Bilby’s back
The ambitious plan to reintroduce native mammals into the wild

Edge of reality
Multi-user VR enters the fight against cancer

Country roads
Indigenous students return to rural NSW as doctors

Brave new world
Historian takes a fresh look at the Huxley family
UNSW congratulates this year’s Eureka Prize winners

Scientia Professor Justin Gooding won the Eureka Prize for Outstanding Mentor to Young Researchers.

Associate Professor Handan Wand, Scientia Professor John Kaldor and Dr Lucia Romani from the Kirby Institute were part of the Scabies Research Team that won the Eureka Prize for Infectious Diseases Research.
Being a doctor and a cancer researcher can be hugely rewarding – and equally frustrating at the same time. Every breakthrough raises new questions and for every discovery there is still so much we don’t know.

A step forward in unlocking these mysteries, and developing new cancer treatments, is being able to actually visualise cancer cells and their interaction with various drugs. That’s what makes UNSW’s Journey to the Centre of the Cell project, featured in this edition, so important.

This innovative project sees gaming technology – virtual reality – merge with scientific discovery to allow scientists to ‘walk’ through cancer cells to imagine and interact with them in ground-breaking ways, and hopefully to develop the cancer drugs of the future.

This project is a great example of interdisciplinary teamwork – combining art and design with medical science. And it is a great example of the type of impact-driven research we are carrying out at UNSW.

I am incredibly proud of our work and the difference our staff, students and alumni are making in the world. The year 2017 has been huge for UNSW, as we embarked on implementing our ambitious 2025 Strategy.

I want to thank our staff for the quality of their work, their resilience and patience as we worked through the most extensive change agenda in the history of UNSW. Some of the developments have been challenging but the benefits will start to flow in 2018.

As this year draws to a close, I wish everyone in the UNSW community a relaxing and enjoyable holiday season and the very best for a successful 2018.

Professor Ian Jacobs
UNSW Scientia Professor Veena Sahajwalla (second from left) has been awarded the inaugural PLuS Alliance Prize for Research Innovation for her revolutionary approach to recycling toxic waste materials.

The award, recognising outstanding innovation contributions that address global challenges facing society, was one of four $25,000 prizes presented at the Times Higher Education World Academic Summit in London in September.

Sahajwalla and her team at the UNSW Centre for Sustainable Materials Research and Technology (SMaRT) have developed technologies to convert complex waste materials, such as old tyres and disused electronic devices, into ‘green’ materials for use in industry.

“This recognition from the PLuS Alliance for the work we’ve been doing to drive change and impact communities across the world is a real honour,” Sahajwalla says.

The PLuS Alliance is a unique international collaboration between Arizona State University, King’s College London, and UNSW Sydney that enables research-led solutions to global challenges while expanding access to world-class learning.

The Education Innovation award went to Arizona State University Assistant Professor Laura Hosman for her work with SolarSPELL, a portable, solar-powered digital library that helps remove barriers to learning for people in remote areas.

Narayana Murthy, an Indian IT industrialist and co-founder of Infosys, received the PLuS Alliance Prize for Global Leadership, and CRISPR researcher Francisco Mojica won the PLuS Alliance Prize for Global Innovation.

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Australia’s first quantum computing company launches at UNSW

Australia’s first quantum computing company, Silicon Quantum Computing Pty Ltd, has been launched to advance the development and commercialisation of UNSW Sydney’s world-leading quantum computing technology.

The NSW Government is the latest partner in the $83 million venture, pledging $8.7 million from its Quantum Computing Fund. The commitment builds on earlier investments from UNSW and its quantum computing researchers ($25 million), Commonwealth Bank of Australia ($14 million), Telstra ($10 million over two years) and the Commonwealth Government ($25 million over five years) through its National Innovation and Science Agenda.

Working alongside the Australian Research Council (ARC) Centre of Excellence for Quantum Computation and Communication Technology (CQC2T), Silicon Quantum Computing Pty Ltd will operate from new laboratories within CQC2T’s UNSW headquarters.

It will drive the development and commercialisation of a 10-qubit quantum integrated circuit prototype in silicon by 2022 as the forerunner to a silicon-based quantum computer.

The international push to build the first practical quantum computer has been referred to as “the space race of the 21st century”. CQC2T is home to an incredibly strong team of silicon quantum computing researchers and the only group in the world that can make atomically precise devices in silicon. Led by UNSW Scientia Professor Michelle Simmons, the centre’s teams have produced the longest coherence time qubits in the solid state, the ability to optically address single dopant atoms in silicon, the lowest noise silicon devices and the first two-qubit gate in silicon.

“It’s an exciting time to invest in this new industry that will shape the 21st century,” Simmons says.

UNSW MAGAZINE
Upfront / 05

EMINENT STEM LEADERS RECOGNISED

• Professor Laura Poole-Warren, UNSW’s Pro Vice-Chancellor (Research Training) and a leader in biomechanical engineering, and Garvan Institute executive director and UNSW Professor of St Vincent’s Clinical School John Mattick were elected as Fellows of the Australian Academy of Technological Sciences and Engineering.

PIANO MAN

• Jincheng Jiang is the first Master of Architecture student in Australia to receive a six-month internship with the prestigious Renzo Piano Foundation in Italy. UNSW Sydney is the first Australian university to be offered a Renzo Piano Foundation internship, which sees interns participating in every phase of architectural projects and visiting construction sites to help bridge the gap between academic knowledge and the reality of the architect’s profession.

INTERNET COLLAR WINS SILICON VALLEY TRIP

• A global tracker for gas cylinders that was developed in just seven weeks has won five UNSW engineering students an all-expenses-paid trip to Silicon Valley, worth $25,000. Henry Blumentals, Matthew Eyles, Vanja Videnovic, Michael Irwin and Matthew Buffa – making up Team Raven – won the inaugural Maker Games for their sensor-laden collar that connects gas cylinders to the cloud and allows them to communicate with each other and their owners anywhere in the world.

JANE MCADAM AWARDED INTERNATIONAL HUMAN RIGHTS PRIZE

• Scientia Professor Jane McAdam, Director of the Andrew & Renata Kaldor Centre for International Refugee Law, is the first Australian to be awarded the prestigious Calouste Gulbenkian Prize. The jury highlighted the global scope and impact of Professor McAdam’s ideas, saying their practical effect on legislation, jurisprudence and policy had led to better lives for thousands of refugees and migrants.

UNSW RATES HIGHLY FOR EMPLOYMENT

• UNSW Sydney has scored highly in two sets of graduate employment rankings. The University received the maximum five-star rating for ‘Getting a Job’ in the Good Universities Guide, the only Group of Eight university to do so this year. In the 2018 QS Graduate Employability Rankings, UNSW ranked third in Australia and 36th in the world.

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Education institute honours David Gonski’s work

NSW Chancellor David Gonski’s game-changing contribution to education has been recognised with a new interdisciplinary institute being named in his honour.

The Gonski Institute for Education (GIE) was officially launched by UNSW President and Vice-Chancellor Professor Ian Jacobs at the University’s annual Town and Gown event.

Based in UNSW’s Arts & Social Sciences’ School of Education, the GIE will bring together scholars, policy makers and practitioners to conduct research that will help improve academic and wellbeing outcomes particularly for disadvantaged students and those who live in rural and remote Australia.

One of Australia’s most prominent business leaders and philanthropists, Gonski has made a huge contribution to education in Australia through his school funding review and in his role as UNSW Chancellor for the past 12 years.

Gonski says he feels extremely honoured to have the new institute named after him.

Former NSW Education Minister and GIE Director Adrian Piccoli says he is looking forward to the contribution it will make to education in NSW.

“Education is one of the most powerful forces in the world – it changes individual lives and it has an enormous impact on society in general,” he says.

The Gonski Review Report (2011) identified highly concerning trends in the educational outcomes of Australian school students, including a significant link between low levels of achievement and educational disadvantage, particularly among students from low socioeconomic, regional, remote and Indigenous backgrounds.

Tackling India’s heatwaves, one roof at a time

UNSW Built Environment researchers are investigating the potential of a removable rooftop weather barrier to alleviate the effect of intense heatwaves on low-income communities in urban India.

Working in collaboration with Administrative Staff College of India (ASCI) and DuPont Tyvek, and with support from UNSW’s Node for Low Carbon Living and the Australia India Institute, Dr Komali Yenneti is implementing a small-scale project in Hyderabad, which has experienced record-breaking heatwaves in the past decade.

Yenneti, New Generation Network Scholar with the Smart Cities Research Cluster, says nearly 1,000 square metres of rooftops in low-income households will be wrapped with DuPont’s removable weather barrier Tyvek, designed to reflect sunlight and absorb less heat than a standard roof.

“This thin, foldable roof material can be applied on the conventional roof during extreme weather conditions and then can be easily removed when it isn’t required,” Yenneti says.

Over eight months, researchers will measure the effectiveness of the material in reducing indoor heat and thermal exposure.

- Clare Morgan

NEW SOCIAL SCIENCES ACADEMY FELLOWS

- Four UNSW academics were among the 46 new Fellows elected to the Academy of the Social Sciences in Australia (ASSA). The new Fellows are Professor Eileen Baldry, Deputy Vice-Chancellor Inclusion and Diversity and Professor of Criminology, Professor Ross Buckley, Scientia Professor, UNSW Law, Professor Megan Davis, Pro Vice-Chancellor (Indigenous) and Professor of Law, and Professor Rick Richardson, School of Psychology.

THREE HONOURED WITH PREMIER’S PRIZES

- Scientia Professor Trevor McDougall from UNSW Science, Professor Maria Kavallaris from UNSW Medicine and the Children’s Cancer Institute, and Dr Brett Hallam from UNSW Engineering have won prestigious NSW Premier’s Prizes for Science and Engineering. The annual prizes, awarded in nine categories, reward leading researchers, innovators and educators for cutting-edge work that has led to economic, environmental, health, social or technological benefits for New South Wales.

FELLOWSHIP FUNDS ‘SECRET RIVER’ PROJECT

- Professor Grace Karskens has won the prestigious $75,000 Coral Thomas Fellowship, which will enable her to use State Library of NSW archives to research Aboriginal names and stories about the Hawkesbury River. Karskens is already working on a major ethnographic study of the Hawkesbury-Nepean, and her chance discovery in the Mitchell Library of a list of more than 180 Aboriginal place names turned her attention to the lower reaches of Dyarubbin, the Hawkesbury River.
Irish President Michael D. Higgins has called on Australia to consider revisiting events of its past, such as the treatment of our Indigenous people, in a way that recognises and includes the voices of those previously marginalised.

“The challenge of being open to revisiting anew some formative events of the past that we had, as it were, put on a shelf in our mind, is … a challenge we all face in all cultures,” President Higgins said in an address at UNSW as part of his recent State visit to Australia.

“There is nothing truly to be gained from amnesia … and everything to be lost, for it is only by acknowledging, questioning, sometimes revising, but always remembering, in an ever more inclusive way, the events of our collective past that we can begin to build a collective future.”

UNSW President and Vice-Chancellor Professor Ian Jacobs noted he was welcoming a statesman who was also a strong human rights activist.

“Yours is a lifetime of service and commitment to making the world a much better place and we are honoured to have you here today,” Professor Jacobs said.

President Higgins has been working on what he describes as a strategy for an “ethic of remembrance”.

This was in part in response to the commemoration of the formative events that took place in Ireland between 1912 and 1922, such as the 1916 Easter Rising, the First World War and the Irish War of Independence and Civil War.

He said Ireland was seeking to restore to its national memory the 250,000 men and women from the South of Ireland who served in the British Forces in World War I.

This was not to minimise debate about the causes and consequences of that war but “to recognise the lives of those Irish soldiers lost, and those whose potential and promise were extinguished”.

The President said an even more difficult commemoration lay ahead as Ireland approached the centenary of the Irish Revolution, the independence struggle and the Civil War.

“We must acknowledge the brutality of that struggle, the viciousness that was unleashed and the brutal tactics that were employed by both sides,” he said.

The act of remembering should be placed in an ethical framework that included previously marginalised voices, that was open to the perspectives and stories of “the enemy of yesterday, however dissonant they may be”, and in a manner that critically evaluated often competing foundational myths and beliefs.

“Our words matter and in our present circumstances when anger is the temper of our times we need to use our words for healing rather than wounding,” he said.

- Wendy Frew

Student’s Indigenous design gives Wallabies a winning edge

UNSW Art & Design honours student Dennis Golding is the artist behind Australia’s first Indigenous national rugby jersey, which was worn by the Wallabies in the third and final Bledisloe Test in October.

Golding, a Kamilaroi/Gamilaraay artist and third-year Fine Arts student, was chosen to design the jersey after winning an Australia Rugby Union (ARU) tender in 2015.

The green and gold jersey features an image of a wallaby on the front and shows Indigenous and non-Indigenous communities joining together, with symbols for the 14 Indigenous players who have represented Australia: Cecil Ramalli, Lloyd McDermott, Mark Ella, Glen Ella, Gary Ella, Lloyd Walker, Andrew Walker, Jim Williams, Wendell Sailor, Timana Tahu, Anthony Fainga’a, Saia Fainga’a, Beale Hodgson and Matt Hodgson.

Golding says he was honoured to present the jersey to the team.

“It’s a simple recognition of the enormous Indigenous contribution made to the sport and it’s incredibly powerful,” he says.

Golding, 28, has also designed the NRL Wests Tigers team’s Indigenous jersey, acknowledging the merger of the Balmain Tigers and the Western Suburbs Magpies clubs in 2000.

“Sport plays an incredibly important role in Indigenous communities. Being able to give back by recognising the important role Indigenous communities play in sport is something that feels right,” he says.

- Lucy Carroll
The challenge of tech

Living With 21st Century Technology is UNSW’s latest Grand Challenge. UNSW Magazine sat down with its lead Lyria Bennett Moses, Grand Challenges Academic Lead Robert Brooks and Head of the School of Computer Science and Engineering Maurice Pagnucco to talk through some of the issues. This is an edited version of the conversation.

Everything is affected by technology. How will the Living With 21st Century Technology Grand Challenge help us deal with some of that change?

Robert Brooks: We want to understand the change and the unanticipated ways in which we might have to change. We think often about the “tech” side of technology, but the social consequences are [also] part of what we’re interested in. For example, how has nearly everyone having a smartphone influenced the ways in which we relate to each other? Everybody has a strong opinion about those influences, but is it the same as our individual experience?

Lyria Bennett Moses: Part of it is understanding the impact of technology, but it is also the fact that we make the change. This University is a leader in bringing new technologies into being. So, just as we can talk about the impact of technology on other sectors, I think we can also think about what other disciplinary perspectives might offer to technology.

What does the future of work look like?

LBM: The expectation in our society is that everyone works. Should that be the case if, in the future, everyone isn’t working? If that happens, how do we create value in lives? How do we give people roles that, in a sense, could potentially be infinite? There’s no reason to have a finite number of mathematicians or philosophers, for example. Should we put people to work in those areas?

That’s a big question – for many people, their identity is very tied up with the job that they do.

LBM: There are choices. Either we find work, and maybe have far greater numbers of philosophers and mathematicians or musicians or actors than we have now, or we rethink leisure time. We might have a 20-hour work week and share work around, or societal wealth supports people whether or not they work.

This is where the Grand Challenges come in. To answer the question about work, for example, you need people who are expert in artificial intelligence (AI) who can talk about where the technologies are going [but] you also need sociologists, philosophers, experts in education. One thing I know:
we can’t just keep things going as they are and not think about it.

These conversations can be difficult, though, because politics often intrudes.

Maurice Pagnucco: There is little dialogue in Australia, and other countries have taken the lead. I think this is the point of the Grand Challenges: to really step up and have these discussions that we aren’t having now.

RB: Some of the discussions can be had in a way that doesn’t polarise along traditional lines. There are some very strong, financially conservative arguments for a Universal Basic Income, for example. The chance to air those at UNSW, to explore them and pull them apart, is really exciting.

How do we make sure an ethical framework is a part of technological change?

LBM: Ethicists will tell engineers not to build a bridge that’s going to fall down. But I think the ethical discussion that needs to take place around AI is more complex and links into discussions around the future of humanity … how we create AI that makes the world a better place for humans. That requires different and much broader questions rather than just ethical and unethical categorisation of streams of AI research.

RB: And this Grand Challenge isn’t just about AI, it’s about all types of technology. We have CRISPR gene editing, allowing us to make potent changes to an organism’s genome. Suddenly, all the things we thought were whacky science fiction are possible. This is technology we must use because it can deliver great good, but at the same time there are lots of nuanced decisions to be made.

And who makes those decisions?

LBM: It will vary by field. There are some decisions embedded in law, some are made by an individual when they’re choosing how to design something or which parts of research to pursue, and some are made institutionally. In some places there are mechanisms that bring the public into the debate.

How important is it for the community to be more informed and involved in decision-making?

LBM: Both are important but also challenging. Technology can enable engagement. It’s not just about how many people you can fit in a room – we can have platforms through which people can comment. A multi-pronged approach is necessary to tease out what people care about, but recognising diversity among that is also important.

MP: I think education needs to be part of it too. You want people to be engaged in the decisions being made but they need to be educated in what technology does, the social issues that need to be considered. Which is where the Grand Challenges come in.

RB: One of the things about the Grand Challenges is having discussions we think the world needs to have rather than those the media might want because they get lots of clicks. If you don’t have the sensible discussion and educate [the] public about a big issue like this, sooner or later the public will get involved and they’ll have pitchforks.

One of the other Grand Challenges is Inequality. In a time of technological change, how do we ensure people don’t get left behind?

LBM: We often talk about the digital divide or the genetic divide – who can afford to make the best genome – so we worry about inequality in terms of technology. But technology is only one strand. Conversations about the future of work bring up questions about the potential for this to turn into a dystopia of vast inequality. But there’s not much point just looking at technological divides without seeing them in the context of how they arose from educational divides or wealth inequality.

RB: Another type of inequality we haven’t yet considered in our Grand Challenge is what’s neuro typical. That’s a polite way of saying people who have different mathematical abilities, for example. The stereotypical mathematical introvert may well be the plutocrat of the next generation. Two thousand years ago it was the big and brawny and aggressive who were able to corral all the resources and build lineages. Now it’s a completely different type of person. Where does that leave us?

Where does the human factor fit in to this technological future?

MP: There are some key researchers who believe we’ll never have autonomous vehicles on the road because there are just too many possibilities for errors. We tolerate humans having accidents and killing one another but we wouldn’t tolerate that with technology. I don’t think we’ll have autonomous vehicles; I think we’ll have humans augmented with machines making the decisions.

LBM: If we’re going to talk about how we live with 21st century technology, we have to ask, what can technology do? What role do we want to have in a world where humans can manipulate their own genetic makeup and can automate processes including simulating intelligence and simulating various forms of creativity? What room is there for something that hasn’t been programmed or designed and what role do we want to maintain for that thing being us?
With their long, pink noses and pointy ears, bilbies are among the most delicate of the desert mammals that can survive in the harsh Australian outback. And, sadly, they make a dainty morsel for feral cats and foxes.

“They are very pretty animals, but very vulnerable. It is almost as if they have ‘eat me’ written across their foreheads,” says UNSW scientist Professor Richard Kingsford.

The nationally threatened species has not been seen in the wild in NSW for more than a century, mainly due to this predation by introduced species, as well as habitat loss. But now bilbies are on their way back.

The Greater Bilby will be the first of seven locally extinct native mammals to be reintroduced into Sturt National Park near Tibooburra, in the north-west corner of the state, as part of the Wild Deserts project that Kingsford leads.

Initially, about 10 bilbies will undergo a breeding program in a 110-hectare sanctuary at Taronga Western Plains Zoo in Dubbo. In 2019, 30 or so of these bilbies will be transported to Sturt and released into two 20-square-kilometre, fenced exclosures from which every single cat and fox has been removed.

“If just one cat remains inside the exclosures, the bilbies will not survive,” says Kingsford, Director of the UNSW Centre for Ecosystem Science.

The 10-year initiative, launched by NSW Environment Minister Gabrielle Upton in September, is a partnership between UNSW and Ecological Horizons, and the NSW Office of Environment and Heritage, in collaboration with Taronga Conservation Society Australia.

“It’s a really exciting project that combines high-quality scientific research with conservation outcomes,” says Dr Katherine Moseby, a DECRA Research Fellow in UNSW Science and Director of Ecological Horizons, a consultancy company that has helped introduce locally extinct native mammals into other reserves.

As part of the research at Sturt, Moseby will test a new device for killing feral cats, called a grooming trap. It has sensors and a camera that detect the shape of cats lured to the device. Once they are close, it fires a toxic gel at them.

“Cats are instinctive groomers and they ingest the poison this way. It has the advantage of avoiding the need to lay baits in the environment,” says Moseby.

Seven native mammal species – the Greater Bilby, Burrowing Bettong, Stick-nest Rat, Western Barred Bandicoot, Golden Bandicoot, Western Quoll and Crest-tailed Mulgara – have been chosen for the rewilding project at Sturt.

While cats and foxes will have been removed, the two exclosures will not be predator-free havens: cat-sized Western Quolls and the ferocious Crest-tailed Mulgaras also eat bilbies and other small mammals.

“These native predators will be needed to stop the bilbies and other species breeding so quickly that they eat themselves out of house and home and starve,” says Kingsford.

Bilbies themselves are omnivores and consume mice, small lizards, spiders, insects, roots and seeds.

The seven species will be introduced into the two exclosures in different numbers and orders to determine if this affects the outcome.

The scientists will also study the impact the mammals have on the whole desert ecosystem, including the soil, vegetation and...
BILBY BOUNCES BACK
**NATURE’S ENGINEERS**

Australia’s Burrowing Bettongs (above) play a vital role as ecosystem engineers in the arid zone, improving soil health by mixing in water and organic matter as they dig their burrows.

“One bettong can shift three tonnes of soil in a year,” says UNSW scientist Associate Professor Mike Letnic.

“Our recent research also shows that small mammals including bettongs are much bigger consumers of plant seeds than had been realised, which means their loss due to predation has likely caused significant changes to vegetation in outback Australia and contributed to the rapid spread of woody weed shrubs.

“This new knowledge reinforces the importance of rewilding projects such as Wild Deserts for restoring the environment.”

Letnic and his team’s recent study – published in the journal *Functional Ecology* – was conducted in central Australia at two desert sites where small native mammals have been re-introduced into predator-free exclosures: the Arid Recovery Reserve in South Australia and the Scotia Wildlife Sanctuary in south-western NSW.

“We conducted a cafeteria experiment, where we set out trays of native shrub seeds that only mammals or ants could access,” says study first author and UNSW Science PhD candidate Charlotte Mills.

“We compared seed removal rates in re-wilded areas with those outside the predator-proof fences, where few native mammals live. Up to eight times more seed was taken from the trays in the re-wilded areas.”

Photographs and other evidence such as footprints and droppings confirmed that mammals were active around the seed trays. Surveys also revealed there were fewer woody shrub seedlings in re-wilded areas compared with areas outside the exclosures.

“These results overturn the long-standing view that ants are the most important species when it comes to eating and removing seeds in the Australian desert,” says Letnic.

“It shows that mammals are important predators of seeds and their re-introduction has helped restore the landscape and helped prevent the encroachment of woody shrubs.”

- Deborah Smith

The 1.8-metre-high barrier will have an overhanging floppy top so that cats cannot climb over it, as well as buried netting at the base so rabbits and foxes cannot dig under it.

If all goes well, the native mammals will be introduced into a third, 100-square-kilometre training area that contains a small number of cats and foxes, to educate them about their enemies.

West and Moseby’s recent research with bettongs has shown if prey-naïve animals are exposed to small numbers of predators, they can learn avoidance behaviours, such as increased wariness when feeding.

The aim of the project is to see all seven locally extinct species eventually reintroduced into the wild, outside the protected areas, where they can once again roam the desert areas of NSW and restore the landscape.
When Luke Walker and Jason Sines arrived at UNSW Sydney in 2012, they were daunted by the road ahead of them – six years of university study and hundreds of kilometres between them and their families.

Luke struggled with homesickness. A Wiradjuri man from the NSW town of Narromine (population 3800) near Dubbo, he was used to walking down the street and seeing only familiar faces.

But the whole community was behind him, and sending their well wishes via his mum, Debbie, who works at the town’s pharmacy.

Jason would also learn that he needed to build new support networks at university. A Bundjalung man, Jason was the first Indigenous dux of his high school in Ballina, northern NSW, where his mother, Angelique, works. His father, Jason Snr, works in the Department of Education.

The students met at the pre-program for medicine at Nura Gili, and both received six-year Shalom Gamarada residential scholarships. These scholarships aim to increase the number of Indigenous Australians studying and practising medicine by funding tuition and board at UNSW’s Shalom College.

The Shalom College community became like family for both men, who had strong personal motivations to study medicine.

Luke became attracted to medicine after observing the doctors who had treated his father, Richard, who died from renal cancer when Luke was in primary school.

The youngest of three boys, he recalls how the doctors communicated differently with each member of the family throughout his dad’s year-long illness, so each could understand the situation.

“That was probably the most important thing they could do,” he says. “They could extend Dad’s life, and do only that, but we wouldn’t have known what was happening.

“Because we were aware of what was happening, we kind of got some sense of control back. That’s what drew me into medicine.”

Jason was in the early years of high school when he lost his grandmother. Dawn Sines was only 60 when she died, and had required dialysis for kidney disease for many years.

“At the time, it seemed like a normal thing, I didn’t really see anything unusual about it,” Jason says.

“But then I did some research for an assignment at school, and I learned about the disparity in life expectancy for Indigenous people. It was completely shocking to me, and that was one of the main reasons I was attracted to medicine.”

At the national level, the life expectancy gap between Aboriginal and Torres Strait Islander and non-Indigenous people is 10.6 years for men and 9.5 years for women.

Jason knows having more Indigenous doctors will help to close the gap, and that has kept him going through the hardest times in his degree.

In November he packed up his room at Shalom College ahead of starting his career at a hospital in the rural NSW town of Orange.

“It’s important to me to work in the country because I was raised in a rural area, I just feel that I want to give back to the country,” he says.

Down the hallway, Luke was packing his bags for a hospital in Dubbo, which he hopes will lead to a placement in paediatrics the following year.

“All of us Indigenous doctors want to improve the health profile of Indigenous people, and I think one of the best ways of doing that is to start young and create relationships between a child and their practitioner,” Luke says.

Luke believes a working group to improve the Indigenous curriculum will strengthen the UNSW Medicine course, and help make all students more culturally aware.

He hopes too that more Shalom Gamarada scholarships can be funded, so that students don’t have to struggle to make ends meet, on top of worrying about their studies.

“Over the past six years I’ve been able to surround myself with strong friends,” he says. “Seeing the way they dealt with challenges, I was able to lean on them, and learn from them.”

The long road

After six years of study, and support from Shalom Gamarada, Indigenous students Luke Walker and Jason Sines are returning to rural NSW to start new lives as doctors. By Gabrielle Dunlevy.
The world of virtual reality and the science of the body can seem a paradox: one takes you out of space and time and the other is wholly tangible – a living, breathing collection of cells.

But for Associate Professor John McGhee, pulling on a virtual-reality (VR) headset doesn’t transport you to a sci-fi underworld. It is a journey to the surface of a cancer cell.

Ground-breaking virtual-reality technology led by McGhee, from UNSW Art & Design, allows multiple scientists to see inside a human cell at the same time, giving researchers a three-dimensional tool to improve doctor interaction and help analyse how cancer drugs work.

“I saw we could do so much more with VR than selling products and superheroes,” says McGhee, who began his career visualising data in a UK radiology clinic. “Maybe I’m a frustrated scientist but I want to help people make sense of their bodies. We have such amazing gaming technology and we can use it to benefit patients and specialists. The inner workings of the body can often get lost in specialist data. This makes the process democratic.”

McGhee is working with Professor Maria Kavallaris, from UNSW’s Australian Centre for Nano Medicine and Children’s Cancer Institute, in the second phase of the Journey to the Centre of the Cell project, which combines scientific data, microscopy images and animation to create a VR world of cells and blood vessels that can be seen through headsets.

Until now, McGhee’s work involved single VR headsets, with one person moving around in the data. But new technology means multiple users from different parts of the world can walk inside the ‘landscape’ of the cell at the same time. It is a huge leap for scientists and clinicians.

“We can have multiple scientists logging in at once and up to four scientists being able to view the same data, so multiple people can annotate, interact and make sense of what’s there,” he says. “This could help researchers ask questions they’ve never thought of. It’s a dialogue tool that could help change their approach [to cancer treatment].”

As co-chief investigators at the ARC Centre of Excellence in Convergent Bio-nano Science and Technology, McGhee and Kavallaris are using this phase of the project to educate researchers on how cells function and to look at the way nanoparticle drugs are absorbed by cancer cells.

“Rather than seeing data through a microscope, we use immersive headset systems so you are literally standing right next to a cell structure,” McGhee says. “The first phase was static but now we have dynamic data so we can track the movement of nanoparticles.

“Our goal is to be able to see a drug absorbing into the tumour, so you can highlight the target for radiotherapy. It could mean you can also deploy a drug more accurately.”
Kavallaris, a leading cancer biology researcher and nanomedicine expert, says tracking the three-dimensional movement of cells in tumours can show scientists what happens when cells move in real time – information that can be used when looking at the spread of cancer.

“We look at tumour cells in a live animal, capture information about the migration of the cells, and that data gets sent back to John to be rendered to make it interactive,” Kavallaris says.

“We have never had access to something like this before. Apart from being educational, we hope the multi-user VR will help scientists better understand how and what happens if you interfere with a genetic process and add certain drugs, to see what the effect is on the cancer cells. We can travel and touch things and walk through structures. When I’m looking at a static image I can’t look at the underside of a cell.”

Kavallaris can see VR technology being particularly useful in the childhood cancer neuroblastoma, due to the speed at which it spreads.

“Eventually it could be a tool to explain to patients and their parents about a cancer. Ultimately the technology could be used in MRI and PET scans, to take patients through the body to show where the cancer cells are and what doctors are doing to treat them,” she says.

Instead of the doctor talking to a patient about how the tumour has shrunk or grown, the technology could allow the patient to see the three-dimensional uptake of the drug and feedback on its effectiveness.

McGhee has collected cell data using PET CT, MRI data, cryo-electron microscopy and lattice light-sheet microscopy to create a dynamic cell.

“If scientists can work more collaboratively then they can see more things in the data that can accelerate the discovery process,” he says. “And that’s the ultimate thing. If a scientist can walk up to a three-dimensional data set and touch and engage with cells, it becomes an incredibly useful tool.”

“The first phase was static but now we have dynamic data so we can track the movement of nanoparticles.”

For more than a century, the deaths of Scott of the Antarctic and four companions as they returned from the South Pole were blamed on poor planning by the expedition leader.

But research by Chris Turney, UNSW Professor of Earth Sciences and Climate Change, suggests another expedition member brought about their deaths, and his actions were covered up.

Turney discovered documents in the British Library that reveal how the expedition’s second-in-command, Lieutenant Edward (Teddy) Evans, later the 1st Baron Mountevans, stole rations and failed to pass on orders that could have saved Scott.

“The new documents suggest at the very least appalling leadership on the part of Evans or, at worst, deliberate sabotage, resulting in the death of Scott and his four companions,” says Turney, leader of the Australasian Antarctic Expedition 2013–2014.

“The documents also show how public records were altered in later recounts of the expedition and why a Committee of Inquiry into the expedition was rapidly shut down almost before it began.”

Early in the 1912 expedition, multiple members of Captain Robert Falcon Scott’s team developed doubts about Teddy Evans’ role as second-in-command. Scott himself described Evans in letters as “not at all fitted to be second-in-command”, and promised to “take some steps concerning this”.

It is likely one of the reasons Scott sent Evans back to base before he pushed on to the South Pole with Henry Bowers, Edward Wilson, Edgar Evans and Lawrence Oates. But on their return journey, the rations the expeditioners had planted on the trip out had disappeared.

The updated orders Scott gave to Evans to send a dog team to meet them were seemingly never delivered and Scott and his team were left to die alone and starving in a blizzard.

“For too long Scott has been held responsible for the death of himself and the men of his party who made the fateful expedition to the South Pole,” says Turney.

– Alvin Stone
Shaping the new world

World-leading historian Alison Bashford has always been interested in how the past shapes our present.
By Wendy Frew.

Professor Alison Bashford spends a lot of time in the hushed corridors of university libraries. It was at Rice University in Houston, Texas, some years ago that she stumbled across a rare 1803 edition of Thomas Robert Malthus’s An Essay on the Principle of Population, which theorised human population would outstrip food production and result in famine and disease.

It was a discovery that led her to radically recast our understanding of the world’s most famous book on population, and culminated in publication of The New Worlds of Thomas Robert Malthus, co-authored with Harvard’s Professor Joyce Chaplin.

Bashford researched and wrote the book while she was a Fellow of Jesus College, Cambridge, Malthus’s own college and custodian of his family’s library.

“Many days and long into the evenings I was able to sit alone in the beautiful 16th century library, with Malthus’s own books, reading what he read, looking over the maps and the plates that he consumed, as he wrote what was really an economic history of the world,” she recalls.

Now working on her next book, Bashford, a world-leading historian of modern imperialism and environmentalism, will launch her research from UNSW Sydney where she has been appointed Professor in Humanities and Languages.

UNSW Arts & Social Sciences Dean Professor Susan Dodds says Bashford’s work aligns well with the University’s strengths in history and environmental humanities.

“The recruitment of an academic holding a named chair at Cambridge University, achieved through the Strategy 2025 Strategic Hires and Retention Pathways (SHARP) initiative, demonstrates the ability of UNSW to attract world-leading researchers of the highest calibre,” says Dodds.

Bashford’s return to Australia comes in the wake of controversy in the US about Confederate monuments, which in turn sparked renewed calls to change the date of Australia Day because of its association with Indigenous dispossession.

Bashford, who in 2013 co-edited The Cambridge History of Australia with University of Melbourne’s Professor Stuart Macintyre, is optimistic about Australians’ evolving view of their own history.

“In my view, we have a completely different vision and view of Australian history now, in part due to previous public discussion, which is always healthy,” she says.

It was Malthus’s musings about how Australia’s Indigenous people controlled their population in the face of a climate that appeared too harsh to support a large number of people that set Bashford rethinking his essay.

“Aboriginal history pre-exists ‘Australian’ history in fascinating ways, and is part and parcel of Australian history and – as even Malthus knew in 1803 – of world history,” she says.

“That attachment to big ideas has led Bashford to her next project – the Huxley family, including 20th century Malthusian, Julian, his writer brother Aldous and their grandfather, the English biologist Thomas Henry Huxley.

The Huxleys, she says, were interested in concepts “about deep time, and the distant future, about evolutionary possibilities in a closed world, about human interventions into the Earth’s future”.

She will also begin a research program on New Earth Histories, looking at comparative cosmologies.
Graduation ceremonies are a special time at UNSW because they remind us that finishing university is the dream of many beyond the students wearing the caps and gowns.

It is a dream shared by their families, who come from all over the world for the happy day – parents and grandparents who perhaps didn’t have the opportunity of a university education.

This was the case for UNSW’s President and Vice-Chancellor Ian Jacobs when he graduated from Cambridge University in 1980. He was photographed with his beaming father, a shopkeeper, who saved to pay for extra tuition so that Ian and his brother could pass their exams and get into university.

In a special feature for the UNSW Newsroom, Professor Jacobs and four UNSW students share their experiences of being the first in their families to go to university – what it has meant for them and for their parents.

Jacobs says getting a university degree is about much more than the employment prospects that follow, and is something that should be available to everyone.

“I believe passionately that everyone should have an equal opportunity to obtain the benefits of a university education regardless of gender, ethnicity, socioeconomic background or any other factor,” he says.

“Of course, we want our graduates to achieve financial security but there is much, much more to a UNSW education than that. We are aiming to produce thoughtful, well-trained people who feel a sense of responsibility to contribute to society and improve the lives of others in whatever they do.”

As a recipient of the Ngoc Tram Nguyen Scholarship offered by UNSW Law, commerce/law student Mary Tran understands this, and intends to do work that benefits the wider community when she graduates.

Growing up in Sydney’s south-west, Mary’s parents had encouraged her to go to university because they had fled the Vietnam War as teenagers and weren’t able to complete their education.

For Ateeq-ur Rahman, a mining engineering student, university wasn’t talked about at home, because no one there had experienced it.

He is now finishing his degree and heading to a mining job in the Hunter Valley, with the support and admiration of his father, who worked as a taxi driver to build a better life for his six children.

Read more about the journeys of “First in Family” students in a special feature on the UNSW Newsroom: https://newsroom.unsw.edu.au/features/first-in-family/
Books

The Best Australian Science Writing 2017  
*Edited by Michael Slezak*  
NewSouth Books

- Now in its seventh year, *The Best Australian Science Writing* brings together essays from Australia’s brightest thinkers as they explore the intricacies of the world around us. The latest lively collection covers a wide range of subjects, including the future of the Great Barrier Reef, the reality of shark attack statistics, the challenges faced by cancer scientists and whether it would be ethical to eat sentient aliens.

The Conversation Yearbook 2017  
*Edited by John Watson*  
Melbourne University Press

- This year’s collection of 50 Conversation articles ranges from ancient trees to a defence of grammar pedantry. UNSW authors include Matthew Hale and Sarah Perkins-Kirkpatrick on climate change, Gabrielle Appleby and Gemma McKinnon on constitutional recognition, Lindsay Wu on reversing the biology of ageing, Joseph Forgas on the benefits of sadness, Eileen Baldry on the incarceration of Indigenous Australians, and Travis Wearne on drinking and brain damage.

Asylum by Boat: Origins of Australia’s refugee policy  
*Claire Higgins*  
NewSouth Books

- In 1976, the first refugees from Vietnam sailed into Darwin Harbour, seeking asylum. What followed is a story of necessity and invention by the Fraser government. Through exclusive access to UNHCR records and interviews with key players, Kaldor Centre Senior Research Associate Dr Claire Higgins traces how Australia’s original principled position on refugees was shaped – and how it was gradually eroded by political demands, leading to today’s dramatically different approach.

Elizabeth Harrower: Critical Essays  
*Edited by Elizabeth McMahon and Brigitta Olubas*  
Sydney University Press

- This first collection of critical writing on Elizabeth Harrower’s fiction includes eloquent tributes by two acclaimed contemporary novelists, Michelle de Kretser and Fiona McFarlane, and essays by leading critics of Australian literature – including Elizabeth McMahon, Brigitta Olubas, Kate Livett and Julian Murphet from UNSW Arts & Social Sciences. Together they offer new insights into Harrower’s writing and invite readers to read and re-read her work in a new light.

The Crying Years: Australia’s Great War  
*Peter Stanley*  
NewSouth Books

- UNSW Canberra historian Professor Peter Stanley takes an original approach to the Great War, weaving his narrative around striking images – many never seen before. Documents, diary entries, photographs and artefacts from the National Library of Australia help tell stories of battles, and the war’s impact on Australians at home. ‘The crying years’ of the title is taken from poet Zora Cross’s tribute to her soldier brother who was killed at age 19, *Elegy on an Australian Schoolboy*.

A Good Life to the End: Taking control of our inevitable journey through ageing and death  
*Ken Hillman*  
Allen & Unwin

- UNSW Professor of Intensive Care Ken Hillman has worked in intensive care since its inception. But he is appalled by the way the ICU has become a place where the frail and dying are given unnecessary operations and life-prolonging treatments without their wishes being considered. In *A Good Life to the End*, he explores the question of whether our quest to extend life has made us forget how to die well.

Widening Minds  
*Tom Frame*  
NewSouth Books

- Tom Frame examines the productive 50-year partnership between UNSW and the Australian Defence Force, tracing the evolution of officer education, the controversial decision to create the Australian Defence Force Academy, the subsequent development of undergraduate and postgraduate courses, the response to cadet controversies and the University’s efforts to raise educational standards and the quality of intellectual debate across the defence community.

Dialogues in Urban and Regional Planning 6  
*Edited by Christopher Silver, Robert Freestone and Christophe Demaziere*  
Routledge

- UNSW Built Environment’s Professor Robert Freestone co-edited this selection of some of the best scholarship in urban and regional planning from around the world. The theme of this 6th volume is ‘The Right to the City’, speaking to a growing new movement within planning theory and practice that aims to advance a more just and equitable world.
UNSW congratulates Scientia Professor Michelle Simmons

The UNSW physicist and director of the ARC Centre of Excellence for Quantum Computation and Communication Technology, CQC2T, has been named 2018 NSW Australian of the Year.

Professor Simmons will be in the running for Australian of the Year when the winner is announced in Canberra on 25 January 2018.