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The Network of Life: changing what
we think we know about evolution.

Why there's more to the Bumps
than just messing about on the river.



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Nash Weerasekera

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Welcome to the Easter edition of *CAM*.

Editor's Letter

It rains. The rules are complicated. Everyone has to get up at 6am (six days a week, for weeks and weeks on end). Is it worth it? Of course it is. Because there is nothing like the feeling you get rowing with pride, and possibly with flowers in your hair, in the College III – or IV, or even V – boat in the Bumps. Relive it all on page 18 – and I promise we don't mention ergs. Not even once.

However, while some of us were messing about on the river, others have been busy rewriting the rules of evolution. Forget the Tree of Life (so – quite literally – 19th century) and instead, on page 36, meet the Network of Life.

Meanwhile, if you're planning to read the rest of this magazine on a sun lounger (excellent choice), might we suggest some rather magnificent bookshops to visit – and some fascinating summer reading? Celebrated readers, from Vick Hope (Emma 2007) and Professor Robert Tombs to Professor Lord Martin Rees and Sathnam Sanghera (Christ's 1995), share their recommendations – and confess what they should be reading but, frankly, aren't. All on page 29.

Elsewhere, on page 11, Sandi Toksvig (Girton 1977) explains what she is doing back in Cambridge, and on page 8, Dharshini David (Downing 1991) makes some surprising revelations as she revisits her old room.

On these topics – and on all things Cambridge-related – we look forward to your contribution to the debate, online at magazine.alumni.cam.ac.uk, by post and email or on social media.

Mira Katbamna
(Caius 1995)



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Inbox

Greeks bearing gifts

✉ The story of Mike Brearley (Alumni life, *CAM 101*) needs completion: in the end, Dodi Rylands did not direct the Greek play (*Clouds* by Aristophanes), and Mike accepted the part of the god Hermes. I too was a performer in that performance and, on the last evening, my college teacher at Jesus, Moses Finley, introduced me to the Greek ambassador to London, George Seferis. George was a famous Greek poet, who a few weeks later sent me a gift, a paperback edition of some of his verse in translation.

Sidney Miller (Jesus 1961)

Kettle's Yard

✉ For me, Jim Ede's generosity and hospitality at Kettle's Yard was one of the great experiences of being at Cambridge. At various times I had drawings or paintings by Christopher Wood, Alfred Wallis and Ben Nicholson in my digs on Parker Street.

Nicholas Bielby (Downing 1958)

My room, your room

✉ Whenever graduates of a certain age gather, there is often escalating boasting about who had the most challenging lavatory arrangements – John Simpson's long corridor at Magdalene was capped by David Latimer's snow-

covered Gisburne Court crossing at Peterhouse. These inconveniences came about because of the ending of the use of chamberpots. Anthony Powell's memoir, *Infants of the Spring*, recalls their vital importance. In 1923, his friend Alf Duggan came close to being sent down from Oxford because his scout reported him as being absent from his room overnight. Duggan had neglected to set up the usual ruse to fool the scout, which was to arrange "for a friend to untidy the bedclothes, and urinate in the chamberpot, the night before; thereby giving an impression that the owner had risen early and was already up and abroad."

David Mills (Caius 1982)

This idea must die

✉ Professor Roulet has identified that older generations typically assume their younger counterparts are less hard-working (This idea must die, *CAM 101*). However, he omits an important new generational difference. Recent research suggests Gen Z workers take more sick days, are twice as likely to suffer from depression as the average worker, and more than twice as likely to take time off due to stress compared with those over 55. To explore those more, the think tank Health Action Research Group, of which I am chair, is putting

together an inter-generational research project to explore Gen Z's perceptions of negative feelings compared with their grandparents' generation, and we'd welcome any questions, suggestions or evidence.

Michael Baber (Downing 1968)

An ill wind

✉ The bireme depicted on page 29 (*CAM 101*) can't be making much headway – the wind is blowing it towards the right, but the galley slaves on the top deck are doing their best to propel it in the opposite direction; while those on the lower deck appear to have gone on strike!

Richard Holroyd (St John's 1968)

A good story

✉ Lucy Jolin's interesting article on the power of stories/narrative includes a reference, headed 1896, to *La Fée aux Choux*, a film described as "arguably the earliest film to tell a story". This claim might have some validity if the date were correct, but the film is more likely to have been made about five years later, by which time film stories were not uncommon. The later dating is supported by many members of the Association française de recherche sur l'histoire du cinéma (of which I am a member), but we are opposed by a large band of Alice Guy supporters who base their earlier

claim on little more than Guy's reminiscences. And the Guy-ites have the better narrative: a humble woman beat the well-established men! As your article puts it: "Forget facts. If you really want to win an argument... make sure you've got a really good story."

Stephen Bottomore (King's 1974)

In support of raw milk

✉ I was disheartened to read that the University Farm sell its milk to a national corporate dairy and that Mark Holmes thinks that putting unpasteurised milk on cornflakes is not a very good idea. Pasteurised, homogenised milk and raw milk are two very different foods and there is growing evidence that raw milk has a number of health benefits. I work for an organic dairy farm that has pioneered direct sales of raw milk and associated products for more than 25 years. Hygiene is a top priority – they treat their milking parlour as a food preparation area and there are rigorous and regular health tests. Many of the thousands of customers buy the products for health reasons. The University farm might benefit from researching the opportunities that direct sales of raw milk could bring, not only to it but also to the people of Cambridge.

Paul Lovatt-Smith (Robinson 1980)



200+ fragments of a 75,000-year-old Neanderthal skull reconstructed at the Department of Archaeology, revealing the face of ‘Shanidar Z’

cam.ac.uk/shanidar-z

Compendium



Philanthropy

Landmark donation boosts pioneering early cancer research at Cambridge

The Early Cancer Institute – the UK’s only research facility dedicated to understanding early cancer – has received a landmark £11m donation to support its vital work in the fight against cancer.

The generous gift will support the redevelopment of the Institute’s Hutchison Building, enabling it to create the cutting-edge laboratory space its research teams need to drive their early detection efforts forward.

Detecting and treating all types of cancer earlier dramatically increases survival rates and reduces healthcare costs. But detection and treatment methods have changed very little for hard-to-treat types of cancer over the past few years. Researchers at the Institute are making pioneering early detection research advances and translating these into clinical practice.

They have used the power of theoretical physics to identify blood cancer years before the patient has symptoms, while biology and chemical engineering experts have collaborated to develop a method to detect and destroy early lung cancer.

The building will be renamed the Li Ka Shing Early Cancer Institute, in honour of the enduring partnership between the Li Ka Shing Foundation and the University. Sir Ka-shing Li generously donated to the original Hutchison Building in 2002, and then – in 2007 – to the Li Ka Shing Centre, which houses the CRUK Cambridge Institute.

“This inspirational journey with Cambridge University, spanning more than two decades, fulfils my lifetime commitment to build the good of science,” says Sir Ka-shing Li. “I am truly gratified by this partnership.”

Research gift

Renowned biomedical Egyptologist Professor Rosalie David has made a gift in her will that will support early career researchers at the Department of Archaeology. "People who are very good often tend to not continue their research, largely because they cannot see how to fund their next steps," she says. "If we can bridge that gap, more young researchers can build their careers."

cam.ac.uk/rosalie-david



Deconstructed

Medieval money mystery solved: new tests reveal the origins of silver coins

Between 660 and 750 AD, the use of silver 'pennies' in Anglo-Saxon England surged. But until now, nobody knew where that silver came from.

A research team has analysed coins held by the Fitzwilliam Museum for the first time, using a new technique known as portable laser ablation.



They found that coins from 660 to 750 AD matched silver from the Byzantine Empire, while coins from 750 to 820 AD matched silver from France.

"Now we have confirmation that Byzantine silver was the dominant source behind the surge in minting and trade," says Professor Rory Naismith.

Three-minute Tripos

WELLNESS BELONGS TO POLITICAL RADICALISM AND NOT THE RICH AND FAMOUS. DISCUSS.

AAAAAAAAEEEEEEEE! AAAGGGHHHH!

What the actual heck?

I'm practising primal screaming within the forest bath, therefore holistically releasing the psychological toxins from the deep core of my lizard-brain.

And how much did you pay for that?

My wellness guru is doing a special offer for a selection of followers only. If you book five forest screaming sessions, you get a free organic vegan protein meal substitute shake.

Wow.

And a water bottle! For the environment. And for the climax of the ceremony when we all drink our own urine.

OK.

It has amazing health benefits.

You do know that you scream and drink your own wee in the forest for free, right? That's what they did back in the 70s.

Yeah, but back in the 70s all the gurus were so... hairy.

Well, at least they were championing self-care as a way to enhance social wellbeing just as much as they focused on the needs of the individual.

I am absolutely enhancing social wellbeing when I spend £50 on dehydrated dopamine balancing water pills and share a picture of them! I'm sharing love and grace!

But don't you long for the era which Dr James Riley describes in his new book, *Well Beings: How the Seventies Lost its Mind and Taught Us to Find Ourselves?* When wellness wasn't about celebrity endorsements and quackery for the rich, but something much more practical, accessible and political?

Now that's an entirely new wellness concept! Stripped down! Back to basics! Hairy!

cam.ac.uk/reclaim-wellness



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THE WEST END IS CLOSER THAN YOU THINK!



Cambridge Arts Theatre



Clockwise from top left: Peter Methley, Corpus, PhD Earth Sciences; Boris the mascot; John Leung, St Johns, Third Year NatSci; Margaret Johncock, Peterhouse, Third Year NatSci; and Timothy Wong, Robinson, Fourth Year NatSci.



bang

Crash

Creating CHaOs – the students taking their love of science to UK schools.

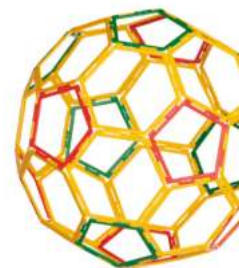
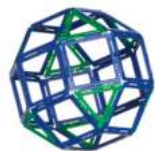
WORDS **PETER WATTS**
PHOTOGRAPHY **ADAM LAWRENCE**

squelch

splat

whoosh

pop!



Any student joining CHaOs, Cambridge's student-run science education outreach group, must be prepared to get their hands dirty... and eat their own body weight in sweets. "We bribe our volunteers with sweets and chocolate – the amount of sugar we consume is not good," says Margaret Johncock, a third year Natural Sciences student and CHaOS President.

"We travel round the country visiting schools with a van-load of experiments. We make explosions, we have skeletons, we have vacuum bazookas – we do all sorts of things. It gets children interested in science and you feel like a child again yourself."

CHaOS – Cambridge Hands-On Science – was founded in 1997 to introduce primary and secondary school children to the wonders of science through entertaining experiments. And since 2002, CHaOS has run annual summer roadshows, with student volunteers giving up one or two weeks of their holidays to

travel to different parts of the UK, staying at campsites and visiting schools, museums and libraries. It's all made possible by donations from scientific and educational bodies as well as individuals – CHaOS is always looking for supporters.

As well as the big summer roadshow, there are other events throughout the year, such as school visits and the Crash, Bang, Squelch! event in the Department of Zoology laboratory, where 1,500 excited children are let loose under the supervision of 100 volunteers. On these occasions, CHaOS really lives up to its name.

Johncock says that even the simplest experiments can blow young minds – a piece of string tied to a Slinky and then held to the ear produces sounds akin to a 'death ray', while all children relish making slime or using baking powder to power a homemade rocket.

For their part, club members get to travel,

meet other students who share their passion for science and watch young children's faces light up with delight as they make something else go bang. "We travel and share stories around the campfire," says Johncock. "But we also get to show kids from disadvantaged backgrounds that they can be scientists – and that a scientist can be anyone. It's a great way to engage. The teachers often tell us that this is the most excited the children have ever been, and it is amazing to see the impact it makes."

For more about the group's education outreach work, visit chaoscience.org.uk



K15, Downing College

Journalist Dharshini David meets Jiyaad Ali to discuss the challenges of a work-life balance and why the must-have gadget in her day was... a microwave.

WORDS LUCY JOLIN PHOTOGRAPHY MEGAN TAYLOR



Back in the 1990s, one particular gadget was the guarantee of social success. A CD player? A PlayStation? “A microwave!” says Dharshini David (Downing 1991). “I made a lot of friends. It meant that I ended up experimenting and baking cakes in it. So, I became the person who made cakes for birthdays in the microwave. It was a little bit trial and error, but I don’t think we blew anything up...”

Rather less successful was her famous Tuna Surprise: tuna, sweetcorn and tinned tomatoes. “Are students healthier these days?” she asks the room’s current occupant, Jiyaad Ali (Engineering, Second Year), who admits that Mill Road’s plethora of delicious takeaway outlets was somewhat damaging to his waistline (and bank balance) in his first year. “This year, I’ve been trying to eat a lot healthier. Chicken and rice is my

signature dish. And Hall food is great, too. I’ve already had it this morning because I couldn’t be bothered making breakfast.”

There’s certainly plenty of room for all manner of gadgets: K15 is large and light, with neutral walls and stripy curtains framing two vast windows. “I loved the view: being able to see into the Downing site and see people walking back from lectures,” says David. “Hearing people’s music through the walls, and the organ from the chapel.” For Ali, it’s something of a downgrade. “My room last year was even bigger!” he says, “almost twice the size of this.” He is manfully struggling through, however. “I’ve only got two plug sockets, which is a bit of a pain. But I’m managing!”

David, meanwhile, is marvelling at the glow-up since her days – a notable exception being the radiator, which is still making

strange noises. “So I suspect it’s the same radiator. But now it’s got matching furniture, as opposed to stuff that looks like someone just shoved it in a room.” The ensuite is a welcome new addition. “I feel quite emotional but also quite jealous. When I was here, you had to wander down the corridor and use the block at the end, which wasn’t particularly nice.”

But she nonetheless had the time of her life: starting the Abba Society (“I think we got featured in *The Sun*”), making a tight-knit group of friends along her corridor, and even taking up rowing. “I got the work-life balance thing a bit wrong, because a lot of rowing is done in the morning, and my fingers would freeze. My friend Tina and I always used to be late to the 9am lecture, because we couldn’t move our hands to get back in the room to change. And my handwriting was

I loved seeing people walking back from lectures, and hearing other people's music through the walls and the organ from the chapel



appalling. I couldn't read my notes because my hands were so cold."

Finding that mix can be tricky, Ali agrees: alongside his work, he also plays for Downing's football, basketball and hockey teams. "My course is probably one of the hardest – though a few friends disagree! But I think the balance of studying different disciplines of engineering and managing time between labs, lectures, supervisions and relaxation can be quite difficult. It took me a good year to figure out a good balance between work, academic, having a social life and personal wellbeing."

Cambridge is a dream come true for him, he says – and he's determined to make the most of it. "Not many people go to university from my area of Manchester, especially universities like Cambridge. This is a once in a lifetime opportunity, so I don't want to leave having regrets." David agrees. "I went for a job in an investment bank," she says. "And I remember in an interview, the guy who would become my boss asked me how I felt about my degree result – I'd just missed a First. I said I was really pleased because I got such a great balance, and had such a brilliant time."

Jiyaad Ali is studying Engineering. Dharshini David is chief economics correspondent for BBC News and a presenter for Radio 4.



Neuroscience

Gene therapy breakthrough in hearing treatment

A baby girl born deaf can now hear unaided for the first time after receiving gene therapy at Addenbrooke's Hospital.

Opal Sandy was born completely deaf because of a rare genetic condition, auditory neuropathy, caused by the disruption of nerve impulses travelling from the inner ear to the brain.

At 11 months, she was given a gene therapy infusion to deliver a working copy of the OTOF gene. This gene produces a vital protein called otoferlin, which allows the inner hair cells in the ear to communicate with the hearing nerve.

Now 18 months old, Opal can respond to her parents' voices and can communicate words such as "Dada" and "bye-bye."

Chief investigator of the trial Professor Manohar Bance, an ear surgeon at Cambridge University Hospitals NHS Foundation Trust, says these results are "spectacular".

"Gene therapy has been the future of otology and audiology for many years and I'm so excited that it is now finally here," he adds. "This is hopefully the start of a new era for gene therapies for the inner ear and many types of hearing loss."

cam.ac.uk/gene-therapy

ILLUSTRATION: MICHAEL KIRKHAM

In brief

NEW CLIMATE CAMPAIGN

Climate experts including Nigel Topping, the UN's COP28 Climate Champion, and Mike Berners-Lee, author of *There Is No Planet B*, are backing the Cambridge Press and Assessment Climate Campaign. The group is calling for an independent review to gather evidence on the climate knowledge and skills young people urgently need.

A DOG'S LIFE

A new study from the Department of Physiology, Development and Neuroscience suggests a quarter of labradors have a genetic mutation that hard-wires them for obesity. The POMC mutation profoundly changes the way certain dogs behave around food, making them feel hungrier in between meals and burn fewer calories when resting.

CONCRETE EVIDENCE

Researchers from the Department of Engineering say their method of recycling cement – the carbon-hungry ingredient in concrete – could be a 'miracle' for the transition to net zero. By substituting the lime flux normally used in steel recycling with used cement, recycled steel and recycled cement are created simultaneously, reducing their carbon footprint with no significant cost increases.

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Sandi Toksvig (Girton 1977) is the first Qantabrigian Q+ Fellow Sociology and a Bye-Fellow at Christ's.

Mapping the world of great women and their incredible stories

INTERVIEW **LUCY JOLIN** ILLUSTRATION **KATE COPELAND**

What do you have to do to be a 'notable' woman on Wikipedia, that supposed repository of all the world's knowledge? After all, the eminent Canadian physicist Donna Strickland was deemed not 'notable' enough to have her own entry. Contributors kept writing and posting the page, and it would then disappear, in what's known as a 'drive-by deletion'. This kept happening right up until the day that Strickland won the Nobel Prize. There you go, women: if you want to be 'notable' on Wikipedia, just win a Nobel Prize.

It's certainly notable that Wikipedia is 80 per cent by, and about, white men. And it is, of course, not the only place where women are erased. Take the film *Oppenheimer*. So many amazing women living interesting lives are given no background or hardly noticed at all. Imagine what it must have been like to be one of the youngest female scientists at Los Alamos – yet acclaimed chemist and feminist activist Lilli Hornig apparently merits only one line.

I have decided this is not OK. But what to do? Initially, I considered writing an atlas. But you can't fit all the world's women into a single book. Then I met Professor Sarah Franklin in the Department of Sociology, who founded the Qantabrigian Fellowship: it enables distinguished Cambridge LGBTQ+ alumni to spend time at the University to conduct a research project or incubate a new idea. I'm now honoured to be the first Q+ Fellow. And with the help of Professor Allen Blackwell in the Department of Computer Science, we are creating Mappa Mundi.

The name is inspired by a map from 1300 – the Ebstorf Mappa Mundi, created by the nuns of a monastery in Ebstorf, Germany. Three metres square, the Mappa Mundi is a piece of art showing what the nuns thought the world contained. I want to do that again – but online. In our Mappa Mundi, you'll be able to click on an interactive globe to watch and listen to women speaking about their lives. You'll see the data about how they live, and access information about great,

overlooked women of the countries you click on – historians, scientists, musicians and artists. It will be curated in each country by the women of that country. And the support of feminist men will also be critical to the project.

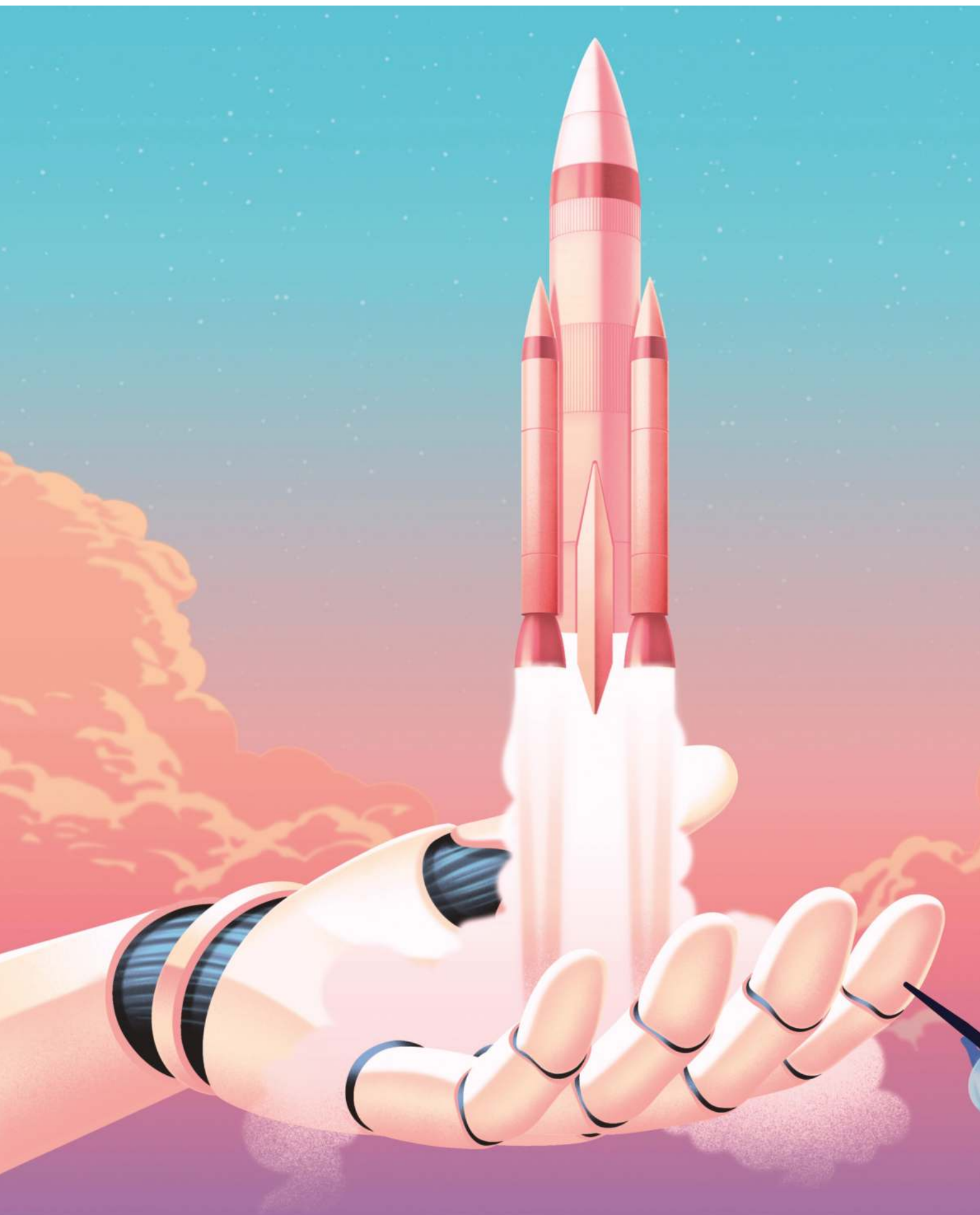
Lilli Hornig died in 2017. She is not ancient history. Yet if we're not careful, women like her will continue to disappear from the historical record – or be remembered simply as a single line from a film. That's not good for society. The fact is, women have not achieved equality in a single country in this world. And it's better for everybody if we have equality. If you have diversity everywhere, everybody does better. I'm trying to change the world by changing how we look at it.

But we must do it properly. There is no way we can create Mappa Mundi as a crowdsourced free-for-all: the website would be destroyed within an hour of going live. So we need funding to hire a small group of people who can give this project the attention it requires. We need to find more ways to give the project academic rigour. And we need a board of trustees, as the aim is for Mappa Mundi to become a foundation. Right now, it's just me trying to do everything. That includes sitting in wonderful computer science meetings mostly not understanding what anyone is saying.

So, let's make it happen. I've been stunned by the reaction to the project, and I've been swamped with offers of help. Recently, I spoke to a group at Newnham. I assumed they'd ask me about *The Great British Bake Off*. Nobody did – all the questions were about Mappa Mundi. But now I have to find a way of achieving it, of creating this vast repository of amazing women and data and stories and using it to drive equality. And I think we can do that at Cambridge. After all, if we can't do it here, where can we do it?

To find out more about supporting the Mappa Mundi project, please contact: rosalind.griffin@admin.cam.ac.uk

Wikipedia is 80 per cent by, and about, white men. It is, of course, not the only place where women are erased. I have decided this is not OK



HELPING

Finding answers to the really big questions no longer depends on human ingenuity alone: machine science is enabling scientists to go further faster than ever before.

WORDS **MARK FRARY** ILLUSTRATIONS **NASH WEERASEKERA**

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First there was Newton, then Einstein. But when it comes to next steps in our understanding of how the world around us actually works, it's less a case of 'who' and more about 'what'. Welcome to the new machine age.

Deep in the heart of the Centre for Mathematical Sciences, Dr Miles Cranmer is working on, and with, a new dimension in science – a neural network or machine scientist, a series of algorithms that aim to mimic how the human brain works. It's a sort of Sir Isaac Newton for the AI era.

The network is trained by feeding it data to make it better at its purpose – in the same way that the hugely popular AI chatbot ChatGPT has been trained on millions of pages of text from books, newspaper articles and web pages. But rather than building a way for computers to mimic human speech, for example, Cranmer's machine scientist has a loftier goal – to become the next Newton, Curie, Einstein or Hawking.

"I became interested in machine learning because I started thinking about the pace of scientific discovery," says Cranmer, who grew up near Toronto and studied undergraduate physics at McGill University in Quebec. "I remember reading an interview with someone talking about how, in physics, there can be generations before we solve specific problems. That, to me, was very frustrating to hear, but it made me think: 'How can we accelerate the pace?'" Cranmer realised that machine learning might be able to help, because its analytical power scales exponentially with computing power – which has been growing exponentially for 50 years. >

PULL QUOTE
PRESENTS THE VALUE OF THE
ALGORITHM FOR PLANETARY MOTION

The machine scientist is fed tens of thousands of simulated planetary systems. The data is crunched on a single graphics processing unit – the same sort of chip that sits in high-end gaming PCs. And the result? A simple algorithm for planetary systems that provides 10 times greater accuracy than existing equations based on chaos theory

ILLUSTRATION
A LARGE HAND
USES A PIPETTE

As the machine learning model gets trained, the outputs of the various algorithms are tweaked or weighted. And as the outputs get closer to the actual data, the artificial brain closes in on the best model for that data, something very difficult for the average person to do. This gives the machine scientists a huge advantage, says Cranmer. “The human brain is not like that.”

Take the solar system, and specifically our understanding of the motion of planetary bodies within it. While science dating back to Johannes Kepler and Newton can accurately predict the behaviour of planetary systems with two bodies, adding more bodies makes those systems chaotic and harder to model accurately far into the future, because of the complex instabilities introduced by the gravitational tugs between the growing number of bodies (as fans of the novel *The Three-Body Problem*, now a Netflix hit series, will know).

Under Cranmer’s supervision, however, the machine scientist is fed tens of thousands of simulated planetary systems. The data is crunched on a single graphics processing unit – the same sort of chip that sits in high-end gaming PCs. And the result? A simple algorithm for planetary systems that provides 10 times greater accuracy than existing equations based on chaos theory.

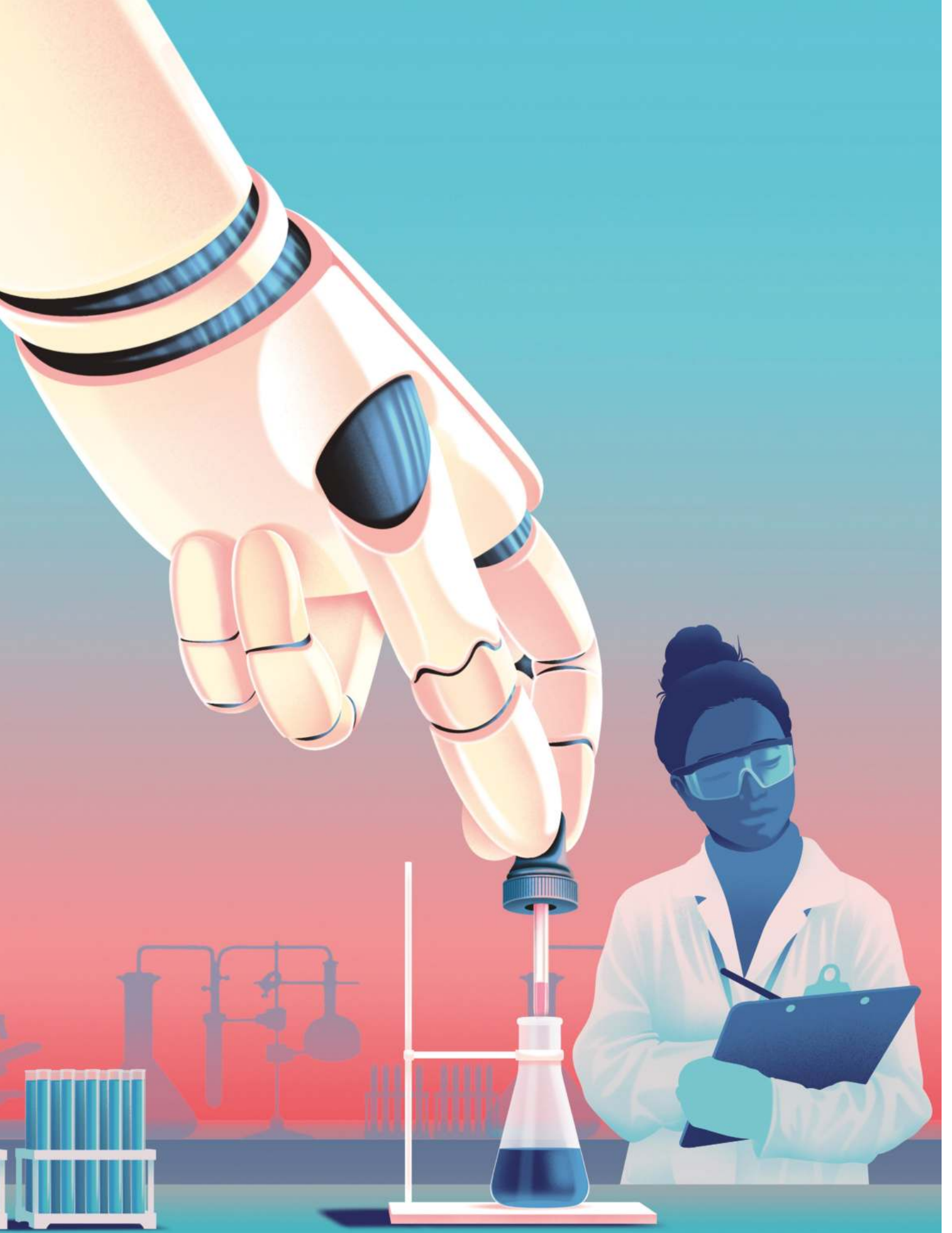
“What machine science allows us to do is crunch large scientific datasets and discover empirical equations that concisely describe the data, without having to work out the theoretical basis in advance,” says Cranmer. This, he says, is an inversion of the usual process where a theorist comes up with a plausible description of the universe and then experimentalists carry out research to confirm or challenge the data (which is how the existence of the Higgs Boson was proven, for example).

There are precedents for such work. Newton’s law of universal gravitation worked very well for 250 years in predicting the movement of planets. When Albert Einstein came along with his theories of gravitation, scientists realised that while Newton’s equations were good, they only told part of the story. Einstein’s theories boiled down to Newton’s equations in most everyday situations, but Einstein’s tweaks explained phenomena that Newton’s laws could not.

But in Cranmer’s world, the machine scientist starts with a simple equation – perhaps the equation of a straight line, the simplest form of equation with the lowest number of parameters. Then the machine starts making small modifications, adding in extra parameters until the equation matches the real-world data as closely as possible.

Given that any set of data can be recreated by a suitably complex equation – the basis of a branch of mathematics called Fourier analysis – the challenge for Cranmer is to ensure that the equation the machine scientist spits out actually represents a real-world physical process. “We are trying to optimise both accuracy and sparsity,” he says. ›

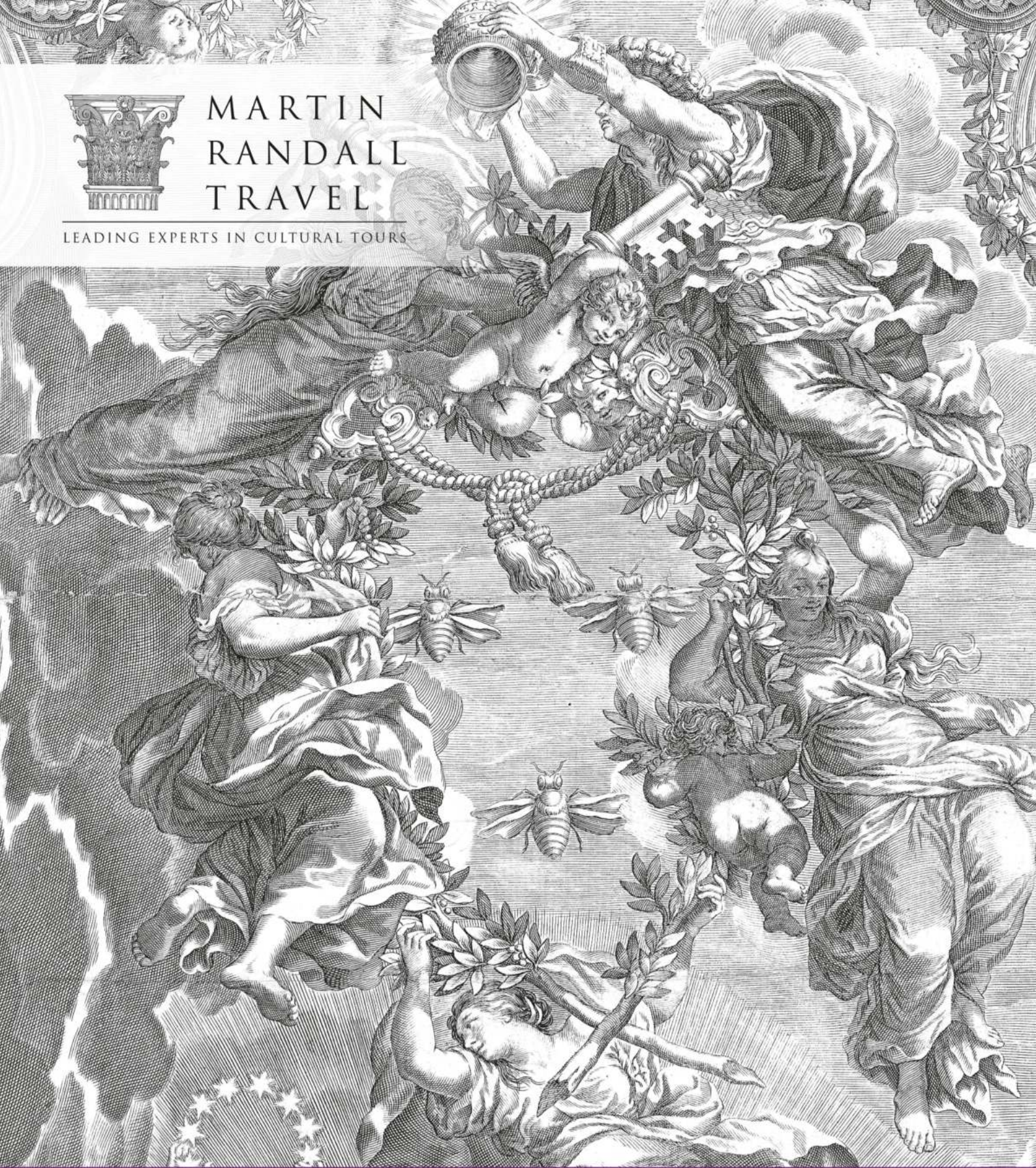






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Illustration: 18th-century engraving after a ceiling painting in Palazzo Barberini, Rome.

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PULL QUOTE
DISCUSSES THE INVERSION OF THE
USUAL EXPERIMENTAL PROCESS

What machine science allows us to do is crunch large scientific datasets and discover empirical equations that concisely describe the data, without having to work out the theoretical basis in advance. This is an inversion of the usual process where a theorist comes up with a plausible description of the universe and then experimentalists carry out research to confirm or challenge the data

PAGE FURNITURE
SIGNALS INTRO FOR
FINAL PARAGRAPHS

By getting the machine scientist to favour the sparsest equations possible – those with a minimum of parameters and using simple mathematical operators – he hopes it may mirror some underlying physical reality that can be gleaned from looking at the equation. After all, Einstein’s $E=mc^2$ is a relatively simple equation that contained a huge number of new ideas.

The next step for Cranmer, in collaboration with NYU and the Flatiron Institute in New York, is to create something with even grander goals – to build a general AI tool that is multi-disciplinary, learning general models for science that work across many fields – thus accelerating discovery of new scientific frameworks themselves. Rather like generative AI tools such as ChatGPT, the team are now working on creating an all-purpose machine scientist based on what is called a foundation model.

However, unlike ChatGPT, this foundation model will be trained on vast amounts of purely scientific data. It is a fundamental shift in how machine learning is used. “The reason we think building foundation models for science will work is because, in science – as in language, images and videos, for example – we have these universal concepts across different fields,” says Cranmer. “If you zoom out and look at all of science, there are concepts like causality and conservation laws that are shared between disciplines.”

Cranmer believes that applying ideas from one area of science to another could lead to new and faster discoveries. “It’s basically trying to connect different fields of science that we’ve never really had the chance to understand, because you need someone who is an expert in two areas of science to realise the connections,” he says.

Cranmer’s all-purpose machine scientist will be called Polymath 1, and is set to be released later this year. The type of data Polymath 1 is being trained on includes the reaction diffusion equation, the compressible flow equations and the Navier-Stokes equation for incompressible fluids, along with many others.

“One thing that is really interesting is that the datasets you use do not need to be closely related to the science you care about,” says Cranmer. “It turns out it doesn’t really need to be related at all. The model will still pick up general concepts from whatever data you feed it. We have even found that machine scientists trained on a dataset of cat videos does better at finding these connections in science. It’s incredible. Cat videos are not related to the movement of fluids, but it is learning how cats move and the physics of that.”

Polymath 1 will be opened up to all scientists, in the hope that they will be able to explore interesting new applications. “People can then start downloading it and fine-tuning it to different tasks,” he says.

Does Cranmer think his machine scientist will replace human ones? Simple answer – no. “Polymath 1 is a tool scientists will use to accelerate the discovery process. The scientists are still key. Even if we can predict something with 100 per cent accuracy, I don’t think scientists would be satisfied. Fundamentally, humans will always want to understand as well as predict the universe.” ©

For more information, please contact meaghan.annear@admin.cam.ac.uk



BUMPS BUMPS

You'll never make the Blue Boat, and Blondie and Goldie are only a dream. But you still fancy your day on the water with an oar in your hand. It's time for messing about on the river.

WORDS LUCY JOLIN PHOTOGRAPHY JOE MCGORTY





Easter Term 2001, and Alex Goldsmith (St John's 1999), Captain of the Lower Boats, crashes through the door of the St John's bar. "Who in here rows bow side?" he bellows. Luis (Luigi) de Guzman (St John's 1998) only has one season of rowing under his belt. He is, he will happily admit, terrible at it. But for some reason – his deep love for his College? A romantic dream of saving the day? Too many beers? – he raises his hand. Next morning, he discovers that he is now in the fifth men's boat for the May Bumps. "The College had too many spots in the bump order that it had to fill – or forfeit," he remembers. "So, we were the scratch crew."

Their first practice starts inauspiciously, in an ancient clinker boat that famously must be left in the river for the boards to swell, otherwise it takes on water. The boat has not been left in the river. De Guzman's crew make it as far as Plough Reach before rowing back, deep in bilge and gloom. "We complained to the boatman, the formidable Roger Silk. Roger, in his inimitably surly way, snapped back: "I don't know what you're complaining about. She was Head of the River in 1954."

The May Bumps approach: de Guzman's valiant crew do their best. They are bumped three days in a row. The humiliation! But our heroes will not give in. And on the fourth day, their

courage is rewarded... by everyone else being worse. "There was such carnage ahead of us that the marshals stopped the racing and awarded us a technical row over. We held our place on the river, and we felt like conquering heroes. It didn't matter how terrible we were. We came around the Plough and our blades squared up and there was an enormous shout from the bank. Honestly, that was the proudest I ever was."

If you've ever rowed in the Bumps, or shouted from the bank for your College, you'll no doubt be nodding along with de Guzman's story. But if you don't know your coxes from your crabs, stay with us. The Bumps – in the simplest of terms – is a rowing race where the crews aren't side by side: there isn't enough room on the Cam. Instead, each boat starts a certain distance apart, strung out down the river. A very small cannon goes off and each boat must now row as fast as it can. The object? To bump the boat in front of you while avoiding getting bumped yourself.

Bumping, or getting bumped, moves your boat up and down the league tables; the finishing order of the crews for one set of races forms the starting order for the next. Lent Bumps take place in Lent and May Bumps (naturally) take place in June. (There are many more rules: those interested in the finer points of administration, such as whether a boat proceeding to the start of the Bumps may spin before First Post Corner, may consult the excellent CUCBC website.)

The first Bumps race took place in Lent 1827, and they've been going strong ever since, with only the occasional cancellation due to world wars, a global pandemic or British weather. But while it's easy to see >





A BUMPS GLOSSARY IN TERRIBLE VERSE

If your boat or oar or crew
Touches the boat in front of you
Then hurrah! A **BUMP** is given!
Off you go to rowing heaven.

And don't forget, with joyful thanks
To **WEAR THE WILLOW** from the banks
Festoon your team with leaves divine
But not too many. (You'll get a fine.)

Bump every day and you'll parade
A lovely painted oar – a **BLADE!**
(Or rise four places and – hooray –
A **TECHNICAL BLADE** will come your way.)

If you don't bump or get bumped at all
“**A ROW OVER!**” the ref will bawl
But watch your oar doesn't get stuck
You'll **CATCH A CRAB** and lose your luck.

Reached your division's very top?
Your **SANDWICH BOAT** cannot now stop
You'll row again – such indisposition –
At the bottom of the higher division.

And if to Division One's heights you rise
HEAD OF THE RIVER will be your prize.
Off you go to drink and cheer
And contemplate doing it all again next year.

the reason why so many long for the glamour of being a Light Blue, the appeal of huddling in your College's third (or fourth, or fifth) boat during a rainstorm is a little more mysterious. Why do so many people – many of whom may have never rowed in their lives before – not just take part in, but love the Bumps?

“It seemed weird, but fun,” says First Year Ellen Brewster (History, Caius), who rowed in their first Bumps this year. “I had no idea how it worked. I'd never done any rowing before but because Caius has such a renowned boathouse, I thought I'd give it a try. Bumps just kind of... happened.”

Brewster's crew achieved a row over on the first day and bumped every day after that, entitling them to technical blades and a move up from Division Three to Division Two. They achieved their final bump – Magdalene – within just 13 strokes. “One of their rowers caught a crab, so they were just drifting. It felt amazing. I spent pretty much the whole week panicking about it. It's a team sport so you don't want to let anyone down. But as soon as it started, I was completely chill about it. Caius women's second boat (W2) has been in Division Three since 2013, so we made history, which was very cool.”

The rowing community was a pleasant surprise for Brewster. “I was worried it might be elitist, but the community is so lovely, and it encompasses everyone – not just rowers, but people like me who had no idea that Bumps was a thing and had never rowed before. Traditions like Bumps aren't necessarily changing, but the community and the institutions themselves are.”





The community is so lovely, and it encompasses everyone – not just rowers, but people like me who had no idea that Bumps was a thing and had never rowed before



Merodie Rose (St Edmund's 2014) also found a community at Bumps. A mature student married to a former Trinity rower, she wanted to meet people and find something to replace the outdoor activities she was used to as a New Zealander. "Rowing just seemed like the thing to do in Cambridge, and it hit the spot: I have some great friends from that time." Putting together an all-women team at St Edmund's, however, proved tricky. The postgraduate college was 80 per cent male and most students were only there for a year. Although Rose was in

St Edmund's W1 – normally reserved for the very best rowers – most were novices. And it was hard work. "When I was trying to get out of bed at 5am, I'd think: 'Why am I doing this?'" Despite a series of disasters – injury, last-minute subs, having to be sandwich-boat and row twice on the first day – they acquitted themselves well, bumping twice on the first day, rowing over on the second and third, and bumping again on the fourth. But by May, they were ready, roaring back to win their blades. "Our best bump was under the motorway bridge: some of them were pretty rapid,"

Rose remembers. "I caught a crab on our practice start: I was so nervous." The Bumps might seem slightly mad, she says, but there's something hugely valuable about being able to compete, even if you've never rowed before. "It's a hilarious racing format and such fun to take part in – if you don't take it too seriously. It connects people – across Colleges, within Colleges, and across disciplines. And you can win at all levels. You don't have to be the best. St Edmund's could never compete with some of the bigger boat clubs. But we could still win this." >



PETER SOMMER
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You give up trying to look cool. I didn't care how ridiculous I looked in the end. I was going to get in the boat wearing many jumpers, and that was OK

Perhaps the appeal is that, despite its egalitarian outlook, you're still out there representing your College. George Budden (Caius 1984), the current Boat Club President, was bumped four times at Lent Bumps. "We went down four places. That was a terrible experience, and I was determined never to let it happen again." Sure enough, in the May Bumps, they won their blades. But that was just the beginning. The next year, he moved up to the 1st Eight, coached by Dr Chris George. George's formula for success was simple: fitness and miles on the water win races.

"We'd go on camps to London, stay in his house and do his decorating in lieu of rent," remembers Budden. "And over the next two years, we bumped up to head of the Mays – though we weren't sure how long it had been since that had happened. In 1987, there was an argument between *The Times* and *The Telegraph* about whether it was

144 or 147 years." The secret to their success? Teamwork, says Budden. "If you're in a football team and one person doesn't show up, you can still play as 10 people. If you're in a boat and one person doesn't show up, nothing's happening."

It can, admittedly, be hard to put in that work, as Sarah Williams (King's 2006) will attest. "I was in lectures and labs and then suddenly it was a freezing cold February, and I was sat in a boat," she remembers. "Rowing during the winter in Cambridge is a bit grim. It's often just getting light. You're cold, it's 6.30am and you're waiting at your boathouse, often in the rain. You give up trying to look cool. I didn't care how ridiculous I looked in the end. I was going to get in the boat wearing many jumpers, and that was OK."

And perhaps it's the teamwork, the camaraderie, the esprit de corps, that makes Bumps such an odd and special experience. Oscar Wilson (King's 2019),

former King's Boat Club Captain, was in King's M1 last year. "We bumped Peterhouse, then Pembroke on the third day, and Emmanuel on day four. We had our blades! And when we bumped Emmanuel, the atmosphere just went crazy. Everyone was so excited. We weren't Head of the River but we were fourth – the highest King's M1 had ever been on the river."

Yet alongside the excitement of the race itself, it's the moments of stillness that stay with Wilson: "We'd put loads of garlic bread in the oven to eat while we were cooking tortellini and sit around outside on the terrace or in front of the Chapel if it was warm. We'd watch old Bumps videos on YouTube and talk about how the day's racing had gone, and make plans for the next.

"It was one of those times when you want life to be like that for ever. You know it can't be. But for those short weeks, it feels very special." 🍷

Good memories: a life dedicated to the mind

Professor Carol Brayne has pioneered specialist research into dementia prevention and treatment, dedicating her life to a world where medicine meets statistics.

WORDS VICTORIA JAMES PHOTOGRAPHY KATE PETERS

“I had rather a feral childhood,” says Carol Brayne, Professor of Public Health Medicine and Director of Cambridge Public Health. “The minute school was finished we’d be on the beach where we lived in north Norfolk, enjoying Mum’s bacon and egg pie. She was active in so many causes, so maybe it was natural that I’d be interested in medicine from a young age. One day I told her I’d like to be a nurse – she said: ‘Why not a doctor?’”

It’s clear the roots of what would become Brayne’s lifelong commitment to public health – a career that has seen her revolutionise our understanding of dementia and Alzheimer’s – lie in that childhood. Her interest in health inequalities springs from growing up in a one-parent family, at a time when there was still a stigma around that. “My mother took in foreign students to make ends meet,” Brayne says.

“At school I’d begun reading *New Scientist* and became really concerned about the environment, and about the Cold War. The minute I got to medical school in London, I set up branches of Friends of the Earth and CND.”

Brayne’s branch of medicine didn’t exist in her university days – nor did a medical education resemble that experienced by today’s students. “I went to the Royal Free and we worked incredibly hard during what was an apprenticeship model during the clinical years. We were expected to know all our patients on the ward, inside and out. In retrospect it was a rigorous medical training founded on a deep interaction between us students and our patients that isn’t there in the same way now.”

A series of junior doctor rotations in north London followed, one spent in an accident and emergency department “where we’d see so much that was distressing”, and a turn at the prestigious Whittington. Then came an unusual opportunity at the (now closed) Royal Northern Hospital

that would lead Brayne to her first research opportunity – and spark a lifetime’s interest in neurology. “The police asked us to do it,” she explains. “They were always in and out of A&E with patients involved in violence, so we knew them well. They needed medical attendance at a local amateur boxing bout, so we designed a study alongside this to go ringside, take blood tests before and after a bout, and to count the blows to the head that each young boxer received.”

Brayne and her co-researcher (and soon-to-be husband) Dr Paul Calloway proved that creatine kinase BB, an amino acid-like compound only produced in the brain, leaked out proportionally to fist/head contact sustained by the boxers. “We got it into *The Lancet* as a letter,” Brayne recalls. “That was the early 1980s and you likely wouldn’t be able to do research like that now, but these sorts of studies are being done again using imaging, and that connection between trauma and brain function has been accepted. Medicine can be like that. As with pharmaceutical innovation, it takes a while for proof to filter through.”

By now, Brayne had a name for what she wanted to study: epidemiology, the study of how often diseases occur in different groups of people, and why. “It’s where medicine and the environment intersect,” she explains. And it is the epidemiology of dementia (a general term for the life-changing loss of memory, language, problem-solving and other cognitive abilities) and Alzheimer’s (a specific brain disease) that has formed her lifetime’s work.

Coming to Cambridge in 1985 on an early career research fellowship in epidemiology, Brayne found that she and many other researchers in related fields didn’t have a suitable academic ‘home’ within the University – so they set about creating one. “What was at first known as >



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community medicine over time became public health – and was strongly multidisciplinary. I began to understand the gossamer work that is public health. It's about being an advocate for all, understanding the balance of investment and activity for current and future populations, and identifying the evidence base that will enable us to do the best for them. Because public health isn't in anyone's pockets, it's able to speak truth to politicians. Over the decades I've been at Cambridge, the transformations have been remarkable."

Dementia was in many ways the perfect subject for epidemiological investigation. "It's about all-around health across the life course," Brayne says. "So many conditions can impact cognition. You need a sense of who someone is, what their health has been like, the community they live in, as well as knowing their final physical condition and the results of any physical testing." Under the multidisciplinary umbrella of public health "there are so many opportunities for molecular chemists, geneticists, clinicians and policymakers to generate valuable results from population studies."

Brayne went on to head one of the most ambitious population research programmes examining dementia – the Cognitive Function and Ageing Studies (CFAS). The initial research block began in 1989, and is the first of its kind to have been completed. Her work had started with a smaller, population-based study of women in the fens of East Anglia, examining dementia and normal ageing. Folding in a larger study based in Cambridge, the Cambridge City over-75s Cohort (CC75C), these studies piloted much that followed.

CFAS started with a cohort of more than 18,000 participants, who were all aged over 65 when the study began. The Fenland and Cambridge City studies established an important principle, increasingly accepted now but not initially well understood: that dementia "is a continuum, not a binary which you either have or you don't. It's like that once you scratch the surface of so many conditions." A comparison study, CFAS II, launched in 2009 and is ongoing.

CC75C pioneered the use of 'brain banking', in which brains were collected post mortem from study participants. "It was so innovative that initially the ethics committee didn't know what to do with us," Brayne admits. But thanks to a carefully negotiated process of consent-seeking, subject to frequent review, the team assembled a unique biological archive. "We studied these



The research is the first of its kind to have been completed, helping establish the principle that dementia is a continuum and not a binary

people so carefully in life – it was remarkable to be able to study them in death."

More than that, it led to significant breakthroughs in our understanding of dementia and its relationship with Alzheimer's, not all of which are fully recognised – yet. Although the media that surrounds us is filled with alarming stories about the prevalence and societal burden of an ageing population living with dementia, Brayne's work has shown that "over the lifetime of our study there has been a clear reduction in age-for-age prevalence of dementia".

That's not all. The findings from CFAS, and work on those precious donated brains, has enabled Brayne and colleagues to challenge simplistic assumptions about how physiological change in the brain manifests as cognitive impairment. "We've shown that you cannot tell from a brain's altered pathology whether that person had dementia," she says, "while dementia can occur in people with none of the expected pathological changes to their brain." It can be challenging pushing back

on received truisms, such as the assertion that 60 per cent of dementia is caused by Alzheimer's disease. "That gets into the ether and is repeated, but our work puts it much lower, nearer 20 per cent. And that's hugely important, because it entirely alters how risk factors are viewed and what policymakers should be prioritising."

Brayne now oversees a cohort of researchers studying everything from 'age-friendly cities' to the impact of ageing populations and dementia in low-to-medium income countries, such as Uganda (where a study sees scientists working alongside artists). After all these years, she finds herself "looping back to themes from the beginning of my career, those social and environmental passions I had as a student, and an appreciation of the significance of inequality.

"We know how to reduce the probability of developing dementia over the life course," she says, "just as we know how to reduce the prevalence of obesity. Taking a preventative approach would also drive sustainability and reduce our dependence on biomedical science for early diagnosis, which is hugely expensive and damaging environmentally. You get far more bang for your buck with a public health approach. As I look at dementia studies today, I see what I was searching for at the beginning – so much potential for improving the health of populations." ©

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Page-turners, eye-openers, brain-blowers. Your summer reading is here...

INTERVIEWS **PAMELA EVANS** PHOTOGRAPHY **JAKIE DRUE**

VICK HOPE (EMMANUEL 2007)

BROADCASTER, TV PRESENTER, CHILDREN'S BOOK AUTHOR
AND HOST OF WOMEN'S PRIZE FOR FICTION PODCAST BOOKSHELFIE

I'm so keen to read Kiley Read's debut *Such a Fun Age*, and her follow-up *Come and Get It*. I interviewed her recently, and we talked about work-life balance, which both these books discuss: it's such an interesting topic and one that I haven't read about much, particularly in fiction. Apparently, they are both completely unputdownable. That's what you want from a summer read! And, of course, anything by Dolly Alderton. She's the queen. Her books are amazing. They read like the WhatsApp friend groups I'm on and it's so hard to reflect that in a book: they're incredibly relatable.

I REALLY SHOULD BE READING...

The Obama autobiographies. I'm so sorry, Michelle and Barack Obama. I love you both and find your lives incredible, but both your books have been on my shelf for years. I think it's because they're so big and heavy. Yes, I know Kindles have special screens for when the sun is shining, but I have to hold an actual book.

PROFESSOR ROBERT TOMBS

PROFESSOR EMERITUS OF FRENCH HISTORY

History is endlessly able to deepen our knowledge of the present and the past, so I'm reading works connected to the biggest and most controversial issues of today. For example, was the Enlightenment a major foundation of modern thought, or the origin of racism and colonialism? Or a bit of both? *The End of Enlightenment* by Richard Whatmore (Fitzwilliam 1986) examines leading Enlightenment thinkers and reveals that they themselves were aware of problems in their own time: their own doubts may help us understand our problems, too. On gender and sexuality, I'm very much looking forward to *Forbidden Desire in Early Modern Europe: Male-Male Sexual Relations 1400-1750* by Noel Malcolm (Peterhouse 1974). It's partly a story of repression and cruelty, but it's also partly a story of what was, to some extent, culturally accepted in different parts of Europe. It looks like an extraordinary work of scholarship. And if I have any more time, I'll read *Erasure* by Percival Everett – a satire on identity politics, victimhood and how you can work that system. ›

I REALLY SHOULD BE READING...

The Political Thought of Xi Jinping by Steve Tsang and Olivia Cheung. One of the reviewers said it's like eating sawdust, but apparently its presentation is user-friendly: it's like a handbook where you can just dip in.

NEHA PAULY

SECOND YEAR POLITICS AND INTERNATIONAL RELATIONS,
CHRIST'S, CAMBRIDGE UNION PRESIDENT-ELECT

I've been thinking a lot about the idea of grief lately, and Sloane Crosley's memoir *Grief is for People* sounds fascinating: about losing her best friend to suicide and how to deal with grief. I'm currently looking into a career in investment banking, so *The Trading Game* by Gary Stevenson will be a must-read. It's about his time as a young investment banker in New York: the codes, the moral conflict. My third year dissertation will challenge the concept that the British helped develop India, so my degree-related read will be *Shashi Tharoor's Inglorious Empire: What the British Did to India*. And this will sound rather insane, but I'm weirdly interested to read Liz Truss's *Ten Years to Save the West* – what was it like to be one of the UK's shortest-serving prime ministers?

I REALLY SHOULD BE READING...

Kashmir: The Case for Freedom, a collection of essays by authors including Pankaj Mishra and Arundhati Roy, which discusses the struggle for independence in Kashmir and how that struggle is perceived in India's media. I feel like it will help to give me a holistic idea of Indian issues.

SATHNAM SANGHERA (CHRIST'S 1995)

SUNDAY TIMES BESTSELLING AUTHOR OF *EMPIRELAND: HOW MODERN BRITAIN IS SHAPED BY ITS IMPERIAL PAST*, AND *EMPIREWORLD: HOW BRITISH IMPERIALISM HAS SHAPED THE GLOBE*

I've spent the past few years reading about nothing but the British Empire and am now looking forward to reading other things. First up will be *The Bee Sting* by Paul Murray, which has been nominated for loads of prizes and sounds like the kind of comedy that's right up my street. Then Hilary Mantel's *Beyond Black*: I think she's the best writer of our generation, and while I've read the *Wolf Hall* trilogy, I haven't read any of her contemporary work. And anything by Jane Gardam, because I read *Old Filth*, which was actually a great story of empire, and I think she's one of the best writers we have.

I REALLY SHOULD BE READING...

Anything by Charles Dickens. The closest I've got to him is *The Muppets Christmas Carol*. But Nick Hornby (Jesus 1976) wrote a great book, *Dickens and Prince*, comparing Charles Dickens to the singer, Prince. I'm a big Prince fan, and that made me want to read Dickens. I'm going to try *A Tale of Two Cities*.

PROFESSOR GILES YEO

PROFESSOR OF MOLECULAR NEUROENDOCRINOLOGY AND
PROGRAMME LEADER AT THE MRC METABOLIC DISEASES UNIT

When I read on summer vacation, I like to take a brain bath and read things that don't require a great deal of thought. I'll be looking up anything by my favourite authors. Kim Stanley Robinson writes realistic science fiction and his *Mars Trilogy* has been called the best future history of all time. His most recent book, *Ministry for the Future*, is all about what happens when we ignore climate change. I'm a Mars freak: I love anything to do with Mars, so I'm also hoping for a new book by Andy Weir, author of *The Martian*. Like Robinson, he also writes science fiction with plausibility around it. >

I REALLY SHOULD BE READING...

A Brief History of Time by Stephen Hawking. I've seen *The Theory of Everything*. I know he was a Cambridge man. But still it sits there on the shelf.





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PROFESSOR LORD MARTIN REES

ASTRONOMER ROYAL, EMERITUS PROFESSOR OF COSMOLOGY AND ASTROPHYSICS AND CO-FOUNDER OF THE CENTRE FOR THE STUDY OF EXISTENTIAL RISK

This year, I am planning to become rather broader in my science. As an astronomer and physical scientist, my knowledge of biology is gained mainly from popular science books. Ed Yong (Pembroke 1999) is one of the best-known blogging journalists on biological topics, and he has written a very big, comprehensive and eloquent book on how nature interrelates: *An Immense World*. I'm also looking forward to Philip Ball's *How Life Works*, which brings what we know about life up to date by exploring the most recent genetic discoveries. My main general reading is political biographies: I'm intending to read *Keir Starmer: The Biography* by Tom Baldwin, Rory Stewart's *Politics on the Edge* and *One Boy, Two Bills and a Fry Up* by Wes Streeting (Selwyn 2001).

I REALLY SHOULD BE READING...

One of Neal Stephenson's science fiction books, which are very long indeed. Or another big book: *The Earth Transformed: An Untold History* by Peter Frankopan (Jesus 1990) which links history to geology and climate.

OKECHUKWU NZELU (GIRTON 2007)

AWARD-WINNING AUTHOR OF *THE PRIVATE JOYS OF NNENNA MALONEY* AND *HERE AGAIN NOW*, AND LECTURER IN CREATIVE WRITING AT LANCASTER UNIVERSITY

I'm interested in writing stuff that's set in the UK, and that often means reading around contemporary English language writers, which can leave you a bit siloed. That's why I'm excited to read *Bad Habit* by Alana S Portero, translated from the Spanish by Mara Faye Lethem. It's the story of a young trans woman living in Madrid; the prose is just beautifully poetic. I've also heard a lot of people discussing *Anyone's Ghost* by August Thompson, which sounds so moving; I love a sad queer love story. I know there are conversations to be had about how not all queer love stories should be sad. And I think that's valid. But I also think there's something beautiful about exploring traumas and tragedies that happen in real life.

I REALLY SHOULD BE READING...

Love Again by Doris Lessing. I started it and put it down and started it and put it down. It feels very noble: it's deep and thoughtfully written. The subject matter is right up my street: love, frustration and the past. But somehow I keep getting distracted by other books.

JAIDEEP PRABHU

JAWAHARLAL NEHRU PROFESSOR OF INDIAN BUSINESS AND ENTERPRISE AND DIRECTOR OF THE CENTRE FOR INDIA AND GLOBAL BUSINESS

I'm very much looking forward to *Shadows at Noon: The South Asian 20th Century* by Cambridge History Professor of South Asian History Joya Chatterji. It's a fascinating book which combines memoir with a social history of the subcontinent, and I love the title. I'll be interested to see how French writer and Nobel Prize winner Annie Ernaux also uses a mix of autofiction and sociology for her novel *The Years*, written from the perspective of women in modern Europe. And I keep going back to a book-length poem in rhyming couplets by another Nobel Prize winner, Caribbean poet Sir Derek Walcott, *Tiepolo's Hound*, about impressionist painter Camille Pissarro. You absolutely get sucked into the beauty of the language. ›

I REALLY SHOULD BE READING...

The whole of Marcel Proust's *In Search of Lost Time*. I have made many attempts. I love it but I've never gone past the first book, and I think I'll go to my grave hanging on to the fantasy of reading it.

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NIAMH HOWAT

THIRD YEAR HISTORY, ROBINSON, PRESIDENT OF FOOTLIGHTS

I'm longing for some post-degree escapism this summer and I'm planning to reread *The Hitchhiker's Guide to the Galaxy* by Douglas Adams (St Johns 1971): I've only read the first couple of books, so I want to read the whole series. I'm also going to return to *Alice in Wonderland* by Lewis Carroll; when I was a kid, I read it with my mum, but I'd like to read it again. Also on my re-read list is the *Percy Jackson* series by Rick Riordan, which imagines what would happen if the Greek gods were real and here right now. I'm dyslexic and I've got ADHD, just like Riordan's son. He deliberately wrote them to appeal to his son, who was finding it hard to get engaged in reading at school.

I REALLY SHOULD BE READING...

The BBC: A People's History by David Hendy and *Northerners: A History* by Brian Groom, because I'm from the north, and because I'm a history student. They both look really interesting – I've just not had the time!

PROFESSOR DIANE COYLE

BENNETT PROFESSOR OF PUBLIC POLICY AND CO-DIRECTOR OF THE BENNETT INSTITUTE FOR PUBLIC POLICY

My research is on the digital economy and economic impacts of AI, and there are some interesting titles around those, such as Verity Harding's *AI Needs You: How We Can Change AI's Future and Save Our Own* and the FT's tech correspondent Madhumita Murgia's new book *Code Dependent*, examining the human impact of working in AI. Plus, I've seen a draft of my colleague Professor Neil Lawrence's upcoming *The Atomic Human*, which looks fantastic. I'm going on holiday to Japan soon, so I'm reading Japanese detective novels like Seicho Matsumoto's *Tokyo Express*.

I REALLY SHOULD BE READING...

The huge pile of politics and economics books I get sent, which currently includes Stephen Roach's *Accidental Conflict: America, China and the Clash of False Narratives* and Dermot Hodson's *Circle of Stars: A History of the EU and the People Who Made It*.

ON THESE PAGES

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TOM CREWE (FITZWILLIAM 2007)

EDITOR AT THE LONDON REVIEW OF BOOKS AND WINNER OF THE SUNDAY TIMES YOUNG WRITER OF THE YEAR AWARD FOR *THE NEW LIFE*, HIS FIRST NOVEL

The summer, with its promise of an expanse of reading time, seems the right moment to fulfil one of my resolutions for 2024: that I'll finally read James Boswell's *Life of Johnson*. (I once read an abridged version, though I only realised it was abridged afterwards and have been annoyed with myself ever since.) I usually find in practice, however, that the summer favours a slim novel, or short stories. Someone who did both very well was the British writer Elizabeth Taylor (the other Elizabeth Taylor). And indeed, a book of hers I haven't read is called *In a Summer Season*, which perhaps seals the deal.

I REALLY SHOULD BE READING...

Vikram Seth's 1500-page *A Suitable Boy*. I took it on holiday with me last year, only to quail before it. But in the colder months one forgets, and becomes scornful of sun-lounger laxities.

ELLEN THOMAS

SECOND YEAR HISTORY, PRESIDENT OF TRINITY HALL JCR

Earlier this year we had an incredible speaker at our History Society – Dipo Faloyhin, who writes on culture, race and identity. I'm planning to read his book *Africa Is Not A Country: Breaking Stereotypes of Modern Africa*. But I'm also very keen to practise my French, as I did it at A Level but it's not part of my degree. So I've just started *Beyrouth-sur-Seine* by Sabyll Ghoussoub. It follows a family from Lebanon who immigrate to France. Plus, a friend gave me Agatha Christie's *Three Little Pigs* to read just after exams, and it was just so good. I'm now completely hooked on Christie. ☺

I REALLY SHOULD BE READING...

John le Carré's *Tinker Tailor Soldier Spy*. I've watched the film so many times and I still don't remember a single plot point. But my parents really like it, so I do intend to read it one day.

Evolution. But not as we know it.

**Forget the Tree of Life, meet the Network of Life:
a new model that is about to change everything
you think you know about the principles of evolution.**

WORDS LUCY JOLIN INTERVIEWS KAT BROWN ILLUSTRATIONS MIKE McQUADE

It is 18 November 1859, and Anglican rector and novelist Charles Kingsley has just finished reading an advance copy of a new book by his friend Charles Darwin, *On the Origin of Species*. His mind is blown (to use a highly scientific term). He sits down and scribbles a note to his friend. “All I have seen of it [the book] awes me... If you be right I must give up much of what I had believed and written.” Six days later, the book was published. It changed the way humans thought about themselves – both suddenly, as with Kingsley, and gradually.

And now – once again – Cambridge scientists are at the heart of another seismic shift in how we think about not just ourselves, but everything around us. In *On the Origin of Species*, Darwin gave us the idea of the Tree of Life – a great, bifurcating, endlessly splitting way to map the species evolution on Earth, which has been a central principle in modern biology ever since. But biologists are now challenging this thinking. What if evolutionary relationships don’t resemble a tree, but instead a network? What if evolutionary processes – from genetic inheritance through to language and cultural evolution – are better represented as interconnected networks rather than a branching tree?

“A network perspective on evolution has the potential to make a paradigm shift,” says Ian Henderson, Professor of Genetics and Epigenetics. “The idea and model of a tree is incredibly powerful. But we now know, as genome information is accumulating, that bifurcating trees are not a good model for evolution in all cases. We know that genomes can diverge and come back together, and that relationships become yet more complex when we consider the repetitive ‘junk’ DNA that makes up most of the human genome. It’s less like a tree, more like a complex and ongoing web of exchanges during evolution.”

Furthermore, thinking about evolutionary networks extends beyond genomes – within the University, there is a consortium of researchers interested in network approaches to evolution, which includes experts from a range of diverse fields spanning biology, genomics, linguistics and archaeology.

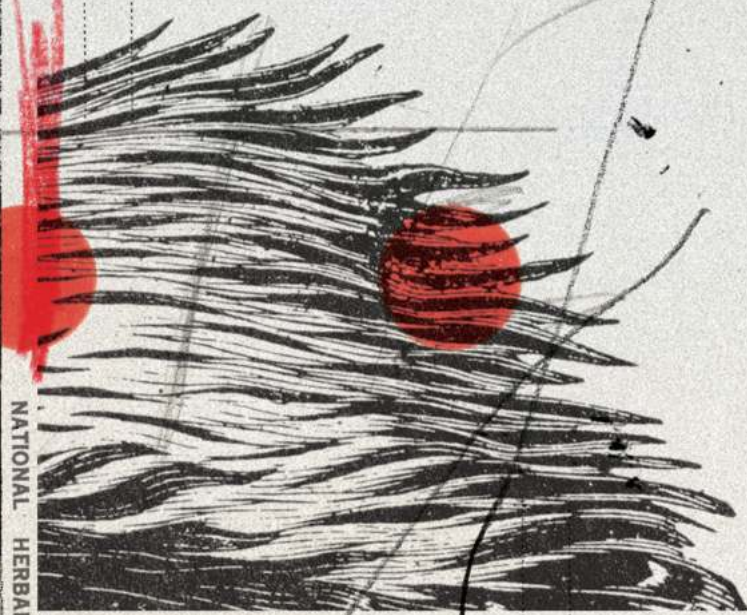
“It is exciting that there can be a methodological bridge between the humanities and the sciences. There’s a common challenge to some of these evolutionary questions. Even though the study systems may be radically different, there is common ground in asking basic evolutionary questions and developing new methods.” Linguistic and genomic evolution, for example, are very methodologically aligned. “You can think of the genome as language – strings of characters. So you could think of a gene as a word, or bits of genes as words.”

It feels rather fitting that one of Henderson’s projects does involve a tree – the thousand-year-old Major Oak in Sherwood Forest. His team is sequencing its genome to investigate how it has evolved along the branches. “As the tree is acquiring genetic change during growth, those changes can also potentially be transmitted to the next generation via the acorns that form on each branch.”

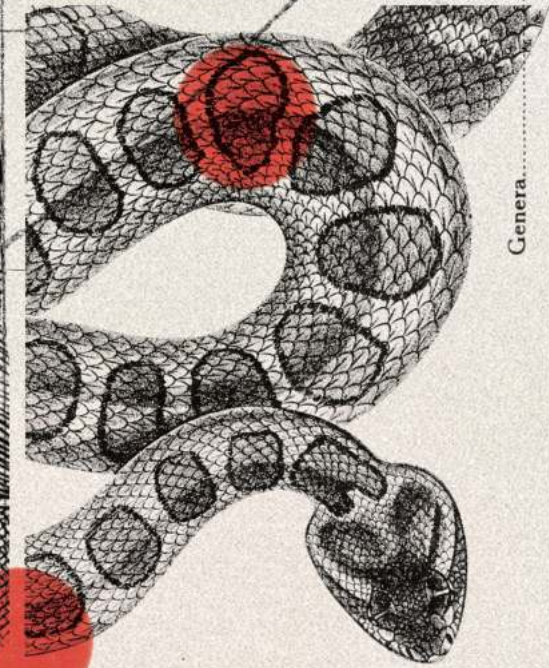
Just as the observations Darwin made on the voyage of the *Beagle* underpinned his ideas on natural selection, science is now taking its own similar voyage around the genome, says Professor Rebecca Kilner, Head of the Department of Zoology and Director at the University Museum of Zoology. “We’re getting to the point where the next Darwin will synthesise what we know and make interesting inferences, in the way that Darwin was able to draw together the mass of information that suddenly exploded with Europe’s colonial conquest of the rest of the world. Patterns >



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NATIONAL HERBARIUM



Genera.....

Species.....

70



became obvious, and explanations were called for to account for those patterns. Maybe this network approach will be the kind of insight that can take us to the next level in the way that Darwin's ideas did."

Henderson is looking forward to using new sequencing technologies to investigate patterns of genome evolution in plants. These approaches are giving insights into parts of genomes that we have never had access to before, and reveal that the genome is very fluid, even within individual species. "It will be interesting to explore network models of evolution of genomes," he says.

According to Dr Aylwyn Scally, researcher in human evolutionary genetics, we are now

degrees of social organisation – where you move from having a string of genetic material to lots of bits of genetic material gathered together in a chromosome, to two different chromosomes gathered together in a cell, to cells occupying a single body together," says Kilner.

"Looking through the lens of social evolution has enabled a revolution in the way that we think about the major steps in evolution. The new view is driven by incorporating social interactions into our understanding, rather than focusing on things like whether animals have got a backbone."

Where might this thinking take us? Darwin famously never actually said that humans

Maybe this network approach will be the kind of insight that can take us to the next level in the way that Darwin's ideas did

able to collect and see the genetic differences between humans on a scale that was never previously possible: "Until relatively recently, there wasn't any data; we were conjecturing based on tiny scraps of comparisons between proteins. Now, we have whole genome sequences for millions of people. Just over the last decade, we've worked out how to get DNA from fossils and from bones that are tens of thousands of years old. It's astonishing. It's like inventing a new telescope – a completely new way of looking at the universe. Now we can try and build these models and try to decipher this complex structure."

But it's not just about tech: it turns out that there's also a social network of life. Just like humans, animals have a social network, and some animals are more social than others. This behaviour can influence how they evolve: Kilner is an expert in the behaviour of the burying beetle, which takes just six or seven weeks to go from egg to sexually mature adult. "We have populations living in the woods around Cambridge, so they're very close at hand. And we can breed them really easily in the lab at scale, which means that we can observe in front of our eyes how the social behaviour carried out by these beetles is changing the way in which they evolve. We try and recreate the patterns of variation that we see in the woods around Cambridge."

Or take, for example, the humble invertebrate. Traditional evolutionary thinking runs thus: worms in the sea acquired backbones, which enabled them to crawl out of the sea and on to land. But incorporate social behavioural thinking and social organisation into our understanding of that process, and a more complex picture emerges.

"So, a more modern take on the major evolutionary transitions is to think about

were descended from apes – but the idea that we might be sent shockwaves through human thought. We used to think of brutish Neanderthals, for example, as very different to us refined *Homo sapiens*. But while Neanderthals became a separate group from humans around half a million years ago, says Scally, we now know that they interbred with us up to around 50,000 years ago.

"This possibility and propensity to exchange genetic material does happen. And these are relevant to our own history. Watch *Who Do You Think You Are* and you can see that humans have a very linear sense of their own ancestry, going back along a line. But in reality, it's a big structure that connects all of us to each other: we all share ancestors." (In which case, a more accurate family history programme might be *You Are Not Who You Think You Are*.)

Many divisions and distinctions are founded on a sense of a very long and ancient difference and separation from others – and the idea of a network of life undermines that, Scally points out. "In places like Europe, people still have this notion of belonging to a historically well-defined group, which goes back thousands of years. And that's completely at odds with the reality of ancestry and the relatedness of groups. It's become clear, over the last two decades, that differences are a lot less than we thought, separation is a lot less than we thought and that the notion of a species is a much less clear concept." Perhaps it's time for us to channel Darwin's friend Kingsley and learn to think about ourselves and our world in a whole new way. ☺

If you would like to learn more, please contact Holly Singlehurst at holly.singlehurst@admin.cam.ac.uk

School of thought: The real impact of social inequality on progress

Study shows disadvantaged children's struggles are not down to a simple lack of character or attitude.

WORDS KAT BROWN

What does it take for children to succeed at school? A growth mindset? A strong character? A good attitude for learning? The bootstrap argument suggests that these core elements will be enough for a child to 'get on', but there is one key factor that the theory fails to consider – social inequality.

"Educational inequality cannot be solved primarily through social and emotional learning," says Dr Rob Gruijters from Cambridge's Research for Equitable Access and Learning Centre. "The idea that children can overcome structural disadvantage by cultivating a growth mindset and a positive work ethic overlooks the real constraints many disadvantaged students face, and risks blaming them for their own misfortune."





Students who lack the right mindset may perform less well at school – but that may be because their academic performance has eroded self-belief

Grujters is lead author of a new study that challenges the widespread policy conviction that work ethic, mindset and socio-economic skills – or ‘pulling oneself up by one’s bootstraps’ – are key to improvement. Researchers from the Universities of Cambridge, Zürich and Tübingen analysed data from almost a quarter of a million 15-year-olds from around the world and found that social and emotional learning – which has become an industry projected to reach \$3.9bn in the US by 2025 – cannot solve educational inequality, despite many of these learning providers suggesting their services can help to narrow the achievement gap.

It follows a Cabinet Office survey from 2015 which said that neglecting social and emotional learning would “perpetuate the cycle of advantage or disadvantage across generations” in the UK. However, the study found that these qualities accounted for around nine per cent of the gap – estimated to be around three years of school – but which could be an overestimation due to low achievement affecting children’s self-belief.

Instead, the study’s authors state that for meaningful change to occur, policies should address the structural reasons that cause some students from lower socio-economic backgrounds to underperform. These include differences in school quality, resourcing and funding; the lack of high-quality preschool options in many countries; and a lack of extracurricular clubs, societies and out-of-school opportunities compared with their wealthier peers.

The academic benefits that disadvantaged children gain from socio-emotional skills were found to be similar to those gained by advantaged children. This contradicts the widely held assumption that focusing on these skills is especially important for children from socio-economically disadvantaged backgrounds, a belief which underpins many social and emotional learning programmes.

“Students who lack the right mindset may perform less well at school, but that may be because their academic performance has eroded their self-belief; not the other way round,” says Isabel Raabe, a researcher in the Department of Sociology at the University of Zürich.

Developing social and emotional skills is hugely valuable for all children says another of the report’s co-authors, Nicolas Hübner, assistant professor at the University of Tübingen, but the evidence suggests it has little to do with why low-income students are more likely to struggle academically. “According to our results, it is not a magic bullet for tackling the socioeconomic achievement gap.”

“Now we’ve got to make sure we embed the good practices”

Jonathan Clarke, (Homerton 2008)
Headteacher at Somersham Primary School

Why did you go into teaching?

I was really lucky to have fantastic teachers at school. Schools are really important places for developing that sense of community and relationships in young people, and I wanted to be part of giving that back.

What’s your role today?

I’m Headteacher at Somersham Primary School. It’s a typical village school, with 270 children. And it’s a cliché, but no two days are the same – sometimes I’m teaching, but there’s lots of people management. Supporting children with safeguarding, special educational and behavioural needs has significantly increased over the past 15 years.

What have you been working on over the past year?

We’ve done a lot of work to make sure the quality of teaching and learning is as consistently high as it should be. Now that we’ve made progress with what happens in the classroom, we’re able to look more widely at extracurricular clubs and visits so that children aren’t always sitting at desks but are getting out and about – outside and in the community.

How did Cambridge influence your working life?

When Somersham was struggling to recruit, we knew we had to make our own luck. We asked the faculty if we could host placements and started mentoring, which was also a great boost for the staff. Even though we’ve been through tricky times, we are good; we know what we’re doing. We host all of the primary PGCE trainees for a day visit, and one of our early career teachers from Cambridge chose to apply here for a permanent job.

What’s next?

Our ‘outstanding’ Ofsted label [Somersham was rated ‘outstanding’ five years after it was branded ‘inadequate’] is a fantastic recognition of everyone’s hard work. Improvement has been very quick, so we’ve got to make sure we embed the good practices. Just because you’re outstanding, it doesn’t mean that there’s nothing left to do and learn.



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We had a show called *Too Marvellous for Words*. One review said: “It’s not”

For David Pickard (Corpus 1979), director of the BBC Proms, Cambridge was about discovering new music, converting people to opera... and performing terrible shows in Edinburgh.

INTERVIEW MEGAN WELFORD



Peter Grimes Benjamin Britten

I had caught the opera bug at age 16 – I loved music and theatre, and now I found them perfectly fused in opera. When I got to Cambridge, I didn’t sense much excitement for it among my friends so I set about trying to convert people. Still now, I meet contemporaries who say:

“Oh David, you introduced me to opera!” For me, the masters are Britten and Monteverdi – they show such an understanding of how music and drama work together.



Anthems from King's

This wonderful collection by composers like Stanford, Wood and Parry was the music of my life as a choral scholar – just gorgeous pieces. At Corpus, we sang two services on a Sunday and midweek evensong. We may not have been the best singers compared to King’s, but we loved singing. And you did

get a better room in those days if you were a choral scholar – close to the chapel, so you could slope in sheepishly after the choir stalls were full if you’d overslept.



King Arthur Henry Purcell

I was introduced to Purcell’s viol fantasias on my first day at Cambridge – I had never heard these extraordinary, magical pieces by one of Britain’s greatest composers. A fellow student, played it to a few of us in his room in the early hours

after a lot of wine. By the end of the night, we were firm friends and I had been introduced to music that would later allow me to run the Orchestra of the Age of Enlightenment.



Symphony No 2 Rachmaninoff

One of my frustrations in my first two years, despite how much I loved studying music, was rarely getting past Mozart and Haydn to the late 19th century onwards. It was a time when the early music movement was taking off, and people could be rather pious about Bach and

Handel and how baroque music should be played. I longed for something more emotional and so, after hours of dry academic work, I would escape to this Russian romantic – a great release.

We may not have been the best singers compared to King’s but we loved singing. And choral scholars got better rooms!



Ella Fitzgerald Sings the Harold Arlen Song Book

Some of these songs were among those Michael Law carefully transcribed for jazz arrangements to accompany a show we took to the Edinburgh Fringe in the early 80s. The music was fantastic, but the script was terrible. The cast was strangely distinguished – actor

Simon Russell Beale (Caius 1979) played Churchill, baritone Simon Keenlyside (St John’s 1980) played Hitler and I played Neville Chamberlain... so you can see where it might have been going. We were supposed to run for three weeks – we did 10 days. The show was called *Too Marvellous for Words* and one review simply said: “It’s not.”

David Pickard is stepping down as director of the BBC Proms.

This idea must die: “Small island economies aren’t worth investing in”

Dr Nazia Habib says we must focus on the potential – not the challenges – of isolated island communities.

INTERVIEW LUCY JOLIN ILLUSTRATION GEORGE WYLESOL

They may be tiny in size, but small island developing states (SIDS) – countries identified by the UN in 1992 as having unique social, economic and environmental challenges – play a crucial part on the world stage. The islands’ geographical isolation, however, leads to a perception that it’s hard to undertake sustainable – and sustained – economic development there. The focus, in other words, is on what isn’t, rather than what is. But why not look at what SIDS can offer – to their citizens, to investors, to the global economy and to meeting global challenges?

For example, these islands manage 22 per cent of the world’s Exclusive Economic Zones – ocean zones where a coastal nation has jurisdiction over living and non-living resources – including seven of 10 coral hotspots. Their cultural resources and indigenous knowledge provide living laboratories for researchers to learn about sustainable practices, while their language, culture and history make them some of the most culturally diverse areas in the world.

These nations have demonstrated significant agency and moral leadership in international affairs to influence global diplomacy, especially regarding climate change. And although their land mass may be small, their power over the sea is not. The 1982 UN Convention on the Law of the Sea allows SIDS to claim rights over vast marine territories.

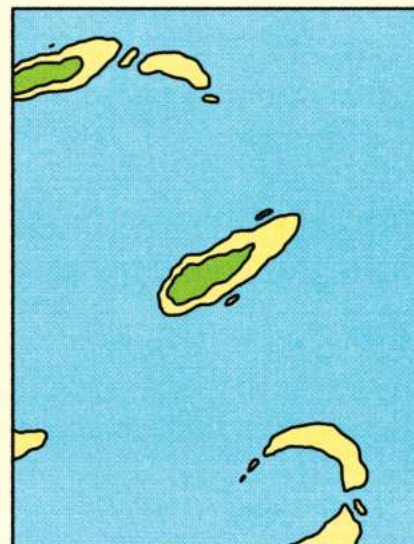
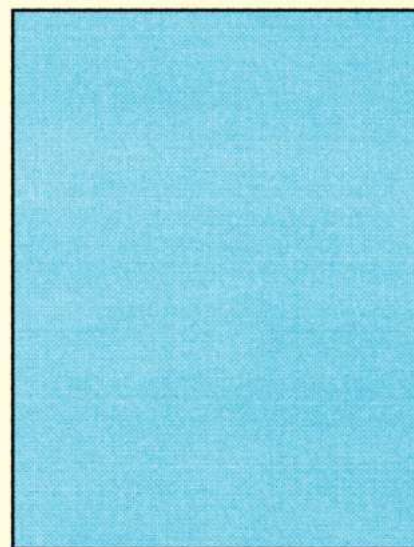
Thus, small islands challenge traditional notions of state size and power. The legal maritime framework endows these states with significant quasi-territorial rights over a substantial portion of the world’s oceans. (And as ongoing negotiations over the

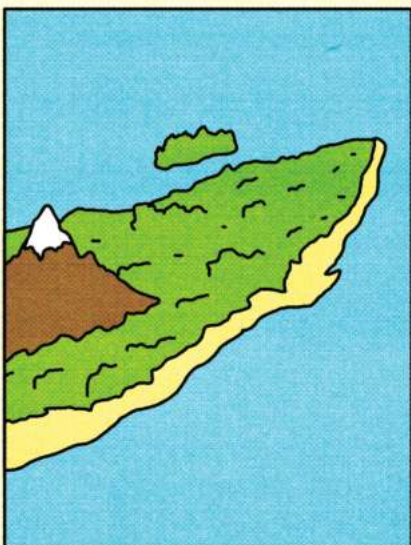
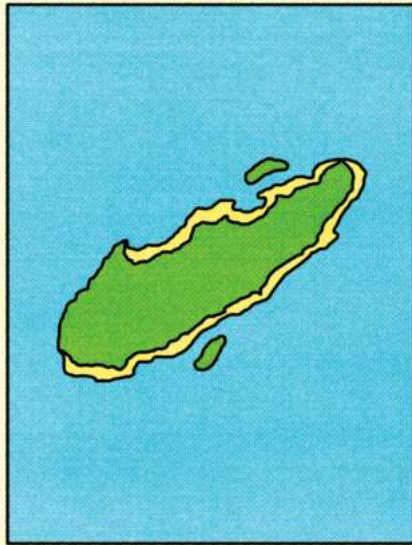
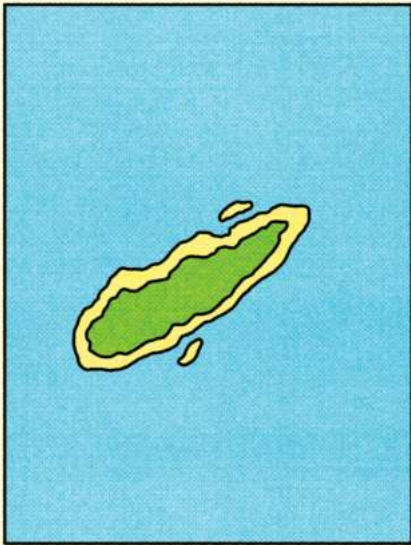
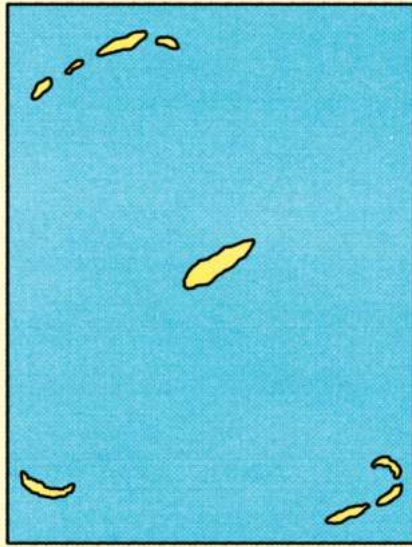
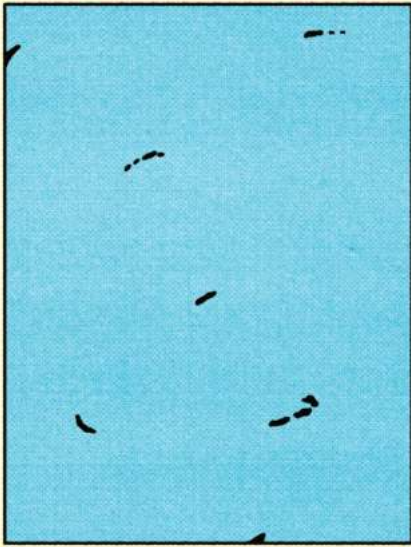
extended continental shelf continue, the scope of coastal states’ sovereign rights is set to expand further.)

These islands, therefore, should be significant players. Yet our work – kindly funded by the Commonwealth Secretariat – has shown that they face numerous barriers in accessing finance: there is a perceived or actual lack of opportunity for investable projects, due to a range of factors including small populations and a limited range of resources; limited scale and capacity that drive up the cost of receiving and managing funds; and the fact that power and agency lie with donors and multilateral organisations, not SIDS or direct beneficiaries.

Furthermore, development assistance such as loans – not grants – adds to the debt burden. And the impacts of climate change and other environmental issues create a dynamic risk profile for the islands – while the length of time required to access international finance may simply not match the time frames within which investment is needed by SIDS to respond to their ever-changing environment.

Our work – Their Future, Our Action – aims to change this. The Small States Policy Simulation Labs Project is a collaboration between the Commonwealth Secretariat and the Centre for Resilience and Sustainable Development, focused on achieving sustainable development, good governance and responsible innovation. Using net zero methodology, we gathered information and data virtually from around 5,000 young people, using more than 15,000 expert interview hours across the Commonwealth member countries to inform our hypothesis. And we have developed the Common





Their cultural resources and indigenous knowledge provide living laboratories for researchers to learn about sustainable practices

Pool Asset Structure System (COMPASS) proposal to help SIDS overcome two systemic barriers in accessing finance: the small size of the individual SIDS economies and communities; and their disproportionate exposure to climate change impacts and global financial conditions.

Collaboration, co-operation and adaptation have been key to the survival of islander peoples for thousands of years. This has been reinforced by the upheaval and changes brought to the islands through colonisation, modernisation and geopolitics. COMPASS will enable islands to build collaborative, investable large-scale projects, implemented simultaneously across multiple jurisdictions to address common challenges.

It enables SIDS and investors to pool their risk and generate sustainable development goals-themed projects, beyond what would be possible with single-jurisdictional investment approaches. It gives them, in short, umbrella credibility. As proof of concept, the collaboration has already secured collective non-debt financing of youth training projects through a \$10m private sector investment in digital training and health programmes in the Caribbean.

When we challenge the accepted narrative, we see the potential in these islands, rather than their problems. They are sites of globally significant cultural, economic and ecological resources. They need and deserve adequate investment in their stewardship of these things which matter so much – to citizens of big and small nations alike.


Dr Nazia Habib is Founder and Research Centre Director for the Centre for Resilience and Sustainable Development.

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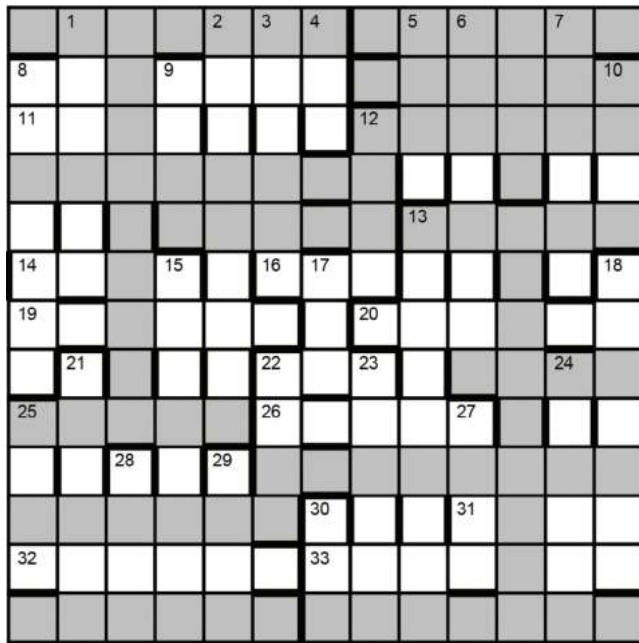
Missing Title

by Nimrod

In an *Only Connect* Wall, 16 arbitrarily arranged words or names must be sorted into four groups of four, each with a different thematic link. Representing such a Wall, the 16 silvered answers in the grid are clued in alphabetical order of solution, by wordplay only.

The links for the four thematic groups, which have a missing title in common, are character creations (two each) of two people with the same given name, to whom this puzzle is dedicated. The dedicatees' surnames must depart, one letter at a time, from several numbered down clues before they can be solved. In the final grid, one unchecked occurrence of the initial letter of their shared given name must be replaced with the missing title, leaving a real word.

One numbered clue answer is an abbreviation.



Wall clues

- Wrongly, only one succeeded
- Join what promises to be a wearying union for Spooner
- Bank of Scotland keeping cool
- Cold daughter walking out on dad
- I almost caught the end of *Jackanory*
- So far dons anonymous
- That is Victor checking into Hotel, having missed India
- Cycled around South Island
- Distressed, as it's departed tailless after reversing
- Money drawer is left open now and again
- Read over the abridged *Crockford's*?
- Person at sea comes to understand
- Song is powerful with this
- Climber logging a fast time?
- A question about performance's finale
- Where iniquity is brought to court

Across

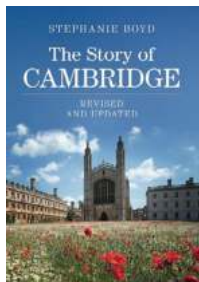
- 8 City in California? I have it in *Maine*, oddly (7)
- 11 Batty for one ill-advised to carry on one's painting career? (4)
- 14 Something to restrain the old dog from Ballymena (4)
- 16 Exactly what, we're told, will fall this evening (3)
- 19 Religious feast = recurring series (no Beginning, no End) (6)
- 20 Mark off Greater London College as an alternative (6, 2 words)
- 22 I'm disgusted about accident (3)
- 26 Papers at intervals reverse theories of Descartes? (5)
- 31 Make money from Interpol cases (4)
- 32 Physicist's dispensing with one of his mugs (6)
- 33 Longing to have treasures back here in London (7)

Down

- 1 Escaped from tyrannous crackpot with lordly wedge (6)
- 2 Busy advertisers taking no notice he's on standby (9)
- 3 Keep agreeing, it seems, to lift academic chap from Downing into office (6)
- 4 Big Bird's at home among the Muppets (3)
- 5 Vessel transporting freight iron from dispensers with packaging (4)
- 6 Take these cases for nan and gramps? (8)
- 7 With selection of studs and earrings I'll give you a smooth look! (6)
- 8 Shields can supply almost all of Troy (7)
- 9 With biases from a senior cardiologist, hospital overlooks Ed's ticker (4)
- 10 Gas turbine? One's impressed (4)
- 12 Bits collected as part of hobby trending (4)
- 13 He secured net gain at close, merchant parted with gold (9)
- 15 Uphill move about which to consult the song of the Duke of York (8, 2 words)
- 17 Prudent folk will keep this country in wienies! (3)
- 18 Soft and smooth-textured touch of verdant city to blind old GI? (7)
- 21 Cover for hot Indian brew, did he say? (6)
- 22 Local chap's welcome on stableman's chase (4)
- 23 Ball to hurl at walls one's after (6)
- 24 Illuminated outside of a cube? (6)
- 25 They're amazing women that swine stitches up (4)
- 27 Minutest drink overwhelms weak and feeble Texan (4)
- 28 Christmas Number One not on line (4)
- 29 Poet's given this right to hearten wearying worker (4)
- 30 Potential developer at intervals visiting website (3)

All entries to be received by 4 October 2024. Send your entry:

- **by post to:** CAM 102 Prize Crossword, University of Cambridge, 1 Quayside, Bridge Street, Cambridge CB5 8AB
- **online at:** magazine.alumni.cam.ac.uk/crossword
- **by email to:** cameditor@alumni.cam.ac.uk



The first correct entry drawn will receive a £75 CUP book token and a copy of *The Story of Cambridge* by Stephanie Boyd. Two runners-up will receive a £50 CUP book token.

Solutions, winners and runners up will be published in CAM 103 and online on 18 October 2024 at: magazine.alumni.cam.ac.uk/crossword

Solution to CAM 101 Crossword

2s, 3s & 5s

Extra letters in two sets of across clues give PALINDROMIC/ UNIQUE PRIME, (describing each member of a series beginning 3, ($x =$) 11, ($y =$) 101, 1,111,111,111,111,111 ...). Further extra letters spell THE NUMBER OF/ THIS EDITION (of CAM).

Unjumbling the sequences removed from the three remaining clues gives BI/NAR/Y FIVE, ie 101, the number of MENDELEVIUM (on the Periodic Table), DISNEY'S DOGS (Dalmatians), HAYDN'S CLOCK (Symphony) and ORWELL'S ROOM (in *Nineteen Eighty-Four*).



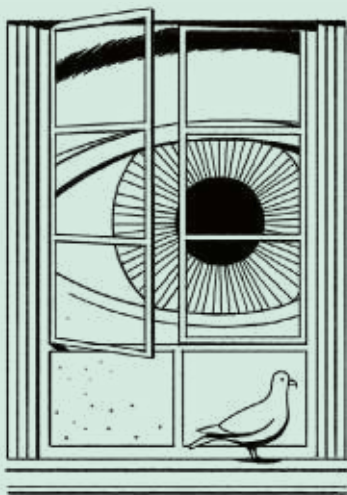
Winner: Andrew Mackay (Trinity 1970) **Runners-up:** Tony Marshall (St Catharine's 1961) and John Widger (St John's 1963)

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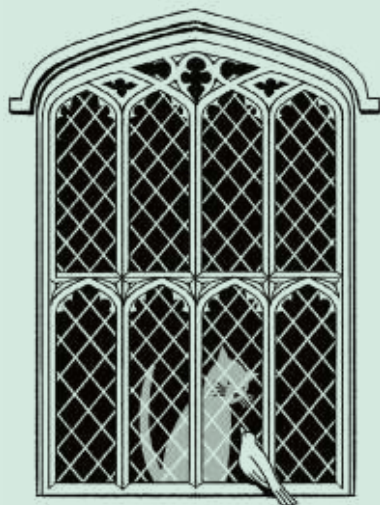


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