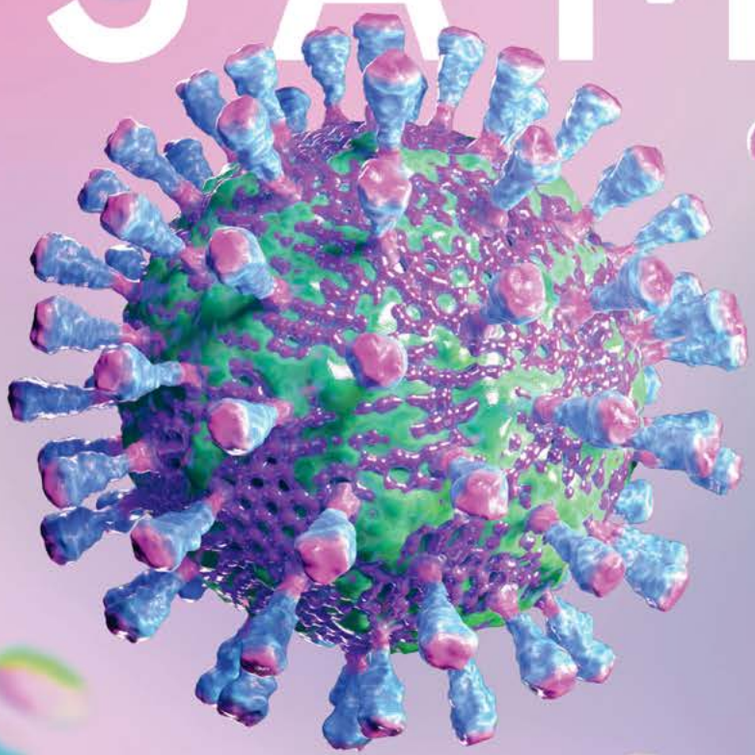
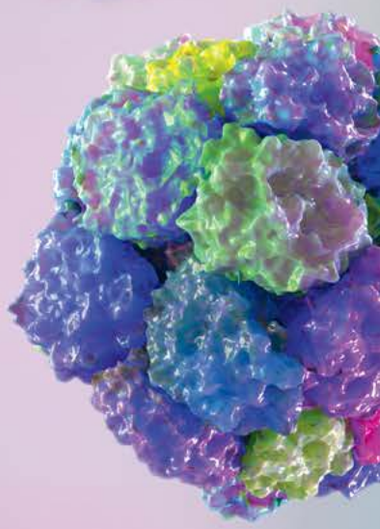
SYDNEY ALUMNI MAGAZINE

ISSUE 13 — SEMESTER ONE 2021

SAM

THE UNIVERSITY OF SYDNEY



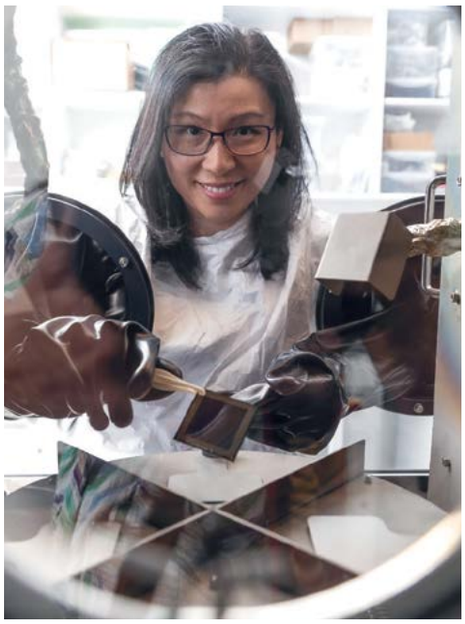


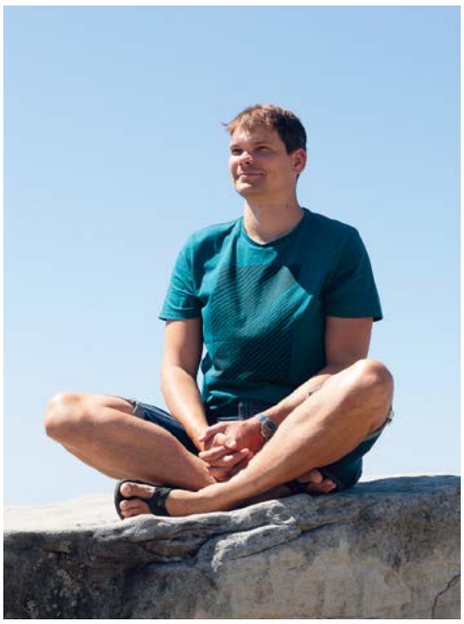
Going viral

STRATEGIES FOR VACCINATION

Women's cricket and tennis teams, 1890.
Archive photo G3_224_0005.

CONTENTS





Managing Editor: Alicia Simes
Publishing Editor: George Dodd

Advancement Portfolio
The University of Sydney
Level 2, F23 Administration
Building, NSW 2006
+61 2 9036 9222
sam@sydney.edu.au

Produced by Marketing and Communications, the University of Sydney. Printing managed by Publish Partners.
Design: Fábio Dias and Katie Sorrenson

Cover: Julie Leask with viruses controlled by vaccination.

Distributed to more than 155,000 members of our community.
21/8575 ISSN 1834-3929

PEFC Certified
This product is from sustainably managed forests and controlled sources
Recognised in Australia through the Australian Forestry Standard
www.pefc.org.au

SAM AS A PDF

To download complete, PDF copies of SAM and SAM Heritage, past and present, visit:sydney.edu.au/sam

Download links are on the right side of the page.

RISING TO CHALLENGES

As I was delighted to announce in March, the University has appointed Mr Mark Scott as our 27th Vice-Chancellor and Principal. Mr Scott will take up the role in July, and I look forward to working with him to help shape the future of Australia's first university.

I also wish to express my sincere thanks to Professor Stephen Garton for his steady leadership as Vice-Chancellor since the departure of Dr Michael Spence in December 2020. Professor Garton returns to his role as Senior Deputy Vice-Chancellor with the gratitude of the whole University community.

Mr Scott arrives at a time of tremendous change for the University, and indeed the world. The circumstances of the COVID-19 pandemic over the past year have seen us adapt to an unpredictable global environment; we have had to find ways not only to survive, but to innovate and to thrive.

For example, even though our institution has a long history of face-to-face teaching, we were able to transition quickly to an online learning model, a feat that may have seemed improbable to some at the outset. But through the incredible resourcefulness of our staff and the determination of our students, we made this massive change while also continuing to provide our students with an excellent education.

This continuation of our high standards was borne out by a student satisfaction survey carried out last year. At the height of the COVID-19 lockdown that had made online teaching necessary, we asked students to reflect on their learning experiences so far. Had they felt part of a learning community? Did they have access to the resources they needed? And had they developed the critical and analytical skills that are so important in a university education?

I am proud to report the survey responses gave the most positive indication of student satisfaction that we have had since 2015, reaffirming that the University continues to achieve one of our key goals: educating the most promising young minds of today to become the leaders of tomorrow.

Of course, not all change has been in response to the virus. During 2020 we opened the Chau Chak Wing Museum, which has already been hailed as a tremendous addition to Sydney's cultural life. As well, colleagues moved into the new Susan Wakil Health Building.

Made possible by the largest-ever gift to the University of $35 million from the Susan and Isaac Wakil Foundation, this innovative building has put the University's health and medical disciplines under one roof, enhancing multi-disciplinary research and learning and readying our graduates for the 21st century health workforce.

The ancient Greek philosopher, Heraclitus, once said "change is the only constant", and it has never been more true. But we are certain of this: a central aspiration of the University of Sydney community will always be to improve the lives of others, around the world and in the communities we serve.

Belinda Hutchinson AC (BEc '76), Chancellor

SUSTAINABILITY

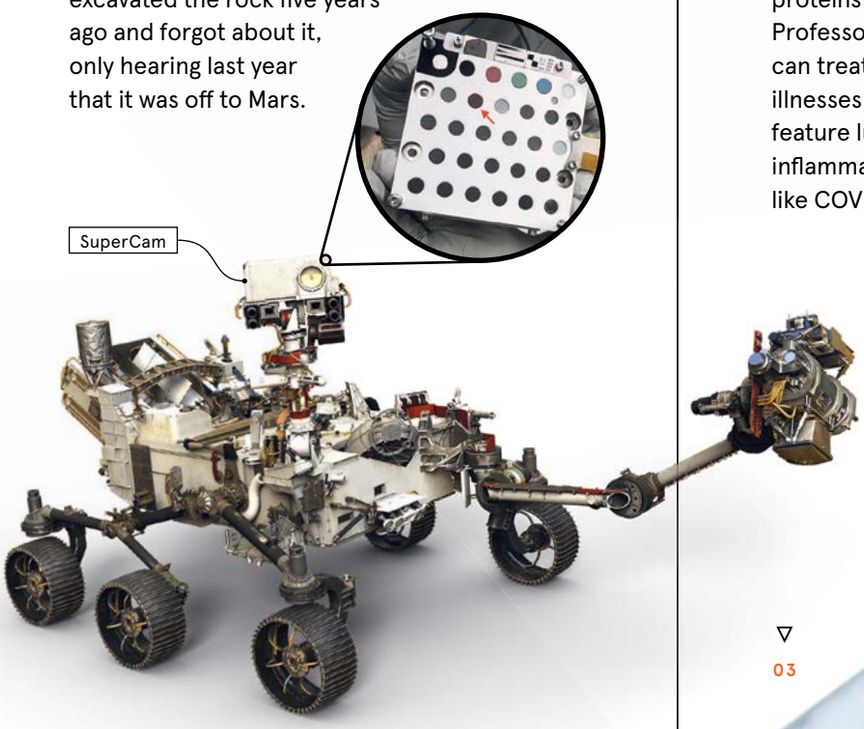
We need to talk about cement

It's the second most used commodity after water but cement sucks in massive amounts of sand and water and spews out enough CO_2 to make it the third largest carbon emitter after China and the US. But the Waste Transformation Research Hub might have a solution. Using fly ash and other waste materials to create cement, the Hub team have laid a test eco-pavement. It will be monitored for 12 months, but laying it saved 752kg of dredged sand and 327kg of emitted carbon dioxide.

SCIENCE

Earth to Mars

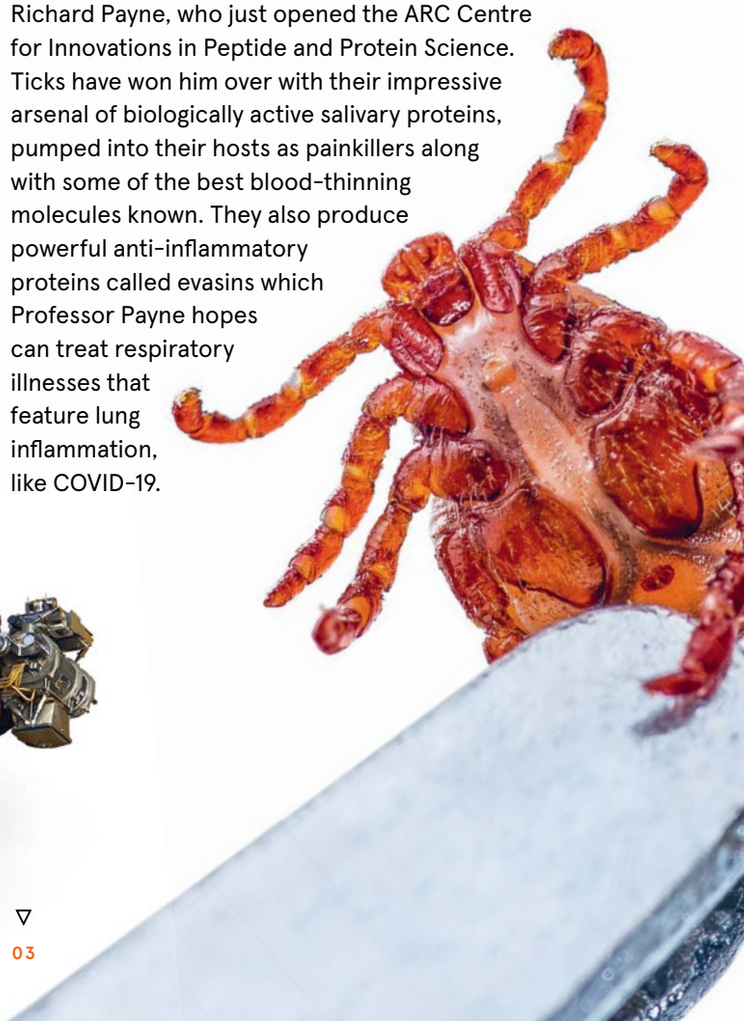
To examine the surface of Mars, the Perseverance rover has an aptly named SuperCam, which itself is equipped with a fragment of Australian sedimentary rock. Called a chert, it's from the Pilbara in Western Australia, which is geologically similar to the exploration area. To maintain its accuracy, the SuperCam recalibrates itself using 22 calibration points of which the chert fragment is one. University geoscientist, Associate Professor Patrice Rey, excavated the rock five years ago and forgot about it, only hearing last year that it was off to Mars.



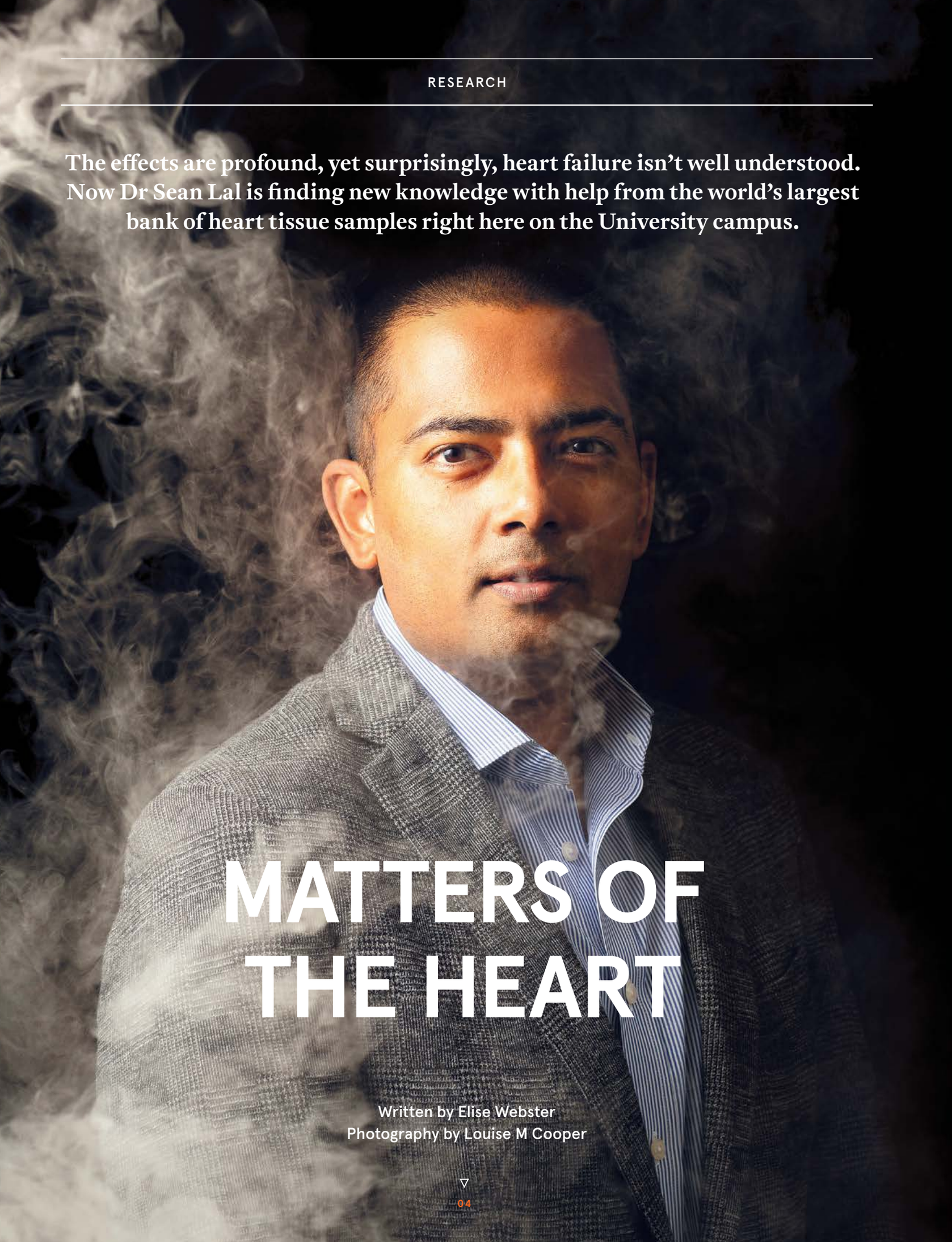
MEDICINE

Giving a sucker an even break

To see the positives in a blood-hungry tick, you'd really have to be a medicinal chemist like Professor Richard Payne, who just opened the ARC Centre for Innovations in Peptide and Protein Science. Ticks have won him over with their impressive arsenal of biologically active salivary proteins, pumped into their hosts as painkillers along with some of the best blood-thinning molecules known. They also produce powerful anti-inflammatory proteins called evasins which Professor Payne hopes can treat respiratory illnesses that feature lung inflammation, like COVID-19.



The effects are profound, yet surprisingly, heart failure isn't well understood. Now Dr Sean Lal is finding new knowledge with help from the world's largest bank of heart tissue samples right here on the University campus.



MATTERS OF THE HEART

Written by Elise Webster
Photography by Louise M Cooper

When Dr Sean Lal was 10 years old, his dad developed acute heart failure from a viral infection. A heart transplant, performed by renowned cardiac surgeon Dr Victor Chang (BSc(MedSci) '61, MBBS '63), gave his dad a few more years, but it wasn't enough to save him from a condition some medical experts have called 'more malignant than cancer'.

Today, Lal is a consultant cardiologist at Royal Prince Alfred (RPA) Hospital and the Director of Acute Heart Failure Services. He's also an academic in the Faculty of Medicine and Health at Sydney, where his lab studies the mechanisms of heart failure at the molecular level.

This means he's looking beyond the usual named causes of heart failure, such as a heart attack, high blood pressure or diabetes, to find its more fundamental drivers.

The most common cause of heart failure is blocked arteries which creates a particular problem for women. Only one in three women has the classic heart attack chest pain, instead most experience shortness of breath, nausea, and pain in one or both arms. This means women are often misdiagnosed, with a recent Sydney study finding they are twice as likely to not receive the most appropriate treatment. This could delay their heart failure diagnosis.

"My patients ask me all the time why heart failure happened to them. I can't give them an answer right now, but I'm doing my best to find out," Lal says.

Full of energy, with a wide smile, Lal's youthful demeanour belies his impressive resume, which includes fellowships at world-renowned research facilities, the Massachusetts Institute of Technology (MIT) and Harvard University, where he showed that the human heart has the potential to regenerate following a heart attack.

"This goes against all the textbooks," says Lal, whose work is supported by donors to the University. "We had no idea that the human heart had this potential and we think this drive to regenerate could be the key to reversing heart failure."

The term 'heart failure' conjures images of the heart suddenly stopping. However, it actually refers to a failure of the heart to pump enough blood around the body. In essence, the heart is still beating, but not well enough, causing shortness of breath, chest pain, palpitations and many other effects that limit quality of life.

The condition is incurable, with death a possibility. If you were diagnosed with heart failure in the 1970s, your chance of surviving beyond five years was 30%. Today, with new treatments and faster diagnosis, the five-year survival rate is around 60% for the 30 million people worldwide, including half a million Australians, who currently have heart failure.

While treatments have come a long way in the past 30 years, advances lag behind cancer research. Today, heart transplant is still the only treatment for end stage heart failure, but with 60,000 new heart failure cases diagnosed in Australia each year, only about 100 to 200 transplants are performed.

"We urgently need new treatments. I hate seeing families go through what my family went through," says Lal, who has just recommended his latest patient at RPA be considered for the heart transplant waiting list: a 41-year-old with a young family.

As they work to slow the progression of heart failure, Lal's team has access to an extraordinary resource: the largest bank of heart tissue in the world. Located on campus, it has helped give new insights into why heart failure occurs and how it differs in men and women.

The hearts have been donated by patients from St. Vincent's Hospital who have suffered from all kinds of heart failure that necessitated a heart transplant. Now, for the first time, heart failure samples are being collected from patients undergoing all forms of heart surgery at Royal Prince Alfred Hospital.

"We had no idea that the human heart had this potential... this drive to regenerate could be the key to reversing heart failure."

— Dr Sean Lal

Liquid nitrogen vapour pours off one of the heart bank racks. Each rack contains about 1000 cryopreserved heart samples, with the bank having about 20,000 samples in all. Photography by Stefanie Zingsheim

There are also healthy hearts of various ages which were not used for heart transplantation for logistical reasons. These healthy hearts allow researchers to compare diseased with non-diseased tissue.

The Heart Bank, of which Lal is now Director, was created in 1989 by Sydney Emeritus Professor Cristobal dos Remedios and the aforementioned, Dr Victor Chang. Their visionary idea was to snap freeze hearts at -196°C using liquid nitrogen, preserving the DNA, proteins and enzymes within the heart tissue for future analysis, when advancing technology might make more possible, as it has.

Today, the Sydney Heart Bank, which is completely not-for-profit, shares tissue samples and data with some of the best heart researchers in the world, including those at Harvard, Oxford, Imperial College London and Johns Hopkins.

Lal's team recently drew on the heart bank to analyse what makes the heart tick at the molecular level. They found changes in many important processes in the heart, including mechanisms that generate energy for the heart, pathways that deal with injury, clotting mechanisms, and processes that maintain structural integrity.

The team were also surprised to discover that the thyroid hormone, which is present in every organ and is crucial for metabolism, was 'switched off' in the hearts of heart failure patients.

All this has resulted in a much more layered and sophisticated view of how the heart maintains itself.

"We're really excited about these discoveries. Now we know more about the basic science underlying some of these processes, we can use them to design new therapies that could treat or even prevent heart failure in the future," Lal said.

Born in Brisbane to Fijian immigrants, Lal is bursting with drive, and single-minded about curing heart failure.

"When my dad died, it was difficult for my mum to put me through uni. But I knew from the age of 10, when my dad got sick, that I wanted to be a 'heart doctor'.

"So I applied for an academic scholarship at Sydney and got it. I completed my four degrees here, met my wife here and now I work here. I don't think I can ever leave," laughs Lal. Which is just as well because there is still so much for him to do.

Lal and his team are now hoping to embark on the Heart Bank's most ambitious project to date – analysing the genome and protein profile (proteome) of all 20,000 heart samples. This equates to more than 260 million pieces of data.

It would be the most comprehensive study of human heart failure ever undertaken and will almost certainly lead to world-first discoveries of what causes heart failure and new therapies to treat and cure it.●

KEEPING HEARTS STRONG

For more information or to help Dr Lal advance his ideas, please contact the alumni team on +61 2 9036 9222. Email: alumni.office@sydney.edu.au

Dr Sean Lal

DEGREE
BMedSc (Hons) '03
MBBS '07 MPhil '09
PhD '17

WHAT ELSE YOU MIGHT HAVE BEEN
A tennis player but that would have meant having enough talent!

FAVOURITE CHILDHOOD TV SHOW
Blinky Bill

YOUR LEAST FAVOURITE BIT OF HOUSEWORK
That would imply that there is a favourite!

HERE COMES THE SUN

Photography by
Stefanie Zingsheim

Written by
George Dodd

The fight against climate change might be gaining pace, but it seems green energy silicon solar cells are running out of puff. The good news? Professor Anita Ho-Baillie is researching a substance that might be cheaper, easier to handle and even more efficient.

There is an enormous fission reactor in our planet's sky. In just one hour, this reactor bathes the Earth's surface in enough energy to supply all humanity's electricity needs for a whole year. The problem is, the Sun's energy arrives as solar radiation but we need to turn it into electricity.

The most direct way to make the conversion right now is with solar panels, but there are other reasons why they're the great hope of renewable energy.

Their key component, silicon, is the second most abundant substance on Earth after oxygen; since panels can be put where the power is needed – on homes, factories, commercial buildings, road vehicles – there's less need to transmit power across landscapes; and mass production means solar panels are now so cheap the economics of using them are becoming inarguable.

If you're expecting a but, here it is: but silicon solar panels are reaching the practical limits of their efficiency because of some quite inconvenient laws of physics. Commercial silicon solar cells are now only about 20% efficient (though up to 28% in lab environments. Their practical limit being 30%).

This means that solar panel technology must soon evolve. A world leader in helping that evolution take place is Professor Anita Ho-Baillie who was recently appointed the inaugural John Hooke Chair of Nanoscience — a position supported by a $5 million donation to the University. Talking to her at the University's Sydney Nano labs, she points out another problem with using silicon.

> "It used to take me four weeks to make a silicon cell in the lab. With perovskite, it takes only two days."
>
> — Professor Anita ho-Baillie

"Solar panels need silicon that's 99.9999% pure, but you start with an impure rock called quartzite. The purifying has to be done in four steps and each step involves heating to 1000 degrees Celsius. When I realised that I went 'wow. That's a lot of energy'."

Still, a solar panel will produce many times more emissions-free energy in its lifetime than was used in its manufacture.

You might not expect a world expert in materials engineering, semi-conductor physics, applied physics and chemistry to be playful and outgoing, but that's how Ho-Baillie is. Hearing her talk about her career (including stints at British Aerospace, the telco Alcatel Australia and various solar-related organisations), you get the sense of someone who is quickly recognised by industry people as an asset worth having.

One of her early solar contributions concerned another little-known aspect of using solar panels; not all solar panels are compatible.

To get maximum output from a solar panel array, all the solar cells must be connected to other cells that match their natural characteristics, a laborious process. For her undergraduate thesis, Ho-Baillie created an algorithm that allowed mixed cells to be connected and still achieve maximum output.

"Imagine a factory that produces hundreds of cells a minute, and my goodness, that's a lot of sorting they don't have to do anymore," Ho-Baillie says.

Now Ho-Baillie has turned her mind to creating the next renewable evolution. The substance that has become the focus of her research, and research around the world, is part of a class of crystalline compounds called perovskite; specifically, metal halide perovskite.

Like silicon, this crystalline substance is photoactive, meaning that when it's hit by light, electrons in its structure become excited enough to break away from their atoms (this freeing of electrons is the basis of all electricity generation, from batteries to nuclear power plants). Allowing that electricity is in effect, a conga line of electrons, when the loose electrons from silicon or perovskite are channelled into a wire, electricity is the result.

An immediate benefit of perovskite for Ho-Baillie is that it saves time. "It's just easier to handle than silicon," she says. "It used to take me four weeks to make a silicon cell in the lab. With perovskite, it takes only two days."

That's because perovskite is a simple mixture of salt solutions that is heated to 100-200C to establish its photoactive properties. But the real excitement is around perovskite's energy production potential.

Removing a perovskite cell from a 'inert box', which protects the cell from moisture and other contaminants.

Down to the wire

All the methods of electricity generation are about freeing electrons from their atoms.

Solar cells do this with the energy in sunlight.

Sunlight hitting layers of silicon or perovskite knocks electrons loose.

The electrons are channeled away to the external circuit.

The first perovskite devices in 2009, converted just 3.8% of sunlight into electricity. By 2020, efficiency was 25.5%, close to silicon's lab record of 27.6%. There is a sense that its efficiency could soon reach 30%. "It took people 40 years to double the efficiency of silicon," say Ho-Baillie. "Perovskite caught up with silicon in just ten years."

If you're expecting a 'but' about perovskite, well, there are a couple. A component of the perovskite crystalline lattice is lead. The quantity is tiny, but the potential toxicity of lead means it is a consideration. The real problem is that unprotected perovskite easily degrades through heat, moisture and humidity, unlike silicon panels which are routinely sold with 25-year guarantees.

It's the work Ho-Baillie and her team are doing in this area that has recently captured world attention. The goal was for a perovskite cell to pass the industry-critical heat and humidity test set for solar panels by the International Electrotechnical Commission. The Ho-Baillie device was the first to pass, and it passed comfortably.

The innovation that made it possible was to laminate the perovskite cell with glass and the sort of polymers used in double-glazing windows. It was cheap and easy to do and, as it turned out, effective.

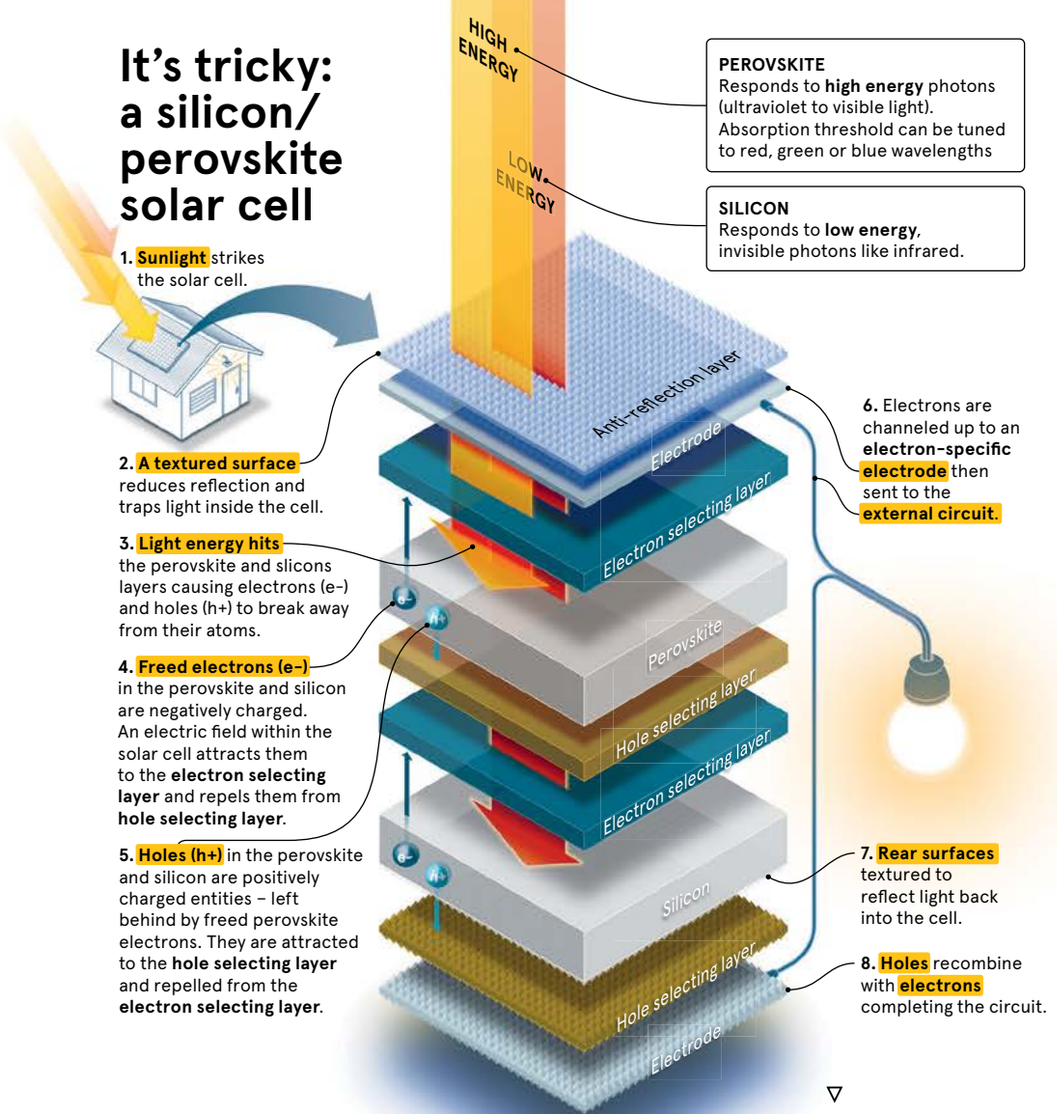
This has given a huge boost to the prospects of perovskite and seen Ho-Baillie become highly cited by researchers internationally. The timing is good too because the last few years have offered something that could produce the best solar cell efficiency ever seen. It's called silicon perovskite tandeming where the two substances are layered into the same cell to give a higher voltage than either could give on its own.

This works because silicon is better at dealing low energy light waves, and perovskite works well with higher energy visible light. Perovskite can also be tuned to absorb different wavelengths of light – red, green, blue. With careful aligning of silicon and perovskite, this means each cell will turn more of the light spectrum into energy.

The numbers are impressive: a single layer could give 33% efficiency; stack two cells, it's 45%; three layers would give 51% efficiency. These sorts of figures, if they can be realised commercially, would revolutionise renewable energy.

Asked about the most fun part of her job, Ho-Baillie doesn't hesitate, "The students," she says. "I love working with such bright young people. They'll be able to go out and change the world."●

It's tricky: a silicon/ perovskite solar cell



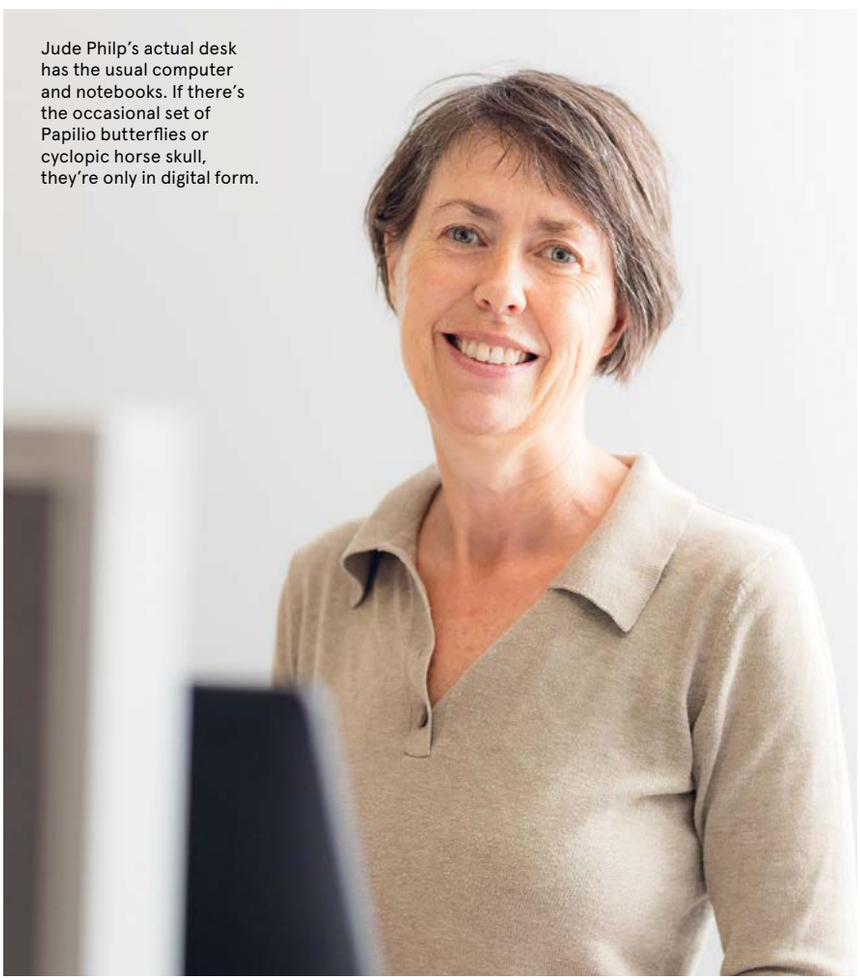
HELP GREEN-POWER THE FUTURE

For more information or to help Professor Ho-Baillie take solar energy to the next level, please contact the alumni team on +61 2 9036 9222. Email: alumni.office@sydney.edu.au

ON MY DESK: DR JUDE PHILP

Photography by Louise M Cooper

SENIOR CURATOR OF THE MACLEAY COLLECTIONS AT THE CHAU CHAK WING MUSEUM

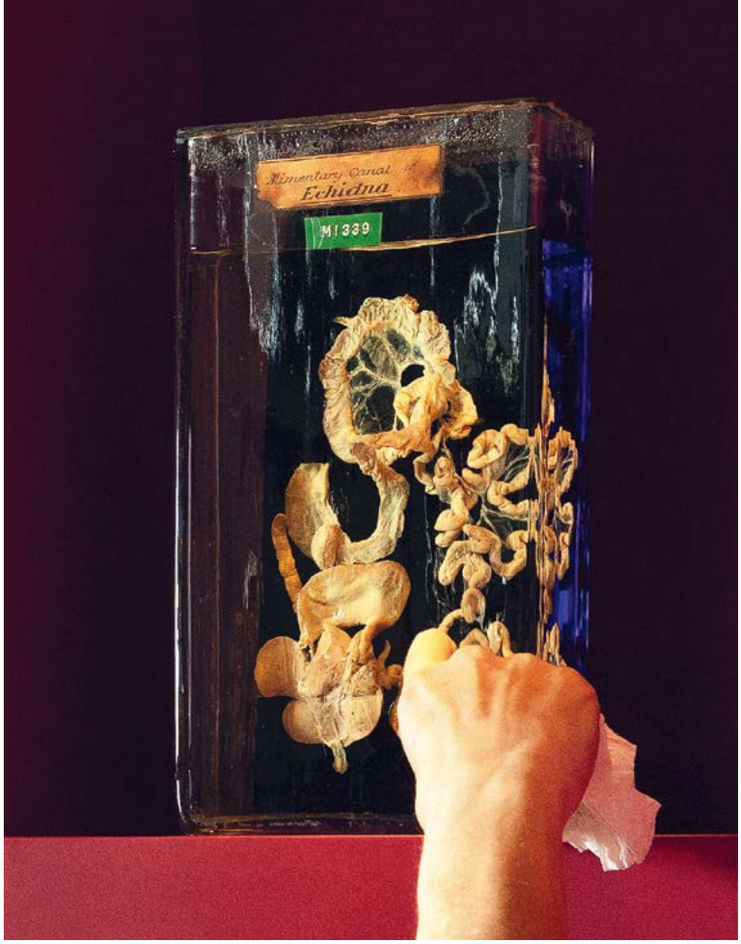


Jude Philp's actual desk has the usual computer and notebooks. If there's the occasional set of Papilio butterflies or cyclopic horse skull, they're only in digital form.

"When I studied art history and anthropology in the 80s, there wasn't a huge exploration of other cultures," says Dr Jude Philp who always wanted to be a curator. "But I was curious about what was art in societies outside the European tradition." With the Macleay Collection now housed in the Chau Chak Wing Museum, a space made possible by benefactors, including Dr Chau Chak Wing, Philp can fully indulge all her art and history impulses. In her warm but precise way, Philp notes that to be a curator you need a good visual sense and to be a magpie for knowledge, which is why a favourite part of her job is the visitors. "They bring their own knowledge of butterflies or 19th century taxidermy," she says. "It's valuable information."

EVIDENCE OF THE BUNYIP?

For eons, Aboriginal peoples have spoken of the bunyip, which lived in watery places bellowing out its call. In 1847, the press reported a strange one-eyed skull found in a river as evidence of the bunyip. William Sharp Macleay refuted this by using this very skull. He said both were European animals born with a skeletal variation, our skull being a one-eyed horse: in effect, a cyclopic horse. The river skull is now lost.



THE ALIMENTARY CANAL OF AN ECHIDNA

If I had to choose a favourite this would be it (today anyway!). It looks like lace but it's a meticulously presented alimentary canal of an echidna. In 1860s Germany, a zoologist, philosopher, physician, and artist called Ernst Haeckel (and others) changed how science was presented to the public. His work, (and specimens like this) was graphically powerful, and inspirational for the art nouveau movement. For me this is where science crosses over into art in the creation of intriguing aesthetic forms.

PARRYING SHIELD ATTRIBUTED TO THE BANGERANG PEOPLE OF THE MURRAY RIVER

All we have in writing about this is a label from 1851 that says 'N. S. Wales', which is more than we know about some other Indigenous pieces we have. They were just taken with no record kept. It's a terrible shame that Indigenous people looking for their heritage objects can be disappointed, even angry, because we know so little about what we have. But today we're working with Aboriginal peoples to know and understand more.

EARLY STUDIO PHOTOGRAPH

Photography was volatile and complex technology in the early days and mostly carried out indoors by photographic businesses. It meant a lot of sitting still for a long time and sometimes babies were tied in place. The Macleay has a big photography collection representing the evolution of the technology. This glass plate positive image is incredible in its detail. Every bead on the magnificent gown is in sharp focus. In modern terms it's about 110 megabytes of visual information, but it was taken in the 1890s.

THE WHISTLE CRICKET

The Macleay has everything from scientific instruments to fossils. But it was started as an insect collection by Alexander Macleay in 18th century London. It became one the most celebrated insect collections in Europe, and Macleay brought it with him to Australia in 1826. His descendants in NSW kept collecting before donating everything to the University in 1874. This is a Gryllus spinulosus, or the whistle cricket and the oldest dated specimen in the collection. Its label says "A curious insect from Barbary, the only one known of its kind in England. Geo Edwards, 1756".

COVID-19 is now one of the super-villain diseases, like smallpox and whooping cough, tackled by vaccination. Though some people still won't be vaccinated, their reasons might not be what you think.

Taking your best shot

Written by George Dodd

Illustration by Sam Bailey

Photography by Stefanie Zingsheim

Know your enemy and know yourself. This piece of advice, written 2500 years ago by military strategist and philosopher, Sun Tzu, now applies to the global battle being waged against COVID-19.

On the 'know your enemy' side of the equation, is one of the most concentrated and goal-driven medical endeavours ever undertaken, with thousands of researchers working to understand a virus that before January 2020, was unknown to science.

As a range of vaccines are produced and rolled out, the 'know yourself' element comes into play. That's where Professor Julie Leask works. She is a social scientist and world authority on why people are and are not willing to be vaccinated. Currently she is applying her expertise to the emerging data on COVID-19 to find new and useful insights.

"It's an area of huge complexity," says Leask. "It incorporates sociology, psychology, cultural studies, implementation science, public health, ethics, and other disciplines."

Leask doesn't do this thinking just for Australians. As chair of a World Health Organisation (WHO) working group on the behavioural and social drivers of vaccination, she influences global strategies. She also co-wrote the WHO's COVID-19 vaccine safety communication plan. As COVID-19 vaccines roll out, the plan is shaping how countries maximise uptake.

"For some time, my team has been interviewing people about COVID-19," she says. "People from culturally and linguistically diverse groups; people living in less wealthy areas of Sydney; people in other parts of New South Wales and in Melbourne's hot spots. We've asked how COVID-19 has affected their lives.

"We've also looked at why some people who get symptoms don't get tested and why some might not accept the vaccine."

Once the information is assessed, the findings are fed through to state health departments to assist them with planning and producing information in a way that's most likely to be effective.

It's important work and Leask's 23-year public health contribution hasn't gone unnoticed. In 2019, at the Australian Financial Review 100 Women of Influence awards, she won the Global category then went on to become the overall winner.

Antivaxxers aren't the problem. Professor Julie Leask takes extensive research data and uses it to understand the actual reasons people might not be vaccinated.

And the work continues. Leask has a small team at the University and also works closely with former PhD students now at the National Centre for Immunisation Research and Surveillance. Together, they recently came up with possible negative scenarios around the COVID-19 vaccine rollout and how to deal with them. Scenarios like: what if a stress-related fainting spell among a group of people in a clinic is blamed on the vaccine? What if people feel unwell after the jab and start putting their friends off having it? And what if reports emerge linking the vaccine to a medical syndrome? That scenario has since become real with reports of a very small number of vaccinated people affected by blood clots from a condition called cerebral venous sinus thromboses (CVST).

"There are some key things in dealing effectively with anything around vaccination uptake," says Leask. "You must communicate honestly and transparently and communicate uncertainty where it exists.

"Choosing the right messengers is also critical, because people will usually ask, 'who is telling me this and can I trust them and their motivations?' before they even begin to listen."

A great advantage for Leask in understanding those who refuse vaccination is that her own grandmother was against it, believing instead that healthy living would prevent and cure diseases. "She said it was the worst day of her life when her grandchildren were vaccinated," remembers Leask. "I know those perspectives. They're not shocking to me."

In a world where so-called anti-vaxxers get a disproportionate amount of media attention considering their small influence (vaccination rates in Australia have held between 91% and 93% since 2003), Leask admits that early in her studies, she also started down the wrong path.

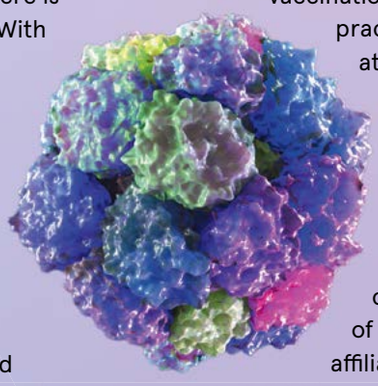
"Because my grandmother refused vaccination, I went into the topic seeing it as just an issue of personal belief," she says, "So, when I started my PhD, I made the assumptions most people make about why people don't immunise.

"Problem was, the research didn't support my preconceived ideas. It just didn't. There were other forces at play. This was a slightly inconvenient fact for me and I had to reframe my PhD."

Leask now calls this moment an epiphany where she started seeing people who weren't vaccinating as a much broader group.

In reality, most are people faced with day-to-day logistical barriers. They might be single parents or families with multiple children where vaccination drops down the to-do list, or people with questions about vaccination who don't have easy access to health professionals they can talk to.

For Leask, the answer is developing systems that address these obstacles. "Where this is done, there is success," says Leask. "With busy parents, a simple reminder or a home visit can do the trick. And for people with questions, well-trained health professionals can encourage them to be vaccinated with empathic questions and a recommendation."



Based on Leask's research, she anticipates the majority of Australians will welcome the COVID-19 vaccines, as long as there aren't any major safety or other hurdles. Some people will be unsure because they don't believe such a new vaccine can be safe. A smaller number will refuse it outright for any number of reasons. An even smaller group still will grab their keyboards to loudly campaign against its use.

With the limited resources she has, Leask doesn't waste too many of them trying to convert the refusing groups. Instead, she focusses on what are called 'the hesitant'. Still a relatively small number of people, they are the largest group of people not vaccinating, though it would be unfair, and even counterproductive, to label them anti-vaxxers.

So, what will be the post-vaccination future of COVID-19 in Australia? There is no predicting how a virus will behave or how a vaccination program will play out; Leask certainly won't commit to an outcome, instead she emphasises the need for more knowledge and education, which is another element of her work.

Originally studying to be a nurse ("I found it too chaotic and I'm not a very practical kind of person in that way"), Leask is glad that her road away from nursing eventually led her back to it.

She now shares her knowledge about vaccination and evidence-based practice with nursing students at the University's Susan Wakil School of Nursing and Midwifery. She is also a member of the Marie Bashir Institute for Infectious Diseases and Biosecurity and she has a connection to the School of Public Health through an affiliate appointment.

"There's a shared value of working for the benefit of communities and society," she says. "Public health is a really constructive world to be in." ●

EVEN STRONGER PROTECTIONS

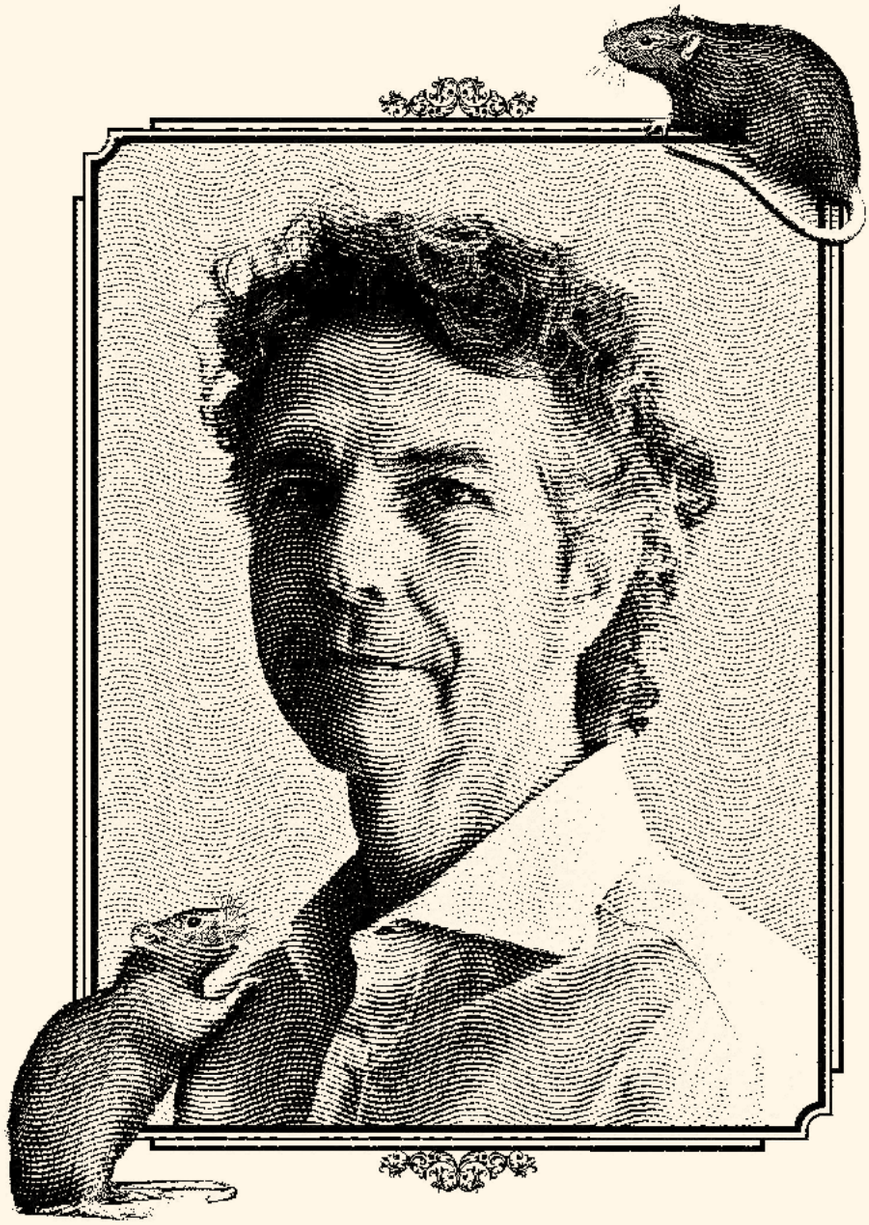
To learn more about this story or to support the work, please contact the alumni team on +61 2 9036 9222. Email: alumni.office@sydney.edu.au

As the first Europeans set foot on Australian soil, the first European rats weren't far behind. These rats were the start of a tsunami of feral animals that has engulfed many native species. Professor Peter Banks has an ingenious idea that could bring the odds back in favour of the natives.

Thereby hangs a tail

Written by George Dodd

Collage by Fabio Dias



He doesn't want his work to be about documenting the decline of the natural world. Professor Peter Banks (above) wants to be a voice for plants and animals and do something positive. Photography Stefanie Zingsheim

As COVID-19 closed down New York's restaurants and fast food joints, food waste quickly disappeared from gutters, dumpsters and garbage bins. Within days, there were stories of rat gangs fighting in alley ways for scraps. There were stories of rat cannibalism.

Though New York has the Norway or brown rat, similar scenes possibly played out with Sydney's black rats which have the rakish scientific name of Rattus rattus (brown rats are Rattus norvegicus).

While rat populations are less dense here, the recent spike in rat-control callouts to suburban homes can probably be explained by people spending more time at home, post-COVID-19, and seeing the rats they've always lived near.

An interested and informed observer of all this has been Professor Peter Banks. He leads the Behavioural Ecology and Conservation Lab in the School of Life and Environmental Sciences. Rats are one of his things. Though considering the bad-guy reputation of Rattus rattus, he offers a more nuanced insight.

"They're not very good competitors. Normally, they'll shy away from a fight," he says.

Banks remembers as a youngster, standing in front of his high school and talking about conserving forests. An interest in science soon emerged; first physics and chemistry, then biology came into focus. His honours research was on the biology of native small mammals. His PhD was on the impact foxes had on native wildlife.

A key question for Banks, that frames much of his work, is this: why don't native animals in their own environments actually have an advantage over new arrivals? The main answer is often habitat destruction but there's more to it. One element is naivety.

"Naivety has many aspects but it can be as simple as a native not recognising an introduced animal as a predator," says Banks, who travels Australia observing animal interactions in the wild. "It's an element of animal behaviour that shapes outcomes. But with the right knowledge, it can be manipulated in favour of the natives."

This is clearly demonstrated in the interaction of Australia's feral rats and its native birds. The story starts with the arrival of the First Fleet in 1788.

As the first European foot touched Australian ground, the foot of the first European black rat wasn't far behind. In fact, they entrenched themselves so quickly, some settlers thought they were natives. Rats have since damaged agriculture, infested buildings and spread disease, bringing little of value to these shores, except perhaps the inspiration for that quintessentially Australian remark, flash as a rat with a gold tooth.

Those first rats soon realised they had family in their new home. Australia already had numerous species of local rodents, evolved from two previous rodent arrivals; one four million years ago (perhaps a single rat family clinging to a palm frond), the other one million years ago, both facilitated by land bridges created as oceans rose and fell.

> “We put out a fake nest with a tiny amount of bird nesting odour. Within a day, rats had found the nest and eaten the egg.”
>
> — Professor Peter Banks

Professor Peter Banks

DEGREE
BSc ‘92, PhD ‘97

FAVOURITE PIECE OF TECHNOLOGY
Wildlife cameras. They’ve opened up the unseen world of nocturnal wildlife. We couldn’t do anything without these little devices

OCCUPATIONAL HAZARD
Being bitten. The worst was the cutest – a sugar glider. Or when I had 120 ticks down my pants. Or the mosquito that gave me ross river fever.

HIDDEN TALENT
I like to cook. I wanted to be a chef in year 10. My mum changed my mind.

The key difference between most native Rattus and the 18th century arrivals was that the newly arrived black rats were good climbers. This meant the nests of Australian native birds were now up for pillaging by a new, egg-eating marauder. There haven’t been any definitive studies on what effect introduced rats have had on native bird populations so, as a scientist, Banks can’t commit.

That said, he does note that rat-populated urban areas have very few small, native birds. He has also tested the proposition.

“We put out a fake nest with a tiny amount of bird nesting odour,” he says. “Within a day, rats had found the nest and eaten the egg.”

A saving grace for native birds in the regions is that black rats tend to prefer disturbed landscapes near urban areas. Also, as mentioned earlier, black rats aren’t really up for a fight, “We did an experiment that showed if you remove the black rats and bring back the native rats, the black rats find it harder to get back in,” says Banks.

With the insight into nesting odour and rat behaviour, came a perhaps game-changing idea: what if you sprayed bird nesting odour all over an area where birds like to nest so rats aren’t able to actually pinpoint the nests at all?

“We tested that idea round Sydney, then took it to New Zealand, working with people from the Manaaki Whenua – Landcare Research facility. The paper has just been published and notes that the method saw a doubling of breeding success for endangered shore birds in the areas where it wasn’t possible to actually remove the predators.

“I didn’t believe it really,” says Banks still excited by the idea. “But it was there in the results. It was amazing.”

In effect, this is a form of disruptive thinking. Identify how invading species find their food or prey, know where they like to take shelter, understand why the native species don’t cope, then come up with ideas to disrupt all that and tilt the game back in favour of the natives. This game plan plays to one of Banks’ key goals.

“I’ve done a lot of work in feral pest management,” Banks says. “But to conserve some things the ideal would be to not necessarily kill other things.”

Allowing that the phrase ‘eradication program’ is often used in pest control circles, a reticence to eradicate seems perhaps anti-intuitive. Certainly, there is a long list of animals most Australians would happily see pushing up the native daisies: cane toads, feral pigs, feral carp.

Things get a bit more emotional with the cute ones, like the brumbies of Kosciusko. Sure, they’re a numerous and destructive pest in a fragile environment, but no-one really wants to see them being shot from helicopters.

“We haven’t killed anything in the New Zealand bird experiment at all, but we reduced the impact of the invading species so the native species could return. It’s understanding the ecology that makes that possible. It can be applied in other places.”

Places like Sydney itself. In a reversal of usual outcomes, one native animal has made something of a comeback; the bandicoot, which is a small marsupial sometimes mistaken for a rat, and often mistaken for a dinner by foxes and cats.

Banks has had a long-time interest in helping bandicoots hang on and he’s worked with local land managers at Sydney’s North Head to nurture the natural population and protect it.

“Again, it’s about understanding biology so you can look after bandicoots better,” says Banks. “National Parks has had really encouraging success with it. The numbers have grown, the population is stable and slowly moving back into the suburbs. It’s a good news story.”

DEFEND OUR NATIVE SPECIES

To learn more about this story or to support the work of Professor Banks, please contact the alumni team on +61 2 9036 9222. Email: alumni.office@sydney.edu.au

Chain reaction

Written by
George Dodd

Photography by
Louise M Cooper

They bring us the goods we want and need but hidden in the world's supply chains can be unethical or destructive practices. Dr Arne Geschke uses data to illuminate supply chains because you can't fix what you can't see.

Over the past few years, there has been an aggressive and sometimes corrupt agricultural push into the Cerrado region of Brazil.

Since 2001, nearly 300,000 sq km of biodiverse forest, grassland and scrub has been cut down or burned, with some of the land being used for the lucrative production of soybeans that are exported for animal feed.

A recent investigation in the UK found that chicken sold in major supermarkets were fed using these destructive soybeans. The question was asked, should consumers be made aware of this, especially since some of the chicken would have been labelled as sustainably produced, based only on how the chicken was raised in the UK?

It's up to regulators, producers and retailers to answer that question, but scrutinising supply chains so there are facts to inform the discussions is the task of researchers like Dr Arne Geschke.

"We essentially look at and assess the elements in the supply chains operating in countries and industries. We look at all relevant details," Geschke says.

Companies are often unaware of the complexity and implications of their own supply chains, but they may well assess the larger elements that might allow them to maximise profits by say, consolidating factories, reining in energy use or moving production to a country where labour costs are lower.

The analysis done by Geschke has other goals. Working with the University's Integrated Sustainability Analysis (ISA) team, Greschke crunches huge supply chain numbers that can reveal hidden environmental devastation, worker exploitation, child labour and corruption.

"It's so easy to open a can of worms with this," says Geschke who now, thanks to COVID-19, mostly works from his home in the Sydney beachside suburb of Coogee. "Australia imports of a lot of carbon-heavy tech goods. We might want to reduce our carbon load but we don't always have control over it. There are hidden interdependencies with other economies."

The rise of green investments has made these insights important to more people with financial advisors now competing to offer the greenest possible investment portfolios to their clients. At the same time, companies want to find any dark dealings in their supply chains before someone else drags them into the light.

There are two main ways of gathering supply chain information. The first is called lifecycle assessment which uses a bottom-up approach. You start gathering information about a company then move to its suppliers. "This is labour-intensive. What happens is you quickly run out of puff or funds," says Geschke, noting that supply chains can have millions of data points to interrogate.

The other method, and the one mostly used at the University, is a top-down approach called input-output analysis and it's based on the fact that governments and organisations all around the world publish their economic data. That is certainly the case in Australia where businesses are obliged to report in great detail to the Australian Bureau of Statistics which then publishes the information in about 120 categories.

One challenge is ensuring that the information has integrity. For example, the laws of some countries might allow products to be called sustainably produced that would never be allowed that label here. Other countries simply manipulate their figures. The ISA team, working out of the School of Physics, puts a lot of effort into finding the most reliable sources.

"You can ask a commercial data provider for the carbon footprint of a big company, but different providers will have different numbers because there isn't a universally-agreed way to compile the information," says Geschke.

"Here at the ISA, we're working on a system that would allow for a unified global approach that compares apples with apples."

> “If you look at data on corruption, you start to understand inequality and how much our western bubble relies on cheap labour from elsewhere.”
>
> — Dr Arne Geschke

Dr Arne Geschke

DEGREE
PhD ‘13, MEd ‘20

HIDDEN TALENT
I’m an avid remote control car driver of average talent who likes setting speed records in parks.

FAVOURITE BAND
Foo Fighters forever. We are getting old together.

THING YOU NEVER WANT TO DO AGAIN:
Migrate to a different country. Once is enough and Australia is a great place.

Helping with the mathematical and hardware design legwork is Geschke’s long-time colleague, Manfred Lenzen, who is Professor of Sustainability Research in the School of Physics. Any other names on the many papers they produce together are usually experts from the fields they are analysing; for a study on the impact of fishing, a fisheries expert would join the team.

Using the right information and mathematical modelling, you can stitch together the information of two or more countries to get a sense of how they feed into supply chains for various products and commodities. This, and dealing with the hugely powerful computers they use, is the fun part for Geschke.

He is also passionate about developing ways to see environmental and social problems that are hidden by complexity, distance or outright deception.

Still, seeing can be difficult, and sometimes people don’t want to see at all.

“Carbon footprint should be the star of full supply chain studies and we’ve been raising the alarm for maybe 25 years,” says Geschke. “But people are still umming and erring about it. There are times when I think, ‘Why am I doing this?’

“But there are other important issues to pursue. Like if you look at data on corruption, you start to understand inequality and how much our western bubble relies on cheap labour from elsewhere.”

Without doubt, the modern world is held together by supply chains, but the ISA also looks at other areas.

“We’re currently running simulations for the United Nations’ (UN) sustainable development goals,” says Geschke. “There are seventeen and we are officially tracking the global progress for a few of them. We use pretty serious computers to run programs but for each year they have to run non-stop for 48 to 50 hours.”

Obviously, a sustainable development goal is a large enterprise to map. But even the supply chain of a single consumer product can quickly reveal a vast landscape of inputs.

Take the rare earth metals used in mobile phones. They might be mined in Uganda or Mongolia, taken to another country for processing, sent on again to become components, and again to wherever the phones are assembled. Then there are the phones’ other metals, plastics, glass and constructed components to consider.

Geschke has recently become one of the most internationally cited researchers in his field, especially through a study that investigated the effect of COVID-19 on the international economy.

“That was massive,” he says. “A lot of news outlets ran it as a story.”

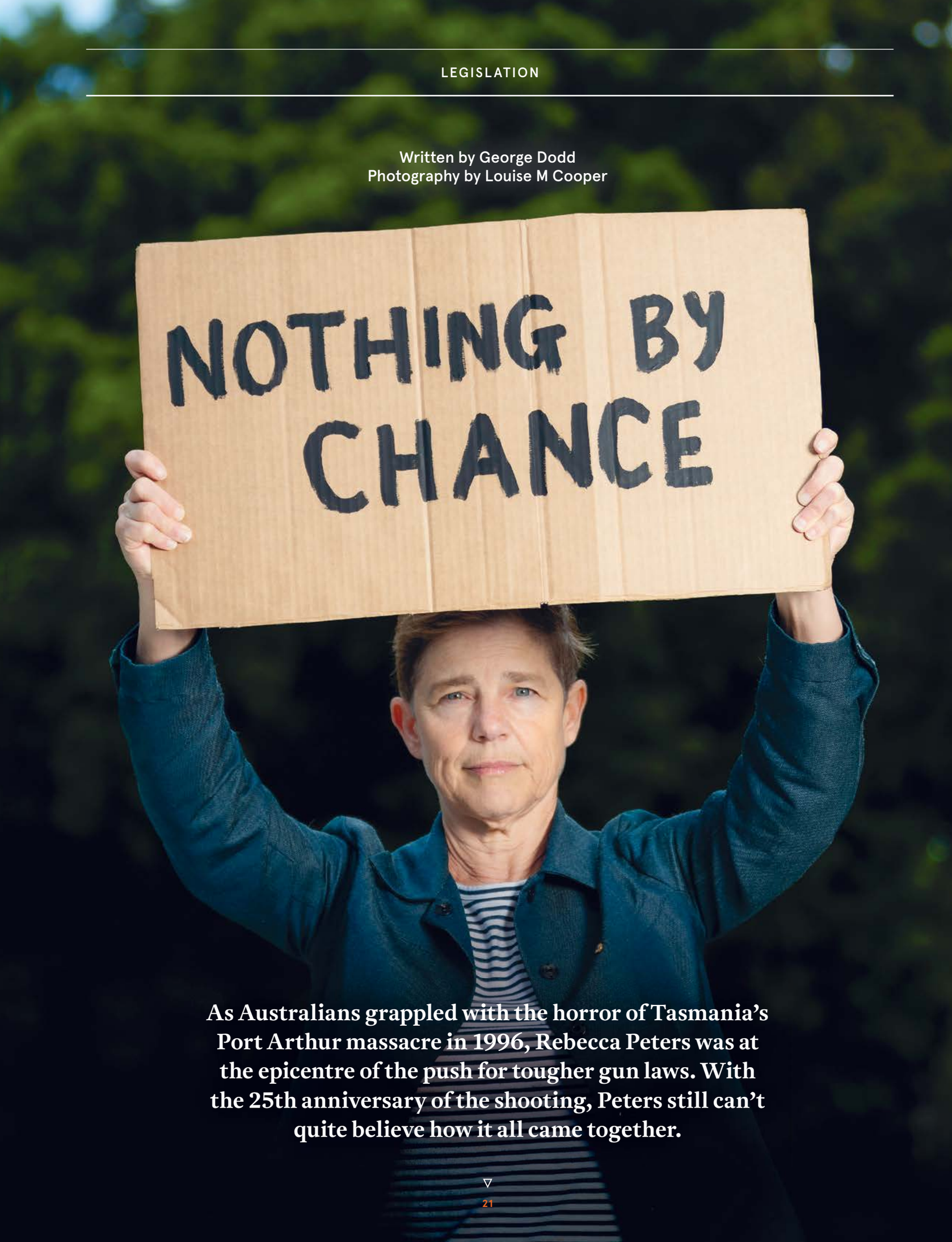
Drawing on the findings of another of their studies that looked at the carbon footprint of international tourism, the ISA was able calculate that pre-COVID-19, international tourism was responsible for between 7% and 10% of carbon impacts around the world, either directly or indirectly. That’s a sizeable proportion.

“These effects are certainly interesting to look at scientifically,” Geschke says. “But really, it all comes down to how can we actually survive on this planet?”●

FIND WHAT NEEDS FIXING

For more information or to help Dr Geschke dig even deeper, please contact the alumni team on +61 2 9036 9222.
Email: alumni.office@sydney.edu.au

Written by George Dodd
Photography by Louise M Cooper



As Australians grappled with the horror of Tasmania's Port Arthur massacre in 1996, Rebecca Peters was at the epicentre of the push for tougher gun laws. With the 25th anniversary of the shooting, Peters still can't quite believe how it all came together.

In the immediate aftermath of the Port Arthur massacre, Rebecca Peters (MAppSci(Res) '20) spent long, frustrating hours in her kitchen sending out faxes on the same phone line she was telling journalists to call her back on (this was before the internet or mobile phones).

The other volunteer members of Australia's Coalition for Gun Control (now Gun Control Australia), mostly had full time jobs making it hard for them to be fully on the front line to help, and where could they all work together anyway?

As Peters was swamped by media demands, she knew there would only be a brief window when the horror of Port Arthur might be used to enact real change. Then an offer of space came from the University. Peters and two team members moved to a basement room in the Edward Ford Building, which was walking distance from the share house where Peters was living.

There the small team worked round the clock with meagre resources to help a shocked and distraught nation understand the legislative failings that had led to such a catastrophe and to know that there were clear steps to be taken that would make Australia a safer place.

In the following weeks, Peters had to be reminded to eat, to sleep; one colleague noted that at times she was so tired she could barely walk. Unflinching, Peters became the face, voice and driving force for the vast majority of Australians who wanted tougher gun laws.

Despite the horrifying numbers – 35 dead, 18 injured - it would have been easy for Port Arthur, like the many mass shootings before it, to have had no effect on gun laws at all. It only led to change because of the specific chemistry of Port Arthur. Peters can easily list off the interactive elements.

"Being a tourist spot, people from every state in Australia were killed and injured in the shooting. It wasn't personal for just one state. The whole country felt it; six weeks before Port Arthur, 16 small children and their teacher were killed in Scotland's Dunblane massacre. With so many British-connected people in Australia, the horror of it felt closer to home than massacres in the US; and very significantly, John Howard OM AC (LLB '61 DLitt '16) had just won an election.

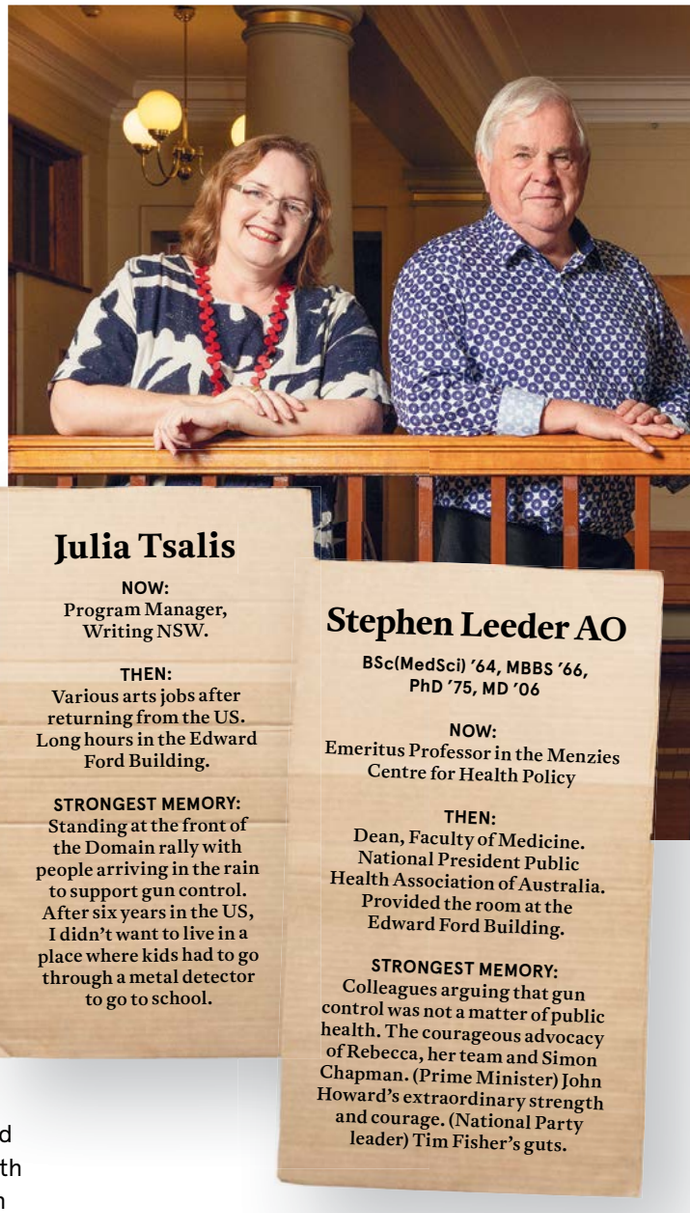
"If an election had been coming up, Howard might have worried about a pro-gun backlash that could cost him seats," says Peters. "But an election was a long way off so he could do more."

There was another factor. As Australians confronted the shock of Port Arthur, the Coalition for Gun Control was already primed and ready for the fight to toughen gun laws. To a large extent, this was because when Peters had first volunteered for the organisation five years previously, her first project was to assess its resources and priorities.

Savvy, strategic, tireless and determined, Peters' influence was transformative.

PASSION PROJECT

Of the many who helped, four in particular stood strongly with Rebecca Peters AO. Nearly 25 years later, they are photographed in the Edward Ford Building where Peters (centre), Tsalis and Giles put in long hours.



Julia Tsalis

NOW:
Program Manager, Writing NSW.

THEN:
Various arts jobs after returning from the US. Long hours in the Edward Ford Building.

STRONGEST MEMORY:
Standing at the front of the Domain rally with people arriving in the rain to support gun control. After six years in the US, I didn't want to live in a place where kids had to go through a metal detector to go to school.

Stephen Leeder AO

BSc(MedSci) '64, MBBS '66, PhD '75, MD '06

NOW:
Emeritus Professor in the Menzies Centre for Health Policy

THEN:
Dean, Faculty of Medicine. National President Public Health Association of Australia. Provided the room at the Edward Ford Building.

STRONGEST MEMORY:
Colleagues arguing that gun control was not a matter of public health. The courageous advocacy of Rebecca, her team and Simon Chapman. (Prime Minister) John Howard's extraordinary strength and courage. (National Party leader) Tim Fisher's guts.

In her early career as a journalist and radio producer, Peters had a strong social justice bent. She soon decided to study law with a view to helping shape the issues that were important to her. This she did while still working in the media (Peters is an audacious multi-tasker).

During her first year at law school, in 1991, there was a mass shooting in the inner west Sydney suburb of Strathfield. Seven people were killed. Though not part of the gun control movement at this time, the furious community response to the Strathfield massacre made Peters curious about the New South Wales gun laws.

She found they were, at best, vague and patchy, "You want to believe that laws have been thought through so

Jennifer Giles

LLB '85, BA '94

NOW:
NSW Magistrate.

THEN:
Lawyer loaned to the Edward Ford team from The Women's Legal Centre, so the only person being paid.

STRONGEST MEMORY:
Everyone across the nation was desperate for something to be done about guns. Rebecca was a focus to pour out their grief and energy. I've overheard Australians overseas skiting about our gun laws. But it was touch and go there for a long time.

Simon Chapman

PhD '86

NOW:
Emeritus Professor, School of Public Health, plus other projects

THEN:
Associate Professor, School of Public Health. Co-convenor of the Coalition for Gun Control (1994-1996). Wrote "Over our dead bodies: Port Arthur and Australia's fight for gun control."

STRONGEST MEMORY:
Doing lots of media work; the overwhelming community support; political unity; and relentless advocacy to safeguard the reforms.

they at least have the basic things," says Peters. "But reading the gun statutes, I actually thought a page was missing." She laughs at this remark but the expression in her eyes is still disbelieving.

Significantly, her investigations gave Peters her first contact with Australia's small gun control movement. But it was the Central Coast massacre in 1992, at Terrigal, that first introduced her to the news-watching public. Peters could speak knowledgably to the media about the gun laws because she was writing her law thesis on the New South Wales gun laws after Strathfield. Terrigal demonstrated one of the laws' greatest failings.

In the beach town of Terrigal, about 95 kms north of Sydney, a man went on a shooting spree, killing six people.

The murderer, now serving life in prison, was known to police as a violent man who owned guns. After a domestic dispute, the police raided his home to pre-emptively confiscate his guns.

The problem was, the NSW gun laws at the time didn't require that guns be registered, so the police didn't know how many the gunman had. They confiscated the five they found. He owned six.

In the years after the Central Coast massacre, Peters and her colleagues at the Coalition for Gun Control, laid out a game plan for the next mass shooting. As part of Peter's review of the organisation's strategies, she put together a shopping list of essential tasks. The trickiest part was the specifics of the changes they were asking for. The list had to be short so the media could easily report it and politicians could more easily say yes to it.

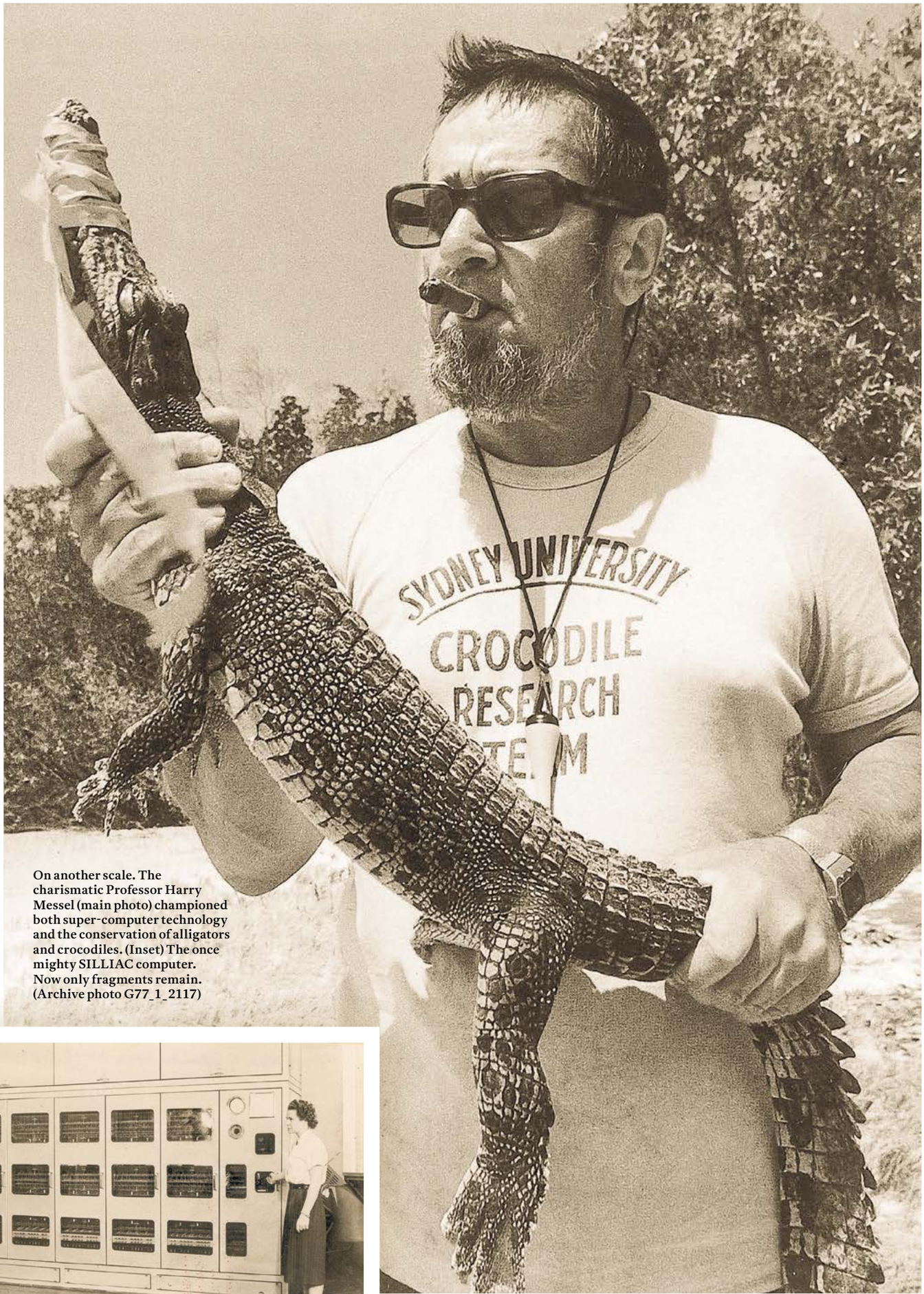
First and foremost: uniform gun laws across the country. But the Federal government could only regulate gun importation. Each State had its own laws around the purchase and use of guns. Luckily, most state governments at the time were of John Howard's Liberal party, so his election victory gave him great powers of persuasion, and to his eternal credit, he used them.

Once established, those uniform laws needed to ban all semi-automatic rifles, shotguns and assault weapons. The guns that were allowed had to be registered by their owners. And those owners, be they farmers, hunters, collectors or sportspeople, had to provide proof of their reasons to have a gun.

As Australia was deciding what to do after Port Arthur, the Coalition for Gun Control had already looked at every state's gun laws, saw what worked and didn't work, and fashioned a proposal for broadly acceptable national standards.

On May 10 1996, just 12 days after the Port Arthur outrage, Australia's state and federal governments agreed to make their gun laws uniform. Over the following year, each parliament enacted the laws that are now a source of some international envy and true national pride. ●

> "Being a tourist spot, people from every state in Australia were killed and injured in the shooting. It wasn't personal for just one state. The whole country felt it."
>
> — Rebecca Peters



On another scale. The charismatic Professor Harry Messel (main photo) championed both super-computer technology and the conservation of alligators and crocodiles. (Inset) The once mighty SILLIAC computer. Now only fragments remain. (Archive photo G77_1_2117)

TIMELINES:

The machine that advanced Australia into the computer age: SILLIAC

It's a story that's easy to love. In the early 1950s, the University wanted to build one of the first and most powerful computers in theworld, which became SILLIAC. But funds were short and it was only built because the race horse of a prominent donor had just won the Melbourne Cup. No Melbourne Cup win, no SILLIAC.

The truth is a little less cinematic. The donor, Adolf Basser, wasn't a 'colourful racing identity'. He was a man of modest disposition who happened to love horse racing: even more so when his horse, Delta, won the Melbourne Cup in 1951. But this was two years before he contributed to SILLIAC. In fact, Basser, who'd made his fortune through the jewellery business, was a long-time philanthropist supporting many causes, but he had a particular interest in science.

SILLIAC was just the sort of thing that would catch his eye, especially since the project was pitched to him by one of the University's most charismatic and spirited characters, Professor Harry Messel. Basser gave the modern equivalent of $4 million.

Hailing from Canada, the cigar-smoking Messel became head of the School of Physics in 1952, when he was just 30, little knowing his tenure would last 35 years. He was to completely transform the department, but one of his first adventures was meeting the fearsome media mogul, Sir Frank Packer (father of Kerry and grandfather of James), to ask for money to establish the Nuclear Research Foundation (now the Physics Foundation) within the School of Physics.

Sir Frank asked what he would get out of the deal. "Absolutely nothing," answered Messel. Messel got his money.

In establishing the Nuclear Research Foundation, Messel knew his research ambitions for the place would need serious computing power (or at least, the best that computers in the 1950s could offer). He estimated that just one of the necessary calculations would take people using desk calculators 2000 man years.

At that time, there were just a dozen computers in existence worldwide, and the Illinois Automatic Computer (ILLIAC), built by the University of Illinois, was considered the best. That said, it was a beast that comprised 2,800 vacuum tubes and weighed nearly 5 tonnes. Like all the computers at the time, it was 'developmental'. Ideas around intellectual property were more relaxed then than now, and Illinois University was happy to share their ILLIAC blueprints, if Sydney shared its own advances on ILLIAC with them.

There was a great deal of information exchanged in both directions as ILLIAC became the Sydney version of ILLIAC, or SILLIAC.

All this was never going to be cheap. At the time, a Sydney suburban house cost about £3,500. It was estimated that SILLIAC would cost ten times more, or £35,000. Though, as is the way with these things, SILLIAC eventually cost £75,000.

For that money, the world welcomed probably the most powerful computer it had ever seen; it was certainly an advance on ILLIAC. There was little in the way of miniaturisation though. At 2.5 metres high by 3 metres wide and 0.6 metres deep, SILLIAC took up most of a room in the Physics Building, plus a room for a power plant, plus a room for cooling.

In contrast, and by modern standards, its performance was modest. The information it could store would amount to less than a second of an MP3 music file and what SILLIAC did over its 14 year life, could probably be done by a smartphone in under a minute.

The first scientific calculation using SILLIAC was carried out by PhD student Bob May in June 1956, three months before the official opening. The machine would be a seismic advance in the Australian and world computer scene, and government and industry started asking what it could do for them.

SILLIAC ran Australia's first computer payroll system for the Postmaster-General's Department (now Australia Post). It was used by organisations like Woolworths, Snowy Mountains Hydro-electric and banks, who then went on to buy their own computers. It also saved University researchers many thousands of hours of laborious calculation.

Along with all this, some of Australia's earliest IT professional developed their craft by working on SILLIAC.

As computer advances accelerated, SILLIAC was left behind. It was turned off in 1968 and dismantled. Only a couple of fragments can be found in museums. Still, it ran a great race.

Written by George Dodd with thanks to Associate Professor Robert Hewitt, previous Director of the Science Foundation for Physics.

CLASSNOTES

ALAN HOPPE

AdvDipFarmMan ’86.

With 30 years in corporate agriculture, Hoppe has worked in diverse locations from the Riverina to Central Brazil. Starting with 13 years as a farm manager, he has overseen the production and sale of beef, dairy, horticulture, grains, pulses, oilseeds and beef feed lotting. He’s had operational roles with Macquarie Agricultural Funds Management in Australia and Brazil growing almonds, wine grapes and grains. With ICM Agribusiness, he was responsible for annual production including more than 20,000 metric tonnes (MT) of wheat, 10,000MT corn, chickpeas, sweet corn, and barley. In Rwanda, Central Africa, he developed a successful rice business. Hoppe is now CEO with Gunn Agri Partners, an Australian agricultural investment manager running farms for third parties, currently managing over 2.5 million acres.

CAROLINE BOATENG

BEc (Hons) ’11

Corporate strategist by day, sustainable jewellery designer by night, Boateng has leveraged the skills learnt in her Economics degree to pursue personal and professional endeavours focussed on positive change. Since graduating, Boateng has worked in corporate strategy, helping organisations carve out competitive advantage and achieve growth aspirations. She is currently a Senior Manager at CommBank with a primary focus on customer experience strategy. Boateng has also channelled her creative passion into her eco-friendly jewellery brand, Created by Culture. The brand is working to create social and environmental change, as it addresses Ghana’s systemic waste management issues. Created by Culture collects discarded glass bottles from Ghana’s streets and coastlines, and cleans, melts and moulds them into upcycled, hand-crafted jewellery.

JESSICA WILLIAMS

MIPH ’11

With experience across a number of industries including oil/gas, retail, financial services and manufacturing, Williams has developed high level skills in human resources. After finishing her undergraduate studies at Stephen F. Austin State University in the US, Williams went on to complete a Masters to extend her skills and knowledge in community health management, health promotion, qualitative health research and public health ethics. She is now at TimelyMD, a telehealth provider in Fort Worth, Texas, that has a focus on helping students thrive. Williams is the Associate Vice President of People & Culture, using her value-driven leadership and creative problem solving for strategic talent acquisition, performance management, diversity/inclusion and policy development.

JULIET DONALD

BPsych ’01, DCPsych ’09, MSc ’09

Living in Canada for the last ten years, Donald has worked as a clinical psychologist in Australia, Canada and internationally with Doctors Without Borders/Médecins Sans Frontières. Having seen firsthand the mental health impact of detention for refugees and asylum seekers, in 2019 Donald and University of Toronto professor, Laura Beth Bugg, co-founded the not for profit Australian Diaspora Steps Up Canada (ads-up.org/canada). The organisation provides permanent resettlement in Canada for refugees in indefinite detention, including those in Nauru, PNG and Australia’s onshore immigration detention system. Through the Private Canadian Refugee Sponsorship Program, they have submitted applications and formed resettlement support teams for over 40 refugees in 2020 and will continue providing resettlement pathways for those in need.

More stories of alumni at work around the world. We love hearing what our alumni are doing. Help us keep track by updating your details at sydney.edu.au/alumni/update-details

DR CHRISTINE ASMAR

BA '69

Ongoing enthusiasm for engaging with cultural difference marks Asmar's career. Indonesian Honours took her first to Australia's Jakarta Embassy, then to a lectureship at London's School of Oriental & African Studies. Eleven years teaching English in the Arabian Gulf (Dubai, Kuwait, Qatar, Saudi Arabia) sparked compassion for the dispossessed leading to a PhD in Australia in Palestinian politics. Authoring Australia's first national study of Muslim students, Asmar gained international recognition post-9/11. Drawn, finally, towards issues of race at home, Asmar has worked with Aboriginal colleagues on Indigenous issues, including Australia's first national study of Indigenous academics. She was awarded a National Teaching Fellowship for her achievements in Indigenous teaching. Now retired, Asmar volunteers at Tranby Aboriginal College.

HENRY YAO

M.Com '00

With careers in both Australia and Asia, Yao is now Vice President of Dian Diagnostics Ltd, a listed independent laboratory in China that conducts diagnostic tests including for COVID-19. Starting at PricewaterhouseCoopers' Tax and Legal division, Yao also worked for KPMG's Risk Advisory Services in Sydney. He is a Certified Public Accountant having had a number of corporate leadership roles across the Asia Pacific, including over nine years with GE, starting in Australia as SOX Leader of GE Commercial Finance, then promoted to CFO of GE Capital Real Estate's ANZ business with over $1.6 billion under management. He also worked for Roche Diagnostics global pharmaceuticals as Head of Compliance for China. Yao is a Certified Internal Auditor and a Certified Anti-money Laundering Specialist.

JOAN ROSS

BSc '53

Leaving Broken Hill in 1949, Ross loved first year medicine except for the realities of practical anatomy. Changing to Science (she met her future husband in the Chemistry lab), Ross joined the first Science Pharmacology group. On graduation she worked at the Repatriation Dept of the Commonwealth Public Services in Haematology, then becoming a bacteriologist, mostly testing for TB in ex-servicemen. After a break to have children, Ross became a chemistry demonstrator at the University, then at UNSW, a chemistry tutor, a lecturer, a coordinator for bridging and revision courses and the HSC examination committee representative. Ross continues as a casual academic in foundation studies teaching overseas students. She also supports an endowed scholarship for rural and remote students to study science.

LAVENNIAH ANNADORAY

BSc(Hons) '15

After an epiphany where she saw human beings as walking molecular machines, Annadoray pursued science research. A two-year research assistant role at Singapore's Agency for Science, Technology and Research (A*STAR) and the Genome Institute of Singapore (GIS), garnered her the skills to engineer DNA/RNA for use in disease therapies. In 2017, Annadoray pursued her PhD at the Foo Lab in NUS Yong Loo Lin School of Medicine (NUSmed), with a deep-dive into the advanced RNA therapeutics, leading to the development of an entirely new circular-microRNA interference technology platform. On being published in Molecular Therapy journal, interest came from venture firms in both USA and UK. Annadoray will use an award from the NUSmed Kickstart Initiative to commercialise her innovation.

JUST THE FACTS

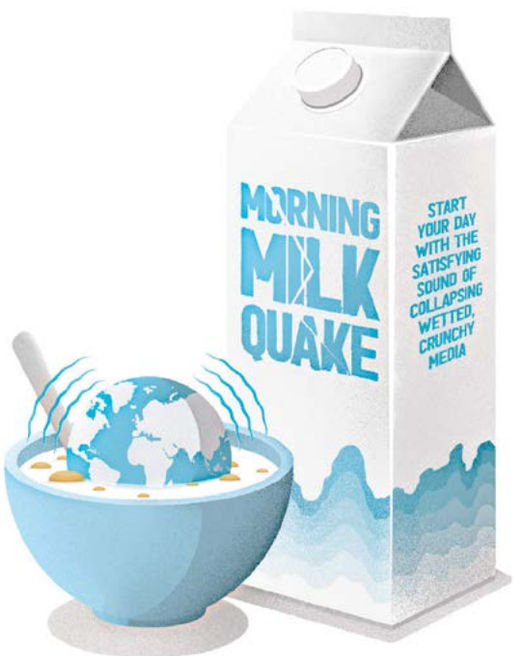
Dealing with vast amounts of information is just another day at the office for University researchers and academics. Here, three researchers explain an idea at the centre of their current work.

ON BREAKFAST CEREALS AND QUAKES

How might breakfast cereals help predict earth and ice collapses? It is well known that cereals are easily crushed and that they become soggy when soaked in fluid. But what if they are loaded and soaked at the same time? The result is 'ricequakes' where the sudden collapses of wetted, crunchy media produces clicking sounds. As capillarity drives fluids upwards through the cereal against gravity, micro-pores weaken and gradually crush. Similar forms of gradual collapse were observed in larger scale environments like stockpiles, sinkholes, and ice shelves which are, in effect, under concurrent load and partial soaking. So, the next time you listen to your cereal bowl snap, crackle and pop, think about global warming and Antarctic icequakes.

Professor Itai Einav

It's the little things. Despite our reliance on it, we don't yet fully understand the mechanics of sand. Einav works to define how particles like grains of sand or lumps of rock behave under varying conditions; knowledge which can, for example, reduce energy wastage in mineral processing.



ON RE-ENLIVENING POLLUTED ESTUARIES

Estuaries surrounded by urban settlements such as Sydney Harbour are highly vulnerable. Humans are replacing their natural habitats with human-made structures and dumping high loads of contaminants into their waters. This results in high accumulation of contaminants in sediments followed by biodiversity loss. To improve the health of these waterways, I am reintroducing sediment dwelling animals such as worms, clams and crabs and harnessing their natural capacity to remediate contaminants. Much like earth worms in a garden bed, these marine animals oxygenate sediments through their burrowing activity, boosting the capacity of sediment microbes to process contaminants. My research focusses on understanding the best conditions for reintroduction to maximise their capacity to kick-start the healing process of urban estuaries.

Dr Ana Bugnot

Out of sight is not out of mind for Dr Ana Bugnot. Using quantitative ecology and advanced statistics she assesses the sometimes-hidden human impacts on environments and works widely with industry and environmental managers to develop solutions.

ON NUTRITION FOR CHICKENS

Chicken-meat is the most consumed meat protein in Australia with 90% of us having chicken at least once a week. Despite what is sometimes suggested, chickens are never raised with added hormones and their fast growing is the result of selective breeding. Their diets are also much more healthy than for most human beings. Poultry nutritionists like me, formulate poultry diets to include more than 20 nutrients for energy, essential amino acids, minerals and vitamins. The diet also changes with the chickens as they age. I'm particularly interested in poultry nutrition because it is part of sustainable and resilient animal production and supports global food security,

Dr Sonia Liu

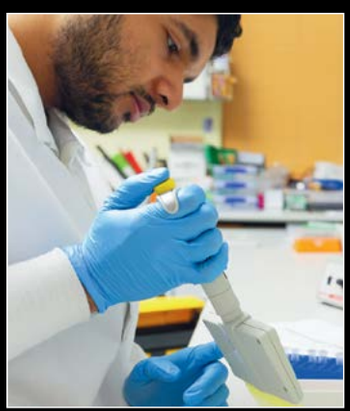
Poultry nutrition isn't just about what goes into a chicken. It's also about what comes out. Dr Sonia Liu's research looks at sustainable poultry production that improves gut integrity, reduces nitrogen and phosphorous excretion and optimises feed efficiency.

University of Sydney Women's 1st XV winning the Jack Scott cup in 2020 for the third consecutive year. Photo AJF photography.

It can take a lifetime to decide on your legacy








One phone call can make it real.

Whether you need starting advice or you're ready to take your plans further, the University has people who can help make your passion your legacy.

To find out more, call our Planned Giving team: +61 2 8019 7964

THE UNIVERSITY OF SYDNEY