

# IMPERIAL

THE MAGAZINE FOR THE IMPERIAL COMMUNITY / **SUMMER 2024**



## **THE FORECAST? IT'S GOOD.**

THE IMPERIAL TEAM  
PREDICTING THE IMPACT  
OF CLIMATE CHANGE

**Dr Friederike  
(Fred) Otto,**  
Senior Lecturer  
in Climate  
Science and  
co-lead of  
World Weather  
Attribution

# Bill imagined a better world, with a gift in his will

Why alumnus Bill Anglesea chose to leave a legacy for future generations at Imperial College London.

Bill Anglesea (Chemical Engineering 1962) loved his time at Imperial in the 1960s. As his cousin, Jenny, puts it: "He always said he felt privileged to study Chemical Engineering at a true centre of excellence for his subject." He grew up with his mum and aunt in a two-up, two-down terrace in Wigan.

His family valued education, and from an early age Bill saw it as a pathway to success. He also knew first-hand the life-altering impact of financial support; he had attended Wigan Grammar School on a scholarship, and was also awarded a scholarship to study at Imperial.

## Passing it forward for the next generation

Bill met his wife Alison in his 40s, and they loved to travel and explore the countryside together. He was devastated when Alison passed away suddenly as a result of medical negligence, and he was proud to create a scholarship in her name for students studying medicine at Imperial, a place that had given him such opportunities.

When Bill died recently, he made donations to more than 50 people and causes in his will, including a very generous gift to create a second scholarship for future students in engineering at Imperial.



People who leave a gift in their will make an incredible difference. They make possible the futures that many people deserve but, without financial support, would never have.

Martin Lupton, Vice-Dean (Education), Faculty of Medicine

Imagine a brighter future – make a gift in your will today

A gift in your will can give future generations of students and researchers the chance to thrive at Imperial and beyond. You'll also be playing your part in research breakthroughs that tackle some of the world's biggest global challenges. For more information on leaving a gift in your will, get in touch with Anna Wall, Head of Regular Giving and Legacy Giving, on +44 (0)20 7594 3801 or email [a.wall@imperial.ac.uk](mailto:a.wall@imperial.ac.uk)

[imperial.ac.uk/legacy-giving](https://imperial.ac.uk/legacy-giving)

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**YBM**



# DIGEST



## IMPERIAL GLOBAL

### First stop: Singapore

Imperial's new research and innovation centre is just the start of our global collaboration initiative.



Singapore will connect with world-leading science and tech in Singapore and Southeast Asia, and enable stronger collaboration with the UK.

The centre's inaugural S\$200 million research programme, IN-CYPHER, will leverage Imperial's expertise in security of medical devices and health data

to establish Singapore as a global leader in health cyber security and AI for healthcare.

Next to come in Imperial Global's network of hubs in strategic cities is Imperial Global: Ghana, which will develop major programmes across West Africa. Imperial Global: USA will strengthen our research partnerships with American academic and industrial partners, and support our growing US alumni network and student recruitment opportunities. And Imperial Global: India will build the university's profile and partnerships in this emerging scientific and industrial superpower.

Our academics have forged research collaborations in more than 190 countries, and Imperial Global will help to make us the partner of choice for the ideas, talent and innovation that will tackle the biggest global challenges. ♦

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**Left:** Professor Brady at the launch of Imperial's first overseas research and innovation centre – Imperial Global: Singapore.

## WRITE TO US

### Letters

Join the debate and share your news and views.



**Left:** Tom Cafferkey (Geology 2005)

### Tunnel memories

When I opened *Imperial* issue 55 and saw the reference to Imperial's tunnels, I was instantly transported back to my student days, when in 1944 I was a resident of the Union buildings in Prince Consort Road. The Second World War was still underway and residents like myself were expected to participate in the air raid warden duties. This included access to the tunnels and I found myself exploring this extensive spider's web of underground passages. They seemed to extend to the Albert Memorial in the north, down to South Kensington station in the south and, I understand, westwards to Kensington High Street, although I did not push my explorations quite that far. During one expedition I came across a group of engineers indulging in their coffee break, but I did not disturb them, returning back to my base in the Union building.

*Peter Murden (Physics 1947)*

### A handy short cut

Back in 1951, we often took 'best value' for lunch at Queenies. After lunch, we needed to get to the Union in Prince Consort Road, and one of my friends pioneered a route (in the tunnels) to avoid the long hike round. We went into the Imperial Institute (of which only the Queen's Tower remains), then down into a dusty uninhabited world, rising behind Chem Tech and straight across Prince Consort Road to the Union.

*John Stoton (Mechanical Engineering 1953)*

### Chased out

When I was living in Weeks Hall in 1970/71, a few of us used to explore the tunnels after the hall bar closed. I can't remember exactly where we got in, but it did involve climbing over a locked gate. At one point we emerged in the basement of the Science Museum and were chased out by a museum guard!

*Tim Straker (Chemistry 1971)*

### More tunnels...

The tunnels provoked lots of chat over on our social media channels. Here are a few from LinkedIn – read more and join the conversation over on LinkedIn by searching 'Imperial College London'.

Let's hope this isn't a way of finding miscreants and revoking their degrees...

*Tom Cafferkey (Geology 2005) – pictured left*

Rumours when I was a student... "If you are caught down in the tunnels you will be instantly expelled."

*James Geach (Physics 2003)*

There was an unlocked entrance door over some railings on Exhibition Road which was an easy way in. You could get to Southside Halls bar one way and under the main College buildings the other. Queen's Tower has a hollow column on each corner you could get to from the tunnels and someone placed some aid climbing bolts in one so you could get up into the tower itself. Happy days!

*Alastair Dunn (BEng Mining Engineering 1994)*

### CONTACT US

Keep up with the latest from Imperial and share your thoughts and news. Please mark your message 'For publication'. Messages may be edited for length.

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 ✕ @imperialcollege, #OurImperial

For the latest news from Imperial as it happens, and to be a part of the Imperial community, visit our alumni Facebook page and LinkedIn group.

fb.com/alumni.imperialcollegelondon  
 linkedin.com/groups/87488

FROM THE PRESIDENT / PROFESSOR HUGH BRADY

# Our new strategy will shape a future where science truly serves humanity



In my last column in this magazine, I stated that Imperial's star is rising. The start of 2024 has shown just how brightly that star is shining. Chief among my highlights so far has been the publication of our new strategy: Science for Humanity, which sets out how Imperial will maximise its potential as a force for good.

I want to thank all of you who took part in our wide-ranging consultation. Your ideas and vision were inspiring as we drew this document together. I am proud to say that this strategy reflects the purpose and priorities of our staff, students and global Imperial community.

Much work is already underway to implement this strategy and its nine core initiatives. We will feature these in more detail in future issues of *Imperial*. Plus, this issue is still packed with examples of how our community is already driving forward this agenda.

On Enabling Talent, the future we are building is committed to nurturing the brightest minds from every corner of the globe, regardless of background, empowering them to become the problem-solvers our planet desperately needs. We discuss nurturing the next generation of Helen Kemp Porters and Abdus Salams, or the medical pioneers on page 46, not just with exceptional education, but with the resources, connections and support they need to make a real difference.

Beyond nurturing talent, we are powering research by creating fertile ground for groundbreaking discoveries. We're fostering an environment where collaboration thrives, where cross-disciplinary teams of engineers, medics, scientists and business minds tackle global challenges head on – whether it is producing a

synthetic chromosome for yeast cells (page 20) or teaching AI to prove mathematical theorems (opposite).

Finally, the best discoveries are meaningless if they stay locked away in labs. We want to amplify impact by taking our incredible research and translating it into real-world solutions. In this issue of *Imperial*, we explore the world of sustainable aviation (page 32), where Imperial academics, students and alumni are translating research into innovative and sustainable solutions that benefit society.

This strategy is not just about the future of Imperial; it is about shaping a better future for all. We, as a global community, have a responsibility to use our combined knowledge and expertise to tackle the challenges of tomorrow.

I hope you find the stories in this issue both inspiring and informative. And I hope you will join us on

## We're fostering an environment where cross-disciplinary teams tackle global challenges head on

Imperial's exciting journey as we put our new strategy into action – as alumni, as partners, as ambassadors – to shape a future where science truly serves humanity.

I couldn't end this column without sharing my praise for our brilliant team of *University Challenge* winners (featured on page 8). The Imperial team – comprising captain Suraiya Haddad, Sourajit Debnath, Adam Jones and Justin Lee (supported by reserve Mattia Elkouby) – won the final by an astonishing margin of 165 points. A tremendous win, which now makes Imperial the most successful team in the quiz's history! ♦

> *Professor Hugh Brady is President of Imperial College London.*

PHOTOGRAPHY: IMPERIAL COLLEGE LONDON/THOMAS ANGUS

## HEALTH

## School of Public Health opens

Imperial's campaign for a dedicated centre for the School of Public Health – launched in 2019, a year before the COVID-19 pandemic hit – has seen its vision become a reality, with Professor Sir Chris Whitty, Chief Medical Officer for England, opening the new centre at the White City Campus.

Speaking at the event, Whitty said: "Imperial's strong foundation in science allows it to channel knowledge and understanding, making it one of the most effective centres for public health in the world."

The Centre is a hive of flexible spaces where academics, collaborators, students and the local community can create ambitious ideas, supporting advances in genomics, data sciences, community engagement and educational facilities. It's been made possible by an ambitious fundraising campaign that attracted the support of leading philanthropists, including Dame Marit Mohn and Humphrey Battcock, and Community Jameel, an independent global organisation.



Left: Imperial brought together European and global science communities in December 2023 to mark the start of the UK's association with Horizon Europe.

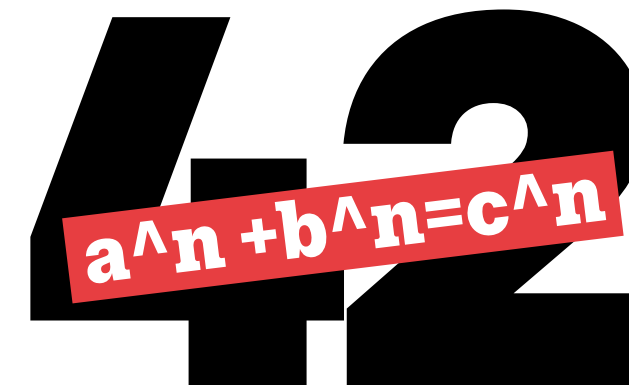
## RESEARCH

## Exploring new Horizons

Developing a world-first CO<sub>2</sub> capture plant that could cut costs in half; understanding how clouds and aerosols affect our climate; and transforming detection, diagnosis and prevention of Alzheimer's disease – these are just a few of the pan-European research projects where Imperial researchers are leading, innovating and making a difference, thanks to their participation in Horizon Europe.

Horizon Europe is the biggest research and innovation programme in the world, set up to fund groundbreaking science and ideas. "Our scientists here at Imperial are making a significant contribution," says Provost Ian Walmsley. "There is so much to gain from bringing together the brightest scientific minds from across Europe, and we are excited by the future opportunities to work closely with our colleagues in Europe and around the world."

PHOTOGRAPHY: FERGUS BURNETT



*The Hitchhiker's Guide to the Galaxy says 42 is the answer. But what is the question? Professor Kevin Buzzard asks: how do we teach AI to prove mathematical theorems?*

A lot of people think mathematics is easy for computers, because they can calculate pi to a million decimal places or add up numbers super quickly. And yes, computers are extremely good at calculation – they can do it better and more reliably than humans and they've been doing that for decades.

But proving mathematical theorems is a different challenge. It's very easy to teach AI the axioms – or basic assumptions – of mathematics. If you can get the computer to do them all in exactly the right order, then you'll get to the proofs you want. But working out the right order, when you have almost infinite possibilities, is surprisingly tricky. Humans are really good at it because humans have some insight that AI doesn't have yet. Mathematics is an art, as well as a science.

I've been given a five-year grant to give AI some of the tools to tackle mathematical theorems. We take an existing proof – such as Fermat's Last Theorem, first proposed in 1637 and proved by Andrew Wiles in 1994 – and teach it to the computer. With the help of – hopefully – lots of citizen mathematicians around the world, I'll be translating that human proof into a language that computers understand. At the end of the project we're going to have this gigantic database – the complete proof of this extremely hard theorem down to the axioms. The AI will be able to look at it and say: that's what a complicated mathematical proof looks like; that's maybe how I should start thinking about mathematics.

The potential applications are exciting. If we can teach computers how to do this stuff, and get mathematicians using these systems, then mathematicians are less likely to make mistakes. Mistakes are problematic because mathematics builds on other mathematics. The step after that is teaching AI to prove theorems by themselves. I want to get to the point where computers are better than humans at it. Then I can retire, because we'll just let computers solve all the hard problems. ♦

## IMPERIAL INNOVATES

# A great step forward

WeWalk collaborators Dr Jean Marc Feghali and Gökhan Meriçliler share a vision of a more inclusive world.

Words: **Jo Caird**



*TIME Magazine* picked it as one of its best inventions of 2019; the prestigious Edison Awards gave it a Gold Medal; and Amazon named it Startup of the Year two years later. But for all the accolades, WeWalk collaborators Dr Jean Marc Feghali (MEng Civil Engineering 2018; PhD 2022) and Gökhan Meriçliler (MSc Business Analytics 2022) share one important vision for their groundbreaking smart cane.

“WeWalk is more than a product,” says Feghali, “it’s a shared vision for a more inclusive world. By blending rigorous research with real-world needs, we have developed a smart cane that helps visually impaired people actively participate in society. Thousands of WeWalk users are telling us that our smart cane has enabled them to live fuller lives.”

WeWalk acts as a new handle when attached to any long cane, vibrating to inform users of low-hanging obstacles that the bottom of a cane may typically miss, while also offering up a range of smart navigation features. For Meriçliler, co-founder and CEO, it is the culmination of ten years’ work developing technologies with and for visually impaired people.

He was previously at YGA, a tech-driven social innovation NGO based in Istanbul, but when he relocated to England in 2018 to grow the business, he came to the attention of Feghali, visually impaired himself and at the start of a civil engineering PhD addressing the mobility challenges faced by visually impaired people. The pair hit it off right away and the collaboration was born.

Having joined WeWalk as Head of Research and Development, Feghali approached his supervisor, Professor Washington Yotto Ochieng, Head of the Department of Civil and Environmental Engineering, about bringing WeWalk into his PhD. With Imperial behind them, it was time for take-off. “With Professor Ochieng in our corner, we applied for Innovate UK grants, built and tested indoor navigation systems at Imperial, and are still collaborating to this day,” says Feghali.

That collaboration has also opened the door to other successful partnerships – with the Royal National Institute of Blind People, for instance, which extensively tests, iterates and validates WeWalk’s products; and with Microsoft, which supports the company’s Artificial Intelligence Mobility platform.

“The smart cane is a very important step forward for the visually impaired community – the white cane is a universal tool, and through our partnership with Microsoft and the mobility app Moovit, people can use it with our navigation app in more than 3,000 cities around the world,” explains Meriçliler. “But we hope to go beyond that, drawing on Imperial’s know-how and deep tech expertise.” The sensing technology being developed for autonomous vehicles, for example, could have applications when it comes to wearable navigation devices for visually impaired people.

“You can truly feel the enthusiasm of Imperial’s PhD students working with our visually impaired participants,” says Feghali, “when they’re taking Imperial’s great theoretical work and transitioning it to something practical.” And securing funding from prominent venture capitalists worldwide, including Nesta, KHP, APY, Vestel and NEC X, “empowered us with the financial strength and confidence to transform our state-of-the-art research to tangible products”, adds Meriçliler.

“We are eager to reach a global community to support our cause,” says Meriçliler. “But we’re also grateful for what this represents – shining a light on tech for good initiatives – because impact-driven businesses will be essential for societal transformation in the future.” ♦

> *Gökhan Meriçliler and Jean Marc Feghali were joint winners of the Alumni Entrepreneur Award 2024 for WeWalk, their social impact startup.*

**Right:**  
WeWalk’s Dr Jean Marc Feghali and Gökhan Meriçliler.



PHOTOS: LUCY POPE

## IN BRIEF

**Immunotherapy trial**

The first UK cancer patients have received an experimental mRNA therapy known as mRNA-4359 – which ‘trains’ patients’ immune systems to recognise and fight cancer cells – at Imperial College Healthcare NHS Trust. The clinical trial will evaluate its safety and potential for treating solid tumour cancers such as lung cancer.

**Imperial is out of this world**

A magnetometer built by Imperial physicists is on its way to space. The instrument, which measures the local magnetic field, will be fitted on NASA’s Interstellar Mapping and Acceleration Probe. It’s hoped that its measurements of the interplanetary magnetic field will enable better understanding of charged particles in the Sun’s heliosphere.

**New Dean for Business School**

Professor Peter Todd has been named new Dean of Imperial College Business School, succeeding Professor Franklin Allen who has served as Interim Dean since September 2023. Todd has a wealth of experience in senior academic roles: most recently, as the Director General (CEO) and Dean of HEC Paris, the first non-French holder of the post.

## OVERHEARD ON CAMPUS

*Flip: a robotic plesiosaur designed by Imperial’s Dr Luke Muscott and featured in the documentary “Attenborough and the Giant Sea Monster”. Sir David himself came to the deep-water wave basin at the Imperial Hydrodynamics Lab to see Flip in action and interview its creator.*

*Phototaxis: the movement of organisms such as insects in response to light. New research from the Department of Bioengineering has found that flying insects are not attracted to light. Rather, they think it is the sky and therefore ‘up’ – which causes them to fly into it.*

*Humourbragging: promoting yourself by drawing attention to your positive qualities, while raising a smile in a contextually appropriate way. It’s the latest way to ace your interview or pitch, according to a new study from Imperial Business School.*



## UNIVERSITY CHALLENGE

## RISING TO THE CHALLENGE

Imperial has affirmed its place as the most successful team in the history of TV's toughest quiz.

**Starter for ten**, no conferring: which is the most successful team in *University Challenge* history? Imperial, of course, following an incredible fifth triumph, this time against University College London. Congratulations to the winning team – captain Suraiya Haddad (Medicine 2023), Sourajit Debnath (Earth Science and Engineering 2023), Adam Jones (Computing, Fourth Year), Justin Lee (Chemistry, Third Year) and reserve Mattia Elkouby (Chemistry, Third Year).

“Imperial’s diverse international community is used to finding the answers to really tough questions, whether that’s in the lab or on *University Challenge*,” says Provost Professor Ian Walmsley. And tough questions this year ranged from classical sculpture and European history to Korean mythology and mathematics.

So how do students from a university orientated towards maths and science answer questions on the arts and humanities? “For me, it’s easy to pick up a book, but it’s not so easy for an English Lit student to write a computer program,” says Justin Lee.

Quizzing is, of course, a serious business – but in between memorising BAFTA-winning video games and finding out why so many members of the Swedish monarchy are called Henry, the team also had to keep up with their university work. “All of us were balancing our degrees with our exams – in my case, my finals,” says Haddad.

Now, they’re looking forward to getting behind next year’s team. “The level of support we have received from the Imperial community and beyond has been amazing,” says Haddad. “Thank you to everyone who has been cheering us on!”

WORDS: LUCY JOLIN. PHOTO: BBC

“Imperial’s diverse international community is used to finding the answers to really tough questions

### HOW TO BUILD THE PERFECT TEAM

#### STEP 1: CREATE THE DYNASTY

Nobody knows the quirks and challenges of *University Challenge* better than previous players – and Imperial has a vast pool of knowledge to draw on. The independent *University Challenge* committee, made up of past contenders, chooses the final team, and also coaches the current team on revising topics.

#### STEP 2: DO YOUR HOMEWORK

It’s one thing to hold a first in Chemistry; it’s quite another to know who won the Nobel Prize for Chemistry in 1926 (Theodor ‘The’ Svedberg). In other words, studying a subject is no guarantee of success in that subject area when it comes to the quiz – you may be better off just learning its Nobel Prize winners!

#### STEP 3: GET THE RIGHT MASCOT

Science has yet to explain the power of the mascot: just how might its presence determine who can identify a Winslow Homer painting? Fluffy animals are always reliable, however: UCL’s Jeremy Bentham doll was no match, this year, for Imperial’s Carole Otter and her ever-changing fashion accessories.

#### STEP 4: SHARE THE PAIN

You can’t learn everything yourself, so decide who learns what. Legend speaks of a spreadsheet containing all the quiz’s canonical knowledge. This gets divided up between team members to learn: for example, one player might take Shakespeare’s histories, one player the comedies and one player the tragedies.

#### STEP 5: EMBRACE POP CULTURE

Think *University Challenge* is all about the highbrow? Think again. This series’ most famous question hinged on the difference between two underground 90s dance music genres – so make sure you memorise the lyrics to Cruel Summer alongside *The Clerk’s Tale*.

## PUZZLES

## Think you’ve got what it takes?

Test your skills with questions created by the Imperial Quiz Society to put *University Challenge* 2024–25 wannabes through their paces. Good luck!

#### Question 1:

What doubled letter begins all of these: a new Japanese religion founded in 1892 by Deguchi Nao; a type of drink with oxidation between that of green and black tea; a mixture of cornstarch and water that displays non-Newtonian properties; and a region of the outer Solar System which may contain trillions of comets?

#### Question 2:

What surname links all of the following: the founder of twistor theory; a two-dimensional compactified spacetime diagram; a ‘kite’ and ‘dart’ that are the basis of a type of aperiodic tiling; and the two impossible objects that take the form of a staircase and a triangle respectively?

#### Question 3:

“It was almost as incredible as if you fired a 15-inch shell at a piece of tissue paper and it came back and hit you.”

Which physicist said this, remarking on an experiment performed by Hans Geiger and Ernest Marsden under his supervision, where alpha particles were fired at a thin gold foil?

With thanks to the Imperial Quiz Society.

> Find the answers on our website at:

[imperial.ac.uk/be-inspired/magazine/issue-56/brain-power](https://imperial.ac.uk/be-inspired/magazine/issue-56/brain-power)

FOR ISSUE 55 SOLUTIONS:

[imperial.ac.uk/be-inspired/magazine/issue-55/brain-power](https://imperial.ac.uk/be-inspired/magazine/issue-55/brain-power)

# 50 years of changing lives: join Outreach@50

For nearly five decades, we've been supporting young people explore the exciting worlds of science, technology, engineering and maths through our schools outreach programmes.

## Our outreach history

Imperial's legacy in schools outreach began in 1975 with the pioneering Pimlico Connection - a student-led tutoring programme believed to be the first of its kind in the UK.

Since then, we have remained dedicated to breaking down barriers to higher education and unlocking potential in young minds, through a range of innovative programmes. From tutoring to summer schools, we have positively impacted thousands of young people, as well as the passionate individuals in our own community, who have championed and contributed to these activities.

## Marking moments

To celebrate 50 years of making a difference through our outreach work, we're launching our Outreach@50 profile series. This series will tell the stories of the amazing people and communities we've worked with and highlight our ongoing commitment to helping young people. It's also a big thank you to everyone who has supported us along the way.

## Join us

Do you have a story to share from your involvement in our schools outreach initiatives? Join us in marking this milestone by sharing your experiences to help share our collective impact and inspire future generations.



Share your stories via  
the form on this page.



Imperial's Schools Outreach through the ages

## It's humans – not machines – that make the future of AI in education so exciting



W

ill artificial intelligence transform education? Undoubtedly. But this isn't about machines taking over, it's about humans rising.

Over the past few decades our learning technology has favoured one directional flow of content and standardised assessments. In mirroring this pattern, we created a system that has made our jobs susceptible to automation and has led to a lot of disengaged educators and learners.

The introduction of new technologies like AI, spatial computing and extended reality (XR) is creating an opportunity to merge human intellect and technology in a way that will make learning feel like a natural extension of ourselves – where AI and XR understand and respond to our gestures, gaze, voice and natural language, giving us the opportunity to create a more intuitive and adaptable model.

Educational institutions have an unprecedented advantage to turn their data into verified systems that can then be used to create AI-driven assistants and simulations. These large learning models are dynamic knowledge databases – containers you can add to and train in exchange for more personalised outputs – which can then be connected to industry and culture to create the first scalable model for lifelong learning.

And these technologies aren't just new gateways to knowledge, they are the keys to unlocking curiosity, creativity and connection at scale. The future of learning will be almost invisible, ubiquitous and much more human.

At the IDEA Lab we are building, testing and iterating these AI-driven pathways to create AI-driven assistants and simulations for our courses. In parallel, we are working with immersive technologies for learning in simulated environments. These simulations allow us to scale the human side of learning, where future leaders can develop the skills for crucial conversations, negotiations, problem solving and innovation.

The transformative potential of AI and immersive technologies in education is grounded in robust evidence and practice. For instance, while traditional lectures often lead to modest retention rates, learning in immersive environments can dramatically increase engagement and retention, with students retaining up to 75 per cent of the learning, according to findings from the National Laboratory.

Companies are also pioneering this frontier, with aerospace firms creating digital twins and AI avatar instructors for enhanced pilot training, and nursing programs employing role-play simulations to cultivate empathy in patient care.

The potential for immersive and interactive learning is limitless. As technology evolves, so too will our ability to create more engaging and effective learning experiences, leading us to a world where education becomes engaging, adaptable and personalised.

But it won't happen without deep change. Historically, building products was similar to a mathematical function machine, where inputs were turned into predictable outputs because we programmed the product to behave that

## New technologies create opportunities to make learning a natural extension of ourselves

way. Building solutions with AI is more like scientific discovery, where we aren't always sure of the outputs we will get. It calls for adaptability, curiosity and the assembly of cross-disciplinary teams dedicated to innovation.

As we step into this new era, it's crucial to remember that technology is just a tool. Its impact – whether positive or negative – will depend on how we choose to use it. We need to build this future with wisdom, empathy and responsibility. The true measure of our success will be how well we enhance the human experience and foster a culture of lifelong learning. ♦



**Spreading the message:** Dr Linda van Keimpema (right) and Louisa Thompson (far right) deliver their Invisible Warrior workshops in a variety of settings.



ADVENTURES IN... SOCIETAL ENGAGEMENT

## Invisible Warrior

Not much is known about the impact of sickle cell disease – something Dr Linda van Keimpema and Louisa Thompson are determined to change.

Words: **Kat Brown** / Photography: **Angela Moore**

**N**ovember 2020. A presentation by a patient with sickle cell disease (SCD) sounded interesting – and for bioengineering and neuroscience specialist Dr Linda van Keimpema, it would be the “start of everything”. She went along, heard Louisa Thompson’s story and the seed was sown for Invisible Warrior, a life-changing project spreading information about a cruelly misunderstood disease.

Thompson’s story is at the heart of Invisible Warrior, with the Imperial team making the project a reality. “I want to show the other side of SCD,” she says. “Not just the medical facts but the experience. The pain, the treatment, the mental health aspect and how it impacts your day to day, especially because it’s an invisible illness – hence the project name.”

SCD – a disease where red blood cells are unusually shaped, inhibiting their ability to transport oxygen around the body – is chronic, and there is no cure for most patients. One in 79 babies in the UK is born with the trait, and if both parents carry it, their child will have the disorder. Symptoms can include episodes of extreme pain (crises) that can last for weeks, anaemia and an increased risk of infections. It is more common in people from African and Caribbean backgrounds, and medical racism is an additional obstacle to gaining treatment.

Diagnosed with SCD at birth, Thompson was told that she wouldn’t live to see 18. Now in her 40s, however, she has become a brave and bold speaker, advocating for patients with SCD. “Her story completely blew me away,” remembers van Keimpema. “I only knew about it from the biomedical side. I never considered what it would mean for patients.”

Van Keimpema reasoned that if she, with her background, was clueless, then there was significant work to do. She and Thompson created a team to deliver awareness projects in London, which has a high number of people with SCD. They have so far reached 1,000

pupils in 18 schools, and their workshops have seen advocates from around the world speaking.

The workshops are delivered digitally, which means that Thompson is safe from infection risk. “I’ve learned that I can’t do it all, so I’ll tell the team when I’m not feeling well,” she says. “They push through without me a lot and still spread awareness on my behalf, and I couldn’t be more grateful to them for being my advocate when I can’t do it.”

In 2022, van Keimpema nominated Thompson for Imperial’s Inspirational Partner Award, one of the President’s Awards for Excellence in Societal Engagement, which she won. However, Thompson is most proud of her interaction with students: “I was so scared at first as I spoke about personal experience and mental health, but it was amazing to be received so well. The empathy and understanding, good wishes and gratitude from the students made me cry.”

The team are currently at capacity but would love to deliver workshops more widely – to the general public and through wider science events. Van Keimpema is delighted with what they are achieving. “We’re invited to speak at hospitals, we work with the Sickle Cell Society and have a team of more than 20 volunteers helping at events,” she says. “It’s grown bigger than we ever imagined.”

Schools remain at the heart of everything Invisible Warrior does. “It’s very important to come into schools and speak to students around an age when most people struggle anyway,” says van Keimpema. “We normalise the fact that it’s okay to struggle, but it’s also okay to ask for help.”

Many patients with SCD endure post-traumatic stress disorder because of the challenge of having the disease in their childhoods, so spreading awareness has a positive impact more widely. “I’m so proud and still sometimes can’t believe that it’s happening,” says Thompson. “I just want to keep doing the best I can to spread knowledge. At times, it serves as my therapy that, no matter the challenges, some good can come out of it.” ♦



**“I want to show the other side of SCD, how it impacts day to day”**

> To find out more, visit: [imperial.ac.uk/immunology-inflammation/research/invisible-warrior](https://imperial.ac.uk/immunology-inflammation/research/invisible-warrior)





**Right:**  
**Professor  
Fredi Otto**  
of the Grantham  
Institute for Climate  
Change has been  
co-lead of World  
Weather Attribution  
since it was  
founded in 2015.

# **Extreme rainfall, heatwave, drought, wild fire, flash flood, tropical cyclone**

What were once rare weather events have become a regular feature of global news bulletins. Climate change is the obvious reason, but how to prove it?

Words: **Megan Welford** / Photography: **Dunja Opalko**

**A**fter the Russian heatwave of 2010, Dr Friederike (Fredi) Otto was discussing the ‘weather’ versus ‘climate’ issue with her colleague and friend Professor Geert Jan van Oldenborgh. Both were frustrated that a focus on short-term weather forecasts often comes at the expense of the longer-term climate view, says Otto, and that in the time it takes to bridge that gap, the link between event and cause can be deniable.

“We were fed up with major weather events happening and the scientific community staying silent because they needed the requisite time to research and ▶

peer-review. After discussions with a non-profit who were also interested in putting climate change into weather bulletins, we thought: ‘We can do this faster.’”

Thus the World Weather Attribution (WWA) initiative was born – almost. “Our first study was the European heatwave of 2015,” recalls Otto, now Senior Lecturer in Climate Science at the Grantham Institute for Climate Change and the Environment. “And it was a steep learning curve. We crunched the numbers and produced a factsheet within a couple of days that demonstrated the influence of global warming on the heatwave.”

It turned out, however, that the numbers weren’t enough. “The media didn’t really know what to make of the figures and did not report it. So, for the next study, we also wrote a scientific paper on the same timescale, which created quite a backlash from the scientific community, who said: ‘If you can do it that quickly, it’s not real science.’” The pair also began to write web summaries and press releases that highlighted the human impacts of the weather event, working with the Red Cross Climate Centre to produce simple explainers. They published their data and methods, as well as peer-reviewed papers to build trust with the scientific community. “Gradually, we went from producing five studies a year, working all the time and very late, to growing the team and becoming more systematic. Now, we produce 14 studies a year, mainly within working hours!”

**T**hese days, the crack WWA team of 11 – five full-time researchers at the Grantham Institute and seven part-time from other organisations – has a streamlined process that can produce a full report seven to ten days after a weather event, describing if and how it was directly influenced by climate change. “Every Monday we have a meeting with the Red Cross who have scanned humanitarian appeals and websites to assess the impact of weather events, such as how many have died, how many displaced,” says Otto.

“The London heatwave of July 2022 was a good example. We have to decide if an event qualifies as severe enough to study, and then do we have access to the climate and data models? Observations from the Met Office told us the extreme heat was forecast to continue. London is a densely populated area, and the population counted as vulnerable because it was unprepared. So we decided to produce a report.”

The next stage is to define exactly what weather event a particular case is. “We take observed data from local meteorological services and scientists – part of a network we have built up all over the world,” says Otto. “We bring in relevant climate models, of which we can use up to 70 that are accessible.”

Here, statistician Dr Clair Barnes comes into her own, as she builds statistical models of the relationship between climate change and weather events, as well as writing computer code to automate the process of checking and analysing the climate models. “We tend to share roles, but no one else really likes the stats!” laughs Barnes. Over the week, the team stay in constant contact as they build the statistical and humanitarian picture.

Then comes the important bit – attribution. Once the team have the data they need, they run the same model but with global warming removed. Statistically, they recreate the world from around 1850, just before we started emitting greenhouse gases. That way, they can see what the event would have looked like then and how likely it would have been without climate change. “We found that the likelihood of the London heatwave happening without climate change was one in 10,000,” says Otto, “which basically means it wouldn’t have happened. We also found that climate change made the heatwave 2°C hotter, pushing temperatures above 40°C, which has caused heat stress for tens of thousands more people.” Their report hit the headlines while London was still reeling. ▶

**We found the likelihood of the London heatwave happening without climate change was one in 10,000**

**Right:**  
Dr Clair Barnes  
is a Research  
Associate at the  
Grantham Institute.



**Attribution science communicates the impacts of planet-warming on humans and natural systems. It's a science for change**



**Left:**  
**Dr Joyce Kimutai**  
is a Research  
Associate at the  
Grantham Institute.

In October to December 2022, the horn of Africa experienced its worst drought in 40 years, leaving 4.35 million people in need of humanitarian assistance. Here, as well as proving that there would not have been drought at all in a 1.2°C cooler world, and that the drought had been made 100 times more likely by human-induced climate change, the WWA team were also able to assess the impact of climate change on natural weather variations. Working with WWA's climate scientist Dr Joyce Kimutai, Barnes built a new statistical model that could factor in the El Niño-Southern Oscillation, a natural ocean variation that affects weather, adding to understanding of climate and weather extremes. It also meant the team could prove, in 2023, that drought in the Amazon basin was caused by climate change rather than El Niño.

"We know that Africa and the Amazon are disproportionately affected by climate change because they sit in the Tropics, where weather systems are naturally more erratic," says Kimutai. "The east African drought had an impact on food security – plants drying out, crop reduction, no water or pasture for animals so that livestock died. Livelihoods were destroyed, people went hungry." Using WWA studies, investigative website Carbon Brief was able to estimate that 15,700 people died in Africa during 2023 from weather disasters. "And these countries are getting less resilient each time," says Kimutai. "Developmental gains, such as roads, are literally being swept away."

Kimutai acted as a systematic observer at COP28 on behalf of the Kenya Meteorological Department, pushing the UN World Meteorological Association to support countries like Kenya, which are classed as developing rather than vulnerable. "Attribution science communicates the impacts of planet-warming on humans and natural systems," she explains. "How people live, move around and produce food and goods relate to each other. It's a science for change. It shows us we need adaptation strategies, which means building new infrastructure that is resilient – roads that won't get swept away, crops that are drought-resistant."

And where we can no longer adapt, we need to address loss and damage, says Kimutai. "For instance, pastoral farmers in Kenya can no longer make a living, as their animals keep dying. They are already asking: 'What should we do?' We need planning and new research into geo-engineered crops, but there are always other valid development priorities for governments, such as health, education and poverty eradication, for example."

**T**he Loss and Damage Fund, which began at COP26 in Glasgow, would not have been possible without attribution science, says Otto. "Without linking climate change to a weather event you can't have accountability. And accountability allows remuneration – and litigation." She cites the NGO Bush Fire Survivors, which successfully sued the Australian government for lack of adaptation and mitigation strategies, and set a legal precedent: that the Australian Environmental Protection Agency had a legal duty to take action on climate change.

And for Otto, the WWA's work also allows impact on a small, local scale that can be empowering. "Calling for heat action plans in cities, for example, is really important and can save lives – letting people know what to do in a heatwave, for example, such as closing the curtains during the day. It's easier to canvass your local council than the UN!" But change has also been large-scale; the German government adopted a nationwide heat action plan in 2023, following WWA recommendations.

For the WWA team, there is one clear action for the world to take. "Burning fossil fuels is what causes global warming," says Barnes. "So if we're still issuing oil and gas licences, we're not doing enough." Kimutai adds: "We need to stop making oil deals – connecting money and oil. What's all the wealth for, if we all die?" ♦

# BUILD YOUR OWN GENOME

A synthetic chromosome could unlock our understanding of all living organisms.

Words: **Bianca Nogrady**  
Illustration: **Matt Murphy**

**Without it**, we wouldn't have bread, beer, chocolate, wine or whisky. And biofuel, insulin and antibiotics rely on its presence for their production. But as the Swiss Army Knife for science, one humble genome found in brewer's yeast could hold the key to unlocking our understanding of all living organisms.

The ease with which *Saccharomyces cerevisiae* can be grown in culture and with which its relatively simple genome can be manipulated and altered has made it a



**Above:**  
Professor Tom Ellis  
Professor of  
Synthetic Genome  
Engineering in  
Imperial's Faculty  
of Engineering.

mainstay of biotechnology and molecular biology. So when an international team of scientists were looking to build a synthetic genome, they knew *S. cerevisiae* would be the perfect candidate.

“It was clear that despite technology moving quickly in synthetic biology and DNA synthesis, it would be a massive undertaking for just one group alone to build the *S. cerevisiae* genome from scratch,” says Professor Tom Ellis, Professor of Synthetic Genome Engineering in Imperial’s Faculty of Engineering. And so it was that after a chance meeting at a synthetic biology conference in California between Ellis and Professor Jef Boeke (then at Johns Hopkins University and now at New York University), Ellis joined Boeke in an international team trying to make the synthetic genome. Working together at Imperial, Ellis and Dr Benjamin Blount, now at Nottingham University, took on the specific task of building a large section of the *S. cerevisiae* genome – chromosome 11.

Thanks to genome sequencing efforts, the genetic ‘program’ for *S. cerevisiae* is already known. But while the genome of *S. cerevisiae* has been sequenced and studied more rigorously than almost any other organism, synthetic biology opens up a whole new avenue of exploration, enabling scientists to examine how the organism functions – and how to tweak and alter that function with incredible precision.

The ‘rungs’ of the DNA double helix are formed by four nucleotide bases pairing together: adenine (A), thymine (T), guanine (G) and cytosine (C). “The best way to think about it is to consider DNA as a programming language; it has its As and Ts and Gs and Cs, just like computers go with ones and zeros,” Ellis

**Chromosome 11** consists of around 700,000 base pairs, or pairs of DNA nucleotides. The first step in synthetic chromosome assembly is to split up that entire long sequence into a set of smaller sequences that can be made from chemicals by companies specialising in synthesising DNA. These companies chemically synthesise DNA molecules about 250 bases long, then link them together into longer lengths going up to 10,000 base pairs. Ellis and colleagues take these longer DNA molecules and link them into even longer pieces of around 50,000 base pairs.

“We then take that DNA and we put it into the yeast cell using a very specific reaction that will swap the equivalent bit of the yeast genome, putting our synthesised bit in and taking out the natural bit,” Ellis says. At this point, they need to check there are no errors in the sequence, and the best way to do that is by checking the yeast organism still functions in a range of conditions.

This ‘debugging’ is vital, and is the reason why the team only swaps in a smaller section of the genome each time – in effect ‘walking along the genome’ and gradually making it more and more synthetic. Debugging in synthetic biology is just as time-consuming and arduous as it is in software programming: “We spent about three and a half years on building it, and about three and a half years on debugging,” Ellis says.

Once that entire process is complete, and the synthetic chromosome has been thoroughly debugged, the fun part starts, says Blount. ▶

**Breakthrough:**

The synthetic version of yeast’s chromosome 11 could see a transformation in synthetic biology.

**Synthetic biology opens up a whole new avenue of exploration, enabling scientists to examine how the organism functions – and how to tweak and alter that function with incredible precision**



# Your gift set me up for life

When Engineering student, Tristan, struggled with his mental health, he was able to focus on his studies and succeed thanks to the generosity of our kind Imperial supporters, like you.

Reaching Imperial was a dream come true for Tristan. Having grown up in a small Midlands town, he was excited to experience life in the capital city whilst pursuing his passion for engineering. But as his degree progressed, the pressure of his studies began to mount and he found it increasingly hard to cope.

The demanding days and intensity of his degree, coupled with the rising costs of living in London, put a huge strain on Tristan. He began to question if he could continue at Imperial whilst he clung on to everything he'd worked so hard to achieve. It felt like his future was at stake.

## Your generosity kept Tristan on track

Kind Imperial donors, like you, supported Tristan through his toughest days. By funding his scholarship, his money worries were taken away, freeing him to focus on his studies and make time to address his emotional needs.

"My scholarship meant I didn't have to hunt for a part-time job when I already felt anxious and stressed," he says. "Having that financial security allowed me to unwind, meet up with friends and exercise — which all played a huge role in my recovery."

## A future built on your support

With your generosity, Tristan overcame his mental health struggles, completed his degree, and is now working as an actuarial analyst at Deloitte. He attributes his success to the experience he had at Imperial and your support.



**I'm so grateful to the alumni and friends who helped me overcome my struggles. They eased my worries, made me more resilient, and set me up for the future.**

"It may not always be obvious, but a donor's gift is truly life changing. My scholarship helped me to make the most of my time at Imperial, which is an amazing foundation for the rest of my life. I feel proud to be part of such an amazing community and I've no doubt that alumni support means just as much to other students as it does to me."

## Will you help more students like Tristan?

No one knows the life-changing impact of an Imperial education better than the Imperial community.

Your support can ease students' financial worries and give them the means to thrive, whatever hardship they face. If you would like to support more students like Tristan, please give a gift using the form enclosed or online: <https://bit.ly/3VA3dtv>

"We can use an in-built gene-shuffling system to make lots and lots of random changes on a scale that was previously impossible," he says. This can involve removing existing genes, adding in extra copies, changing how and when they function, or adding in completely new genes and seeing what happens.

For example, Blount is particularly interested in using the synthetic genome to build strains of *S. cerevisiae* that can perform specific biotechnological functions, such as making biological molecules with pharmaceutical potential or that can act as a more efficient or sustainable biological replacement for a chemical industrial process. And because the synthetic gene-shuffling system is so rapid, it doesn't take long for the results of those genetic tweaks to become clear. "The great thing about this system is it allows you to quickly prototype whether this is going to be a feasible thing and whether it's working," Blount says.

The intended genetic changes in the synthetic chromosome are very specific and targeted. And having synthetic chromosomes has also provided the opportunity to insert DNA sequences that accelerate evolution in *S. cerevisiae*, so that people can observe what random or useful changes come from genome evolution. The key to this is inserting a particular genetic sequence — called loxPsym — approximately every 2,000 to 3,000 base pairs along the chromosome. For the majority of the time, this sequence does nothing and the yeast ignores it. But when scientists flick the genetic switch for production of an enzyme called Cre, which is not normally made by yeast, this enzyme interacts with the loxPsym sequences and causes them to rearrange or delete the DNA between the loxPsym sites.

This random scrambling of DNA within and between chromosomes is a massively sped-up version of what normally happens with mating, or the

## *S. cerevisiae* has opened up some extraordinary and exciting new avenues of scientific study

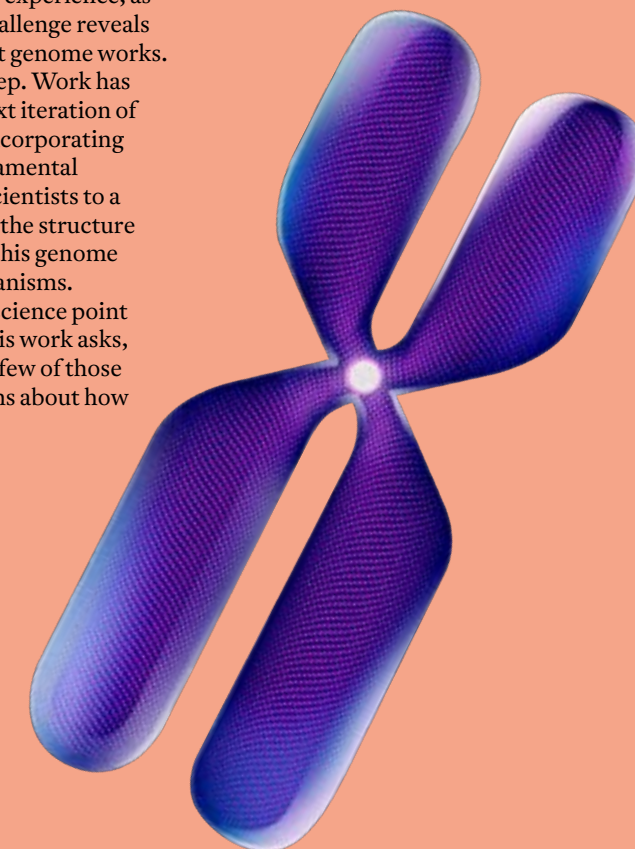
exchange of genetic material between two individuals. Bits of DNA are swapped or deleted or duplicated, in exactly the same fashion as happens to the genome during sexual reproduction. "Now you have a million different versions of the genome of the regions that are synthetic," Ellis says.

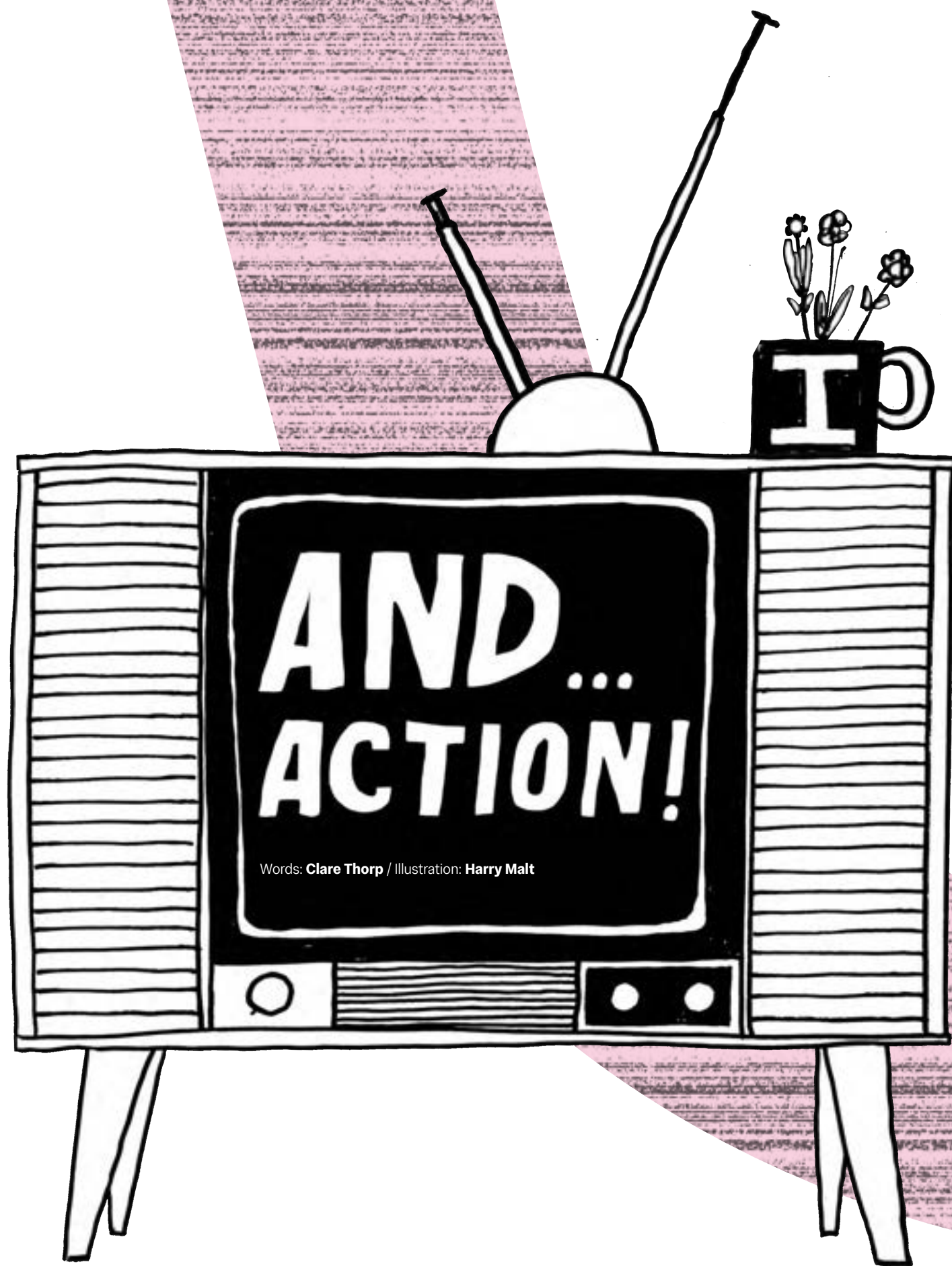
Some of those scrambled yeast genomes will be viable, some won't. Some will be better at certain tasks than others. "That can teach you about what are the essential genes and what are the non-essential genes, and eventually maybe use this system to build a minimal genome for yeast," Ellis says.

From being the first fully sequenced eukaryotic genome to the first fully synthetic genome, *S. cerevisiae* has opened some extraordinary and exciting new avenues of scientific study. It has been a profound learning experience, as each error, failure and challenge reveals more about how the yeast genome works.

And it's just the first step. Work has already started on the next iteration of this synthetic genome, incorporating more changes to its fundamental structure that will help scientists to a deeper understanding of the structure and function, not just of this genome but those of all living organisms.

"From a fundamental science point of view," says Blount, "this work asks, and hopefully answers, a few of those really important questions about how genomes work." ♦





**We dive into the unique, brilliant and often bonkers STOIC video archives.**

**A**n interview with Luke Skywalker, a recipe for jam sponge, a report on the Iranian Embassy siege and an investigation into the strange sounds emanating from underground tunnels on the South Ken campus. What's the link? All these things – and much, much more – were caught on camera by the Student Television Society of Imperial (STOIC) which, for 50 years, compiled a unique record of life at Imperial.

“The STOIC videotapes offer a history of Imperial that doesn't exist elsewhere,” explains Colin Grimshaw, who worked as the TV Studio Manager until 2007 and now oversees the video archive and associated Imperial blog. “Students in STOIC could go out and shoot whatever they wanted to. Every time I go through the tapes, I'm finding all manner of things that I didn't even realise had been recorded. Many things they captured on video no longer happen at Imperial.”

This includes long-forgotten RAG week activities, a raft race across the Serpentine and a summer

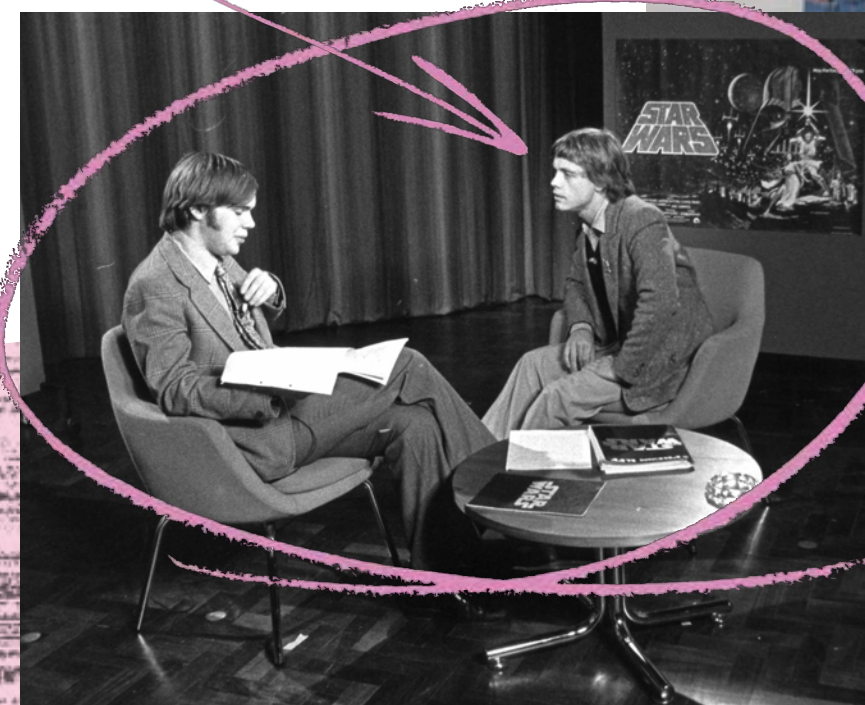
concert tradition in which the 1812 Overture was performed on the Queen's Tower lawn. “They used to ring the bells in the tower to coincide with the music. Then they went one better and set off cannon fire from the tower. It no longer happens – but we've got it on video.”

Grimshaw recently discovered a short clip of former Professor and Nobel Prize-winner Abdus Salam giving a lecture. He's also unearthed the only known Imperial-made video of Lord Penny, Rector ▶



Oxford Street tiddlywinks, 1980.

Mark Hamill studio interview.



An interview with Glenda Jackson.



from 1967 to 1973, who led the development of Britain's first atomic bomb. "There's some pretty damn good stuff in the archives," he says.

STOIC was formed in 1969 when it was suggested that students from the Electrical Engineering department – which owned and ran the university's TV studio – could help operate the cameras to film weekly 20-minute talks. This group of student volunteers soon morphed into a society that started producing an experimental news magazine programme, called *IC Newsreel*.

The first episode was broadcast in February 1970 and included a lengthy piece on Imperial's Pro Rector Lord Jackson of Burnley, who had died the day before. "I had to very hurriedly try to get someone to do an obituary," says Andy Finney (Electrical Engineering 1971), STOIC's first Chairman, who convinced the Head of Electrical Engineering, Professor John Brown, to record a straight-to-camera tribute.

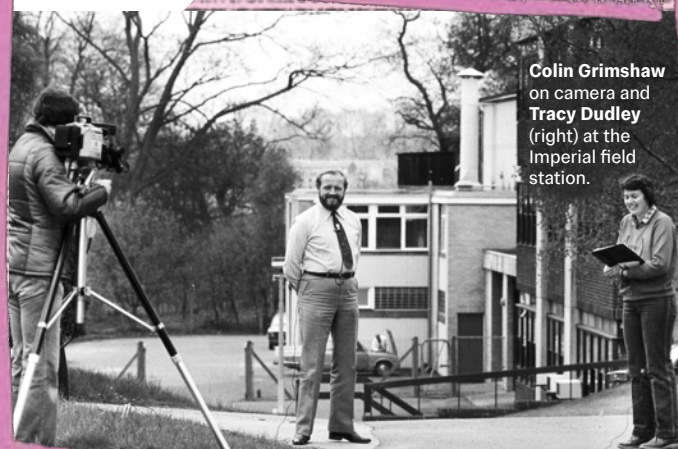
Around 100 people watched the first show, with numbers somewhat limited by the technology. "We basically wheeled the videotape machine and monitor on a trolley down into the nearby junior common room (JCR) and played the programme back at lunchtime," says Finney. STOIC would later



Filming *tiddlywinks* in Oxford Street, 1980.



David Attenborough interviewed in the TV studio in 1982.



Colin Grimshaw on camera and Tracy Dudley (right) at the Imperial field station.



Barry Humphries studio interview.



Studio interview with Trevor Phillips, 1976.



Filming more *tiddlywinks*.



Studio interview with James Sinclair.

be linked to the JCR by cable, and then the Southside Halls and Students' Union. In future years it extended further across campus, and was even screened in other London universities via a cable network.

Episodes of *IC Newsreel* were often delightfully eclectic. The second edition included a report on a visit by the President of Yugoslavia, featuring footage of his motorcade leaving – though with no portable camera, the students had to improvise. "We had a long lens pointing out of the window," says Finney. In a later episode, he managed to secure an interview with Radio 1 DJ Mike Raven. "He was a very eccentric character and turned up in a black cape looking as if he should be in a horror film. In fact, he eventually gave up on DJ-ing to become an actor in horror films."

**T**here was no means of editing footage at first, so if anyone made a mistake they had to start again at the beginning or just keep going. "I was there very much in the rudimentary phase before the equipment and the programming improved dramatically, but it was great fun," says Finney, who went on to work for BBC radio and have a long career in broadcasting. "We were making it up as we went along."

With a few exceptions, much of the existing STOIC archive is confined to the period between 1980 and 1986. Before that, video tapes were so expensive that they had to be reused. (After 1986, STOIC got their own studio in the Students' Union and stopped using the university's TV studio.)

"1980 was crucial because we went on to a different videotape format and started to record in colour," says Grimshaw. "At that point the cost of videotape dropped dramatically. We also had the ability to edit, so you got a much more sophisticated result." ▶



Terry Thomas studio interview.



Pram race with Willie Rushton.

“In retrospect, I wish I had done more in front of the camera, but as an electrical engineering student I was rather timid and in those days the idea of being in front of a camera held more concern than it probably does today.”

Richard Copnall (Electrical Engineering 1986) was a STOIC member from 1982 to 1986. “It was my main excuse for missing labs and tutorials,” he says. “But it gave me a great understanding of the importance and techniques of visual communication, and I think the teamwork was more effective than anything we did as part of our courses. There was lots of joking around, and always a drink at Southside Bar when the show was finished.”

Like many STOIC alumni, Copnall has been enjoying taking a trip down memory lane with clips Grimshaw is posting on his blog, covering the footage he finds as he digitises the collection. “It’s

a bit embarrassing to see the old footage, but it’s a primary source of history that Colin is preserving.”

Despite the fact that STOIC (later ICTV) hasn’t re-emerged after its COVID-enforced hiatus, the archives live on – though only thanks to Grimshaw, who, shortly before he retired in 2011, rescued them from being thrown into a skip. “They needed the space and asked me if I was interested in some tapes held in a small room under a staircase. If not, they would throw them away. They didn’t realise the importance of what was on them. The next day we went and boxed up the entire archive and shipped it to the holding store. Thank goodness we rescued them – we would have lost so much history.” ♦

➤ Check out Colin’s blog at [blogs.imperial.ac.uk/videoarchive/author/cgr/](https://blogs.imperial.ac.uk/videoarchive/author/cgr/) and email [alumni@imperial.ac.uk](mailto:alumni@imperial.ac.uk) with your memories.

Other notable advances included an on-location camera, meaning students could go and report on outside events.

The equipment progressed a little faster than the gender ratio of the society. “When I joined there were no other women involved,” says Tracy Dudley, née Poole (Life Sciences 1982), a STOIC member from 1979 to 1982. Still, she found the society a welcome distraction. “When I arrived at Imperial I felt out of my depth and was quite stressed about my course,” she says. “Funnily enough, the only time that I wasn’t feeling anxious was when I was at the television studio in front of the camera. Just having that break on a Wednesday afternoon and evening when I could forget about everything else was great.”

She remembers reporting on student elections, the Lord Mayor’s show – and the launch of the Austin Mini Metro. “We went to the Design Centre to film a piece about it and there was a display model that I sat in,” she says. “And I just could not get the words out in the right order. It became so funny. I think I must have had nine or ten attempts to get it right, all caught on camera.”

STOIC members admit that capturing mistakes on camera was all part of the fun. But there were serious stories to cover, too, including in 1980, the Iranian Embassy Siege in Princes Gate. University buildings backed onto the embassy building, so the STOIC team headed out to do some live reporting from the scene – though they were swiftly moved on by police. “It was a big thing



A STOIC team on an outside broadcast.

because it was very close by, and I think I was quite nervous,” says Dudley.

STOIC also became an unlikely stop-off on the publicity tour for British and Hollywood actors and celebrities. “The film companies were keen to promote films to students,” says Grimshaw. “We had all sorts of people, including Mel Brooks, Malcolm McDowell, Leslie Phillips, Christopher Lee, Michael Palin, Andrew Sachs and Terry Jones.” There was also an appearance from Barry Humphries, who arrived at Exhibition Road in full Dame Edna Everage costume.

In 1978, Mark Hamill stopped by the studio to promote *Star Wars*. He was gifted an Imperial T-shirt which he wore on *Blue Peter* later the same day. “A lot of the interviewees let their guard down with us and were surprisingly candid,” says Phil Claridge (Electrical Engineering 1982), who mostly stayed behind the camera.

Edward Heath interview.



The Missing Scientists band performing in Imperial's TV studio in 1980.



Mel Brooks studio interview.

C A N W E  
R E A L L Y  
M A K E  
F L Y I N G  
G R E E N ?

CO<sub>2</sub> emissions from the aviation industry are expected to triple by 2050. But rather than suggesting we give up flying altogether, the Imperial community is working on some clever – and surprising – solutions.

Words: **Lucy Jolin** / Photography: **Victoria Ling** / Styling: **Vicky Lees**



**When a 24-hour deluge** hit the city of Mumbai in 2005, Swapnil Jagtap (PhD Civil Engineering 2022) wasn't unduly worried. The city rarely flooded, he reasoned, and even when it did, his flat was not affected. This time, though, was different. The water rose and rose, and by the time the storm ended, his home was under five feet of water – and the city was devastated.

This was the first time Jagtap was exposed to the change in weather patterns brought about by climate change – but it wouldn't be the last. In 2017, in Orlando, Florida, he witnessed a level three hurricane: the local community was without power for a week. “And, of course, as someone from a tropical climate, I always thought European heatwaves were weak,” he says. “Not anymore. We need to act on climate change, and I always wanted to use my engineering skills

for something impactful, something big. That's why today, my research is focused on sustainable aviation.”

Right now, decarbonising air travel is one of our biggest challenges – aviation contributes around 3.5 per cent of the total manmade climate forcing across all industries. This doesn't seem like a lot, says Rafael Palacios, Professor of Computational Aeroelasticity at the Department of Aeronautics and Director of the Brahma Vasudevan Institute for Sustainable Aviation, “but then, you realise that everyone has a plan for decarbonisation apart from some very hard-to-decarbonise sectors, aviation being one of them. Aviation is unlikely to be net zero by 2050 – planes have a lifespan of more than 20 years, so we should already be building those sustainable planes by now. The technology is clearly behind the curve.” ▶



**Professor Rafael Palacios**  
Professor in Computational Aeroelasticity at the Department of Aeronautics.

And that is what the Brahma Vasudevan Institute for Sustainable Aviation, Imperial's flagship multidisciplinary research centre in net-zero aviation technologies, is hoping to change. Established with a visionary £25 million gift from Brahma Vasudevan (Aeronautical Engineering 1990), founder and CEO of private equity firm Creador, and his wife Shanthi Kandiah, founder of legal firm SK Chambers, it opened in 2022.

The Institute is focused on maintaining the benefits of aviation in a way that continues to be safe, accessible and sustainable. "We need to be able to quantify the adverse impacts of aviation on the environment, rethink the way flying currently works within the wider transport system, and propose sustainable solutions valid across the full life cycle of the aviation system," says Palacios. "Sustainable aviation fuels (SAFs) don't yet exist in the volume they are needed. Right now, there

is a competition of ideas – including biofuels, hydrogen and power-to-liquid fuels – and no clear winners. The Institute will be the perfect place for all these ideas to come together."

**Jagtap, who was funded** by the President's PhD Scholarship, was named one of Forbes' 30 under 30 for one of those ideas: a PhD focused on his new hydrogen aircraft design. Picture an aeroplane and most of us picture a tube wing aircraft, such as a Boeing 777 – essentially a tube with wings. A version of that design capable of carrying cryogenic hydrogen tanks would have to have a fuselage 40 per cent bigger. Or you could design something entirely different, as Jagtap did: a blended wing body aircraft. It sounds dry but the reality is beautiful: a hydrogen-powered aircraft with zero emissions where the wings and the fuselage are a single object: a manta ray of the skies.



**FIG 1: FOSSIL FUEL**

A Boeing 747 uses approximately one gallon of fuel every second and is a significant contributor to climate change.

Of course, designing such an aircraft is one thing; building it and scaling the systems needed to get it working globally is quite another. Jagtap emphasises that his work is at the conceptual state and, as yet, he hasn't published his research, though he is hoping to do so later this year. Hydrogen isn't a magic potion, either: it comes with its own problems. While hydrogen combustion has zero carbon emissions and creates lesser contrails – the white streaks an aircraft leaves in the sky, which contain harmful particles – producing it conventionally is sufficiently carbon-intensive to wipe out any gains. Airports don't currently have the infrastructure to handle large quantities of hydrogen either, as it has to be handled in a cryogenic state.

"But hydrogen can be produced in 59 different ways – and biofuels in 58 – so I explored these different ways in my PhD and the best routes we can use to produce these alternative fuels,"

says Jagtap. "This helps fuel manufacturers to focus their efforts, improving supply chain and manufacturing efficiency."

In the absence of abundant and affordable SAFs coming online any time soon, finding ways of burning less conventional fuel is vital. Palacios's own work seeks to find new ways for planes to be efficient: to free aviation from the constraints of its traditional design concepts. Using computational modelling, he examines what fuel efficiency might look like if those parameters are changed.

What would happen, for example, if wings were much, much longer and thinner? Greater aerodynamic efficiency for a start, he says. "Of course, now you have wings that are 60 metres long, when before they were 30 metres long. That has challenges – firstly, they wouldn't fit in one of today's airports. But they outperform current airplanes in terms of fuel efficiency. So, you need ►



**Swapnil Jagtap**  
Postdoctoral research fellow of the IDEAS Lab at the University of Michigan.



**FIG 2: POWERED BY ELECTRIC**

Batteries and electric motors drive propellers or turbines that provide zero emissions and quieter flights.



**Professor Silvestre Pinho**  
Professor in the Mechanics of Composites at the Department of Aeronautics.

much less fuel for the same performance.” He is currently working with Airbus on a possible solution to the airport problem: folding wings.

**Another key to better fuel efficiency**, he says, is using software to shape the aerodynamic environment. Right now, planes are designed to passively sustain whatever comes their way – turbulence, wind and snow. These new software solutions would allow planes to reconfigure themselves according to conditions. (If you have noise-cancelling headphones, Palacios points out, then you’ll already have benefited from this idea.) “And that gives you a huge improvement in performance – 20 per cent plus. It’s not a micro improvement. It’s a fundamental change.”

Meanwhile, Silvestre Pinho, Professor in the Mechanics of Composites, is developing numerical models of new wing designs that can accurately predict how they would react in real-life situations,

enabling more fuel-efficient designs to get to market sooner. These models will also enable new innovations to be tested, such as the effect of installing hydrogen tanks. “Shaving a few years from an aircraft development cycle – especially if it’s an innovative aircraft development cycle – is hugely important,” he says.

But a change this big won’t happen just by working in the lab, so much of Pinho’s time is spent on advocacy and policymaking: speaking to MPs, MEPs, industry and think tanks. “Talking to policymakers is absolutely paramount. Whether we get to net zero in aviation or not depends on political choices. We need investment to develop aircraft and flight path management – flying at different heights in different atmospheric conditions, for example – to reduce the effect of contrails, which make up about half the warming effect. Policy should be informed by actual technical data, and it is the duty of universities and researchers to get that message across.”



**FIG 3: HEAVY AIRCRAFT**

The average commercial aircraft weighs between 153 and 220 tons, causing huge amounts of CO<sub>2</sub> emissions.

And finally, efforts are – literally – getting off the ground. Last November, a Virgin Atlantic Boeing 787 became the first plane to fly from London Heathrow to New York JFK Airport powered entirely by SAF. The Virgin Atlantic-led project, Flight100, involved a consortium including Imperial, Boeing and BP, and set out to demonstrate that SAF is a viable alternative to regular jet fuel. Working on the project was Georgia Gamble, whose PhD at Imperial is examining the health impact of particulate matter generated from a burner – which she designed – that models aviation emissions.

Traditional combustion engines have been subject to considerable scrutiny – but aviation, says Gamble, has avoided monitoring of aerosols up until recently, partly because it’s much harder to do. “You can’t really put a monitoring set-up next to an aircraft engine as it’s obviously dangerous. But now, we are starting to look at how we might be able to do it safely.”

Gamble was able to collect emissions from an auxiliary power unit using the fuels for Flight100, which she then tested on a model of lung cells. “We have had some very interesting results, which we hope to publish soon. We believe we are the first to look in detail at the health impacts of SAFs. It’s great to feel that we could have a direct impact on what is hopefully going to be the future of aviation.”

These are grand challenges indeed – but there has never been a better time to work on the cutting edge in this sector. “Is it daunting?” says Palacios. “Yes. But I’m an engineer. I thrive on technical challenges and uncertainty.” Pinho agrees: “We are probably in the most exciting time since the development of the jet engine in the 1930s and 40s, which transformed aviation. Now, with the transition to net zero, we are looking at another huge shift in technology that changes things completely. The future is incredibly exciting.” ♦



**Georgia Gamble**  
is a PhD student in Aviation, Health and Sustainability, and specifically combustion aerosol toxicology.



**FIG 4: LIGHTER AIRCRAFT**

The design of much thinner, fold-up aircraft wings helps reduce carbon capture by more than 60 per cent.

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## GLOBAL SUMMER SCHOOL

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DATASET – DR KONSTANTINOS TSILIDIS, READER IN CANCER EPIDEMIOLOGY AND PREVENTION

## Eat your greens – not just good advice, but a potential factor in avoiding bowel cancer



**Context** Every day in the UK, around 125 people are told they have bowel cancer. It is the fourth most common type of the disease for both men and women – 43,000 cases annually – and globally it is the second leading cause of cancer death. The challenge, as with any potentially deadly illness, is not just finding a cure, but establishing what actions we can take to prevent it.

**Background** For generations we've known the importance of vegetables in a healthy, balanced diet – but scientists are still investigating if, and how, eating those greens reduces your chance of getting cancer. Now, Dr Konstantinos Tsilidis, a Reader in Cancer Epidemiology and Prevention in the Department of Epidemiology and Biostatistics, is leading a project funded by the World Cancer Research Fund to establish whether regular intake of folate – vitamin B9, prevalent in green vegetables such as broccoli, spinach, cabbage and sprouts – cuts chances of getting colorectal (bowel) cancer.

“We are aware certain factors increase or decrease the risk,” he says. “For example, obesity raises it and anti-inflammatory drugs such as aspirin reduce it. But there's inconsistency in what we know about diet. We understand that when it comes to cardiovascular disease, red meat can be bad for us and wholegrain is good, but cancers take longer to develop and are therefore more complicated.”

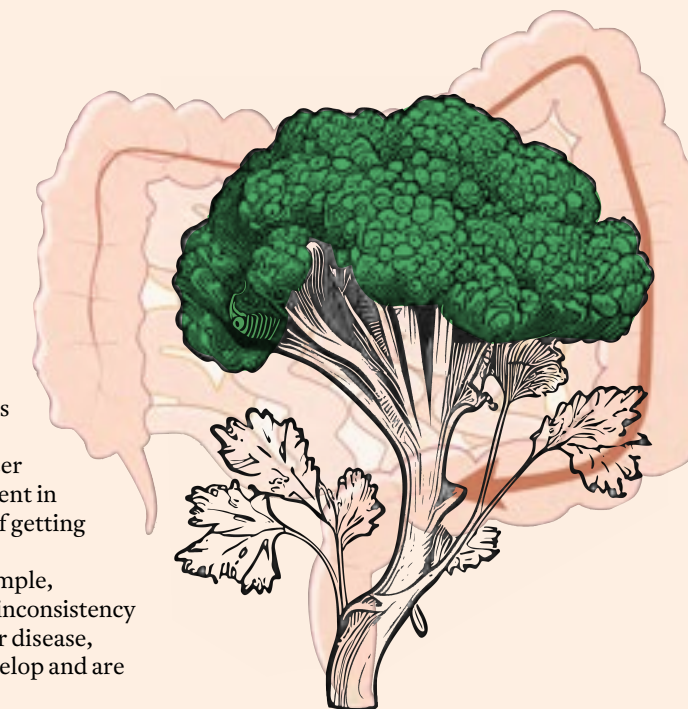
**Method** In the largest research project of its kind, Tsilidis and his team analysed data from more than 70,000 people in 51 studies across the USA, Europe and Australia. “We wanted to see if individual genomes interacted with folate in developing colorectal cancer,” he says. “We didn't start with a hypothesis of specific genes interacting with folate, but investigated genetic markers across the genome. With this volume of data we have billions of genomic positions and can associate them with whatever disease we like. Researching agnostically enables us to explore all of this – sometimes confirming what we already know, but always potentially finding something new.”

**Results** The findings were significant: folate can significantly help cut your chances of getting colorectal cancer. “We found that for every 260 micrograms of folate – which is around 65 per cent of the daily recommended amount, the risk of developing the condition was reduced by seven per cent,” says Tsilidis. “But we also found that the effect may depend on each person's individual genes. There are many unanswered questions and much more research is needed.”

**Outcome** As well as potentially influencing our diets, Tsilidis' findings offer huge potential for medicine. “The fact that folate's impact depends on our individual genetic make-up may open up avenues for personalised prevention actions,” he says. “You can't change your genes but you could change your folate intake according to the unique impact it might have on your body. With these results we can continue to explore 'precision medicine', which makes prevention, diagnosis, treatment and prognosis more personalised to every one of us.” ♦

WORDS: PETER TAYLOR-WHIFEN

> For more from the School of Public Health, visit: [imperial.ac.uk/school-public-health](http://imperial.ac.uk/school-public-health)



**Good effects**  
The effects of folates such as broccoli and spinach were studied in the largest research project of its kind.

IMPERIAL ENVIRONMENTAL SOCIETY

# THE BUZZ ON CAMPUS

There's a sting in the tale for one section of the Environmental Society – looking after the university's two beehives, tucked away in the Society's wildlife garden.

Words: **Greer McNally**  
Photography: **David Vintiner**



**If I'm having a conversation, there's always a random bee fact I can bust out**



**Bee ready:**  
As the Environmental Society's Head Apiarist, Thaarukan Arunmolithevar is responsible for the university's two beehives in South Kensington.

**T**here's a buzz outside the Ethos gym behind Exhibition Road, a murmuring of excitement coming up from one of Imperial's hidden wonders. For lurking among the fruit, veg and flowers being grown in the Environmental Society's wildlife garden are two beehives, each teeming with nature's greatest pollinator: the honeybee.

The hives are the responsibility of head beekeeper Thaarukan Arunmolithevar (MEng Computer Science, Fourth Year). One of his primary roles, he says, is to monitor the bees' battle against their natural enemies. "There are several predators, but it's the wasps that are just so annoying. All they do is invade the hive to get the honey." But he enjoys seeing the bees hold their own in these insect wars. "Sometimes when you open up the hive there will be a bee just dragging the corpse of a wasp away, carrying this bright yellow body through the air."

The job – and how the bees react – changes with the seasons. In autumn and winter, the hives stay mostly shut to protect the bees from the cold. Then in the spring they are opened again as the temperature rises. "That's when our inspections start," explains Arunmolithevar. "First, we make sure that the hives have survived through winter and that they are still active. We also have to check that the queen is laying, the workers are healthy and that there are no signs of disease within the hive." He's also on the look-out for extra queens, as they can create anarchy in the hive and lead to worker bees leaving in a swarm when "their" queen is ousted.

Spring is a critical time to increase the population, but things can go wrong, as the previous Head Apiarist, Louie Yip (MSc Bioinformatics 2022), well knows. One year, when he opened the hives, both colonies had failed to survive the winter. "It was quite shocking at the time – and a little heart-breaking," he admits. "I just wasn't expecting it. In the end I had to order another hive and start from scratch."

Yip did his training during the pandemic. "I had to learn most of the beekeeping stuff by watching YouTube," he says. Since graduating he has gone on to work at the Francis Crick Institute, but he credits his time as Head Apiarist as changing how he sees the world. "There was a lot to discover – bee behaviour is fascinating. If my colleagues and I are having a conversation, I know there's always a random bee fact I can bust out."

Of course, the bees are just one part of the Society's activity. In the wildlife garden, they grow tulips, carrots and wild onions, and look after the pond where frogs spawn each year. When not outside, they also host guest speakers to discuss issues around climate, conservation and sustainability, provide career insights in the green sector through careers fairs, and run sustainability workshops to demonstrate how to make your own eco-items, such as beeswax food wraps.

For Arunmolithevar, though, it's all about the bees. His favourite part? Listening to the gentle buzzing of the hives. "The way that they move around makes such a therapeutic sound," he says. ♦

POLICY AGENDA – PROFESSOR JIM SKEA, CHAIR OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)

## The Imperial man setting governments' agenda on climate change action



### The landscape

Arguably the best chance of mitigating the effects of climate change is political will – the most significant recent actions in the fight to slow global warming are intergovernmental collaboration such as the Paris Agreement, the Kyoto Protocol and the UN Framework Convention on Climate Change.

But who advises the governments? Since 1988, the Intergovernmental Panel on Climate Change (IPCC) has been providing policymakers with regular scientific assessments on global warming, its implications and its potential future risks – identifying the strength of scientific agreement in different areas and indicating where further research is needed.

### The challenge

As the IPCC says: “Every increment of warming results in rapidly escalating hazards: more intense heatwaves, heavier rainfall and other weather extremes further increase risks for human health and ecosystems. In every region, people are dying from extreme heat. Climate-driven food and water insecurity is expected to increase as the Earth gets warmer. When the risks combine with other adverse events, such as pandemics or conflicts, they become even more difficult to manage.”

This is the challenge facing Imperial's Professor Jim Skea, who was elected IPCC Chair at the UN Environment Programme's African headquarters in Nairobi last July. “It is a huge honour,” says Skea. “We're not politicians so we don't set the agenda for discussions and climate goals, but we make sure everything we do is directly relevant to the current landscape.”

### The priorities

As the effects of climate change become ever more apparent, so the IPCC's focus changes, says Skea. “One of the biggest messages for governments now is that this is no longer just about reducing emissions, but how we'll adapt to a world with more extreme weather, more forest fires, a rise in sea level. How will our agricultural systems adapt? How will we adjust to changes in rainfall or temperature?”

And the IPCC is tasked with finding scientific-based solutions. “We are constantly challenged to make our findings actionable, so governments can actually do something. In our last report on emissions reduction, we specifically identified near-term actions bringing big short-term benefits – things like renewable energy or reducing leakage of methane from natural gas systems, which is an obvious quick win. At the

### It's a particular achievement that every word in our report is agreed by governments in consensus

first meeting of this cycle (term), the governments have challenged us to produce guidelines on how countries can formulate strategies for adapting to climate change, and that is a priority.”

But even with broad international agreement, the IPCC still has to handle different governments' national priorities. “In the panel's early days, the challenge was about convincing people that human beings are affecting the climate. Now that's established, the IPCC's focus has moved to what is done about it. All those governments bring a lot of perspectives and sometimes very different ideas.”

### The collaboration

“I think it's a particular achievement that every sentence, every word in our final report, is agreed by governments by consensus in a single room, together with the scientists. Pulling off that trick is an enormous feat,” says Skea.

And although he has the top IPCC role, he's far from the only Imperial person informing the work. “There's the Grantham Centre on Climate Change, some of whose scientists are prominent authors in IPCC reports. Then there's work being done at the Centre for Environmental Policy, the Faculty of Natural Sciences and the Energy Futures Lab looking at how different engineering approaches reduce emissions. And the Business School is working on the economics and funding of environmental policies and other research in chemical engineering and physics.”

### The future

So, with the clock ticking, is there still time for bodies such as the IPCC to have an impact? “We're trying to promote the message that every fraction of a degree makes a difference, so there's never a point at which we will have run out of time completely,” he says. “There will always be a case for action to avoid the worst effects of climate change.”

And the IPCC – and his role in it – will have a huge impact on that action. “Carbon is a bit like money,” he says. “It flows to every part of society and the economy, and touches on absolutely everything. Therefore, so does the IPCC's work. It's hugely valuable and I'm proud to be part of it.”

> *Professor Jim Skea was Professor of Sustainable Energy, 2009–2023.*

WORDS: PETER TAYLOR-WHIFFEN

ALUMNI LIFE

## Are you ready to change a life?

The Imperial Bursary helps students reach their true potential, and your support could make all the difference.

Words: **Lucy Jolin**

Illustration: **Marcos Montiel**



When Dr Luke McCrone (BSc Geology 2015; MSc Petroleum Geoscience 2016) left his working-class community in the West Midlands to join Imperial more than ten years ago, he felt as though anything was possible. He wanted to make the most of every opportunity, but there was just one nagging problem. “I really worried about money,” says Luke. “How could I participate fully and live in one of the world's most expensive cities when my finances were so tight? It was a real source of stress.”

But with the award of funding from the Imperial Bursary, Luke was able to put what he calls this “wasted worry and energy” into more beneficial things, like focusing on his degree and making lifelong connections. “Receiving financial support made the world of difference to me, as it does for every student who receives it,” he says. “It gave me a real sense of freedom, let me live in halls, and put me on a level playing field with others who seemed to have more money to spend.”

Luke is just one of many Imperial students who have been able to make the most of their studies through the Imperial Bursary. Automatically awarded to any students whose family's household income is under £70,000, eligible students can receive an award each year, paid on a sliding scale, with the maximum amount being £5,000 per year.

Without the Bursary, talented and dedicated students like Luke, who now works at Imperial as a postdoctoral researcher, might drop out because they can't afford to stay, or not come to Imperial at all. “Every Imperial student should have the opportunity to reach their potential, whatever hardship they face,” he says. “It takes courage to ask for help, so when a student reaches out – in a financial crisis or if they become unwell, for instance – they shouldn't be turned away.”

The Bursary is needed now more than ever. Requests for hardship support have risen by 500 per cent compared to pre-pandemic years – a third of all home students now receive its support, with 40 per cent receiving the full £5,000 a year. But helping students like Luke is only possible through the incredible generosity of our alumni.

By making a gift of just £45, you can help a student to not just survive at Imperial – but thrive. ♦

> *Donating is simple: just visit [bit.ly/summermag24](http://bit.ly/summermag24) and choose Student Assistance Fund, which funds the Bursary and student hardship payments.*



## WORKING LIFE

# 'Wow science' – the highs and lows of a life in physics.

Dr Giuliana Di Martino (*PhD Physics 2014*), says without perseverance her career could have been very different.

Interview: **Megan Welford**



**I was on the bus when proof arrived that the crucial particle was a boson. I cried**

PHOTOS: JEAN-LUC BENAZET

**P**hysics has been a central part of my life for as long as I can remember. In high school my friends didn't care, but I remember listening to my physics teacher and thinking he was some kind of god, because he was explaining nature through physics – why a balloon goes up, why certain things sink in water. Now I explain it to my son, who's four, when he's in the bath – and I've become the god!

But pursuing physics through academia takes perseverance, and that's been the most precious thing I've had throughout my career. As an academic in the field of device materials, there are moments of what I call the 'wow' science, where you're thinking: "I love this, this is amazing." But don't be fooled. This accounts for only about 20 per cent of the job. A lot of my week is spent at home, doing the background stuff that keeps the lab running. People are depending on me, and that keeps me awake at night. But going into the office to meet with those people – my group – to finally discuss the science: that's the best bit of my week.

My PhD was in plasmons – trying to understand these quantum particles and what is going on inside them, which you need to understand to be able to build a quantum computer, for example. You start not knowing anything, and you design experiments to learn things, very slowly. I spent three years of wonder and frustration: in the lab, in the dark, building optical setups with mirrors and lenses, detectors and cameras, lit up with red and blue lasers, listening to Iron & Wine.

Those were the good bits, but I also spent time tearing my hair out. I didn't find my answer until the final hour. My funding had run out – I was on the bus, with the lab results transmitting to my phone, when it finally came through: proof that the crucial particle was a boson. I cried.

My supervisor at Imperial was Dr Yannick Sonnefraud, who died suddenly due to brain cancer just as I was finishing. I was very shaken and saddened by this. I had been approached by several companies about joining them, but Yannick's death pushed me back to academia, and I joined Professor Jeremy Baumberg's nanophotonics lab at Cambridge.

The field of device materials seemed to bring everything together and offer plenty of 'wow' moments, such as the way oxygen, or the absence of oxygen, moves inside a transparent material. Or the change of electrical properties as a phone is charging or running out of battery – the tiny piece of information that helps you understand something huge. If we understand how light interacts with novel materials, we can transform most of the devices we use today into low-power devices, which would speed us towards net zero. That's the mission of my lab.

If I'm going to do something, I'm going to do it properly. I have found that, being a woman, you have to battle twice as hard for everything. Subconscious bias that means you have to prove yourself first – with students who doubt your knowledge, or lab technicians who question what you've asked them to do, rather than just doing it. I used to think it was because I was young, but now I'm not young, and it still happens. Still, it can't be as bad as the funding interview I once went to when I was overdue with my second child. I really wanted the funding, so I decided to go in person, but I was having some dislocation in my hips so I asked if I could sit for the interview. The all-male panel said that wouldn't be fair on the other candidates, so I stood. I persevered.

Now I have two children under five, so life could be easier. But perseverance for me means being able to stand back and see the bigger picture, remember the excitement of discovery. When things get tough, I tell myself: "This is temporary," and I keep going. ♦

> *Read more about Giuliana and submit a nomination for the Alumni Awards 2025 at [imperial.ac.uk/alumni/alumni-awards/](https://imperial.ac.uk/alumni/alumni-awards/)*

**Dr Giuliana Di Martino**  
Fellow of the Institute of Materials, Minerals and Mining

**2008–2010**  
Scuola Superiore di Catania  
**Master's Degree, Physics**

**2010**  
Boston University  
Photonics Center  
**Visiting scholar**

**2010–2014**  
Imperial College London  
**Doctor of Philosophy (PhD), Physics**

**2014–present**  
University of Cambridge  
**Associate Professor, Di Martino Lab**

**2024**  
Winner of the **Emerging Alumni Leader Award 2024**

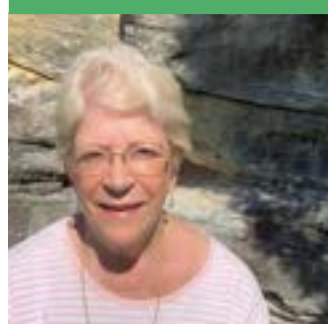




OUR IMPERIAL

# True pioneers

For healthcare professionals, it's all about making a difference, and these Imperial graduates have certainly done that – and some.



**DR SUE ROWLEY**  
OAM (St Mary's  
Hospital Medical  
School 1973)  
GP, The Mosman  
Practice, Australia

**What fuelled your passion at St Mary's (now part of Imperial College School of Medicine)?**

**A.** I wanted to be a doctor for that well-known reason of wanting to help people. I felt that I had been born with 'Reserved for Medical School' stamped on me! During my clinical training at St Mary's, I enjoyed the drama of being in an A&E department. Initially overawed by the sheer range of emergency presentations, I soon learned that it could be a very satisfying career once you understood and could manage these patients.

**Which part of your training left the biggest impact?**

**A.** I joined ambulance crews on some 999 calls and observed what they actually did or did not do in that vital 'Golden Hour' [the first hour after injury]. St Mary's allowed all medical students an elective period in their final year, so I spent part of mine in Kenya visiting the Royal Flying Doctor Service in Nairobi and observing how emergency care was delivered by plane to the rural areas.

**How did you take what you learned into your career?**

**A.** In 1976, I decided to work in Sydney, starting at a hospital located in a beachside suburb, where I soon observed an emergency helicopter bringing people involved in beach- and surf-related accidents to a helipad outside the department. As they only had limited first aid capabilities, I volunteered my services. Soon I was spending all my weekends alongside other volunteers at the base flying to a wide variety of medical emergencies, and was made Medical Director for New South Wales.

In 1980, I toured the USA, Germany and Switzerland to learn more about pre-hospital care. Back in Sydney, I worked to incorporate the best of what I had seen. It was revolutionary in the 80s but today helicopters are taken for granted throughout Australia – success for us pioneers!

**>Dr Rowley was the first helicopter rescue doctor in Australia and the first woman appointed to the NSW Surf Lifesaving Association's Medical Board. She was given an Order of Australia Medal in 2021 for services to medicine and emergency and rescue organisations.**



**MR MYRDDIN REES**  
OBE FRCS  
(Westminster  
Hospital Medical  
School 1973)  
Consultant surgeon,  
The Hampshire Clinic

**What led you to move from medicine to surgery?**

**A.** When I arrived in London at 18, I was still translating between Welsh and English and was regarded by my fellow students as a bit slow. This was hard to take for someone who had won the major academic prize at his school – the Gwendraeth Valley Grammar School. The rugby team at Westminster came to my rescue. I was asked to be captain, and they became more like my adopted family. It was not until 18 months after I qualified that I realised that being a rugby captain was not enough. After watching a neurosurgeon at work, I decided to switch my focus to surgery – a decision I have never regretted.

**What was the most important thing you learned at Westminster (now part of Imperial College School of Medicine)?**

**A.** Rugby taught me the importance of being part of a team which has served me well, especially in the early years of establishing a nationally recognised liver surgery programme in Basingstoke. It is now accepted that the best-performing operating theatres are those with a strong team ethos, which is why I greatly support team sports for the young. When I became President of the Association of Upper Gastrointestinal Surgery in 2006, it became clear that the individual specialist surgeons were making plans to walk into the sunset as separate organisations. It required all my experience in team building to pull them back under the umbrella.

**Who was your favourite teacher?**

**A.** At Westminster, we were blessed to have Professor Harold Ellis, one of, if not the best, medical teachers around. His ability to simplify any difficult topic had a big impact on me. His flamboyant presentation style, often mixed with humour when appropriate, is something I have tried to emulate over the years. I have also taken a significant part in the postgraduate teaching of safe liver surgery. I am not convinced that I have been able to match my mentor, but I am pleased to have given lectures all over the world for 30 years.

**>Mr Rees was presented with the Sir Clement Price Thomas Medal in 2023 in recognition of his pioneering contribution to liver surgery.**

INTERVIEWS: KAT BROWN



**PROFESSOR ANGELA VINCENT**  
(Westminster Hospital  
Medical School 1966)  
Emeritus Professor  
of Neuroimmunology,  
University of Oxford

**What led to your joining Westminster?**

**A.** As a teenager, I really liked science. There was no doubt that that was what I wanted to study but my parents seemed to think medicine was a more respectable profession. I don't regret it at all because I've used it a lot. Medicine has made me much more able to communicate with doctors than the average scientist, who can find it quite difficult, so it was actually very lucky.

**What was it like studying something you weren't keen on?**

**A.** I was not a good medical student, but what I did learn was that there were very few medics who were scientifically orientated. There was a very good professor of medicine who took an interest in me because he happened to know my uncle, but I left without being terribly convinced about medicine, but I did a year in what was St Stephen's Hospital in Fulham, and I enjoyed that. I was perfectly competent as a doctor at that level, but I didn't really want to continue. I wanted to do science, and so I did a Master's in Biochemistry at UCL.

**How did you use your medical background?**

**A.** After my Master's, I took a research assistantship rather than a PhD because, by then, I had a child, and the salary came in handy for childcare. The study didn't go anywhere, though, and after three years, Ricardo Miledi in the biophysics department at UCL agreed to let me work with him to explore a specific clinical disease – myasthenia gravis, which was shown by others to be caused by specific autoantibodies. Years later, at Oxford, we started identifying different antibodies in patients who had brain disease and showed that they could also be treated with immune therapies that reduce the antibody levels. It opened people's eyes to this sort of new concept of antibody-mediated brain disease. We have helped neurologists to consider the possibility that their patient had an autoimmune disease, and now these rare but treatable conditions are being identified regularly.

**>Professor Vincent was a winner of the Distinguished Alumni Award in 2020.**

**In character:**  
Ankita on stage at  
the Union Concert  
Hall as Pansy in  
*The Doctor  
in Wonderland*.



**The people I've  
met at Medics  
Drama are  
like a second  
family to me**

#### MY IMPERIAL

## A LIFE FULL OF DRAMA

Ankita Menon  
(*Medicine, Second  
Year*) has rediscovered  
her dramatic side...  
and a love of teddies.

Interview: **Greer McNally**  
Photography: **Angela Moore**

I've become really involved in drama since I started at Imperial – so the Union Concert Hall, and the memories I've made there, are an important part of my life. In fact, the people I've met in Medics Drama are like a second family to me. I gave all that stuff up in Year 9 to concentrate on studying at school, so having the opportunity to try it now is brilliant.

The only problem is that I do find it hard sometimes to say no when people ask me to help out! I was on my hospital placement last term and still ended up stage-directing a musical – *Beauty and the Beast*. I don't drink coffee and discovered that exhaustion can manifest in some very strange ways. I had heart palpitations and weird bouts of dizziness. Nowadays, my number one recommendation is to make sure you get more than four hours of sleep every night.

I wouldn't have missed it, though, it's been very eventful, like the time a shoulder carry nearly resulted in the pair ending up in the band pit. Last term we put on a crazy crossover of *Alice in Wonderland* and *Doctor Who*. It was called *The Doctor in Wonderland* and I played a mechanical flower called Pansy. I won't give too much away about my costume, but there was a lot of green.

The directors have worked so hard to make it very easy for us to fit it around our schedules, and I'm using the experience to help out in other areas. TeddyBear hospital is a perfect example – it sounded like a leisurely activity when I first heard about it, but actually we spend our Wednesday afternoons teaching six-year-olds about their health – about health emergencies, how to eat healthily, and how to keep clean.

The skills and experience I've picked up on and around the stage have been invaluable. We focus our attention on the kids' teddies – that way they feel more relaxed talking about stuff. We do have a large, hot and sweaty teddy bear costume that I wore once. The whole time the head was falling off slowly, but I couldn't let it go altogether – the kids would have been horrified. I was leaning back to balance it on top of my head.

It's brilliant hanging out with people I cherish so much, and really enjoyable meeting new people as well. We rehearse in room R1 in the Reynolds Building, but I'll be back in the Union Concert Hall for the show. I can't wait. Will I still be acting in five years? I don't know. But I'm loving every minute of it right now. ♦