

Tiny miracle: lab on a chip → SUPERBUGS: MYTH-BUSTING + MICROBIOLOGY → Students ride the Silk Road

Winter 2015–16



Strong foundations



- 3 President's welcome**
- 4 Inbox**
Editorial, letters and comments
- 7 In brief**
Spotlight on recent events and discoveries
- 14 Product pipeline**
A STONE'S THROW AWAY
AcuPebble is making waves in the world of medical sensing technologies
- 15 Question time**
TIME TRAVEL
Imperial alumni and academics take a fantasy trip in a time machine
- 16 Campus life**
POTENTIAL ENERGY
PhD scholar Clementine Chambon on studying and global entrepreneurship

ON THE COVER
A visualisation of key words from the Imperial College London *Strategy 2015–2020*.
→ Explore in depth at www.imperial.ac.uk/strategy

- 17 Career ahead**
FANTASTIC FIVE
Five Imperial alumni breaking new ground in their fields
- 20 Feature**
GREAT ADVOCATE
Imperial's President Professor Alice P. Gast discusses her vision for a global university
- 24 Feature**
WHITE CITY, BRIGHT FUTURE
The latest developments at Imperial's new 25-acre campus, featuring a three-page aerial map
- 30 Going public**
#SUPERBUGZONE
How researchers encouraged debate around antimicrobial research
- 34 Behind the scenes**
INSIDE AN ANIMAL RESEARCH FACILITY
A look inside one of the College's research facilities, aimed at keeping animals as healthy as possible

- 36 Picture this**
MOLTEN MINERALS AND FLYING ARROWS
An introduction to eccentric inventor Sir C.V. Boys
- 38 Global citizen**
SAFE, OR IS IT?
Dr Rob Ewers takes a walk on the wild side in the rainforests of Borneo
- 39 Alter ego**
SEAT OF THE SOUL
Three intrepid Imperial medical students go soul-searching on two wheels
- 40 Annals of medicine**
CAUSING A STIR
Imperial's Creative Director meets a surgical patient with a surprise in his stomach
- 42 Good reception**
Alumni, friends, supporters and staff at College events around the world
- 44 Alumni dispatches**
- 46 In memoriam**
- 48 Alumni services**
How alumni can make the most of their Imperial connection
- 50 Have you joined the conversation?**
Imperial's social media
- 51 Calendar**



IMPERIAL

Staff

- Editor-in-Chief: Tom Miller (*Biology 1995*)
- Creative Director: Beth Elzer
- News Editor: Laura Gallagher
- Managing Editors: Pamela Agar, Alice Ferns
- Sub Editor: Joanna McGarry
- Distribution: Elizabeth Swift
- Designers: Beth Elzer, Abby Lloyd-Pack
- Contributors: Jenn Bywater, Andrew Czyzewski, Hayley Dunning, Debbie Evanson, John-Paul Jones, Simon Levey, Daniel Mapp, Sarah Marcus, Natasha Martineau (*MSc Science Communication 1994*), Nancy Mendoza, Jon Narcross, Nicola Pogson, Isabella Richardson, Andrew Scheuber, Laura Singleton, Colin Smith, Elizabeth Swift, Katie Weeks, Kate Wighton (*Biological Sciences 2004*, *MSc Science Communication 2005*)

The magazine for Imperial's friends, supporters and alumni, including former students of Imperial College London, the former Charing Cross and Westminster Medical School, Royal Postgraduate Medical School, St Mary's Hospital Medical School and Wye College.

Published by the Communications and Public Affairs Division.
imperialmagazine@imperial.ac.uk

Subscriptions
If you would like to subscribe to Imperial magazine please email imperialmagazine@imperial.ac.uk

Online
www.imperial.ac.uk/imperialmagazine

Opinions, beliefs and viewpoints expressed by authors in Imperial magazine do not necessarily reflect those of the College. No part of Imperial magazine may be reproduced in any form without permission.

©Imperial College London 2015

Imperial College
London



Inspiring present, ambitious future

FROM THE PRESIDENT

I loved reading the Winter 2015–16 issue of *Imperial* magazine. The things our students and academics are doing inspire me and get my adrenalin flowing, as do the impressive work and accomplishments of our alumni. When I think of what is happening at Imperial, I think not only of what is happening here in London, but of all the great things Imperial academics, students and alumni are doing around the world.

In addition to the panoply of current discoveries, innovations, programmes and projects in these pages, there are harbingers of a great future. As the Imperial White City Campus takes form, we can start to see into the future more clearly than our time-travelling alumnus H.G. Wells could have ever imagined. We are defining the 21st-century academic campus through new partnerships, new areas of research and new experiences for students.

The near future is laid out in our *Strategy 2015–2020*. We will build on existing strengths, yet have the courage to explore new and uncharted areas. We begin with our strong foundations. We have world-class core disciplines in science, engineering, medicine and business that provide the fundamentals for great discovery. The Dyson School of Design Engineering (see page 7) has added a new core discipline to our roster. Our academics like Professor Chris Toumazou (see page 8) leverage our strength across disciplines to pursue multidisciplinary research and to deliver a vibrant research-led education.

Great discoveries begin with talented, confident academics, who are adept at collaborating



and working on challenging problems. Talented support staff put their energy and passion into making these exciting things happen. Our bright and energetic students learn from these discoveries, both in the classroom and as active participants in our research.

Students like Clementine Chambon (see page 16), are integral to our mission. We enhance their experiences by embedding their education in cutting-edge research and providing increasing opportunities for them to use their talents in entrepreneurial, creative and practical ways. You can see from these pages just how entrepreneurial they are.

Dr Andreas Mogensen's mission to the International Space Station (see page 12) has energised the College community. The knowledge, expertise and experience of alumni like Andreas is a great asset that adds to our environment of excellence. We want our alumni and friends to be even more active participants in defining our future.

We also recognise the power of partnership and we seek relationships throughout the world with peers in other universities, institutions, industries, governments and

service organisations. The visit of President Xi Jinping of the People's Republic of China (see page 13) demonstrated the depth of our collaborations with China. The work of Imperial scientists at CERN (see page 10) shows the great strengths we bring to the table, and the great things we accomplish when we collaborate.

Addressing global challenges is at the heart of our strategy. An article in this issue highlights one such challenge: superbugs (see page 30). The Superbug Zone at the 2015 Imperial Festival illustrated the way we work to educate the public and decisions makers, while rallying over 100 of our academics into the Antimicrobial Research Collaborative (ARC) to find solutions to this global crisis.

I hope that you will enjoy these inspiring stories from today and the ambitious plans for the future. Please let me know what you think by contacting me at president@imperial.ac.uk.

PROFESSOR ALICE P. GAST is President of Imperial College London and a chemical engineer. Before joining Imperial in September 2014, she spent eight years as President of Lehigh University. From 1985 to 2001 she taught and conducted research on surface and interfacial phenomena at Stanford University; she was Vice-President for Research and Associate Provost and Robert T. Haslam Chair in Chemical Engineering at the Massachusetts Institute of Technology from 2001 to 2006.

→ To read Imperial's *Strategy 2015–2020*, visit www.imperial.ac.uk/strategy
→ To find out about ARC, visit www.imperial.ac.uk/a-z-research/arc



FROM THE EDITOR

Building blocks

This issue of *Imperial* is crammed full of stories that show how the College is building strong foundations for its future.

Our first report on the emerging White City Campus (formerly described in these pages as Imperial West — the change brings it in line with geographical naming of the other campuses) is on page 24.

Alongside Lucy Tobin’s insightful words on its place in London, the illustrator Nicolas Rapp provides us with a clear view of what is planned and being built on the north site, and for context, on the south site, what remains to be discovered.

To set the ambition for White City in context, it was wonderful to be able to bring together our President Professor Alice P. Gast with eminent science writer and Imperial alumnus Dr Anjana Ahuja (Physics 1990, Space and Atmospheric Physics PhD 1993), for a conversation about the future of the College (page 20) and its impact and place in the world.

We welcome another new writer, our new Director of Alumni Relations, Nicola Pogson, with her first letter to alumni on page 48. As she highlights, there are now many ways for you to make connections and join conversations with the College and your fellow alumni, and you can enjoy a flavour of these in the latter pages of the magazine.

And if *Imperial* magazine leaves you wanting to hear more from the College, then please try our new daily email offering *Imperial Today*. We hope it’s almost like being back on campus!

Wishing you all the best for the festive season and we look forward to your letters and comments as ever.

TOM MILLER
(Biology 1995)

+ ONLINE EXTRA: To receive a daily email covering Imperial’s freshest online news and digital content, visit: www.imperial.ac.uk/media/imperial-today



the INBOX

IMPERIAL PRANKSTERS

In the last issue we asked you to share stories of your best student pranks.

In my last year, 1988–89, one of the engineering departments took a commission to build the world’s largest candle as part of some celebration. Wax was poured into a mould some 10 metres high, but by the time it was required it had still not set – it seems that latent heat of fusion wasn’t something the engineers had taken into account.

As a physicist I took the chance to rub this in a bit. A couple of us climbed up the scaffold and abseiled down the candle in the dark, spray-painting a giant thermometer onto the mould. We graduated it from 0 to 100 Celsius, and sprayed in the mercury at 62° – the melting point of paraffin wax. Theta being the RCS mascot was just the icing on the cake.

DUNCAN MCGREGOR
(Physics 1989)

One Saturday from the rear door of the Union building we noticed workmen digging up the road near the Albert Hall. We rang the police and told them that students were digging up the road as a prank. We then went out and told the workmen that students dressed as policemen were coming to arrest them. The resulting fight was spectacular.

JOHN WOOD
(Electrical Engineering 1964)

SHARE A STORY, GET A FREE T-SHIRT

→ From Morphy Day to RAG week antics, we want to hear all about your best hijinks. Email tales and photographs to us and we’ll send you a limited edition t-shirt as a reward (while supplies last): imperialmagazine@imperial.ac.uk

DOUBLE TROUBLE

I’ve just read your article on mascotry in the Summer 2014 issue. I studied Physics in 1982–85 and don’t know whether it’s apocryphal though recall hearing about a new RCS student who shared the same name as a new C&G one who, for some reason, didn’t actually show up. Apparently the RCS student also took on the C&G one’s identity, even attending some of the lectures, in order to get in with the C&GU and, in particular, their mascotry team.

Eventually he found himself alone with Spanner, Bolt or, perhaps, both (don’t know how heavy they are) and managed to spirit it/them away on behalf of RCSU.

Naturally I can’t verify this, though it may ring a bell with someone else who studied at the time.

LEE EVANS
(Physics 1985)

→ Read more memories and share your own at www.imperial.ac.uk/mascots



3D PRINTING

I was pleased to see that a small piece of work of mine was featured on page 12 of the Summer 2014 issue. I was the researcher who led the team of undergraduate students to combine theoretical complexity models (such as the forest fire model) and 3D printing. So much has happened since this publication and I wanted to share some of our recent successes and advancements. After publishing a paper, ‘Sculplexity: Sculptures of complexity using 3D printing’ in *European Physics Letters*, another pair of students and myself found new ways to use 3D printing to represent another popular model in complexity, namely Diffusion Limited Aggregation models. I plan to ask next year’s students to adapt some advanced visualisation libraries to produce yet more sophisticated representations. My goal is to use ideas from complexity to produce something as appealing as WertelOberfell’s Fractal.MGX table (a coffee table that derived from studies into the fractal growth patterns of trees), which is displayed at the V&A museum and is the original inspiration for this work. Luckily our students always seem to rise to challenges even when they are tangential to their previous experience.

DR TIM EVANS
Senior Lecturer, Centre for Complexity Science, and Theoretical Physics group, Department of Physics

WYE COLLEGE

In 2015, Imperial announced the sale of the central former Wye College site to Telereal Trillium, one of the UK’s largest property companies. To find out more about the sale, turn to page 9.

➔ YOUR RESPONSES

I read the news about Wye College with mixed feelings. A good positive development for the land and buildings that have not been used for some time, but sad that I will never come back to the same Wye College again. I have great memories of the place where I did my Master’s degree. I will always be an alumnus because of Wye College.

PATRICIA MUTINTA SITIMELA-MASOLE
(PGDip Wye College 1994, MSc 1995)

🐦 We should clearly invite Prince to the next Imperial graduation #purplerain @imperialcollege #impalumni

It was sad to hear about the closure of Wye College. The curriculum for the post-graduate programme was highly regarded for being particularly suited to developing countries; it undoubtedly contributed immensely in strengthening ties between the UK and its former colonies.

LANGTON MUKWEREZA
(MSc Wye College 1992)

A WEEKEND TO REMEMBER

I just wanted to drop you a line to let you know how much we enjoyed the Alumni Weekend and visiting the Festival as part of our trip. My wife is a linguist and wasn’t too interested in coming along to see a load of science exhibits, and nor were my kids. But all of us were totally blown away by how amazing it was. There was so much to see and do, and not all of it was science based. The dancing and music added to the feeling of celebration, as did the choice of food for lunch. I arranged the day and suggested that some old friends from Imperial joined us, and a few did. Similarly delighted, they kept thanking me during the course of the day for arranging it.

BILL QUINTON
(Physics 1995)

Thank you so much to all those who helped in making arrangements for our group at the Alumni Weekend. We had a splendid time meeting each other again and visiting old haunts.

DRUMMOND MODLEY
(Civil Engineering 1985)

We all had a great day. We mainly stayed in the Alumni Hub and talked, then went to the Department tour, which went down very well. Finally we went to the Union bar, which has not changed at all. I met up with my friends from Electrical Engineering too. Thanks to the Alumni team for helping us make it happen and to all those who helped make our day.

BERNARD HAGGER
(Chemical Engineering 1975)



→ Join in the conversation about all things Imperial. Find the networks that match your career or social interests, and take part!

📘 imperialcollegelondon
📘 alumni.imperialcollegelondon
🐦 @ImperialCollege and @ImperialSpark
📷 imperialcollege
🌐 bit.ly/imperial-alumni-LinkedIn-group



Byte out of history

📘 IMPERIAL HAS CHOSEN A NEW NAME FOR ITS SUPERCOMPUTER: HELEN.

The name was selected from entries from students, alumni and staff, including some comical ones such as Magnificent Imperial kNoledge Device (MIND), Mr Floppy, Steve and Megatron 3000.

The name was chosen in recognition of Helen Kemp Porter — the first female Professor at Imperial. Professor Porter was a botanist, biologist and biochemist.

Professor Porter was an early adopter of the latest techniques, using two of the innovative technologies of her day to study the chemical reactions that keep plants alive. That is what high performance computing provides today: innovative technology that enables discoveries in science and engineering across all disciplines.

SHARE YOUR THOUGHTS

By post to • Alumni Office, Level 1 Faculty Building, South Kensington Campus, London SW7 2AZ, UK
By email • imperialmagazine@imperial.ac.uk
By online comment • www.imperial.ac.uk/imperialmagazine

Oliver Graham, PhD student
in the Department of Surgery
and Cancer, and recipient of
a PhD scholarship

HELP BRING IMPERIAL DISCOVERIES TO LIFE WITH A LEGACY GIFT

Prostate cancer is the second most commonly diagnosed cancer in men, with **1.1 million cases** identified globally every year.

By investigating the possible links between diet and the disease, Imperial researchers like Oliver Graham hope to find new ways to combat prostate cancer. Oliver was able to come to Imperial **thanks to a PhD scholarship, partly funded by legacy gifts** from generous supporters of our vital work.

“The scholarship has been very important, as it has given me an **opportunity to contribute to cancer research**. We have to stop prostate cancer from being such a prevalent killer.”

Last year, legacy gifts contributed over £1.5 million of funding for research and scholarships at Imperial. These gifts, large and small, create new opportunities for talented young scientists and make ground-breaking discoveries possible. For over a century, Imperial has relied on the support of alumni and friends to advance education and research. With your help we can continue to make scientific breakthroughs for generations to come.

To find out how you can **play your part** in supporting outstanding research at Imperial, please contact Anna Wall:
+44 (0)20 7594 3801 • a.wall@imperial.ac.uk

Filling a talent vacuum

The first new engineering department to be established at Imperial in two decades was launched in 2015 by George Osborne, the Chancellor of the Exchequer, and inventor and industrial designer Sir James Dyson. The Dyson School of Design Engineering will educate much-needed graduate engineers and technology leaders, and has been established thanks to a £12m donation from the James Dyson Foundation. “Design engineering combines the best of technical expertise with creativity and the Dyson School of Design Engineering is uniquely placed to bring these together in its student experience and research,” said Imperial’s President, Professor Alice P. Gast. Students will learn engineering fundamentals, design thinking, creative problem solving, and management and communication skills.



CATCHING A BREEZE

Moya Power uses plastic strands to generate low-cost wind energy.



Designing outside the box

Featuring nearly 50 devices developed by students, the Imperial Show celebrated the best that up-and-coming design has to offer the world of technology.

From a sonar-inspired headset to a smart exercise suit, an exhibition at the South Kensington Campus in October showcased ideas and prototypes from students on the Innovation Design Engineering and Global Innovation Design courses – run jointly by Imperial’s Dyson School of Design Engineering and the Royal College of Art.

One of the projects on display was Charlotte Slingsby’s Moya Power,

a semi-transparent low-cost material used to harvest small amounts of wind energy.

Inspired by Slingsby’s native South Africa, where power-cuts could be a frequent occurrence, Moya Power features finger-like filaments to capture passing currents of air – using the movement to generate electricity. The filaments can be optimised for maximum efficiency and adapted to specific architectural designs.

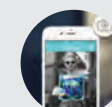
The end result is a flexible material that can wrap around buildings, coat windows, line bridges or be hidden in structures to offer a new low-cost way of generating power.

42%

PERCENTAGE OF FEMALES accepted for the four-year engineering design course, three times the UK average.

HATCHING BIG IDEAS

THE IMPERIAL INCUBATOR provides office and laboratory space on the South Kensington Campus for science- and tech-based start-up companies. Since its founding in 2006, it has hosted over 60 companies, attracting £750 million (\$1.2 billion) of investment. New incubation facilities at the College’s White City Campus further support innovation. In 2015, four companies outgrew their space and are ready for the next stages of development.



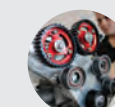
CORTEXICA

Image recognition specialist, whose software is used by companies such as fashion retailer Net-a-Porter



MICROTEST DX

A fully automated biochip system that tests for up to 50 allergies from a few drops of blood



DEARMAN

Global technology company delivering clean ‘cold and power’, such as a zero emission transport refrigeration system



RESPIVERT

Drug discovery company focused on developing inhaled therapies for pulmonary diseases

PHOTOGRAPHY: MOYA POWER; CORTEXICA; DEARMAN

IN BRIEF

SPOTLIGHT

BIG QUESTION:
WHAT ROLE DO MICROCHIPS
HAVE IN PREVENTING
ILLNESS?

One small microchip could identify your predisposition to hereditary diseases in a matter of minutes, and outside of the laboratory.

Developed by Imperial's Regius Professor Chris Toumazou, the 'lab on a chip' is a silicon microchip in a USB. It can rapidly screen for genetic mutations that determine a person's predisposition to certain hereditary diseases, for example type 2 diabetes. The chip can detect genetic differences in a sample of saliva or a swab from inside the mouth. When plugged into a computer, the portable, low-power device can analyse data on the spot within around 30 minutes. DNA Electronics (DNAe), the spin-out from Imperial that was set up by Professor Toumazou to produce the chip, licences out its patents to organisations including the NHS National Institute for Health Research, Roche, and Life Technologies.

Professor Toumazou's invention could make DNA testing more economical for clinics and hospitals that once had to spend upwards of half a million US dollars on conventional DNA-sequencing machines.

IN THE PIPELINE

DNAe is now working on a blood test for serious infections that provides results in two to three hours. The invention should enable doctors to quickly diagnose what infection a patient has, so that they can intervene before sepsis sets in.

⇒ Toumazou is Imperial's First Regius Professor in Engineering, awarded by The Queen during her Diamond Jubilee celebration in 2013.



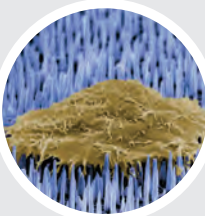
**PROFESSOR
CHRIS TOUMAZOU**

CURRENT POSITION:
Chief Scientist for the
Institute of Biomedical
Engineering at Imperial

AWARD-WINNER:
Toumazou was winner of the
European Inventor Award 2014
in the category of research
for the 'lab on a chip' and
of the 2014 Faraday Medal of
The Institution of Engineering
and Technology



BREAKTHROUGH



A nanoscale bed of nails

A penetrating new approach by researchers from Imperial and Houston Methodist Research Institute in the USA has successfully prompted parts of the body to generate new blood vessels, in a trial in mice. The team has developed tiny biodegradable nanoneedles that can pierce a cell without harming it, in order to deliver nucleic acids – the building blocks of life. Ultimately they hope their technique could help damaged organs and nerves to repair themselves and transplanted organs to thrive.

FROM THE FIELD

Grub's up

Earth-worms may have a humble appearance but they have strong stomachs. They drag fallen leaves and other plant material down from the surface and eat them, enriching the soil, and they do this in spite of toxic chemicals produced by plants to deter herbivores. Drs Jake Bundy and Manuel Liebeke (Surgery and Cancer) have identified molecules called drilodefensins in the earthworm gut that enable the worms to digest otherwise inedible plant material. "Without drilodefensins," said Dr Bundy, "our countryside would be unrecognisable, and the whole system of carbon cycling would be disrupted."



Biting data

Shark attacks are often big news stories, but fatal crocodile attacks are far more common and for some people, especially in Africa, they are a daily hazard. Dr Simon Pooley (Life Sciences) investigated nearly 3,000 incidents of crocodile attacks in southern Africa and found patterns that could help people avoid being bitten. For example, crocodiles hunt by learning the routines of their prey, so it is best to avoid predictable activities near the water's edge; and their main habitat is shallow water, so wading should be avoided. Dr Pooley also produced a booklet of helpful tips, which is being distributed for free in southern Africa.



“People have been told that making lots of noise might scare them away. This is terrible advice.”

Dr Simon Pooley



New chapter for the Wye College site

Imperial's Wye College site has new owners, following its sale to property company Telereal Trillium in July this year.

Wye College became part of Imperial College London in 1999, and throughout its history played an important role in agricultural research and education. However, largely due to declining numbers studying agriculture and agricultural-related courses in the UK, academic activity ceased in 2009. The site has been dormant since then. Central to the new owners' emerging plans will be finalising proposals for the long-term consolidation and growth of the Wye Free School. The other buildings could accommodate a mixture of residential, business and community uses.

The proceeds of the sale will be used to support activity in the College's Centre for Environmental Policy, the Grantham Institute, the Porter Institute, the Institute of Systems and Synthetic Biology and the Department of Life Sciences (including at Silwood Park Campus – see page 38 for an insight into to one Silwood researcher's ecological work).

**In the spotlight:
top bods talk
global finance**

The Brevan Howard Centre for Financial Analysis at Imperial College Business School has hosted several high-profile speakers since launching in 2014, on hot topics from zero lower bound interest rates to sovereign debt restructuring and high frequency trading.

Led by two of the world's leading experts on financial contagion, the mission of the centre is to increase understanding of global financial issues to prevent future crises.

A recent highlight was a talk by economist Dr Ben Bernanke, former Chairman of the Federal Reserve under Presidents George W. Bush and Barack Obama, with an introduction by the Governor of the Bank of England, Mark Carney. It was Dr Bernanke's first event outside of the United States since the publication of his new book, *The Courage to Act*, a memoir of the financial crisis and its aftermath.



ILLUSTRATION: (DOOMSDAY) JORGE LAWERTA

Doomsday for carbon dating

Imperial researchers predict that by 2050 fossil fuel emissions could spell the end of radiocarbon dating as an accurate way to determine the age of organic artefacts. Radiocarbon dating works by measuring how much the fraction of carbon-14 versus non-radioactive carbon in an object has changed over the years, but when fossil fuel emissions mix with the modern atmosphere, they flood it with non-radioactive carbon. In radiocarbon dating terms, this makes the atmosphere appear older, which is reflected in the tissues of plants taking in CO₂ during photosynthesis, and their products such as cottons. A paper by Dr Heather Graven (Physics/Grantham Institute) suggests that, at the rate fossil fuel emissions are currently increasing, by 2050 a new t-shirt would have the same radiocarbon date as a robe worn by William the Conqueror 1,000 years earlier.

**IDEAS
ON TAP**



**THE END OF THE
CAR WASH?**

Birds can seem to have a sixth sense for a newly-washed car, despoiling the clean surface just minutes after you've packed up the sponges. But now cars could fight back, in the form of a tough new paint that makes surfaces self-cleaning. The paint, created by a team from Imperial, UCL and Dalian University of Technology in China, is resistant to damage and can be applied to clothes, paper, glass or steel. The paint is extremely water-repellent, causing water to ball up and roll off the surface, taking any dirt with it.

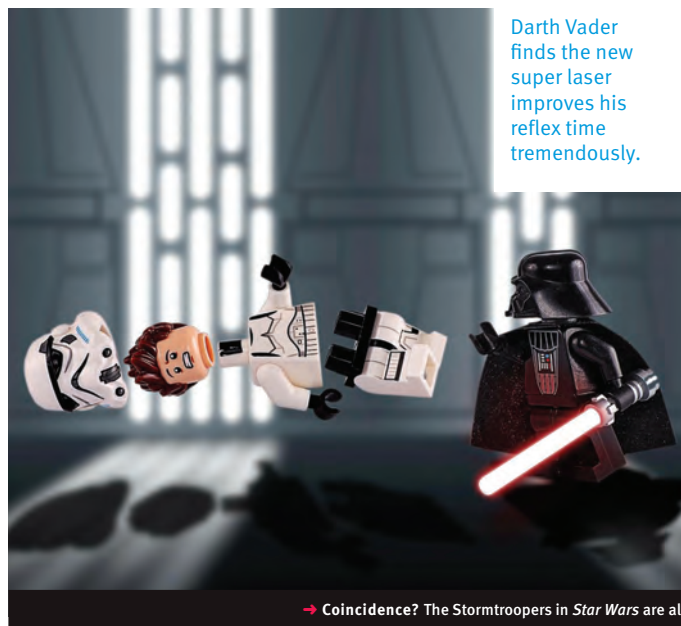


SEALED UP TIGHT

The world relies heavily on concrete for its buildings, roads and bridges but concrete structures can become vulnerable in extreme weather conditions. PhD student Charikleia Spathi (Civil and Environmental Engineering) is tackling this problem by developing a waterproof concrete additive, made from waste material, which could protect buildings and infrastructure. Thanks to this work, Spathi has won the first Althea-Imperial prize, a £10,000 award for Imperial's most innovative female student entrepreneurs in science and technology.

Light speed

Imperial physicists have designed a record-breaking laser that accelerates the interaction between light and matter by ten times. It turns on and off in less than a picosecond – one million-millionths of a second. Designed in a collaboration with researchers at Friedrich-Schiller-Universität Jena, the laser is not only ultra-fast, but also stable and effective at room temperature. It was created by using an incredibly thin wire just 120 nanometres wide – around a thousandth of the diameter of a human hair – and the concept of ‘plasmons’, which allowed the team to shrink a laser into a much more tightly focused beam than usual. This tighter focus made the beam interact with the wire more strongly, which accelerated the rate at which the laser could be turned on and off. Lead author Themis Sidiropoulos (Physics) explained that one of the uses of this technology could be to improve communication technology: “Turning a laser on and off quicker means more information carrying 1s and 0s per second, allowing much faster data communications.”



Darth Vader finds the new super laser improves his reflex time tremendously.

→ Coincidence? The Stormtroopers in *Star Wars* are all lefties. No Imperial Storm Troopers were harmed in this research (probably).



LEFT-HANDED COSMOS

A worker at CERN inspects components within an oversized waveguide inside the Large Hadron Collider.

Only around ten per cent of us are left-handers – including Angelina Jolie, John McEnroe and Chewbacca the Wookie – but the universe itself has a left-handed bias, say researchers.

Scientists working at CERN’s Large Hadron Collider looked at the direction in which a particle called the lambda b baryon spins as it decays via one of four fundamental forces in the universe, known as weak nuclear force.

Within the lambda b are smaller elements called quarks and the researchers analysed how one particular quark, called the beauty quark, decayed into another type of quark, called an up quark. The team’s measurements demonstrated that the decay only takes place when the beauty quark has a ‘left-handed’ spin.

“Our results show that the decay does indeed, contrary to earlier indications, behave in a left-handed way. The ‘handedness’ of the universe is, in combination with differences between matter and antimatter, fundamental for how our universe evolved,” said study author Professor Ulrik Egede (Physics). “Because the weak force is the only one of the fundamental forces to distinguish between right and left, we can also say that the universe has a left-handed bias.”

PHOTOGRAPHY: ZENITH ARDOR (LEGO/STAR WARS)

Turbo charged

An Imperial-led team is developing a gene therapy to boost the immune system, after discovering a protein that turbo charges the production of immune cells that kill cancer cells and cells infected with viruses. The researchers found that mice with enhanced immunity produced high levels of this protein, which they named lymphocyte expansion molecule (LEM). They also showed that LEM modulates the proliferation of human immune cells. The scientists hope to begin human trials of a gene therapy to boost the production of LEM within three years.

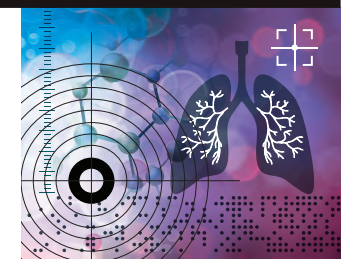


➔ **PITCH PERFECT** Help is at hand if you have a fear of public speaking, thanks to a new virtual audience simulator that Imperial College Business School is using to help business executives improve their skills. Part of the School’s Impact Lab, the Performance Simulator features an on-stage and back-stage area and a virtual reality audience. Beate Baldwin (Business School) said: “The simulator allows people to improve their confidence by taking risks in a safe environment.”



Hip-hop’s revolution: it’s like that

Culture evolves, and it turns out that this change can be analysed in much the same way as biological evolution. Using techniques usually applied to species data, scientists from Imperial and Queen Mary, University of London analysed the musical properties of 17,000 Billboard Hot 100 tunes between 1960 and 2010. They pinpointed three major revolutions, with the most significant in terms of new sounds being the rise of hip-hop in the early 1990s. The rise of rock and roll in the 1960s was another revolution, though it had less to do with the ‘British Invasion’ of America than often thought, according to the researchers. The third revolution, brought about by drum machines and synthesisers in the mid-1980s, actually led to a drop in diversity, as songs started to sound more similar. The study identified 1986 – the year of Robert Palmer’s ‘Addicted to Love’ and Whitney Houston’s ‘How Will I Know’ – as the least diverse in chart history.



Targeting hope

Gene therapy for cystic fibrosis shows encouraging results in major UK trial

A new type of inhaled gene therapy – that sends packets of DNA wrapped in fat into the lungs – could give hope to people with cystic fibrosis. The condition, caused by an inherited genetic mutation, affects 10,000 people in the UK and causes the lungs to become clogged with mucus. The new therapy aims to deliver healthy copies of the affected gene into the lungs. Patients inhale the gene, which is wrapped in globules of fat, and it can then be absorbed by cells in the lining of the lungs. In a trial of 136 patients, those who took the therapy had an improvement in lung function compared to those who took a placebo. The trial is the first to show that repeated doses of gene therapy can have a meaningful effect on the disease, and change the lung function of patients. Professor Eric Alton (Medicine), the coordinator of the UK Cystic Fibrosis Gene Therapy Consortium that developed the therapy, said: “Patients who received the therapy showed a significant, if modest, benefit. Whilst the effect was inconsistent, with some patients responding better than others, the results are encouraging, laying the groundwork for further trials.”

EVOLUTION OF SPORT

No-limits innovation

Now in its fifth year, the Sports Innovation Challenge is a project that asks students from the Faculty of Engineering to design, build and implement Paralympic sporting equipment. Student teams have created a range of innovative solutions to diverse challenges, including 'bruise trousers', a rowing boat for use on ice and a re-righting wheelchair.

→ The programme is currently seeking new sponsors to continue the Challenge up to the Tokyo Games in 2020.

SEEING RED

Many people living with disabilities struggle to correctly assess the severity of their injuries. Internal injuries often don't give athletes visible warning signs such as swelling or marks on the skin. The **bruise trousers** consist of breathable Lycra trousers and reactive film, and enable people paralysed from the waist down to quickly identify sections of their lower body that may be injured from high impacts following a sports game.



ICE, ICE BABY

The student team created a piece of equipment for a new type of sport: **ice rowing**, in which teams of athletes race against each other on an ice track. The team were initially inspired by visually impaired Paralympic skier Millie Knight, who competes with the assistance of a guide. They decided to create a self-guided and social sport. Taking inspiration from the biomechanics of rowing, ice rowing leverages a full body stroke, allowing athletes of varying ability levels to compete in teams as equals.



RIGHT ON TRACK

In wheelchair basketball, players can crash into one another and sometimes tip over onto the floor, which means games have to be stopped mid-play. The **re-righting wheelchair** is an augmented sports wheelchair featuring a metal wheel with rubber casing and a clutch mechanism which provides a lockable pivot point between the wheelchair's bumper and the floor so that players can push themselves up from the floor, re-right the chair and resume play.



BLAST OFF

Exploration has been a dominant theme in Dr Andreas Mogensen's (MEng Aeronautical Engineering) life ever since his days as an student at Imperial — when the College's Exploration Board supported two trips to South America, including a pioneering expedition to the Amazon to document butterfly biodiversity. But even he never imagined his love of adventure would take him into orbit. However, this September, after years of training at the European Space Agency, Andreas blasted off on a ten-day mission to restock the International Space Station and carry out zero-gravity science experiments. With so much of space still left to visit, Andreas isn't resting on his laurels. "I would very much like to be part of future space exploration missions... There are so many exciting places in our solar system to explore in more detail."

PHOTOGRAPHY: ESA-STÉPHANE CORVAIA, 2015 (ASTRONAUT); RICHARD BLAKE PHOTOGRAPHY (RE-RIGHTING WHEELCHAIR)



THUMBS UP! I'VE DONE A THOROUGH CHECK AND THERE ARE NO TRIBBLES* ON BOARD.

*Tribble (noun) A wee, fluffy alien species that purr adorably, but when left unchecked, are insanely prolific breeders. 😊 This one is for our Trekkies.

HEALTH TRENDS



DOCTOR'S NOTE

You might want to pause before phoning in sick with flu, if you're over the age of 30 — Imperial scientists have found that people over 30 only catch flu a couple of times a decade. They found that while children get flu on average every other year, flu infections become less frequent through early adulthood. The team analysed blood samples for antibodies against nine strains of flu that circulated between 1968 and 2009. The results showed that from the age of 30 onwards, flu infections tend to occur at a steady rate of about two per decade.

NEW LEASE OF LIFE

It looks as though we may all have bit longer on the clock than we thought, according to Imperial scientists who have forecasted how life expectancy will change in England and Wales. The research, published in *The Lancet*, also suggests that the life expectancy gap is closing between men and women. The scientists predict that by 2030, life expectancy for men will increase to 85.7 years and to 87.6 for women. This is 2.4 years more for men than official estimates, and one year more for women.

BIG DATA CHIC



China's First Lady Madame Peng Liyuan grabbed headlines around the world as she was photographed receiving a unique gift from Imperial's Data Science Institute.

Madame Peng and her husband President Xi looked delighted as she was presented with a data-designed cape by Professor Yike Guo, Director of the Data Science Institute.

The garment was created with British-Chinese designer Holly Wang and Imperial researchers using more than 700 public photos of Madame Peng to find the ideal style, cut and fit.

Professor Guo said: "The First Lady is known for her very good taste in clothes, so it's difficult to design something that suits her well. Style, colour and fit all needed data analysis."



Presidential visit

President Xi Jinping of China visited Imperial as part of his historic UK state visit in October.

The President and First Lady Madame Peng Liyuan were joined by His Royal Highness The Duke of York Prince Andrew, the Chancellor of the Exchequer George Osborne, Commercial Secretary to the Treasury Lord O'Neill, and several senior Chinese ministers.

They were welcomed to Imperial, the UK's number one research partner with China, by Professor Alice P. Gast, Imperial's President, and Professor James Stirling, its Provost.

In a speech, Professor Gast told President Xi and guests: "Imperial's exceptional academics and talented students are working with outstanding Chinese partners. Together we are addressing some of the world's greatest challenges."

Imperial has intensified its research collaborations with China significantly over the last decade. In 2005, 3 per cent of *Science* and *Nature* papers authored by Imperial academics had a co-author from a Chinese institution. In 2015, that figure stands at 22 per cent.

While on campus, President Xi toured some of the world's most advanced labs specialising in big data research and medical robotics. He also met a group of Imperial students, including two from the College's 2,000-strong Chinese student community.

Coinciding with President Xi's visit, Imperial announced a series of new UK-China education and research collaborations, including a £3 million gift from China UCF Group, scores of new Chinese Scholarship Council scholarships, and plans for an entrepreneurship hub at the College's White City Campus in partnership with Zhejiang University.



PHOTOGRAPHY: TONY FRENCH / ALAMY (STEGOSAURUS)

WEIGHING IN AT A STAGGERING 1.6 TONNES

A few doors down from Imperial, in London's Natural History Museum, resides Sophie — one of our more elderly neighbours, at around 150 million years old. Sophie is the most complete skeleton of a stegosaurus in existence and it was discovered in Wyoming in 2003, moving to the museum's Earth Hall in 2014. Scientists from Imperial and the museum have recently calculated that Sophie, a young adult dinosaur, would have been a similar weight to a small rhino, at around 1.6 tonnes. This is valuable information for understanding the metabolism, feeding requirements and growth of stegosaurs.

A STONE'S THROW AWAY

WEARABLE
WIRELESS
WELLBEING

1 Discreet monitor

AcuPebble is a wearable wireless device, approximately the size of a pound coin, which sticks on the patient's neck or chest, discreetly underneath clothing. The device continuously monitors sounds from the heart and respiratory system in real time, and has the ability to wirelessly transmit data to the patient's doctor.

2 Multi-purpose

Based on their research and development over the past five years, the Imperial team believe that AcuPebble can be used as a diagnostic tool, a health monitor and an early warning device. It is equipped with advanced algorithms to sift through a range of sounds, detecting only those that may indicate deteriorating health or illness.

3 Breathe easy

Patients with respiratory and cardiac conditions could benefit the most from AcuPebble. These include people living with chronic obstructive pulmonary disease (COPD), sleep apnoea, whooping cough and congestive heart failure.

Researchers from Imperial's Department of Electrical and Electronic Engineering have developed a wearable sensor that can monitor a range of conditions and gather critical data about the patient. AcuPebble is now making waves in the world of medical sensing technologies.



4 Testing times

A small pilot clinical study was conducted with academics from the UK's National Hospital for Neurology and Neurosurgery, on patients with sleep apnoea. The device detected at least nine out of ten individual apnoea episodes in patients, picking up a range of sounds associated with sleep apnoea, such as turbulence in airways, depth and duration of breathing, and other vital signs such as heart rhythm.

5 International acclaim

The Imperial team, led by Dr Esther Rodriguez-Villegas, along with her research assistants Guangwei Chen and Syed Anas Imtiaz, was one of the major winners in the global XPRIZE Nokia Sensing XCHALLENGE for the AcuPebble device. They were the only UK entrants to win an award in the competition, which rewards researchers developing high-impact medical sensing technologies.

6 Next steps

The researchers are currently in discussion with potential partners, including pharmaceutical manufacturers and mobile phone operators. They are aiming for AcuPebble to be in the marketplace within a year. To find out more visit: www.acupebble.com



ALTERNATE UNIVERSE

If time travel were possible, what would you do?

→ Imperial alumnus H.G. Wells' famous novella, *The Time Traveller*, conjured up a fantasy of time travel, but Einstein's theory of general relativity made it a possibility. General relativity tells us about the relationships between gravity, light and time. The closer to the speed of light you travel, the slower time passes for you; the same effect is seen when you move further away from large objects with great gravitational pull. **To mark the 100th anniversary of Einstein's theory, we asked academics and alumni: If you had a time machine, what would you do with it?**

BOLT OF LIGHTNING

"In films, trying to fix world events, introduce technology early, or buy a *Sports Almanac* often goes wrong, so I'd rather be an observer of moments than a changer of them. I would travel to Budapest, 1882, when Nikola Tesla invented the idea of the alternating current while walking with a friend. I'd take the place of his walking partner while Tesla pondered the inefficiencies of the direct current generator. Legend says he recited a stanza from his favourite play, *Faust*, in which a scientist trades his soul for knowledge. Then, Tesla's prodigious brain conjured up the design for an alternating current motor. Using a stick to sketch in the dirt, Tesla conveyed his plans directly to his friend. So, I would have witnessed a moment of great human advancement, and been lectured by one of the world's greatest ever minds."

RICHARD LAMBIE (Executive MBA 2014)

FLIGHTS OF FANCY

"I'd like to go back to 1505 to meet Leonardo da Vinci when he was designing his famous flying machine, the 'complex ornithopter'. It was a human-powered machine, based on the flapping wings of a bird or bat – a principle now used successfully, for the first time, in small aerial drones. We still don't know whether he ever actually built it, so I'd love to find out. After that, I'd bring Da Vinci home with me to the 21st century.

Da Vinci studied anatomy and served as Cesare Borgia's military engineer; I'd like to invite him to dinner for a truly fascinating evening, discussing all his life sciences and engineering concepts!

Then, I'd take him on a tour of the 21st century to show him the influence that his ideas continue to have on modern life."

JEHANGIR BYRAMJI (MEng Electrical and Electronic Engineering 2002)

YOU'RE SO SPECIAL

"Let's set a ground rule that I'm not allowed to influence history. With that in place, I'm a physicist so I'd like to meet some pioneering physicists.

Talking to Isaac Newton would be fascinating but at that time everyone was so paranoid about someone else taking credit for their discovery that he probably wouldn't speak to me. I think Newton would have worried that I might go back a bit further in time and claim his discoveries.

I'd really like to go back to the mid-nineteenth century and show James Clerk Maxwell just how beautiful his theory of electromagnetism is, in the context of special relativity. He was working with classical Newtonian physics but he came up with something that would prove central to special relativity. In fact, without James Clerk Maxwell, my time travel device wouldn't make much sense!

PROFESSOR ALAN HEAVENS is Chair in Astrostatics in the Department of Physics

BUTTERFLY EFFECT

"I tend to look forward rather than back but I'm also intrigued by how the past can influence the future. So I'd like to go back and make a small change and see if it would have a big effect in the present or the future.

For example, how do we encourage more women into science? Perhaps we could experiment a little to find the most effective approach to creating a more equal society.

The beauty of this is that you'd never be doing it for real because you could always go back and try something different. This would get around the fact that it can take generations to make cultural shifts. Using the time machine, we could try one change at a time and see if, by the end, we have a more equal society."

SUSAN WATTS is Head of Communications and Public Engagement at Imperial's MRC Clinical Sciences Centre

WIN THIS T-SHIRT

If you had access to H.G. Wells' time travelling machine, what would you do?

Send your answers for a chance to win a limited edition H.G. Wells t-shirt: imperialmagazine@imperial.ac.uk



ILLUSTRATION: (T-SHIRT) DEREK STENNING

ILLUSTRATION: MARTIN LAKSMAN

BOTTOM
LINE



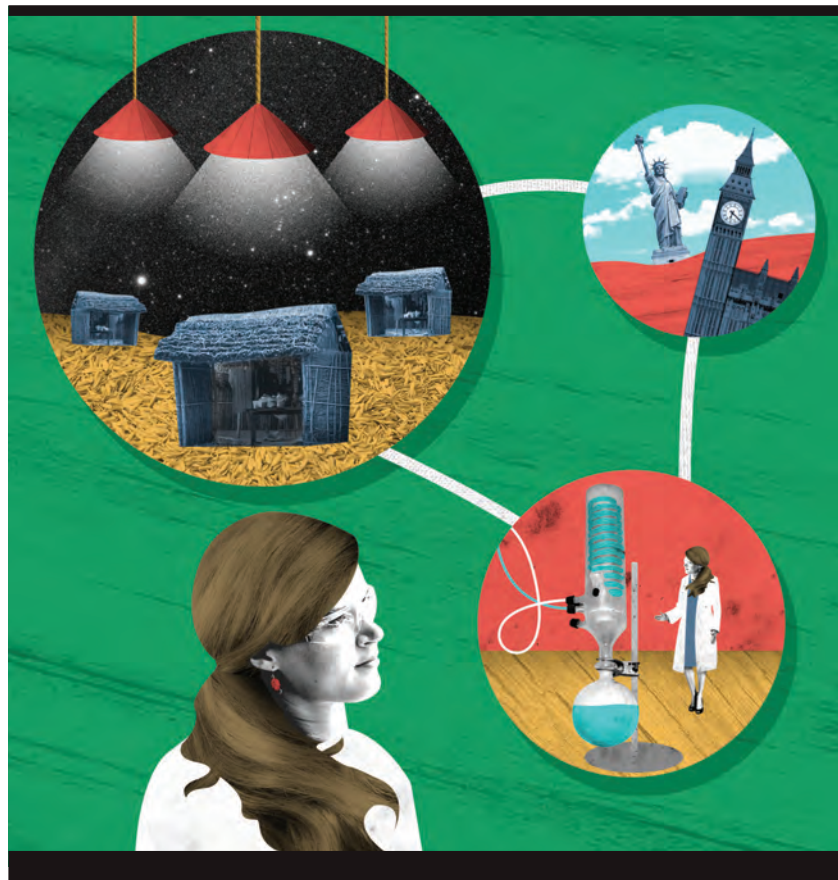
3 MILLION DEATHS from COPD occurred worldwide in 2012.



1 IN 10 ADULTS over the age of 40 affected by COPD in the UK.



EXPECTED 41% INCREASE in medical technology industry sales 2013–2020.



POTENTIAL ENERGY

A bright idea can take you across the globe, says Imperial College PhD Scholar and winner of the first Althea-Imperial prize, Clementine Chambon.

It has taken time to get accustomed to the notion of myself as a full-fledged entrepreneur. The past 12 months have been incredibly exciting and challenging as I have grown from being a PhD scholar to co-founder and Chief Technology Officer of social enterprise, Oorja.

People often say how impressive it is to see a female engineer and entrepreneur, but I don't face great hardships in my day-to-day life as a result of being a woman – although I am trying to serve those who do. There are around 80 million women living in rural Uttar Pradesh, northern India, who have no access to electricity and a precarious livelihood blighted by ever-increasing crop failures.

The idea behind Oorja (Hindi for 'energy') is to put power back in their hands – by installing easy-to-operate reactor plants that use locally-sourced agricultural waste, including rice husks, to generate reliable and affordable electricity for lighting, as well as biochar to improve

long-term crop yields and lock carbon in the soil. We have developed a unique proprietary design for a pyrolysis reactor that can be assembled locally from readily available parts. Central to the idea is to franchise the ownership and operation of plants to communities themselves.

My business partner Amit Saraogi and I came up with the idea at the EU-funded Climate-KIC entrepreneurship workshop in 2014, and since then it's been a rollercoaster journey that has taken us all the way to New York City via the rural villages of India.

Last October, I submitted our seed stage business plan to the inaugural Althea-Imperial Programme, which aims to encourage and support female-led enterprises at the College. After a series of developmental sessions on leadership, public speaking, learning from failure and pitching, each team submitted a full business proposal for review. We were delighted to be among five ideas

shortlisted to pitch to a panel of expert judges for the chance to win seed funding.

I was able to convince the judges of the strong socioeconomic and environmental impact that Oorja could have and we secured a runner-up prize of £5,000 in funding. There wasn't time to celebrate, as two days later I flew out to Uttar Pradesh in India to carry out a field survey for Oorja. It was my first visit to the country and a very demanding two weeks.

Whilst we were there, we interviewed rural low-income household members, particularly women, about their domestic energy needs. We also surveyed farmers about their soil conditions and agricultural practices. I learned some very basic Hindi and was thrilled to get such a close insight into the daily lives of the women we talked to. It was amazing how much we could learn from communities who get by with very few resources. We're currently analysing data from the survey and we'll use it to inform the construction of a full-scale pilot plant in an Indian village next year.

Almost immediately after India, Amit and I travelled to New York to pitch for a prestigious fellowship from Echoing Green – an organisation that invests in early-stage social entrepreneurs. Going from a place where there was one light bulb between 12 people to Times Square was something of a culture shock!

Out of 3,629 applicants we were one of 52 businesses who successfully secured a fellowship. Oorja will receive \$90,000 in funding for two years and we'll also participate in a programme of leadership development events.

I'm now back at Imperial, focusing on my PhD, which is investigating the process of making biofuels from waste, and has helped me develop the technical skills needed to support Oorja. My supervisors are hugely supportive and have helped me find the resources to meet the demands of my PhD and Oorja.

I am very thankful to the Althea Foundation for their generous support of this project and I'm excited about helping out with the second Althea-Imperial cohort as a mentor. I think it's important, when starting out as an entrepreneur, to know someone who is trying to do something similar, to see them working alongside you overcoming similar challenges. If I can be a role model in any small way, then I will try.

CLEMENTINE CHAMBON is an Imperial College PhD Scholar in the Department of Chemical Engineering and co-founder and CTO of start-up Oorja (bit.ly/oorja).

+ FIND OUT MORE: The Althea-Imperial Programme was created in 2014 with the support of the Althea Foundation bit.ly/althea-imperial. The Imperial College PhD Scholarship scheme is part-funded by donations from Imperial's alumni and friends. To find out more, please visit www.imperial.ac.uk/giving

ILLUSTRATION: NATE KITCH

Fantastic five

From building satellites to saving a Tudor warship, we meet five alumni who are leading change in diverse disciplines.

› Stargazer

DR MAGGIE ADERIN-POCOCK (Physics 1990, PhD Mechanical Engineering 1994) is a space scientist, science communicator and presenter of the BBC's *The Sky at Night*. She is Managing Director of Science Innovation Ltd, through which she organises public engagement activities which show school children and adults the wonders of space.

IMPERIAL: When did your interest in space begin?

ADERIN-POCOCK: Ever since watching *The Clangers* as a child, I've always had a strong desire to go into space; it has been the driving force in my life. I recently helped relaunch *The Clangers* for the BBC and I got to do some filming with them. At one point they looked up at me and said "Hello Maggie!" in their little whistles and I cried because the three-year-old girl inside of me was so excited to be finally meeting them!

IMPERIAL: What motivates you as a space scientist?

ADERIN-POCOCK: What is so compelling is just how little we know; our understanding of the universe just keeps on evolving. First we thought the Earth was

the centre of the universe and then we thought it was the Sun. Now we know we live in a galaxy of 200 billion stars, and that there are billions of galaxies out there. It's all mind expanding stuff.

IMPERIAL: You've previously said you'd like to retire to Mars. How would you spend your days?

ADERIN-POCOCK: I can't see myself sitting quietly. I would have to be running around investigating things. I'd try and find out what happened to Mars – it used to have a thick atmosphere and lots of running water. People think it might have had a magnetic pole but the core solidified. I'd look for the evidence of what happened, for traces of life and magnetic pointers in the rock. I would like to take my husband and five-year-old daughter with me, so I will definitely have to wait until she is grown up.

IMPERIAL: How can the study of space help us on Earth?

ADERIN-POCOCK: Many of the detectors up in space



“What is so compelling is just how little we know.”

INFLUENCE + INSPIRATION

Reach for the moon The *Clangers* and their small blue planet inspired a childhood fascination with space.

Live long and prosper A lifelong Trekkie, Spock was a childhood hero due to his logical focus on hard facts.

are looking out at the stars, but there are thousands of satellites pointing directly at Earth and they have so many uses. I've worked on satellites for the European Space Agency to measure the photosynthesis of huge masses of plants. Satellites can also measure the composition of soil to see if it is deficient in particular minerals, coordinate relief during natural disasters and monitor the movement of troops during war to prevent war crimes. There are endless possibilities.

IMPERIAL: What are your memories of Imperial?

ADERIN-POCOCK: Imperial seemed like a magical place to me. When I was a child, I used to go to the Science Museum with my sister. Walking past Imperial, I used to think, "That's where the clever people and scientists go!" So to get admitted for my undergraduate degree was a dream come true in itself.

The people I met were so inspiring. Professor Tom Kibble used to take my first year laboratory. He was so down to earth. To find out later that he had co-discovered the Higgs boson was crazy because he just seemed so human! The lecturers made everything seem so accessible.

IMPERIAL: What advice would you give to a young person graduating today?

ADERIN-POCOCK: When I was graduating, I thought careers were very linear. You went into a job, stayed 30 years and got your carriage clock at the end. But my path has taken me in many different directions and I have found that the tools I've picked up along the way are incredibly useful. Now I don't think any direction is particularly wrong as long as you keep your end goal in mind.

IMPERIAL: Tell us about a current project

ADERIN-POCOCK: I'm involved in a new animation that explores cosmology for four to seven year olds. As a science communicator, I truly believe that with analogies you can find ways of explaining virtually anything to anyone. That's my challenge and it is a fun one.

IMPERIAL: Who is your personal hero?

ADERIN-POCOCK: Yuri Gagarin. He was born on 9 March, so we share a birthday. He was just a kid from the countryside who was sent up into space. When he was going up, they'd only sent a few animals before, so he really didn't what was going to happen – he could have blown up on the launch pad. He's always been my hero and one day I'd like to follow him into space.



“Microbes... I was fascinated and totally hooked.”

➤ Healthy foundations

DR LESLEY DRAKE (PhD Epidemiology/Parasitology 1993) is the Executive Director of the Partnership for Child Development (PCD) based at Imperial's School of Public Health.

Pivotal moment Sitting in a biology lesson, aged 10, when my teacher showed us some pictures of microbes. I was fascinated and totally hooked. From then on I wanted to be in the world of bugs, worms and diseases.

Career journey I completed my PhD at Imperial and, after a series of posts at other institutions, the College's ethos led me back here. PCD supports school health and nutrition programmes across the world, such as treating children for parasitic worms and providing hot nutritious meals in schools. A big part of my job is collaborating with governments, funding agencies and other partners to recognise the true worth of academic excellence.

Inspiration The children I've met along the way who have absolutely nothing – no power, no money, no food or even shoes. The kids who go to such enormous lengths to get into the education system and try to break out of the poverty cycle. I sometimes question whether I would have the same inner strength to try and do this.



➤ Power to the people

JOACHIM HORN (MEng Mechanical Engineering 2013), is the CEO of SAM Labs and the creator of SAMs (sensory actor modules), wireless electronic building blocks which enable anyone to create smart products and hardware apps in minutes.



What's SAM? SAM is a toolkit that empowers anyone to build interactive prototypes, products and apps in seconds with no previous coding experience needed. It makes it possible to instantly create robots, home automation or design projects, such as interactive doorbells, responsive shoes and smart lights.

Company story I founded SAM in 2014, so the adventure has just begun. Founding a company has been a real learning curve, dealing with the joys of having to learn everything and making stupid and offensive mistakes every day. SAM now has a team of 15, who contribute to the daily successes that we are proud of.

Advice for younger self Your friends/colleagues/professors are about a quarter as sure of or set on what they're doing as the impression they give. Allow this to cut yourself some slack in terms of finding exactly what you enjoy and what makes you happy.

➤ Disruptive finance

KARL HARDER (MBA 2009) is Managing Director of Abundance NRG Ltd, the UK's first regulated crowd-funding platform, which allows individuals to invest in renewable energy products through debentures (long-term unsecured bonds issued by a company).



Biggest challenge Being the first company of our kind has been challenging as we had to work with the UK financial services regulator to create regulatory space for us to exist. During the approval process we went through virtually every aspect of our business, including the team's experience and capability; all our management systems and controls; as well as the logic of the debenture itself.

In the pipeline We are working with the UK Treasury to get ISA status for crowdfunding investments and we hope that from April 2016 we will be able to offer an Abundance ISA for crowdfunded investments.

Personal inspiration Anita Roddick, founder of The Body Shop and investor in my first business. She taught me you could run a profitable business but do good at the same time.

➤ At the helm

DR ELEANOR SCHOFIELD (MEng Aerospace Materials 2002, PhD Materials Research 2006) is the Conservation Manager at the Mary Rose Trust. The Mary Rose is a Tudor ship, which sank in 1545 and was discovered in 1971.

SET A COURSE I manage a team of conservators and maintenance staff, who look after our artefacts, monitor the ship's hull and maintain the environmentally controlled conditions. My job also involves getting all the safety gear on to access the ship and collecting samples to analyse. The hull was sprayed for years with a polymer to reinforce the wood, and is now drying under controlled conditions. During this phase, we have to monitor it very carefully for chemical, mechanical and biological stability.

BIGGEST CHALLENGE The physical aspect of my job – I have even been trained to drive a crane! It can be difficult in that environment to focus on the science whilst staying safe and navigating the crane around the hull.

MOTIVATION Getting people interested in science, and not scared of it inspires me. I like that I get to break down barriers and stereotypes of people who work in science. It's great talking to people about the Mary Rose, and seeing them realise that it's science and it's exciting!



+ MAKE THE CONNECTION: Learn more about what your fellow alumni are doing and share your accomplishments by joining the Imperial College London alumni LinkedIn group: bit.ly/imperial-alumni-LinkedIn-group

GREAT ADVOCATE

ONE YEAR INTO HER PRESIDENCY AT IMPERIAL, **PROFESSOR ALICE P. GAST** TALKS TO DR ANJANA AHUJA ABOUT HER EXPERIENCES OF LEADERSHIP, THE NEW COLLEGE STRATEGY, AND THE ROLE OF A UNIVERSITY IN THE 21ST CENTURY.



“It’s probably the biggest thing to happen to Imperial since Prince Albert acquired some land in South Kensington.” So says Alice Gast, the President of Imperial College London, of the purchase of a 25-acre brownfield site in White City in the west of London, currently being transformed into a substantial new interdisciplinary campus boasting academic departments, laboratories, residential halls and business space.

The same might one day be said of Gast, a distinguished chemical engineer, admired university administrator and a former science envoy for the US Department of State. Hers is an historic appointment: Gast, who succeeded Sir Keith O’Nions in 2014, is the first woman and first non-Briton to lead Imperial in the university’s 108-year history. It also marks a break with tradition: while her predecessors were called Rector, the College has adopted the American model of having a President and Provost. Gast became President, overseeing the strategic development of this great global university; Professor James Stirling CBE, the former head of the Cavendish Laboratory at Cambridge University, was named Provost. He is in charge of academic affairs but is ultimately accountable to the President.

Being President is, she declares when we meet

for tea in her office, a “dream job, absolutely marvellous. What I love is how everyone’s passion for what they do comes through so well. People do tremendous things, it’s just awe-inspiring. Every day my Imperial Google Alerts are brimming with new discoveries.”

Gast, 57, who was previously President of Lehigh University in Pennsylvania, has wasted no time in setting out her vision for the next five years at Imperial: July saw the publication of Imperial’s *Strategy 2015–2020*, a result of consultation across the campus. While it predictably maintains the emphasis on academic excellence, it is also a fiercely ambitious mission statement that may well reshape Imperial forever. Research will centre on four overarching themes: discovery and the natural world; engineering novel solutions; health and wellbeing; and leading the data revolution.

Students and academics will be nurtured as technically brilliant, entrepreneurial, risk-taking leaders, capable of going out into the world and influencing decision-makers. The deep commitment to core academic excellence and cross-disciplinary working remains (in 2014, the university’s published research papers involved partners in 140 countries and 6,000 institutions). Most striking, though, is Imperial’s vow to “place our bets” on ideas ahead

of their time, even if the gambles don't always pay off. The stakes will come from fundraising, via Gast's networking and partnerships with government, industry, alumni and other friends who have cash to invest.

"By 'friends' I mean people who want to make a difference in the world, and have an interest in a field or an issue, or in young people's education," Gast explains, in her gentle American accent. "We have many potential friends, including alumni who haven't yet built a relationship with us and haven't yet understood what an impact their donations can have.

“WE NEED TO MAKE CLEAR THE IMPORTANCE OF WHAT WE DO, AND INVITE PEOPLE TO BECOME PART OF WHAT WE DO.”

"We need to make clear the importance of what we do, and invite people to become part of what we do. We need to enhance our corporate and foundation, trust and philanthropic investments – I view them as investments because anyone donating a sizeable sum to an organisation is placing a bet on the impact they can have with their wealth, and they want to see outcomes."

Gast says that Imperial's bold decision to change the leadership structure frees her up to be "a bit more outwardly focused. I see my position as one of a great advocate for Imperial – with government, industry and philanthropists. All universities have a tendency to look inward at their own matters and put their heads down and move forward. But UK universities have to be more externally focused."

In practice, this has meant Gast marching out into the world on Imperial's behalf. She has already collected a hefty number of air miles this year: visits to China and the US; appearances at the World Economic Forum (WEF) in Davos and Dalian; trips to India, Malaysia, Singapore, Qatar and Saudi Arabia. The gruelling schedule is paying dividends: Imperial academics are being invited to WEF, collaborations are growing in China and she has brokered a joint MIT-Imperial seed fund targeted at riskier technology research. Gast, it seems, is starting to place her bets.



WHILE IMPERIAL HAS ALWAYS BEEN A PRESTIGIOUS INSTITUTION, with corridors stalked by Nobel Prize winners, it is instructive to peruse the company it keeps in the global university rankings. The *Times Higher Education* World University

Rankings put the California Institute of Technology in first place, on measures of teaching, research and international outlook. Imperial comes eighth, behind both of its major domestic rivals, Oxford (second) and Cambridge (fourth). Interestingly, Gast has professional connections with three other institutions in the top ten: she has a PhD from Princeton (seventh); taught for 16 years at Stanford (third) and was Vice President of Research and Associate Provost at MIT (fifth).

Imperial is clearly up against stiff competition as it tries to recruit talented students and scholars but, alas, it is a Cinderella at the global university ball, with around £500m in its endowment. Cambridge tops the European wealth league, with endowments across its colleges worth a collective £4.9bn; Oxford boasts £4.3bn. These vast sums, though, are eclipsed by the eye-watering endowments amassed by American universities, and in particular the two that have turned out the most US Presidents: Yale has built up around £21bn, while Harvard is the richest of them all, with around £33bn.

The endowment provides long-term financial security, and expanding Imperial's is essential if it is to retain its competitive edge. Alumni, Gast believes, could be a game-changer in this respect; after all, Imperial graduates do rather well in the world. But us Imperial alumni and Brits in general are positively miserly (my words, not Gast's) compared to our American counterparts. This is gradually being recognised in the UK, especially in the light of austerity and falling government support: in 2014, Cambridge nearly doubled its fundraising staff to 120 and declared its intention to capture some of the money destined for American universities, particularly from Asian philanthropists.

Gast has form here: she raised over \$225m for Lehigh during her tenure. "People in the UK are very generous in their support of charities," she notes. "The primary difference [between graduate-giving in the UK and US] is in the culture of the university and the way they've been organised, and the way students and alumni have been engaged. You are now seeing quite significant increases in alumni giving in the UK and we need to be a part of that.

"It will take a concerted effort from Imperial and we need to be more intentional about it. It's about making sure we're staying in good touch with alumni and that they know what's going on here. It's also about finding other ways to involve them so they can come back and recognise not only the value that Imperial had to them, but also the value it has to those coming along behind them." She will be assisted in this by Sarah Porter Waterbury, who came from New York University in April to become Imperial's first Vice President (Advancement).



THE VALUE OF A GREAT GLOBAL UNIVERSITY ACCRUES not only to its students, staff and alumni – but should also accrue to the world, according to Gast. When I ask her what the role of a university should be, in the 21st century, she responds with another plank of her strategy: a vision of Imperial as global problem-solver.

"I've thought a lot about the principles on which our institutions are founded," she muses. "It's usually to create new knowledge and impart that knowledge to create an educated citizenry for the community or the region or the world. Even today, institutions formed in the 21st century like King Abdullah University of Science and Technology (where she is a trustee) and Singapore University of Technology and Design, have founding principles that sound very much like those from 150 years ago, for economic development or to improve society in their regions.

"We are not solely here to provide regional development for London or even the UK; we are here to solve problems that affect the whole world ... we recognise that many of the problems that our academics are dealing with, and that we are training our students to go out and deal with, are global in nature and know no boundaries. Diseases and climate change know no boundaries. We should be playing our part in world issues."

Those world issues are not always predictable, another aspect that Gast adopts as a key theme. Imperial's new strategy document borrows heavily from the language of enterprise, with references to being "courageous" and "risk taking". Gast signs off the document's presidential introduction by promising to build "a more agile, adaptive and resilient organisation so that we will be ready for whatever the future holds".

How will she practically achieve this?

"We need to encourage our academics to take intellectual risks and try new areas of research that are unproven and untried. When you exist in a system that rewards excellence ... it can drive you to take fewer risks because you don't want to propose something that might not be successful. So over time, research can become more incremental and less bold. I don't want to send the signal that we don't have bold academics, but we need to help them find the funding mechanisms so they can try out the things that are not so well-funded or proven."

Where will Imperial get the money? "I need some co-investors and philanthropists who would love to help us move forward in those bold ways. True breakthroughs come from taking great leaps and doing things differently. When you look where funding goes, it's sometimes last year's, or even last decade's, big idea."

In order to foster this spirit of creativity, Imperial is building incubator space (to germinate spin-out companies) and 'hackspaces' so that students can come together to kick around ideas. Academics are invited to contact Gast at any time: "We're a pretty coupled and open and flat organisation – anyone with a good idea can approach the leadership team and we will figure out if we can find a way to support it."

That reflects Gast's leadership style, which she describes as consultative and consensus-oriented. She is also keen to see women flourish both academically and entrepreneurially, and points to the Althea-Imperial prize for women entrepreneurs as way of encouraging this. Does she regard herself as a role model? "Yes! We all forget that people are looking up at you and you can share simple bits of wisdom that you've picked up along the way, or simple ideas or experiences, and people appreciate that."

Gast, who is married to computer scientist Bradley Askins and has two children, reveals that her own career has not always been plain sailing: "There have been difficult personalities along the way and I think it was rare for me to attribute any obstacles I encountered to my gender ... Looking back, I realise that people may have had issues with me being a woman. I was more into interpersonal relationship management than worrying about it as a sexist thing.

"People have different leadership styles and



different approaches to trying to build relationships and manage them. I hope that I bring good qualities to that."

I had previously heard Gast described as "folksy"; I'm not quite sure that is the right word to describe the air of accessibility and approachability she brings to her elevated position. She has been spotted cooking pancakes on the Queen's Lawn but is obviously keen to maintain smooth relationships beyond a hungry student body. One example of this was her decision, in response to a freedom of information request, to publicly reveal her £421,000 salary before joining from Lehigh (where she received substantially more) and before she was obliged to. It reflects her belief that "institutions shouldn't struggle with transparency. So long as you're true to your values and goals and doing as best you can to lead the institution even through difficult times, you want to share that philosophy and approach and the facts with your stakeholders."

Gast hopes to grow Imperial's influence with government and policy-makers; she recently hosted a high-profile meeting about antimicrobial resistance, attended by England's Chief Medical Officer Professor Dame Sally Davies, and the College will bring ministers and scientists together for a conference on climate change ahead of the United Nations conference summit in Paris, commencing in late November 2015. On this strategic issue, too, the Gast CV looks pretty solid: her appointment as a US science envoy to the Caucasus and Central Asia gave her influence in the White House, the State Department and in the National Academy of Sciences.

I put it to her that, unlike Yale, Harvard, Oxford and Cambridge, Imperial has never produced a head of state. "We currently have five Chief Scientific Advisers – isn't that our thing? That's how we contribute to policy and government. Just as we are very committed to our core disciplines and our depth, our communities should be articulate and able to communicate well and eager to share the wonder, to inform and influence.

"We have some people who'd be marvellous politicians but isn't it better to be informing the politicians and be really good at the science than to try to make yourself into something else?"

Then she smiles: "I don't want to suggest they're all genetically bred to be scientists but I think, as an institution, we need to be true to ourselves and do what we do best."

DR ANJANA AHUJA (*Physics* 1990, *PhD Space and Atmospheric Physics* 1993) is a science journalist and contributing writer at the Financial Times. She was a former columnist for The Times and is also a regular contributor to the Daily Telegraph, Prospect and BBC2's Newsnight.

WHITE CITY, BRIGHT FUTURE

Imperial's new White City Campus is rising fast and is set to alter not only the landscape of west London, but also the shape of interdisciplinary research and innovation. **Lucy Tobin** finds out more about the site's heritage and its promising future.



➔ If you stood at the bar during one of the drinks receptions held by London's big corporates this autumn, you may have heard suits animatedly discussing 'agglomeration economies'.

It's this theory that has made major firms desperate to build their offices near art colleges packed with creatives in King's Cross, as well as being the reason why City money men are moving to Shoreditch to hang out with tech entrepreneurs.

Agglomeration economies refer to the benefits that come when entrepreneurs, companies and financiers cluster together in cities or industrial business parks. It's the open-plan office on a larger scale: the idea being that populating a new development with a wide range of diverse and interesting companies and individuals will lead to more success for all of them.

And it's a concept that it could be said is at the very heart of Imperial's £3 billion, 25-acre White City Campus.

The College's aim for its new development is to give academics and students a place to collaborate with the entrepreneurs, investors, tech-experts and creatives who are driving London's international eminence. At the same time, it will give Imperial researchers who haven't previously been able to work together the space to collectively tackle major interdisciplinary experiments that could change lives.

Whilst furthering science and technology research to improve lives is at the core of the project, there's also a strong element of commercialisation. The White City site – which is three miles from Imperial's South Kensington home and adjacent to its Hammersmith Campus – is divided into two zones. The north campus, where construction is well underway and where 600 postgraduates have already moved into sleek new

studio apartments, is just a few minutes' walk from Hammersmith Hospital, Imperial's focal point for translational medicine. It's also close to another major Imperial research hub, St Mary's, as well as the Francis Crick Institute, further to the east.

Focused on health and wellbeing, the north part of the campus will house the site's flagship building – the 24,000m² Translation & Innovation Hub, where scientists and researchers are going to be sharing space with tech giants and fledgling start-ups. The building – part funded by a £35 million government grant – will provide facilities for 1,000 scientists and engineers, and will house more than 50 start-ups and innovation hubs for several large technology companies. Some 140 spin-out companies have been founded or funded by Imperial Innovations (a commercialisation company founded by Imperial) over the past decade; the new campus is set to bring ideas to market on an even greater scale. "The Innovation Hub will see us bring in companies, incubate brilliant new spin-outs, and help us to focus on the health and wellbeing parts of our strategy," says Professor David Gann CBE, Imperial's Vice President (Development

and Innovation). He hopes the campus will help London compete with the American powerhouses of Silicon Valley for digital technology and Boston for bio-medical research and innovation, pointing out that White City Campus is a key part of the London-Oxford-Cambridge 'golden triangle' which, says Gann, has "more science and tech workers and faster industry growth than Silicon Valley."

Indeed, over a third of the space at White City Campus will be devoted to diversifying Imperial's income. That commercial nous was reflected in the project's inception: it began just as Britain fell into recession. Whilst the College knew it needed to expand to fulfil its research potential, falling land values helped Imperial to initially buy a 7-acre brownfield site from the BBC in 2009 and break ground on the first building in its new site a year later. The purchase of another 17 acres of adjacent land from insurer Aviva took place in 2013.

The scale and ambition of Imperial's White City plans were hard to imagine a decade or so ago. That was before Australian mall giant Westfield completed its huge first London shopping centre, down the road. The mostly

commercial area consisted of warehouses, struggling workshops, and train tracks; its major attraction then was the A40 Westway.

But the area boasts a prestigious pedigree: more than a century before Usain Bolt and company descended on Stratford for the London 2012 Olympics, the area that is now being transformed hosted the 1908 Summer Olympics. One year after that, it held the Imperial International Exhibition, carrying on the tradition of the Great Exhibition of 1851 which was held in South Kensington and led to the university's creation.

Today, planning works for Imperial's White City Campus continue apace. Next door to the Translation & Innovation Hub will be the 26,000m² Molecular Science Research Hub, with the new Department of Chemistry research facilities at its core, bringing together synthetic biology, data sciences, technology and health research, and due for completion in 2017. Two years later, the Michael

Uren Biomedical Engineering Research Hub (see overleaf), a cutting-edge 19,000m² building, will open its doors and draw together scientists, engineers, and medical professionals to pursue life-changing research into new medical technology.

Nearby will be a residential tower block, with some apartments earmarked for Imperial key workers at below-market rents, whilst the last major building on the north part of the campus will be Imperial's School of Public Health. This will give the department which last year helped the College be recognised for having the greatest concentration of high-impact research of any major UK university (according to the Research Excellence Framework) a more spacious, purpose-designed building, to accommodate work on improving the health of the population.

Little wonder Imperial's President Professor Alice P. Gast sees the White City development as playing "a central role in cementing Imperial's position as

one of the world's top universities." She adds that the campus "offers the opportunity to fulfil our ambitions. Our ambition to do things differently: develop new partnerships, diversify revenue streams and provide students with entrepreneurial experiences. Our ambition to start new areas of research."

More of that ambition will eventually be fulfilled across the A40, on the south site of Imperial's contiguous campus. Still in the planning stages, the addition will vastly increase the College's capacity for delivering its strategy on translation activities. As the land awaits its transformation, Imperial has already converted old buildings for new uses. DNA Electronics, Professor Christofer Toulouzis's spin-out company which is known for technology like its 'lab on a chip' that allows DNA data to be analysed within minutes and outside of traditional laboratories, has already moved in. So too has Autolus, an auto-immune company run by researchers from UCL.

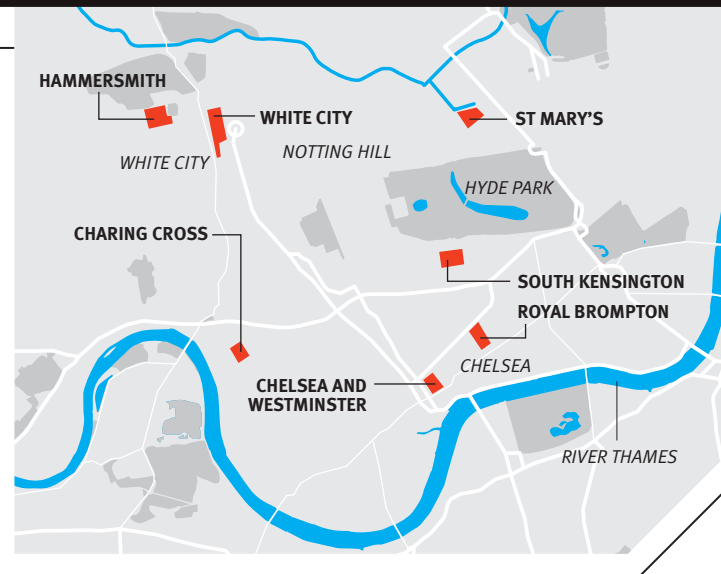
Imperial's regenerative vision aims to support local organisations, community groups and residents. Another south campus building, Stadium House, will host community engagement events and local meetings. Nearby, developers are transforming the iconic former BBC Television Centre into 950 new high-end homes and a new Soho House hotel. The hip hotelier – whose other locations include New York, Mayfair and Hollywood – is, like Imperial, betting on White City becoming an intellectual and creative powerhouse in west London.

LUCY TOBIN is an Evening Standard journalist and author of six books, including her latest *The Book of Jobs* (Heron Books, £9.99). She tweets @lucytobin.

➕ **DISCOVER MORE:** To find out more about White City Campus, including the story so far and the latest developments at the site, visit: www.imperial.ac.uk/white-city-campus

The next Albertopolis

Imperial's £3 billion, 25-acre White City Campus is the College's major new campus, co-locating world class researchers, businesses and higher education partners to create value from ideas. Explore the plans so far...



NORTH SITE

Construction is progressing on the seven-acre north site. Next to the Hammersmith Campus, it is the natural place to co-locate multidisciplinary activity focused on health and wellbeing – one of the four initial global challenges selected to be central to the new Strategy 2015–2020.

FOREST HOUSE

Location of biotechnology company Autolus, spun out of University College London to develop engineered T-cell therapies for haematological and solid tumours.

UGLI CAMPUS

A hub for small- and medium-sized enterprises and entrepreneurs from the media sector and creative industries.

SOUTH SITE

Development of the south site will take place over the next 15 years. Plans include new academic research and translation hubs, makerspaces for students, staff and for the local community, a new nursery and commercial facilities and housing to generate income for reinvestment in our academic mission.

STADIUM HOUSE

The building will host community engagement events and local meetings.

CENTRE HOUSE

Location of Imperial ThinkSpace – a co-working space offering networking opportunities and a creative environment. The buildings also house the BBC's South Lab, which is home to their Research & Development team (creators of BBC iPlayer).

NORTH SITE

THE MOLECULAR SCIENCE RESEARCH HUB

To be completed 2017

The Molecular Science Research Hub will be a 26,000m² state-of-the-art science building housing research from Imperial's Department of Chemistry to seed a new molecular sciences neighbourhood, connecting with work in synthetic biology, data sciences, digital and health.

THE TRANSLATION & INNOVATION HUB

To be completed 2016

Connected to and sharing services with the Molecular Science Research Hub, the 24,000m² Translation & Innovation Hub will house co-located laboratories with major technology partners, new start-ups and fast-growth technology companies, supporting innovation on an unprecedented scale in London.

THE MICHAEL UREN BIOMEDICAL ENGINEERING RESEARCH HUB

To be completed 2019

The Michael Uren Biomedical Engineering Research Hub will provide a world-class space to draw engineers, scientists and clinicians together to pursue life-changing research into new and affordable medical technology and treatments. This 19,000m² hub is part-funded with a £40 million gift from Imperial alumnus Michael Uren and his Foundation.

RESIDENTIAL TOWER

Construction will start within the next year of a residential tower to provide 192 new homes including 59 earmarked for key workers at below market rents.

SCHOOL OF PUBLIC HEALTH (TBC)

Imperial is formulating plans for a new building for our world-class School of Public Health, which will complete the health and wellbeing cluster north of the Westway.

WOOD LANE STUDIOS

Completed
GradPad accommodation, housing 600 postgraduate students on site.

OFFICES AND UNIVERSITY USE

A NEW CHAPTER IN A COLOURFUL HISTORY

An area of arable farm land until 1908, White City now boasts a heritage that reflects all aspects of British culture, from world fairs to Queens Park Rangers Football Club and Top Gear. The College will continue to invest in the culture and community of this unique area, with plans for outreach events, makerspaces for collaborative working, and temporary housing for start-up companies in currently vacant space on the campus site.

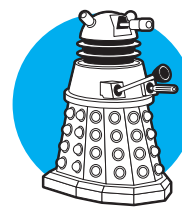
WHAT'S IN A NAME?

The area was known as "the Great White City" due to the white-marble covered pavilions that housed world exhibitions between 1908 and 1914: successors to Prince Albert's Great Exhibition of 1851 in South Kensington.



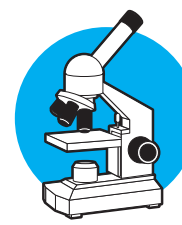
DO NOT ADJUST YOUR SCREEN

Iconic cult classics Doctor Who and Fawlty Towers were both created at the original BBC Television Centre in White City.



ON THE FRINGES

Imperial plans to extend its successful Fringe event programme to White City Campus, providing an opportunity for local residents to meet researchers and explore the livelier side of science.



SPIN CITY

Imperial's Incubator, which has attracted \$1bn in investments for spin-outs in South Kensington, will expand to White City, bringing some of its successful firms to the new campus.



“White City offers the opportunity to fulfil our ambitions. Our ambition to do things differently: develop new partnerships, diversify revenue streams and provide students with entrepreneurial experiences. Our ambition to start new areas of research.” – PRESIDENT PROFESSOR ALICE P. GAST

TIMELINE

25 ACRES OF INVENTORS, ENTREPRENEURS, INVESTORS, ACADEMICS AND CREATIVES

As in any successful city, space in London is at a premium. Firms need the right environment in order to grow. That's why Imperial is developing a 25-acre innovation district in White City, where academics, entrepreneurs and investors can collaborate on new ideas.

September 2009
Imperial purchases former BBC Woodlands site

July 2012
Planning permission for the College's masterplan granted

September 2012
Phase one completed with the opening of the GradPad postgraduate accommodation

October 2012
The College receives a £35 million award to support development of the Translation & Innovation Hub

June 2013
The College extends the White City Campus site to 25 acres

May 2014
Michael Uren OBE donates £40 million to create the Michael Uren Biomedical Engineering Research Hub

October 2014
Ground broken on Translation & Innovation Hub

October 2015
Imperial announces partnership with Zhejiang University on a new centre for translational entrepreneurship, which is expected to open at White City in 2016–17

CASE STUDY

The Michael Uren Biomedical Engineering Research Hub

The architectural plans and computer-generated models of the glistening Michael Uren Biomedical Engineering Research Hub (BmE Research Hub) might appear futuristic, but the research work that will shortly take place inside the building promises to make life-changing advances.

It is a £40 million donation from Michael Uren OBE and the Michael Uren Foundation – the most generous gift in the history of the College – that will fund the creation of a 13-storey centre where engineers, scientists and medical researchers will collaborate on new, or more affordable, medical technology. In some cases, specialists from fields who have never before worked together will have a space to do so for the first time. In addition, alongside labs and offices, a medical clinic will give patients direct access to the newest healthcare innovations, helping to tackle musculoskeletal disorders.

Imperial's Institute of Biomedical Engineering, led by Professor Anthony Bull, has embarked on world-leading research since its creation in 2004. Specialisms include Professor Justin Cobb's Musculoskeletal Lab – where, as a patient, Uren first learnt about the biomedical field – based at Imperial's Charing Cross Campus. Engineers and clinicians at Charing Cross take their lab and technological findings straight to patients' bedsides and surgeons' operating

tables, with recent work including the creation of precision computer models of joints to assist with the design of new, longer-lasting and easier-to-fit joint-replacement implants for osteoarthritis sufferers.

For now, Imperial's biomedical engineering research is spread across various hospitals as well as the South Kensington Campus – but Professor Bull expects the multidisciplinary approach of engineers, scientists and clinicians on-site at the new BmE Research Hub to provide fresh impetus.

“It is difficult to overstate the difference that the new hub will make to the work of Imperial,” he says. “The building is designed to support collaboration – not just between different faculties, but with research groups at other institutions, and industrial partners.”

Another key research area to be tackled in the BmE Research Hub will be furthering work that helps soldiers and civilians hurt in warzones to recover from injuries caused by explosives. Researchers at The Royal British Legion

“It is difficult to overstate the difference that the new hub will make to the work of Imperial ... The building is designed to support collaboration – not just between different faculties, but with research groups at other institutions, and industrial partners.”

–PROFESSOR ANTHONY BULL, INSTITUTE OF BIOMEDICAL ENGINEERING

Centre for Blast Injury Studies at Imperial already work with military doctors to design innovative new prosthetics, for example developing ‘smart sockets’, with the capacity to monitor activity, muscle movement, and force profiles; and using computer modelling as a design tool to develop new methods of protection against injuries. With the input of experts from a wider range of fields in the BmE Research Hub, Imperial hopes that its research will help prevent more life-threatening wounds.

Such multidisciplinary collaboration wasn't on the syllabus when Michael Uren graduated from Imperial in Mechanical Engineering in 1943 – but the military backdrop was. “I first joined Imperial as a young engineering student in September 1940, when London was being bombed every night,” he recalls.

After graduating – from a four-year degree course compressed into three years – Uren served in the Royal Navy before setting up Civil and Marine Limited, which helped develop the UK offshore marine aggregate industry, and pioneered the creation of a more durable and more environmentally-friendly form of cement. The entrepreneur used his business success to become one of the UK's most generous philanthropists, focusing on medical research and projects linked to education, the armed forces and wildlife conservation.

Today, Uren is excited about the BmE Research Hub's potential to “transcend the traditional boundaries between engineering and medicine, in a way that simply wasn't possible” when he was an undergraduate. This new approach is made possible by enabling collaboration between some of today's most innovative engineers, scientists and companies, who will be brought together in one unique space.

“Imperial,” he adds, “is building one of the biggest research centres in the world within a few miles of the City of London, the biggest financial centre in the world today ... The investment world will be watching for, and waiting for, the research and inventions which will create tomorrow's great companies.”

#SUPERBUG ZONE

→ In the battle against ‘superbugs’, public awareness is as critical as cutting-edge research. The 2015 Imperial Festival provided an opportunity for Imperial researchers working on antimicrobial resistance to spark a conversation far beyond the borders of the South Kensington Campus. Dr Marianne Guenot explains more.

It's minutes before we open the doors of the Superbug Zone at the Imperial Festival. The room is buzzing with anticipation. I am one of 200 Imperial scientists who have helped design a series of interactive exhibits to encourage debate about our research.

On a normal day, I'd be working away in the lab. But I spend today frantically tweeting, favouriting and hashtagging conversations taking place in the Zone, in order to encourage further debate on social media.

A soft ping attracts my attention to the first tweet of the day, from Haringey Sixth Form Centre. It's a simple question, but it reflects hours of work from my colleagues. I am thrilled by these 120 characters (see left).

DO SUPERBUGS AND BACTERIA SMELL? IF YES, WHY DO THEY SMELL?

HARINGEY SIXTH FORM
@HARINGEY6THFORM

● Let's go back a couple of months.

My colleague Dr Joana Moscoso, an Imperial microbiologist, called together PhD and postdoctoral scientists from the MRC Centre for Molecular Bacteriology and Infection (CMBI). Joana is deeply committed to engaging lay audiences with science, and she had the idea of organising an event that pulled together research into antimicrobial resistance (AMR) from across the College for the upcoming Imperial Festival. Over the next few months, we worked with Imperial Festival staff and researchers from medicine, life sciences, public health, engineering and environmental sciences, to design ways to spark conversations about this major threat to public health. Because communication is the best weapon we've got.

● Antimicrobial-resistant microorganisms, commonly known as superbugs,

are microbes that have become less susceptible to the drugs we use to block them. Bacteria that can resist antibiotics are becoming increasingly common, and threaten to jeopardise our entire health system – a phenomenon described as a “ticking time bomb” by the UK's Chief Medical Officer, Professor Dame Sally Davies.

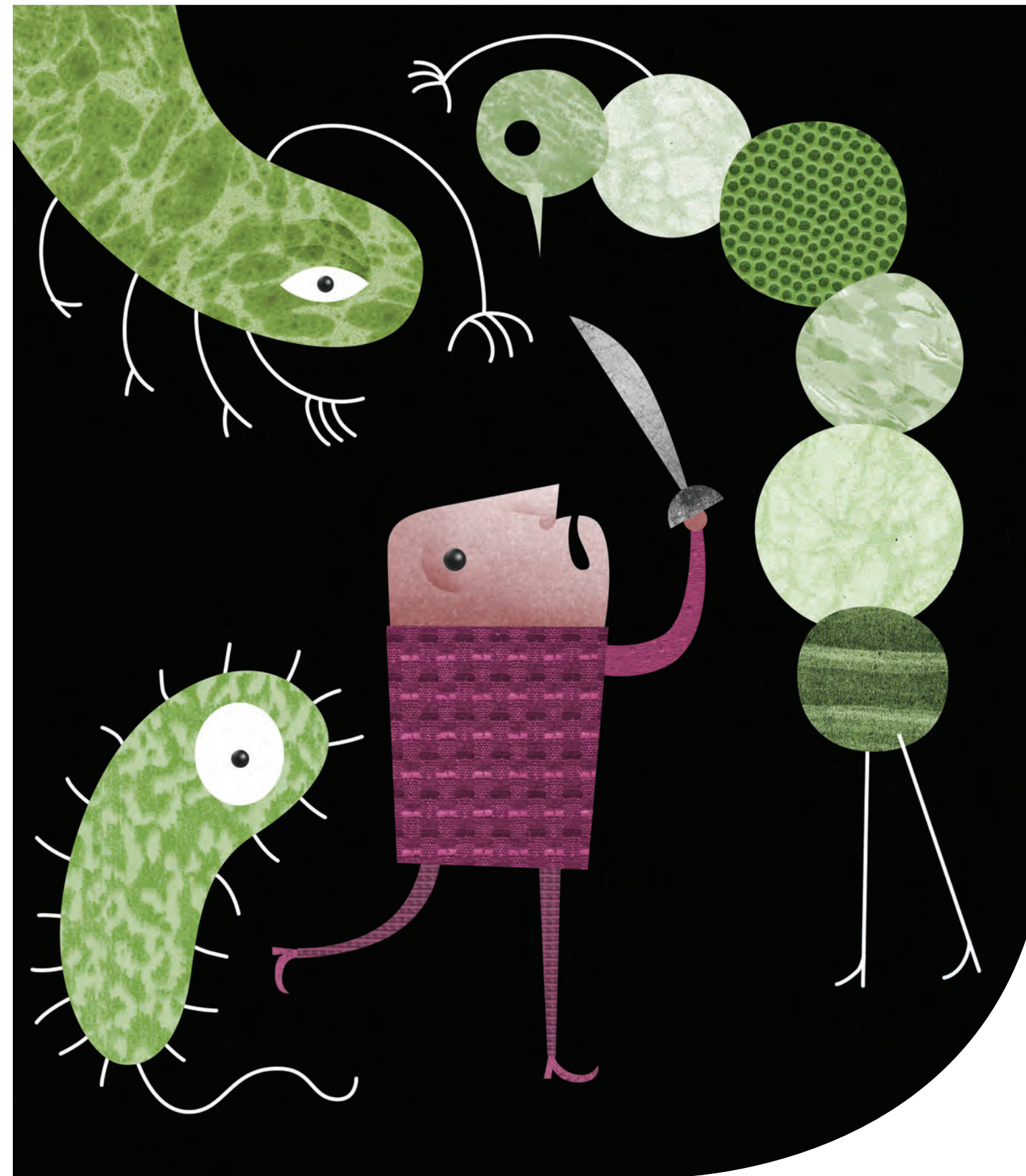
In the past few years, AMR has featured heavily in the media, and governments have started to recognise how dangerous it can be. They are now implementing new tactical strategies and actively redirecting resources to win the war on superbugs. Of course, a considerable effort is being put towards encouraging research.

For example, in June 2015, Imperial launched the Antimicrobial Research Collaborative – an innovative, multidisciplinary approach to consolidating Imperial's research in this area. The initiative adopts a ‘one-health’ approach, focusing on healthcare collaboration and communication across the College, and with Imperial College Healthcare NHS Trust and other academic, industrial and healthcare partners. It aims not only to develop new antibiotics and identify novel targets, but also to consider how society can better use antibiotics, prevent infection and minimise transmission and emergence of resistance.

MORE THAN ONE IN TEN COURSES OF ANTIBIOTICS NOW FAIL TO CLEAR THE INFECTION BEING TARGETED

SUPERBUG ZONE
@CMBI_CPA
#ANTIBIOTICSRESISTANCE

ILLUSTRATION: JOYCE HESSELBERTH



This approach reflects a big part of government and health agency plans – simply to talk about AMR. Raising awareness of the issue through public engagement is a key point in the published action strategies from the UK and the World Health Organization. This is because making people aware and generating conversation around the issue will help us combat it.

• **Antibiotics were discovered in 1928 by Sir Alexander Fleming** at Imperial's St Mary's Campus. Since then, they have become seen as a miracle drug – a cure for every infectious disease – even though they do not work on viral, parasitic or fungal infections. Even today, patients request antibiotics for many ailments, and will go as far as faking symptoms or refusing to leave the doctor's office until they are prescribed. This has led to an estimated 10 million inappropriate prescriptions a year in the UK alone, imposing unnecessary evolutionary pressure on bacteria, which respond by becoming resistant.

Much of this stems from a basic misunderstanding of AMR. A recent Wellcome Trust study showed that while people are aware of AMR, they do not understand it or do not see it as a personal threat. Instead, they put it down to media scaremongering. "These misinterpretations about antibiotics are because people don't understand the basics," says Joana. "It's not their fault. Even scientists didn't understand them 20 years ago."

• **"We designed the Superbug Zone as a journey into microbiology**, to give people the tools they need to understand different aspects of this complicated issue," says Joana. "We provided a strong focus on antibiotic resistance, but we also went beyond that. We compared bacteria and fungi. And we explained what bacteria are, where they live, how they live, how they become resistant, if they are good or bad and so on."

Fifteen interactive research stands led visitors through a narrative, starting with the basic biology of antimicrobial resistant microorganisms, followed by an opportunity to see Fleming's microscope and meet the curator of the Sir Alexander Fleming Museum, and then talk with researchers and clinicians about their research. For example, Dr Luke Moore talked about how he has developed a phone app to help doctors prescribe antimicrobials more efficiently.

The Superbug Zone also provided an opportunity for people to challenge their sometimes stereotyped image of scientists. Several visitors confessed that the researchers they met looked very different from the clichéd image of the lab-coat wearing, bespectacled, timorous nerd. Instead, they talked about meeting communicative, friendly scientists, keen to present their work, and open about discussing controversial issues, such as DNA manipulation and animal research.

ANTIMICROBIAL RESISTANCE CAUSES 2.5 MILLION EXTRA HOSPITAL DAYS ANNUALLY IN EUROPE. FOR MORE FACTS VISIT THE SUPERBUGS ZONE AT IMPERIAL FESTIVAL

SUPERBUG ZONE @CMBI_CPA
#SUPERBUGZONE #ANTIBIOTICS #ANTIBIOTICSRESISTANCE #IMPFEST



↑ Above: Children got a chance to pose as scientists as part of a Festival photo competition at the Superbug Zone 'Picture this' stand.

• **Events like these create direct lines of communication** between public audiences and researchers. The transition of the internet from one-way information provider to a platform for user-generated content also provides researchers with a way to propagate their science and to go where the audiences are. Not everyone lives in a university city, but they still deserve access to this kind of engagement, so social media is a great way to interact with them.

Microbiologist Dr Ronan McCarthy has been using Twitter for some time to reach broader audiences: "Twitter is a fantastic resource, which enables communication between fellow scientists and the general public on a truly international level," he says. Ronan and I decided to use social media to publicise the Superbug Zone, and to use this project to learn about social media campaigning.

During the month before the Festival, we constructed a Twitter presence for the CMBI Postdoctoral Association, which we used to promote the Superbug Zone. With our new-found experience, we then organised departmental workshops to train other scientists. "The workshops generated a lot of interest in social media," Ronan explains.

By posting science facts, teaser pictures and scientist profiles, we engaged with those who were curious about science, and got a brilliant response to our efforts. "The lasting outcomes include establishing a Twitter page for the CMBI Postdoctoral Association which now has almost 200 followers and is a fantastic tool to promote research done in the CMBI," attests Ronan.

The Superbug Zone social media campaign has subsequently inspired us to kick off conversations on other topics. For example, we recently launched a #tweetpaper campaign, encouraging scientists to tweet the latest academic paper in everyday language. We are hoping to strengthen our Twitter platform so that it remains a source of information for the public in the future.

GOT A QUESTION? TWEET A SCIENTIST!

SUPERBUG ZONE
@CMBI_CPA
#SUPERBUGZONE
#IMPFEST



↑ Above: The interactive stands included a bacteria 101, inviting visitors to find out more about superbug real estate and lifestyle. → Right: Visitors discovered that fighting superbugs is as much about hygiene as antibiotics, as they found out what it takes to keep hands clean.

• **Putting on events like this takes a lot of time**, so why do busy professional researchers volunteer to do it? "Universities have understood that they need to reach out and invest in outreach, and that engaging with wider audiences is part of a scientist's job," says Joana. "More and more funding bodies require scientists to engage with broad audiences through routes such as organising events, publishing podcasts and blogging. Doing outreach is another way of generating value and impact for the work we do."

MEET TOM, A #SCIENTIST AND SO MUCH MORE!

#SCIENCE #FOOTBALL
@IMPFEST SUPERBUG
ZONE @CMBI_CPA

• **What the Superbug Zone made clear** is that the public often ask questions that can prompt a new approach to research. It is often surprising how relevant these questions can be, reminiscent of the metaphor of not being able to see the wood for the trees. You spend so much time specialising in a, quite literally, microscopic subject, that it's sometimes easy to lose sight of the bigger picture.

Public engagement also provides a way for researchers to challenge theories with real-world perspectives. For example, I had a fascinating discussion with an experienced lawyer about the science and politics of drug development in the UK – a conversation I would probably have never had otherwise. Each encounter has the potential to bring some perspective to my research project.

• **Lastly, many of us do this work because, well frankly, it's quite fun.** By the end of the Festival, we were all hoarse and exhausted, but we all had big smiles on our faces. We knew that the time and effort we had put into organising this event had given us and our visitors plenty to think about, and that we all had better ideas of what we need to do to fight AMR.

TOO BUSY TO TWEET! LOTS OF GREAT INTEREST IN OUR #SUPERBUGZONE

JAMIE BERRY @DOCTORBEZ
@CMBI_CPA #IMPFEST

A BIG THANK YOU FROM THE #SUPERBUGZONE FOR A GREAT WEEKEND! SEE YOU NEXT YEAR!

#MICROBIOLOGY #OUTREACH
SUPERBUG ZONE @CMBI_CPA



Congratulations to Dr Moscoso

As we went to press we heard that Dr Joana Moscoso has been awarded a Royal Society of Biology's

Science Communication Award 2015. Judge Dr Steve Cross, Wellcome Trust Engagement Fellow, said: "We were so impressed by her work that she beat a pool of much more senior scientists. She's clearly a great leader and is solving problems that she spotted, and taking science to an under-served audience."

Twitterbugs

Perhaps not surprisingly, the researchers who feature in this article are active on Twitter in a personal capacity, in addition to the CMBI Twitter handle @cmbi_cpa. Sign up to follow them via @Marianne_Guenot, @JoanaMoscoso and @McCarthy_Ronan.

✚ **ONLINE EXTRA:** The 2016 Imperial Festival takes place on 7 and 8 May. See highlights from the 2015 Festival, including from the Superbug Zone, at www.imperial.ac.uk/be-inspired/festival/about/festival-2015

DR MARIANNE GUENOT is a microbiologist who finished a postdoc at Imperial in August 2015. She enjoys communicating about research so much that after more than eight years as a scientist, she has left the pipettes behind to go back to school and take an MSc in Science Communication at Imperial.

BEHIND
THE SCENES

INSIDE

AN ANIMAL RESEARCH FACILITY

The use of animals in research is a vital part of the College's work to improve human and animal health and welfare. It also deepens our understanding of biological systems.

We put considerable effort and thought into ways to reduce, refine and replace animal experimentation. We only work with animals where no other alternatives exist. The welfare of our animals is very important to us, and the College employs more than 60 staff to care for them.

We are also committed to explaining why animal research is still necessary and talking about the benefits it brings, and what we do to minimise suffering. Take a look at some of the design features in one of our research facilities aimed at keeping rats as healthy as possible, and protecting the staff who care for and work with them.

+ MORE INFO:
www.imperial.ac.uk/animal-research/annual-report



LIGHTING

Ambient lighting is programmed to dawn, day, dusk and night settings. Cages on the top row are shaded so they receive the same light levels as cages lower down.

VENTILATION

Filtered air is ducted into the individually ventilated cages and is filtered again as it is extracted, before being vented directly out of the building through the white ducts in the centre of the ceiling.

CAGE LABEL

Each cage is labelled with the name of the lead researcher, project details, and the number of animals it contains. The label is barcoded with a unique ID, which is stored on a central computer system.

TWO-LEVEL CAGE

This cage design provides more space for rats to exercise, and includes objects to create a more stimulating environment, such as nesting material and tunnels. Each cage is designed so that one person can lift it safely.

PROTECTIVE CLOTHING

Everyone entering an animal room must put on a cap, lab coat, and disposable overshoes, gloves and face mask to protect both the animals and the handlers.

CHANGE STATION

Cage stacks are wheeled to this individually ventilated change station, where animals are transferred to the clean cages waiting on the left.

FLOORS, WALLS AND CEILINGS

These are made from impermeable surfaces for regular washing and sanitising.

MOLTEN MINERALS AND FLYING ARROWS

Sir Charles Vernon Boys, FRS (Royal School of Mines 1890) was an experimental physicist and prolific inventor. Like many inventors, Sir Charles relied on a healthy dose of serendipity and a little eccentricity. Whilst trying to measure the density of the Earth, he hit upon a different bullseye: the creation of fine silica fibre – a scientific breakthrough that has since reverberated across our everyday lives and led to the development of new technologies.

PICTURE THIS

HOW IT ALL BEGAN

Boys began his career in the 1880s, lecturing on thermodynamics at the Royal College of Science (now Imperial), but struggled to win the approbation of one famous pupil.

And we quote...

“One of the worst teachers who has ever turned his back upon a restive audience ... galloped through an hour of talk and bolted back to the apparatus in his private room.”

—H.G. WELLS

SPIN DOCTOR

Boys published a paper in 1887 in which he described “the method of electrical spinning” to produce nano-fibres. Sadly, his fibres did not have the mechanical properties desired so his quest continued.

And we quote...

“I was driven to the necessity of trying by experiment to find some new material. The result of these experiments was the development of a process of almost ridiculous simplicity.”

—C.V. BOYS

CALLING USAIN BOLT...

Boys melted rods of various minerals while making a hapless laboratory boy run away with the red-hot glowing end as fast as possible. Verdict? Thin, but not thin enough.

ARROW DYNAMICS

So he constructed tiny arrows made of straw and a needle which he dipped into molten quartz (silica) before firing a miniature crossbow across two long rooms. He could tell the fibre was still there by attaching a piece of postage stamp to the end he *could* see, and pulling it across the laboratory from the arrow.

HOW THIN IS THIN?

1/250,000
CENTIMETRES IN DIAMETER

So theoretically, a piece of quartz the size of one grain of sand could be stretched to form a fibre 1,600 kilometres long.



THE LASTING IMPACT

Silica fibre has proven pivotal to the aerospace, automotive, telecommunications, and medical industries.

BENDING THE RULES

In 1954, Narinder Kapany (PhD Physics 1955) demonstrated that light can travel in bent glass fibres leading to advances in imaging optics such as endoscopic surgery.

And we quote...

“I was just a precocious kid taking a college physics course when one day the professor told us that light ‘always travels in a straight line’. But that can’t be true, I thought — it must be bent sometimes.”

—NARINDER KAPANY

SMOKIN’ HOT

Space shuttle tiles are made of high-purity amorphous silica fibres which protect the orbiter (and crew) from extreme temperatures during re-entry into the atmosphere.

1,260°C
MAXIMUM TEMPERATURE
OF SHUTTLE ON RE-ENTRY

In 1984, Marc Garneau (Electrical Engineering PhD, 1973) became the first Canadian in space, aboard Space Shuttle Challenger mission STS-41G.

And we quote...

“I didn’t want a desk job. The idea of space was just too big to resist.”

—MARC GARNEAU

CAN YOU HEAR ME NOW?

Today, fibre-optic cables carry phenomenal quantities of data around the globe. In the future, Imperial researchers predict fibre optics could be used to create holographic communication devices.

And we quote...

“The future cannot be predicted, but futures can be invented.”

—INVENTOR OF THE HOLOGRAM,
NOBEL LAUREATE AND IMPERIAL
PROFESSOR, DENNIS GABOR

7.1
billion
people in
the world

6.8
billion
mobile phone
subscriptions

Q+A

SAFE or is it?

DR ROBERT EWERS of the Faculty of Natural Sciences is an ecologist investigating the impact of deforestation on local biodiversity in Borneo. His work is part of the Stability of Altered Forest Ecosystems (SAFE) Project, one of the world's largest ecological experiments. He works in an area where 8,000 hectares of natural forest are being cleared to make way for a palm oil plantation. SAFE aims to develop approaches that minimise the ecological impact of such changes to the rainforest. Life in a tropical rainforest is quite different to Rob's Silwood Park office, where *Imperial* caught up with him. We spoke about the sounds, sights, and experiences of doing field work 11,000 kilometres from home.



IMPERIAL: What is daily life like at the research station?

EWERS: Camp has been growing over the years; to begin with it was a tarpaulin roof and when that broke, you put another one on top! Now there are 60–70 people living on site, including local research assistants and visiting researchers, and we're using materials made from local sawmill waste to build solid structures. We still mostly sleep in rows of hammocks, though.

We have a kitchen and a cook who prepares typical Malaysian meals – it's mainly rice with some veggies and either chicken or fish. I think the food is great, but my colleagues say the variety of dishes is considerably better when I'm there, because I'm the boss!

IMPERIAL: What kind of work are you doing?

EWERS: It depends on the project – there are many within SAFE. One researcher works on the river, trapping and tagging fish so that we can track their movements and seasonal behaviour.

A PhD student of mine climbs

3rd
largest
island on
Earth

80%
of Borneo's
rainforests
have been
heavily
impacted
by logging

trees and becomes the bait for catching mosquitoes – the plan is to catch them on your skin before they bite, but you do have to be quick!

IMPERIAL: What have you learnt?

EWERS: We're monitoring all aspects of life (vegetation, small mammals, fish and insects) in the rainforest before, during and after the deforestation of the area. By measuring basic population parameters, like abundance and movement, we can track the true impact of the changes being made to the landscape.

IMPERIAL: How much time do you spend in Borneo?

EWERS: Some of my colleagues spend up to six months at the research station, but I'm usually there for about a month, two or three times a year.

IMPERIAL: Is there anything that really scares you?

EWERS: The most dangerous animal we encounter is the elephant; research teams have been stranded in the forest for several hours because their route was blocked by a herd. It's not a problem when we're working on steep terrain because elephants can't climb, but they do wander onto the road and through the flatter parts of the forest. People don't realise that elephants will charge on humans – I'm not sure of the figure for Borneo, but in India around 100 people a year are killed by elephants.

Our camp also gets quite a lot of rodents and they attract snakes. There are 160 different species of snake in Borneo, 24 of which are highly poisonous. We've seen king cobra and black cobra near the camp, which are both deadly. They usually get chased out with the aid of a big stick!

We also have land leeches and they're a bit gross. Whenever you sit down they sort of flip-flop towards you – it's like some kind of miniature zombie apocalypse! They aren't dangerous but they do have a habit of latching on in the most awkward places. I've had to get one out of my belly button before now!

IMPERIAL: Is it hard being away from home?

EWERS: Obviously I miss my wife when I'm away, but since becoming a parent, it feels like a physical wrench to leave my son.

IMPERIAL: What has been the most challenging difference?

EWERS: The weather in Borneo is quite hot and extremely humid, and it rains a lot. You are basically constantly sweaty, smelly and damp.

IMPERIAL: When you're home, what do you miss about Borneo?

EWERS: Probably the soundtrack of the forest – it's like nothing else on earth. Cicadas create a din of white noise in the background, and the range of bird calls is extraordinary. The most unusual sound comes from gibbons – they call to each other over long distances; it's a sort of whooping sound and it really travels!

IMPERIAL: Would you recommend working in the rainforest?

EWERS: I really love it. I grew up being outside, hiking and camping in New Zealand and I'm glad I can continue to explore the outdoors as part of my job. All the stories that ecologists have come from being outside in the environment they study. Most of them will have an anecdote or two to share over a cuppa or a beer.

IMPERIAL: What experience do you like to recount to friends?

EWERS: In the early days when we were cutting trails, being completely naïve to the environment, I was walking behind the research assistants who were cutting through the brush. Suddenly they all started running in different directions, giggling, and I was just standing there dumbfounded and wondering what had happened. It turned out one of them had put his *parang* [a Malaysian machete] through a wasp's nest! I was really lucky not to get stung that day!

SEAT OF THE SOUL

When you're cycling 3,000 kilometres across strange new lands, your saddle transports you to incredible sights, cultures and experiences.

It can also drive you to absolute despair, causing physical and mental agony and some deep soul searching. Medical students Kamil McClelland, Chris Holt and Robert Bennett know this all too well. In Summer 2015 they undertook a journey along the historic Silk Road, supported by Imperial's Exploration Board, which has been sending intrepid students on unique and daring expeditions for nearly 60 years.

In temperatures that threatened to rise above 50 degrees Celsius, the team faced punishing hill climbs laden with all their equipment and tents.

"It was physically and mentally draining, particularly in the morning. To avoid the midday heat

we got up at 4am to get in the miles, but you're still exhausted from the previous day. That was very difficult," said Chris.

Still, they were rewarded for their efforts with some fantastic sights and experiences including visiting a remote 2,500-year-old Persian hill fort; opening a new English school in Kyrgyzstan, appearing on regional TV; and drinking Uzbek moonshine at a local 'mafia' wedding.

"On the very first day of cycling we encountered a goat herder and his family and tried to converse with our very limited Russian. At first we mistakenly thought he was telling us we were to be massacred, until it became clear he was inviting us to stay for dinner and shelter," said Chris.

There were great challenges too, including emergency trips to hospital for infected road rash and crash injuries, mechanical failures and the sheer frustration of getting lost.

Undeterred, they completed the ride in September: "Cycle touring is a great way to see the world and really interact with people from all walks of life," said Kamil.

"The region is a melting pot of different cultures that have collided; it was an amazingly rich experience."

+ ONLINE EXTRA: Watch out for Issue 41 of Imperial magazine, which will feature even more adventurous Imperial expeditions and delve into the history of the Exploration Board. For now, you can listen to a podcast interview with Kamil, Chris and Robert at bit.ly/silk-bike



CAUSING A STIR

Riding a small lift to one of the surgical wards at St Mary's Hospital in London, I felt a bit like Alice falling down the rabbit hole –

I wasn't entirely sure what I was going to find when the doors opened. Surgical pioneer Professor the Lord Darzi of Imperial's Faculty of Medicine had graciously agreed to be photographed operating in theatre. But I hadn't been told what procedure he would be performing, so I was more than a little curious.

When the lift doors parted, I met the patient, a man in his 30s, looking remarkably cheerful on the trolley. After introducing myself and the photographer, I explained that we were there to document the surgery for the College's photo library, and asked if he had any objections. Once consent forms had been signed, we had some time to spare and began to chat.

It was then that I enquired what sort of surgery the man was having. "Gastro-intestinal surgery" was his reply.

Politely asking the reason for the surgery, I was caught off guard by his response.

"I swallowed a dessert spoon."

"Excuse me? Did you say a *dessert spoon*?"

"Well yes. Rather, I swallowed two dessert spoons about ten years ago during my final week at university – after a bit of drinking to celebrate the end of my degree. One came out, and one never did. I decided it was probably time to get the other one out."

✦ BETH ELZER, *Creative Director, Imperial*

📷 DAVE GUTTRIDGE, *The Photographic Unit*



good reception

ALUMNI WEEKEND

More than 900 alumni and guests attended the Alumni Weekend in May, exploring the Imperial Festival in a special preview of the Research Zone, rediscovering Imperial landmarks on exclusive tours, and sharing their College with friends and family. Milestones alumni were the focus of reunion activities and alumni volunteers organised class reunions for eight different groups across the weekend.

Old friends gathered for a drink at the Union Bar



Alumni took behind-the-scenes tours across Campus

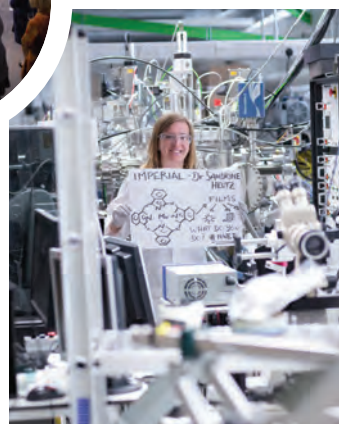
“We had a splendid time meeting each other again and visiting old haunts.”

—Drummond Modley
(Civil Engineering 1985)



CELEBRATING WOMEN

We championed the work of female staff and students with Women@Imperial (a public exhibition) and a Twitter campaign for National Women in Engineering Day.



COMMEMORATION DAY

Among the graduates, ICU President Lucinda Sandon-Allum was accompanied by her uncle, Dr Keith Bellamy, who is also an Imperial alumnus (Electrical Engineering 1965). Lucinda explained: “We had big celebrations for him that day as well, as he graduated exactly 50 years to the day. It was great that he could see me graduate at a milestone anniversary for him!”



AROUND THE WORLD

Alumni got together across the world in 2015, from volunteer-organised gatherings to College receptions and lectures. Over 400 alumni met President Alice P. Gast in Beijing and Hong Kong.



WELCOMING NEW FACES

Imperial hosted a special welcome reception for parents of new international students to the College in October as part of its Welcome Week activities. The event was hosted by Vice Provost (Education), Professor Debra Humphris.



“Aside from Imperial’s academic record, we were attracted by its international community. My son can make friends with top students from all over the world – a fantastic opportunity for him to broaden his horizons!”

—NaWeiyi Liu, whose son is studying for a BSc in Mathematics (2015 intake)

Students moved in to the new Woodward Building halls of residence



PRESIDENTIAL ADDRESS

Professor Alice P. Gast delivered her first address to Imperial staff, students, alumni and friends on 3 March. She explained her vision for the College and looked ahead to future opportunities, speaking of her admiration for Imperial’s “spirit of discovery, passion for research and education, and sense of purpose.”

GOOD RECEPTION

SPECIAL GUESTS



The US Defense Secretary, Dr Ashton Carter, and UK Secretary of State for Defence, Michael Fallon, visited the College in October 2015 to hear about joint UK and US initiatives in innovation.



His Royal Highness The Duke of York visited Imperial to launch the Pitch@Palace Bootcamp in October 2015, where more than 40 start-ups pitched their ideas to industry experts and academics.



Imperial welcomed Singaporean President Tony Tan Keng Yam to the College, marking the end of his four-day State Visit to the UK in October 2014.



His Royal Highness The Prince of Wales opened the Surgical Innovation Centre, a joint initiative with the Imperial College Healthcare NHS Trust in January 2015.

CLOSER LOOK

JUMPING BACK IN TIME

Our alumni share three stories of lasting bonds, reunions and milestones celebrations



◀ Desmond Kearns, Norman Price, Peter Chase, and current President of the RCSU Serena Yuen

Recreating a memory

We've stayed in touch since leaving Imperial so when we discovered that we were both planning to return to South Kensington for the Alumni Weekend in 2015, we decided that in celebration of our reunion, we would recreate history by re-enacting our starring roles on the cover of a 1965 Imperial College Carnival record, produced to help raise funds for the Notting Hill Housing Trust.

In the original shot, we all jumped multiple times together and in unison in front of the Albert Memorial, while the photographer took many shots with great glee, and a whole bevy of passers-by enjoyed the fun. The photographer then assembled the final photo for the record cover by cutting and pasting the best images together. Fifty years on, we decided to re-create the image in exactly the same way with some gowns hastily gathered up

from the graduation ceremonies a few days earlier.

Celebrating our positions of great responsibility, we were joined in the original image by Dave 'Yogi' Bishop, President of City & Guilds Union (CGU) at the time, and Kish Sadhvani, former President of the Royal College of Science Union (RCSU). We ourselves were Presidents of the Royal School of Mines Union (RSMU – Desmond) and the Imperial College Union (ICU – Norman).

Dave was sadly unable to attend the Alumni Weekend as he was holidaying in Italy, and we were unable to get in touch with Kish, so Peter Chase, the current Treasurer for the CGCA and Serena Yuen, the current President of the RCSU were drafted in to represent their organisations.

Although the photographer seemed to be getting too much pleasure from making us jump repeatedly in a non-stop, rapid-fire sequence, we enjoyed being able to out-jump our 50-years-younger



successors, and only wish that Yogi Bishop and Kish Sadhvani could have participated as well. Of course, they may have feared that we would be too much competition for them! It was a relief to stumble over to the Celebratory Milestones Lunch for alumni celebrating 50, 60 and 70 year reunions and take a well-earned rest. The grand lunch was a little bit different from the pint at the Union Bar that we had after our first jump in 1965!

DESMOND KEARNS (MINING 1965) AND NORMAN PRICE (PHYSICS 1964)

// CELEBRATE A MILESTONE REUNION AT THE ALUMNI WEEKEND 7-8 MAY 2016

Alumni who graduated in a year ending in **1 or 6** are invited to reunite with their classmates to celebrate their milestone anniversary at the Alumni Weekend in May 2016. Alumni who graduated on either side of these years are also invited to participate in the gatherings. The Alumni Office can offer advice on format, help classmates get in touch, connect alumni with their old department and help out with all the other things that can make the event special.

Find out more by emailing alumni.weekend@imperial.ac.uk

40 years of reunions

Our group first met in 1975, when we were mostly residents in the Prince's Gardens Halls – in particular Tizard Hall. Most of us graduated in 1978, but we range from 1977 to 1979. Tizard Hall had an active social scene, which our group helped to run, and we were invited to remain in residence during the 1976-77 academic year, to help continuity. In the following year, we all moved out to College-owned flats but continued our friendship.

Throughout our time at Imperial, anyone who was in our group was referred to as 'Harry'. I confess I cannot remember now how this started – perhaps we had some difficulty originally in remembering everyone's name! As a generic moniker, though, it actually proved to be a very useful device. For example, one could ask the group as a whole such questions as "What does Harry think?"

Before we graduated, we decided to set aside one weekend a year for a reunion, inevitably called Harry's Reunion. We thought that it would not have much significance in the early years but might become more meaningful as the years went on.

And so it has – we have held this reunion every year since then. Over the years, it has grown to include spouses and families and is usually held in the UK – but we sometimes go abroad. This year, it coincided with the Imperial Festival and we were not far away, so we popped in to spend a very enjoyable afternoon back at the College.

Maybe we'll have to come back again for our 40th ... we're very nearly there!

NEIL WINSOM (ELECTRICAL ENGINEERING 1978)

➡ Alumni explored the labs of their old department which included a tour by Professor Roland Smith proudly showing off a laser target chamber.

Revisiting old haunts

The Physics Class of 1965 gathered in South Kensington in June 2015, almost 50 years to the day after finishing our final exam. Seventeen alumni made an early start to our reunion by meeting in the Eastside Bar on Friday, before 35 of us plus partners renewed our acquaintances in the Physics Building (now renamed the Blackett Laboratory).

The next day, we were welcomed by the Head of Department, Professor Jordan Nash, and were given a tour around some of the state-of-the-art research laboratories by Professors Lesley Cohen, Sergey Lebedev and Roland Smith, and Paul Brown, Mechanical Instrumentation Workshop Manager. Some of us remembered making screwdrivers in our first year, not all successfully and with no computers in sight.

Before lunch, we welcomed Emeritus Professor Sir Tom Kibble, then a young lecturer who probably had to endure paper darts from us, now honoured for his work that helped to predict the Higgs boson. Meeting old friends and reminiscing followed, aided by some excellent catering. These few hours recreated the atmosphere of those three years in the early sixties when we were starting out.

On our way out, we called in at the Main Lecture Theatre. That was where all 120 or so of us first met for a lecture which was the first of a series on the Theory of Errors, given by Professor (subsequently Lord) Blackett.

Photographs were then taken outside with the surprise guest, fire engine mascot Jezebel.

A number of us went for a pint or a coffee at the nearby Queens Arms where we found an Electrical Engineering reunion taking place. They were only celebrating 45 years or so.

EDWARD FORTUNE (PHYSICS 1965, MSC MECHANICAL ENGINEERING 1966), CAROLE SUNDERLAND/WADE (PHYSICS 1965), CHRISTINE BICKERSTADT/WILLIS (PHYSICS 1965, DIC PHYSICS 1966) AND GORDON SELLERS (PHYSICS 1965)





IN MEMORIAM

It is with regret that we announce the death of the following alumni of Imperial College London and the constituent medical schools and Wye College. Alumni are listed according to their year of graduation. When an alumnus has obtained more than one degree from the College they are listed according to the graduation year of their first degree.

Obituaries are available online at www.imperial.ac.uk/alumni/obituaries. A dagger (†) indicates that the alumnus was also a member of staff. Printed copies of obituaries are also available on request from matters@imperial.ac.uk

1930s

Eur Ing Jehangir D. Daroga (DIC Mechanical Engineering and Motive Power 1935)
Dr Stanley Fordham (Chemistry 1934, PhD Chemical Technology 1936)
Mr Alan G. Gowers (Civil Engineering and Surveying 1938, MSc DIC 1939)
Mr Rogers E. Knight (Electrical Engineering 1937, Mechanical Engineering and Motive Power 1938)
Mr Edward F.O. Masters (Electrical Engineering 1937)
Mr John R. Maunsell (Chemistry 1937, Chemical Technology 1940)
Mr George E. Wild (Civil Engineering and Surveying 1934)

1940s

Mr Derek Alderman (Civil Engineering 1947)
Mr Herbert B. Ambrose (Wye College 1949)
Mr Arthur L.H. Baylis (Civil Engineering and Surveying 1942, DIC 1947)
Mr Kenneth F. Bishop (Physics 1947)
Dr Desmond J. Brown (PhD Chemistry 1948)
Dr David St Bunbury (Physics 1948, PhD 1952)
Dr Hastings E. Carson (Charing Cross Medical School 1946)
Prof Alexander L. Cullen (Electrical Engineering 1940)
Mr John C. Faull (Mathematics and Mechanics 1945)
Dr Thomas Forster (St Mary's Hospital Medical School 1947)
Mr Colin F. Harris (Metallurgy 1947)
Dr Kurt Hellmann (Msc Physics 1943)
Mr Charles G. Holthouse (Mechanical Engineering and Motive Power 1944)
Dr James E. Hughes (Metallurgy 1949, PhD 1952)
Professor S.P. Hutton (PhD Civil Engineering 1949)
Mrs Joan Kear (née Bridges) (Mathematics and Mechanics 1947)
Dr Stanley W. Kemp (St Mary's Hospital Medical School 1947)
Mr Walter E. Lanham (Electrical Engineering 1943)
Mr Judah F. Levy (PhD Civil Engineering 1947)
Dr Douglas E.E. Loveday (Chemistry 1947)
Dr Raymond D. Lowde (Physics 1943)
Mr Gwilym I. Lumley (Chemical Engineering and Applied Chemistry 1947)
Dr J. G. Mander (St Mary's Hospital Medical School 1951)
Prof Alan H. Mattock (DIC Civil Engineering 1949)
Dr Christopher H. Mckoen (Mathematics and Mechanics 1949)
Mr James O. Moorhouse MEP (DIC Aeronautics 1946)
Mr Walter R.E. Nice (Metallurgy 1946)
Mr Derek J. Ottley (Metallurgy 1948)
Dr Kenneth Owen (St Mary's School of Medicine 1944)
Prof Geoffrey G. Parfitt (Physics 1943, PhD 1948)

Miss Margaret H. Platt (Life Sciences 1945)
Dr Peter A. Robins (Chemistry 1944, PhD 1948)
Mr David A. Rolt (Civil Engineering and Surveying 1945)
Mr Harry D. Savage (Civil Engineering 1940)
Mr Robert G. Sharpe (Electrical Engineering 1943)
Mr James H. Sheldon (Geology 1944)
Mr Brian S. Soan (Mechanical Engineering 1948)
Mr Guy D. Stephenson (Mechanical Engineering and Motive Power 1943)
Mr Peter H. Stokes (Mechanical Engineering and Motive Power 1943)
Mr R.J.G. Taylor (Wye College 1940)
Mr Desmond A. Victor-Byrne (Electrical Engineering 1948)
Mr John A. Walters (Civil Engineering and Surveying 1944)
Dr John G. Waller (Chemistry 1944)
Dr Geoffrey A. Welch (Chemistry 1946, DIC 1947)

Prof Kadavil P. Abraham (PhD Metallurgy 1959)
Dr Mahmoud Abu-Zeid (Electrical Engineering 1956)
Dr Alan P. Ardouin (Charing Cross Hospital Medical School 1954)
Dr Dennis Ball (Chemistry 1951)
Dr John R. Bartlett (St Mary's Hospital Medical School 1958)
Dr Kenneth E. Bett (DIC Chemical Engineering and Applied Chemistry 1950)
Dr John W.P. Bradley (Westminster Hospital Medical School 1952)
Mr Noel S. Bromilow (PhD Physics 1956)
Mr Ian R.M. Chaston (Metallurgy 1955)
Dr Jean E. Clark (Westminster Hospital Medical School 1955)
Dr Warwick J. Comley (Physics 1959 PhD 1962)
Mrs Judith O. Cox (née Lemon) (Physics 1959, MSc 1962)
Sir Charles N. Davies (Mechanical Engineering 1956)
Mr Geoffrey Derbyshire (Mechanical Engineering 1958)
Mr Francis A. Dixon (MSc Physics 1959)
Professor Emeritus Shaoul Ezekiel (Electrical Engineering 1957)
Mr Anthony C. Fleischer (Mining 1950)
Mr Robert Freer (DIC Civil Engineering 1955)
Prof Noel H. Gale (Physics 1953)
Dr D D. Gibbs (St Mary's School of Medicine 1952)
Dr Bruce Gilhurst (Mathematics 1951, PhD 1952)
Mr Raymond C. Goodburn (Electrical Engineering 1951)
Mr John W. Hilton (Electrical Engineering 1959)
Dr John A. Hofmeyr (St Mary's Hospital Medical School 1952)
Mr Anthony M. Humphrey (Chemistry 1958)
Mr John G.E. Hone (Physics 1950)
Mr Laurence I. Irons (Chemistry 1958)

1950s

Dr Clifford H. James (Earth Science and Engineering 1954, MSc 1957, PhD 1963)
Dr Norman A. Jaques (Westminster Hospital Medical School 1956)
Mr Isaac W. Joffe (Civil Engineering 1953)
Mr Ernest H. Kingston (Civil Engineering 1956)
Dr Gerald W. Korn (St Mary's Hospital Medical School 1950)
Dr Anthony Lake (PhD Chemical Engineering 1958)
Mr Constantinos S. Lytras (DIC Geology 1960, MSc 1964)
Dr Helen MacDonald (St Mary's Hospital Medical School 1952)
Mr Adam S. Malhomme De La Roche (Aeronautics 1957)
Mr John McDaniel (Electrical Engineering 1952)
Mr John U. Neukom (Mechanical Engineering 1952)
Mr Charles D. Palmer (Mining 1953)
Mr Terence F. Purdie (Mechanical Engineering 1955)
Mr Geoffrey M. Pinfold (Civil Engineering 1960, DIC 1961)
Dr Leonard C. Roselaar (PhD Chemistry 1957)
Prof Peter N. Rowe (PhD Chemical Engineering and Applied Chemistry 1952)
Mr Pranab K. Sengupta (DIC Civil Engineering 1958)
Mr Francis W. Slingerland (Mechanical Engineering 1955)
Mr Joseph Smartt (Physics 1958)
Mr Ralph E. Smith (Civil Engineering 1951)
Dr Patricia Swain (PhD Chemistry 1958)
Dr Collin D. Walker (Westminster Hospital Medical School 1959)
Dr Rita C. Walker (St Mary's Hospital Medical School 1958)
Professor Emeritus John H Westcott (PhD Electrical Engineering 1951) †
Dr Raymond A. Woodrow (Electrical Engineering 1954)

1960s

Dr Frank H. Allen (Chemistry 1965, PhD 1965)
Mr Mieczyslaw K. Banasiak (DIC Civil Engineering 1960)
Mr Derek J. Barr (Chemical Engineering and Chemical Technology 1966)
Mr Roy G. Basham (Earth Science and Engineering 1961)
Prof Colin B. Besant (PhD Mechanical Engineering 1964)
Dr John Blake (Westminster Hospital Medical School 1958)
Dr John H. Carlton (St Mary's Hospital Medical School 1964)
Mr John D. Carter (Mechanical Engineering 1962)
Mr Dudley F. Chown (Mechanical Engineering 1964)
Mr Suhas Choudhury (DIC Civil Engineering 1963)
Mr Reginald S. Collingwood (DIC Mechanical Engineering 1960)
Miss S Courtenay (Wye College 1964)
Mr Jack Davis (Mathematics 1960)

Dr William G. Dutch (DIC Civil Engineering 1960)
Dr Barrie C. Edwards (PhD Mining and Mineral Technology 1967)
Emer Prof. Ralph H. Estey (DIC Zoology and Applied Entomology 1965)
Mr Robert P. Gibson (Chemistry 1960)
Dr Stanley G. Ginn (Chemistry 1962, PhD 1966)
Mr W E. Griffiths (Westminster Hospital Medical School 1962)
Prof Inamul Haque (PhD Chemistry 1968)
Mr David H. Hammonds (Civil Engineering 1961, DIC Geology 1962)
Mr Graham M. Harris (Civil Engineering 1961, DIC 1963)
Dr David N. Hingle (PhD Chemistry 1968)
Mr Kenneth W. Innes (DIC Civil Engineering 1960)
Mr Christopher R. Jubb (Mathematics 1967)
Dr Nasir Khan (Westminster Hospital Medical School 1962)
Mr Desmond Lampard (Aeronautics 1963)
Mr Thomas Limna (Civil and Environmental Engineering 1963)
Mr Norman E. Loch (Mechanical Engineering 1960)
The Rt Hon Riliwanu Lukman KBE (Mining and Mineral Technology 1962)
Mr George A. Manson (Mining and Mineral Technology 1963)
Mr Alastair K. MacDonald (MSc Civil Engineering 1965)
Dr Ian S. Maines (MSc Chemistry)
Dr George E.S. McDonald (St Mary's Hospital Medical School 1963)
Dr Christina H.E. McFarlane (née Mannerskantz) (PhD Chemistry 1962)
Mr Stephen J B. Pick (Physics 1961)
Mr Richard Reader (Civil Engineering 1961)
Dr Harry Selwell (Physics 1976, PhD Electrical Engineering 1970)
Mr Bashir A. Shakir (Civil and Environmental Engineering 1966)
Mr John M. Shanahan (Civil Engineering 1961)
Mr Richard E.G. Simms (Chemical Engineering and Chemical Technology 1960)
Dr Leonard Sinclair (Charing Cross Hospital Medical School 1965)
Mr Robert D. Singleton (Civil Engineering 1966)
Prof Dafydd Stephens (Charing Cross Hospital Medical School 1965)
Dr Dean L. Struble (Chemistry 1967)
Dr P F. Tidnam (Westminster Hospital Medical School 1963)
Mr John F. Troughton (Physics 1962, MSc 1965)
Mr Nigel A. Wallington (Physics 1968)
Dr Peter S. Walton (Chemistry 1964, PhD 1967)
Dr Ivon Williams (St Mary's Hospital Medical School 1962)
Mr John A. Willington (Chemistry 1965)
Mr Horace C. Woodman (DIC Chemical Engineering and Chemical Technology 1964)
Dr Peter M. Zollman (PhD Electrical Engineering 1960)

1970s

Mr Nicholas S. Astley (Mining and Mineral Technology 1974)
Mr Andrew P. (Paul) Bentley (Mechanical Engineering 1977)
Dr Kenneth Brown (Physics 1978)
Dr Amit Chatterjee (PhD Metallurgy 1970)
Dr Sukhendu Cjatterjee (Civil Engineering 1972, PhD 1977)
Mr Jonathan P. (Paddy) Chesterman (MSc Geology 1976)
Mr Timothy G. Clark (Computing and Control 1979)
Mr Roy C. Dale (Physics 1974)
Mr Richard G. Dodds (MSc DIC Chemical Engineering and Chemical Engineering 1971)
Mr Mieczyslaw (Mike) Fabjanczyk (Mining and Mineral Technology 1974)
Dr Caroline D. Hargreaves (Charing Cross Hospital Medical School 1979)
Dr Richard A. Harrison (St Mary's School of Medicine 1972)
Professor Roger J. Mortimer (Chemistry 1977)
Mr Hilal A. Raza (Geology 1970, DIC 1971)
Dr Michael K. Roberts (MSc Geology, PhD 1980)
Mr Frank M. Russell (MSc Mining and Mineral Technology 1975)
Mr Pinakin M. Sheth (Chemical Engineering 1975)
Dr John Partridge (Mechanical Engineering 1977)
Dr Jean A. Thomas (St Mary's Hospital Medical School 1970)
Mr Roger P. Tilley (MSc Mechanical Engineering 1967, MSc Management Science 1973)
Mr Ian Whittle (Chemical Engineering 1972)
Mr Andrew A. Wilson (Physics 1971, MPhil Electrical Engineering 1973)
Mr Martin E. Wright (Geology 1971)

1980s

Mr Nadeem Ahmad (Mechanical Engineering 1983, MSc Electrical Engineering 1984)
Dr Richard H. Jones (PhD Social and Economic Studies 1985)
Mr Lawrence A. Mintoff (MSc Civil Engineering 1985)
Dr Ellis F. Owen (PhD Geology 1982)
Dr C. Stephan Rastomjee (Chemistry 1988, PhD 1990)
Mr Serge M. Selfslagh (MSc Management Science 1984)
Mr Martin J. Webster (MSc Computing 1985)

1990s

Mrs Madeleine M. Danton (Mechanical Engineering 1992)
Mr Christopher J. Davies (MEng Chemical Engineering and Chemical Technology 1994)
Mr Shivraj Desai (MSc Electrical Engineering 1990)
Mr Willy W.S. Parsalaw (MSc Wye College 1990)
Dr Trevor R. Reid (PhD Mineral Resources Engineering 1998)
Mr Tony S. Wiltshire (MBA 1993)
Mr David K. Wray (MSc Management School 1998)

2000s

Mr Webby C. Bwanali (Biology 2000)
Mr Patrick Casey (MSc Business School 2003)
Mr Robert M. Evans (Computing 2005)
Mr Thomas Kirby (MSc Civil and Environmental Engineering 2008)
Miss Elizabeth Nnyanzi (MSc School of Public Health 2006)

2010s

Mr Tian Wei Chew (Life Sciences 2014)

STAFF

Prof Robert S. Braman (Centre of Environmental Technology)
Prof Brian J. Briscoe (Chemical Engineering)
Miss Jacqueline Shane (Computing)

CORRECTION

Imperial was incorrectly informed that Mr Brian D. Steel (Botany and Plant Technology 1979, MSc Computing 1981), Colonel John F.H. Fitzgerald (Civil Engineering 1977), Mr Harvey N. McLeod (Civil Engineering 1980) and Dr John Watson (St Mary's Hospital Medical School 1966) were deceased and they were listed in the In Memoriam pages of issue 39. They are all in fact alive and well, and we sincerely apologise for the distress caused by this error.

➡ If you would like to discuss how to leave a gift to the College, we would love to hear from you. Please contact Imperial's Head of Legacy Giving, Anna Wall at a.wall@imperial.ac.uk



FROM THE DIRECTOR OF ALUMNI RELATIONS

➔ **A DEFINING MOMENT** in my attitude towards education came when I was 11 and living in Lagos, Nigeria. I knew a man there called Edward. He was 30. One day he said he had something he wanted to show me. He opened an exercise book and proudly showed me his work: he was learning to read and write. Edward taught me that access to education is something that can never be taken for granted.

At Imperial, people not only have access to education, but are immersed in an atmosphere of excellence, and benefit from the highest standards of training. Wherever you are today, in one of the 200 countries in which our alumni live, your life has been shaped by your Imperial education, the connections you formed, and the experiences you had whilst you studied here. You share that with over 180,000 alumni.

It is an exciting time to be appointed Director of Alumni Relations, having headed up Alumni Relations at Imperial College Business School for over nine years. Imperial has formally recognised the importance of its alumni community in its *Strategy 2015–2020*, and the role that its wider community of staff, students, alumni and friends can play in helping humanity address the changes and challenges ahead. The commitment to building strong relationships with our alumni, and the recognition that a lifelong exchange of ideas and support will benefit us all, is fundamental to building a strong and consistent alumni relations programme.

I have been talking with alumni and students who are helping us to develop our alumni relations strategy by sharing their concerns, ambitions, knowledge and insights, with a view to us supporting each other. Our vision is to create an outstanding virtuous circle of engagement and support between the College and its alumni: to forge mutually beneficial lifelong connections, building a proud and engaged alumni community, supported in its desire to connect and contribute. We are investing in a team so that we are able to create value and opportunities for alumni to benefit from their Imperial connection, as well as increasing opportunities for alumni to contribute to the continued success of the College through volunteering.

Building the strongest Imperial alumni community we can starts with data. To stay connected and improve our communications, we really need to improve our alumni home address and email contact details. We would like to ask you to help us now, in a tangible way, to develop a more connected community. Do let us know if you don't get our monthly e-bulletins. You may be in touch with classmates or alumni that we have lost contact with. If they don't get our e-bulletins, please encourage them to contact us by emailing alumni@imperial.ac.uk.

Nicola Pogson

Take part and MAKE AN IMPACT

From speaking at career events for students to inspiring a crowd of fellow alumni during the Alumni Weekend, there are so many different ways for you to make an impact on Imperial's future and help us to build a vibrant alumni community.

BRING ALUMNI TOGETHER WITH GROUPS, PROFESSIONAL NETWORKS AND MILESTONE REUNIONS

Alumni volunteers are key to maintaining a global network of groups, associations and Professional Interest Networks that connect alumni to each other across the world.

Alumni also bring friends and classmates back together. The annual Alumni Weekend in May is the focus for milestone celebrations and eight class reunions took place at the 2015 event.

These gatherings would not be possible without dedicated alumni volunteers who work with us to bring together former classmates and re-live fond memories at reunions.

“You know you have moved on but your memories of your cohorts are still as they were 30 plus years ago. Once you get over the initial shock, we were back to our old selves – laughing at old memories, sharing confessions and re-igniting friendships.”

—Smadar Gabbay
(MSc Management Science 1984)

CELEBRATING MILESTONE REUNIONS



On a Saturday afternoon in June, four separate reunions took place across South Kensington, from the Physics Class of 1965 who were celebrating their 50 year milestone, to the Chemical Engineering Class of 1995 who gathered with their families to mark 20 years since their graduation.

All four reunions were organised by alumni volunteers who reached out to their old classmates with support from Imperial's Alumni Office.

“Someone said to me that it was like we'd never been apart” said Becky Andrew (Chemical Engineering 1995). “We picked up the conversation as if 20 years had never happened. It was lovely to have everyone's families there and very interesting to see the variety of careers that people had gone on to after we all completed the same degree.”

SHARE EXPERTISE AND PROVIDE CAREERS ADVICE

From answering a few questions by email to providing ongoing advice, alumni have been sharing their years of experience with current students, giving them insight into the working world and guiding them through their first steps as part of the Careers Service's Ask an Alumnus and mentoring schemes.

We also offer our alumni the opportunity to tap into the best and brightest minds. We encourage alumni to consider getting in touch with Imperial when building their internship programmes or for their employment opportunities.

60+

↑ **ALUMNI VOLUNTEERED
FOR THE 2014/2015
MENTORING SCHEME**

OTHER VOLUNTEERS



Dr Alok Gupta
(MSc Maths and Finance 2006) spoke for the Data Science Institute about cracking the trust code at Airbnb.



Rima Sen Mortemart
(BSc Chemistry and Management 1993) hosted a gathering of alumni in Paris to discuss contemporary challenges for sustainability.



ALUMNI DEBATE GLOBAL CHALLENGES

At a reception for over 200 alumni, parents and students in Hong Kong, a panel of alumni volunteers explored challenges and opportunities in the fast-changing global financial, engineering, scientific and research sectors. Professor Paul Cheung (BEng ACGI Electrical Engineering 1973, PhD DIC Electrical Engineering 1978) chaired the panel, joined by Cheuk Wan Fan (MBA DIC 2000), Dr Robin Sham (PhD DIC Civil Engineering 1989), Vincent So (BEng ACGI Mechanical Engineering 1991, MBA DIC 1994) and Imperial's Professor David Klug.

HELP US ATTRACT THE BEST STUDENTS

We regularly contact our international groups and other alumni to ask them to talk to students at UK and international recruitment fairs. Alumni around the world also regularly attend pre-departure events to meet students and help them prepare for life at Imperial.

“There is nothing more rewarding than talking to prospective students and taking them from a ‘maybe’ position to a ‘100 per cent yes, this the one is for me’ position.”

—Suraj Bassi (MSc International Health Management 2009)



Find out how you can take part and join our volunteering team:
www.imperial.ac.uk/alumni/take-part

Make the most of being an alumnus

As an Imperial alumnus, you are entitled to a range of benefits and discounts:

➔ Register for a free online account to set up your exclusive alumni email address ending in @alumni.imperial.ac.uk; search our professional directory for friends and classmates; update your contact details; and access the Central Library at South Kensington.

➔ Access to the full range of careers services for the first three years after graduation. Access to some services continues for the rest of your career.

➔ Receive some discounts on further study, such as a 10% discount on short courses and evening classes at Imperial and up to 20% off some Business School post-graduate programmes.

➔ Enjoy discounts on campus accommodation during the summer, membership of Ethos (Imperial's state-of-the-art sports centre based in South Kensington), and room hire rates in Imperial's conference facilities.

➔ Gain exclusive access to the Alumni Visitor Centre on the South Kensington Campus, including a bookable meeting room for up to six people, free wi-fi, computer access, complimentary refreshments, newspapers and magazines.

Have you joined the conversation?

→ Imperial's online community is only a few clicks away. Our Facebook, Twitter and LinkedIn pages are jam-packed with College news, details of the latest events and networking opportunities. Connect with fellow alumni, catch up with Imperial and get nostalgic.

NETWORKING AND EVENTS



“It was an excellent event – really well organized! Thank you very much!”
—Constantinos Brikos (Medicine 2003) on Facebook



“I am pleased to announce that myself and two colleagues from the Aeronautics Department are in the process of establishing an alumni association in Sweden.”
—Spyros Tsampas (PhD Aeronautics 2012) on LinkedIn

“Are you coming to Stanford? I'm an Imperial class of '11 grad doing my MBA at gsb, would love to meet more alums!”
—Isabella Torres Maluf, (MEng Chemical Engineering 2011) on Facebook

“Congratulations to Jim Virdee who proved a fabulous host when Friends of Imperial College visited CMS at CERN.”
—On LinkedIn

ADVENTURES AND ACHIEVEMENTS



“Student Ellie Johnstone and alumnus Jack Redvers just ran 400km across Iceland in 12 days”
—@imperialcollege, on Twitter



“@imperialcollege thanks to the Exploration Board for starting my career in exploration. Two expeditions they supported!”
—@Astro_Andreas, on Twitter



“Alumnus @raymondyyu talks about his composing influences ahead of his @bbcproms performance”
—@imperialcollege, on Twitter

COLLEGE NEWS

“A most warm welcome”
—Christopher Eriksson (BSc Physics 1965, PhD 1969) on arrival of President Alice P. Gast, on LinkedIn

“Alumnus Dejan Mitrovic's @kidesign3d is one of projects on show at next week's #impfringe”

“Currently reading tweets from A-Level students who secured a place @imperialcollege today. Kind of makes me want to go back! :P (Well done!)”
—@kyle_hellemans on Twitter

“This is an amazing announcement and achievement. Great stuff ICI!”
—On Imperial Incubator on LinkedIn

“Lifetime souvenir, such an awesome day for you and your family.”
—Lucas Braunschvig (MSc Environmental Technology 2012) on Graduation, on Facebook

SHARING MEMORIES

Alumni shared their best RAG Week memories on our LinkedIn pages. What is yours?

“I haven't seen that video since I was interviewed by STOIC in 1979! My daughters are asking who is that man with hair and a funny accent...”

—Nab Kalsi (BEng Civil and Environmental Engineering 1980) on LinkedIn

“Tiddly-winking down Oxford Street. Painful.”

—Martin Robinson (BEng Mechanical Engineering 1983) on LinkedIn

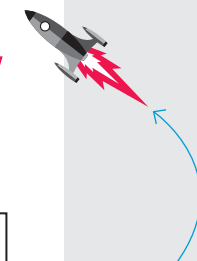
“Anyone remember the sponsored streak naked run round the Albert Hall? 1976 I think...”

—Jeremy Walker (Electrical and Electronic Engineering 1977) on LinkedIn



PHOTOGRAPHY: (ANDREAS MOGENSEN) NASA/ESA+JBLAIR; (RAYMOND YIU) MALCOLM CROWTHERS; (CERN) SAMUEL RUBIO; (JILLIE JOHNSTONE) JACK REDVERS HARRIS; (JEZEBEL) DAVE GUTTRIDGE

CALENDAR //



FRINGE

It is rocket science

3 DECEMBER

South Kensington Campus

Explore the livelier side of space science with activities for all ages and the annual Children's Christmas Lecture.



JOIN THE PRESIDENT

Hear about some of the exciting new initiatives happening at Imperial directly from President Alice P. Gast at one of our special local events. Connect with other alumni and expand your network.

San Francisco

9 DECEMBER

Join President Alice P. Gast for an evening reception in San Francisco, hosted by alumnus Michael Birch (BSc Physics 1991) and his wife Xochi at their private residence in Pacific Heights.

Kuala Lumpur, Malaysia

7 JANUARY • TBC

Singapore

8 JANUARY • TBC

Miami

2 FEBRUARY • TBC

Houston, Texas

SPRING 2016



ALUMNI ON CAMPUS

Jezebel's 100th Birthday

9 APRIL

Imperial mascot Jezebel the fire engine celebrates her centenary in style with day-long events and a black tie dinner.

2016 Alumni Weekend

7–8 MAY

Celebrate milestones, meet old friends and catch up on the latest in Imperial research during this special weekend that runs alongside the Imperial Festival.

2016 Imperial Festival

7–8 MAY

Save the date for a packed weekend programme of hands-on activities, talks and performances for all ages.

“The experience was awesome.”

Igho Ogonor (MSc Earth Science and Engineering, 2013)

Jezebel, a 1916 Dennis 'N' Type fire engine, weighs five tons and has 55 square feet of brass to polish.



LECTURE

Can we feed the world sustainably?

19 JANUARY

South Kensington Campus

Professor Sir Gordon Conway presents the 28th Schrödinger Lecture on achieving global food security.



GRADUATION

Postgraduate Awards Ceremonies

4 MAY

Royal Albert Hall

Postgraduate students return to South Kensington to celebrate completing their studies and joining the ranks of Imperial alumni.

#impgrad

STAY UP TO DATE

Stay up to date with Imperial news, find old friends, learn about events and make connections with our alumni social network groups.



alumni.imperialcollegelondon



bit.ly/imperial-alumni-LinkedIn-group



@imperialcollege



“The livelier side of science”
TimeOut

IMPERIAL FESTIVAL

Each year this celebration of the College's research captures the imagination of public audiences, alumni, staff and students. Make a date with discovery in 2016 at this **FREE** event for all ages, including talks, hands-on research demos, workshops, and performances.

Sharpen your thinking in spirited debate and intelligent discussion

Talk with 500+ Imperial scientists and engineers

Take part in experiments

Inspire scientists-in-the-making with a programme of family-friendly activities

Sign up for news and updates at festival@imperial.ac.uk

SAVE THE DATE



ALUMNI WEEKEND

Discover a line-up of additional activities and a great base from which to explore the Festival for everyone who has studied at Imperial.

Take advantage of this unique opportunity to catch up with recent advances in your degree subject, share your university with friends and family, and reconnect with your department, the College and classmates.

IT'S BEEN HOW LONG?

If you graduated in a year ending in **1** or **6**, this is a great opportunity to reunite with your peers and celebrate your milestone anniversary during the Alumni Weekend. Alumni who graduated on either side of these years are also invited to participate.

We can take some of the work off your hands and help you reach out to your friends and classmates, even those you've lost touch with, as well as help you to get the most from your reunion and reconnection with the College.

Contact us now:
alumni.weekend@imperial.ac.uk

+44 (0)20 7594 6138

“A great, fun day”
Tim Griggs
(Materials 1974)

“Fascinating event”
The Guardian

7-8 MAY

IMPERIAL FESTIVAL + ALUMNI WEEKEND 2016

[#impfest](#) and [#impalumni](#)

www.imperial.ac.uk/festival ➔ www.imperial.ac.uk/alumni-weekend