

ENCOUNTER

THE ANNUAL MAGAZINE FOR FLINDERS UNIVERSITY ALUMNI AND FRIENDS / 2018

OUR PRECIOUS WATER

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Flinders
UNIVERSITY

100,000th

REASONS TO CELEBRATE

Flinders University's significant graduate milestone

On Monday 16 April 2018, outstanding scholar Sarah Wright (BEd(MidSecSch)/BHlthSc '18) became Flinders University's 100,000th graduate.

In the milestone graduation ceremony Sarah received her Bachelor of Education and Bachelor of Health Sciences, marking the end of an extraordinary educational journey for the mother-of-two.

To celebrate the occasion, Flinders flew in its very first graduate, Professor Alan Easton (MSc(PhysSc)(Res) '67, PhD(PhysSc) '71), to join Sarah on stage for the conferral of her double degree.

To achieve her dream Sarah took on five years of full-time study while also working in retail and raising two young children.

'I had never been to university before, but I knew I wanted to move my life forward and do something I was passionate about,' says Sarah.

She chose to combine her teaching studies with her passions for health and physical education in a double degree.

'I never really considered any other university as Flinders offered the exact degree combination I was looking for and I had friends already enrolled there who were having a great experience.

'When I began my double degree, my son Tyson was only three years old and I fell pregnant with my daughter in my fourth year. Ellie was born prior to my final year of study, and my health education tutor allowed me to bring her to class so I didn't fall behind,' says Sarah.

Sarah is now at Banksia Park International High School teaching physical education classes to year 8s and 9s.

'I'm really enjoying getting to know the students and assisting with their skill and technique development of different sports,' says Sarah. 'Because of my time at Flinders, I felt very confident and qualified to transition into a live school environment and ask for help when I needed it.'

In addition to her double degree, Sarah also received a Chancellor's Letter of Commendation for academic excellence from the University.

'I am really happy with where I am right now. I've grown into an independent thinker and discovered a resilience inside myself that I didn't know I had,' says Sarah.

Joining her at the milestone graduation ceremony was Flinders University's very first graduate, Professor Alan Easton.

Graduating with a Master of Science (Physical Sciences) in 1967, Professor Easton was one of just three students conferred at the University's first graduation ceremony.

Professor Easton followed up his Masters degree with a PhD from Flinders focused on Australian tides, and went on to pursue an illustrious career as a teacher of mathematics to engineers, as well as a reputed mathematical ecologist and oil spill investigator. He is now 75 years of age.

'Growing up in country South Australia, in Tarcoola, Quorn and Port Augusta, I had no concept of university,' says Professor Easton.

'I was the first of my family to attend university, and as I progressed with my studies, my expectations grew. Flinders provided the platform for my career.

'It's remarkable that half a century on from my degree I was able to join Flinders' 100,000th scholar as she takes her turn in the world as a Flinders alumna, with all the knowledge and work-readiness that this represents.'

Professor Easton has maintained strong ties with the University, donating to rural scholarships and the library fund along with attending various events, including the Foundation Reunion held for early year graduates during the University's 50th anniversary in 2016.

Having given most of his life teaching mathematics to engineers, and making a difference through his active involvement in the Uniting Church and Probus, Professor Easton is now retired and keen to pass the torch to new graduates.

'I wish Sarah every success and hope that she enjoys the same opportunities I did to make a difference in the world and live her life's purpose,' says Professor Easton.

FLINDERS HAS 100,000 ALUMNI STORIES

Flinders University values each and every one of our graduates and is proud of their achievements. We recognise these achievements through regular alumni profiles that capture the essence of our graduates who are finding their place, making their mark and making a difference around the world.

flinders.edu.au/alumni-stories

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OUR SUSTAINABLE FUTURE



Many relate to the replacement of disposable plastics with biodegradable alternatives and the recycling of waste plastics into higher value re-usable objects. Increased recycling and composting facilities are highly popular along with improved water capture and re-use. Renewable energy and energy saving technologies are also high on our students' agenda, as is the expansion of our community garden facilities.

We are keen to hear from our alumni so please take a look at flinders.edu.au/campus/sustainability and share your ideas and experiences by emailing sustainability@flinders.edu.au. By early next year we will have assessed the feedback and come up with an action plan for our sustainable future.

But we're not twiddling our thumbs, and I would like Flinders University to aspire to become the first carbon negative university.

Our current power consumption is substantial, as you might expect for a campus community the size of a suburb. So, we're implementing energy saving technologies and turning to renewable energy generation to power our campus.

We've recently completed construction of one of the largest solar arrays in Adelaide, with 6,000 panels capable of generating nearly 20% of our electricity needs. More than 4,000 of these panels form a massive solar carport above Car Park 3 (or 'Siberia' as it is affectionately known). It provides shade for parked vehicles but, more importantly, charging points to encourage plug-in vehicle use. It will also power the autonomous electric shuttles currently driving around Tonsley as part of Flinders research, and soon to be ferrying students around campus from the new Flinders train station, due for completion in 2019. It also makes sound economic sense, with the investment expected to pay for itself within seven years. Further renewable energy generation projects are being planned.

We teach and undertake myriad research in everything from nanotechnology that is informing better solar panels, to water management and ecological sustainability. Shouldn't our campus itself be not just a place for research, but for action? In demonstrating some of these more progressive ideas, our campus can become a place where we live and breathe and create a living laboratory for new technologies, sustainable activities and new behaviours.

Professor Colin J Stirling
President and Vice-Chancellor, Flinders University

We all know that the world around us is changing in many ways. From the threats of climate change and the rapid rise of disruptive new technologies, to the impact of increasingly polarised political debate fomented by 'post-truth' advocacy.

These are challenging times and it is essential that our universities rise to these challenges. We are ready to do so here at Flinders University where we are committed to the education of global citizens, with the skills required for success in the future world of work and, perhaps most importantly, the ability to critically evaluate information to distinguish fact from fiction.

I will update you on some of these activities in the future but will concentrate here on our approach to a sustainable future.

Gandhi once said, 'Be the change you wish to see in the world'. It's a call to action and a challenge to turn vision into reality in order to make a positive difference.

Your University has embarked on an ambitious initiative to be a more environmentally sustainable place to live, work and socialise.

We've developed a draft sustainability plan and asked our community for their feedback and ideas. Our sustainability webpage and social posts have received more than 19,000 impressions, and our students and staff have provided their thoughts and suggestions by email or on 'scribble-boards' across our campuses.

A rich pool of ideas has already been received across nine key themes: Buildings and Landscape, Education, Energy and Emissions, Food, Research, Resource Recovery, Social and Community, Transport, and Water.



MESSAGE FROM THE EXECUTIVE DIRECTOR

Welcome to *Encounter*, the annual magazine for our alumni and friends of Flinders University that celebrates your achievements and puts a spotlight on some of the exciting activities and cutting-edge research being undertaken at your University.

We've been busier than ever in the past year, and this edition gives an insight into the depth and breadth of our research

activity, from life-changing research such as cancer testing kits and international fossil finds, to developing flexible solar cells that may soon be available at your local hardware store. This is but a mere glimpse of our current research!

One of the privileges of my role includes the opportunity to meet many of our dedicated staff, explore our research, interact with the community, and absorb the essence of our University.

A personal highlight of the past year was seeing first-hand the impact of the work our incredible people undertake to support the health and wellbeing of others in the community, particularly within Indigenous communities in the Northern Territory. The depth of passion and commitment of our people in regional and remote locations is inspiring, and speaks strongly of our vision to make a difference. Read more about this in Dr Belinda Washington's story.

In April this year we celebrated Flinders' 100,000th graduate – an amazing milestone in the University's history.

The focus that this milestone brought to our alumni network prompted much feedback.

You've made it clear that you want your University to proactively engage with you and provide tangible benefits

such as professional development and networking opportunities. As a result, over the next 12 months we will be expanding our Alumni and Advancement team, and establishing an active alumni program.

Early in 2019 our alumni team will reach out to invite your thoughts on how you'd like to hear from us and what you are interested in hearing about, as well as the benefits, events and professional development activity you would find beneficial. Please send any suggestions you have to me or our Alumni Relations Manager Kim Pryor via: alumni@flinders.edu.au

To stay up to date on alumni news, activities and professional development be sure to keep an eye on your inbox for your alumni monthly e-newsletter.

Finally, we love to celebrate the achievements of our alumni so please ensure you connect with us and tell us about the journey your degree has taken you on.

I look forward to connecting with you over the coming year.

Callista Thillou

Callista Thillou
Executive Director
Alumni & Advancement

EVERYBODY'S ROLE MODEL

A remarkable graduate of the Flinders University NT medical program

Every Thursday, Belinda Washington (MD '17) would cry when she removed the bandages from elderly Aboriginal women who had undergone cataract surgery in Alice Springs.

One day, the ophthalmologist she was working with could bear it no longer and said, 'Belinda, these operations have been successful each time, why are you crying?'

She explained the tears were an outpouring of emotion, as she recognised the enormous impact of the operation on the patient's life.

'I said, "You don't understand. This lady is like my grandmother or my aunty. She's been clinically blind for 15 years and this operation has given her life back, it's given her back her independence. She's now able to keep an eye on her grandchildren whereas before she couldn't do that"', says Dr Washington with a quiet smile.

Dr Washington is a remarkable graduate of the Flinders University Northern Territory Medical Program who is making a profound difference to the lives of seriously ill patients in Australia's Top End.

'Studying was definitely a challenge,' she says. 'I was prepared for hard work, I was prepared to learn about the text book science. I guess what I hadn't prepared for is how much you learn about yourself, how much you learn about the people around you and what makes you resilient.'

It's an impressive result for a girl who had to put school as a distant second to help raise her siblings when her mother became ill.

'When I was young my mum was diagnosed with breast cancer,' says Dr Washington. 'She didn't have access to the surgery needed or the treatment required after the surgery so was away from home for about 18 months in total, which had a big impact on me.'

Dr Washington also lost her eldest brother, quite suddenly at 22, and she realised that, because they were remote, he didn't have access to the health services he needed at the time.

'It became a growing need for me to want to care for others – knowing the limitations of being remote and needing specialised health care.'

Dr Washington is proud of her achievements: 'I grew up feeling there were always limitations on what I wanted to achieve but seeing my children grow and them watching me study medicine, I feel I am a role model for my children.'



Graduate of the NT medical program, Dr Belinda Washington.

BECAUSE OF HER, WE CAN

This article is an extract from the *Because of her, we can* publication by Flinders University. Inspired by this year's NAIDOC Week theme, the publication celebrates the strength, knowledge and wisdom of Indigenous women from Flinders University.

flinders.edu.au/naidoc

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CATCHING CANCER

BEFORE IT TAKES HOLD



Associate Professor Michael Michael at the Flinders Centre for Innovation in Cancer.

An innocuous package arrives in the post, the contents of which are potentially life-saving.

Inside is a kit that allows any Medicare registrant between the ages of 50 and 74 to take part in the National Bowel Cancer Screening Program, and it's having a major impact on how Australians are fighting the disease.

The screening program was designed with assistance from researchers at Flinders University. It's part of an entire network of advances in cancer screening and prevention that the Flinders Centre for Innovation in Cancer (FCIC) and Flinders Medical Centre (FMC) have facilitated in recent years.

'Preventive medicine has always been a major focus at Flinders, historically because of the work of Professor Graeme Young, who helped drive the establishment of the Bowel Cancer Screening Program,' says Associate Professor Michael Michael from the FCIC.

'The main treatment we currently have against cancer is still surgery, which means we need to reach cancer before it spreads.'

Bowel (or colorectal) cancer is the second most common cause of cancer death in Australia, but, if found early, 90% of cases can be treated successfully.

Bowel (or colorectal) cancer is the second most common cause of cancer death in Australia, but, if found early, 90% of cases can be treated successfully.

And yet, only about 40% of those who receive the screening kit actually use it.

'Despite not everyone participating in the screening program, it's still well worth the effort,' says Associate Professor Michael, 'because bowel cancer can be detected significantly earlier in people who are actively screening for it.'

In fact, Australia's program has been so successful that the UK has recently followed suit.

The team at Flinders is now working hard to increase screening rates for bowel cancer in the general population, including those who have a family history of the disease, or who have been treated for cancer in the past.

Already, in collaboration with the CSIRO and biotech company Clinical Genomics, Flinders researchers have developed a blood test to track the recurrence of colorectal cancer. The test is based on the detection of specific molecules in the blood, called biomarkers, which are indicative of colorectal cancer.

Known as Colvera, the blood test was released in the US in late 2016, and won the Australian Museum's 2017 Johnson & Johnson Eureka Prize for Innovation in Medical Research.

'Our development of the new diagnostic blood test will be a step forward in improving screening rates of the general public,' says FMC senior research scientist Dr Erin Symonds. 'The blood test will provide an alternative to the current test, which involves looking for traces of blood in a stool sample.'



Dr Erin Symonds with a bowel cancer screening test.

A similar strategy could also be applied to other types of cancers, including a particularly nasty one that occurs at the other end of the digestive system, in the oesophagus. The head of surgery at Flinders University, Professor David Watson (PhD(Med) '15), has helped to establish a national research network, PROBE-Net, which is addressing the precursor condition to this cancer, called Barrett's oesophagus.

Professor Watson is working with colleagues at Flinders, including Dr Damian Hussey and Associate Professor Michael, to identify genetic molecules known as microRNAs as potential biomarkers for this condition. Work has also commenced to find biomarkers of oesophageal cancer in breath samples.

But why stop at the digestive system?

Dr Symonds and her colleagues are now gathering samples of prostate and breast cancers to look at the possibility of developing blood tests for each. There has also been preliminary work done on testing urine for molecules associated with kidney and bladder cancer. Even saliva is being considered.

Since 2016, a new laboratory at the FCIC, called Cell Screen SA, has provided facilities to grow tumour cells from patient biopsies into clumps known as organoids. These organoids can be used to track the behaviour of a tumour on an individual basis, and study the effectiveness of different treatments.

In the future, it's hoped that we'll be spending less time treating cancer, because we're preventing it where we can, and treating it more effectively when we can't.

Watch this space.

AT THE HEART OF CANCER RESEARCH

Flinders Centre for Innovation in Cancer (FCIC) is a joint venture between Flinders University, the Flinders Medical Centre, and the Flinders Foundation. In the coming decades, advances in our understanding of cancer will revolutionise how we prevent it and treat it in its early stages. FCIC will be at the heart of this global research.

BRIGHT IDEAS
LIGHTEN
ENERGY BILLS

As the cost of power goes north, an Adelaide business is quietly switching on new devices to help cut costs.

When it comes to cheaper and better home or office lighting – and adding to city skylines with quality high-rise accommodation – Flinders University Commerce graduate Nicho Teng's (BCom '11) face literally 'lights up'.

His unstoppable drive to cut lighting bills by half via new LED efficiencies and electrical fittings has seen Mr Teng build multimillion-dollar national supply company, Haneco.

The rise of Haneco in tandem with his other company, national property developer Greaton, is linked to a deep-seated belief in the power of technology to make life easier for regular families.

He is even taking the fight for energy efficiencies right up to Canberra. As director of the Lighting Council Australia, Mr Teng is battling Australian Government agencies over 'false savings' on tougher regulations on wattage per square metre requirements.

'I LOVE WHAT I DO, IT'S MY LIFE, AND I WANT TO KEEP BRINGING NEW TECHNOLOGY AND PRODUCTS ONTO THE MARKET AT AFFORDABLE PRICES'

'I love what I do, it's my life, and I want to keep bringing new technology and products onto the market at affordable prices,' the 31-year-old says from the Adelaide head office of national lighting fixture group Haneco.

'It all began with the pure intention of promoting energy savings, and I was lucky enough to establish a good business model right here in Adelaide.'

While studying at Flinders in 2009, Mr Teng started working for his friend, a residential property developer, and soon took an interest in the options for lighting, identifying a market demand for emerging light-emitting diode (LED) products.

'I took to the market like a missionary to educate potential customers of the cost-savings of LED products,' says Mr Teng. 'With just three people at the beginning, I have done every job from sales and marketing, to finance, HR, product delivery and customer service. Knowing the company operations from the ground up put me in good stead to keep a tight rein on operations now,' he says.

Haneco is now one of the largest lighting suppliers of hundreds of staple electrical products in Australia, and Greaton is hitting the headlines with major developments across the country – from a proposed five-star hotel at the GPO in Adelaide's CBD, to a spectacular showpiece hotel being planned for prime Darling Harbour views in Sydney.

Annual turnover at Haneco is around \$50 million while the property business Greaton is four-times more – even though triple-figure growth has 'slowed' to double digits.



Commerce graduate Nicho Teng.

Photo credit: Tom Roschi

Born into an entrepreneurial business family in the southeast Chinese province of Fujian, Mr Teng seemed to have a clear vision of his future from a very young age – well before he arrived at Flinders University.

'I told my family I'd like to go to Australia to study in high school and they agreed,' he says. 'I always planned to go back to China but after seven or eight years living in Adelaide, I decided I wanted to stay here to build a business.'

His family's commercial enterprise, including real estate and property development, has helped him on his successful path, but he also credits his success with a solid education in business tax, commerce and accounting at Flinders, and help from mentors and friends along the way.

Now Mr Teng is as content working next to electrical engineers in the research and development division, as he is travelling the world to expand his overseas operations.

He also keeps grounded through his commitment to 'giving back', with donations to Cancer Council SA and medical research, and as a keen corporate sponsor of the Port Adelaide Football Club.

IDEAS THAT CHANGE LIVES

Bridging
the gap
between
research
and
industry

Professor
Karen Reynolds,
Director of the
Medical Device
Partnering
Program.



In the age of the internet, where everyone has a platform to broadcast new solutions to global problems, it can be tempting to think we're all just one good idea away from changing the world.

But, as the saying goes, 'Ideas are cheap; execution is everything.'

Nowhere is this more relevant than in the medical technologies space, where you need both business acumen and clinical experience to bring something to market – and that's where a lot of ideas tend to fall down.

'Med-tech companies are very often small companies, and don't necessarily have all the expertise they need in terms of clinical knowledge, manufacturing, and commercialisation, or access to the right facilities to support product development,' says Professor Karen Reynolds (GradCertTertEd '98), Dean of Research at the College of Science and Engineering and Director of the Medical Device Research Institute at Flinders University.

An internationally renowned expert in biomedical engineering, Professor Reynolds has also been the Director of the Medical Device Partnering Program (MDPP) since it launched in 2008.

'The MDPP is effectively an ideas incubator, giving people access to the best research expertise available to support medical device and assistive technology products or ideas, and helping to bring them to market,' she says.

Projects receive up to 280 hours of professional expertise, including commercial advice, proof-of-concept research, prototyping, and clinical evaluation.

'It could mean taking the device to a group of clinicians to run preliminary trials in a hospital setting, or putting it straight into the hands of prospective end-users to get their feedback.'

Products under development range from simple, low-tech solutions to everyday problems, to highly sophisticated implantable electronics or devices.

A recent MDPP project, Maxm Skate, aims to empower patients to take control of their own rehabilitation progress.

The brainchild of orthopaedic surgeon and Flinders University alumnus Dr Matthew Liptak (BMBS '96), the skate-like device straps to a patient's foot, and sensors developed by the MDPP wirelessly transmit the user's movements to a smartphone app, so they and their health professionals can visualise live data and track progress.

Having spent ten years perfecting the Medical Device Partnering Program in South Australia, Professor Reynolds is now expanding the program nationally.

'It's all about bridging the gap between research and industry,' says Professor Reynolds.

'IT'S ALL ABOUT BRIDGING THE GAP BETWEEN RESEARCH AND INDUSTRY'

Another big focus for the award-winning engineer is creating smart homes of the future.

She's been contracted by the State Government to investigate how the design of homes for older people or people with disabilities can help maintain their independence.

This can mean building new, technology-enabled houses from the ground up, or retrofitting existing homes to automate regular activities such as opening doors, making phone calls, or transmitting vitals to healthcare workers in real-time.

'We're trying to get the best outcomes for the people who are going to be living in these places,' says Professor Reynolds.

Building technological solutions to change lives and improve outcomes in health care across Australia is a lofty ambition, but Professor Reynolds says the personal side of her work is what really inspires her.

'I've spent quite a bit of time working alongside patients in the work that I do. You get to meet your end-users and clients, and that's really meaningful,' she says. 'You can see the outcomes of what you're doing, and it really makes you realise why you're doing it.'

CAREER HIGHLIGHTS

- Australian Professional Engineer of the Year, 2010
- Australian Learning and Teaching Council Citation, 2011
- Fellow of the Australian Academy of Technological Sciences & Engineering, 2011
- South Australian Scientist of the Year, 2012
- Named in Top 100 Most Influential Engineers in Australia, 2012, 2013 & 2015
- Fellow of the Australian Academy of Health & Medical Sciences, 2014
- Medical Technology Association of Australia Outstanding Achievement Award, 2014
- Women in Innovation Award (Engineering), 2016
- David Dewhurst Award, Engineers Australia, for contributions to Biomedical Engineering, 2016

CURRENT ROLES

- Dean of Research, Flinders University College of Science and Engineering
- Director, Medical Device Research Institute, Flinders University
- Director, Medical Device Partnering Program
- Director, Academy of Technological Sciences & Engineering Board
- Chair, Health and Technology Forum, Academy of Technological Sciences & Engineering
- Member, Advisory Committee on Medical Devices, Therapeutic Goods Administration
- Member, Australian Medical Research Advisory Board

GETTING DOWN TO BUSINESS

CREATIVE ARTS DEGREES CROSS NEW FRONTIERS AT FLINDERS UNIVERSITY

ARTS

Bachelor of Creative Arts (Visual Effects and Entertainment Design) student Anthony Robinson.

Photo credit: Richard Lyons Photography

'Creativity' and 'innovation' have become buzzwords in workplaces looking to build an adaptable workforce. Accordingly, Flinders University is now giving its creative arts students a valuable dose of business skills to develop adaptability and broaden their career options.

From 2019, the new Bachelor of Creative Arts (Enterprise) will formally introduce the practical subjects of business and entrepreneurship. Vital skills such as accounting, marketing, sole trading requirements and business planning for a creative enterprise will give graduates a head start in their creative careers.

Vice-President and Executive Dean of the College of Humanities, Arts and Social Sciences Professor Vanessa Lemm says the new degree builds on the strong creative arts tradition at Flinders.

Over the past 50 years, Flinders University has produced some of Australia's leaders in creative writing, digital media, film and theatre-making, acting and directing.

'WHEN CREATIVE MINDS MIX WITH BUSINESS SKILLS, ANYTHING IS POSSIBLE'

'When creative minds mix with business skills, anything is possible,' says Professor Lemm. 'In a competitive world, where rapid technology changes are putting business success and artistic enterprise under constant pressure, we know these skills will help our graduates.'

Along with the integration of business in creative arts, Flinders is also relaunching the Bachelor of Professional Writing and Communication as a Bachelor of Media and Communication.

'We've completely overhauled the degree to better prepare students for the world they'll enter,' Professor Lemm says.

The degree will teach traditional skills of researching and writing for different audiences alongside creating graphics and images, and how to publish and maintain a consistent voice on various media platforms, including blogging and social media.

In keeping with industry trends, Flinders' popular Bachelor of Creative Arts (Digital Media) will be rebadged as a Bachelor of Creative Arts (Visual Effects and Entertainment Design), preparing students for the booming jobs market in gaming, film, animation (2D or 3D), virtual reality, production and illustration.

'Offered in partnership with CDW Studios in Adelaide, the degree is very good,' says course coordinator Katie Cavanagh (BA(Hons) '05). 'The name change helps to clarify both for the students and for prospective employers what the students have studied.'

Flinders has trained some of the world's top-ranked digital illustrators and visual effects artists as recognised in the global Rookies competition – the highest honour for creative media and entertainment students across the globe, which has ranked the Flinders/CDW illustration school as the best in the world for the last two years running.

In a rapidly evolving and expanding field of employment around the world, Ms Cavanagh is proud to see her graduates snapped up by companies such as Google, Twitter, Double Negative, Ready At Dawn, Pixel and Method Studios.

Flinders creative arts students have also been hired locally at Rising Sun Pictures, Animal Logic, Iloura, Mighty Kingdom and Monkeystack.

Anthony Robinson, a third-year student, says the demands of the degree are fulfilling his creative passion for 2D illustration and character and concept design.

'The coursework really prepares you for the demands of industry,' the 26-year-old former apprentice electrician says.

'I am getting a lot of creative satisfaction working with the professionals at CDW and at Flinders,' says Anthony. 'Over this year and in 2019 for Honours, I am making a game to pitch to studios with the intention of starting my own studio in the future.'

From filmmaking to the small screen, Flinders is moving with the times to give creative arts graduates new firepower in 2019.

NEW CREATIVE ARTS DEGREES AT FLINDERS

- Bachelor of Creative Arts (Enterprise)
- Bachelor of Creative Arts (Visual Effects and Entertainment Design)
- Bachelor of Media and Communication

Current Flinders University creative arts students can add an extra innovation, entrepreneur or enterprise topic per semester to their degree through the Bachelor of Letters.

flinders.edu.au/creative-arts



FLINDERS UNIVERSITY STUDENTS LEAD THE FIGHT AGAINST SEXUAL HARASSMENT

'We need to do something different if we're to cut through with students.'

This simple remark by Flinders University Deputy Vice-Chancellor (Students) Professor Clare Pollock was the catalyst for a remarkable campaign by students, for students, to raise awareness of sexual consent and help combat sexual harassment and sexual assault.

Australian universities collectively are addressing campus safety, including the commissioning of the Australian Human Rights Commission to survey students about their experiences of sexual harassment and assault at university and in the community. The findings were presented last year in the Change the Course report.

In addition to accepting and actioning all the report's recommendations, Flinders took a deliberately student-centric approach by empowering the Flinders University Student Association (FUSA) to tackle the challenge at the grassroots.

The result is the *Be a Better Human* campaign.

'It sounds simple – and it is. There is no excuse, ever, for harassing or harmful behaviour,' says FUSA President Ashley Sutherland (BA '18).

The information toolkit is based on the principles of consent, respect and empathy. It encourages students to own their behaviour, understand affirmative consent, and to stand up against bullying, harassment and assault.

'One in five women are victims of sexual violence in their lifetime – but five in five people can do something about it,' says Ashley.

Posters, videos and social media posts have spread the word to students using the channels and language they're familiar with. Other creative approaches included coasters in the University's student bar, The Tavern, badges, t-shirts and even a line of undies. Their design was a direct counterpoint to the widespread sexualisation of clothing, with proceeds going to the not-for-profit Victim Support Service.

'I admit the idea of slogan-embazoned underwear was initially challenging – it's not how universities typically communicate these things – but that's the point. What's important is what will have impact for students,' says Professor Pollock.

FUSA has waived copyright over *Be a Better Human* campaign materials to ensure they are freely available to student associations across Australia and internationally – already 11 universities have downloaded the materials with interest in Europe and the US.

It's hoped that the campaign will continue to filter out beyond campuses to society more broadly, fostering healthier relationships and safer communities.

JOIN THE FIGHT

Be a Better Human is about self-improvement for everyone through the shared principles of consent, respect and empathy. If you're interested in being a better human too, join the discussion online with #BeABetterHuman or download the toolkit.

fusa.edu.au/babh

THE DNA

OF EATING DISORDERS

A researcher's hope for a future without eating disorders



Matthew Flinders Distinguished Professor Tracey Wade.

Twelve-year-old Elizabeth has anorexia nervosa. If you think that's young, her parents had been worried about her weight for four years before they bypassed their family GP ('It's probably just a phase,' she suggested) and saw a specialist – someone like Professor Tracey Wade.

Professor Tracey Wade (BSc(Hons) '86, PhD(SS) '98) is a Matthew Flinders Distinguished Professor in the College of Education, Psychology and Social Work at Flinders University. She is an internationally renowned expert in eating disorders.

Professor Wade is shaping Australia's mental health research agenda with her role on the Expert Advisory Panel of Million Minds Mission, providing \$125 million to worthy projects over 10 years through the Medical Research Future Fund.

She has dedicated her career to those with eating disorders,

including anorexia nervosa and bulimia nervosa.

These disorders are the third most common chronic illness in young women. Fifteen percent of Australian teenage girls will be diagnosed with an eating disorder before they turn 19.

Elizabeth and others like her will experience any number of symptoms: weight loss, fatigue, dizziness or fainting, constipation, dry skin, dehydration, absence of menstruation, low blood pressure, irregular heart rhythms, and seizures. Devastatingly, people with an eating disorder also have a mortality rate 12 times higher than people without an eating disorder. The struggle can be lifelong if not life-ending.

Professor Wade questions, 'If we knew which young people are likely to develop an eating disorder, could we prevent it?' and is looking for answers in the genes of young people.

She is forming a picture of eating disorders as a genetic predisposition triggered by factors like weight-related bullying, stressful life changes, and traumatic events.

Her traditional research, including creating a genetic test for the risk of developing an eating disorder, sits alongside her development of preventative, evidence-based community programs, and consulting with government and organisations that could make a difference.

One of Professor Wade's biggest projects and proudest achievements is the Media Smart program, targeted at late primary school to early high school-aged children.

The program addresses everything from airbrushing in Instagram posts, to how we analyse media messages, to tips for handling peer pressure, and boosting confidence without needing hundreds of 'likes'.

Developed in 2003 with Dr Simon Wilksch (BPsych(Hons) '03, PhD(ClinPsych) '07), the program has been adopted by 42 schools across Australia and Asia, and is a promising approach to eating disorder prevention in primary and secondary education.

With a program like this, Professor Wade hopes to keep that genetic switch turned off.

Professor Wade is also consulting with government. She has been the driving force behind the federally-funded National Eating Disorders Collaboration and in 2014 helped to establish the Statewide Eating Disorder Services (SEDS) in South Australia.

'Before SEDS was established, people were falling through the cracks. There was no central point of referral and not enough services, or variety of services, to meet the needs of people at different parts of the eating disorder journey,' she explains.

In partnership with Flinders University, SEDS uses the latest research to offer treatments that work for South Australians – including people living in remote and rural areas who may not otherwise have access to specialist care.

Elizabeth and her parents endured years of uncertainty, worry and escalating symptoms before they found the support and treatment needed for Elizabeth to recover from her eating disorder. Children and teenagers like Elizabeth have better chances of recovery when appropriate treatment is provided as early as possible.

With an organisation like SEDS, the process will be quicker and easier for families in the same scenario. Better yet, with a program like Media Smart or a genetic test, Elizabeth's eating disorder might have been prevented or treated in its earliest stages.

'I hope for a future where all young people can live a life free of eating disorders and embrace all the possibilities that life has to offer'

'I hope for a future where all young people can live a life free of eating disorders and embrace the possibilities that life has to offer,' says Professor Wade.

Professor Wade has worked for years seeing the damage that eating disorders do, but it is observing the courage and life-transforming recoveries of people with eating disorders that inspires her to keep going.

TREATMENT FOR EATING DISORDERS

Flinders University offers a 10-session cognitive behavioural treatment to improve symptoms of disordered eating such as binge eating, purging, fasting, and preoccupation with weight and shape. The Service for Eating Disorders is offered to the general public to provide valuable opportunities for our students to gain real-life professional experience and support research at Flinders.

flinders.edu.au/engage/community/clinics

THERE'S A PROBLEM WITH OUR WATER

Our water is precious, so why aren't we paying more attention to its conservation and management?

Professor Craig T Simmons FTSE (PhD(SE) '97)
explains the urgency to secure the Earth's
most overlooked resource

As hard as it might be to imagine, you can live without your mobile phone, without wifi, without electricity, even. You can survive for days without food. But you'll die without water.

While water makes life on Earth possible and we rely on it completely, we give little thought to where it comes from. We turn on the tap and it comes out. Simple? Well – yes and no.

Australia is heading into its second drought in as many decades. On the evening news we are confronted with withered crops, starving stock and devastated farmers.

A quick look around the world today demonstrates water supply and demand problems are common and growing.

In 2019 the city of Cape Town, South Africa, is predicted to reach Day Zero: the day on which the city's dams would be completely dry. On this day the people of Cape Town will be forced to receive water rations – less than 25 litres per person, per day, for all their washing, drinking and cooking needs.

Cape Town is not alone. A number of other cities around the world are staring down the barrel at Day Zero.

With the situation as dire as a Day Zero on the horizon, it really is time we started thinking about water, understanding its importance and planning for a future where there's enough for everybody. We need to develop a holistic approach to water supply and conservation.

Firstly we need to understand the sources of our water – including both groundwater and surface water – to interrogate all of its uses and project our national needs as we formulate a plan for our future.

Groundwater is often 'out of sight, out of mind' yet 30% of water in Australia comes from the ground beneath our feet. Some 97% of the fresh water on Earth lies underground, and it supplies half of the world's drinking water and 43% of the water used for growing food.

Groundwater is often 'out of sight, out of mind' yet 30% of water in Australia comes from the ground beneath our feet. Some 97% of the fresh water on Earth lies underground, and it supplies half of the world's drinking water and 43% of the water used for growing food.

This is water that has seeped through the earth and been stored in vast underground geologic structures called aquifers. These are not underground lakes and streams, but a layer of rock that allows water to move through it very slowly. Groundwater can be very old – tens of thousands or even millions of years old.

Groundwater is vital for farming, industry and mining and supports \$34 billion of Australia's economic activity each year. But issues related to groundwater dominate the news: fracking and coal seam gas production, mining, nuclear waste storage, and contamination from fire fighting chemicals such as PFAS.

Based on data from NASA satellites, 21 of Earth's 37 largest aquifers are being depleted, and 13 are considered significantly distressed, threatening regional water security and resilience.

And, perhaps more disturbingly, trends highlighted in recent reports suggest that the rate at which we're extracting this precious resource is increasing rapidly, leaving aquifers even more depleted.

We need to learn more about this precious groundwater resource and how to manage its use and replenishment. Replenishing groundwater resources is as important as its extraction, and yes, it can be done.

Rather than building vast surface dams, water can be pumped back into aquifers to replenish what farming and mining have removed. This is called managed aquifer recharge and it's a lot cheaper and more environmentally friendly than building a dam. It also stops metres of water evaporating back into the atmosphere each year. So why aren't we doing it?

There has been a significant reduction in public investment in both water research and management, which are now close to their lowest ebb in 30 years. There are a billion dollars worth of scientific boreholes and data collection facilities in dangerous states of decay across the country. How can we monitor water movement, use and contamination if we do not have the tools?

Australia is the driest inhabited continent in the world. Climate change and population growth are looming over our shoulders. As we confront the challenges of our current drought and droughts to come, there are opportunities to develop new solutions for Australia and the world, but water research, development and innovation must be supported.

The good news is that the National Centre for Groundwater Research and Training, based at Flinders University, has made significant progress in groundwater science, education, management, and policy reform. It is one of the reasons Flinders was recently ranked 12th in the world in the 2018 Academic Ranking of World Universities 'water resources' category.

But we all use water so we're all in this together; we cannot sit back and hope for the best. Now is the time to start asking more questions of our councils, of our governments and of ourselves.

We need a National Water Plan.

Professor Craig T Simmons FTSE

A Fellow of the Australian Academy of Technology and Engineering, Director of the National Centre for Groundwater Research and Training, a Matthew Flinders Distinguished Professor of Hydrogeology, and holds the Schultz Chair in the Environment at Flinders University. He was named 2015 South Australian Scientist of the Year and 2017 Australian Water Professional of the Year. Professor Simmons is a 2017 Flinders University Convocation Medallist.

groundwater.com.au

FIVE FOSSIL DISCOVERIES THAT STUNNED THE WORLD



Finding fossils, says internationally renowned palaeontologist Professor John Long, is an art form. And just like prospecting at the edge of a lake, the real skill is knowing how to put yourself in the prime position to strike gold.

As Australia's leading university for palaeontology, Flinders University has an incredible track record of discoveries that have made their mark on the international stage.

'We know what we're doing, we know how to find fossils,' says Professor Long, Strategic Professor in Palaeontology at Flinders, and member of the Flinders Palaeontology Group.

'You can spend five or six weeks out in the field, but eventually you hit paydirt and you find something spectacular.'

Here are five of the most iconic finds by Flinders palaeontologists.

Professor John Long on expedition in Antarctic
Photo credit: Professor John Long

1.



Close-up of an embryo inside a fossilised fish, with the umbilical cord still visible. Photo credit: Professor John Long

The 'mother fish'

This fossil represents the origin of sex as we know it – a 400-million-year-old fish carrying a perfectly preserved embryo.

Found in 2015 by Professor Long on Gogo Station in the Kimberley region of Western Australia, it made the Guinness World Records 2010 as the 'Oldest Live Birth'.

'It was remarkable, not only because it was the oldest

embryo and represented the origin of complex sexual reproduction, but it also had a mineralised umbilical cord still attached to the embryo,' says Professor Long.

The species was named *Materpiscis attenboroughi* after Sir David Attenborough, who later remarked, 'Now my name will always be associated with the origins of sex.'

The fossilised tooth of a 390-million-year-old Antarctic shark
Photo credit: Professor John Long



2. Sharks of Antarctica

Fossilised teeth and jaw bones pulled from rocks in Antarctica established it as the origin point of shark diversity on earth.

'These fossils represent a massive increase in size,' says Professor Long, estimating that these 390-million-year-old sharks would have been three metres long. 'The only known sharks that are older than these were really, really tiny.'

3.



An almost complete skeleton of *Genyornis*, the last surviving dromornithid.
Photo credit: Aaron Camens

Demon ducks

In 2014, the remains of the giant flightless bird, *Genyornis*, were found at Lake Callabonna in South Australia by Drs Trevor Worthy and Aaron Camens (BSc(Hons) '05). It belonged to a group called the *dromornithids*, which, standing 3 metres tall and weighing 650kg, were some of the largest birds ever to have lived on Earth.

'Trevor and Aaron have been pioneering new methods of fossil collection to make these discoveries,' says

Professor Long.

'These are very remote salt lakes and you can't take a normal four-wheel drive out there, so they've been hiring quad bikes to get to sites that no one else has ever been to.'

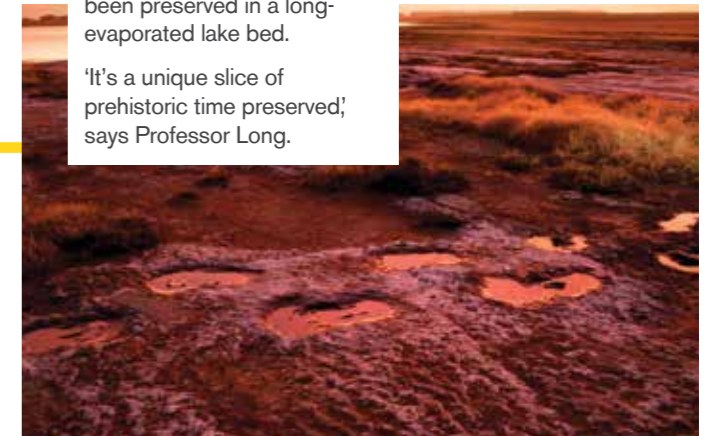
These giant birds weren't like emus or cassowaries – their closest living relatives are ducks and geese. No wonder they've been nicknamed the 'demon ducks'.

Footprints of Australia's extinct animals

Prehistoric animal tracks are extremely rare in Australia, but Dr Aaron Camens managed to find a site in western Victoria where an array of extinct animal footprints have been preserved in a long-evaporated lake bed.

'It's a unique slice of prehistoric time preserved,' says Professor Long.

The site also happens to include tracks left by the car-sized, wombat-like *Diprotodon*, Australia's largest ever marsupial, which weighed up to 2.8 tonnes.



4.

Footprints of the car-sized *Diprotodon*.
Photo credit: Amy Toensing

Professor John Long with the first ever complete marsupial lion skeleton. Photo credit: Clay Bryce/Western Australian Museum



Lions and tree kangaroos in the Nullarbor

It might be a barren landscape now, but hundreds of thousands of years ago the Nullarbor Plain in southern Australia would have been a very different place. In fact, it was once home to a bunch of tree-dwelling marsupials.

In the early 2000s, a team led by Professor Gavin Prideaux (BSc '91, BSc(Hons) '92, PhD(SE) '99) discovered skeletal remains of an extinct species of tree kangaroo –

5.

now known as *Bohra* – that had fallen into a cave.

Alongside the tree kangaroo were fossils from animals no one had ever seen before, as well as the first complete skeleton of a marsupial lion.

CELEBRATING 40 YEARS OF NURSING GRADUATES

In 2018 Flinders University celebrates 40 years of nursing graduates, recognising the contributions of staff and students over four decades of significant change in the sector. With a reputation for world-class research, teaching and partnerships, Flinders produces nursing graduates who are advancing health care around the globe.

DIANNE LONGSON: IMPACTING DEVELOPING COMMUNITIES THROUGH HEALTH

From India to Rwanda to Vietnam, Dianne Longson's (DipAppSc(Nurs) '82, MNg(Cwk) '08) remarkable nursing career has taken her across the world and fulfilled a lifelong dream to make a difference in developing communities.



Dianne Longson with nursing students in Vietnam.

After graduating from Flinders University in the early 1980s with a Diploma in Applied Science (Nursing), Ms Longson embraced training the next generation as a nursing teacher. She later completed a Master of Nursing at Flinders – before answering the call to Rwanda.

'I always had in me that seed of wanting to do something valuable in a different culture, and contribute something meaningful to the world,' she says.

That desire led to her working as a clinical nurse educator and team leader at the King Faisal Hospital, Kigali in Rwanda for nine years. It was at a critical time when the hospital was embarking on international accreditation, the first hospital in East Africa to do so.

'Accreditation was a long process – it took us nearly six years,' Ms Longson recalls. 'It meant installing best-practice equipment and processes across every aspect of the hospital.'

She says accreditation was valuable for better community health outcomes and to set an example to other East African hospitals, as well as providing health security for greater foreign investment.

Ms Longson's sought after nursing education skills were instrumental in another milestone in East African health – helping to establish its first cancer treatment ward at the Butaro Cancer Center of Excellence in Rwanda's northern highlands.

The groundbreaking centre heralded a new future for local cancer sufferers, who previously were destined for early, often imminent death.

The groundbreaking centre heralded a new future for local cancer sufferers, who previously were destined for early, often imminent death.

Ms Longson has also worked on projects in India and more recently in Vietnam, where she educated nurses in teaching and clinical supervision.

The skills, values and world view shaped by Ms Longson's education at Flinders have helped her seamlessly fit in with cultures around the world, assisting her to achieve her own dreams, while also impacting the lives of thousands of patients and student nurses.



Community nursing pioneer
Emeritus Professor Jeff Fuller.

EMERITUS PROFESSOR JEFF FULLER: A PIONEER IN COMMUNITY AND RURAL HEALTH

Forty years ago Jeff Fuller (DipAppSc(Nurs) '82, BNg '89, MSc(PHC) '94, PhD(Ng/Midwif) '02) was at a crossroad, having just returned from a stint of overseas travel and wondering 'where to now?'

Flinders University was also undergoing change – at the forefront of a reform in nursing training that would see it transition from a hospital-based apprenticeship to a tertiary model, equipping graduates with the theory and strategic focus to change the world of health care delivery, planning and policy.

Emeritus Professor Fuller made a decision to enrol in the Graduate Diploma in Applied Science (Nursing) at Flinders University, which was then the Sturt College of Advanced Education. At that time, Sturt was one of just a handful of tertiary institutions in Australia that had started to offer nursing.

'I wanted to study something that would lead to a job but also provide meaning,' he reflects.

I wanted to study something that would lead to a job but also provide meaning.'

As a pioneer of nursing as a profession, Professor Fuller had no way of knowing just where his studies at Flinders would take him.

His journey has since been a roller-coaster that has seen him complete a Masters and PhD at Flinders and win a Basil Hetzel

Award for Leadership in Public Health.

His career has covered academia, clinical practice and planning of service models in cross cultural health care and chronic disease management. At Flinders his work has involved the development of community nursing roles both in Australia and China where he is currently supervising three PhD candidates.

Forty years on, nursing at Flinders is still at the forefront, pioneering new interventions, digital applications and innovative teaching to drive better outcomes for some of the most challenging and prevalent issues in the community.

'It was nothing like this when I first studied at Flinders 40 years ago,' says Professor Fuller. 'The technology and the style of teaching has all changed.'

As a member of several health leadership boards and a sought after consultant on community health programs, Professor Fuller's major focus is now on rural health. He is also passionate about better support for the elderly and people with mental health issues.

Having 'basically retired' several years ago, yet continuing to contribute to community health through myriad leadership roles, there's little doubt Professor Fuller's career choice has delivered the meaning and sense of purpose he originally desired.

HELP GROW OUR ART

collection

'The eyes of each figure meticulously removed, are replaced by my own. In doing this I have stepped inside the portrait sitter, to ask "How did you divide up and classify your world?" and in doing so, I return a new gaze, unpacking the past to view an entirely different present,' says Dr Christian Thompson AO of his Museum of Others series.



THE FLINDERS UNIVERSITY ART MUSEUM IS A UNIQUE EDUCATIONAL RESOURCE

The Art Museum has the opportunity to purchase two important artworks by Dr Christian Thompson AO from his *Museum of Others* series. Help enrich the Art Museum's collection for current and future generations of students, researchers, staff – and for you – by making a donation to support the acquisition of these artworks.

Trailblazing artist Christian Thompson belongs to the Bidjara people of central South West Queensland. He is the first Indigenous Australian to complete a PhD (Fine Art) at the University of Oxford. Thompson's artworks are held in major international and national collections.

Photo captions:
Christian Thompson, Bidjara people, *Museum of Others (Othering the Anthropologist, Walter Baldwin Spencer)*, 2016, C-type photograph on metallic paper, 120 x 120 cm, © courtesy the artist and Michael Reid Sydney + Berlin, Flinders University Art Museum TAN 1830.002

Christian Thompson, Bidjara people, *Museum of Others (Othering the Explorer, James Cook)*, 2016, C-type photograph on metallic paper, 120 x 120 cm, © courtesy the artist and Michael Reid Sydney + Berlin, Flinders University Art Museum TAN 1830.001

Make a tax-deductible donation today

artmuseum.flinders.edu.au/donate



A TREASURE IN AUSTRALIA'S ART RESOURCES

Donations made in memoriam grow the Flinders University Art Museum collection

Art Museum donor
Ann-Maree O'Connor.

'The Flinders University Art Museum collection is a treasure in Australia's art resources,' says long-time supporter and donor Ann-Maree O'Connor.

Established at the same time as the University in 1966, the Art Museum's collection includes important works by non-Indigenous Australians, Aboriginal and Torres Strait Islanders, and Indigenous artists from around the world.

A former Flinders University staff member, Ann-Maree has been attending Flinders University exhibitions for nearly 30 years. She believes in the value of art as a research and teaching resource, and is passionate about developing the Art Museum's collection.

This year, Ann-Maree made two donations to the Art Museum's quest to purchase a pair of important artworks by internationally acclaimed photographer Dr Christian Thompson AO.

'The works by Christian Thompson are at the heart of why the Art Museum matters.'

'The works by Christian Thompson are at the heart of why the Art Museum matters. His works give a new dimension to portraiture, and as an Indigenous artist he is so right, and so thoroughly entitled, to question the roles that have been ascribed to James Cook and biologist and anthropologist, Walter Baldwin Spencer in colonial Australia.'

Ann-Maree's donations to the artwork acquisition were particularly special as they were made in memory of her late partner Peter Bailie, and her friend the late Gary Haigh.

'I heard about the Flinders Art Gallery and Museum through Peter, from his time working at Flinders from 1989 until 2000, when he passed away,' she says. 'Peter loved art and was an active supporter of the Art Museum. We used to go to exhibitions together.'

In remembering her friend Gary Haigh, Ann-Maree says 'Gary and his partner Robyn Barratt were strong supporters of the Flinders University Art Museum and went to many openings where we enjoyed catching up to talk about the art on display.'

At the time of the Flinders University City Gallery's final exhibition *HEAD-TO-HEAD: Shifting perspectives in Australian portraiture*, Mr Haigh was very ill and wasn't able to attend. Sadly, he passed away in June this year.

'Gary was a keen and talented photographer. The works, particularly in relation to the innovative use of the medium of photography, were very appropriate as a way of remembering him.'

Ann-Maree encourages others to support the development of the collection. 'It's important that it continues to grow, that it's a living Art Museum, and that it retains its place as a serious and important art resource in Australia.'

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And also to our many anonymous donors

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YOUR GUT: THE HOTTEST ORGAN IN SCIENCE

Flinders University researchers are advancing our understanding of the body's 'second brain'

Under the leadership of Professor Nick Spencer, researchers at Flinders University are exploring the curious behaviour of our gut's elaborate nervous system to discover how it controls gut function, how it senses pain, and how it interacts with colonies of microscopic life to influence our well-being and behaviour.

'For many years, the gut didn't attract much scientific interest,' says Professor Spencer, from the Visceral Neurophysiology Laboratory at Flinders College of Medicine and Public Health. 'Now, our intestines are one of the hottest organs in science.'

In recent years, our knowledge of the gut's microbiome – bacteria that reside in our gut – has increased rapidly, as has our understanding of how the gut affects our overall health.

In recent years, our knowledge of the gut's microbiome – bacteria that reside in our gut – has increased rapidly, as has our understanding of how the gut affects our overall health.

And now, scientists like Professor Spencer are gaining remarkable new insights regarding the gut's unique neural circuitry, including the fact that the gut is the only internal organ with its own independent nervous system, called the enteric nervous system. So, although the gut is connected to, and influenced by, major nerves from the spine and the brain, it can function just fine by itself.

'It's a bit like a car engine running idle,' Professor Spencer explains. 'The engine can run without the car physically moving anywhere. While the accelerator and brake can speed up and slow down the car, you don't actually need to use either of those for the engine to run.'

If primary control isn't coming from the brain, then how do the hundreds of thousands of neurons in the gut work together to control muscle contractions?

A new technique called optogenetics has revolutionised our ability to address such questions, so that we can understand how a healthy gut works in order to develop effective treatments for diseases of the gut.

Optogenetics involves taking a light-sensitive gene from algae and incorporating it into certain types of cells, such as neurons.

When these newly light-sensitive neurons are illuminated with pulses of blue light, they can be turned on or off, making it much easier for scientists to figure out their specific function.

Professor Spencer and senior collaborator, Dr Hongzhen Hu from Washington University in the US, were the first to use this approach to show that pulses of light, instead of drugs, can be used to control the muscle contractions and movement in freely moving, conscious mice.

They also revealed that around 30,000 nerve cells in the gut must fire simultaneously in order to produce coordinated muscle contraction. Knowing this will help them determine what's going wrong when muscle contractions aren't working properly.

'That was a major new finding for us,' says Professor Spencer, whose study was recently published in the prestigious journal, *Gastroenterology*.

The Flinders team is now using a similar approach to investigate gut pain.

Recently, they were able to identify the specific nerve endings that detect pain in the gut – the first time that such nerve endings had ever been unequivocally characterised in full, in any organ of any species.

This now clears the way for them to investigate a whole host of questions about how these nerve endings function, and whether it's possible to silence pain signals using optogenetics, thus reducing our reliance on medications.

With these advances in our understanding of the 'second brain', Professor Spencer is also keen to discover how it interacts with the gut microbiome.

'Despite increasing evidence that microbiota in the gut can affect the function of our brain and central nervous system, no one knows exactly which nerves are involved, or what the nature of that interaction is,' he says.

It's likely that, while the nerves of the spine and the brain may not be mandatory for the gut to function, they might act as a conduit for the gut to send signals to the rest of the body.

The next step is to figure out how microbiome signals are hitching a ride.

Having demonstrated that optogenetics is effective in revealing the inner workings of the body's 'second brain', Professor Spencer and his team are well-placed to find out.

SOLAR

AT THE MOLECULAR LEVEL

From little things, solar energy flows



Professor Mats Andersson with flexible, semi-conducting polymer used to make solar cells.

From finding new sources of energy to building the next generation of solar power stations, scientists are working at the molecular level to advance our solar future – one which will be far less dependent on fossil fuels.

The team at the Flinders University Institute for Nanoscale Science and Technology is at the forefront of this research, developing polymers and processes to make solar cells, self-cleaning mirrors, and catalysts to split water.

'There is no single solar energy solution, but rather multiple ways of approaching things, depending on scale, location and geography,' says the Institute's Director, Professor David Lewis.

The Institute has around 30 researchers working on solar energy projects, from fourth year honours students to professors.

One such professor is Mats Andersson, a world leader on solar cells. He's been developing new semi-conducting polymer materials for use in solar cells, which are much more flexible than silicon.

Although these materials are less efficient at generating electricity than their silicon counterparts, they have other advantages, particularly for large-scale use.

'POLYMERS ARE COST-EFFECTIVE, CHEAP, EASY TO MAKE, QUITE STABLE, AND WE CAN PRODUCE THEM IN DIFFERENT COLOURS TO INTEGRATE WITH BUILDINGS.'

'The polymers are cost-effective,' says Professor Mats Andersson. 'They are cheap, easy to make, quite stable, and we can produce them in different colours to integrate with buildings.'

They can even be printed using existing technology. Square metres of the material are already being tested on bus shelters in San Francisco and schools in France.

'We've developed new techniques to control processing and determine the nanostructure,' Professor Lewis explains, 'so we can produce material with the best properties for the job at hand.'

'I can see the day when you'll be able to go to a place like Bunnings and buy a roll

of solar cells, screw it down on your roof, and plug it in,' says Professor Lewis.

Professors Lewis and Andersson are also working with Flinders researcher, Professor Gunther Andersson, to further improve the stability – and hence, longevity – of the material. If things go well, it could be available commercially in as little as three years.

Another big focus for the team is developing technologies for the next generation of concentrated solar thermal power stations.

A key collaboration with the Australian Solar Thermal Research Institute (ASTRI), which includes the CSIRO and five other Australian universities, is working on an array of mirrors that will focus sunlight onto a point to heat gas that will then drive a turbine to generate electricity.

A new solar thermal power station is planned for construction near Port Augusta, South Australia.

The system works best at between 700°C and 800°C, but such high temperatures can lead to problems with corrosion. So, the Flinders researchers are investigating the causes of this corrosion with a view to selecting the lowest cost corrosion-proof materials that still give the best performance.

'Because it's a power station, it needs to last 30 to 40 years,' says Professor Lewis. 'A demonstration plant is due to be running at the CSIRO site in Newcastle in New South Wales in four years time.'

In the longer term, Professor Gunther Andersson is exploring photocatalysis – using sunlight to split water into hydrogen and oxygen to generate a sustainable energy source.

The process requires a catalyst, and the prime candidate is an unusual one. It's a metal normally prized for its ability to remain almost entirely inert – gold.

But, it turns out that tiny clusters of gold under specific conditions can become a highly effective catalyst.

Professor Gunther Andersson is now investigating how and why gold behaves like this, which could lead to ways of replacing this expensive metal with a cheaper alternative catalyst.

Whatever the outcome, the goal in the coming years is to scale this technique up to the level of a refinery, to eventually produce power on a much larger scale.



Associate Professor
Bibi Sangha and
Adjunct Principal
Researcher
Dr Bob Moles.

QUIET REVOLUTIONARIES

TURNING MORE THAN 100 YEARS OF
ESTABLISHED LAW ON ITS HEAD

*Quiet revolutionaries at Flinders University made history in 2013
with the establishment of a new statutory right of appeal for criminal cases.*

Flinders University's Associate Professor Bibi Sangha and Adjunct Principal Researcher Dr Bob Moles' tireless crusade against miscarriages of justice has turned more than 100 years of established law on its head, giving hope to those jailed for crimes they didn't commit.

This new right has already resulted in three convictions being overturned, but it was a movement that the legal establishment in Australia fought every step of the way.

'Miscarriages of justice are going to upset a lot of powerful people,' says Dr Moles.

'Miscarriages of justice are going to upset a lot of powerful people,' says Dr Moles. 'The trials are costly and long, and then someone comes along and suggests that the conviction may be wrongful. Well, there are a lot of people who don't want to hear that.'

The case that started it all was that of Henry Keogh, a banker jailed erroneously for 25 years in 1994 for the murder of his fiancée. Keogh spent 21 years behind bars before walking free in 2015.

New evidence had saved Keogh, but that evidence would not have been heard without Associate Professor Sangha and Dr Moles' long fight to allow old cases to be re-opened.

Less than a decade ago, appeals to re-open old cases were almost never allowed, under a long-established legal principle in Australia.

'Whenever you took a case back to court that had already gone to its normal appeal, the court would not easily re-open it,' says Associate Professor Sangha. 'And it did not matter how compelling the fresh evidence was.'

This meant that there were cases slipping through the cracks.

When the researchers took the Keogh case to the High Court in 2007, the judges acknowledged the potential for a miscarriage of justice, and noted that the law could be changed.

But their hands were tied by the existing law.

Associate Professor Sangha and Dr Moles began their work in 2002, collaborating with experts such as forensic scientists and pathologists to identify cases that had relied on potentially incorrect 'expert' evidence, leading to wrongful convictions.

'Clearly, being sent to prison for something you haven't done is a nightmare to the individual, and utterly abhorrent in a free society,' says Dr Moles.

Though, at the time, he and Associate Professor Sangha were met with deep reluctance to change the status quo.

'Strangely, the principle of double jeopardy – the longstanding legal principle that no one can be charged twice for the same crime – became our ally,' Dr Moles explains.

In light of several cases where evidence that might have resulted in a conviction was not heard in the original trial, the principle of double jeopardy was being re-examined in Australia at the time. The law was changed so that, in some cases where there was fresh, compelling evidence, a retrial could be ordered.

'So, the argument we made was that if the prosecution can have a second go, why can't the convicted person?' says Dr Moles.

The careful language and demanding tests used in cases of double jeopardy provided a path that could overcome the arguments against allowing a free-for-all in appeals.

From 2007, the researchers ran an extensive media campaign to explain the problem to the Australian public, and began further research into miscarriages of justice, engaging with other jurisdictions with similar experiences.

In November 2012, the South Australian Government presented a Bill, which was adopted unanimously by the parliament and came into effect in May 2013, allowing for appeals where there was 'fresh and compelling' evidence that might give rise to a finding that there had been a 'substantial miscarriage of justice'.

Similar legislation has since been enacted in Tasmania, and is due to be introduced in Western Australia in late 2018.

As former Justice of the High Court the Hon Michael Kirby AC CMG noted: 'Sometimes in Australia, principle triumphs over complacency and mere pragmatism.'

THE CASE OVERTURNED

Henry Keogh's 25-year prison term for the 1994 murder of his 29-year-old fiancée, Anna-Jane Cheney, was overturned in December 2014 when expert evidence in the appeal showed that the death had been accidental. Keogh's appeal related to 'false and misleading' evidence given by South Australia's former chief forensic pathologist Dr Colin Manock.



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