

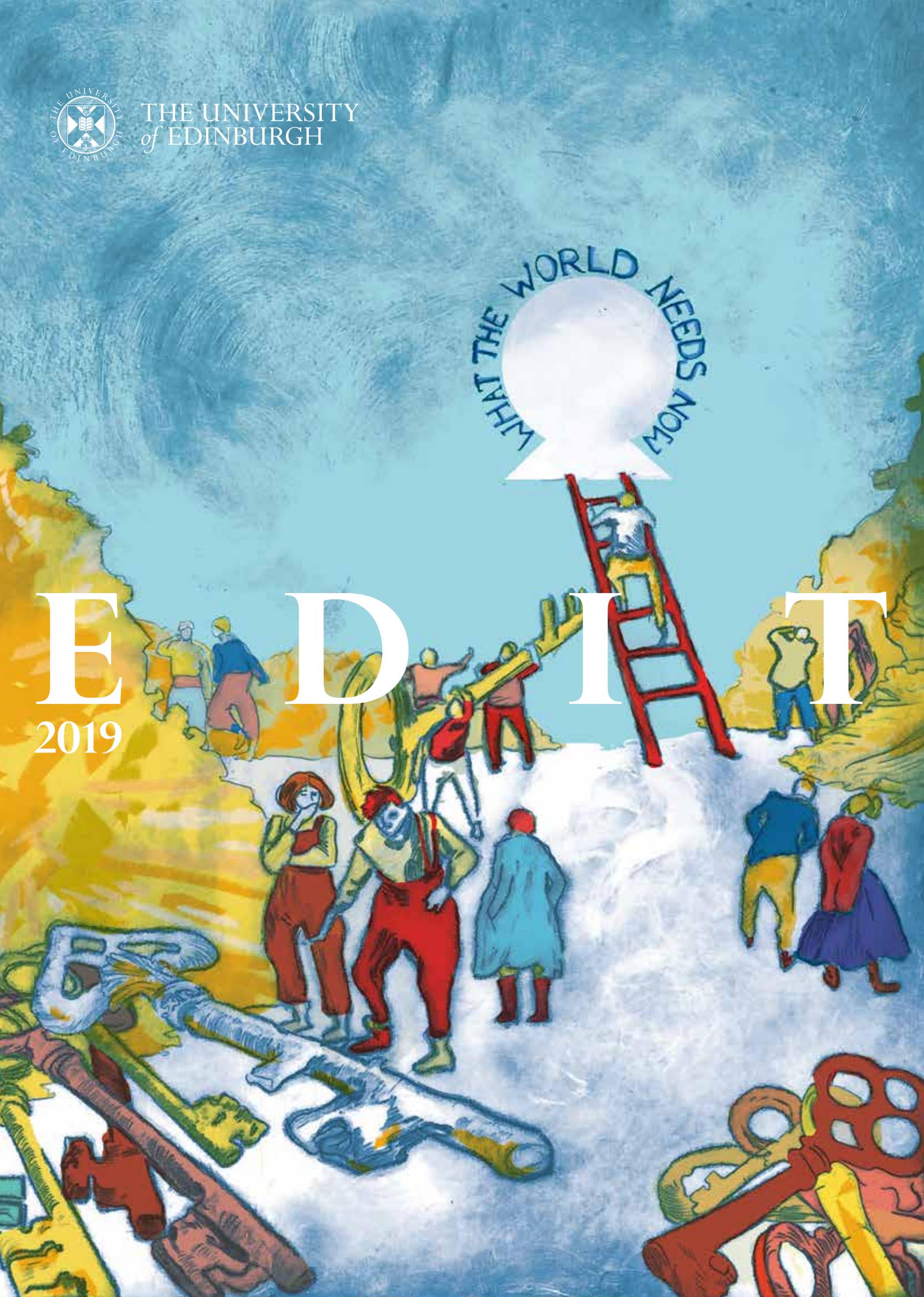


THE UNIVERSITY
of EDINBURGH

WHAT THE WORLD NEEDS NOW

E D I T

2019





▲ Professor Peter Mathieson, Principal and Vice-Chancellor of the University. Photo by Chris Close.

WELCOME

Welcome to the 2019 edition of the University of Edinburgh magazine, *Edit*.

We live in ever-changing and what can often seem turbulent times. Morphing political landscapes, social inequality, deliberate disinformation and rising global temperatures are just some of the threats to the harmony of our relationships with each other and the environment in which we live.

The time has come to pause and take stock of the situation, so we can determine how to make things better, not just for today but also for tomorrow. The time has come to find out what the world needs now. This edition of *Edit* does exactly that. The following pages include inspiring stories about how staff, students and alumni are engaging with topical issues and facing major challenges head on, and with a determination that instils a true sense of optimism about what lies ahead.

Our opening interview with Pulitzer Prize-winning alumnus Andrew Marshall is a stirring reminder about the importance of truth-seeking journalism. Elsewhere, our features highlight how a multisector partnership is taking a compassionate approach to the wellbeing of homeless people, and how problem-solving synthetic biologists are promoting a circular economy. We also share a taboo-breaking opinion piece on the menopause, an open conversation on death and an essay encouraging more young scientists to unravel the mysteries of the universe.

It is true that, at this point in time, our planet and those who live on it have a growing list of essential needs. Reassuringly, as the 2019 edition of *Edit* reveals, we are finding more and more proactive, positive and people-focused individuals who are committed to responding to these needs. Together we could hold the key to opening up a brighter, better world.

A handwritten signature in black ink that reads "Peter Mathieson". The signature is written in a cursive, flowing style.

Peter Mathieson
Principal and Vice-Chancellor of the University

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TIMELINE

Summer 2018

Sealing the City Region Deal

The UK Prime Minister and Scottish First Minister formally agreed the Edinburgh and South East Scotland City Region Deal.

Theresa May and Nicola Sturgeon gave the Deal the green light at a data science event at the University. The £1.3 billion investment will accelerate productivity and growth through the funding of infrastructure, skills training and innovation. The University is delivering the Deal's data-driven innovation component.

Over the next decade, five data hubs at the University – the Bayes Centre, Edinburgh Futures Institute, Usher Institute, Easter Bush and, with Heriot-Watt University, the National Robotarium – will use high-speed data analytics to meet industry and societal challenges.

Find out more: www.ed.ac.uk/local/city-region-deal



▲ Scottish First Minister Nicola Sturgeon arriving at the University with Senior Vice-Principal Professor Charlie Jeffery for the formal agreement of the City Region Deal. Photo by David Cheskin.

A hub for student wellbeing

Work began on a new £8 million health and wellbeing centre for students.

The building in Bristo Square will see Edinburgh's Student Counselling and Disability Services brought together with the medical practice and pharmacy for the first time. The building will provide an accessible entrance, a calming wellbeing lounge and consultation rooms.

The centre, scheduled to open in late 2019, is part of a £200 million investment over the next eight years in student facilities, which will include expanded learning spaces, a major new student centre and enhanced sports facilities.

Find out more: www.ed.ac.uk/estates/news/wellbeing-centre



▲ Professor Richardson (centre) with fellow staff and students at the procession. Photo by Gareth Easton.

Marching on

The University marched to mark 100 years since women gained the right to vote.

Staff and students from Edinburgh College of Art (ECA) and the University took to Edinburgh's streets with banners masterminded by ECA Textiles Programme Director Lindy Richardson. She was selected along with 100 other female artists from across the UK to develop concepts for the nationwide processions.

Professor Richardson collaborated with fellow University women as well as female prisoners from Cornton Vale in Stirling who embroidered equality-themed messages on pieces of fabric for the banners. Textiles students also designed wearable embroidered placards, with messages including 'They Fought, We Vote', which were worn at the Edinburgh procession.

Find out more: edin.ac/procession

This is our annual news review. Read all the latest stories at www.ed.ac.uk/news and www.ed.ac.uk/alumni/news. We also publish a monthly digital supplement. Read the latest features at www.ed.ac.uk/edit-magazine/supplements.

Autumn 2018

Sing it loud

***The Big Sing* came to the University's refurbished McEwan Hall.**

This was the first time the BBC *Songs of Praise* show's main event has been filmed outside of London, having previously been filmed at the Royal Albert Hall. Katherine Jenkins and Aled Jones hosted the evening with special guests including Susan Boyle, Collabro, The Overtones and Russell Watson. The audience also enjoyed festive carols and hymns in the hall, which is one of the University's most iconic and breathtaking buildings.

The production was run for the BBC by Avanti Media, with the University's Festivals Office helping to facilitate the company's 70-strong crew within the hall and ensuring it was an evening to remember.

Find out more about the University's calendar of events: www.ed.ac.uk/events



▲ *The Big Sing* in McEwan Hall. Photo courtesy of the BBC.



A cut above

Edinburgh became the first university to launch a bespoke tweed.

The new University cloth's base colours of blue, grey and white mirror Edinburgh's sky. A green thread references a recent study that identified Edinburgh as having more green space than any other British city. Other threads include the corporate red and dark blue, and gold to reflect Old College's Golden Boy statue.

The tweed was designed in association with Lovat Mill in the Scottish borders, and is sold and distributed by Edinburgh-based tailors Walker Slater.

▲ Edinburgh performance sports athletes modelling the tweed range. Photo by Richard Gaston.

Supporting modern apprentices

A second cohort of modern apprentices started work at the University.

Some 25 new staff began working in a range of roles including landscape gardeners, digital application support assistants, business administrators and lab technicians. The initiative enables young people to earn while they learn valuable career skills.

The intake followed a successful pilot year in 2017, which gave 19 young people on-the-job training – sometimes with study at college – as part of a structured programme that leads to an industry-approved qualification. The scheme's long-term goal is to help create a skilled workforce that's ready to face the future.

Find out more: edin.ac/modern-apprenticeships

Winter 2018

Continental connections

Edinburgh joined UNA Europa – a group of leading universities seeking to redesign the sector in Europe.

The group is developing long-term cooperation and integration among its members, focusing on innovative research and teaching and boosting international opportunities.

Edinburgh joins existing members Universidad Complutense de Madrid, Alma Mater Studiorum – Università di Bologna, Université Paris 1 Panthéon – Sorbonne, KU Leuven, Freie Universität Berlin and Jagiellonian University, Krakow.

Professor James Smith, Vice-Principal International, said: “Joining UNA Europa underlines Edinburgh’s commitment to working with our European colleagues and ensuring continued international experiences and collaboration for our students and staff.”

Read more about the University and Europe: www.ed.ac.uk/news/eu



▲ University Central Area. Photo by Guthrie Aerial Photography.

Queen’s Honours awarded

Alumni and staff were named in the New Year’s Honours 2019.

Among the alumni awarded were: Sir Donald H Brydon Kt CBE, Chairman, London Stock Exchange Group plc, Sage Group plc and the Medical Research Council’s Legacy Council – knighthood for services to business and charity, and Dr Helen Pankhurst, Senior Advisor at CARE International – Commander of the Order of the British Empire (CBE) for services to gender equality.

Alumni who are also staff members included: Professor Ian Deary, Director, Centre for Cognitive Ageing & Cognitive Epidemiology – OBE for services to social sciences, and Anna Meredith, Professor of Zoological and Conservation Medicine – OBE for services to animal welfare.

The full lists can be found at: edin.ac/honours-alumni and edin.ac/honours-staff

Shedding light on depression

An international study linked hundreds of genes to depression.

The study, involving more than two million people, was the largest of its kind. Scientists led by the University studied information pooled from three large datasets of anonymised health and DNA records and pinpointed 269 genes that were linked to depression. A further study is now underway.

“We hope that by launching the Genetic Links to Anxiety and Depression (GLAD) study, we will be able to find out more about why some people are more at risk than others of mental health conditions, and how we might help people living with depression and anxiety more effectively in future,” said Professor of Psychiatry, Andrew McIntosh.

Find out more: <https://gladstudy.org.uk/scotland>



▲ Photo by Getty Images/Fat Camera.

Spring 2019



▲ The Zhejiang University-University of Edinburgh (ZJE) Institute in China. Photo by Mavin Ye.

China medical campus opened

The Zhejiang University-University of Edinburgh (ZJE) Institute in China officially opened its doors.

ZJE champions fresh approaches to teaching, ground-breaking research and the translation of new ideas into practical medical applications. The Institute was winner of the China-Britain Business Award for Education Institutional Partnership of the Year 2018.

Professor Susan Welburn, Executive Dean of ZJE, said: “Our activities are being raised to a new level to deliver a step-change in innovation for healthcare in China and around the world. ZJE offers a catalyst for international research partnerships in China as well as a launch pad for engagement with Scotland.”

Find out more: <http://zje.intl.zju.edu.cn/en>

Responding to the climate emergency

The University is committed to creating a more sustainable and socially responsible world.

We have already pledged to become carbon neutral by 2040 – 10 years earlier than recommended by the Intergovernmental Panel on Climate Change in order to limit global warming to 1.5°C.

The University is on track to halve its carbon emissions – relative to its expenditure – by 2025, compared with 2007/8 levels. In addition, we have received a £5 million interest-free loan from the Scottish Funding Council to deliver a raft of energy reduction projects.

In 2015, we divested from coal and tar sands and, in 2018, announced our intention to fully divest from fossil fuels by the start of 2021. We conduct leading research on the impacts of the climate emergency’s implications for gender, development and poverty, and will expand this work over time.

Find out more: www.ed.ac.uk/about/sustainability

Up to the challenge

Edinburgh won the popular television quiz show *University Challenge* for the first time.

The team overcame St Edmund Hall, Oxford, in the final by 155 points to 140, to become the first Scottish university to triumph in the second series. The last Scottish team to win a grand final was Dundee in 1983.

Professor Peter Mathieson, Principal and Vice-Chancellor, said: “Everyone associated with the University should be justifiably proud of what the team has achieved.” The team, which had a Greyfriars Bobby mascot, was made up of Matt Booth, Marco Malusa, Max Fitz-James and Robbie Campbell Hewson.



▲ Edinburgh’s *University Challenge* team with host Jeremy Paxman. Photo courtesy of ITV Studios.



Keeping it real

▲ Reporting from the Rohingya refugee camps in Bangladesh in 2018. Photo by Mohammad Ponir Hossain.

Today's trend for deliberate disinformation is blurring the lines between fact and fiction. That's why the world needs investigative journalists to tell the real story. In the *Edit* interview, alumnus Andrew Marshall talks about how running the international pages of the University's student newspaper drew him towards a career as a special correspondent delivering hard-hitting reports across Asia.

What is it about investigative journalism that made you want to enter the field?

I didn't start out as an investigative journalist, or as any kind of journalist. In 1988 I joined *Student*, the University of Edinburgh student newspaper, as one of its managers. My chief task was to deliver the newspaper without crashing the office car. Then *Student* got a new editor – Tom Bradby, of ITN fame – who put me in charge of the international pages. That sparked a fascination for foreign reporting and suddenly made such a career seem possible. I've been, for most of my working life, a freelance journalist, which meant I wrote about anything and everything: politics, conflict, sport, books and so on. Only since joining Reuters in 2012 have I dedicated most of my time to investigations.

How did your degree or time at the University influence your career steps?

I remember graduating in 1989, after four wonderful years, thinking: "I'll probably never have that much fun again." As it turned out, there was lots more fun to come, but Edinburgh was special. My stint on the student newspaper was short but inspirational; many of the fledgling journalists I knew then – Tom (ITN), Emma Simpson (BBC), Andrew Sparrow (*The Guardian*) – went on to stellar careers. By the time I graduated, I knew what I wanted to do. Academically, I was an average student, but I enjoyed classes. It's hard not to feel nostalgic about a period in my life when I had so much time to read and think. I also loved – and still love – the city itself.

You've spent most of your career living and working in Asia. What led to you moving there?

I'd like to say that I came to Asia because of a deep fascination for its cultures and languages. In fact, my girlfriend at the time got a job in Japan. I tagged along, fell in love with Asia and stayed. I spent five years in Japan, editing and freelancing, then moved to Thailand in the mid-1990s. Bangkok was a vibrant base from which to explore nearby countries, where I've reported on everything from ethnic cleansing to beauty pageants.



◀ Interviewing Philippine police chief Ronald dela Rosa, the architect of the 'war on drugs'. Photo by Ezra Acayan.

▼ Reporting from the Rohingya refugee camps in Bangladesh in 2018. Photo courtesy of Andrew RC Marshall.



▲ On assignment in Myanmar's Rakhine State during the military's crackdown on Rohingya Muslims. Photo courtesy of Andrew RC Marshall.



► On assignment in Myanmar with Reuters colleague Wa Lone, who was jailed for investigating a massacre of Rohingya Muslims. Photo courtesy of Andrew RC Marshall.

At Reuters, you've been a member of reporting teams that have won three Pulitzer Prizes for International Reporting. What did you win these prestigious awards for?

One of the prizes was awarded in 2018 for our coverage of a brutal 'war on drugs' in the Philippines that killed thousands of people. The others, awarded in 2014 and 2019, were for our coverage of the persecution of Rohingya Muslims in Myanmar. Two Reuters colleagues, Wa Lone and Kyaw Soe Oo, were arrested in Myanmar in December 2017 while investigating the killing of 10 Rohingya men and boys; their report was the centrepiece of 'Myanmar Burning', the series that won that latest Pulitzer. They were later sentenced to seven years in jail – simply for doing their jobs.

What is it like to win these awards?

It's thrilling to win a Pulitzer. As my colleague Wa Lone said, when the news was relayed to his prison cell: "This award is like a dream." It's also bittersweet. The prizes were won for reporting on campaigns of violence that have killed or traumatised tens of thousands of people. The hope is always that big awards shine a stronger spotlight on these important issues. Our most recent Pulitzer was particularly bittersweet, since Wa Lone and Kyaw Soe Oo spent 511 days behind bars for reporting so bravely.

Wa Lone and Kyaw Soe Oo were released from prison in May 2019 after a presidential amnesty. How do you feel about their release?

They are brave and innocent men who did nothing wrong. I'm delighted to see them reunited with their wives and young daughters. In an age where powerful people dismiss real journalism as 'fake news', and when reporters are routinely arrested and murdered, Wa Lone and Kyaw Soe Oo are true heroes. They inspire me and remind me why journalism matters. Their detention has triggered an outpouring of support, both internationally and from inside Myanmar. I'd encourage everyone to read a Reuters investigation called 'Massacre in Myanmar', which got Wa Lone and Kyaw Soe Oo arrested.

You recently relocated to London after an 18-year stint in Asia. Is there any difference between reporting there and here?

My friends joke that all those years covering political dysfunction in Asia has been great training for covering Brexit Britain. One difference is the level of trust in journalists. I rarely had problems encouraging people in Asia to talk to me. Here, however, journalists are sometimes held in lower esteem, which can make reporting more challenging. I feel lucky to work for Reuters, which has a well-deserved reputation for fairness and accuracy.

Remaining neutral and reporting the facts is a vital part of your role. How do you keep bias out of stories?

Reuters journalists operate on the so-called Trust Principles, which oblige us to act with "integrity, independence and freedom from bias". On a practical level, this means – to choose one example – making strenuous efforts to seek pre-publication comments from the people and organisations we write about. The journalist Owen Bennett-Jones recently wrote of a BBC editor who "refused to report on a fire in the Strand which he could see with his own eyes until it was confirmed by Reuters". The story sounds apocryphal, but encapsulates our reputation for factual accuracy.

Who or what are the main influences on your writing and why?

Golden Earth, by the late Norman Lewis, was a big inspiration behind my own book on Myanmar, *The Trouser People*. His powers of observation and empathy, and the grace of his writing, are breathtaking. My favourite book by a journalist about Southeast Asia is *All The Wrong Places*, by the poet James Fenton, who captures the warmth and energy of the region. A literary heir to both these writers is Richard Lloyd Parry, whose *Ghosts of the Tsunami* is

a masterclass in reporting. I also read Evelyn Waugh's *Scoop* every other year, because it makes me laugh and keeps me grounded. Three of Waugh's most odious characters – Shumble, Whelper and Pigge – are, like me, special correspondents. 📖

"In an age where powerful people dismiss real journalism as 'fake news', and when reporters are routinely arrested and murdered, Wa Lone and Kyaw Soe Oo are true heroes."

Andrew Marshall joined Reuters as a Bangkok-based special correspondent in January 2012. He had spent the previous 17 years as a freelance journalist, exploring Asia's remotest regions for *TIME*, the *Sunday Times Magazine*, *National Geographic*, *Esquire* (UK), and many other publications.

While a freelance, he wrote *The Trouser People*, a book about football and dictatorship in Burma, and co-wrote *The Cult at the End of the World*, about Japan's homicidal Aum cult. He also co-produced three documentaries for Al Jazeera – on cholera epidemics in Bangladesh, military torture in Thailand and heroin rehab in Malaysia – and acted as a consultant on a fourth for Channel 4, about apocalypse culture in Israel, Japan and the US.

At Reuters, he was part of the teams that won three Pulitzer Prizes in International Reporting for their coverage of Myanmar's Rohingya crisis (2014, 2019) and the Philippines' 'war on drugs' (2018). He lives in London with his Swiss wife and two children.

Questions by Sarah Lincoln, Publishing & Communications Manager at the University, and an English Literature alumna.



PAUSE AND REFRESH

By Rachel Weiss



What the world needs now is to take time out to talk about taboo subjects. That's the view of alumna Rachel Weiss (MSc Knowledge Based Systems, 1990) who set up the Menopause Cafe to offer women, and their partners, friends and family, a fresh approach to opening up about this natural but often undiscussed phase of life. Here she explains how it all began.

Before my first period, I knew what to expect (roughly), who to talk to (my mum) and what my options were (tampons or sanitary towels).

Before my first pregnancy, I knew what to expect (roughly), who to talk to (my GP) and what my options were.

Before my first baby was born, I knew what to expect (roughly), who to talk to (other parents) and what my options were.

Before my menopause, I hadn't got a clue.

Friends didn't talk about it, it wasn't mentioned in any of the fiction or non-fiction books I read, there was nothing in the media. You would think it was a minority interest, but I knew it was inevitable for me and for half the population; so why was there so little information and conversation out there?

As a former girl guide, I like to be prepared; but all I knew about the menopause was that my periods would stop and I might experience hot flushes. So I read up on the raft of possible symptoms: dry skin, anxiety, loss of confidence, restless legs, vaginal dryness, depression and insomnia. However, I also wanted to hear stories from other women, especially from those who had come out the other side. What were the plus points? What had they learned?

I had already run Death Cafes in my home town of Perth. These are pop-up events where people, often strangers, gather to drink tea, eat cake and talk about death. So I asked Jon Underwood, founder of the Death Cafe movement, if we could set up Menopause Cafes along the same principles, those being:

- With no intention of leading participants to any conclusion, product or course of action.
- As an open, respectful and confidential space where people can express their views safely.
- On a not-for-profit basis.
- Alongside drinks and cake!

The power of taboos, broken by talking

Jon's Death Cafes are helping to break the taboo around talking about death. As a counsellor and coach, I know the power of talking to heal wounds, to take the sting out of fear, to help connect us with other people. The #MeToo movement is showing how talking about abuse, rather than keeping silent, empowers the survivors and makes society more aware and more likely to believe people when abuse happens. We are breaking down the taboo of talking about child abuse, with similar effects, and are beginning to open up about mental health.

Taboos keep people silent, which disempowers them. *Period. End of Sentence*, a film showing women breaking the taboo around menstruation in India, recently won an Oscar. I believe menstruation and menopause are taboo subjects in the workplace. In our quest for equality, women pretend to be the same

as men, with no monthly physical or emotional fluctuations. I hope the time has come for us to move on from equality, to valuing our diversity.

The impact of the menopause taboo at work and at home

A few years ago one of my employee's migraines increased in both frequency and severity. She didn't know why her usual coping strategies weren't helping. I'd read that migraines can increase during the menopause and perimenopause and wondered whether that could perhaps be a factor. She hadn't realised the two could be connected.

Our conversation gave her confidence to approach her GP again, to book a physiotherapy appointment and to take conscious breaks from screen work. It took several months, but the symptoms abated, and she had hope that this too would pass. As an employer, I am glad I was informed enough to suggest the possible link with the menopause and that my employee was comfortable enough discussing that possibility.

The impact of silence and ignorance about the menopause in relationships can be devastating. Some women avoid sex due to vaginal dryness, which can lead to avoiding any form of physical intimacy. Partners may feel rejected, unattractive and unwanted. Add to this the possible mood swings of anger, depression and anxiety and who knows how many divorces and relationship break-ups could be prevented by talking about the menopause and its physical and emotional effects?

The start of the Menopause Cafe

Jon gave his permission for us to use his format to start conversations about the menopause. My husband, Andy (MSc Computer Systems Engineering, 1990) set up a website, we did some PR and on a sunny evening in June 2017 we sat in a Perth cafe waiting to see whether anyone would join us for the world's first Menopause Cafe.

We needn't have worried: 28 women and men came to talk menopause. People sat at tables, discussing whatever they wanted, often starting with the simple question: Why are you here? Every 20 minutes, we encouraged people to move to a different table and start new conversations. There was much laughter and lots of chat, with visitors making comments such as "I talked about more intimate matters to these strangers than I have to my friends" and "Now I feel normal, I know it's not just me, I'm not going mad!"

Many more people heard about us on the radio, press and TV and started their own conversations at home. One couple saw me on the STV news that night: he said, "You should go to that." So she jumped in the car and joined us 15 minutes before the cafe finished.

On the bus, a neighbour asked how the Menopause Cafe had gone and another lady joined in saying she had read about us in the paper. I sat there while these two women in their 70s talked about their experiences of the menopause – on a bus! In Perth!

That's what we want – to start conversations about the menopause, to make it an ordinary topic of conversation. Our purpose is to increase awareness of the impact of the menopause on those experiencing it, their friends, colleagues and families, so that we can make conscious choices about this third stage of life.

We thought this might have been a one-off event; however, I secretly hoped it would inspire a worldwide network of Menopause Cafes.

We use a social franchise model, so volunteers worldwide can host their own Menopause Cafe. There have now been more than 170 Menopause Cafes, with more than 1,700 participants, in all

▼ Rachel with husband Andy. Photo by Andrew Cawley for the *Sunday Post*.





◀ Patron of the Menopause Cafe and alumna Kirsty Wark. Photo by Fraser Band.

“The impact of silence and ignorance about the menopause in relationships can be devastating.”

four nations of the UK and one in Toronto. We've become a registered charity, with Kirsty Wark as our patron, and gained the Prime Minister's Point of Light award for volunteers making a change in the community.

Several employers hold Menopause Cafes at Work including SSE, the Universities of Leicester, Birmingham and Sheffield, NHS Trust Velindre and Action for Children. We even offer a how to guide to running a cafe on our website. All you need is a venue, refreshments, a welcoming attitude and an open mind.

Philosophical as well as practical

Initially conversations focus on the medical and practical aspects of the menopause, but often they move on to the more psychological and philosophical:

- What does it mean to be an older woman in today's society?
- Is my body forcing me to put myself first after decades of putting others first, whether through family or work?
- Is now the time to think about “I want” or “I need” rather than “I must” or “I should”?

This broader conversation led to us running the world's first Menopause Festival, #FlushFest, in Perth last year, giving visitors a real chance to break the taboo while having some fun.

It was such a success we went on to hold our second Menopause Festival in April this year. The Friday afternoon focused on ‘Menopause at Work’ with talks on employment law, case studies

of supportive workplaces, menopause policies and the government report called *The Effects of Menopause Transition on Women's Economic Participation in the UK*. The Saturday offered creative writing and photography workshops, as well as workshops on mindfulness, cognitive behavioural therapy and exercise, a Q & A session with a sexual health doctor and an inspirational speaker flying in from the US.

As for me, well, it still hasn't happened yet (although I now recognise that I'm perimenopausal). However, I feel more prepared and able to look forward to this third stage of life and to support my friends and colleagues through ‘the change’. 🗨

www.menopausecafe.net

@Menopause_Cafe

www.facebook.com/menocafe17

▶ The first Menopause Cafe at Blend Coffee Lounge, Perth, June 2017. Photo by Andy Sanwell.



Yuta Era

Dr Virginia Echavarri-Bravo

Meet the problem solvers

By Monica Hoyos Flight

▲ The Horsfall Lab team. Photo by Chris Close.

Dr Louise Horsfall

Dr Nick Pantidos

The latest Intergovernmental Panel on Climate Change (IPCC) report calls for urgent action to avoid global temperature rises above 1.5°C. Radical change in the use of fossil fuels, waste management and recycling are required to reduce greenhouse gas emissions. Dr Louise Horsfall and her team are harnessing the power of biology to recover valuable resources from contaminated land and industrial waste, in a quest to find solutions to the world's environmental problems.

As the global population grows, so does our waste and demand for natural resources. One actively pursued solution is to move away from the current linear economy, in which we extract, produce, consume and discard resources, to a circular economy that sees waste not as a problem, but as a raw material to reuse in future goods.

According to environmental think tank Green Alliance, the UK currently exports seven million tonnes of steel scrap every year and is 100 per cent reliant on imports of raw materials like rare earth elements and cobalt for producing high-tech products and developing renewable energy technology. Recovering these materials from discarded products, which would otherwise be wasted or exported, could supply more than a third of domestic rare earth element demand and cut carbon emissions from steel production by around 30 per cent.

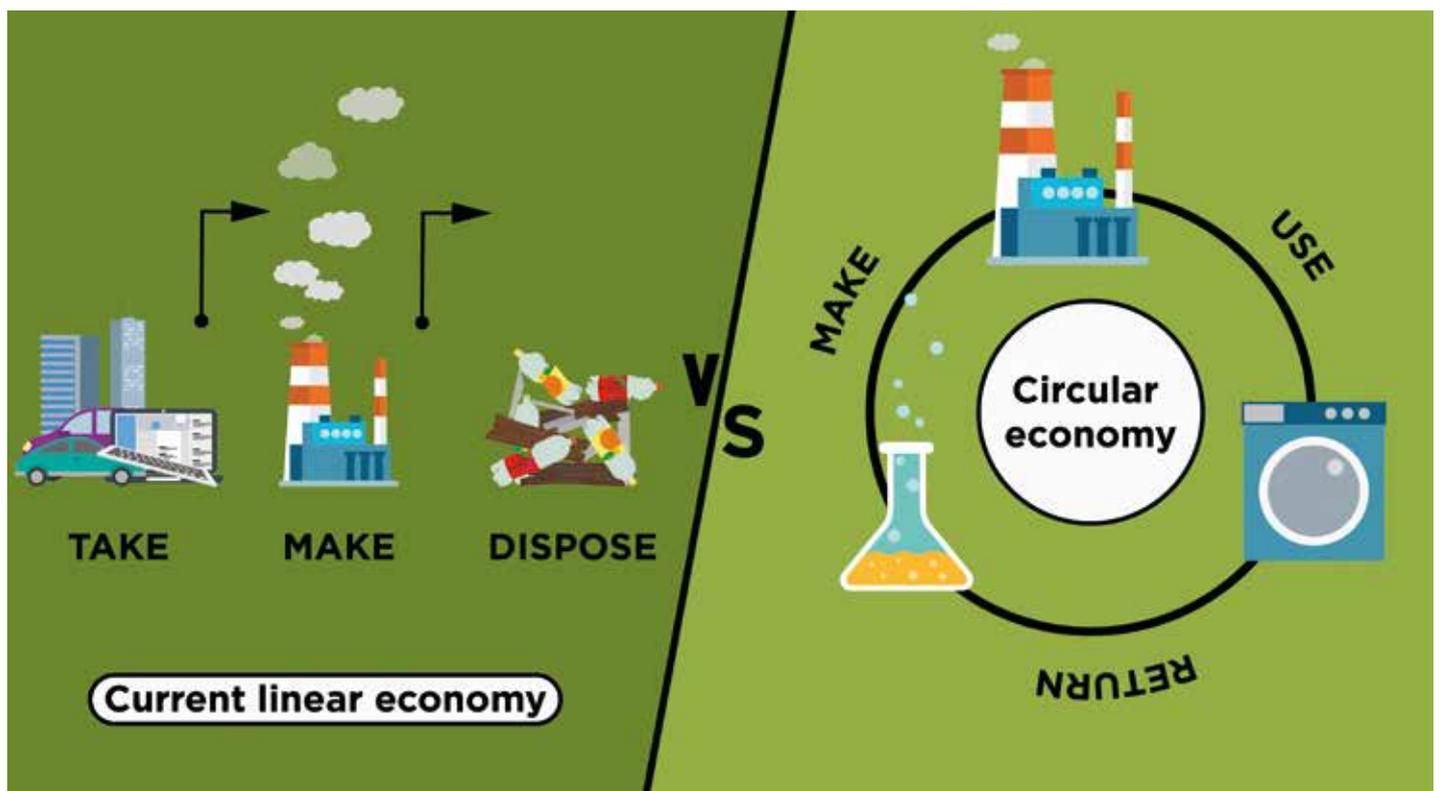
The IPCC prediction that we have 12 years to avert a “climate catastrophe” highlights that the time to act is now. As Dr Louise Horsfall, Director of the University’s MSc in Synthetic Biology & Biotechnology and elected co-chair of the Bioengineering and Bioprocessing section of the European Federation of Biotechnology, explains: “The realisation that we are reaching the end of easily accessible resources and that we need to reuse and repurpose seems to finally be hitting home.”

The Horsfall Lab is working at the frontier of biology and engineering to create microorganisms that can extract reusable materials from industrial by-products or contaminated land.

Since 2015, when the European Commission adopted a Circular Economy Action Plan to stimulate Europe’s transition towards a circular economy, 54 actions have been delivered or are being implemented. Over the period 2016–2020, the Commission is investing more than €10 billion in public funding to the transition to boost Europe’s global competitiveness and foster sustainable economic growth.

Looking outside the EU, China and Japan are also committing to transition to a circular economy, and not just by improving waste management but also by introducing eco-friendly design criteria that reduce the addition of hazardous substances during manufacturing and increase product lifespan. China’s import ban on 24 types of waste in 2018 injected new momentum into the improvement of recycling systems in many countries, including the UK.

▼ Illustration by Sci Ani.



Technologies supporting a circular economy

A whole range of technologies are being applied to improve manufacturing processes and waste management; from digital technologies focusing on computer science, electronics and communication, to physical and chemical technologies that explore how the basic properties of materials can be exploited to make production and recycling more sustainable. However, it is biological technologies that are providing the most transformative solutions to the challenges posed by the transition to a circular economy.

The Horsfall Lab is working at the frontier of biology and engineering to create microorganisms that can extract reusable materials from industrial by-products or contaminated land.

“Biology is incredibly specific and selective; our aim is to harness and improve these properties so that they can be put to other uses, affordably and effectively,” says Dr Horsfall.

Synthetic biology uses engineering principles to design, build and test new biological systems for useful purposes. It has been described as a disruptive technology at the heart of the fourth industrial revolution, capable of delivering biological devices and systems with potential applications in energy production, environmental protection and healthcare. The UK Government has invested heavily in synthetic biology as one of the country’s eight great technologies that will provide significant long-term benefits for the economy and society.

The University is internationally recognised for its synthetic biology research, which has more than £50 million in investment and 40 multidisciplinary research groups with world-class capabilities in this exciting area of technology. It also hosts the Edinburgh Genome Foundry, a BBSRC-funded national facility that can design and assemble genetic material on an unprecedented scale using a fully automated

robotic platform. Extensive collaborations with industry allow researchers to address real-world problems and create new business opportunities.

Cleaning land for wealth

Dr Horsfall’s research has contributed to a nationwide project aiming to incentivise the decontamination of land. Following phytoremediation, that is the removal of heavy metals from contaminated land using natural plant varieties, her lab explored ways to effectively extract the heavy metals from these plants so they can be reused.

“We found that particular bacterial strains are able to extract dissolved nickel, one of the major soil contaminants in the UK, from biomass produced in phytoremediation and produce high-value nanoparticles that can be easily removed from a solution,” she says. Such tiny particles can be used as catalysts in hydrogen fuel cells or as antimicrobial agents, thus improving the economic viability of cleaning up contaminated land.

In addition to nickel nanoparticles, researchers in her lab are also studying bacteria that can produce nanoparticles of other valuable metals, such as platinum and palladium. At present the process is carried out in laboratory conditions, but the aim is to make it economically viable so it can be carried out at an industrial scale. This can be achieved by enhancing the efficiency of nanoparticle production, so that more metal ions are extracted from a sample, and by improving nanoparticle utility by increasing the production of particles that are uniform in size and shape.

Understanding the mechanisms through which bacteria make these metal nanoparticles will not only allow researchers to optimise the conditions for the process to take place, but also enable them to improve the process at the genetic level.

▼ Dr Horsfall examines bacteria in her lab. Photo by Chris Close.



Deriving value from industrial by-products

Metal-nanoparticle-producing bacteria can have many uses besides decontaminating land. In collaboration with industry, Dr Nick Pantidos, an Edinburgh biotechnology graduate and postdoctoral researcher in Dr Horsfall's lab, is exploring the use of bacteria to extract copper from whisky distillery by-products.

"Copper ions are toxic to most living organisms, but some microorganisms have developed a defence system against that," Nick explains. "By converting copper ions to more inert copper nanoparticles they can survive in environments where other organisms cannot and we can take advantage of this to make the disposal of whisky by-products safer."

Not only that, it could lead to new revenue streams for distilleries as the copper nanoparticles could be sold for the production of antimicrobial coatings, transistors, solar cells and LEDs. Large distilleries producing up to one kilogram of copper nanoparticles a day could make more than £5,000 from them.

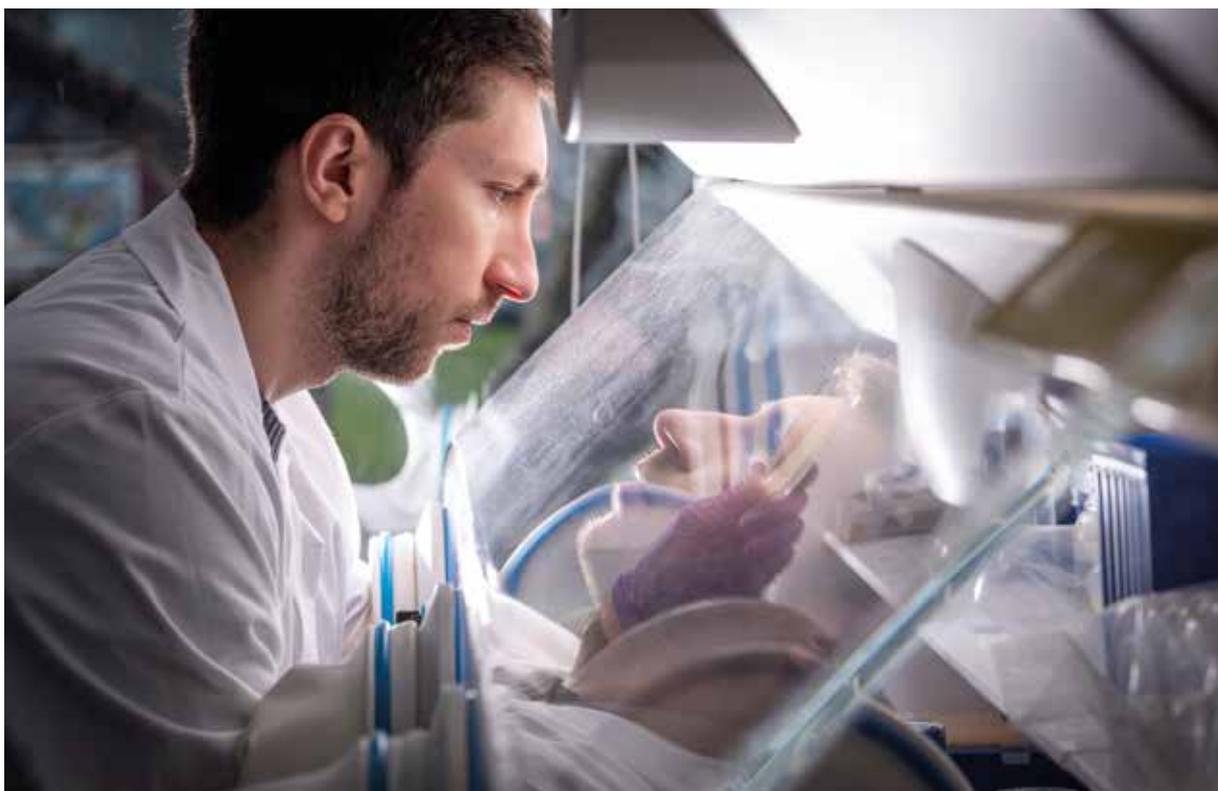
Lignin is another interesting waste product as, after cellulose, it is the most abundant renewable carbon source on Earth. If broken down efficiently, it could be a very valuable source of aromatic chemicals that are currently derived from fossil fuels. It is a major component of the waste biomass produced by the biofuel, food and paper industries but it is extremely resistant to chemical or physical degradation due to its rigid structure.

"At present 'waste' lignin is burnt to fuel industrial processes. Breaking down lignin to generate useful, high-value and sustainable chemicals is a major part of improving the sustainability of these industries," says Zak Towle, a quantitative biology, biochemistry and biotechnology

"We're seeing a perceptible shift away from asking what we can do with waste to asking how we can redesign products and systems so they never create waste in the first place."

Colin Webster,
Ellen MacArthur Foundation

▼ Dr Nick Pantidos examining the anaerobic growth of nanoparticle-synthesising bacteria. Photo by Chris Close.



PhD student in Dr Horsfall's lab. He is investigating how some microorganisms are able to degrade lignin and ways to accelerate this naturally occurring process by genetically engineering bacteria and yeast.

"Compared with physical and chemical approaches that generally require a lot of heat, pressure and solvents, biological approaches offer a cheaper, more environmentally friendly and, potentially, more predictable way of breaking down lignin," he adds.

Tackling battery waste problems

The lab is also exploring the bio-recovery of metals from spent batteries. The growing environmental and health hazards of conventional mining methods for extracting metals that power electronic devices inspired Yuta Era, a first-year PhD student at Edinburgh who gained his undergraduate degree in mining engineering from Kyushu University in Japan, to explore the use of biological processes to recover metals from dissolved battery waste. "Louise's lab was a perfect match for my research interests," he says.

By optimising how bacteria can extract specific metals from solution, he aims to improve the security of future sources of palladium, platinum, nickel and cobalt. The Japanese Government will be contributing to fund Yuta's project as he explains: "Japan and the UK are similar in the sense that they have large motor and electronics industries but are poor in natural resources, so both countries need solutions to meet the growing demand for metals."

Anticipating this issue, the UK Government's Industrial Strategy Fund launched the Faraday Battery Challenge to support research into the production of cheaper, longer-lasting and recyclable batteries. Further research into lithium-ion battery technology in particular is crucial to meet the government's ambition to replace conventional petrol and diesel vehicles with electric and zero emissions vehicles by 2040.

"To meet the exponential demand for lithium-ion batteries we need to ensure that we will have access to the raw materials required for producing them," says Dr Virginia Echavarrri-Bravo, a postdoctoral researcher working on one of the first Faraday Institution projects. The Recycling of Lithium-Ion Batteries (ReLiB) project sees Dr Horsfall's lab collaborating with the University of Birmingham to improve the safety, economics and efficiency of battery recycling while minimising the environmental impact of these processes.

"Our aim is to recover metals from disassembled lithium-ion batteries and separate one from each other using a combination of physical, chemical and biological methods," she explains. Her work focuses on characterising the mechanisms through which different bacterial species can extract specific metals and produce reusable nanoparticles.

"It is immensely rewarding to work towards environmentally friendly solutions to real-world problems in collaboration with other universities in the UK and industrial partners," she says.



▲ Yuta Era's research explores how bacteria can extract specific metals from solution. Photo by Chris Close.

Building momentum

"There was virtually no awareness of the circular economy seven years ago, but now it seems to be on everyone's agenda – governments, businesses, universities, community groups..." says Colin Webster, an Edinburgh alumnus who is now Learning Content Manager at the Ellen MacArthur Foundation, a charity launched in 2010 to accelerate the transition to a circular economy. "We're seeing a perceptible shift away from asking what we can do with waste to asking how we can redesign products and systems so they never create waste in the first place."

According to Joyce Tait, co-Director of the Innogen Institute at the University, and member of the Synthetic Biology Leadership Council and the Council for Science and Technology that advises the Prime Minister on science and technology policy issues, synthetic biology is a key driver of the circular economy. "The Horsfall lab is working at the cutting edge of a wide range of disciplines to deliver solutions for the UK bioeconomy and contributing to the aims of the UK's Strategic Plan for Synthetic Biology, which sets out a clear path to ensure the UK maintains its position as a global leader in this field," she says.

"So far, synthetic biology has only led to incremental advances and is not even close to delivering its full potential," says Dr Horsfall. "We are at an extremely exciting time; we are just starting to push the boundaries and establish new multidisciplinary collaborations looking beyond the element carbon to explore a myriad of ways to help us transition to a circular economy." 📍

Find out more at <http://horsfall.bio.ed.ac.uk>

Dr Monica Hoyos Flight is a freelance science writer and previously worked as Research Administration & Communications Manager at the University's Roslin Institute.



▲ Ewan Aitken, Chief Executive Officer of the charity Cyrenians.

Compassionate communication

Across the city, medical professionals, charity workers, policymakers, academics, students and those with personal experience of living on the streets are coming together for discussions driven by a united belief. A belief that what the world needs now is compassion for the wellbeing of homeless people.

By Edd McCracken





▲ Dr Fiona Cuthill, Academic Director of the Centre for Homeless and Inclusion Health.

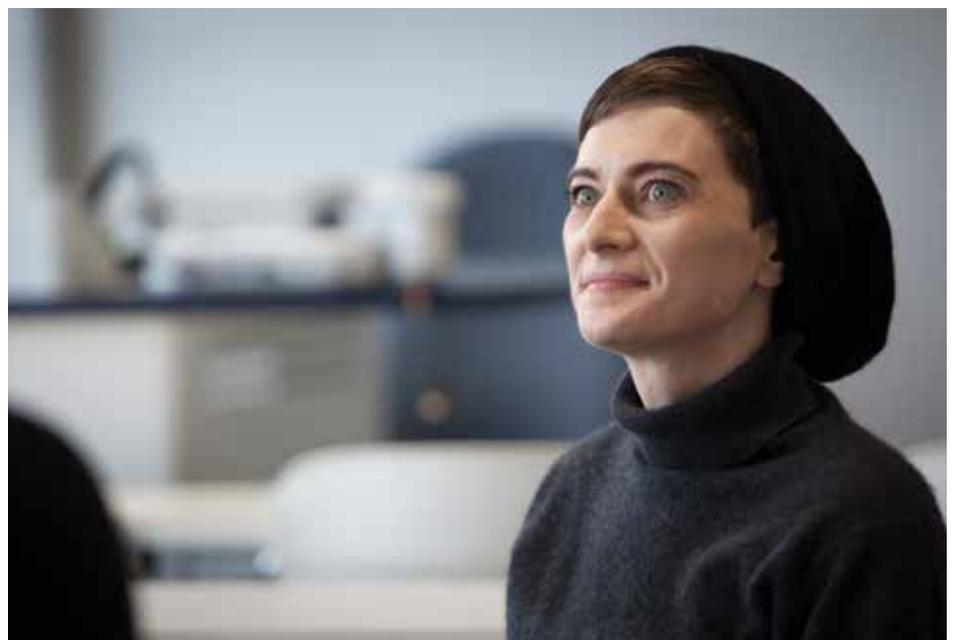
If you are homeless in Scotland today, according to the charity Streetwork, the average life expectancy is 47 for men and 43 for women. That is around 30 years worse than the general population. Those are the homeless who flit between friends' sofas, prison, hostels, bed and breakfasts, and, only occasionally, the streets. For those who call the country's pavements their permanent home, it is much worse. Their life expectancy plummets to 39-years-old, according to the charity Streetwork. That is a lifespan of a Briton born in the 1500s.

Sadly, after years of decline, homelessness is on the rise again. Last year, Shelter announced an increase in the number of people in Scotland registering as homeless. In 2017/18, nearly 35,000 people declared themselves to be without a home. Edinburgh's night shelter, which is run by Bethany Christian Trust through the city's winter months, recorded more than 700 individuals using it this year, a grim uptick on previous years.

It all asks a very urgent question about what the world needs now to tackle the problem. It's a need that has sparked animated, passionate conversations among a group of key multisector partners across Edinburgh. They have now come together to offer one answer: the Centre for Homeless and Inclusion Health.

“I could do research on homelessness for the next 20 years and I wouldn't have the same insight that someone like Josh has through his experience.”

Dr Steph Grahmann
Research Fellow at the Centre



More than 700 individuals used Edinburgh's night shelter this winter.

If you are homeless in Scotland today, the average life expectancy is 47 for men and 43 for women.

Opening the door to collaboration

Formed in 2017, the Centre is a collaboration between the University of Edinburgh and the NHS, the third sector, the council, local government, academia and – crucially – people who have been homeless. It brings together individuals and agencies that come into regular contact with the issue of homelessness, but might not habitually work together in tackling it. It has a simple ambition within a complex, multilayered field: to improve the health and wellbeing of people who experience homelessness.

“For me the Centre acts as an open door between the University and the partners,” says Dr Fiona Cuthill, Lecturer in Nursing Studies at the University, who is the Centre's Academic Director. “Our partners said they'd like education courses and to be at the very beginning of research projects. They said, we want staff and students to come out and work in our organisations. They also felt that there's loads of things the University can do, in terms of evaluation and data collection.” And shot through everything that the Centre does is making sure that those with experience of homelessness are heard.

Dr Steph Grahmann is a Research Fellow, tasked with devising new strands of enquiry for the Centre. Working with people who have lived life on the street is key to everything she does.

“The intention is not to treat people who are homeless as objects of research and talk about them in the third person,” she says. “Rather, we want to bring them to the table as the actual experts on their situation. I could do research on homelessness for the next 20 years and I wouldn't have the same insight that someone like Josh has through his experience.”

Sharing lived experiences

Josh Dumbrell became homeless when he was 19. His mum kicked him out for the last time after several years of substance abuse. Within months he had exhausted the goodwill of friends and family and found himself in night shelters

around his native Hampshire and Surrey.

“It started with the first time I was drunk. I look back on it and realise how ill equipped I was to deal with life, until I could change the way I felt,” he says. “I only felt safe and secure if I was heavily under the influence. So that's what I did.”

Stints in rehab and prison marked the following years, taking him eventually to Edinburgh. A cycle of recovery and relapse continued for 14 years. He slept rough around 100 times. Finally, seven years ago, he tamed his addiction through Alcoholics Anonymous.

“I was a long time clean and sober before I realised that this could be for the long term and that recovery was possible,” he says. “I had a genuine sense that these people cared about me, even though I knew they wouldn't if they really knew me, which is a common feeling for people in early recovery.”

Josh's experience, and many like his, is contributing to the Centre. He is working with researchers and speaking to students, sharing his testimony on how homelessness and its attendant issues affects health.

“I suffered from psychosis several times in withdrawal,” he says. “I had seizures. I woke up in hospital, stitched up, with no recollection of how I got there, around 30 times. I was brought back from overdoses 20 times. I just demonstrated a suicidal, total lack of self-care.”

He now works for the Salvation Army in Edinburgh's Cowgate, delivering an intervention to reduce harm among the homeless through peer support. Having once lived on the front line, he now works it. His caseload includes people in their early 30s and 40s with the lung capacity of 100-year-olds and people carrying blood-borne viruses. They trust him, he says, because of his history.

Learning new ways to build trust

“The NHS and the care it provides implicitly requires a trust on behalf of the recipient that most of the population

“Without compassion, you can’t do this job.”

Isobel Nisbet
Homelessness Manager, Inclusive Edinburgh



“A lot of the time the treatment isn’t a specific intervention. It’s more about being around someone, building up trust, developing a relationship – sometimes over years.”

Adam Burley
Consultant Clinical Psychologist,
NHS Lothian

take for granted, but that many on the streets find difficult to develop,” says Dr Adam Burley. He is a Consultant Clinical Psychologist in NHS Lothian’s Psychotherapy Department and criss-crosses Edinburgh on his bike, servicing the city’s homeless services.

“Once I started working with the homeless it became obvious that I was working with a population that doesn’t fit in well with mainstream healthcare structures,” he says. “By virtue of their earliest experiences of care having been massively problematic – riven with pain, anxiety, trauma and abuse – a lot of people we work with often have real difficulty trusting care. That’s the ailment really. We’ve been fighting an ongoing battle to shape the NHS and local authorities to be more understanding. That’s no criticism of the NHS – big organisations find it hard to set up niche services.”

Which is where something like the Centre comes in. Dr Burley is part of the Centre’s founding steering group, which sees the partners meeting up for monthly discussions. From providing support to more than 25 staff groups across the public and third sectors over the last 12 years, he sees how someone from an NHS background can learn.

“A lot of the time the treatment isn’t a specific intervention. It’s more about being around someone, building up trust, developing a relationship – sometimes over years. And that’s the treatment,” he says. “In the health service, we don’t have that. But it turns out there’s been third-sector services that have been doing this for years. And doing it very well. They just don’t call it health. But it is, and some of the most fundamental health work you can do. Because they are not recognised as health workers, they don’t get recognised as being able to tell us what works, what is useful, or help develop services that are outwith traditional models.”

And that is his hope for the Centre, that it will be a place to “house, amplify and clarify” the experiences of the partners, and “push ideas forward using the power of research.”



“You can do all the research about homelessness, but without compassion it’s a bit empty.”

Emma-Jane Robertson
Fourth-year nursing studies student



Doing things better

Ewan Aitken is Chief Executive Officer of Cyrenians, a charity that has been supporting the homeless and the vulnerable for 50 years, and a founding member of the Centre's steering committee. Cyrenians has had a ringside view of some of the less successful endeavours to tackle homelessness over the decades. "It is the social challenge," says Ewan, that "most confounds the logic model."

"If the Centre does anything, we need to get away from the idea that if we get lots of A, problem B will be sorted," he says. "Homelessness is simply not like that." What the Centre can do, he believes, with the University using its "size and gravitas to be facilitator and the catalyst", is to create a space for third-sector organisations to step back and do some thinking.

"We'll do things together and be brave enough to do so because it is under the banner of the Centre. We'll reflect on it and then ask, what can we do better? This back and forth will bring the lived experience to the heart of the conversation. That will be powerful," Ewan explains.

In the summer of 2019, groups of students – overseen by members of University staff – are working with Cyrenians. It is just one of the ways the Centre is already living up to its ambition. Elsewhere, students from Edinburgh College of Art will be holding workshops with people experiencing homelessness, working on a mural for the new Inclusive Edinburgh building at Panmure St Anne's in the Cowgate. The former school house is being converted into the new home of the Edinburgh Access Practice and Access Point, and will be a one-stop-shop for homeless needs in the city centre.

Working across boundaries

Inclusive Edinburgh's Homelessness Manager is Isobel Nisbet. She too is excited by the Centre's possibilities. "I've been a manager for 20 years and this is the first time it feels like there is a lot of joining up," she says.

By hosting the University within the Inclusive Edinburgh building and being part of the Centre's steering group, Isobel hopes to harness academia's power to make a difference on the streets.

"We're always looking for ways to build evidence into our practice," she says. "If I'm looking to measure how effective intervention is, I can now work across boundaries and talk to an expert about that. We can really use the knowledge within the University to inform and develop our services."

Speak to anyone involved in the Centre and they will say that underlying all these processes, information sharing and transactional relationships, is something even more fundamental.

Isobel sums up what the world needs now. "Compassion is crucial," she says. "We are working with a number of challenging people who, because of trauma and mental health, can sabotage things for themselves. Compassion has to be a part of that. They have to feel it. It has to be part of you. It's obvious if it is not. Without compassion, you can't do this job."

Taking a compassionate approach

To see how the Centre is infusing compassion into everything it does, meet Emma-Jane Robertson. This fourth-year nursing studies student is part of the first intake onto one of the Centre's two 10-week courses, run at undergraduate and masters level.

"You can do all the research about homelessness, but without compassion it's a bit empty," says Emma-Jane.

"In terms of being a nurse – which I love doing – this course has changed my perspective on how I treat patients that come in.

"Hospital staff – and it's not their fault – can become frustrated by what they call 'frequent flyers', or repeat visitors, who are mainly homeless," she continues. "My course is filled with people from clinical development, government and the NHS who have been working for 20 or 30 years. The perspectives and

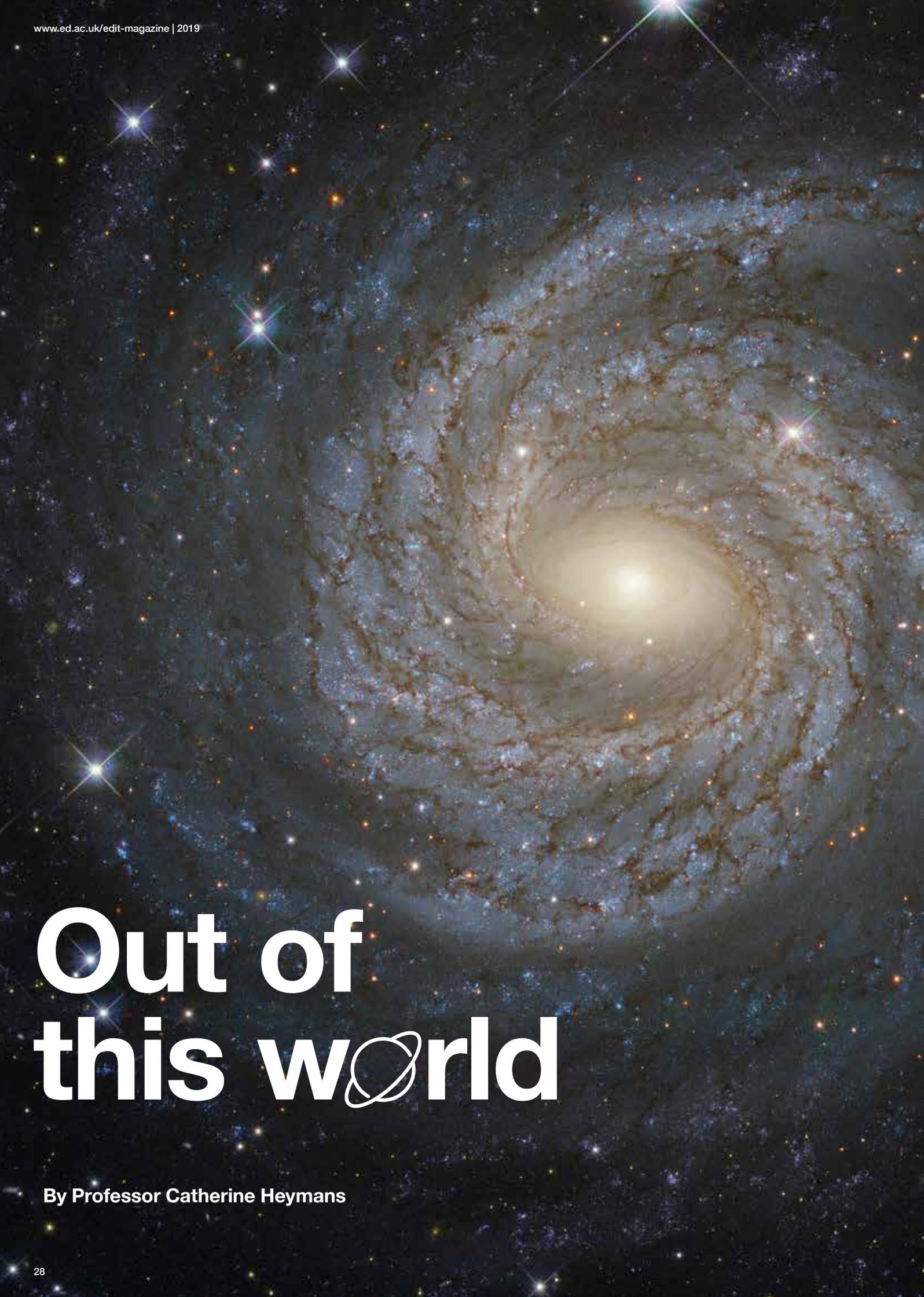
real-life application they bring someone who is young and naive is really amazing. It makes it easier to step back and realise everything else that is going on. It has helped me care better." 

edin.ac/chih

Edd McCracken is joint Head of News at the University. He is a former arts correspondent for the *Sunday Herald* and his freelance work has appeared in the *Guardian*, *Holyrood Magazine*, the *Scotsman*, *Time Out Dubai* and www.bookriot.com.

Photography by Sam Sills.

In 2017/18, nearly 35,000 people in Scotland declared themselves to be without a home.



Out of this world

By Professor Catherine Heymans

◀ A spiral snowflake galaxy taken by the Hubble Space Telescope.
Photo courtesy of ESA/Hubble & NASA. Acknowledgement Judy Schmidt.

We only understand five per cent of the universe, according to leading astrophysicist at the University, Professor Catherine Heymans, who studies the enigmatic energy and matter that make up the other 95 per cent. Here she muses on the dark side of the cosmos and shares her hopes for a world where more young scientists are encouraged to solve its mysteries.

Right from an early age I knew I wanted to explore the cosmos – the great unknown. What still amazes me today is the sheer scale of it all – the essential infinite enormity – contrasted with the realisation that at one point, in the very distant past, everything we can see was located in the same place in space and time. You may not have realised it yet, but we’re really highly insignificant in the grand scheme of things – just one out of seven billion people on planet Earth, orbiting just one star out of 100 billion stars in our Milky Way galaxy, just one galaxy out of 100 billion galaxies in our observable universe.

The sky is not the limit

Our universe is likely just one universe in an almost infinite number of universes where everything can and will happen. These ideas excite everyone, young and old, female and male. So what is the reason women make up less than 21 per cent of the scientific workforce in the UK? The reason less than a third of PhD science students are female? The reason why less than 10 per cent of physics professors in the UK are female? As one of the youngest female physics professors in the country, I fear the answer to this question is that we, as women, have made it so.

Have you ever helped a niece, cousin or daughter with her homework? When they are struggling to read, you’ll patiently sound out the letters together. When they are battling with their spelling and writing, uncomplaining you’ll calmly show them how. But when it comes to tears over numbers, maths and science, so many of us will reply: “Oh I shouldn’t worry about that, love, it’s something I could never do either.”

Mothers, grandmothers, aunts and cousins, the most important female role models in the lives of young girls, are telling them from a very early age that science is too hard and not for them. This well-established cultural perception of science is at the root of why in the UK only 20 per cent of girls choose to study physics at A level. No matter how many schools I visit and children I talk to, I can’t change this ingrained view.

I’m writing this article to tell you, the role models of all future bright sparks, that science isn’t any harder than other subjects. Science is utterly awesome and absolutely for everyone.

What the world needs now is more young scientists. The more we can train, the more technological innovation and advances you will see in the future. We need all children to embrace and enjoy science and technology, so the next time you see a young girl, or boy, struggling with their maths homework, don’t tell them to give up. Step in and calmly work it through together. Show them that science is just like any other subject: challenging, exciting, and definitely something that she or he can and will learn.



▲ Professor Catherine Heymans. Photo courtesy of BBVA Foundation.

“We simply don’t understand 95 per cent of our universe. Now you can view this as a major failing of scientists, or an amazing opportunity for future scientists.”

▼ The VLT Survey Telescope at the Paranal Observatory in Chile. Photo courtesy of ESO/Y. Beletsky.



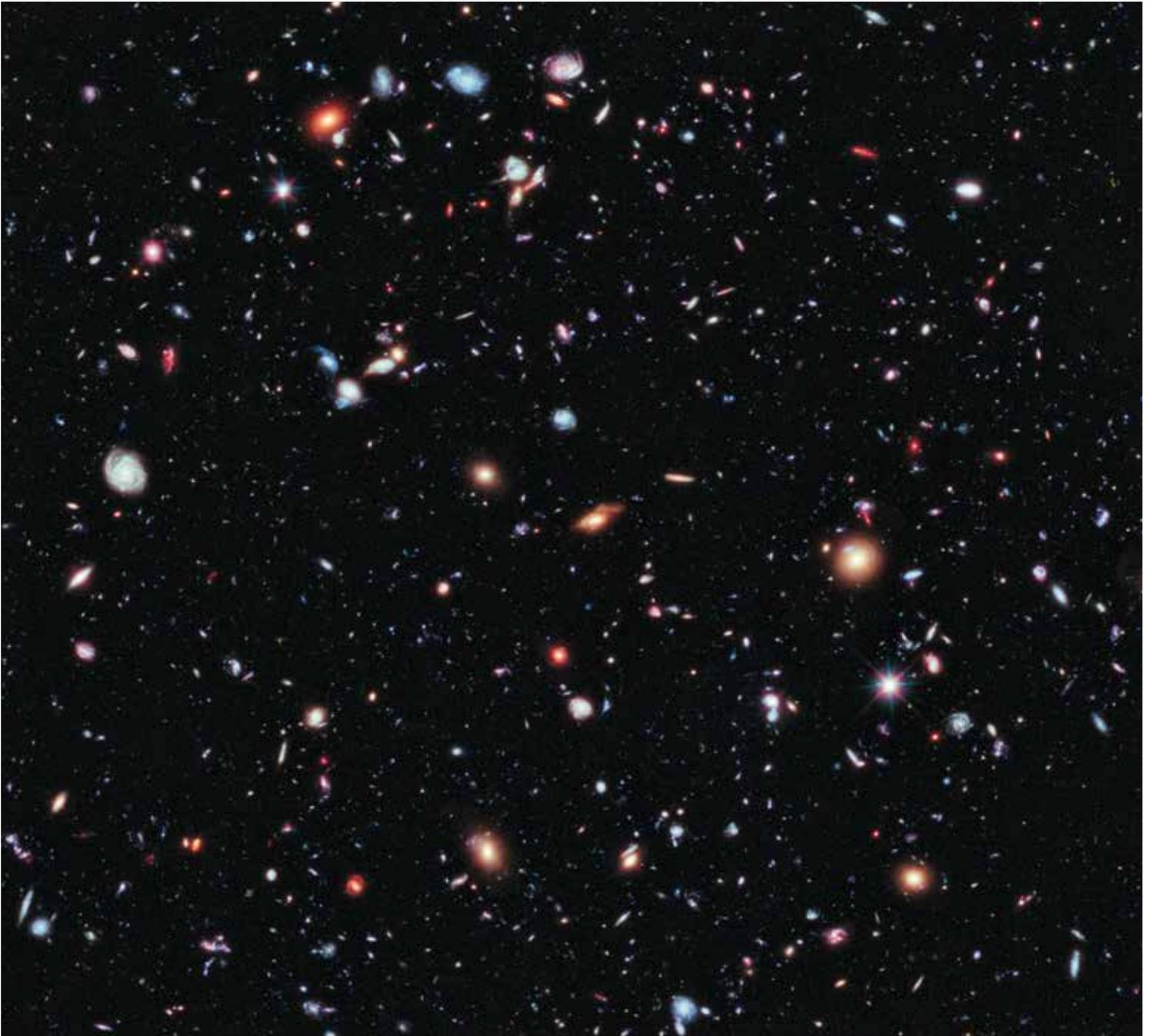
Delving into the dark side

The deepest ever photo of the universe was taken by the Hubble Space Telescope. Hubble orbits the Earth once every 97 minutes only 350 miles above the Earth’s surface. For a total of two weeks, Hubble stared at one tiny patch of sky catching the light from galaxies that are so far away their light has taken more than 13 billion years to travel to Earth. This breathtaking image reveals a zoo of different brightly coloured galaxies. Some are swirling blue spirals like our own Milky Way. Others are giant red galaxies that weigh more than a thousand trillion trillion tonnes. The universe that we can see is immense, diverse and astonishingly beautiful. However, it may surprise you to learn that all of the stuff that we can see makes up less than five per cent of the universe.

I’ll make a bit of a confession now. Physicists understand the five per cent that we can see really quite well. We know all about atoms, quarks, bosons, all the tiny particles that make humans humans, planets planets and stars stars. For the other 95 per cent, however, the mysterious unknown stuff that we call ‘the dark side’, we haven’t a clue – we simply don’t understand 95 per cent of our universe. Now you can view this as a major failing of scientists, or an amazing opportunity for future scientists. When you’re missing a piece of key information that enormous, it surely means that a major breakthrough in our understanding of the world around us must be just around the corner.

The effect of dark matter

There are two entities on the dark side. The first is called dark matter, a mysterious type of particle that you can’t see or touch, but that we know is there because of the effects that it has on the things that we can see. Take our own Milky Way galaxy as an example. If it didn’t live inside a massive clump of invisible dark matter, the stars that are currently spiralling around in our galaxy would simply fly out into space.



“This breathtaking image reveals a zoo of different brightly coloured galaxies.”

▲ The deepest ever photo of the universe. Photo courtesy of NASA and ESA.

The gravity of dark matter is needed to kind of 'glue' it all together.

But if our galaxy lives inside a clump of invisible dark matter, then that means there must be some of it right now in your house. Focus your eyes for a brief moment on the tip of your nose. In that second, more than a million dark matter particles passed through your nostrils – but you can't feel them because the type of particles that you are made up of are completely oblivious to their dark cousins.

Fact or fiction? On the matter of dark matter, I'm betting on this being fact. Particle physicists are trying to catch one of these elusive particles in deep underground lairs with massive vats of liquid xenon. They are also trying to create them by smashing particles together in highly energetic collisions in a 27-kilometre-long particle accelerator, CERN's Large Hadron Collider. It can only be a matter of time before a major discovery is announced, I hope. On the matter of dark energy, our second component on the dark side, I'm less sure, however.

The power of dark energy

Our universe was created in a Big Bang 13.8 billion years ago and it has been expanding ever since. When I started studying astrophysics, I delighted in the idea that, one day, our universe would cease to expand, collapsing back in on itself in one giant explosive crunch. This explosion would seed a new Big Bang, and a beautiful birth-rebirth cycle would be born that matched my Buddhist philosophy of the time. My vision was shattered, though, with the discovery in the late 90s that the expansion of our universe wasn't slowing down at all. Indeed, it was getting faster and faster each and every day. Far from a fiery rebirth, our universe was doomed to a cold empty death once the stars had burnt away the last of their fuel.

What could be causing the expansion of our universe to speed up? Well the simplest explanation for this phenomenon is very strange indeed. In the universe there are huge regions of nothingness: pure emptiness where there are no galaxies, no stars, no dark matter. Here there is nothing but 'virtual particles'

that can simply pop into existence, providing an extra energy source – a 'dark energy' – to power the accelerating inflation of our universe.

Fact or fiction? Well, fact to some extent, as this weird quantum phenomenon has been measured in a laboratory. But these quantum theories predict that a long time ago our universe should have expanded so rapidly that planets, stars and galaxies should never have even formed. As we're very much here, there is something clearly wrong with this theory! It's my day job to come up with a better explanation.

A job that's out of this world

In what other career do you get to seek daily the answer to mind-blowing questions like "Why do we even exist?" and travel around the world to exotic locations? In the Atacama Desert in northern Chile, you'll find one of the driest places in the world, home of the European Southern Observatory. Our telescope, called the VLT (Very Large Telescope) Survey Telescope, or VST for short, is just one of a number

▲ The Visible and Infrared Survey Telescope for Astronomy (VISTA) in the Atacama Desert, Chile. Photo courtesy of ESO/B. Tafreshi (twanight.org).

“In the Atacama Desert in northern Chile, you’ll find one of the driest places in the world, home of the European Southern Observatory. When the weather is at its very best, we take deep images of the universe spanning about 1/30th of the sky.”

of VLTs in the observatory, sited on the peak of the Cerro Paranal mountain, 2,635 metres above sea level. When the weather is at its very best, we take deep images of the universe spanning about 1/30th of the sky.

We’re now in our sixth year of observations, producing exquisite images that we use to map out the invisible dark matter and test the many different theories that exist for the origin of the dark energy. My team of researchers at the University of Edinburgh are focused on using these observations to test the potentially far-out idea that we need to go beyond Einstein with our current theory of gravity. It could be that our inference that there is a mysterious dark side to the universe is just a consequence of our poor understanding of gravity – maybe Einstein didn’t get it all right. It’s certainly exciting to be able to check. 

Professor Catherine Heymans is Professor of Astrophysics and European Research Council Fellow at the University. In 2018 she became the first winner of the new Max Planck-Humboldt Research Award worth €1.5 million to continue her dark energy research.



Stepping up



By Dr Aileen Ballantyne

▲ From left to right: Edinburgh law students Kay, Jullita, Lorna and Miral on the staircase inside the refurbished Law School at the University. Photo by Chris Close.

More women than men are now entering the legal profession yet relatively few women lawyers hold senior positions or become partners in law firms. So, what needs to be done to change this?

Following on from last edition's feature on the experiences of female graduates in the engineering profession, this time we ask four female students in the University's Law School about the 'leaky pipe' syndrome in the law sector.

There are now more women than men graduating from the Edinburgh Law School – but a recent large independent survey by the Law Society of Scotland showed that the gender pay gap between men and women remained at 23 per cent last year – a change from a 42 per cent gap five years earlier (*Profile of the Profession*, December 2018).

In a bid to drive equality and diversity in law, the University has recently set up The Edinburgh Foundation for Women in Law: Spaces for Voices, co-founded by Professor Lesley McAra (previously Head of Edinburgh Law School) and

“What I hope for in my own career is to set my children an example of a mum who has the grit to follow her dreams, is able to see them through, works in a field that makes the world a better place, and has time to enjoy her family.”

Julita Burgess

alumna Karina McTeague. It provides a safe space for conversations about the challenges and opportunities for women working in law, and organises motivational events and talks.

Director of the Foundation, Annie Sorbie, law lecturer and former partner in a law firm, says: “We believe that there is room for as many voices as possible in the gender equality conversation within the legal sphere, and that the Foundation is uniquely placed to engage with and influence key players.

“This is through our extensive alumni network and strong relationship with the legal profession, and through our role in educating the future legal profession to ensure that gender and wider equality issues are embedded before entering the field,” she explains. “We know there

is much to do but we are committed to effecting real and lasting change in the legal landscape.”

Edinburgh law student Julita Burgess, who has two young children, believes change could be achieved by moving away from the culture of working long hours. “A number of senior women lawyers I know work part time,” she says. “Trimming the working hours would certainly make the business of running a law firm less viable economically, so maybe a healthy solution can only be achieved with a different pattern of legal services provision. Some innovative firms are experimenting with engaging some lawyers as external consultants, for specific projects.”

Looking ahead, she continues: “What I hope for in my own career is to set my children an example of a mum who has the grit to follow her dreams, is able to see them through, works in a field that makes the world a better place, and has time to enjoy her family.”

Fellow student Lorna MacFarlane feels there are assumptions by some that certain types of legal careers aren't

suitable for women, such as corporate/commercial law, mainly because of the perception that these areas of practice involve long hours and some travel. “Students definitely shouldn't be put off pursuing these careers at an early stage – while these assumptions don't seem to be held by the majority, it may be useful for students to have the chance to hear from female commercial lawyers at careers events at university,” she says. “It would also help lawyers of all genders if there was a greater understanding and encouragement for men who choose to balance childcare with their careers.”

Lorna has been to several of the Foundation's events: “It's encouraging to see this initiative and I'm looking forward to seeing it develop in the future.”

The idea that women should support

each other in promoting change is also a strong feature of the Edinburgh law students' recommendations. “The spirit of fraternity is promoted and enjoyed within the faculty of advocates. The same should be instilled among law students from the first year of the LLB,” says student Miral Jaber. “What I hope for is the opportunity to prove that I can go as far as I like. What was it Madeleine Albright said about a special place in hell?” Miral ponders – referring to a comment by the former US Secretary of State that “there's a special place in hell for women who don't help each other”.

For student Kay Cuthbertson, what the legal world needs now to ensure gender equality in the future is transparency: “Law firms need to ensure transparency surrounding salary, internal and external recruitment procedures, and a no-tolerance approach to any form of discrimination in the workplace. Many women aren't even aware of there being a gender pay gap in their own workplace because no one talks about their wage.

“Most importantly,” she adds, “gender equality needs to be intersectional. There are so many other factors which add on to gender, such as race, age, social background, ethnicity, education, disability and LGBTQ. To achieve gender equality we have to look at all of these factors in tandem, hearing voices from each perspective.”

Kay became aware of Spaces for Voices when she attended a talk arranged by the initiative for students by Patricia Russo, Director of Yale Law School. The experience had a profound effect: “Patty was incredible. That event created a space where women in law could talk openly about experiences they'd had and realise that they were not alone in those experiences. Walking out of that talk, I felt invincible – I felt I could achieve anything. It was amazing.” 

www.spacesforvoices.law.ed.ac.uk

Alumna Dr Aileen Ballantyne, PhD Creative Writing & Modern Poetry (2014), is a former medical correspondent for the *Sunday Times* and the *Guardian*. She has twice been commended in the British Press Awards. Her first full collection of poetry is published at the end of this year.



▲ From left to right: Dr Chris Harding, Norman Stewart and Jo Hockley in The New Amphion in Teviot Row House. Photo by Sam Sills.



WHAT IS A GOOD DEATH?

By Dr Chris Harding,
Norman Stewart and Jo Hockley

It's a question many people find very hard to answer. In fact, talking about death is hard, full stop. And yet, the more open we are about it, the more likely we are to accept it as a natural part of life. To kick-start the conversation, we asked a senior palliative nurse, retired lawyer and cultural historian to share their professional and personal insights into what dying well means to them.

Jo Hockley

Senior Nurse Research Fellow

Usher Institute of Population Health Sciences & Informatics

Back in the mid-1970s, having qualified as a nurse and midwife, it was not until my father asked me "Jo, am I dying?" that I realised the humanness of being asked such a question. I floundered; but luckily, after trying to fob off the question, the oncology registrar arrived and Dad repeated the question. The registrar's simple and gently honest response – "Yes, Mr Hockley, you are" – was all my dad wanted. He died peacefully the next day having spoken to each of the family individually.

Whether this personal encounter with death/dying was anything to do with my going to work at St Christopher's Hospice in 1978 I really don't know. All I do know is that what I learnt there has underpinned my whole career, namely: the importance of good symptom control in advanced disease, which then enables people to deal with any emotional, psychosocial and, importantly, spiritual issues they might have, which can't be done if people are in physical distress. For this, we need a relationship-based approach stressing the importance of the patient/resident, family and friends, and staff – across the whole multidisciplinary team.

The work I do now in promoting a good death is solely in care homes with a vision to do for care homes in South East Scotland what hospices have done for cancer. As David Roy – a palliative care physician/ethicist – said: "Dying with dignity is dying in the presence of people who know how to drop the professional role mask and relate to others simply and richly as a human being."

Norman Stewart

Retired Consultant Solicitor and law alumnus

(Law, 1957)

I am an old (and very retired) practising solicitor who was at the 'coal face' for nearly 50 years, including being the President of the Law Society of Scotland 1985/86.

I recall, as a very young green solicitor, being newly released from Edinburgh's relative protection in numbers to the total exposure of being on your own in an isolated northern community. The sole principal whom I had joined, had, on my first day, departed on an "exhaustion" holiday.

An urgent call came in to visit a very sick gentleman in a village some 10 miles away, who wished a will done. So off I went, by bus (as young lawyers then had to do), my objective being to take instructions and return to the peace of the office and prepare the will. I reached my destination and found the house. I was ushered into the bedroom where I immediately saw a very sick man who might depart this life very soon. It therefore had to be plan B.

I had my pad and my pen and after putting the man at ease (he spoke Doric, which in my years of absence I had not forgotten), he was clear in his instructions and I wrote. He read the document, signed and lay back, relaxed and obviously pleased.

I left and returned to the office. A few hours later the phone rang with the message that the gentleman had died. That image followed me through my practice life. That was a good death or, in his eyes, mission accomplished.

Dr Chris Harding

Senior Lecturer in Asian History

School of History, Classics & Archaeology

In my work as a cultural historian I explore the connections between mental health and spirituality around the world, including at the end of life. I've been struck by the enormous diversity of answers to this question – what is a good death?

So my first response would be that a good death is one where the company of others is a true consolation rather than a source of pressure or anxiety about what a good death ought to look like.

The second thing that impresses me is an insight central to acceptance and commitment therapy, found too in some of Asia's religious traditions: that many of the frustrations and regrets associated with living and dying alike are bound up with our deep-seated tendency to root our sense of meaning and identity in 'doing' rather than 'being'.

Someone reaching the end of life may want nothing more than to complete a cherished project. But for others pain, tiredness, or physical incapacity might mean that most sorts of doing are beyond them. Here, one element of a good death might be coming to appreciate the value and to experience the consoling power simply of being, however little time may be left.



▲ From left to right: Jo Hockley, Norman Stewart and Dr Chris Harding in The Teviot Lounge in Teviot Row House. Photo by Sam Sills.

What you did next

Here we explore the interesting locations and careers that our alumni have found themselves in.

These postgraduate alumni have taken different paths, but they share a desire to stay connected to the University. They are all members of Platform One, our online meeting place where alumni, students and staff can gather, support, encourage and share.

You can join them at www.platform-one.ed.ac.uk

▼ Photos by Yao Hui and Johna Sue.

Daphne Loads

PgDip Social Work (1989)

It was my dad who inspired me to value education. He was a very talented man who never got the chance of further or higher education himself, but always encouraged his three daughters.

I initially studied English at the University of Cambridge before teaching English as a foreign language to students in Spain, Portugal and Egypt. I returned to the UK to pursue a career in social care and after working with people with learning disabilities in England I came to Edinburgh to do my postgraduate diploma in Social Work, graduating in 1989. The Social Work programme and the placements involved were demanding, and I still had a lot of growing up to do in those days, but I also knew that experiencing the programme had given me exactly what I needed to develop and move on.

I then started pursuing an interest in staff development and professional education, and began training teams and individuals to support people with learning difficulties to live as independently as possible. I also continued to pay attention to my own professional development, gaining professional qualifications in both counselling and horticulture. In 2006, I joined what was then the Centre for Teaching, Learning & Assessment at the University, and moved to the Institute for Academic Development when it was launched in 2011. All the time, I was studying for my Doctorate in Education from the Open University, which I completed in 2012.

I now lead the Principal's Teaching Awards Scheme, the Edinburgh Teaching Award and the Practical Strategies sessions – initiatives that aim to recognise good teaching throughout the University. I also teach on the Postgraduate Certificate in Academic Practice, a masters-level programme for academics who teach, and I'm an active researcher. I'm focusing on academic identities and arts-enriched development activities. It's part of my role to encourage colleagues to research and write about their teaching.

When I look back to when I left Edinburgh as a graduate I had no idea that I would be back as a member of staff in 2006. So much had happened in those 17 years. I came to study because I needed to grow and develop. I still do.



Sumita Kunashakaran

MSc International Studies (2014)

My time in Edinburgh definitely made me an internationally minded individual. I am now the Advocacy Executive with the Disabled People's Association in Singapore. I work on disability rights and policy. Living and studying in Edinburgh encouraged me to see the bigger world, as compared to the island I was born on, and how global events impact us in our everyday lives.

I have also published an article on unmanned aerial vehicles in an international security journal, been nominated for the United Nations (UN) Women Singapore's Impact Award, and joined the working group that will present a report to the disability committee at the UN in Geneva.

My motto for life and work is definitely 'When in doubt, always ask'. The worst that can happen is a rejection, in which case it becomes a learning point, and you can move on to the next exciting thing. There have been instances where I've worried about what people might think about me, but more often than not, asking questions and putting myself out there has always steered me in the right direction. It's even brought me experiences that I never thought possible.

Creating connections

Sumita has connected with current politics student Coady Johnston on Platform One, sharing advice and tips for life after graduation. Coady is grateful for the opportunity to connect with an alumna: "Being part of the Edinburgh community is advantageous because there is such a wide range of wonderful and helpful alumni, such as Sumita. Although it might seem scary to approach these people, they are very open to supporting you. It really has been so useful to have this contact for advice, a chat or even to find out about opportunities after I graduate."



Brandon Beech

MSc Nationalism Studies (2011)

I came to Edinburgh with a mission to find diversity – and I found it. I lived with four people from four different countries, while my programme of 16 students represented at least 10 different countries, and ranged from ages 20 to 80. We developed a unique community and friendship that we maintain to this day. In fact, whenever I return to Scotland from the US, my first priority is to meet with my 87-year-old friend, Irene, who studied with me. We've formed an incredible friendship. I bring the Prosecco, and she provides the stories.

After graduating, I completed a three-month internship at the British Consulate General in Chicago, which kept me connected to Scotland through regular networking with employees of Scottish Development International (SDI), which serves as Scotland's international economic development agency.

The networking served me well, and after completing my internship I began working as Vice-President for SDI in Chicago. I've been with them for more than five years now, and I spend my time promoting Scotland's energy sector throughout North America. As you can imagine, studying nationalism in Scotland has given me a certain understanding of Scottish and British politics – as well as the culture – and this is so valuable to me on a daily basis. I see my job as promoting Scotland as the ideal place to do business, and I passionately believe that it is.

I also head up the Edinburgh University Alumni Club of Chicago. That's another way for me to stay connected to the University and its people. We socialise together, bounce ideas off each other, and learn so much in the process. I believe that's what's so special about being an Edinburgh alumna – I'm part of this unique community and always will be.



Your words

Using a language other than English is a daily occurrence for many Edinburgh alumni spread over some 180 countries around the world. In celebration of our community's linguistic diversity, we asked you to share your words, with a particular focus on those with no direct English equivalent.

Here is a selection of your words, chosen with the help of Dr Charlotte Bosseaux, Senior Lecturer in Translation Studies.

Is your language missing? Send your word to alumni@ed.ac.uk and it may be added to our online feature.

Meriggiare

Meriggiare (Italian), from Latin *meridiare*, means to rest at noon, on a very hot day, preferably in the shade. It is not used often orally, especially by younger generations, but most Italians know the word because it appears in the title of a very famous (and beautiful) poem by Eugenio Montale called *Meriggiare pallido e assorto*, first published in 1925.

Chiara Ciucani

Visiting student, 2010



Gezellig

Gezellig (Dutch) describes the positive mood or atmosphere of a social get-together. For me, most often, it is the socially rewarding aspect of an event. An example is:

Ik zou het gezellig vinden om je snel weer eens te zien.

It would be nice (and socially rewarding) to see you again soon.

For me, the word *gezellig* reminds me of my life in the Netherlands. From getting together with friends for a beer on a cafe terrace, to trying to catch the first rays of the spring sun. But for those who know anything about Dutch culture and our infamous birthdays, where people sit in a circle to chat about politics and eat limited amounts of food, it may be strange that those parties were always *gezellig* to me, too.

Miranda Geelhoed

LLM in Global Environmental Law & Governance, 2014



Lagom

Lagom (Swedish) roughly translated means just right or just enough, but is used in all sorts of contexts. For example, *Lagom är bäst* roughly means enough is enough, though it really means enough is best, don't overdo it. Swedish is my adopted language, I have been living here since 1971.

Petal Roberts-Leijon
(formerly Hay, née Roberts)
MA (Hons) in Fine Art, 1968



ВИРІЙ

Вирій (Ukrainian; *Vyriy*) is a place where birds fly for the winter. You can also use it to describe a good, heavenly place. For example, if someone asks you how your trip is going you can reply:

Чудово, це місто справжній вирій.
Awesome, this city is a real paradise.

Volodymyr Shevchuk
MSc in History, 2018



Hiányérzet

Hiányérzet (Hungarian) is a feeling that something is missing, but you can't really pinpoint what it is. For example, when you go travelling and think you've forgotten something important at home. You could also say:

Egész jó volt a film, de egy kicsit hiányérzetem van.

I think this movie was quite good, but it's lacking something I can't quite pinpoint that would have made it great.

Dr Eszter Fazekas
PhD in Chemistry, 2019



默契

默契 (Chinese; *mòqì*) refers to the tacit understanding of another person's motivations and expectations. The word is made up of the characters 默 (*mò*) meaning silent and 契 (*qì*) meaning contract. It is commonly used among friends and teams when they've built up that connection which enables them to understand exactly what the other person wants, without explanation. You could say to your good friend:

我们很有默契 (*wǒmen hěn yǒu mòqì*)
We understand each other very well without having to say anything.

Grace Guan
MSc in Education: Language –
Theory, Practice & Literacy, 2010



Aloha

Aloha (Hawaiian) roughly translates to hello, goodbye, and I love you. But there is a deeper meaning to it. *Alo* means the front, the face, the overlying surface of something; *ha* is the breath of life. It is believed that your breath has a lot of power; it's the thing that gives power to your life. Traditionally, when you wanted to show someone some *aloha*, you would grab each other's head and touch your foreheads together. This is the *alo* part of *aloha*. Then, with your heads still touching, you both would each take a deep breath. This is the *ha* part of *aloha*. This deep breath is a symbol of you taking in another person's *ha*. It shows that you understand them and love them because you literally inhaled their breath of life. Likewise, they understand and love you. *Aloha* is something that people use to show that they respect each other.

Jonathan Carino
MSc in Health Systems & Public Policy,
2017



Fernweh

I've always liked *Fernweh* (German) as an opposite to homesick in the sense of yearning to go somewhere far away. I think the most natural way to use it would be to say "*Ich leide unter Fernweh*" or "*Ich habe Fernweh*" (I'm suffering from or I have *Fernweh*). It's similar to wanderlust, the desire to travel, but not quite the same, I'd say, because *weh* implies a sense of painfulness, rather than joy. There's a great German pop song, *Einfach nur weg*, by Johannes Oerding, which describes the feeling perfectly, in my opinion.

Jonas Kellermann
Visiting student, 2013



LANDMARK

Common places

Rather than the iconic or the familiar, this edition of *Edit* seeks to celebrate Edinburgh's campus nooks, common spaces and social places. Often unassuming and modest, our shared spaces help make the other stuff happen. From tea breaks to serious debates and frivolous flights of fancy, common places are about spaces that bind people together, foster friendships and spark ideas. Sometimes the only remarkable thing about them is the kettle, the biscuit tin or the mug tree, but isn't that the point?

Share

We want to know where your common place is. Email alumni@ed.ac.uk with the details or tweet [@ed_commonplaces](https://twitter.com/ed_commonplaces).

▼ Darwin Dance Hall, Ashworth Laboratories. Photo by Laurence Winram.





▲ Easter Bush campus vegetable garden. Photo by Heather Thomson.



▲ The Cockburn Geological Museum, Grant Institute.



▲ uCreate Studio, Main Library.



▲ Royal Medical Society common room, Potterrow. Photo courtesy of the Royal Medical Society.



▲ Fourth floor breakout space, 50 George Square.

Leading the way

Professor Ann Smyth, Secretary of the General Council, graduated in psychology from Edinburgh in 1970 before adding an MPhil and a PhD from the University to her CV. Eleri Connick, 2018/19 Edinburgh University Students' Association President, gained her degree in philosophy in 2018.

As leaders of these vital University bodies, they ensure that the views of students and graduates are represented. Here Ann and Eleri share their passion for their roles and the benefits of getting involved with the University.

What drew you to your respective roles?

Ann: I had served for eight years as a General Council Assessor on Court and more recently on the steering group tasked with reviewing the Scottish Code of Higher Education Governance, so I felt I had a broad understanding of the University and its governance and some insight into how the General Council could be helpful at a time of change in the sector.

Eleri: I had the most amazing year as Vice-President of the Sports Union. I wanted to take this passion and use it on a bigger scale. I absolutely love the University because it has

given me so many incredible opportunities and I wanted to push a manifesto that ensured all students get to make the most of their time here.

Are there any similarities between the two bodies?

Ann: I think the constituencies for both the Students' Association and the General Council have grown enormously. In a world with demands competing ever faster for people's attention and time, we both face a challenge in communicating effectively with our members and encouraging them to engage actively in our organisations and their activities, including elections.

Eleri: Yes, 100 per cent! Both bodies take representation seriously and it's so exciting that we both get to sit on University Court and ensure that what our members are saying is being heard at the highest University committee. It will be exciting to see how many of the student reps of 2018/19 move on to sit on the General Council in the next few years.

What are the benefits of being involved more deeply with the University?

Ann: I enormously value the insight into the range of innovative work in which the University is involved, whether in its thinking about delivering world-class higher education to equip people for the 21st century, its cutting-edge research or its commercialisation activities. Of course, there is a particular joy in the opportunities for engagement with students. They give a tremendous sense of pride by association, and hope for the future of our troubled world.

Eleri: I know I'm extremely lucky to be representing the students at this institution and it is the students' incredible stories that keep me energised. This role really does give you the power to make seriously big changes for students and that's incredibly rewarding.

Get involved

Find out more about the work of the General Council at www.general-council.ed.ac.uk and the Edinburgh University Students' Association at www.eusa.ed.ac.uk

▼ Eleri and Ann sharing wisdom on their roles. Photo by Yao Hui.



Where next?

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Platform One

The University's new online community for alumni, staff and students.
www.platform-one.ed.ac.uk

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