteer hosts, writing the Games events policies and procedures and running 42 test events in the past year, Middleditch is studying for a Master of Management in Sport Business, which she began in New Zealand in 2010. Middleditch believes the qualification will boost her already impressive credentials. "I think at a certain level it's about validation – validation of the work you've done before – and it probably consolidates it in a more structured way. Because when I finish here I'll be focusing my energies back on my consulting firm [Eventium], I think this Master's qualification will be really valuable."

Stress is par for the course in events management, Middleditch says. "You can't do this job unless you are supremely well organised and disciplined, and those are exactly the qualities you need if you're going to study extramurally." And with experience comes resilience. "You start to level out. You don't experience those troughs or those exhilarating highs because after a long career in events you start to develop an equilibrium."

A cool head is certainly required to take responsibility for crowd safety and good hosting at an event like the London Olympics. Middleditch's staff are responsible for access and ticket control, showing people to their seats, providing public information, and making sure disabled spectators have equal access. Stewards – volunteers and paid staff – will ensure the sports events run smoothly and response teams are in place to resolve any conflicts. "We need to make sure they can respond to any scenario that's thrown at them once they are in the field," Middleditch says.

"There's a way of working that is really approachable: it's being open, it's being alert and it's being distinctive. It's being part of a team that actually is proactive in terms of responding to any of our client group needs," she says. "I think anyone who comes to the Games will have a fantastic experience because we have trained our people to be good hosts."

There may be more Olympic Games in Middleditch's professional future. "Once you have worked on one Olympics, or one Games under the auspices of the International Olympic Committee, the opportunities are really there. The committee also manages the Winter Olympics, the Commonwealth Games, the Pan-American Asian Games, the Youth Olympics and the Special Olympics," she says.

Any decisions about what to do next will have to wait until after the Paralympics finish on 9 September, however. The Scottish-born Middleditch is too busy even to decide whether she will support Kiwi or British athletes. "I probably won't have time to do any cheering. When I'm in the main operations centre, my entire focus will be on making this a great Games."

For information about Massey's undergraduate and postgraduate sport management programmes within the School of Sport & Exercise, go to www.massey.ac.nz/sport-and-exercise.


ondon








The road to Rome

A bike concept modelled in clay is taking Sam McCafferty to Italy. He talks to Michele Hollis.

The 20-year-old Wellington design student cuts a dash. He's tall with a mop of golden-blonde hair, his black sneakers matching his black turned-up skinny jeans. "I've loved motorcycles since I was young, and always wanted to design a motorcycle," he says. Once upon a time, you'd have said that figures. Yet Sam McCafferty got his big break precisely because fewer young people these days share his enthusiasm. Gen Z (the current crop of 16- to 22-year-olds) is embracing retro bicycles and motorscooters. Motorcycles, it seems, are no longer hip.

What, then, will make young people embrace the motorbike once more?

Honda decided to ask young people themselves. Its Research & Development Department challenged Massey's design students to come up with a motorcycle that would appeal to people their age. Of the 24 designs submitted, three were developed further and McCafferty's winning design was then taken from the page and made into a life-sized form.

McCafferty based his design squarely on research into Gen Z views of motorbikes. Safety was a major talking point, he says, with many parents reluctant to let their kids ride, but young people were also concerned about looks. "We noticed that Gen Z did not want a small-engine bike that looked like a larger superbike, which could be seen as trying too hard, but still wanted something that stood out from the crowd. The hype around the Vespa and fixed-gear bicycle runs off this idea as well; Gen Z relates well to them because they have an individualised, and sometimes personalised, aesthetic. The vehicle becomes more of a part of the rider owing to its unique style."

In response, McCafferty developed an unusual shape for his motorbike, designed to make the rider feel secure. "A bulky body in front of the rider implies safety and solidity and adds a presence to the bike when it is on the road. The rider feels more confident and the bike can be seen more easily by other vehicles."

A team of eight students worked long hours over several weeks to translate McCafferty's design into full 3-D form, using specialised clay donated by German automotive clay manufacturer Staedtler-Mars, and a new Honda CBR125 frame as the base. The model is the first full-scale clay motorcycle model created at the School of Design and one of only a handful of full-scale clay models in New Zealand. And thanks to that effort, McCafferty has an internship in Rome for at least three months. "There is the possibility of extension further down the line," he says, "but I'm just taking it one step at a time. I will be part of a larger team working on a new bike that may be produced by Honda. In interviews and in my portfolio when applying for the internship, my sketching and creative ability was the main focus, so I guess I will be doing plenty of that."

School of Design senior lecturer Oliver Neuland is proud of his students' work, and the results they have achieved. "Motorcycles are deeply emotional products and the subject of many irrational preconceptions," he says. "These students were able to examine the issues of sustainable transport faced in their lifetimes, and find a way to create an alternative solution that would appeal to their generation. They also learned valuable skills creating this clay model."

McCafferty, meanwhile, is a young man on the go. He is half-way through his third year in a Bachelor of Design majoring in industrial design at Massey. Recently he developed a new self-checkout desk for the Hutt City Library and participated in the Electrolux DesignLab competition, as well as working on the Gen Z Honda project.

"I couldn't be in Auckland for the final parts of the build and painting due to commitments in Wellington, but I was working on details like headlights, tail lights and the speedometer and sending them up. I'm still always thinking about ways to improve the bike if I could design it again. I do a lot of drawing with both pencil and Wacom pad on the computer, so I have little sketch projects running all the time."

As for the degree: "I intend to graduate in the next few years," he says simply.

The full creative team behind the full-scale model were Ali Abbas, Emily Ang, Joonhwan Choi, Rohan Geo, Jason Khoo, Nick Marks, Sam McCafferty, Oliver Neuland (design lecturer) and Joseph Raffills. Paolo Cuccagna and Honda Europe were pivotal partners in the project. And McCafferty thanks his family for letting him sleep in their lounge during his trips to Auckland.

At left: the clay model takes shape on the Albany campus. *Sequence by Ali Abbas.*

Talking points

Even distance-learning education students have to meet their lecturers sometimes. Dr [Paul] Wood's PhD supervisors, Gus Haberman and Stephen Hill, came to Rimutaka [Prison] to cover the work they had to do together.

"That is so far beyond what is required of them.

"By that stage I had started a doctorate and never set foot on a university campus.

"So many academics took on extra work to allow me to continue my study."

The Dominion Post interviews Paul Wood, who graduated with a PhD in psychology at the May ceremony in Wellington. Wood conducted the larger part of his university studies, including beginning his doctorate, while serving nearly 11 years of a life imprisonment term for a murder he committed in 1995 at age 18. Now 35, he is a successful workplace psychologist and consultant.

"It takes time to find your own lane – my lane was writing and cartooning – and when you find your own lane, you will only be competing against yourself. Even on a bad day, I always come runner-up in my lane."

Cartoonist, writer and satirist Tom Scott speaks at a May 2012 graduation ceremony in Wellington. Scott graduated with a degree in physiology – a subject he briefly taught – before lane changing. You can watch — and hear — Scott speak at www.definingnz.com/scott-speaks. Highly recommended, but viewer discretion advised.

"If you can draw it up on the computer, you can make it."

Professor of Mechatronics Olaf Diegel has created a range of guitars with 3D printed bodies. For more, visit www.definingnz.com/how-to-print-a-guitar.

"This is a practical tool for conservation management in situations where you have a few rats to get rid of in protected wilderness areas."

Researcher Idan Shapira talks about the use of a lure rat – dubbed the love rat by the media – to attract and trap wild rats in situations where baits have proven ineffective. Watch the use of the lure rat at www.definingnz.com/lure-rat.

Remembered

Enid Hills, Massey's first female graduate, has died at age 99. Enid never forgot what it was like to be 18 entering the halls of Massey on the first day in January 1932 to study for a certificate in poultry farming. "Down at the main entrance they'd made a guard of honour out of farm implements to mark my arrival. My friend Jeff told me to go in the back way," she laughed when interviewed in 2006.

She was the first woman to join the student roll. On her first day in class, the men all stood when she entered the room.Later that year, three other women joined Enid at Massey; nonetheless, the campus, with its combined roll of 191 students, remained overwhelmingly male, and the male-female ratio meant Enid never had a shortage of girlfriends from Palmerston North looking for invitations to dances at the refectory.

Enid would go on to become a poultry farmer, a journalist and the proud mother of four children. She was an active member of Massey's alumni and a supporter of the Massey University Foundation.

The first woman to graduate from Massey with a degree was Paddy Basset, whose Bachelor in Agricultural Science was bestowed in 1941.

Today about 62 percent of Massey's more than 30,000 students are women.

On the move

Sir Mason Durie, Professor, Deputy Vice-Chancellor and Assistant Vice-Chancellor (Māori and Pasifika), has retired from his duties at Massey University. For the occasion he donned the same kahukiwi (kiwi-feather cloak) he wore when he was welcomed to Massey in 1988.

In attendance at his farewell were a range of prominent academics and representatives of Māoridom, a testament to the enormous regard in which he is held.

Vice-Chancellor Steve Maharey expressed his desire to see Massey perpetuate Sir Mason's legacy.

Professor Robert Anderson, College of Sciences Pro Vice-Chancellor, has been appointed Deputy Vice-Chancellor. Anderson has a long history of academic excellence and thought leadership at Massey and is well known to the wider Massey community. Anderson will retain his leadership of the College of Science.

Samoa Independence Day is celebrated on the Albany Campus.

A 'tastefully raunchy' calendar is raising money for a very good cause. This year, 10 percent of the profits from the annual veterinary students' calendar will go to the New Zealand Wildlife Health Centre, which rehabilitates sick and injured wildlife. Last year's calendar sales raised over $3000 for SPCA Canterbury. The remaining profits will subsidise a half-way celebration: a two-day visit to Taupo by third-year students to celebrate the midpoint of their gruelling degrees. Calendars can be ordered for $15 plus postage from www.vetcalendar.co.nz.

Adopting the recovery position

Since the Christchurch earthquakes, New Zealand has become hyperaware of earthquake risk. But there is another major risk presented by New Zealand's location on the Pacific Ring of Fire: volcanic eruption.

The candidates? There are a number, and one of the most significant is also one of the easiest to overlook. Long quiescent Mount Taranaki.

Professor Shane Cronin (pictured at right), the Director of Massey's Volcanic Risk Solutions (VRS) group, has been interested in Mount Taranaki ever since undertaking a study of the eruptive history of the mountain's lava domes as part of his BSc honours year. In the decades since, he has come to understand the behaviour of this volcano perhaps better than anyone else.

Now, together with a team of environmental and ecological economists from Market Economics Ltd led by Massey alumnus Dr Garry McDonald, VRS is to embark on the economic modelling of what would happen were Taranaki to erupt. The project has been made possible by a $250,000 grant from the Ministry of Science and Innovation's New Zealand Natural Hazards Research Platform.

Cronin says the model will start with realistic volcanic eruption scenarios tailored to Mount Taranaki. "An economic recovery model is being developed and tested through the Christchurch earthquakes, where you have a long-term impact on a large, complex community," he says. "We can use that same framework to forecast what it will cost and what impact there might be if Taranaki erupts. This will show the most effective steps to take to hasten a rebuilding of the region's economy."

However, Cronin points out that in some ways earthquakes and volcanic events are not directly comparable.

"An earthquake stops when the shaking finishes, and then the problems begin. With a volcano you can easily have eruption scenarios that last for many years or even decades, and our model will have to take this into account."

The project will draw on other work being undertaken by the staff and postgraduates of VRS. Currently a 32,000-year history is being completed using a core sample taken from a swamp near Eltham. This extends the 10,000-year history the group has already compiled.

The last known eruption of Taranaki took place a little over two centuries ago.

Venture Taranaki and Massey University have signed a memorandum of understanding, which is to build on the longstanding research, teaching and alumni connections between Massey and the Taranaki region's business sector and wider communities. Pictured from left during a recent visit to Taranaki are Assistant Vice-Chancellor and University Registrar Stuart Morriss, Stuart Trundle (Venture Taranaki), Assistant Vice-Chancellor (External Relations) Cas Carter and Steve Maharey.

Dr John Grigor, PhD student Jeanne Ne Cheong and Dr Kylie Foster get ready for another taste test.

The articulograph and electromyograph

That the very words articulograph and electromyograph are a bit of a mouthful is perhaps apt. Both are used to study the workings of the mouth and its surrounding structures.

The $150,000 Carstens articulograph shown here traces mouth and jaw movements using very small transmitters, which are placed at various locations within the mouth, including lips, tongue, teeth and palate. These transmitters send signals to a receiver, where they are transformed into plotted movements.

The electromyograph records the electrical activity of skeletal muscles, including those of the jaw, so providing further information about such things as how we chew.

As part of the sensory science group at the Institute of Food, Nutrition and Human Health, Dr Kylie Foster and Dr John Grigor are exploring how the texture of food changes during eating, and how particular textural food attributes become more or less prominent as eating progresses (a phenomenon known as temporal dominance of sensation).

Think about what happens when you eat. Imagine eating a biscuit, or a piece of chocolate. What happens inside your mouth? How is the food transformed? Does it change shape? What happens to the flavour? What happens when you swallow? Which part of this eating experience do you enjoy the most or the least? These are the sorts of question that Foster and Grigor explore.

Foster's focus is oral processing. "I want to know what happens inside the mouth when people eat," she says. "What are the eater's perceptions while they're eating? What strategies do they use to chew and swallow? We are starting to find that people have different chewing behaviours and strategies in relation to the food they eat."

The nature of the food within the mouth changes too. "A biscuit starts off as crunchy, until saliva is added to the mix. Then, as the saliva is absorbed rapidly into the bolus (the mass of chewed food), it may be perceived as dry before later being sensed as sticky. A different biscuit or food will have a completely different sequence of sensations."

For food manufacturers, the information gathered by researchers like Foster and Grigor is golden. "We can use the science of eating to stimulate smarter food innovation," says Grigor.

Part of that smarter food innovation may be foods that feel and taste sinfully good but deliver virtuous, heath-enhancing ingredients. "We're interested in designing foods with bio-active compounds that promote optimum health."

Welcome to the age of the guilt-free treat.

Origins

For those with the right reading skills, the language of our genes contains the history of humankind. What do they tell us? For one thing, that all people alive today have a single female ancestor in common, the so-called mitochondrial Eve, who lived around 200,000 years ago. For another, that among New Zealand's first Polynesian settlers were around 70 Polynesian women – a result that fits with the oral traditions. Now **Murray Cox** is shedding light on the perplexing human history of another island nation, Madagascar. He talks to **Malcolm Wood**.

No record exists of what it was like for them, those first settlers, but a few things we can guess at. The sensation of sand beneath their feet. A splash of fresh water from a stream, to quench thirst and wash away the crusted salt. Perhaps there was a meal of shellfish up in the dunes, and fireside talk about the events of the voyage and the prospects for making a new life among unfamiliar terrain, vegetation and wildlife. For Madagascar, the world's fourth largest island, was a place in which now-extinct pigmy hippopotamuses, elephant birds and giant lemurs thrived. So far, so speculative.

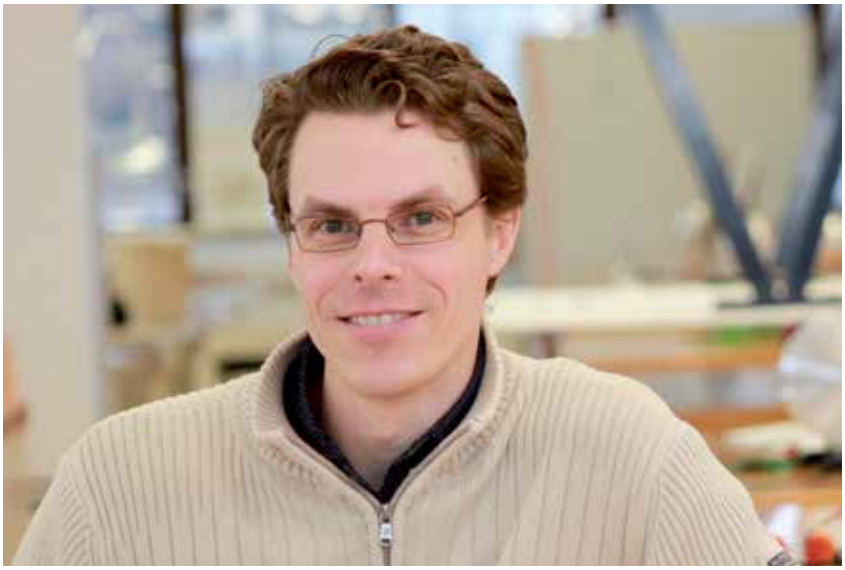
He knows within a whisker of statistical doubt that Madagascar's first settlers arrived about 1200 years ago.

Murray Cox can be more definite. He knows within a whisker of statistical doubt that Madagascar's first settlers arrived about 1200 years ago – late in the history of the settlement of the world, although earlier than that in New Zealand. That they came overwhelmingly not from Africa, less than 350 kilometres distant, but from the archipelago of Indonesia, an ocean and 6000 kilometres away. That this founding population consisted of 30 women and an as-yet-to-be-determined number of men.

And all of this he can say without ever having been near Madagascar. He knows because his analysis of the data held on his hard drives – tens of gigabytes for this project alone, the equivalent of a boxed set of Harry Potter DVDs and then some – tells him that this is what happened.

I have met with Cox in his office on the Manawatū campus. He is dressed in what seems to be his workaday uniform – white woollen jersey and corduroy pants – and his office is the nearest thing I have seen to paper free, a place so bare that it seems unoccupied. Nor, unusually, does he have a cell phone.

The absence of clutter and distraction may be a sign of focus, for although he is only in his mid-30s, Cox has a daunting resumé. He speaks Norwegian, Italian and Solomon Islands Pidgin, has tutored in classical and mediaeval Latin and is fluent in a number of computer languages as well: C, Perl and R. He has variously been a postdoctoral fellow at the University of Cambridge and postdoctoral research associate at the University of Arizona. Nowadays he is a principal investigator at the Bio-Protection Research Centre (see sidebar article, 'Negotiated agreements'), a member of the Allan Wilson Centre for Molecular Ecology and Evolution, and one of 10 inaugural Rutherford Fellows



Left to right: A Malagasy girl with sugarcane; Murray Cox; a Dayak woman in Borneo. The first Indonesian settlers of Madagascar were probably very like her.

announced by the Royal Society of New Zealand in 2011.

His very occupation – he describes himself as a computational biologist – scarcely existed when Cox first entered university. Like the others of his very rare breed, he has created his own niche.

"You have to have such a strange collection of skills to work in this area," he says. "People come in from all sorts of directions: anthropologists who become more quantitative and geneticists who go left field and pick up the anthropology and humanities."

Cox began his career by studying biochemistry. At Otago, he picked up "a really solid classical lab background in biochemistry", but his interests were larger. He had, after all, only decided on biochemistry after a timetabling conflict prevented him following his first impulse, to study ancient languages.

"As I went through the degree I became more and more interested in genetics and population genetics."

For his BSc honours – which he completed in 1999 – he chose, as his dissertation topic, to look at how different types of domestic dog had ended up around the Pacific and what this said about the migration patterns of their human masters.

For his PhD thesis he chose to look at how successive waves of migration had left their genetic imprints on the peoples of that vast sweep of territories where the Austronesian language family – which includes Malay, Filipino, Indonesian, Māori, Malagasy, native Hawaiian and the Fijian language – is spoken.

It meant gaining new skills. "For a lot of the questions I wanted to answer you needed to be able to program." He would need statistical and mathematical skills as well, so he set out to teach himself what he needed to know.

The one omission in his thesis was the question of Madagascar.

Madagascar's Indonesian connection has long been known. The first ever written mention of Madagascar, by a 12th-century Arab geographer, talks of the Indonesian connection. At the beginning of the 17th century a Jesuit priest confirmed that one of the languages in use in Madagascar was similar to Malay, and in the mid-20th century a scholar pointed out the affinities between the Malagasy language and that spoken by an obscure group of the Dayak people in Borneo.

There are other coincidences too. Although a strong African influence is also evident, many of the people in the highlands of Madagascar look Indonesian; similar slash-and-burn agricultural methods and iron-working techniques are traditional in both countries; the 'tropical food kit' of rice, bananas, yams and taro is shared; and a number of Malagasy musical instruments – the flute and xylophone – strongly resemble those of Southeast Asia.

But how it was that Indonesians reached Madagascar, when exactly they arrived, and the degree of contact maintained between Indonesia and Madagascar after settlement, were open questions. So too was the mix of Indonesians and Africans among the first settlers – for with Africa being so close it seemed certain that Africans would have visited Madagascar many times over the centuries and may well have been present when the Indonesians arrived.

A vast expanse of ocean lies between Indonesia and Madagascar.

The traditional explanatory disciplines of archaeology, ethnography, linguistics and anthropometrics could only say so much. What would the genetic evidence contribute?

As Watson and Crick famously discovered in 1953, all of life's intricacies are encoded in the four-letter DNA alphabet: the bases adenine, cytosine, guanine and thymine.

... the founding population of New Zealand Aotearoa had included around 70 women...

Each of us inherits our mix of DNA from both sides of our parentage, mother and father, and in large part it truly is a mix: part of the reason for sexual reproduction is the shuffling of DNA. This variation across individuals means that the species as a whole is able to respond to evolutionary pressures.

But two sets of DNA are largely immune from the garbling effect of sex: mitochondrial DNA (in the geneticist's shorthand, mtDNA); and, as we will come to later, the male Y chromosome.

Every cell in our bodies contains mitochondria, the organelles sometimes termed the 'cellular power plants', and each mitochondrion carries its own DNA.

The mitochondrial DNA passes from mother to offspring. No matter whether you are a man or a woman, your mitochondria are essentially the same as your mother's mitochondria, or your grandmother's, or further back down the matrilinear line. Essentially the same, but not perfectly so: copying mistakes do happen, the most usual being the substitution of one base for another.

Very rarely, a slip-up like this will lead to an evolutionary advantage, more often to a disadvantage, and most usually there will be no discernible change at all. Much of our DNA is 'selectively neutral'.

This means that particular sequences of DNA can be used to track lineages, and some have achieved the status of 'motifs'.

It also means that if you know the rate at which mutation occurs, you can use the DNA as a molecular clock, extrapolating back from the present-day DNA of a number of individuals to their common ancestor.

In 1987, New Zealander Allan Wilson was famously able to date mitochondrial Eve – the woman from whom all living humans descend, on their mothers' sides – at around 200,000 years before present.

In 2002, Massey's Professor David Penny and two of his colleagues looked at the pattern of variation in various sequences of mitochondrial DNA in 162 eastern Polynesian people, 54 of them from New Zealand. They concluded that the founding population of New Zealand Aotearoa had included around 70 women, a result that meshes with Māori oral tradition.

Cox and his colleagues would try to do much the same thing with Madagascar, but this would be a much more challenging problem. After its initial period of settlement by Polynesians, New Zealand had been genetically isolated; in Madagascar, two sets of genes, African and Indonesian, had been mixing for centuries.

Negotiated agreements

If ever there was a place known for luxuriantly green pastures, New Zealand is it. Few would suspect that many of those grasses prosper because of their mutually beneficial relationships with fungi of the family Clavicipitaceae. The grass nourishes the fungi and helps it disperse; the fungi produces chemicals that help to protect the grass from drought and disease and to deter herbivores – both insects and, less desirably from the farmer's standpoint, livestock. But the accommodation between the grass and the fungi is a delicate one. The grass must suppress fungal growth without killing the fungus, and the fungus must not harm its host.

To explore the grass-fungus partnership, Cox, Professor Barry Scott and Postdoctoral Fellow Carla Eaton took the fungal partner of a perennial ryegrass, knocked out the gene responsible for sending messages to plant cells, and reintroduced it to its host. The results were dramatic. The fungus became a pathogen against which the ryegrass mounted an aggressive defence.

What had happened? To find out, the team commissioned a United States firm to carry out a relatively new process, known as high-throughput sequencing, on ribonucleic acid (RNA) on plants containing the normal fungus and the modified fungus.

The result: an immense amount of data – around 40 million sequences per sample – from which Cox has sequenced the transcriptomes (sets of gene molecules that can be influenced externally and reflect which genes are active at any given time) of the fungal endophyte and the grass host.

Currently Cox is working on the genome of a fungal parasite of pine trees, with the intention of seeing if he can somehow sabotage its biochemical underpinnings.

"Genomes, even fungal genomes, are incredibly complex, but we don't really have

a choice. When you think of New Zealand's pine trees, they live for a long time. You can't just breed out and replace New Zealand's pine trees; that would take 30 or 40 years."

"It is more complex – because we have two groups and that seriously doubles the complexity. One group you can deal with in certain ways; more than one group is often hard."

Cox's data came from 2745 individuals from 12 island groups spanning the Indonesian archipelago and from 266 individuals from three Malagasy ethnic groups.

Among the Malagasy, many carried what Cox has characterised as the Malagasy motif; this being a variation on the so-called Polynesian motif (a marker of the Austronesian expansion found widely through Polynesia, Micronesia and Near Oceania) with two more distinguishing mutations.

Oddly enough, the Polynesian motif is rare in Indonesia, and the Malagasy motif is, as yet, unknown.

Does this present an argument against settlement by Indonesians?

Among small populations, a phenomenon called genetic drift exerts a strong effect. Because there are so few people, such things as a death or a new arrival or the number of children a woman raises to childbearing age can have a huge effect on the genetic composition.

So the simple workings of chance in a small population may have led to the propagation of the Polynesian motif and its Malagasy motif subset.

Whether the two distinguishing mutations in the Malagasy motif arose in Madagascar or hark back to an Indonesian source that has vanished, or has yet to be identified, is undetermined.

What did the data say? The statistical modelling favours settlement around the year 830 AD by around 30 women, of whom perhaps 27, give or take, were of Indonesian descent.

So what, then, is the likely scenario for Indonesians arriving in Madagascar?

A wooden double-outrigger sailed vessel of Maritime Southeast Asia depicted in bas relief on the 9th-century Borobudur Buddhist monument in Central Java, Indonesia.

Twelve hundred years is not that long ago. In 9th-century Europe, King Charlemagne ruled over his Holy Roman Empire of the West, and the Vikings were raiding and then invading coastal Britain. Meanwhile, in western Indonesia the maritime Srivijaya Empire held sway, its ships trading widely.

And these were sizable vessels of up to 500 tonnes, crewed by upwards of 100 sailors.

Was Madagascar a formal trading colony? Cox thinks the idea of Indonesia maintaining a trading colony at such a great distance is out of step with the trading practices of the day.

Was it settled by refugees driven from Indonesia by the expanding empire? There is no record of such an event.

Was it a single wayward trading vessel that happened upon the coast of Madagascar?

It is not out of the question: during World War II, wreckage from ships bombed off the coasts of Sumatra and Java was found washed up in Madagascar, as was a lifeboat complete with survivor.

But trading vessels were crewed by men.

Some questions must remain open.

If there is one assumption that bedevils Cox, it has to do with the limitations of using mtDNA, which can only tell you about matrilinear descent.

When the world came to know of his conclusion that Madagascar had been settled by about 30 Indonesian women, it was swiftly assumed that these had been all-conquering Amazons.

In fact, the reason Cox neglected to mention the number of men is that his data has nothing to say about them.

To reach any conclusion about the men he would need to interrogate the other segment of DNA ungarbled by sex, the male Y chromosome, passed down from father to son.

Analysing the mtDNA data was an immense feat. To deliver feasible scenarios for the present-day distribution of mtDNA among the ethnic Malagasy, Cox ran 40 million simulations on a cluster of UNIX computers – the equivalent of running a single computer for 1.3 years. Of these simulations, just 671 were judged to be feasible.

Analysing the male lineage via the Y chromosome would be no easier.

Even so, Cox hates loose ends. "People do keep asking about the men..." ■

Cox, M. P., M. G. Nelson, M. K. Tumonggor, F. X. Ricaut, and H. Sudoyo. 2012. **A small cohort of Island Southeast Asian women founded Madagascar.** *Proc R Soc B* 279:2761-2768.

Fields of gold

Dr Chris Anderson proposes to farm Indonesian mine tailings for gold, creating wealth for local communities and saving the environment from toxic run-off. He talks to **Malcolm Wood**.

Manihot esculenta - cassava

Below: Children play on the cyanide- and mercury-contaminated tailings, adjacent to working rice paddies.

Coconut palms, white sand beaches, azure seas, surf breaks and coral reefs, and behind it all the forested bulk of the volcanic Mount Rinjani. This is Lombok, the Indonesian island next along in the archipelago from Bali. In fact, some would say that Lombok is Bali as it once was. A Bali without the tourist hordes and rampant over-development. A place of unhurried grace and environmental balance. But this old Lombok is under threat. The culprit: mankind's hunger for gold.

The evidence of the rush is everywhere, says Chris Anderson, a Manawatū-based senior lecturer in soil and earth sciences, recently returned from visiting Lombok. On the hillsides, a sea of blue tarpaulins nestles among the greenery. Beneath each one, miners labour away in narrow, hand-hewn shafts and tunnels, filling their buckets with rocks,

A colourised image of Lombok shows the upper slopes of Mount Rinjani – around the same height as Aoraki/Mount Cook – in white.

Above from left: Cassava plants being used for experimental phytomining of arsenic-contaminated gold tailings in Fiji; one of Lombok's many mining encampments; breaking up the ore before it goes into the rod mills (see over page).

Below: Dr Chris Anderson in the field gathering data about cyanide and mercury contamination.

while outside porters heft the 25-kilogram sacks of ore down to the villages to be processed.

Gold has brought good things. Parents can afford to send their children to school, and in the villages leaky thatched huts are giving way to weatherproof concrete and corrugated-iron houses. But prosperity has come at a steep environmental price.

There is no such thing as clean gold, explains Anderson. The problem lies in the same qualities that give gold its undimmed lustre. This is one of the least reactive solid chemical elements, which makes extracting and concentrating it difficult. But fine gold particles will be collected by mercury to form an amalgam and gold will also dissolve in alkaline solutions of cyanide.

Mercury- and cyanide-contaminated tailings have become an environmental bane on Lombok.

But Anderson has a solution in mind: farm the tailings for gold. It is an idea he has had in mind for a while.

Like New Zealand, Lombok forms part of the Pacific Ring of Fire. That means volcanoes, earthquakes and areas of high mineralisation. Elsewhere in Indonesia, such as in Kalimantan on the island of Borneo, gold mining has been going on for years. But on Lombok the gold rush is recent.

It began in 2008 in two villages, after the locals were alerted by the prospecting activities of a mining multinational, then rapidly spread, a people's rush of small-scale artisanal mining operations rather than the industrial operations we are used to in Australasia. In one of Indonesia's poorest provinces, where many people get by on less than US$2 a day, mining promised a path to unimagined prosperity. Thousands have since given their lives over to the pursuit of gold.

Alongside many of those newly built concrete houses lie stacked sacks of ore, and, alongside them, batteries of cylindrical rod crushers, which churn away ceaselessly. Each crusher contains around a sack of ore, a cup of mercury and enough water to top it up. Four to five hours suffice to grind the rock to a slurry from which the heavier mercury-gold amalgam can be separated.

But although this process has removed the greater part of the gold from the ore, payable amounts remain, so the now-mercury-contaminated spoil is on-sold for secondary processing. This time the spoils are immersed in a solution of sodium cyanide and calcium hydroxide held in large tanks, leaching out the gold in the form of gold-cyanide. Activated carbon is then added to the mix to take up the gold from the cyanide solution, and finally the carbon is collected and burned, leaving the gold behind. As for the reprocessed spoil and barren cyanide solution – this is dumped close at hand, perhaps into the sea, onto the adjacent land, into rudimentary tailings ponds, or even into rice paddies that have been informally redesignated as tailings dams. "This is gold at all costs using whatever technology they like," says Anderson. >>>

On Lombok, says Anderson, there are thousands of rod grinders, hundreds of cyanide facilities and vast and unknown numbers of dumping sites.

Mercury and cyanide are both highly toxic. Cyanide – technically a chemical compound consisting of a carbon atom triple-bonded to a nitrogen atom – the popular poison choice of murder mystery writers the world over, is surprisingly the less worrying of the two. "Cyanide is a very safe chemical provided you know what you are doing," says Anderson. "It kills us because it takes iron out of our blood: cyanide binds more tightly to the iron than does haemoglobin, so we asphyxiate. But if you don't have an iron transport system, that doesn't matter: cyanide is a fertiliser, plants love it."

Mercury, on the other hand, particularly in the form of methylmercury, is a pernicious developmental neurotoxin. Formed from metallic mercury by anaerobic bacteria, which are present in soils, sediments, wetlands, rivers and the open ocean, methylmercury accumulates in the food chain, and, if this were not bad enough, mercury is one of the few toxins that easily transits the blood-brain barrier – it has been linked to learning disability and diminished mental capacity – or can make its way from mother through the placenta to a developing foetus.

Below each dump site, a cyanide- and mercury-rich witch's brew discharges into nearby water courses and the water table, contaminating rice paddies and turning streams and estuaries into dead zones. Coral bleaches. Sealife dies. Mercury enters the food chain with who knows what long-term effects. Anderson brings up a picture on his computer. "These are tailings dumped in an old fish farm that connects to the sea. When we went back in January there were piles of dead shellfish."

In paddy fields taking drainage from the cyanidation tailings ponds, mercury enters the harvest. "We have seen the worst methylmercury pollution of rice recorded in the world."

From top: Bagged ore awaiting processing; the bagged ore, having been broken up by hand (see preceding page) and with the addition of mercury and water is processed using rod grinders.

Group of four photographs, clockwise from top left: When the rod grinders are emptied, the mercury-gold amalgam is panned from the mix; the excess mercury is squeezed from the mercury-gold amalgam; the remaining mercury is driven off using heat; the gold is assayed and sold.

At bottom: The spoil from the rod grinders is leached in large tanks using a cyanide solution, with the resulting gold-cyanide collected using activated charcoal. Once this is done, the mercury- and cyanide-contaminated tailings and wastewater are dumped, sometimes into holding ponds, sometimes simply into – or onto – whatever is to hand.

Anderson did not start out to specialise in soil science, a discipline that sits at the boundary of geology and chemistry. He wanted to become a marine biologist, but after his first year of biology, put off by the prospect of having to perform yet more dissections, he made the switch to earth science and chemistry. "Rocks don't bleed," he says.

Eventually he found himself doing a PhD supervised by Professor Robert Brooks, who from the 1960s on had made his name exploring the unusually high uptake of metals by some plant species. All plants take up metals, but Brooks had found that some take up huge amounts, far more than they would seem to need metabolically speaking. Hundreds of what Brooks called hyperaccumulator plants are now known. Most preferentially take up nickel, but others take up zinc, cadmium, arsenic, thallium, manganese, cobalt and copper.

Brooks and those who followed in his path could see the potential. Hyperaccumulator plants could be used in biogeochemical prospecting, as indicators for the favourable mineralisation of the underlying soils. They could be used to clean up unwanted elements from contaminated soils, a process called phytoremediation. They could even, given the right conditions, be used for phytomining: profitably harvesting minerals such as nickel from ore bodies too poor to warrant mining of the conventional kind.

But nickel is a low-value metal, coming in at under US$8 per pound. What of gold, currently at US$1660 per Troy ounce?

As Anderson helped to discover during the course of his PhD, gold can also be phytomined. During his second year, Anderson and his supervisors authored a paper in the journal *Nature* detailing how Indian mustard (*Brassica juncea*) had been successfully employed to take up gold from crushed and cyanide-treated ore taken from the Waihi and Tui mines.

By Anderson's calculations, the discarded mine tailings currently poisoning the soils and sea of Lombok could instead be profitably phytomined, with each hectare producing up to a kilogram of gold and 250 grams of mercury annually over a period of years. Back in 1998, that kilogram would have been worth a little over US$9000; today it would be worth more than US$50,000.

When farming the tailings no longer realises a return, Anderson proposes that they be stabilised with plantings of timbers such as teak.

In theory, phytomining could both help to save Lombok's natural environment and provide a profitable community enterprise. Anderson is determined to turn theory into practice – and it may well happen.

Anderson's visit to Lombok was hosted by Professor Wani Utomo of Indonesia's Brawijaya University on the island of Java – whose son is undertaking a PhD in soil science at Massey – and Dr Dewi Krisnayanti, of the University of Mataram on Lombok, and supported by the New Zealand Aid Programme. There is also a connection to China, which has problems with mercury-contaminated soil, through Professor Xinbin Feng of the Institute of Geochemistry of the Chinese Academy of Sciences.

In September, Massey University and the three partners will open the International Research Centre for the Management of Degraded and Mining Lands at Brawijaya University in Malang. Here the practicalities of phytomining and remediation will be put to the test by researchers and postgraduate students from New Zealand, Indonesia and China, before being introduced into the field.

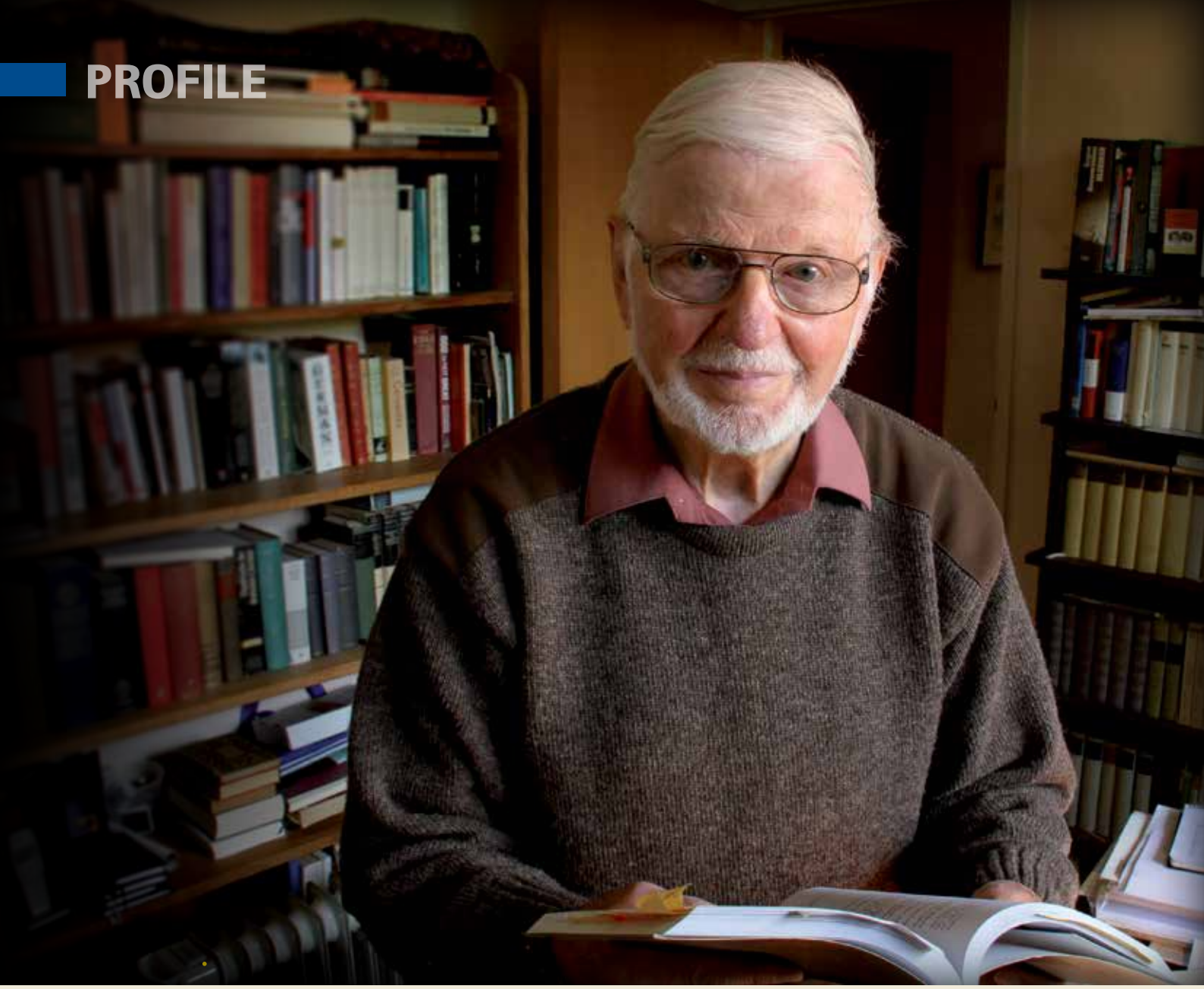
There are problems to be surmounted. As well as mercury, plants will need to be able to withstand the high levels of sodium remaining from the leaching process and the sometimes torrential rainfall during the tropical wet season.

"We'll need a few agronomic tweaks to get plants to grow," says Anderson.

He sounds quietly confident. ■

Back in 1998, that kilogram would have been worth a little over US$9000; today it would be worth more than US$50,000.

Dr Chris Anderson plants a ceremonial tree with Dr Dewi Krisnayanti of the University of Mataram and Professor Eko Handayanto of Brawijaya University during a workshop in Indonesia this year.



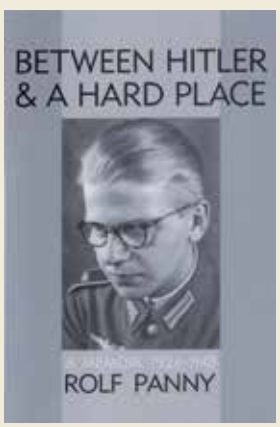
Speaking out

Redmer Yska talks to retired language lecturer **Rolf Panny**.

In Wharerata, the staff-club-turned-restaurant on Massey's Manawatū campus, Rolf Panny is enjoying a late lunch. Bespectacled and snowy-haired, he blends in nicely. Another distinguished humanities lecturer enjoying some leisure in retirement after a lifetime spent in library stacks and lecture theatres, you might think. But you would be seriously mistaken. In his lifetime Panny has been through two serious conflagrations: World War II and the student unrest of the 1960s.

The first was fate. Born in 1924 and raised in Hamburg, Panny turned 18 in 1942, as Germany was experiencing its first major reverses. A reluctant conscript in Hitler's army, he escaped death or capture on the Russian front only by being wounded by shrapnel and evacuated by air – and even then only by taking the place of a more seriously wounded man who had died. The Germany to which he returned was little more than rubble; with the war at an end, like so many others he must have longed for a quiet life.

Events were to conspire against him. After studying in France, Panny moved to America where, in the early 1960s, he found himself at the University of California (Berkeley), married with children, completing a Master's degree and working as a teaching assistant running a language lab.



Between Hitler and a Hard Place, published by Steele Roberts, is the first instalment of Panny's memoirs. The second, on which he is currently at work, will include his time at Massey.

More interesting times. In 1962 there was the 13-day Cuban missile crisis: the Soviet Union had begun constructing bases in Cuba to host a number of medium-range and intermediate-range ballistic nuclear missiles, and as the United States mounted a shipping blockade the Cold War threatened to become hot. Then there was Vietnam, where, in 1963, 16,000 American military personnel were already deployed. In the American south, racial segregation remained a festering sore.

Clearly there were issues of public moment that warranted debate, yet America's universities – although now populated by the first of the rebellious baby boomers – were not about to stir controversy. At Berkeley, the faculty were required to sign a loyalty oath and on-campus political activities were censured.

One sunny morning in October 1963, after attending a lecture, Panny – already a convinced peace activist who had marched against the escalation of hostilities during the Cuban crisis – chanced upon a group of students surrounding a police car. The police, he learned, had arrested Jack Weinberg, former student and anti-racist activist, who was now sitting in the car. Weinberg's infraction? While sitting at a Congress of Racial Equality table, he had refused to show ID to campus police.

With three others, Panny promptly seated himself on the back bumper, ensuring that the car stayed put. He reluctantly gave up his spot on the bumper to open the doors to the language lab. When he returned several hours later, it was to the sight of a sea of students surrounding the car while from its roof a succession of speakers addressed the crowd by megaphone.

"They announced that unless Weinberg was formally released the car would stay there for the night. It was nothing short of a spontaneous rebellion."

Weinberg remained in the car for the next 32 hours before being freed on the promise that the university authorities would issue a ruling on the exercise of free speech.

A ban on campus gatherings followed, leading to counter-protests and strikes and the formation of what was called the Free Speech Movement. For Panny, there was the sense of déjà vu.

"We went into the registry building and organised an all-night teach-in on the upper floors and the stairwells. There must have been 1000 students forming small 'teach-in' groups. With about 12 students I discussed the failure of German universities to stand up to Hitler and drew parallels between the events of the past and the compliant attitudes taken by the Berkeley university administration."

Meanwhile he embarked on his PhD, accepting an assistant professorship in Berkeley's German

From top: Panny chairing a meeting of the Committee of External Relations, German National Union of Students, Bonn, 1949; surrounding a university police car in Sproul Hall Plaza on 1 October, demonstrators listen to Mario Savio (standing on car roof) protest the arrest of Jack Weinberg (photo by Don Kechley, UC Berkeley, University Archives); Panny departing from Vancouver for New Zealand, 1970.

Speaking their language

It might be the lure of the profits to be made on the Chinese market, the romance of strolling the streets of Paris or exploring the ruins of Peru, or the intrigue of delving into Japanese sub-culture: the motives that attract students to Massey's School of Linguistics and International Languages are varied.

On offer are Spanish, Chinese, Japanese and French, with most students opting to study via distance learning.

Chinese is becoming an increasingly in-demand language. Often the students are business people, but pilots, police officers, teachers and ever more New Zealand-born Chinese wanting to reconnect with their roots are also among the students.

Senior lecturer Rosemary Haddon says China is looming large on the horizon for New Zealand, especially in terms of trade, and learning Chinese is increasingly on offer in primary schools.

"Structurally it's a surprisingly simple language to learn; it's not nearly as difficult as people imagine."

Spanish has the highest enrolments of all the languages, and at Massey a team of tutors from Argentina, Colombia, Honduras and Peru, expose students to the language's regional nuances.

Senior lecturer Dr Leonel Alvarado says students soon discover that New Zealand and Latin America share much in common culturally, including a rich indigenous heritage.

"For instance, without potatoes from the Andes we wouldn't have fish 'n' chips, and without Mexican cocao beans there wouldn't be Whittaker's."

Massey is the only university in New Zealand teaching Spanish via distance learning and one of the few to do so in Australasia.

Distance learning offers the flexibility to study when the student chooses, and weekly interactive online tutorials offer the opportunity to practise listening and speaking, Alvarado says. "In other words, they can put their melodious voices to the test."

For the Japanese programme, anime (animation films) and manga (comics) are drawing a new type of language student: ones who beyond learning the language want to delve deeply into Japanese culture. "The popular culture has a really strong appeal; things like J-pop or Japanese music," says lecturer Penny Shino.

Dr France Grenaudier-Klijn says students choose to learn French for both romantic and pragmatic reasons. Aspiring designers, business and communication students and European-based Kiwi athletes are among the students, as is a Kiwi soldier in Afghanistan, and legions of would-be tourists dreaming of a French getaway.

The Kiwi students regularly converse with French students learning English in online forums.

Grenaudier-Klijn says the first 12-week course covers about three years of high school lessons. Other papers on offer introduce students to French history and culture and next year a course will be devoted to diplomatic relations between France and New Zealand. She says language learning is about coexisting; even learning a few words signals your desire to communicate with others across linguistic and cultural divides.

"It [language learning] is deeply enriching, it teaches you not only about that [other] language and culture but very much about your own. I think it's a way of overcoming misunderstanding and it's an opening to another world."

Massey's international language courses are taught via distance learning, with some papers also offered internally on the Manawatū and Albany campuses. They are suited to every level of learner, from novice to advanced.

Department. In 1967 he accepted an 'ambassadorial' teaching role at the University of Wisconsin (Madison), another site of student radicalism.

By the time Panny left California, tensions between protestors and the authorities were growing uglier by the day. In November 1968 he and a group of students travelled to demonstrations in Chicago, witnessing savage police violence against protestors.

"One of the students I had brought along did not return on time to our van parked safely in a side street. It was past nine o'clock when he finally arrived, all bandaged around the head."

Panny's unease deepened. He learned that back at Berkeley, police sent to break up protests mistakenly sprayed tear gas into a hall where his thesis supervisor, Professor Heinz Politzer, was lecturing. Politzer later made the remark: "I've been through this once in Vienna under the Nazis. Why did I have to come here to face the terror all over again?".

Panny watched the Madison campus become more militant. His involvement in anti-war activities there would be reported to campus authorities back at California – who would later signal their displeasure by effectively dismissing him in a sleight of hand involving a job offer from another university.

Happily, Panny's time at Madison coincided with that of visiting Fulbright scholar Kiwi scientist Alan Odell. Odell, a Quaker and former conscientious objector, became a friend and soon persuaded Panny to consider the merits of New Zealand. By mid-1970, the family's passage was booked.

The departure was fraught. As Panny drove back to California, he found out to his horror that Karleton Armstrong, a student he knew, was a primary suspect in the bombing of a campus building used in military research. A death and

injuries had resulted. Panny had innocently lent his van to Armstrong (later sentenced to 23 years in jail) 10 days before the incident.

So it was that Panny and his family were pleased to leave the maelstrom of 1960s' America for the more sedate attractions of New Zealand, where he took up a position teaching German at Massey's Modern Languages Department.

An early intimation that he was entering a different world came with a cricket match. Somehow Panny ended up rolling the pitch for the humanities vs social sciences match, a fixture nurtured by founding Vice-Chancellor Sir Alan Stewart and held on the lawn below his residence. Invited to bat, novice Panny was caught out, but a colleague politely dropped the ball, "showing his respect for the newcomer to the game".

But it took a while for Panny to identify Stewart himself, doing so only by accident. He had seen someone "meandering" on weekends in the parking lot outside the Modern Languages Department. It was Stewart indulging in his practice of managing by walking around.

"Much later I was to learn that it was the Vice-Chancellor inspecting his campus. 'He makes himself invisible during the week,' my office neighbour Rod Lyall told me, 'which gives him the power of the Lord. No one has ever seen him.'"

Yet Massey was not at such a remove from Berkeley as all that. New Zealand too had troops in Vietnam, and Massey, which had begun life as a conservative agricultural college, almost a village with the Vice-Chancellor standing in for squire, was becoming something quite different.

When in 1970 the Ohio National Guard shot unarmed college students at Kent University, the student protest shut down Massey in solidarity.

Clockwise from top: A production of Bertolt Brecht's *The Wedding* in 1989, produced by Panny; accepting life membership of the New Zealand Association of Language Teachers from President Mary Bockman in 1996; Panny in his garden in 2000.

In 1971 Panny joined a group organising an anti-Vietnam war 'mobilisation' all the way along Broadway, ending in The Square with 5000 people. (The election of a Labour Government at the end of the following year led to New Zealand's troops being brought home.)

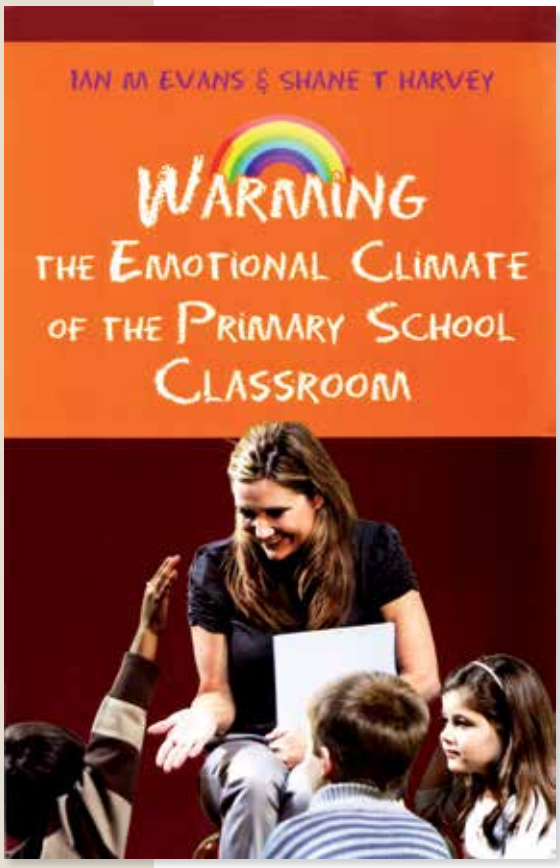
However, increasingly, Panny's focus shifted to community issues. He led opposition, for example, to the tree-lined Fitzherbert Avenue being 'modernised' into a four-lane highway and to the construction of a second bridge. His newspaper ad calling for a public meeting drew more than 200 people – and the bridge proposal was duly rejected.

Panny adores Palmerston North, describing it as a "human-sized city – you meet people who you know everywhere you go, so unlike the anonymous crowd that greet you in Auckland and Wellington".

Since retiring in 1990, Panny has involved himself closely with U3A (the University of the Third Age) in the Manawatū region and begun the labour of writing his life story in instalments. The years growing up in Nazi Germany and serving in the infantry are related in *Between Hitler and a Hard Place,* and a second volume is in the works.

So what lessons has Panny's life taught him? "Ah, that's the $64,000 question.

"One, at least, is the value of free speech: its possession and responsible exercise."■



Warming the Emotional Climate of the Primary School Classroom
By Ian M Evans and Shane T Harvey
Dunmore Publishing

The weather makers

Malcolm Wood writes.

As the Government has recently discovered – not for the first time – education is a matter about which the New Zealand public holds strong opinions. This is to be expected. Each of us has spent a formative decade or more in the education system and many of us now have children at school.

What do we remember of our school days? With luck, some remnants of the curriculum, a few of our classmates, and likely as not a succession of teachers: the good, the not so good, and the ones who maybe should have done something else. At some profound level, we know the difference a good teacher can make.

The statistics bear us out. One US study found that having a good teacher in the fourth grade – think nine- and ten-year-old children – made a student 1.25 percent more likely to go to college and 1.25 percent less likely to get pregnant as a teenager. That may not seem much, but aggregate the effect over the student's lifetime and it comes to US$25,000 more in earnings, or about US$700,000 in gains for an average-sized class.

And one defining characteristic of a good teacher is that they create a happy and productive classroom. Again, we will all have memories of classrooms that worked – where the students were calm, settled and focused – and those that didn't.

In the terms used by Professor Ian Evans and Dr Shane Harvey, a good classroom is one that has a warm emotional climate. Hence the title of their recently published book, *Warming the Emotional Climate of the Primary School Classroom*, which sets out the findings of a series of Marsden-funded research projects.

During the course of these projects, Evans and Harvey set out to identify what it is that sets good teachers apart and whether some part of this elusive ingredient 'X' can be passed on to others. They have been nothing if not rigorous. They have sought out and incorporated Māori worldviews. They have interviewed successful teachers and their students. They have placed observers in classrooms and taken many hours of video footage. They have coded the behaviours they have observed, and developed a typology for categorising them. They have identified some of the particular profiles that good teachers seem to share.

And, using what their research has told them, they have run a series of emotional environment workshops for teachers and assessed the outcomes – both from the teachers' standpoints and of their pupils – to see if there is an appreciable before and after difference.

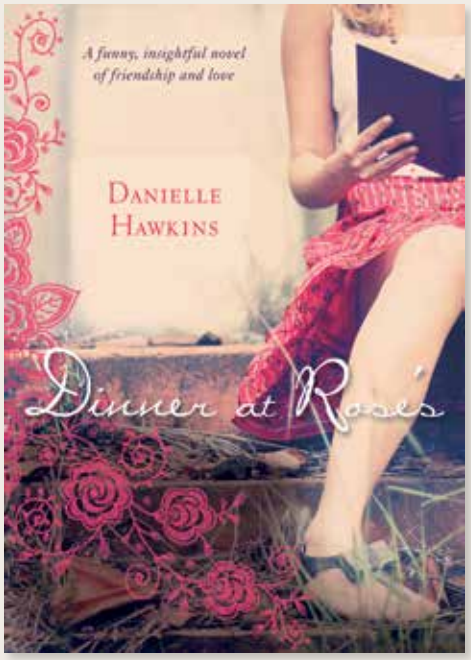
Their results are somewhat equivocal. They found that teachers can increase their emotional competencies over time and that taking part in the workshops did lead to a heightened degree of emotional awareness, but the evidence of better emotional outcomes for students, although marked in some cases, was, for reasons to do with smaller sample sizes, less statistically significant.

Perhaps these sorts of subtle, incremental, hard-to-measure changeare as much as can be expected. As teacher-turned-newspaper-columnist Joe Bennet recently wrote:

"Teaching is an intuitive human business. The golden rule is that you must teach according to your nature. If you don't, the kids will see through you like glass. Otherwise there are no golden rules. There is no one way to do it. And though there are tricks to be learnt, there is no body of knowledge that can turn a bad teacher into a good one."

The book closes by emphasising how important it is that teachers support one another. A good school embraces a series of virtuous relationships: the teachers support one another, the students feel valued, the parents are proud of their children, and the community acknowledges and supports the school.

Evans and Harvey remind us of how complex, multifaceted and demanding it is to be a teacher and that the good ones can be life-changers. We undervalue them at our peril.



Dinner at Rose's
By Danielle Hawkins
Allen & Unwin

Small town love

Bonnie Etherington writes.

Danielle Hawkins's debut novel brings cancer, betrayal, physiotherapy, farming and lovers together with humour and sensitivity. At first glance, the title and blurb of this book gave me the impression that it would be a dainty bit of chick-lit, but these features belie the depth in this story that carries it beyond the standard 'girl-hopes-to-get-back-together-with-boy' plot line, and elevates it into a book of substance and heart.

After discovering her boyfriend having sex in a chair with her best friend, Jo Donelly leaves her life in Melbourne and returns to her tiny hometown of Waimanu in the North Island to take up a temporary physiotherapist position. While there she spends much of her time with her honorary 'aunt' Rose Thornton. Rose is an eccentric and lively woman with four dogs and a pig called Percy, who cooks such concoctions as scalloped potatoes with strawberry yoghurt and prune curry, and who, despite these adventurous inclinations, always insists that everyone in her house call the evening meal by the refined English 'dinner' rather than the standard New Zealand 'tea'. Rose's nephew is Matt King, Jo's childhood friend with whom she had a "spectacular" one-night stand years previously, and subsequently has never quite been able to get out of her head.

When Rose is diagnosed with cancer, dinners at her place become even more central in both Matt's and Jo's lives as they do all they can to help her get through the illness. Meanwhile, under their noses, Rose is pulling strings that will reignite desires that have long been buried.

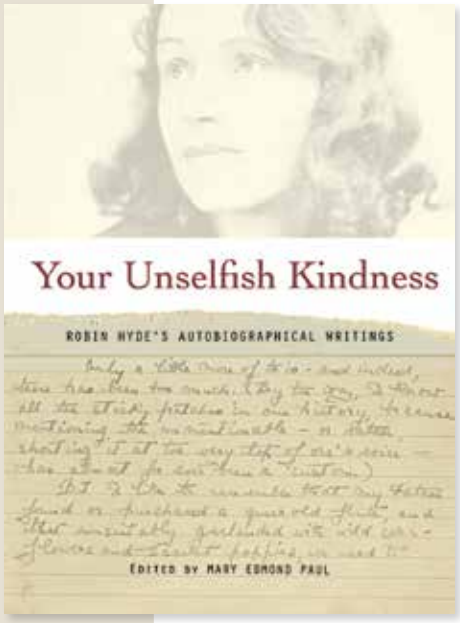
Hawkins's strength clearly lies in her humour. In this way she is able to treat subjects that could become heavy, dreary and clichéd with a light yet sensitive touch. She writes cheesy so well that it doesn't feel like cheesy any more, but she is equally good at writing more biting and sarcastic comedy, which prevents the story from tipping over into over-sentimental territory, while still retaining the emotional depth that such topics like cancer require.

Hawkins has also managed to capture the essence of small-town New Zealand in this novel. So many other writers, trying to be 'authentically kiwi', stuff their books with the kinds of detail you might find in an airport souvenir shop, but Hawkins has managed to avoid this. Instead, she uses details like the intricacies of milking and lambing, one character's preoccupation with turning off lights to save power, and a particularly poignant storm episode, to create a world that any New Zealander who has experienced small-town living will recognise. Hawkins is a large-animal vet when she isn't writing, and this gives her an edge when she describes some of the 'finer' aspects of farming.

With such courageous, endearing and (frankly) peculiar characters, this moving look at illness and love is one you could (and I did) devour in an afternoon or two. It goes particularly well with a cup of tea.

Author **Danielle Hawkins** is married to a farmer and lives in Otorohanga, where she practises as a vet part-time and attends to her two small children – writing in the blessed intervals when both are napping. This is her first book.

Reviewer **Bonnie Etherington** is a Master of Creative Writing student at Massey. Her fiction, poetry and travel writing has appeared in various publications including *Bravado*, *AA Directions* and *Let's Travel*. She is currently working on a novel.



Your Unselfish Kindness: Robin Hyde's autobiographical writings
Edited by Dr Mary Edmond Paul, Otago University Press
Redmer Ysaka writes.

Extraordinary and overlooked

Dr Mary Edmond Paul grew up in a house where the name of author 'Robin Hyde' (Iris Wilkinson) was well known. But Edmond Paul, senior lecturer at Albany's School of English and Media Studies, did not delve into Hyde's writing until the mid-1980s when she began her doctorate in New Zealand literature and history

"It was then that I first read her autobiographical fragment, *A Home in this World*. My father, Blackwood Paul, had been a friend of hers in 1930s' Auckland. Her son [Derek Challis] first offered that manuscript to him as a publisher. But my father died in 1965, when I was only 12, and long before Longman Paul's 1984 edition eventuated."

Today Edmond Paul is an acknowledged authority on this dazzling but often overlooked New Zealand novelist, poet and journalist. She has just edited another important book on Hyde, *Your Unselfish Kindness*, an anthology of her autobiographical writing, published by Otago University Press. It follows her earlier books on aspects of Hyde's writing: *Her Side of the Story: Readings of Mander, Mansfield and Hyde* (1999) and *Lighted Windows: Critical essays on Robin Hyde* (2008).

Your Unselfish Kindness is the final product of the Marsden grant that Edmond Paul was jointly awarded with poet and academic Michelle Leggott and Dr Pat Sandbrook, in 1999. Since then, the project has encompassed the production of a major and definitive biography, *The Book of Iris*, written by Hyde's second son Derek Challis and poet Gloria Rawlinson (2002), and a new edition of poems, *Young Knowledge* (2003), edited by Leggott.

The book includes a chronology of Hyde's 36 years, a brief life that was rarely happy. Born in South Africa in 1906 and raised in Wellington, she spent most of her adult life working as a journalist for a range of local newspapers and magazines, writing luminous poetry on the side and getting some of it published.

The private life of this gifted but acutely sensitive woman was, however, chaotic. When Hyde attempted suicide by jumping into the Waitemata Harbour in 1933, she had already given birth to two children whilst unmarried (one was stillborn) and had been battling depression and medically acquired drug addiction for years.

Hyde agreed to go into a residential clinic attached to Auckland Mental Hospital at Avondale and came under the humane care of Dr Gilbert Tothill, probably New Zealand's first psychologically trained doctor. The clinic she called Grey Lodge would be her home base for the next three years. Tothill urged Hyde to write down her life story, to face and resolve what he called "the evil hour of remembering".

The result of this intensive therapy, the core of *Your Unselfish Kindness*, was a 1934 autobiographical manuscript, running to 190 handwritten pages, directly addressed to Tothill. The results make for sometimes wrenching reading: the botched operation that left her lame at 18, the undiagnosed depression, and the grief over losing her son Robin Hyde (whose pen name she used thereafter).

But what was essentially an experimental process proved highly therapeutic, helping to unleash a torrent of creativity. At Grey Lodge, Hyde would produce her most important work: poems, short stories and a brace of major novels such as the powerful World War I story *Passport to Hell* and *The Godwits Fly*.

Edmond Paul is quick to see parallels between Tothill's experimental therapy at Grey Lodge and today's 'rehab' process, where addicts and alcoholics living communally are actively encouraged to 'open up' and write out their life stories.

"Hyde's process of seeking serenity, sharing her troubles, and taking ownership of the events of her life in order to feel safe in the world, could be seen as similar to 12-step programmes like Narcotics Anonymous. But without the community that might have helped her to retain the practices of truthfulness and acceptance when sick and under mounting strain in London in 1939, she took her own life."

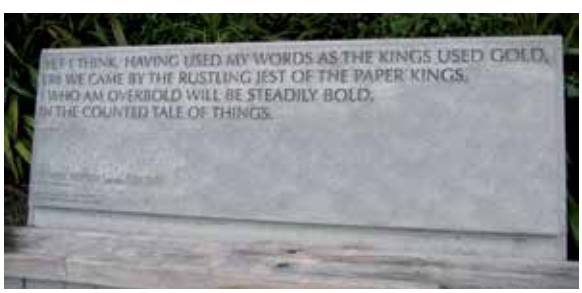
Edmond Paul, whose informative and sensitively written introduction to *Your Unselfish Kindness* explores the landscape of mental illness at the time of Hyde's 'recovery', praises her subject's fearless approach to writing down her life story.

"Her frankness is also a model for a sensitive version of increasing contemporary directness about emotional distress (and symptoms) caused by grieving and trauma, and about consequent self-medication of one kind or another. Virginia Woolf was the first to use the term life writing; she said around the time Hyde was writing that we had yet to learn about women's lives – even just private lives. Hyde's is one story she might have imagined," she says.

Above all, Edmond Paul sees a timeless and universal quality in Hyde's writings: "Her courage to reveal distressing and erstwhile secret recollections and experiences as a means of recovery is moving and relevant to 21st-century readers as both a personal and a social document but more particularly as a subtle articulation of the inside-outside predicament, which in its fineness as writing speaks across decades.

"She also wrote with the desire to enrich the vision of what society could be, and to assist others to feel they belonged in the world by making worlds they could belong to. This is the story of how Robin Hyde struggled with the forms of sanity on offer in the New Zealand of the 1930s and how the 'unselfish kindness' of her doctor helped her to do so."

For Edmond Paul, *Your Unselfish Kindness* represents the completion of a long and dedicated interest in Hyde that has continued for a quarter century. "The book will hopefully allow others to go on and develop more aspects of her work. I want to write something else now."



A Robin Hyde quotation forms part of the Wellington Writers' Walk.

POPULATION TWO

You probably meant to hide out there
for an hour, wouldn't want me to see
the way you stare at the skyline,
as though mentally dismantling
the bank tower, bakery, post offices.

Are you wondering whether it is too late to dismantle
what we have built without our even knowing the design
until intention is revealed not just in its structure
but in every structure that composes it?

Just a guess. Look at the mountains,
how they compose the dusk, the script of history,
is what I would tell you, were we speaking.
Look at the puddles of pale silence,
spilled like old milk, like weak wattage
from the bedside lamp. Imagine a clay
that vanishes, leaving the abstract design
of structure, the outline of an idea.

What we have built can still be seen
as the glimmer of a ghost town
at the moment of waking or when given
shape by the sound of a train, which cuts
like a kettle's whistle through an unpleasant thought.

Look over your shoulder.
The deck's sliding door is open.
I'm watching you
watch the long-dead stars still
shouting their message in light:
Remember us. Remember us.

Dr Bryan Walpert teaches creative writing as a senior lecturer in the School of English & Media Studies in Palmerston North. This poem is from his new collection of poetry, *A History of Glass*.

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA
UNIVERSITY OF NEW ZEALAND

THE NEW NEW ZEALAND IS RAISING OUR MEDAL HOPES IN LONDON

KAYLA SHARLAND
CO-CAPTAIN
OF THE BLACK STICKS
MASSEY UNIVERSITY
STUDENT

ERIC MURRAY
WORLD CHAMPION ROWER
MASSEY UNIVERSITY STUDENT

HAMISH BOND
WORLD CHAMPION ROWER
MASSEY UNIVERSITY
GRADUATE

Massey has more athletes competing at the Olympic Games than a great many countries.

Massey University will have the greatest representation in London of any New Zealand university. In rowing, cycling, hockey, swimming, sailing and canoe sprinting, our students will be there.

We offer students like Hamish Bond, Eric Murray and Kayla Sharland the support and flexibility to pursue their sporting dreams and their academic goals.

Even when training takes students to remote parts of the world, we find ways for them to continue their studies and sit exams – one of the reasons we were named New Zealand's first athlete-friendly university.

At Massey University you don't just get a degree – you come out with the practical skills to create a better future for New Zealand and the world.

Our students, staff and alumni are the engine that is driving change all over the world. Join us in the new New Zealand.

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