SYDNEY ALUMNI MAGAZINE

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SAM

THE UNIVERSITY OF SYDNEY

Ripping into plastic waste

+

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Closing in on malaria

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Deleting India's e-waste

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Reviving an ancient language

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We're unlearning diet to help us live longer

By questioning how the body processes different foods, our researchers have discovered that a low-protein, high-carb diet can delay chronic disease and help us live a longer and healthier life.

Find out how we're unlearning the world's greatest challenges.
sydney.edu.au/our-research

THE UNIVERSITY OF SYDNEY

Leadership for good starts here

POWER OF RESEARCH

Not everything has a simple answer. That might seem like a statement too obvious to make, but at a time when the world is racked by uncertainty and conflict, a demand for strictly simple answers might be part of the problem.

Very few of the questions being tackled at the moment have anything like simple answers; think for example about the complexities and sensitivities of an idea like free speech. But you can be certain the answers – nuanced, considered, balanced and sometimes unpopular as they are – are often formed in institutions like this, your university. And they are formed through research.

If the word research makes you think of white coats and test tubes, you may need a rethink. Research happens across all of our schools and faculties, from languages to economics to urban design. It is done by highly talented, knowledgeable and dedicated people from around the world, using the resources of this institution to make our society richer, more vibrant and a better place in which to live.

As the nature of employment evolves, our researchers are working to understand the consequences and opportunities. They are assessing government processes to ensure that children and young people who go into care have the best possible outcomes. They are creating technologies capable of reversing the tide of plastic waste overwhelming our oceans – you can read the plastics story in this issue of SAM.

Our researchers do not exist in a bubble. They are part of a dynamic, interconnected research environment at the University, with input from peers, students, industry partners and other interested parties from beyond our campuses.

Of course, like anywhere, opinions and preferences exist here. But they exist in a community that is continually questioning and testing the knowledge already available to us. What emerges from this is a rich, campus-wide concoction of ideas brimming with progress, renewal, and often with more questions to ask. What more human impulse is there than to find more answers?

Belinda Hutchinson AM (BEc '76),
Chancellor

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Thomas Maschmeyer,
wrapped up in his work.
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University employee, with a dog.
1886. Photo from the University
of Sydney Archives 809_046

Inside back cover:
One of our students treating
animals at the Veterinary School
pop-up clinic in Wooloomooloo.
Photographer: Stefanie Zingsheim

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SCIENCE

Don't it make your brown eyes blue?

They're the most popular dog breed in Australia, but a research study about labradors in the UK has uncovered an unseen anomaly. It seems chocolate-coloured labradors don't live as long as their black and yellow counterparts.

In the UK, the median lifespan of non-chocolate labradors is 12.1 years, more than 10 percent longer than those with chocolate coats.

Lead author Professor Paul McGreevy, from the University's Faculty of Science, said the relationship between coat colour and disease came as a surprise to researchers, and may be a consequence of breeding for that pigmentation. "The UK findings may not hold in Australian labradors," he points out. "But they warrant investigation."

MEDICINE

A cloud gets its silver lining

With an aging population, joint surgery has become a rite of passage. Only about 2 percent of procedures involving implants result in infections, but the consequences include extensive antibiotic treatment, and re-implantation.

Enter Dr Behnam Akhavan from the Applied Plasma and Surface Engineering Research Group. Working with the University Medical Centre Utrecht, he has developed a silver-based antimicrobial coating for implants. Silver nanoparticles are antibacterial, but silver itself can be toxic to living tissue.

The result? A strategy that fixes silver nanoparticles to the surface but prevents their release into the surrounding tissue. The next step is finding industry support to conduct clinical trials.

◀ THE INSPIRED CAMPAIGN

In a first for an Australian university, Sydney announced in January this year that its INSPIRED philanthropic campaign had reached its ambitious $1 billion target.

Since the campaign began, it has allowed the University to pursue game-changing research and create an educational environment that puts it among the very best in the world.

More than 65,000 donors contributed to the figure and Vice Chancellor, Michael Spence (BA '85, LLB '87) expressed the University's gratitude, "While the amount raised by our campaign is incredible, what it represents is more important. It speaks of the vision for the future of our entire donor community. It speaks of purpose and possibility."

Find out more:
sydney.edu.au/inspired

Not rapt in plastic

As environmental emergencies go, the explosion of plastic waste is right up there. Thomas Maschmeyer wanted to make plastic waste valuable enough for people to use it. What he created might just clean up the planet.

Written by
George Dodd

Photography by
Louise Cooper

Perhaps the only time Professor Thomas Maschmeyer (BSc(Hons) '91 PhD '95) doesn't have his head full of research questions is when he's mountain biking. "Trying not to come off a mountain bike as you scream down a hill is a pretty good way to keep your mind away from work," he says.

Maschmeyer's work is both fascinating and important. One aspect is based on a distressing premise: there are beaches in the world where no human has ever set foot that are covered in our garbage.

Most of it is plastic that spews from the rivers where it's been dumped, often on an industrial scale. If you think things are bad now, it's estimated that by 2050, there will be more weight of plastic in the oceans than fish.

But this article isn't about the problem of plastic waste. It's about a potential technological solution, which is already leading to the construction of a new kind of plastic recycling plant in the UK.

The technology is based on what's called a catalytic hydrothermal reactor (Cat-HTR), an idea originated by Maschmeyer and developed through his start-up company, Licella. The process was and continues to be strongly supported by the University of Sydney and a highly skilled team of academics, scientists, engineers and entrepreneurs.

"People are excited by work that could make a real difference," says Maschmeyer. "With my students, sometimes we have to tell them to go home because they're working too much."

What makes the Cat-HTR process exciting isn't that it can recycle plastic. It's that it can recycle mixed plastics, often referred to as contaminated, end-of-life plastics. This is the material the Chinese recycling industry no longer accepts from the rest of the world because it is so hard to deal with.

To understand why mixed plastics are difficult to recycle, it helps to understand some basics about plastic itself.

The starting point for most plastic is crude oil, which is rich in carbon atoms linked as rings and chains. Each of the carbon atoms is connected to one or more hydrogen atoms. Collectively, these molecules are called hydrocarbons.

When the bonds between the carbon atoms or between the carbon and hydrogen atoms are broken, radicals are generated. By their nature, these radicals are exceptionally eager to bond with other molecules.

On the plus side, inventing new ways for these hydrocarbons to break and recombine has led to the dizzying array of fuels, chemicals and materials that underpin much of modern life, including a huge range of plastics with qualities like transparency, opaqueness, rigidity, squeezability, toughness, delicacy and all the other features that make plastic so endlessly useful.

Imagine if all our containers were still made of glass, pottery or metal. And how would electricity work if there were no non-conductive plastics?

Now the downside. In conventional, ie, mechanical recycling, plastics can only be processed with other waste made of the same or very well-defined mixtures of plastic. Using unsorted, random compositions of plastics gives unpredictable results, producing materials of no use to anyone.

Thomas Maschmeyer

MOST ADMIRED PERSON
Nelson Mandela for his tenacity, persistence, grace, humility and compassion.

BEST ADVICE RECEIVED
Do unto others as you would have them do to you.

FAVOURITE MUSICIAN
Beethoven in classical music. Ray Charles, Eric Clapton, Rolling Stones, Jimi Hendrix and Bob Dylan are my modern classics.

“ONCE YOU GIVE SOMETHING VALUE, PEOPLE LOOK AFTER IT. THEY DON’T TOSS IT INTO RIVERS; THEY’LL TRY AND DO SOMETHING WITH IT.”

— Thomas Maschmeyer

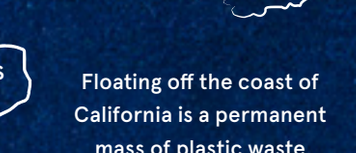
Kicking the bottle. Recycling is part of the solution. But we must also use plastic more carefully.

End-of-life plastic
makes up about
50%
of the world's
waste plastic

450 years

The length of time a
plastic bottle takes
to break down

Nearly every piece
of plastic ever made
still exists today



Floating off the coast of
California is a permanent
mass of plastic waste
twice the size of Texas

Humans can eat up
11,000
bits of microplastic
a year*

* Depending on diet

8 million
tonnes of plastic waste
flow into the oceans
every year

“PEOPLE ARE EXCITED BY WORK THAT COULD MAKE A REAL DIFFERENCE.”

— Thomas Maschmeyer

That's why plastics are sorted strictly into their six classes for recycling, and why most contaminated, end-of-life plastic, which makes up about 50 percent of the world's waste plastic, is burned, sent to landfill or indeed dumped into rivers. Things would be so much easier if all types of plastic could be recycled together using a chemical route.

The questions has always been: how? For Maschmeyer, the answer is water.

As Cat-HTR Technology breaks plastics down into smaller hydrocarbon components, the system uses water and a mix of catalysts to prevent the intermediate radicals from reacting with each other. The resulting liquid is a stew of stable, distillable molecules that can be easily separated into high value components, ready for reuse.

Of all the current recycling methods, this ease of distillation – enabled by Cat-HTR's stable product mix – makes the process uniquely efficient.

Maschmeyer's method also transforms waste plastic in another hugely significant way.

By converting it into saleable products like waxes, lubrication oils, fuels and gases, which can be used to make new plastics, the waste plastic itself is given monetary value. As Maschmeyer says, "Once you give something value, people look after it. They don't toss it into rivers; they'll try and do something with it."

Considering the sheer volume of waste plastic choking the world that can now be monetised, it's not surprising Maschmeyer's work has attracted commercial interest. The plant in the UK is being built through an infrastructure investor, Armstrong Energy, and when it comes online, it will convert 20,000 tonnes of waste plastic annually.

And that's only the beginning. Oil multinationals have expressed strong interest in the oil products the process can produce, and partnerships are being negotiated for more and bigger plants to open around the world, with the Finnish multinational and renewables leader, NESTE Oil, being the first official partner.

It's an amazing place to be for Maschmeyer, especially considering where he started.

Growing up in what was then the rough side of post-Second World War Hamburg, Maschmeyer was the only youngster in his street to finish 'Gymnasium', Germany's senior-tier of schooling, topping most years. Following his Australian wife to Sydney, he started a double degree at the University of Sydney in science and engineering, later focusing entirely on science.

After his PhD, Maschmeyer worked in London, then Cambridge. He progressed quickly, which he credits to his Lutheran world view and protestant work ethic. By the age of 31 he was in the Netherlands and Head of the Department of Applied Organic Chemistry and Catalysis at the Delft Institute of Chemical Technology. He became Vice Chair of the whole institute a couple of years later.

Missing the hands-on research he had enjoyed before his appointment to these senior roles, he decided to return to Sydney as a Federation Fellow.

"Also the kids started to support Dutch soccer teams. I had to put a stop to that," he says laughing.

He hasn't fully avoided senior university postings (until recently he was the Founding Director of the University of Sydney's Nano Institute), but he now happily runs a research team, doing work that just earned him the "Australian Science Oscar" – the 2018 Eureka Prize.

"I have around 15 students doing work in all sorts of areas," he says. "I think I'm quite good at spotting talent and getting people hooked on a particular journey. And of course, if they're successful, I'm successful. So, it's enlightened self-interest, really."

With the Cat-HTR initiative well underway, Maschmeyer is pursuing numerous other high-impact projects. His current research focus is on another revolutionary technology – a new generation of batteries for storing renewable energy. But that's a whole other story.

For more than 10 years, this has been the world's only large scale Cat-HTR plant. Located on the New South Wales Central Coast, what was learned here will underpin future international plants.

Ants are annoying at picnics, but they might make it easier to get to the picnic in the first place. Dr Tanya Latty studies swarm intelligence to improve urban design. And don't even get her started on slime moulds.

Big questions. Little answers.

Written by
Jenny Valentish

Photography by
Louise Cooper

Attention: Elon Musk. Re: Driverless cars. Are there any meat ants working at Tesla? If not, talk to Dr Tanya Latty, a Research and Teaching Fellow in Entomology at the University of Sydney. Among other projects, her team is looking at how meat ants organise themselves, so this can be applied to algorithms for driverless car systems.

"Driverless cars communicate with one another to minimise traffic times across the network," says Latty. "But what happens if one car puts in bad information? Without proper controls that get propagated through the whole network, you can have all these unforeseen patterns."

Meanwhile, ants have been running decentralised communication systems forever. The meat ant, in particular, has become adept at preventing misinformation. Many ants leave a pheromone chemical trail that other ants follow to a food source or back to the nest. This is why ants often travel in strict lines.

“We’ve identified, best estimate, 20 percent of insect species, so every time we lose a species, we’re losing all the information and possibilities that species contained. It’s like burning a library without having an index of what you’ve lost.”

— Dr Tanya Latty

“But the meat ant goes one better,” says Latty. “If we move the pheromone trail so that it’s going in the wrong direction, an ant will default to its memory and go the way that it’s been before.” The mechanics and implications of this are still being investigated.

At dinner parties, Latty is frequently misunderstood. Hearing she’s an entomologist, fellow diners are liable to request that she helps out with their cockroach infestation. “Then there’s a long explanation about, ‘Well, I don’t technically work in pest management’,” Latty says. Then she corrects herself. “In a way, I do.”

In Latty’s lab, researchers work with ants, bees, soldier fly larvae and even slime moulds. Often – as with the meat ants and the driverless cars – swarm intelligence is observed to create bio-inspired algorithms that can be applied to all kinds of human networks, from computers to roads. Sometimes, though, these invertebrates rebel and make a run for it.

“Gosh, we have breakouts all the time,” says Latty. “The lab is basically one giant breakout. We have maggots everywhere right now, crawling randomly around.”

Growing up near Toronto, the young Latty would use her mother’s nail polish to mark the slaters crawling around her childhood home, so she could tell which lived where.

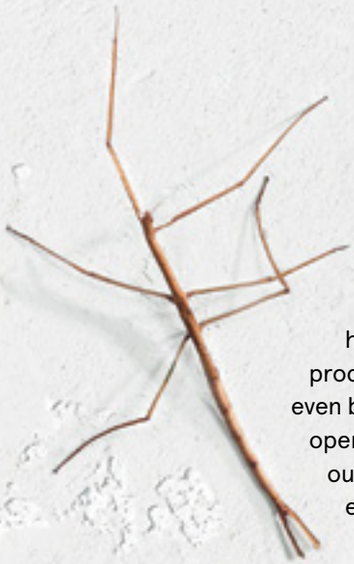
“I’m not sure I knew that I wanted to be an entomologist per se, but I wanted to do something with living things,” she says. “My parents both have science backgrounds, so they were

Dr Tanya Latty

WHAT ELSE YOU MIGHT HAVE BEEN
An astronaut. But I decided the mortality rate was too high.

FAVOURITE AUTHOR
Douglas Adams. I’ve read the *Hitchhiker’s Guide* series more times than I can count.

PROUDEST MOMENT
When my six-year-old daughter opened my insect collection and said, “You put a *dipteran* (fly) in with the *coleopter* (beetles). That’s just wrong, mum!”



just happy I was doing something sciencey, even though they weren't particularly happy with the things that were coming home."

After school, she undertook an undergraduate degree in environmental science and biology, and was particularly drawn to an entomology class. Today, when she isn't teaching or writing papers and grants, she's busy in the lab or out in the field.

"Last week, I was in Tasmania with one of my students where we set up a project looking at pollination in blueberries, apples and market gardens," she says. "This morning I spent a lot of time staring at soldier fly larvae to try to work out what they're doing."

A day at work for Latty isn't all about insects. She also admits to an odd affection for the mysterious slime moulds of the world. Slime mould might look like a fungus but it's actually part of the Protista kingdom, considered the least understood of the five kingdoms of life (the others being bacteria, fungi, plants and animals).

This very elemental creature is made up of just one large cell containing many nuclei, yet it exhibits behaviours that look very much like intelligence. Using a food lure, slime mould can solve a maze, and where there are two ways out, the mould will find the shortest route – all without having anything even vaguely brain-like. But it's the way slime moulds move that has attracted Latty's attention.

Slime mould movement has been described as 'streaming', which it does by pulsing its internal fluid to the front of the cell. How this happens is still not fully understood since there is no apparatus controlling the pulsing, making it a form of forward motion that is uniquely decentralised.

"If it's in contact with something it likes, such as a food source, the bit nearest the food will pulse faster and send more biomass flowing in that direction," Latty explains.

These observations give insights into the roughly 99 percent of life on Earth which is functionally brainless but sometimes looks like it's making decisions. This includes things like the bacteria that make us sick, and macrophages that search and destroy pathogens in our bodies. It's becoming increasingly clear that the brainless majority is not nearly as 'unintelligent' as we thought.

On a completely different tack, Latty's work with soldier fly larvae is focused on making better use of wasted food.

The larvae can turn food waste into high-quality protein, which can then be processed into human food, animal feed, or even biodiesel fuel. "You could have fly breeding operations in city buildings, processing some of our waste," she hypothesises. "It's also more ethical than eating livestock because soldier fly maggots love being on top of one another, so you can keep them in super-high densities."

Our planet is an insect planet. A third of our food is insect-pollinated. Cockroaches and ants recycle our rubbish and keep us from drowning in our own waste. Insects are also an essential foundation stone of the entire food chain.

Yet now we are confronted with the idea that insect populations are crashing, as the mass of insects internationally declines by 2.5 percent a year. The effect is perhaps most broadly felt in Australia as people notice that Christmas beetles and bogong moths are missing their regular appearances, and car windscreens are virtually insect-free after country drives. If we are noting these absences, the many birds and animals that eat insects are noticing as well.

It also pains Latty that insects – which make up more than 70 percent of all animal life – have such a low approval rating, and are rarely on the receiving end of petitions from armchair conservationists.

"We've identified, best estimate, 20 percent of insect species, so every time we lose a species, we're losing all the information and possibilities that species contained," she says. "It's like burning a library without having an index of what you've lost."

Ants, stick insects, leaf insects and slime moulds decorate these pages, but they often live in Latty's office.

The term ‘robot’ comes from a Czech word meaning forced labour. Robots already work in factories, run warehouses and review legal documents. But are we ready for them to perform surgery on us? A redundant question, because they already are.

Smooth operator

Written by
Gabriel Wilder

Photography by
Stefanie Zingsheim

On a winter’s night in inner city Sydney, a few hundred medical professionals sit in the cavernous dining room of a refurbished railway workshop. Their eyes are glued to a giant video screen where a prostate operation is being performed live from an operating theatre elsewhere in the city.

An unusual element of the procedure is that the surgeon is sitting metres away from the patient, his head buried in a console. From there he is controlling the spidery, metal limbs of a robotic surgical unit.

The audience at this medical technology summit aren’t necessarily surprised by what they are seeing; robotic surgery is already well established. But no doubt many conversations will be had later about where the technology might take us.

What’s already certain is that the opportunities of robotic surgery are transformative and will allow clinicians to look in new places for ideas. Research into the possibilities of image-guided robotic surgery and robotic automation are already well underway at the University.

The University is exploring the possibilities of this new technology in its Hybrid Theatre. Buried in the deepest part of the University’s Charles Perkins Centre, it looks like a pristine science fiction movie set where three pieces of technology dominate the room.

The imposing-looking and named Artis Pheno x-ray/CT system moves with the fluidity of an industrial robot painting a car. Instead of a car, it moves around a patient as it delivers detailed 3D images even as an operation is happening.

Nearby is the robot surgeon, more correctly called the da Vinci Surgical System, with its robotic arms containing high-definition cameras and customisable instruments. Beside it is a control console with hand grips that the surgeon uses to control the robotic arms, moving them with super-fine precision. It also provides a detailed, internal view of the operation.

The Hybrid Theatre operates under the umbrella of Sydney Imaging, which provides a suite of preclinical and clinical imaging techniques at the University for leading-edge biomedical research. The Hybrid Theatre itself was purpose-built to accommodate robotic surgery and image-guided surgical technologies. Its level of sophistication presents opportunities that haven't existed in Australia before.

Looking very at home among the theatre machines is Professor Paul Bannon (MBBS '87 PhD (Medicine) '98). A highly regarded cardiothoracic surgeon, he holds many senior titles including Academic Director of the Hybrid Theatre itself. He is one of the people who brought it into existence to be part of the new biomedical research and surgical training precinct taking shape at the University.

"What we always do is try to work out some way of doing things better," says Professor Bannon. "The surgical paradigm right now is minimal invasiveness. Robots are already helping us do that."

Minimal invasiveness means faster recovery for patients with the added benefit of freeing up hospital beds. Associate Professor Ruban Thanigasalam (MS '08) is a urological and robotic surgeon, and an expert in using the da Vinci system (he also helped organise the technology summit mentioned earlier in this story), and he has seen the numbers. "For the last 100 prostate cancer operations we have performed across the Royal Prince Alfred and Concord Repatriation Campus, we found that robot surgery meant less blood loss, shorter hospital stays and less opioid usage compared to open surgery," he says.

As a urologist, he also has an insight into why urological surgeons were among the first to embrace using the da Vinci system, "We often have to operate deep into the pelvis which can mean holding back-bending positions for a long time when performing open surgery. That doesn't happen with console-based, robotic procedures."

The da Vinci Surgical System is descended from robotic technology developed by the US military in the '80s and '90s that was designed to operate on soldiers on the battlefield. It has been used in hospitals in Australia since 2003, and there are now six at the Royal Prince Alfred Hospital and on the University of Sydney campus, including in the Sydney Imaging Hybrid Theatre, which is the most advanced unit of its kind in the country.

While robotic surgery is fulfilling its immediate potential, Professor Bannon, Associate Professor Thanigasalam and other clinicians working in the area are mapping out the technology's future, "The next question is whether we can go hands-off so robots operate by themselves," says Professor Bannon. "Beyond that, can robots actually make decisions? We're in the process of learning what the machine can learn."

If robots can one day make clinical decisions, it will be through machine learning which is related to artificial intelligence. Once provided with vast amounts of relevant information – in this case, the performance of countless surgical procedures – the da Vinci system has the capacity to work out how to do the procedures autonomously.

This is where humans may have to adjust expectations in being comfortable

The da Vinci surgical robot

MOST ADMIRED PERSON
Robby the Robot from *Forbidden Planet*.

WHAT ELSE YOU MIGHT HAVE BEEN
A forklift.
I like to be useful.

BIGGEST PHOBIA
Rust.
Running out of warranty.

Get a grip. The da Vinci console separates the surgeon from the patient, but adds an incredible level of precision.

Associate Professor Ruban Thanigasalam (L), and Professor Paul Bannon, in the Hybrid Theatre, and in the arms of their robotic team mate.

with a machine making clinical decisions. Though in some ways, this is already happening. Some pacemakers now have a robotic element that monitors blood chemistry and flags when treatment may be needed. People who have diabetes also benefit from semi-autonomous devices assessing glucose levels and making decisions about insulin levels.

"Though actually, robotic systems don't make decisions," points out Professor Bannon. "They draw conclusions based on vast amounts of data that have been implanted. How far we can take this will be defined by the safety nets we put in place. And the safety nets will always be multi-layered and extensive."

While fully autonomous robotic surgeons are still some time off, Associate Professor Thanigasalam sees a variation happening sooner, "Robotics could soon act as a fail-safe by overriding a surgeon in case of error. Then within maybe 20 years, we'll likely see artificial intelligence within robotics," he says.

Much more imminent is remote proctored robotic surgery. This is where a surgeon new to the technology in say, Wagga Wagga, can be supervised by a robotic surgeon in Sydney, and guided along the robotic surgery learning curve. With the horizons of robotic surgery widening, previously ambitious goals become achievable. As Professor Bannon says, "If you don't set objectives, you'll never know what's possible."

Certainly, the Hybrid Theatre is working towards becoming part of the global development of new technology in surgical robotics.

When *SAM*, perhaps clumsily, name checks the novel *Brave New World* to express the world-changing potential of the technology, Professor Bannon smiles widely and instead references a 1966 science fiction film where tiny scientists travel through a human body: "We think of it more as a fantastic voyage." ●

LONGER, HEALTHIER LIVES

To learn more about the University's groundbreaking medical research or help advance the work, please call Lachlan Cahill on +61 2 8627 8818 or email development.fund@sydney.edu.au

KEEPING YOUR OPTIONS OPEN

Could open source drug discovery be the gateway to universal access to medicine? School of Science lecturer, Dr Alice Motion, believes so. As the co-founder and director of Breaking Good (breakinggoodproject.com), she works to make drug discovery less secretive, so more people can help find the pharmaceuticals the world needs.

Written by
Dr Alice Motion

Illustrated by
Lachlan Cohn

Open scientists, like myself, believe that we can improve access to medicines by increasing transparency in the drug discovery process. Traditionally, pharmaceutical development is veiled in secrecy, not surprising given the time and investment required to find a new medicine.

On average, it takes 12 years and costs AUD $3.6 billion to bring a new drug to market and it's a risky business. Promising drug candidates often fail in the late stages, sometimes at the final hurdle. Secrecy means that competing pharmaceutical companies could be working on the same compounds at the same time. This duplication of effort is problematic even in cases where the compounds prove to be successful, but when the drugs don't work, it's a terrible waste.

I'm part of the Open Source Malaria consortium (OSM) – founded by Professor Matthew Todd in 2012 – which is trying to find a new medicine for the treatment of malaria as quickly and cheaply as possible by removing secrecy and preventing duplication of effort. We have a strong motivation.

In 2017, there were 435 thousand malaria deaths globally. OSM has brought together an

international team of researchers who design, synthesise and test new antimalarial candidates and publish all of their results on the internet in open lab notebooks that anyone can read. The work is done freely with the understanding that there will be no patents.

Open source drug discovery is a model particularly suited to diseases that disproportionately affect the world's poor, where there is little to no market incentive for companies to invest in drug discovery.

In the open model, researchers from different universities and institutions collaborate and seek input from colleagues from the pharmaceutical industry in online forums. For example, chemists post target structures before starting to make them in the lab, allowing the research community to point out any problems or share ideas.

Another exciting thing about removing secrecy from drug discovery is that it lowers the barrier to participation. Drug discovery is no longer solely the domain of professional scientists and higher degree research students; we've been able to involve undergraduates and even high school students in the search for new medicines in a project called Breaking Good.

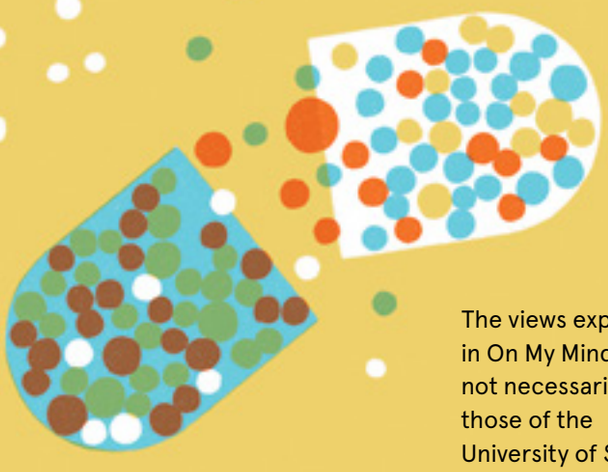
As an example, in 2014, we began a pilot project with a local high school and worked successfully with the students to make antimalarial building blocks. In 2016, we focused on something a little different: recreating the medicine Daraprim, which is essential for treatment of toxoplasmosis, a parasitic condition highly dangerous to people living with HIV or AIDS.

The price for this medicine was suddenly increased in the US from $13.50 a pill to an outrageous $750 per pill, but the students demonstrated it could be made for just a few dollars. They shared all of their experimental details online and took part in an important conversation about the ethics of access to medicine.

> "Many medicines are simply too expensive for patients to afford due to either astronomical costs of development or unconscionable price hikes."
>
> — Alice Motion

The Daraprim story reminded the world that a lack of access to medicine is not limited solely to people in the developing world. Many medicines are simply too expensive for patients to afford due to either astronomical costs of development or unconscionable price hikes. The low market incentive that inhibits development of medicines for the world's poor is also a huge problem for rare diseases that don't have large numbers of potential patients.

I believe that opening up drug discovery is a new model that could help us to find new medicines more efficiently and build trust between patients and scientists through transparency.



The views expressed in On My Mind are not necessarily those of the University of Sydney.

A man of his word

Written by
Jocelyn Prasad

Photography by
Stefanie Zingsheim

At the start of European settlement, there were 250 Aboriginal languages. Today, only 20 are widely spoken. Nathan Schrieber's language, Gunggay, was about to be lost until he made it his mission to bring it back.

Dinner with the family is a chance for Nathan Schrieber (MIL ’18) to speak the Gunggay language with his four children, aged between three and 12.

New words are regularly added to the conversation, but the best sign the language is finding new life is Nathan’s youngest. He is effectively becoming bilingual, speaking to Schrieber in Gunggay as effortlessly as he converses in English.

“I think back to before the Anglican Church came here. It was just our people, and our language was an everyday thing. I can really see that in my youngest son.”

There are few better ways to undermine a people than by forbidding them to talk their own language, as happened in many Aboriginal communities. Language connects people with the cultural nuances of their lore, history, art and ideas. It is a foundation stone of community strength and pride.

Schrieber is one of Queensland’s Gunggandji people, and their language, Gunggay, is among the more endangered of the world’s 2000 plus disappearing languages. “In terms of fluent speakers, I’d be hard-pressed to find five,” says Schrieber, who is spearheading efforts to bring his language back from the brink.

One way he does this is by teaching Gunggay to the students at Yarrabah State School. Yarrabah is Schrieber’s home town, an hour north of Cairns. After driving through lush, mountainous rainforest,

Nathan Schrieber

HIDDEN TALENT
Qualified bookbinder.

BIGGEST LIFE INFLUENCE
Ngayu Walaburri
(my ancestors).

BEST ADVICE RECEIVED
Nyundu bama Gunggay – Ngudju Binanga
(Never forget who you are and where you come from).

“Finding out that the way our language is structured is similar to the majority of other Aboriginal languages in the country was fascinating.”

— Nathan Schrieber

you descend into a welcoming place where the front doors are open and the people mingle easily in the streets.

The Gunggay school classes are lively, with lots of laughter and Schrieber weaving Gunggay into the action. Ask the kids and they say Schrieber is funny; away from class he has great warmth but also a reserve, a sense of seriousness, as he does everything he can to bring back his traditional language.

A dialect of the Yidiny language, Gunggay originated in the area around Cairns. Yidiny is one of 100 extinct (or close to extinct) Australian Aboriginal languages. It wasn’t something Schrieber thought about much until he was at university in Queensland in 2007. Prompted by a lecture on Indigenous perspectives, he began looking for the reasons behind the demise of his language.

He found answers in early records from the Anglican mission set up in Yarrabah. The use of Gunggay plummeted soon after missionary John Gribble established the mission in 1892. Gribble died in 1893 but his son Ernest set up dormitories at the mission school, separating children from their parents and teaching them English.

“Instead of trying to learn our language, he forced English upon our ancestors,” says Schrieber, who is rebuilding Gunggay with the help of his community Elders who have held onto some of the language.

After first contact, the use of Gunggay diminished and a hybrid language, Yarrie Lingo, emerged. A creole built from English and Yidiny languages, it’s still spoken by many Gunggandji people and is far more prevalent than its traditional predecessor.

Growing up in Cairns as the son of an Indigenous Queensland public servant, Schrieber spoke English but had brushes with his first language, mostly through overhearing conversations among his Elders. “We weren’t formally being taught. The language was just floating around within earshot,” he says.

Schrieber started pursuing these subconscious words while still an undergraduate and had a eureka moment at his university’s library. There he found two 50-year-old field recordings of Gunggay songs. “I just struck gold,” he says.

After a four-year stint in Cairns, Schrieber returned to Yarrabah to teach, and continue building on the 350 Gunggay words he identified at university. In 2013, the Yarrabah State School principal asked him to become a dedicated language teacher, an opportunity he grabbed eagerly while knowing there was still much to learn about Gunggay and how he could best pass it on to younger generations.

Off the back of advice from friends and colleagues, he enrolled in the University of Sydney’s Master of Indigenous Languages Education, a one-year, full-time course he completed extramurally as he continued his full-time teaching role. The postgraduate degree was instrumental in improving Schrieber’s grasp of the structure of Gunggay.

“Finding out that the way our language is structured is similar to the majority of other Aboriginal languages in the country was fascinating,” he says. Some words are also similar. For example, the Gunggay word for kangaroo is *kangoola*.

Above left, speaking the traditional language binds communities and gives young people greater self-confidence and a sense of cultural pride.

> “I’m trying to find a way of putting all the language I’m learning into a song, just like our ancestors have always done.”
>
> — Nathan Schrieber

At Yarrabah State School, he teaches Gunggay to most students. “Singing and dancing has always been part of our culture; our kids love singing and dancing. I’m trying to find a way of putting all the language I’m learning into a song or making a dance out of it, just like our ancestors have always done.”

Primary school students receive half an hour a week of language teaching and high school students have 70-minute weekly lessons. He incorporates the two songs he found at the beginning of his linguistic journey to help with pronunciation and motivate learning.

It’s an ever-evolving process, with Schrieber passing on new language to students as he learns it.

“I’ve only been on my journey for 10 years and the school has only been on its journey for six years,” says Schrieber. “Every day we’re coming up with new ways to use the language.”

Revivers of other Indigenous languages have created new words not in their original language, but which reflect modern life. This is on the cards for Gunggay speakers.

“I’m sure we’ll do it because there are so many new things to talk about,” says Schrieber. “I think the feeling in our community is that we want to make use of every single word we currently have because we know where it’s come from, and we know that it’s always been living here on our Country.”

Schrieber says he pinches himself when he considers his good fortune in being a qualified teacher with a postgraduate degree in teaching his first language, who works in a supportive school environment.

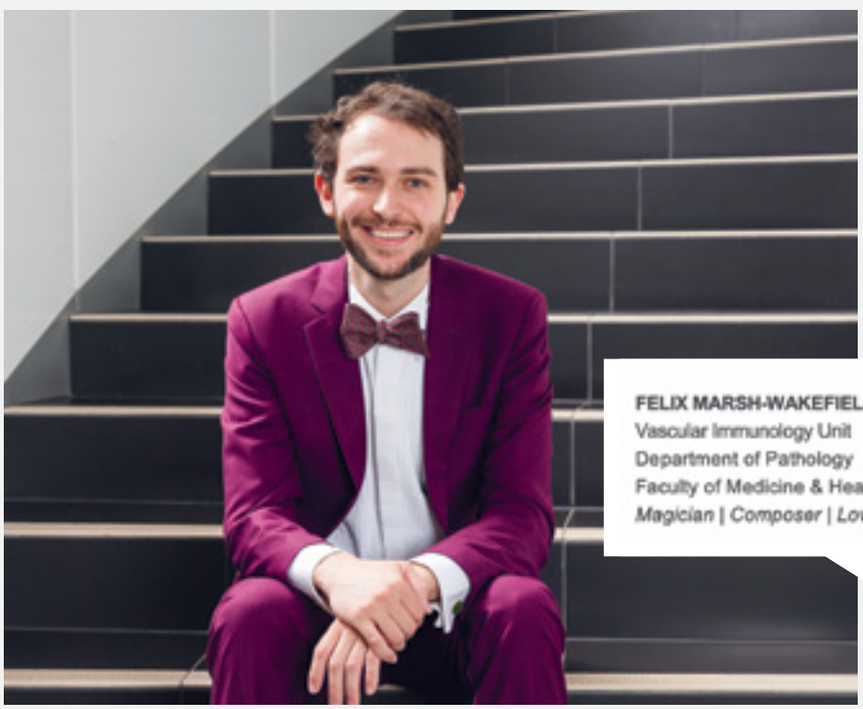
“I feel honoured and blessed that I can go about this important business of revitalising my first language.”

ON MY DESK: DR FELIX MARSH-WAKEFIELD

Rules are for questioning. That's the view of Dr Felix Marsh-Wakefield (BMedSc(Hons) '13 GradCertEdStud '17 PhD(Research) '18). His lab work is focused on multiple sclerosis and understanding which immune cells are really responsible for the disease. He is also on a mission to take scientific thinking outside the box.

▼ THE PURPLE SUIT

I first suited up for an honours presentation at a conference. I was hesitant about doing it again until another lab head said she wanted to see how I'd dress up next time. I thought "That's good enough for me". I dressed up once as a vampire for a PhD video because I think analogies are a good place to start describing things. I also participated in the "Dance Your PhD" video contest.



Photography by Louise Cooper

▲ MAGIC TRICK

I can do magic. My dad still is a magician; he did a lot of kids' shows and things. He taught me and my sister Lucy many different pieces of magic. I've been criticised for having 'magician' in my email signature because I don't do magic enough.

▲ CHOCOLATE REPLICA OF A NOBEL PRIZE MEDAL

This was from a PhD student. When she left, she gave these out to a few of us. We decided none of us were allowed to eat ours until we won a real one to replace it.

◀ EMAIL SIGN-OFF

I liked how some people had quotes in their email signatures. I thought "no-one ever reads them anyway and everything else looked legit". So I added this to mine. The next day my supervisor said "nice signature".

CREATIVE SPIRIT

If the people can't go to the art gallery, take the art gallery to the people. That's been the approach of Kat Roma Greer as she's created dynamic street art events in disadvantaged communities the world over.

Written by
Andrew Stafford

Photography by
Louise Cooper
and supplied

Musician Frank Zappa once said that the most important thing in art is the frame, for without it you can't tell where the art stops and the real world begins. Extending that logic, the art gallery itself is a frame where art is displayed, bought, sold – and for many, effectively sealed off.

Kat Roma Greer (MA(Res) '14 MA '14), founder of the travelling art festival Micro Galleries, aimed to break art out of its frames and take it to the streets. Starting from the chaotic precincts of her base in Hong Kong in 2013, her aim was for "people to stumble over it. That's when they begin to shift their perceptions and believe they should have access to art as well," she says.

Since then, Micro Galleries has exhibited everywhere from Kathmandu to Cape Town, using local and international artists to blur the line between street art and fine art and bring a sense of wonder to unexpected, often disused and neglected spaces. Along the way, she's touched thousands of people who may otherwise never set foot inside a gallery.

One of them was Robbie, a street kid from Denpasar in Bali. In exchange for meals, Robbie cannily worked his way into the Micro Galleries crew, starting by stirring glue and minding the equipment, which he became obsessed with. By the end of a 10-day tour, Robbie had learned so much about the works on display that he was giving guided tours to other kids.

Roma Greer understood that if you live in poverty or disadvantage, even public art venues can feel like inhospitable and remote places. Her idea was informed by her own upbringing in the Illawarra region, on the New South Wales south coast, during the recession of the 1990s, when both of her parents found themselves unemployed and living in housing commission accommodation.

At her school, art wasn't a priority: the resources weren't available. "I really wanted to do music, and my school didn't offer the subject," she says. Pursuing glimpses of another world meant "my English teacher staying back after class to continue unpacking Yeats with me, or my music teacher taking less of a fee because we couldn't afford to pay more.

"But it was those sorts of intersections that gave me a really positive adolescence, helped me access subjects I maybe couldn't have understood as well, and gave me a huge support network … Without that I probably wouldn't have gone on to have a nicely successful career. I want to provide those opportunities for other people."

Roma Greer moved to Sydney with her partner in 2003, then went to Hong Kong in 2010, completing her Master of Arts at the University of Sydney externally, graduating in 2014. Though not Indigenous herself, her focus was on First Nations Peoples. Learning more about Indigenous performance increased her interest in the limited opportunities for artistic exposure, both for creators and consumers.

"It refined the way I engaged with and thought about dealing with minorities and disadvantaged communities and understanding the exceptionally privileged position that I come from," she says.

In Hong Kong she met Bess Hepworth, who was curating a TEDx project which she wanted to culminate in a low-budget art project. Hepworth commissioned Roma Greer to devise something that would engage the community more closely than other art installations and galleries in Hong Kong. Micro Galleries, driven by the overriding idea that art was for everyone, was the result.

"There are a lot of high-end art galleries here that are very pristine, with great curatorial teams and wonderful resources, and at the other end of the spectrum is the Hong Kong Art Fair. So there's a huge industry here in terms of art and phenomenal artists, but the people who are accessing the art are usually educated, resourced, and they have the time and the ability to physically get there."

By comparison, in Sham Shui Po – described as a "down to earth" neighbourhood on the Hong Kong Tourism Board's website – "people still live in cage houses," says Roma Greer. "They're not going to the art fair and they're certainly not going into art galleries, and if they are, I'm sure they don't feel welcome, and there's possibly no way for them to engage on a level that is potentially useful for them."

When *SAM* speaks to her, Roma Greer has just returned from Kathmandu in Nepal, "It's one of the poorest countries of the world, but it has a dynamic art scene," she says.

It was an intense few days that included murals, stencils, photography, painting, installations, sound art, projection art, live music and performance, and showcased the work of local artists and others from as far afield as Finland, Norway, Indonesia and South Africa.

"The best way I can explain the experience is 'epic, and depleting', meaning we do a lot, intensely and in a short space of time. Like most non-profit organisations, we are under-resourced but still trying to do everything we dream of."

The community where the Kathmandu art event happened has kept the dream going. A week after the event, Roma Greer was sent photographs showing how the local people had used some of the art elements to turn their laneway into a garden.

It's all about bringing art to the places that need it most, including the disadvantaged communities where Roma Greer herself grew up. In 2015, she brought Micro Galleries to one of those places, Nowra, a town she says people "drive past to get to the beaches on the other side of it".

"It went from a town that was very confused as to why we were there to being excited and fascinated. We had to beg people to allow us to use their walls – but by the end they were maintaining the works themselves with pride. Later, a radio station declared Nowra the artiest town in New South Wales; the local MP talked about it in parliament.

"Art historically has been set up for one institutionalised purpose or another – religion, patronage or for commercial purposes. Micro Galleries is a disruptive process. It's about providing artists with opportunities, and being in communities in a way that can have a meaningful impact."

1. Setting up in Jakarta. Photo: Teresa Schebiella
2. Part of the *Women on the Wall* mural in Patan, Nepal, with women sitting nearby. Photo: Lara Furst
3. Kat Roma Greer (L)and Dom Decenzo install Andre Eichman's work in Graz, Austria. Photo: Teresa Schebiella
4. Installation by Michelle LL from Nepal, in MG Kathmandu. Photo: Lara Furst.
5. *Brick* by Adam Kuby for Micro Galleries, Kathmandu. Photo: Lara Furst.
6. *Women on the Wall* painting.

Kat Roma Greer

BIGGEST LIFE INFLUENCE

A school trip to the theatre, an art teacher going the extra mile, a music teacher taking less money for lessons.

WHAT ELSE YOU MIGHT HAVE BEEN

I wanted to be a lawyer at one point. But it has too much paperwork. So now I spend my time with wheatpaste glue, ladders and sunshine.

BEST TRAVEL TIP

Activated charcoal tablets for my privileged Western constitution. And a sarong that can be a blanket, towel, pillowcase or a headdress when modesty is required.

1.

2.


WOMEN'S BANK
LOVE
LEAD YOUR REVOLUTION
RESILIENT
LEADER
ACQUA

3.

4.

5.

6.


Women
On The
Wall


Unchecked Material

E-waste is the world's fastest growing stream of rubbish, yet recycling it can be a nightmare for our health and the planet's. Jeevesh Kumar is on a mission to change that.

Buried treasure

Written by
Lauren Sams

Photography by
Abhishek Bali

It was a chance trip across Sydney's Parramatta Road to a second-hand electronics store that sparked a big idea for Jeevesh Kumar (BE(Software) '04): a sustainable electronic recycling company.

"I was living on campus at the time," he says. "I went to the second-hand store across from Victoria Park and got my first refurbished laptop. I knew I didn't need something brand new, and I thought, more people need to do this. Purchasing upcycled electronics needs to become the new normal."

That need is becoming more urgent. E-waste is the fastest growing stream of rubbish today. In the last nine years, global production of e-waste has more than doubled to 49.3 million tonnes. By 2021, it's predicted to reach 57 million tonnes. In Australia, the problem is severe: it's estimated that by 2024, we'll have dumped 223,000 tonnes of discarded electronics in landfill.

To help confront this growing crisis, Kumar co-founded Greenscape Eco Management in 2007. It's now India's leading IT disposal service, taking electronics that were destined for landfill and upcycling them, extending their life by repairing them, or mining them for valuable elements that are then reused.

If the e-waste problem is severe in Australia, it's at breaking point in India, where Kumar was born and grew up, and where he now lives in New Delhi. Here, two million tonnes of e-waste are generated every year. In Australia, the e-waste problem is compounded by the fact we don't consistently direct our used devices to formal recycling centres. India has that plus the added problem of 'backyard' recyclers who mine the streets for discarded e-waste, and use dangerous methods to extract the elements within, causing potential harm to themselves and the environment.

While an old mobile phone might seem worthless, e-waste is actually rich in elements like gold, silver, cobalt and copper. So those billions of tonnes of tossed-aside laptops? They're literally buried treasure. (In 2016, the United Nations University estimated that the raw materials in landfill e-waste were worth about $55 billion.)

They're also riddled with toxic compounds like lead and mercury, so to extract the good stuff, you need to be careful. But amateur recyclers aren't careful, and 90 percent of e-waste in India is processed by these workers. As an example of the processes they use that can do more harm than good, a popular way of removing gold from circuit boards is to soak them in nitric or hydrochloric acid, which then contaminates waterways.

"There is so much inequality in India," says Kumar, "so you can see how this unorganised sector would want to take advantage of e-waste. And it's very hard to tell a guy who doesn't know where his next meal is going to come from: 'Look, you're doing it wrong.'"

Kumar and Greenscape have stepped in to turn these amateurs into trained, skilled recyclers and remove the e-waste problem from the streets. "The social part – training people to do this properly – is very close to our heart," says Kumar.

Greenscape mines e-waste 'from above', meaning it removes unwanted electronics and prolongs their useable life by repairing, refurbishing or 'harvesting' the devices for valuable components.

"We just thought it was a great idea," he says of the initial push to found Greenscape. "What if we could mine all these commodities and, at the same time, process e-waste in the right way? It would solve several problems at once."

Holding back the tide. E-waste wasn't just about business for Jeevesh Kumar. It was an opportunity to educate people about a rapidly emerging environmental crisis.

Jeevesh Kumar

PROUDEST MOMENT
My first employee buying a Greenscape product.

HIDDEN TALENT
Great at reading people.

FAVOURITE PLACE
Top of a snow-covered mountain.

1.

2.

The process works like this. Say a mobile phone comes in from one of Greenscape's roving collection teams. First, there'd be an attempt to extend its life, as this is the most sustainable thing to do. "Recycling still costs the environment," says Kumar.

If the phone can't be resuscitated, the team will take it apart and separate each of its commodities: plastics, the battery, metals and so on. These become raw materials to be processed and then sold to manufacturers who use them in other products.

While Kumar is proud of Greenscape's success so far – in just over 10 years, the company has grown to employ more than 230 people and has an office in Singapore – he's concerned about where the world is headed. "Our culture is obsessed with the next big thing," he says. "You know, 'the new iPhone has come out and I need it right now'. We need to end that idea."

1. The storage area for electronic waste that comes from around the India. It is further processed into commodities like copper, silver, plastics at various plants spread across the world.
2. Face masks protect workers from the hazardous components of e-waste that can travel on dust.
3. Refurbishing and reselling IT devices is more environmentally friendly than recycling them. It's the preferred outcome for Greenscape.


3.

"ONE THING I'VE LEARNED IS THAT THERE'S NO BUTTON YOU PUSH TO MAGICALLY END THE PROBLEM ... CHANGING ONE PERSON'S MIND, RECYCLING ONE LAPTOP. THAT'S HOW IT GETS DONE."

— Jeevesh Kumar

Part of Greenscape's mission is to make recycling popular again and nix the idea of 'planned obsolescence' where products are created with the intention of becoming outdated, to encourage customers to buy new versions. "This is just so flawed," says Kumar. "Companies pushing you to upgrade so they can make a profit, without taking responsibility for their waste: it's a nightmare for the environment."

While some big tech companies are getting better at managing e-waste – Apple, for example, is working towards making its laptops and phones from renewable sources or recycled materials – a huge part of the issue is our consumption habits. Greenscape's recent social awareness campaign, Tiny Bugs Tweet, is testimony to the company's commitment to changing attitudes towards e-waste.

The campaign installed small devices in rubbish tips in India. Every time an insect came near them, a tweet was sent about the impact of e-waste. "We want people to be really clear," says Kumar. "Refuse the waste – stop buying as much – and reuse as much as you can. And at the end of a product's life, if you have no other choice, recycle it in the best possible manner."

For some, the ever-growing problem of e-waste might seem just too hard to tackle. But Kumar is defiant in the face of the challenge, and hopeful. "One thing I've learned is that there's no button you push to magically end the problem. It's baby steps, day by day. Changing one person's mind, recycling one laptop. That's how it gets done."

His ultimate goal is for Greenscape to support the recycling of all extracted commodities, creating a circular system where nothing is wasted.

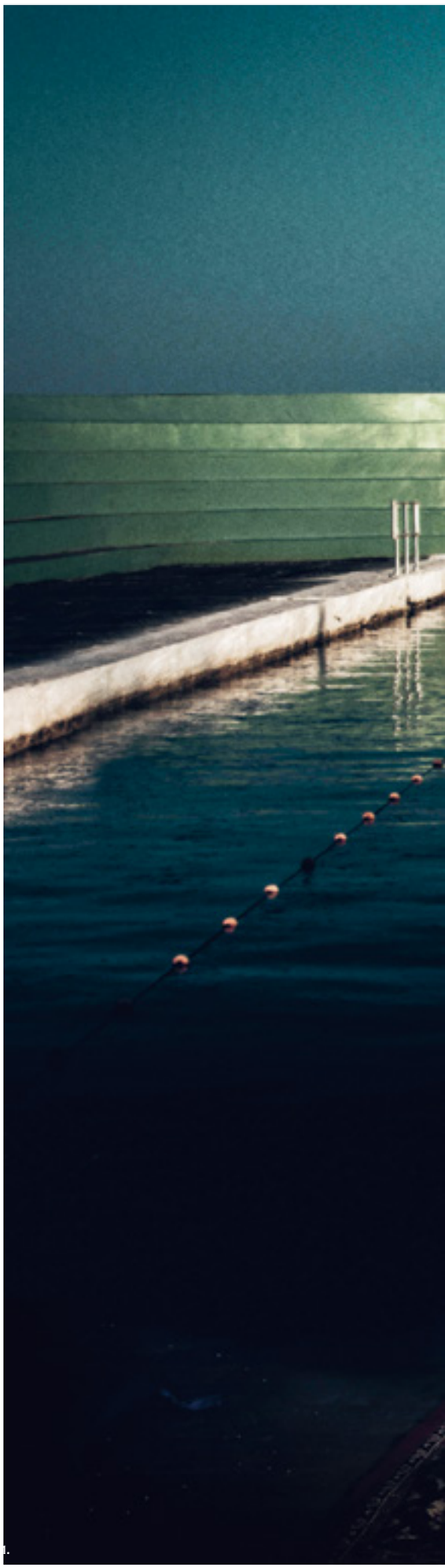
"Whatever we have now, we need to take care of it," he says. "There is no planet B."

Often the first glimpses of a new film are the images captured by the on-set photographer. It's a specialist vocation that requires creativity, spontaneity and diplomacy. Lisa Tomasetti has all three.

Seeing stars

Written by
Gabriel Wilder

Photography by
Lisa Tomasetti



1. "This one's called *Upside Down, Inside Out*. It's a composite image. I shot the foreground in the studio and the background during a TV shoot in Newcastle. It's about disrupting the way people see images. That's my daughter, Matilda, in the red top. She's been in pretty much every exhibition I've photographed since she was about five. She's 21 now, which is great, because she offers suggestions. It's become a close collaboration."


1
3
5
6


2.


3.


4.


5.

There are times when it can be hard to squeeze into the schedule of Lisa Tomasetti (MDP ’12).

When *SAM* contacted her, she was working on two television series in Sydney (she can’t disclose their titles) and preparing a series of eight large-scale images for the 2019 Head On Photo Festival, which displays photographic works in public spaces and galleries across the city.

“My life is not normally this crazy,” she says. “But all these TV series and films suddenly just came up. Sometimes it’s really busy and sometimes it’s not. It’s a great problem to have.”

Lisa Tomasetti is a photographer who specialises in documenting the arts. You’ve probably seen her work without realising it. She was the on-set photographer for *Star Wars: Episode II*, the acclaimed drama *Top of the Lake*, beloved comedy, *Kath and Kim*, and the recent Bruce Beresford film, *Ladies in Black*. And as Geoffrey Rush bounced joyously on a trampoline in the movie *Shine*, it was Tomasetti’s photograph that became the iconic poster image.

Tomasetti also brings visual wit, beauty and wonder as the international tour photographer for the Australian Ballet.

“My idea of heaven is running around a theatre trying to capture the emotion of the production. It’s harder on a film shoot I think. You might have 60 people in a small room battling a brutal schedule, but sometimes you just have to push for the moment that you really need for publicity.”

2. *A Street Car Named Desire* (Sydney Theatre Company)
3. *Waiting for Godot* (Sydney Theatre Company)
4. *Ladies in Black* (film)
5. *Shine* (film)

“The *Shine* poster shot was kind of accidental. I’m not sure I was even supposed to be on the set for that. They were shooting that trampoline sequence in slow motion – and film cameras shooting in slow motion are quite loud, so I was able to click right through the take. I remember feeling very liberated and having a great time trying to capture the sense of action.”

6.

6. “That was Tiananmen Square in Beijing. When we do the shots, we have to be really fast, so the ballet dancers just walk around in their tutus and pointe shoes with a coat on. There were heaps of tourists taking shots on their phones, but as soon as the police saw a professional camera, they were there wanting to confiscate my memory card. I talked my way out of it with a strange mixture of five million different languages.”

7. “The New York police officer was like a character from Central Casting. I told him what we were doing, and asked him to be completely oblivious to this Japanese dynamo of a dancer. He just said, “Yep”. And that leap was done without a run up. She just jumped. The image kind of went bonkers when we got back to Australia, which is great because you want the stories of how cool the Australian Ballet is overseas to be published where people will see them.”

7.

Despite this successful career, Tomasetti says she "honestly can't remember" how she found her way into photography. What is clear, though, is that it has given her a way to stay in the performing arts, which was the centre of her family life as a child.

Every school holiday, Tomasetti swapped pencils for greasepaint, taking to the stage to act in pantomimes organised by her parents' theatre company in Adelaide.

She never felt comfortable on stage, and when she was 15 she gave up acting. But as her subsequent career shows, she didn't stray too far from the arts.

"I grew up with actors," she says. "I feel really comfortable around them and I really respect them and what they do."

Stills photography is crucial yet mostly anonymous work, and Tomasetti says it requires certain characteristics as well as the usual technical skills.

"You need to get on well with everybody and you can't be a pest," she says. "You also have to sense when there's tension on the set, and read actors so you can say to yourself, 'I might just have to let that one go'."

8. "That's me with the camera. There aren't many photos of me on set so I'm quite delighted to be here with George Lucas. This was *Star Wars: Episode II – Attack of the Clones*, partly made in Tunisia. I could not believe I was part of this huge film."

8.

9.

9. "This one is called *Vanilla and Misfortune*. It was a finalist in the Archibald photographic prize. That's my daughter Matilda, again. We'd just moved down to Melbourne and I wanted to do a photograph reminiscent of the painterly grand masters. It's about the innocence and sophistication of a child. I think children have much more wisdom than they're given credit for."

Lisa Tomasetti

OCCUPATIONAL HAZARD
Talking too much on set.

PROUDEST MOMENT
Professionally, being a finalist in the Archibald Photographic Prize.

BIGGEST PHOBIA
Snakes!

Tomasetti came to the University at a time when she says she needed an environment to nurture her artistically. She completed a master's degree in documentary photography, studying the history and theory of photography. "I really loved having lecturers I could have discussions with. It was great to have like-minded people around and talk about your work and their work."

For all she's done, she sees working with the ballet as her "dream job", yet she is driven to craft her own works, saying "it's my own way of looking at the world".

Tomasetti's large-scale photographs, which are included in collections at the National Gallery of Australia and the Art Gallery of South Australia, often feature her daughter, whom she describes as her muse.

"I feel like when I do my visual arts work, it has to be on a grander scale," she says. "It needs to refine the lighting like the grand masters, and hopefully tell a different story so you don't get people in galleries thinking: 'I could have taken that'." ●

When two alumni sat next to each other, their connection was almost instant. It wasn't chemistry but mathematics that linked them, and a plan to educate some of the most disadvantaged children in Uganda.

Written by
George Dodd

Photography supplied by
Eddie Woo

DISTANCE LEARNING

1

2.

3.

4.

5.

6.

You don't hear the word kismet used a lot these days. But when Annabelle Chauncy (BA '07, LLB '10) and Eddie Woo (BEd(Second)(Math) '08) sat next to each other at the 2017 Alumni Awards, kismet was definitely involved.

They were both there as award winners: Chauncy, for building and operating community schools in Uganda; Woo, for his achievements as one of Australia's most influential and effective mathematics teachers.

Chauncy remembers them bonding almost instantly over their passion for education. "By the end of the awards night I think I already had him booked on a plane to come over to Uganda," she says.

It's a long way from the leafy Sydney suburb of Cherrybrook, where Woo teaches at Cherrybrook Technology High School, to the Ugandan capital of Kampala. Not unexpectedly, the always engaging and animated Woo, is across the numbers.

"It's a country of 44 million people in an area the size of Victoria," he says. "Talk about an energetic place. Everyone hustling, everyone trying to get by."

Driving just 20 minutes out of Kampala, things quickly become very different. There are few actual towns but the verdant country is dotted with small properties where subsistence farmers grow food for their families, with hopefully some left to sell. The mud huts where most of them live have no running water, no electricity. Most travel is done by foot.

It was in a rural area even further out that Chauncy chose to build her first school. How that happened is a story she now finds hard to believe, herself.

Annabelle Chauncy

BEST ADVICE RECEIVED
Crawl before you walk and walk before you run.

HIDDEN TALENT
I can play the drums.

OCCUPATIONAL HAZARD
Lack of work life balance.

While studying law, Chauncy decided to take a break by volunteering to teach English in Kenya. Her timing wasn't great. While she was there, an election was called and the country descended into chaos. She remembers holding a phone out of a window so her mother, at the family home in the peaceful Southern Highlands of NSW, could hear the machine gun fire.

Chauncy was evacuated to Uganda but rather than head back to Australia, she decided to see what she could do in this new country. She quickly felt a connection with the place and the people.

"I had a very immersive experience, living in villages with local people who would quite literally give you the shirts off their backs," she says. "They also had this real desire to improve themselves."

It struck Chauncy early on how transformative an education could be for the children in these poor areas. For example, English is the national and business language of Uganda. If you don't speak it, and many rural people don't, you are unemployable. You survive rather than flourish.

With her travel partner, David Everett, Chauncy decided to raise money back in Australia to build a school. It was a standing start. They had nothing more to shop around than a written proposal and a drawing of what a school might look like.

"We were 21, all passion and naivety, and next to no experience in life," she remembers. "But I say to everyone that my law degree set me up to know how to operate in the world."

Just over 10 years later, after navigating steep learning curves, government-level meetings, an arduous building process and tireless fundraising, there are now two primary schools and a high school. Altogether, about 680 students attend what is now called the School for Life, for free.

"Lots of them have never held a pen or pencil before. It's a big deal for their parents to let them be educated, because it means one less family member working on the farm," says Chauncy. "We feed them. We give them a uniform, and we teach them everything they need to be successful."

As Anabelle Chauncy was opening her first Ugandan school, Eddie Woo was in Australia going against family expectations to become a mathematics teacher. He excelled from the start, but what really put him on the world map was, for Woo, a typically compassionate and practical gesture.

In 2012, when one of his students was missing school because of serious illness, Woo started recording his maths lessons on his phone and uploading them to YouTube for his student to watch remotely.

The student wasn't the only one who tuned in. In fact, so many others did the same that the WooTube channel was born. At the time of writing, the channel has had more than 28 million views, and 519,000 subscribers worldwide, who are learning from Woo that maths isn't just graspable; it's fun.

Woo himself is so thrilled that he's chosen not to make *WooTube* a commercial venture. "If a 14-year-old wants to watch a video about maths, the last thing I want to do is give them time to change their mind by making them watch an ad," he says.

1. The speculative drawings that Chauncy used to raise the early funds are now fully realised educational facilities.
2. Some of the students had never held a pencil before coming to the school.
3. Eddie Woo and Annabelle Chauncy, a powerhouse team in the classroom.
4. Grounding the school in the local community was important to Chauncy. Kenyans built it. Kenyans teach in it.
5. Woo was struck by how even large classes were fully attentive.
6. He was there to teach the teachers, but Woo was a hit with the students as well.

Eddie Woo

HIDDEN TALENT
Playing the acoustic guitar (badly).

WHAT ELSE YOU MIGHT HAVE BEEN
A firefighter (a bad idea as I'm a chronic asthmatic).

OCCUPATIONAL HAZARD
Being an introvert whose profession works through relationships.

As his profile increased to the extent that he was being recognised in the street, Woo seized the opportunity to promote not just maths but better ways of teaching it. His achievements have been widely awarded, including as a finalist in the prestigious Varkey Foundation Global Teacher Prize, essentially placing him among the top 10 teachers in the world.

Such a passionate believer in the power of education was always going to be shocked by the education sector in Uganda.

When Chauncy took Woo to see a Ugandan government school, she saw the effect it had on him. "Eddie was deeply, deeply moved by the situation the teachers are in," she says quietly. "I really mean it when I say that you can see pain in their eyes. You can see they're almost helpless."

Woo adds: "The schools are simply not resourced; some don't even have electricity. And the teachers don't get paid. Most I spoke to hadn't been paid for two or three months. So what Annabelle has been able to achieve with School for Life is just astonishing. In educational terms, it's an oasis dropped into the middle of nowhere."

The 17 hectare School for Life property (bought with the money raised in Australia by Chauncy and Everett) is about a 90-minute drive from Kampala (or nearly five hours, if you leave at the wrong time on a Friday). The school buildings are sturdy, spacious and built for purpose.

Western teachers have been a rarity at the School for Life because Chauncy wants to empower the local people – her entire teaching staff is Ugandan. But Woo offered a singular opportunity for professional development and easily fitted into the school community.

"The teachers were just lapping up the time they spent with Eddie," Chauncy says. "And the kids loved him – they were calling him Eddie Whoa!"

"My day was about one-fifth observing a teacher and four-fifths running classes with teachers watching me," Woo says. "Then I'd run a professional development session with the teachers for about two and a half hours. The thing is, I spent four years at university studying learning theory. They've had nothing even close to that."

Woo's time at the School for Life was almost literally a flying visit. He worked at the school for just four days and was operating in jet lag mode the whole time. But he did make a connection with Joseph Kaabunga, the School for Life head teacher. "Joseph satisfies all the criteria of being a highly accomplished teacher," Woo says admiringly. "He asked me how I come up with my stuff. I'd brought lots of reading material with me, including an Adam Spencer (BA '92) book about maths. It's a book I turn to for inspiration. I gave it to Joseph, for him and the other teachers to use. It brought him to tears. It was a very profound moment."

A FIRST FOR EDDIE WOO

Often called "Australia's most famous maths teacher", Eddie Woo has just been made the first ever Education Ambassador for the University of Sydney, through the Faculty of Arts and Social Sciences. The role will see him partner with the University in promoting the importance of education and inspiring Australia's future teaching professionals.

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THE UNIVERSITY OF SYDNEY

The people of Burma, now Myanmar, were being devastated by conflict and drug-resistant malaria when Professor Rose McGready arrived for a temporary placement. It took her life in a whole new direction.

Fight for life

Written by
Ian Simmons

Photography supplied by
Rose McGready

When Professor Rose McGready (MBBS '90) arrived on the Thai/Myanmar border in 1994, it had been a volatile and dangerous part of the world for many years.

Rolling insurgencies against the government from a number of ethnic and political groups created poverty, human rights abuses and the displacement of thousands of Burmese people, many of whom fled into Thailand.

The political situation wasn't McGready's concern though. She was there to help control the drug-resistant malaria that was rampant among the desperate refugees and locals, and the primary cause of death.

As she began this temporary work placement at the Shoklo Malaria Research Unit (SMRU), McGready couldn't have known that this beautiful but fraught region would become her home for 25 years and make her a world authority on malaria in pregnancy.

"It was supposed to be a six-month stop on my way to Africa. I never made it to Africa," says McGready.

In preparation for the African trip, McGready had been studying tropical medicine, and took up the short-term placement at the SMRU to increase those skills. They also desperately needed her existing skills in obstetrics.

Not long into the Skype call with *SAM*, there's a power failure and McGready's line drops out. When it comes back up, McGready remembers another blackout: "We were working in the clinic with only a small kerosene lamp, resuscitating a child on the floor, and my arm felt very hot. My clothes were starting to burn."

Electricity is an ongoing challenge. Supply on the Thai side is reasonable, but just 25 km into Myanmar there is no electricity. Even large towns have one generator that only runs for a few hours, which people connect to car batteries.

"You try to charge your battery in that time, otherwise no power," says McGready. "That makes things like an ultrasound difficult. We have to be inventive."

Rose McGready (2nd from right), has dedicated her life to treating malaria in pregnancy, often relying on the most meagre resources.

Malaria is the most common parasitic infection of humans, transmitted to the blood via mosquito bites. The World Health Organization (WHO) estimated 220 million cases last year and worryingly, data between 2015–17 shows no significant progress in reducing global malaria cases. With a weakened immune system, expectant mothers and their babies are particularly vulnerable.

When McGready started her placement, the SMRU had implemented a way to catch the infection before it became severe. From their base on the Thailand-Myanmar border, they would travel to rural populations by crossing single log bridges over streams and rice paddies, and take foot tracks over hills. The pregnant women they found would be screened by finger prick sampling for malaria, and treated in the early stages with medicine to kill the parasite.

Then in the 90s, the anti-malarial drug they were using, Mefloquine, was becoming less effective. Mefloquine itself had replaced Quinine years before. "The parasite is more clever than us," McGready says. "For every single drug the parasite's seen, it's found a way around it."

There was another drug, Artesunate, but it was believed to be harmful for pregnant women.

"We didn't have a choice," explains McGready. "People were very afraid of using it, and we were too."

The drug was a last resort, given to women who otherwise would not survive. Not only did it work, there were no side effects on the babies.

The SMRU's groundbreaking use of Artesunate subsequently saved countless lives and led to new WHO guidelines for treating the parasite.

McGready is now recognised as one of the world's foremost experts on malaria in pregnancy, but she's quick to correct any suggestion that the work is hers. "We're a unit, a team," she says. "We have many languages. We can't operate without each other and the local staff. It's the local staff who the people trust. It's really the work of the SMRU."

And that work has never stopped. Five years ago they had to face the same crisis as resistance emerged to Artesunate – the backbone of malaria treatment. Another plan of attack was needed, so they approached philanthropic organisations dedicated to improving health in developing countries: the Bill & Melinda Gates Foundation, the Global Fund to fight AIDS, Tuberculosis and Malaria, and the Wellcome Trust.

The new goal is ambitious – to get rid of the parasite completely. With

funding and the SMRU's Malaria Elimination Task Force, every rural village in Myanmar's Kayin State established a malaria post. At each location, a local villager is trained and provided with a box that has what they need to take a blood sample, test it, and if someone tests positive for malaria, provide effective medication.

"You don't need to travel anywhere; you don't have to walk six hours when you feel sick," says McGready. "And malaria, the type that kills you, has disappeared. It's amazing. If we can push this beyond Myanmar and Cambodia and Laos, the prospect of elimination is really on the doorstep.

"We haven't got another drug. It's act or lose out forever. If malaria comes back, many, many people will die and it is so damaging to communities. When malaria is severe, the treatment becomes very complicated. In the first pregnancy case I managed, the woman died at the seven-month stage. To watch the husband and two little boys leave the hospital for home without their mother … it was heartbreaking."

"The first time you see something like that, it changes you forever."

Today, however, one brief sentence on the research unit's website is testament to their decades of work: "The SMRU has developed a system of antenatal care that has eliminated maternal malaria-related mortality."

From what was only supposed to be a short stay, McGready has now raised a family in Thailand and has been working at the SMRU for almost half her life. The research continues, and the delivery room is open 365 days a year.

It's a long way from the University of Sydney in 1986, where McGready's life-changing career began, "I never thought I would be doing this, ever. I never dreamed I would be in a place like this."

SAM finishes the call with one, last question. What keeps her going? After a long pause she says, "I don't know. I love life. It's a wonderful thing to be on the planet. And you want to be healthy, so giving pregnant mums the best chance for a healthy baby is the future, isn't it?"

Professor Rose McGready

OCCUPATIONAL HAZARD
Miscommunication in a workplace where we speak in Karen, Burmese, Thai, English and French.

BEST ADVICE RECEIVED
You can do better than that (my mother).

FAVOURITE ARTISTS
For giving the marginalised a colourful voice – kickstartart.org

Above left, there are more than 100,000 people from ethnic minorities living in a string of refugee camps along the Thai-Myanmar border, where SMRU operates clinics and field hospitals. Services are free, including an antenatal clinic, labour and delivery ward, and care for people living with tuberculosis and HIV.

Right, for McGready (L), giving her all to the job sometimes means donating her own blood, as she had to do for this patient.

CLASSNOTES

DR ANNA DEAN
(BVSc '03 MIntPH '08)

While practising as a small animal veterinarian, Anna Dean became interested in the overlap between human and animal health, particularly in developing countries, so embarked on an international public health career which has seen her live in Africa and Asia. Gaining a PhD from the University of Basel (Swiss Tropical and Public Health Institute), Dean is now an epidemiologist at the World Health Organization of the United Nations. She specialises in drug-resistant tuberculosis (TB) that is not responsive to standard treatment, as well as zoonotic TB, which is mainly transmitted to people through contaminated dairy products. Dean has served as President and Treasurer of the Executive Board of Vets Beyond Borders, an Australian not-for profit organisation, and was also an Australian Youth Ambassador for Development in Vietnam.

HANS STIER
(LLM '10)

Perhaps Stier was rebelling when he left his first career job as a corporate lawyer specialising in energy and sustainability, to enter the world of entrepreneurialism. By 2010 he'd founded the coffee start-up Kaffee Toro in Berlin, using his sustainability skills and enjoying being the boss surrounded by great coffee. That learning curve led to a new start-up, Bonaverde in 2013, which began with one of the most successful European crowdfunding and investment campaigns at the time. The company then created a world first, award-winning coffee maker, which grinds and brews, but also roasts green coffee beans to black. The hope is that this device will allow farmers and coffee drinkers to trade directly using blockchain technology.

ANGUS McFARLAND
(BA '10 LLB '12)

After graduating, Angus McFarland worked for both state and federal members of parliament, including as an advisor to Senator Doug Cameron, whom he considers a personal mentor. McFarland enjoyed working in politics but his drive to improve community outcomes through campaigning saw him take on an organiser role at the Australian Services Union (ASU), the fourth largest union in Australia. He is now Assistant Secretary of the ASU New South Wales Branch and sits on the National Executive. His work involves supporting workers, predominantly women, in the not-for-profit community and National Disability Insurance Scheme sectors.

RANI PRAMESTI
(BA '08 BSW '10)

Rani Pramesti works at the interface of social justice and the arts. She is the founder of Rani P Collaborations (**RaniP.com.au**); its debut production, *Chinese Whispers*, won two awards at the 2014 Melbourne Fringe Festival, and became a digital graphic novel (**www.thechinesewhispers.com**). Next came the critically acclaimed *Sedih // Sunno* at the Next Wave Festival 2016 and Metro Arts. Currently in production is *Surat-surat*, inspired by her grandparents' love letters. She has worked with culturally diverse young people in communities across Melbourne, and presented stories to audiences locally, nationally and internationally. A proud Chinese-Javanese-Indonesian-Australian woman, before she jumped 'heart-first' into the performing arts, Pramesti was a social worker in homeless shelters and refugee support organisations in Sydney.

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SABRIN FAROOQUI
(PhD ’10)

Sabrin Farooqui strongly believes in the benefits of quality education, as reflected in her PhD that looks into how Bangladeshi secondary school English teachers benefit from training. She continues to highlight educational issues in Bangladesh through international publications. Farooqui worked as an academic in the University of Sydney, before moving on to the Australian Bureau of Statistics. She now works for the Fair Work Commission. An artist, Farooqui has participated in a number of art exhibitions and currently organises exhibitions for aspiring migrant Bangladeshi artists. She is an active community volunteer with a focus on vulnerable women and the resettlement of refugees. Farooqui was named ‘Local Woman of the Year’ for Bankstown in NSW on International Women’s Day 2018.

NELL HANBURY
(GradCertCaHaemN ’16)

A cancer diagnosis at the age of 25 at the start of her nursing career inspired Hanbury to become an oncology nurse. In 2014, she applied for a Postgraduate Certificate in Cancer and Haematology Nursing, not expecting to be accepted. Instead, she was successful, though reading the subject outlines at the start, she felt overwhelmed. Again, she didn’t think she’d get through, but did. After graduation, Hanbury quickly found her dream job at Chris O’Brien Lifehouse, a state-of-the-art cancer centre. Her passion for supporting others led her to develop a coping guide for young people with cancer, which has received positive feedback from fellow warriors and colleagues. It has been published on the online platform, Cancer Advisor. Search for ‘Battle Weapons’ on **www.canceradvisor.org.au**

DR JAMES VELLA-BARDON
(GradDipPostgradLaw ’08)

After graduating, Dr Vella-Bardon held a number of risk management roles at leading financial services companies including BlackRock, BT Financial Group and Airlie Funds Management Pty Ltd. But he was always working towards being a writer. In March 2018, his debut novel *The Sheriff’s Catch* was published by Unbound, an imprint of the world’s largest publisher Penguin Random House. After breaking Unbound’s crowdfunding record, the book earned rave reviews on Goodreads following its pre-launch serialisation on popular digital book club, *The Pigeonhole*. Its YouTube trailer was a 19th Golden Trailer Awards nominee, and the novel has sold thousands of copies, rising to number three on the national bestseller list in Malta, Vella-Bardon's birthplace.

FIONA NOTT
(BA ’91 LLB ’94)

As CEO of the Women’s Foundation since 2017, Fiona Nott combines senior leadership experience with a passion for the foundation’s mission of serving marginalised women and girls in Hong Kong. A former lawyer and Hang Seng Index company secretary, Nott moved to Hong Kong nearly two decades ago, having cultivated a career as a senior legal professional and adviser to leading corporations in Hong Kong and Asia including PCCW, AIA, AIG, Aviva, Chow Tai Fook Jewellery, as well as small and medium-sized enterprises, start-ups and non-profits. She is Deputy Chair of the Australian Chamber of Commerce Hong Kong and Macau and was Founder and Chair of its Women in Business Network. Nott is a former President of the student organisation, the University of Sydney Union.

JUST THE FACTS

Dealing with vast amounts of information is just another day at the office for many of the University's researchers. Here we've asked two to explain just one idea that is at the centre of their current work.

ON UNDERSTANDING PROTEINS

'Precision medicine' means designing treatments tailored to individuals, rather than using a 'one size fits all' approach. It promises to revolutionise health care, and I'm particularly interested in how we achieve this vision. I believe the answer lies in technology. A revolution is happening in our ability to study proteins – the tiny molecular machines that power life. Using mass spectrometry, we can already measure tens of thousands of different proteins and their modifications in a single sample, giving us a window into how these machines are functioning. A key question for me is: how can we harness this powerful technology to better understand what goes wrong during disease, and how can we correct this using drugs?

Dr Sean Humphrey

Always driven to understand how things work, Dr Humphrey now studies proteins with the same goal. Using mass spectrometry, he is developing techniques to understand core biological processes, including stem cell differentiation and the pathways involved in opioid addiction in the brain.

ON GAMBLING

Gambling has been present across cultures throughout history, and traditional gambling activities have remained relatively unchanged for hundreds of years. Emerging technology is transforming how we gamble, including virtual and augmented reality and mobile devices enabling gambling in any location at any time. Simultaneously, gambling is converging with gaming, incorporating leaderboards, competition, social interaction, skill, and gaming themes. Online games now incorporate gambling themes and mechanics with no age restrictions or consumer protections. My research on problematic risk-taking involving emerging technologies strives to understand how technology is impacting gambling and gaming addiction, who is at greatest risk, and what evidence-based practices can be used to minimise harms.

Dr Sally Gainsbury (BPsych '05 BPsych(Hons) '05 DClinP '10 PhD '10)

Dr Gainsbury's research looks at the psychology of gambling for the development of responsible gambling strategies and harm minimisation policies. She also leads multidisciplinary research into risk-taking with emerging technologies, such as the problematic use of online games.

YOU AND *SAM*

Where in the world do you read your *SAM*? Send us a photo and we'll put it in a future *SAM* edition. Send your photo to sam@sydney.edu.au

Phillip Orth (BE Chem (Hons) '89)
Wellington, New Zealand. Phillip is project managing the most significant speed camera rollout ever for the New Zealand police.

Elaine Wong (MHIthScEd '05)
Machu Picchu, Peru. As co-founder of Red Element Health International in Singapore, Elaine is a service provider to the Health Promotion Board.

Christine Watson (BA '76 DipEd '77)
Victoria Peak, Hong Kong. Christine was a high school teacher in western Sydney, then retrained as a careers advisor. She is now retired.


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