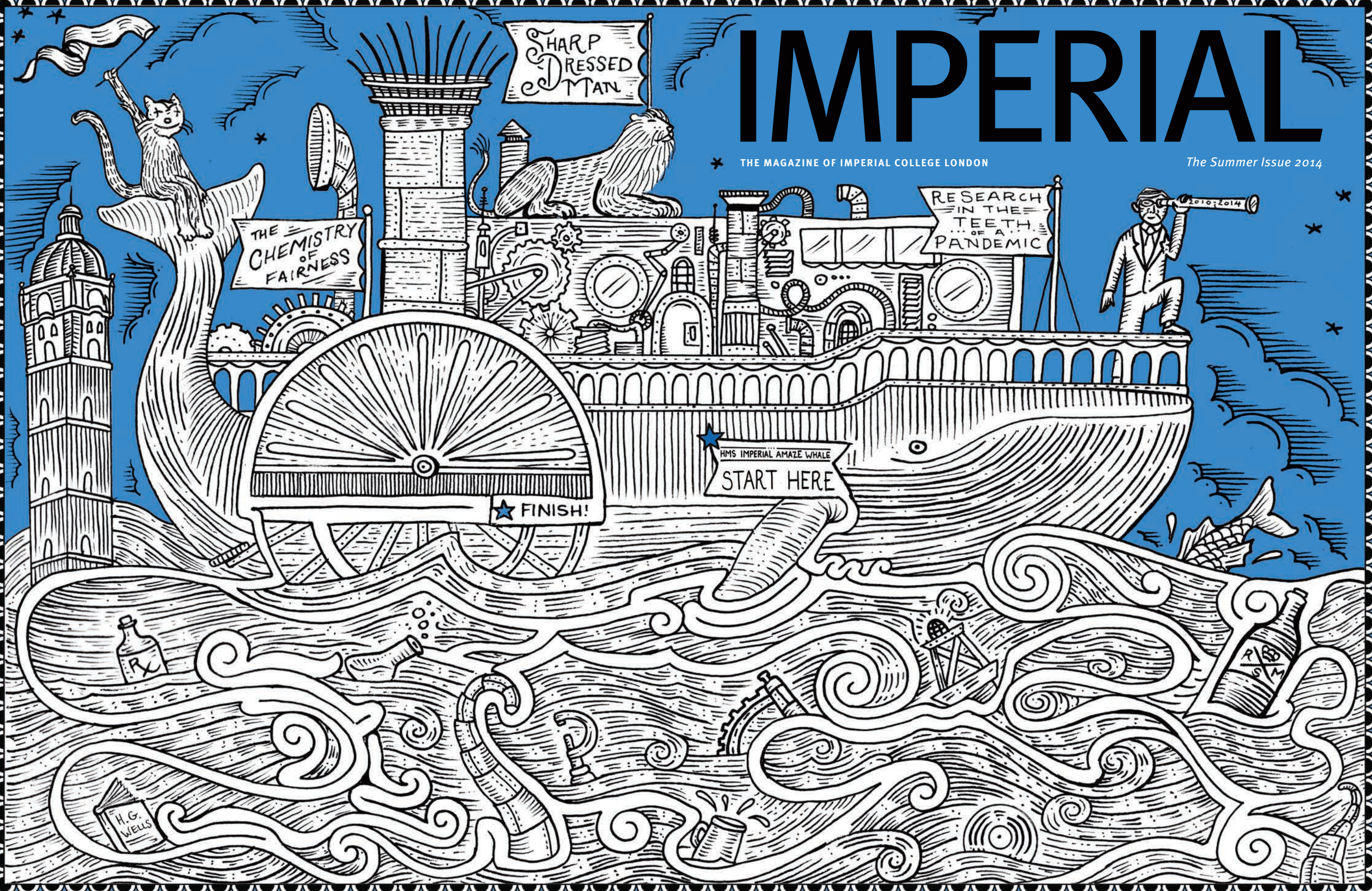


# IMPERIAL

THE MAGAZINE OF IMPERIAL COLLEGE LONDON

The Summer Issue 2014



SHARP DRESSED MAN

THE CHEMISTRY OF FAIRNESS

RESEARCH IN THE TEETH OF A PANDEMIC

HMS IMPERIAL AMAZE WHALE  
START HERE

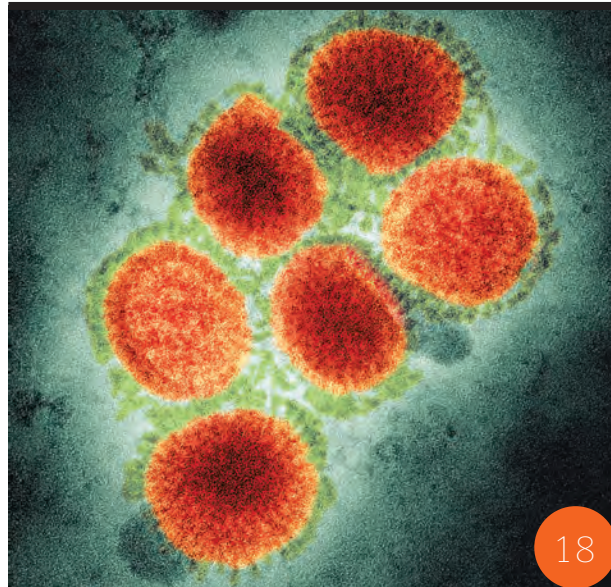
FINISH!

H.G. WELLS

RX

P/B  
Z

MUG



18

### 3 President & Rector's welcome

#### 4 Inbox

Editorial, letters and contributors

#### 6 What's on

#### 7 In brief

Spotlight on recent events and discoveries

#### 14 Technique

##### GLASS ACT

Imperial's resident scientific glassblower drives chemistry research forward

#### 15 Travel

##### FUEL FOR THOUGHT

Brazilian research associate Alexandre Strapasson on global thinking for bioenergy research

#### 16 Carering ahead

##### THE CUTTING EDGE

Meet Mechanical Engineering alumnus Roubi L'Roubi, bespoke tailor to the glitterati, at his Savile Row studios

#### ON THE COVER

Grab your pencil and complete the maze illustration by artist Kyler Martz

### 17 Campus life

#### EASTERN PROMISE

Medical student Jia Ying Tanoto Lim shares her experiences of being one of the first students at the Lee Kong Chian School of Medicine in Singapore

### 18 Feature

#### WHO DIES OF THE FLU?

Two people catch the same flu virus: one dies, and the other doesn't even get sick. Catch up with what we learnt from the 2009–2011 pandemic

### 22 Behind the scenes

#### TALL ORDER

Chemical Engineering students get their hands on the College's £2 million Carbon Capture Pilot Plant



16



28

### 24 Feature

#### CATALYST FOR CHANGE

Chemistry alumnus Les Ebdon discusses his career and life at the head of the Office of Fair Access

### 28 Picture this

#### GOT THE BOTTLE?

Dip into the competitive history of the Royal School of Mines Bottle Match

### 30 Going public

#### FRINGE BENEFITS

Explore what happens when researchers and students get creative as part of the Imperial Fringe programme of events

### 32 Good reception

Alumni, friends, supporters and staff at College events around the world

### 34 Alter ego

#### PITCH PERFECT

Members of Imperial's a capella group test their voices in the Centre for Bio-Inspired Technology's anechoic chamber

### 35 Obituaries

### 36 In memoriam

### 38 Alumni dispatches

## IMPERIAL

#### Staff

- *Editor-in-Chief:* Tom Miller (Biology 1995)
- *Creative Director:* Beth Elzer
- *Editor-at-Large and Features Editor:* Natasha Martineau (MSc Science Communication 1994)
- *News Editor:* Laura Gallagher
- *Managing Editor:* Pamela Agar
- *Sub Editor:* Tess O'Neill
- *Distribution:* Elizabeth Swift
- *Designers:* Beth Elzer, Abby Lloyd-Pack
- *Contributors:* Jessica Adams, Georgia Bergson, Andrew Czynewski, Caroline Davis, John-Paul Jones, Simon Levey, Dominic McDonagh, Maxine Myers, Maddi O'Brien, Andrew Scheuber, Colin Smith, Elizabeth Swift, Gail Wilson, Sam Wong (MSc Science Communication 2009)

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.

#### Subscriptions

If you would like to subscribe to Imperial magazine please email [imperialmagazine@imperial.ac.uk](mailto:imperialmagazine@imperial.ac.uk)

#### Online

[www.imperial.ac.uk/imperialmagazine](http://www.imperial.ac.uk/imperialmagazine)

Published by the Communications and Public Affairs Division.

[imperialmagazine@imperial.ac.uk](mailto:imperialmagazine@imperial.ac.uk)

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 2014

Imperial College  
London



## From the President & Rector

It has been an enormous privilege to lead Imperial College London since January 2010.

One of the most rewarding and enjoyable aspects of my role has been meeting Imperial alumni and supporters. In all those I meet, whether at the annual Imperial Festival in South Kensington, or at one of our many alumni events around the world (see p32), three strong feelings consistently come across: **a sense of connection, pride and optimism about our future.**

These feelings unite an Imperial community which spans many generations. From alumni in their tenth decade who remember lectures interrupted by Second World War air raid warnings, to recent graduates, about to embark on their careers, every alumnus I have met has a story which is a privilege to hear. The sum of those stories is nothing less than the reputation of Imperial.

Imperial is one of the few truly global universities: around the world you will find a growing presence of Imperial and its alumni networks. I am proud to have been at the College to witness this period of increased international presence, such as the Lee Kong Chian School of Medicine in Singapore and greatly increased collaborations in China, India, Brazil, and Malaysia to name a few.



#### GAME CHANGER

Alumnus Michael Uren OBE donated £40 million to transform biomedical engineering research



**FESTIVAL FUN** A record-breaking 800 alumni from 26 countries joined Sir Keith at the 2014 Imperial Festival and Alumni Reunion.

The College has a compelling future ahead of it. Imperial West offers an opportunity unprecedented in the College's recent history to create **a new and innovative environment for research, education and translation.** Our vision for Imperial West is taking shape at a thrilling pace. Last summer we seized the opportunity to increase our landholding at this new campus to 25 acres. In two years' time, the campus' flagship Research & Translation Hub will open, bringing together industrialists, entrepreneurs and researchers to co-locate with our academics.

Furthermore, the generosity of Michael Uren OBE and his Foundation will enable the College to create a pioneering biomedical engineering centre at Imperial West. I hope that this is the first of many headline projects which will pave the way for the College to grow for generations to come.

On a personal level, my family and I will take away many **fond memories of College life** beyond the core academic activities for which Imperial is renowned. My wife Rita and I were honoured that the College Choir and Symphony Orchestra performed at my leaving event. Other highlights of my time at Imperial include the annual Varsity rugby game where I never cease to be amazed by the ability of Imperial students to combine sporting excellence with academic achievement.

From September 2014, I join the distinguished ranks of the Imperial alumni community. I will watch the College progress with great interest from the sidelines and I hope you will, like me, keep in touch, stay connected and carry on being brilliant ambassadors and supporters of this great university.

Best wishes,

Keith O'Nions

SIR KEITH O'NIONS FRS is President & Rector of Imperial College London. He is a geologist who has worked at Oxford, Cambridge and Columbia Universities, and has served the UK government as Chief Scientific Advisor to the Ministry of Defence, and as former Director-General of the Research Councils.



FROM THE EDITOR

# Ahoy there!

As this edition lands I hope all *Imperial* readers have some holiday refreshment close to hand. Like miners with a lot of bottle (p28) we aim to help you reach the parts other universities can't. We've got tattoo artist Kyler Martz inking this summer's cover, featuring Sir Keith and the 'Imperial Amaze-Whale'. It's for future Imperial alumni and the puzzler in us all.

And as we say a fond farewell to Sir Keith, we also prepare to welcome Professor Alice Gast to the Imperial family (p9) from September.

On dry land in May, over 12,000 joined in the third Festival and Reunion weekend. Many met Professor Peter Openshaw and our brilliant researchers behind Debora Mackenzie's flu detective story (p19).

Back on the high seas, a little bit of Imperial came to South East Asia and China in July. Many old friends reconnected at these alumni reunions, but with a 21st century twist. In Hangzhou, an Imperial *WeChat* social media group formed spontaneously. Within 30 minutes most in the room had joined in.

Two days later, 200 Beijing alumni watched a video about the new Imperial West campus. They greeted it with applause and laughter. Applause for the College's ambition. 'The most exciting and important thing for Imperial since merging with medicine 25 years ago,' said one afterwards. But laughter? This was unexpected.

Then the *WeChat* app began to ping. Alumni were posting pictures of the video as London's Mayor Boris Johnson was speaking. Professor Yike Guo (PhD Computing 1993), Director of the Data Science Institute, translated from Mandarin.

- ▶ *This is so cool.*
- ▶ *What is he saying?*
- ▶ *I don't know, I'm just watching his hair!*

We look forward to bringing you the full, serious and exciting story of Imperial West, in Issue 40.

**TOM MILLER**  
(Biology 1995)

➔ **ONLINE EXTRA:** Watch the new *Imperial West* video at [bit.ly/imperial-west-update](http://bit.ly/imperial-west-update)



## the INBOX

### COMPETITIVE SPIRIT

In our last issue, we asked for your tales of Imperial's mascots

Given that there was a bunch of students in RCS who claimed (quietly) that they could get into any room in any building at IC, it could be thought of as naive for RSM Union officials to think that the Davy Lamp was safe in the RSM Union office.

Once we had it, we filled it with cement and painted it wonderful RCS colours and laid a trail of clues. One of the clues was stuck to the inside of Big Ben, the big bronze bell at the top of the Clock Tower at the Houses of Parliament. However, RSM were clueless and ended up having to pay a ransom to charity to get the now-much-heavier Davy Lamp back.

**RALPH CORNFORTH**  
(Physics 1967)

Sometime during my time in EE (1973–76) a (presumably replica) spanner was spotted behind one of the UCL bars. No-one seemed to know where it came from or how it got there.

### WE'RE TWEETING!



#ImpCol President Sir Keith O'Nions cuts Queen's Tower cake to mark his forthcoming retirement  
[@IMPERIALCOLLEGE](https://twitter.com/IMPERIALCOLLEGE)

A lunchtime expedition was launched to retrieve it. Somehow, a large number of us entering, buying drinks and standing in front of the bar, to defend if necessary, seemed to raise no suspicions. Suddenly, the SWAT team burst through the door into the serving area, snatched the spanner and rushed out. We all innocently joined in with the natives wondering what had just happened, supped up, and returned to South Ken. Job done.

**MIKE PELLATT**  
(Electrical Engineering 1976)

The best security feature for Mike when I was President was the tendency of the lifts in the Union building to break down. Bouncing him down the stairs tends to attract too much attention and a nasty bill...

**DR ASHLEY BROWN**  
(Computing 2005, PhD 2009)



➔ Doing something brilliant? Tell us about it at [@ImperialCollege](https://twitter.com/ImperialCollege) or [@ImperialSpark](https://twitter.com/ImperialSpark)

Sorry to say the story under Theta's "last violated" is incorrect. I was part of the dynamic bearer duo with Bob Leman on the fateful evening in 1991. Steve Dorman was part of the team defending Theta and was unfortunately run over before Bob, Theta and I left the Union. Being a resourceful pair Bob and I took Theta on the next bus to Hammersmith and it remained inviolate! A lucky escape for all but Steve. Theta did visit him in hospital the next day, have a look through the Felix archive for a photo.

The whole thing sparked a root and branch review of Mascotry chaired by Zoe, the ICU President at the time, and set me on the path to succeeding her in the role.

**CHRIS DAVIDSON**  
(Physics 1994)

Read more memories and share your own at [www.imperial.ac.uk/mascots](http://www.imperial.ac.uk/mascots)

### REMEMBERING FELIX

Felix Weinberg, FRS was Emeritus Professor of Combustion Physics at Imperial until the time of his death in December 2012. His story — *Boy 30529: A Memoir* — recounts his childhood in concentration camps and on forced marches during the war. But the story in the book stops with his arrival in England as a 16 year old, for whom any schooling was a distant memory. That he, from this distinctly unpromising beginning, would go on to achieve an FRS and a Professorship, constitutes another, currently untold, story. Some of us, who were his research students, want to explore and document this part of his life.

We'd really like to hear from alumni who worked with, and have memories of Felix during half century from 1960 to his death.

**DR BILL AFFLECK**  
(PhD Chemistry 1962)

Editor's response ➔ If you would like to contribute, email us at [imperialmagazine@imperial.ac.uk](mailto:imperialmagazine@imperial.ac.uk)

### EXPLOSIVE SCIENCE

Looking at the Queen's Tower reminds me that in 1965, I viewed it as a place we might emulate a "high" strain rate metal compression apparatus then at Oxford where they dropped weights beside a lift shaft. It turned out that I could get much higher rates using detonators and a gun, and located them in a disused rail tunnel that went under the Royal School of Mines.

When we first visited the tunnels, we found apparently normal light bulbs and connected them up. The bulbs all exploded — perhaps from an era when a lower voltage was used!



I once paced out the point in the tunnel that we used and did the same outside, finding that where we exploded over 300 detonators was under Prince Consort Road. We closed the door to the tunnel and

not much was heard in the main building. Then the geology department set up a creep machine in the adjacent tunnel and they did notice! We stored our detonators in a safe under the watchful eye of the CID.

**DR NIGEL FITZPATRICK**  
(Metallurgy 1965, PhD 1968)

Editor's comments ➔ See more tales from the tunnels and share your own at [www.imperial.ac.uk/tunnels](http://www.imperial.ac.uk/tunnels)

### CORRECTION

We would like to apologise for posting the demise of Mr Ivan Hiscox (MSc Earth Resources Engineering 1995) in the previous issue's *In Memoriam*. This was an error caused by incorrectly labelled returned mail. *Imperial* magazine is pleased to advise Ivan considers himself in rude good health and was touched by the all concern!



### FACEBOOK COMMENT

“In my days as a student at the RSM (1957–60) the RSMU had a purloined Michelin Man as a Mascot, appropriately named “Mitch”, in honour of Professor J C Micheson, the then Dean of the Royal School of Mines. He was sometimes known as “the orange juice Dean” in recognition of his sober bonhomie. For one year, I held the office of “Keeper of Mitch”. Mitch was never violated — the RSM yielded to no-one, then and now — but when we carried him from the RSM building to Exhibition Road one day via the interior of the connected City and Guilds building, it was a close run thing.

**JIM PLATT**  
(Mining 1960)

➔ 'Like us' at [www.facebook.com/imperialcollegelondon](https://www.facebook.com/imperialcollegelondon)

### SHARE YOUR STORIES OF STUDENT PRANKS

Since we relaunched *Imperial* magazine, we've featured the College's beloved mascots and the fierce rivalries between them. We've explored the subterranean world of the tunnels under campus, enjoying the brilliant memories of our alumni who found their way around them when they were students. Now we want to share some of the best student pranks from the College's history! From Morphy Day to RAG week antics, we want to hear all about your best hijinks. Email tales and photographs to [imperialmagazine@imperial.ac.uk](mailto:imperialmagazine@imperial.ac.uk) and we'll send you a limited edition t-shirt as a reward (while supplies last).



➔ For inspiration, watch a cheeky video of flying pie mayhem at the 1979 Morphy Day Battle at Putney: <http://tiny.cc/f4odix>

### SHARE YOUR THOUGHTS

**By post to** • Alumni Office, SALC Mezzanine, Level 5 Sherfield Building, South Kensington Campus, London SW7 2AZ, UK  
**By email** • [imperialmagazine@imperial.ac.uk](mailto:imperialmagazine@imperial.ac.uk)  
**By online comment** • [www.imperial.ac.uk/imperialmagazine](http://www.imperial.ac.uk/imperialmagazine)

# WHAT'S ON



**ERWIN SCHRÖDINGER**  
LECTURE  
12 November

Professor Serge Haroche of the College de France, joint winner of the 2012 Nobel Prize in Physics, will deliver the 27th Annual Schrödinger Lecture.



**SIR ERNST CHAIN**  
LECTURE  
13 November

Professor Michael Levitt from Stanford University, joint recipient of the 2013 Nobel Prize in Chemistry, will present this year's lecture on the modelling the molecules of life.

## UNDERGRADUATE SCIENCE AND ENGINEERING OPEN DAY

20 September

Prospective undergraduates and their parents are invited to find out more about studying at Imperial at our next Open Day. Guests can visit our departments, explore our accommodation and speak to staff and current students. Find out more at: [www.imperial.ac.uk/visit/ugopenday/september](http://www.imperial.ac.uk/visit/ugopenday/september)

## POSTGRADUATE OPEN DAY

10 December

Our Postgraduate Open Day is for anyone who is interested in taking their education to the next level at Imperial – whether through a taught Master's or research course. All of our departments will have information stands and opportunities to visit. Find out more at: [www.imperial.ac.uk/visit/pgopenday](http://www.imperial.ac.uk/visit/pgopenday)

## IMPERIAL VISITS YOU

Various dates internationally

Keep an eye on the College's alumni website for details of reunions and special events around the world as they are confirmed: [www.imperial.ac.uk/alumni/events](http://www.imperial.ac.uk/alumni/events)

Members of Imperial staff also make regular student recruitment visits overseas, and in many cases make arrangements to meet prospective students on these trips. See the calendar of global recruitment events at [www.imperial.ac.uk/international/prospective/visit](http://www.imperial.ac.uk/international/prospective/visit)



22  
OCTOBER

Autumn sees yet another class of bright minds cross the stage of the historic Royal Albert Hall for **Commemoration Day** — where graduands formally become graduates, joining a 170,000-strong global alumni community. Imperial did not become one of the world's great universities by letting its students off lightly. Studying at Imperial requires remarkable intellectual prowess, hard work and creative thinking. Our graduates have truly excelled in these abilities, and their efforts will be rewarded by the exciting and distinguished careers on which they will soon embark. *Congratulations!*

### Tap into the big ideas

Stay up to speed with Imperial's cutting edge research and the latest thinking by catching up with our lectures online. Download talks, explore the archive, watch interviews with top researchers and more:

[www.youtube.com/imperialcollegevideo](http://www.youtube.com/imperialcollegevideo)

### Talk nerdy to me

Join our vibrant online community — be the first to know about Imperial news and events and tell us what you think. Get in on the action online by talking to our Research Communications group on Twitter:

@ImperialSpark

### Prick up your ears

Get the headlines through your headphones. Download the Imperial podcast for research straight from our scientists and news from around campus, presented by Gareth Mitchell of the BBC World Service and Imperial's Science Communication Group:

[www.imperial.ac.uk/media/podcasts](http://www.imperial.ac.uk/media/podcasts)

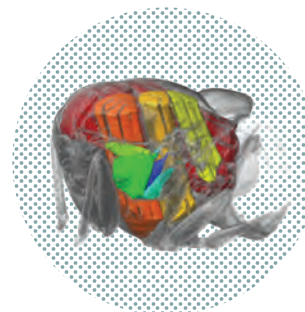
→ For more details on Imperial College events and to sign up to receive the e-Bulletin every fortnight, visit: [www.imperial.ac.uk/events](http://www.imperial.ac.uk/events)

# in brief

EVENTS + DISCOVERIES

## There she blows

YOU DON'T NEED JEFF GOLDBLUM TO MAKE A GREAT MOVIE ABOUT A FLY — A FILM BY IMPERIAL RESEARCHERS TAKES US INSIDE A LIVE BLOWFLY IN FLIGHT, USING HIGH-SPEED X-RAYS.



**IN THE BLINK OF AN EYE** In the time that it takes a human to blink, a blowfly can beat its wings 50 times, controlling each wing beat using numerous tiny steering muscles — some as thin as a human hair.

**PIN HEAD** The study aims to uncover how the fly controls its sophisticated flight engine using the signals from different sensors and a brain no larger than a pin head.

**300 MILLION YEARS** A fly's wing hinge is one of the most complex joints in nature, and has been refined over more than 300 million years of evolution.



A BLOWFLY WALKS INTO A BAR AND ASKS: "IS THAT STOOL TAKEN?"

Researchers from Imperial and the University of Oxford have developed a technique for filming inside a bluebottle, or blowfly, while it is beating its wings. By rotating the flies in a dedicated setup at the Swiss Light Source, a powerful x-ray facility, they reconstructed the 3D layout of the power and steering muscles in flight, giving insights into how the fly performs aerial feats. The work is part of a project by Dr Holger Krapp (Bioengineering) and his team to understand how flies have evolved into such agile acrobats. The researchers have also uncovered how nerves in the fly's body help it to maintain a level gaze during intense manoeuvres without the need for energy-sapping brain computations. Their work could help with the design of new micromechanical devices and miniature unmanned aerial vehicles that attempt to mimic flies' aerial skills.

+ ONLINE EXTRA: Watch a video of the fly muscles in action at [bit.ly/imperialflyfilm](http://bit.ly/imperialflyfilm)

## Alumnus donates £40m

Imperial is to build a pioneering biomedical engineering centre thanks to an unprecedented £40m gift from Michael Uren OBE and his Foundation.

The donation will support the construction of the Michael Uren Biomedical Engineering Research Hub at Imperial West. This will house life-changing research that advances new affordable medical technology, helping people affected by a diverse range of medical conditions.

Imperial's world-class engineers, scientists and clinicians will work together in the new space and facilities alongside spin-out companies, helping to create a vibrant innovation district. The Hub will also incorporate clinical areas, providing patients with direct access to innovations in healthcare.

The building and its location will cement Imperial and the UK's position as world leaders in biomedical engineering research and application.

President Sir Keith O'Nions said: "Imperial is profoundly grateful to Michael Uren and his Foundation for this remarkable gift, the most generous it has ever received."

Michael Uren (Mechanical Engineering, 1943) founded Civil and Marine Ltd which became one of the UK's foremost innovators in cement manufacture. His previous support for Imperial includes funding for the College's MSk Lab, which focuses on joint disease and the surgery needed to restore function.

"In effect, what we are creating here is a new Silicon Valley London, which is bound to succeed."

—Michael Uren OBE



### HEALTH STUDY

## Heavy labour

"We need to understand the long-term outcomes in order to provide the best advice to women who are considering caesarean delivery"

—study author Professor Neena Modi (Medicine)



**Babies born by caesarean section are more likely to be overweight or obese as adults, according to analysis by Imperial researchers.**

After combining data from 15 studies with over 38,000 participants, they found that the odds of being overweight or obese are 26 per cent higher for caesarean babies than those born by vaginal delivery. Caesarean babies have a higher BMI by half a unit on average.

The researchers said they couldn't be sure that higher body weight was caused by caesarean delivery: the association might be explained by other factors that weren't recorded in the data they analysed. But there are plausible mechanisms that could explain the link.

One is that the method of delivery influences the types of healthy bacteria in the baby's gut, which can have broad effects on health. Also, the compression of the baby during vaginal birth may influence which genes are switched on, and this could have a long-term effect on metabolism.

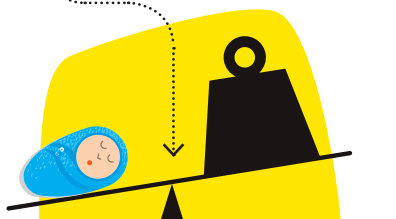
Some previous studies have suggested that the odds of other conditions, such as asthma and type-1 diabetes, are higher in children born by caesarean.

**1 in 4 births**

Approximately one in three to four births in England are by caesarean section today.

**26% ↑**

Increased odds of being overweight or obese for adults born by c-section than those born by vaginal delivery.



PHOTOGRAPHY: (IMPERIAL WEST) VAUsworth 3D / P/P ARCHITECTURE; (NEENA MODI) LAYTON THOMPSON



# Q

## Can statins slow the progression of multiple sclerosis?

Doctors hoping for a treatment that can abate the advanced stages of multiple sclerosis (MS) may already have one in their medicine cabinets.

Statins, which millions take daily to lower cholesterol, appear to have a beneficial impact in patients with secondary progressive MS, according to findings from Imperial.

In a two-year clinical trial involving 140 patients, simvastatin was found to slow brain shrinkage, which is thought to contribute to patients' impairments. Supporting this finding, patients on simvastatin achieved better scores on movement tests and questionnaires that assess disability than patients taking a placebo.

"At the moment, we don't have anything that can stop patients from becoming more disabled once MS reaches the progressive phase," said Dr Richard Nicholas (Medicine), who featured in the cover story of the last edition of *Imperial*. "Discovering that statins can help slow that deterioration is quite a surprise."

"We need to do a bigger study with more patients, possibly starting in the earlier phase of the disease, to fully establish how effective it is."

PHOTOGRAPHY: (GAST) THOMAS ANGUS

### SNAPSHOT



#### TIP TOP

The American Institute of Chemical Engineers named Professor Gast as one of the 'top 100 engineers of the modern era'.



#### GLOBAL CITIZEN

Professor Gast became a US Science Envoy in 2010, advising the White House, State Department and scientific community.



#### BOARD SERVICE

Professor Gast has been actively involved in a number of prominent organisations including the American Association for the Advancement of Science, the US National Research Council, the New York Academy of Science, the Council on Competitiveness and the Academic Research Council of Singapore. She is a Director of Chevron Corporation.

## Welcoming Alice Gast

Alice P Gast succeeds Sir Keith O'Nions as 16th President of Imperial College London this September.

A distinguished chemical engineer, Professor Gast was President of Lehigh University from 2006 to 2014, and held senior roles at MIT and Stanford before that.

At Lehigh, Professor Gast concluded an unprecedented \$550 million fundraising campaign, oversaw a 47% increase in the university's estate, and greater integration between undergraduate and postgraduate teaching and research.

"I have always been excited by what goes on at Imperial, one of the world's greatest scientific universities," said Professor Gast on her appointment. "With its unique focus on science, engineering, medicine and business, and its integrated mission to teach, research and translate its work for the benefit of society, Imperial has a great leadership role in the world. I am therefore deeply honoured by this opportunity to serve as its President."

As President, Professor Gast will lead the College's strategy, including the development of Imperial West, and links to government, industry, philanthropists and alumni. Imperial's Provost, Professor James Stirling, focuses on the College's core academic mission of education, research and translation.



## Idle strands

UNEMPLOYMENT MAY ACCELERATE AGEING OF DNA IN MEN



Telomeres, which buffer the ends of chromosomes and protect genetic material from being degraded, get shorter over a person's lifetime. When researchers from Imperial and the University of Oulu studied telomere length in 31-year-old men, they found that those who had been unemployed for two of the preceding three years were more than twice as likely to have short telomeres compared to men who were continuously employed.

→ Short telomeres are linked to higher risk of age-related diseases such as type 2 diabetes and heart disease.



### SOUTH KOREAN PRESIDENT VISITS

Park Geun-hye, President of the Republic of Korea, addressed leading figures from science, industry and government at Imperial in November 2013, when the College hosted a landmark science and innovation event as part of her visit to the UK. During her tour of Imperial, President Park viewed an 'invisibility cloak', demonstrating the potential of metamaterial technology, and witnessed a live surgical simulation.

President Park said: "It gives me great pleasure that we have gathered at the world-renowned Imperial College London – famous for its cutting edge research in science and technology – together with scientists, businessmen and experts from the UK and Korea to discuss the future of the creative economy."

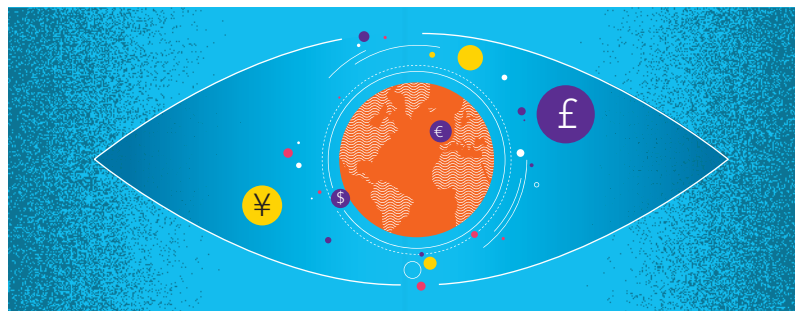
**+ ONLINE EXTRA:** Watch the Korean President hailing UK science at Imperial at [bit.ly/imperial-korea](http://bit.ly/imperial-korea)



### PRINCE HARRY OPENS BLAST CENTRE

HRH Prince Harry paid a visit to Imperial in October 2013, to officially open the Royal British Legion Centre for Blast Injury Studies (CBIS). Funded by the Royal British Legion, Imperial College and the Ministry of Defence, the CBIS aims to mitigate damage and to develop and advance treatment, rehabilitation and recovery for people with blast injuries. Prince Harry said: "This issue affects people on a global scale and whilst work at the Centre is strongly focused on military casualties, its findings will no doubt also provide significant humanitarian benefits across the world." Read more about the CBIS in *Imperial Magazine* Issue 37 (Spring 2012).

**+ ONLINE EXTRA:** View a video and more photographs from Prince Harry's visit at [bit.ly/imperial-cbis](http://bit.ly/imperial-cbis)



## Two heads

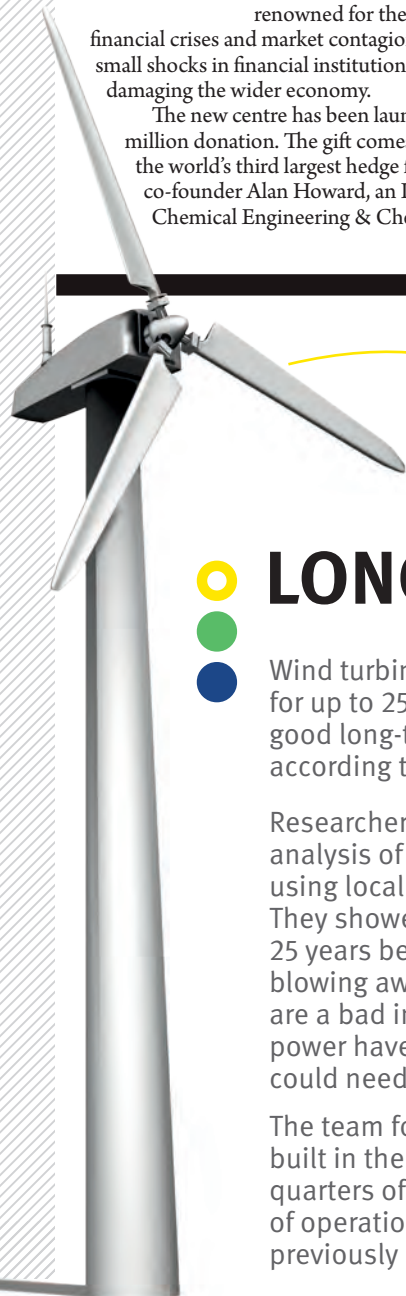
The world's two leading experts on financial contagion will head Imperial's new Brevan Howard Centre for Financial Analysis.

Frequent collaborators, Professors Franklin Allen and Douglas Gale are renowned for their pioneering research into financial crises and market contagion – that is, when relatively small shocks in financial institutions spread and grow, severely damaging the wider economy.

The new centre has been launched thanks to a £20.1 million donation. The gift comes from Brevan Howard, the world's third largest hedge fund, at the behest of its co-founder Alan Howard, an Imperial alumnus (MEng Chemical Engineering & Chemical Technology 1986).

"The Brevan Howard Centre will make our financial system work better and make financial policy much wiser. I have no doubt that it will make profoundly important contributions to the discourse on global finance."

Larry Summers, former US Treasury Secretary



ELECTRIC AVENUE:  
7.5% OF BRITAIN'S ELECTRICITY IS  
GENERATED BY WIND POWER

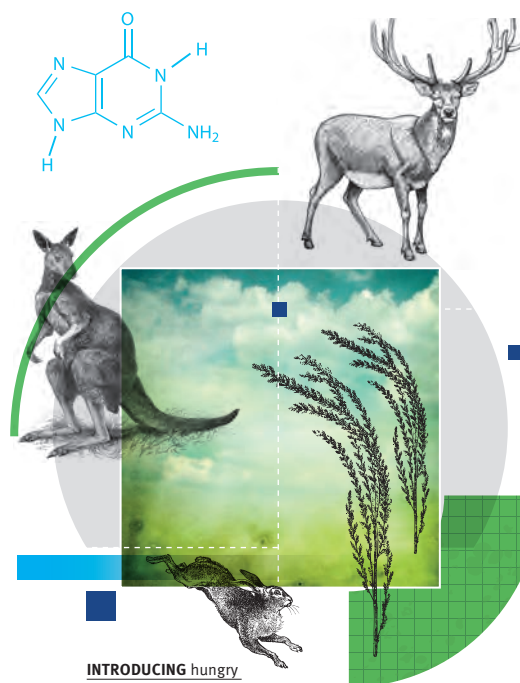
## LONG WINDED

Wind turbines can remain productive for up to 25 years, making wind farms a good long-term choice for energy investors, according to a Business School study.

Researchers carried out a comprehensive analysis of the UK's fleet of wind turbines, using local wind speed data from NASA. They showed that the turbines will last about 25 years before they need to be upgraded, blowing away claims that ageing wind farms are a bad investment. Some opponents of wind power have argued that turbine technology could need replacing *en masse* after 10 years.

The team found that the UK's earliest turbines, built in the 1990s, are still producing three quarters of their original output after 19 years of operation, nearly twice the amount previously claimed.

PHOTOGRAPHY: (PARK GEUN-HYE) LAYTON THOMPSON; (PRINCE HARRY) THOMAS ANGUS



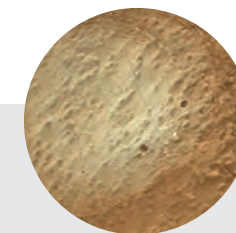
INTRODUCING hungry herbivores to certain areas could make a difference to reducing biodiversity loss.

PHOTOGRAPHY: (MARS) SCIENCE/AAAS; (GRAVITATIONAL WAVES) C. REISSWIG, L. REZZOLLA FOR MPI FOR GRAVITATIONAL PHYSICS / M. KOPRITZ FOR ZIB; (PLANCK) ESA

### ON THE RADAR

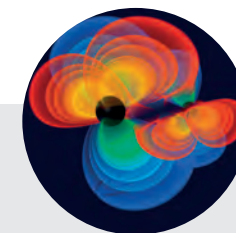
## Meanwhile, the universe keeps on expanding...

Recapping some recent discoveries from that great pie in the sky



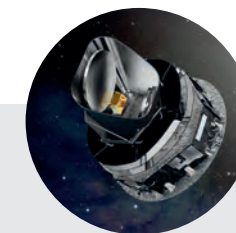
LAKE PLACID

There was once an ancient lake on Mars that may have been home to simple life forms, according to evidence collected by NASA's Curiosity rover mission. Analysis by mission researchers, including Imperial's Professor Sanjeev Gupta (Earth Science & Engineering), suggests that there was a calm, freshwater lake on the Red Planet around 3.6 billion years ago, with the right kinds of conditions for microbial life.



NEW WAVE

The European Space Agency will launch a space mission in 2034 to study the universe in a completely new way. Spacecraft situated between the Sun and the Earth will detect ripples in the fabric of space-time, known as gravitational waves, created by celestial objects with very strong gravity. Imperial researchers and colleagues elsewhere have been working for 20 years to get such a mission off the ground.



A LONG TIME AGO...

An Imperial-led team has discovered four galaxy clusters billions of light years from Earth. Galaxy clusters are the most massive objects in the universe, containing hundreds to thousands of galaxies bound together by gravity. The light from the most distant of the four clusters has taken over 10 billion years to reach us, providing a glimpse of the universe when it was a sprightly three billion years old.

It's a bird...It's a plane...  
It's a  
**3D-printing  
flying robot**



**HOW BIRD SPIT  
INSPIRED THIS  
BRILLIANT IDEA**



**COPYCATS**

The researchers get their inspiration from nature and mimic some of the

abilities of birds, reptiles, mammals and fish to develop their unmanned aerial vehicles and robots.



**A FLYING  
FACTORY**

The team were inspired by swiftlets, which mainly live in the

Asia-Pacific region. Some species of swiftlet are like flying factories, building nests made entirely from their own saliva.



**SWARM-BOTS**

The researchers predict that their flying robots could potentially work together in

swarms, just like insects do, which would make them more efficient at building and repairing machinery.



The world's first flying 3D printer spits out foam to build simple structures and carry out repairs from the air, using off-the-shelf parts. Developed by Dr Mirko Kovac (Aeronautics) and colleagues, the robot has four blades and its underbelly contains two canisters of chemicals that create polyurethane foam when mixed, as well as a printing module. The team that designed the robot hope it could ultimately be used for repairs and construction in hostile environments. For example, it could patch up damaged offshore wind farms in remote, hard-to-reach locations or perhaps seal up leaks in nuclear power plants. Additionally, the texture of the polymer exuded from the 3D printer allows it to create grippers that stick onto objects, making them transportable. This means that the flying robot could be used to pick up and remove bombs, or dispose of hazardous materials like radioactive waste from crippled reactors – without exposing humans to danger.

**+ ONLINE EXTRA:** Watch a video from *New Scientist* of Mirko Kovac, Aerial Robotics Lab Director, explain how the next generation of drones is being influenced by insects and birds: [bit.ly/flying3dprinter](http://bit.ly/flying3dprinter)



**BURNING QUESTION**

Elsewhere on campus, a group of Imperial undergraduates and researchers has turned to 3D printing to help people get their heads around tricky theoretical concepts in physics. In just eight hours, using a commercially available 3D printer, they created an object based on a mathematical model that describes how forest fires can be started and how they spread over time. The team believes the approach could be used to produce works of art based on science, or transform the way that ideas and concepts are presented and discussed within the scientific community.

**A step  
closer**

**A new gene therapy for  
Parkinson's disease has  
achieved promising results  
in its first human tests.**



Fifteen patients have received the treatment, called ProSavin, which uses a modified virus to deliver three genes into the striatum, a part of the brain that controls movement. The genes are intended to boost the production of dopamine, a chemical that becomes deficient in people with Parkinson's.

The trial participants underwent a single operation to inject the virus into the brain. Their scores on movement tests improved on average by 30 per cent, and they also reported having a better quality of life. The first patients to have the surgery have now been followed up for four years, and the effect has been sustained. The treatment has been safe, with no serious adverse effects.

"I'm very pleased that it has appeared to work in the clinic," said Professor Nicholas Mazarakis (Medicine), who developed ProSavin with the biopharmaceutical company Oxford BioMedica. "It needs to be done in more people; we have to find the most effective dose, to further increase efficacy, and prove beyond doubt that this is not a placebo effect."

**+ ONLINE EXTRA:** Watch a video of a participant in the trial describing how her condition improved after receiving the therapy [bit.ly/parkinsons-trial](http://bit.ly/parkinsons-trial)

PHOTOGRAPHY: (DRONE) THOMAS ANGUS; (SWIFLET) LUP KEY YAP; (GD FIRE) THE PHOTOGRAPHIC UNIT/DAVE GUTTRIDGE  
ILLUSTRATION: (ROBOTS) TODD DETWILER; PHOTOGRAPHY: (LEGO) AARON SAVAGE

**ROBOT BUTLERS!**

**At your service**

Imperial and Dyson are teaming up to develop better vision and computer processing power for robots, as part of a new £5 million lab at the College.

The technology will enable robots to take visual information and process it in real time, to map and then navigate the world, which could lead to a range of handy robots for the home.

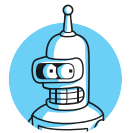
**SCI-FI ROBOTS THAT HAVE  
NOT BEEN SO HELPFUL**



**Ash from Alien**  
Intestellar cleaning skills, but can get messy at dinner time.



**Roy from Blade Runner**  
Close attention to details on cleaning up loose ends.



**Bender from Futurama**  
Loves cooking—he's your own Iron chef.

**Solar panels  
rock**

Listening to music is not just good for the soul, it can actually make solar panels produce more power.

Scientists have shown that solar cells convert sunlight into electricity much more efficiently if high pitched pop and rock music is played to them, because of how it makes the cells vibrate. Classical music, which is typically lower pitched, still produced more power output, but not as much. This discovery makes it possible to power a wider range of devices with solar energy than at present, as scientists can improve the efficiency of solar cells using ambient, or background, noise present in many environments.

They found that by if solar cells are covered with zinc oxide, blasting beats similar to the noise of an office printer is all that is needed to significantly improve the performance of a solar cell.

"We were amused to find pop and rock music rather than classical increased their efficiency."

—Professor James Durrant

CURIOUSLY DISCO WAS NOT  
TESTED AS PART OF  
THIS STUDY...



## Glass act

→ Hidden away on the seventh floor of the Department of Chemistry, looking out over the Queen's Tower, is Stephen Ramsey's glassblowing workshop. The view out of the window is obscured by abstract sculptures: solid cones of finely ground glass; a chain made by forming links of molten glass; and a hollow glass horse, frozen mid-gallop — blown by Ramsey during his apprenticeship.

Yet, Ramsey isn't an artist, though he has worked with many. He is a scientific glassblower making and mending the bevy of glassware required to keep the department running, and repairing the more complicated pieces of apparatus, such as Schlenk lines, which are essential to air-free reaction chemistry. As chemist Dr Andrew Ashley observes: "Glass blowing is absolutely essential and improves the scientific output from an institution."

Ramsey exemplifies the importance of craft in science, helping to create new pieces of glassware that push scientific research forwards — making special prototypes in collaboration with scientists. According to Stephen Hodge, a Chemistry PhD who has worked with Ramsey, these allow scientists to explore new avenues and do more intricate things. The chemists have the ideas, but new designs would remain just dreams without Ramsey.

By KATHERINE POWELL, VICTORIA DRUCE and JOSH HOWGEGO who are science journalists who finished their Master's in Science Communication at Imperial in 2013.



PHOTOGRAPHY: THE PHOTOGRAPHIC UNIT/DAVE GUTTRIDGE

## Fuel for thought

**Brazil has been hitting recent international headlines more for sport than science. Imperial magazine straightens out the balance by catching up with globe-trotting bioenergy research associate Alexandre Strapasson.**

→ IN 2010 I MOVED TO LONDON FROM BRAZIL to carry out research at Imperial into bioenergy and the behaviour of complex systems. My wife Manoela is also studying in London, and even our ginger cat Mimo came with us across the Atlantic. I am based at the College's Centre for Environmental Policy, and affiliated to the Energy Futures Lab, and the Grantham Institute for Climate Change. The cross-disciplinary culture at Imperial helps things connect in surprising ways, which appeals to my approach to work.

I was born during the military dictatorship that ruled Brazil from 1964 to 1985, in the city of Curitiba in southern Brazil. My parents are descendants of Italian immigrants, who left everything behind in search of hope in unknown rural lands. My mother has always been a dynamic person, and recently finished her secondary education more than 40 years after she left primary school, which is a great example of courage and determination for me.

My father was the only child in his family with access to higher education, as his original ambition was to become a Catholic priest. Thankfully he must have given up this idea at some point, because here I am. But his early training left him

with a love for literature. Discussing books and news at home was an important part of my childhood.

I grew up with a passion for science, as well as a keen interest in debating international and local issues. I have ended up combining these approaches by working at the interface between science and policy. Influencing policy is the best way to provide more democratic access to energy sources, income, and environmental services.

Brazil is a leader in biofuels, particularly for its sugarcane-based ethanol programme. I first got interested in bioenergy because it represents so much more than an energy resource: it is a significant driver of rural development in developing countries, and a key route for reducing carbon emissions worldwide. While working in Brazil I became especially interested in collaborations between South America and parts of Africa and Asia, rather than the more common partnerships that cross the North-South divide.

I like the idea of living as a nomad, but please do not ask our cat about that, because he hates travelling! I retain very strong connections with the country where I was born, but I need to work in different cultures to develop a proper international perspective. As we all know, issues like land use, energy and food security transcend country borders.

After training as an agricultural engineer in Brazil, I worked and undertook additional studies in France and Japan. Before moving to London I worked for the Brazilian Government on the bioenergy agenda for the Ministry of Agriculture, and on climate change for the Ministry of the Environment.

Although I enjoyed being involved directly in climate change negotiations and

bioenergy policy making, I also missed the science vibe that comes from being based at a university. In the first instance I tried to compensate for this by taking undergraduate evening classes in physics as a hobby, but eventually realised I needed to resume my academic journey, and made the decision to move Imperial for a PhD.

Imperial's support for interesting connections inspired me to set up the College's Brazil Forum in 2011, to bring together colleagues across Imperial to work on issues related to Brazil. The Forum was born out of a wish to create opportunities to generate new and interesting collaborations, rather than any particular sense of patriotism.

The list of partnerships with links to Imperial and Brazil is growing. In addition to my own area of bioenergy, collaborations include work in aeronautics, theoretical physics and public health. The signing of a Memorandum of Understanding with the São Paulo Research Foundation (FAPESP) in 2013 resulted in significant matched seed funding for up to five new collaborative research projects.

Through the support of BG Group, the College recently launched the Sustainable Gas Institute, with a particular focus on partners in Brazil, to further research into gas innovation, energy efficiency, and carbon capture and storage.

When I left Southern Brazil with a knapsack on my back in search of new opportunities and interesting thinkers all those years ago, I could never have predicted where I would end up. London is a great melting pot for bioenergy research, and continues to provide great opportunities for exploring environmental strategies and sustainable energy futures.



Brazil is a leader in biofuels, particularly for its sugarcane-based ethanol programme.



# THE CUTTING EDGE

As bespoke tailor to the glitterati, Roubi L'Roubi (Mechanical Engineering 1992) draws on lessons from Imperial to stay ahead of the curve



## OFFCUTS

**OCCUPATION**  
Co-Owner and Creative Director of Huntsman (est. 1849, Royal Warrant 1865)

**THE JOURNEY**  
Learned the trade with legendary designers Joseph Ettedgui and Tomasz Starzewski

**SHOP DECORATION**  
Two red deer stag heads, "Derek and Clive" left behind in 1921 by a customer "on his way to lunch"

**IMPERIAL:** When did you become interested in design and how did you get to where you are now?

**ROUBI L'ROUBI:** I've always had an appreciation for form, colour and design in general. But I was certainly inspired by my personal tutor at Imperial, Dr Paul Ewing – who ran an industrial design course with the Royal College of Art. He was quite a sharp dresser himself; always in a bow tie. From Imperial I went straight on to manage a lighting company that sold 20th century design classics, from Le Corbusier to Georg Jensen, then onto managing Joseph Ettedgui's couture houses in South Kensington and Sloane Street – where I caught the fashion bug. Then there was a point at which I thought: 'OK, I really appreciate design, so why not become a designer?' I went into partnership with designer Tomasz Starzewski on Sloane Street and there I learnt my trade on the cutting table – on the job, so to speak.

**IMPERIAL:** Queen Victoria, Winston Churchill and Clark Gable are among the luminaries to have worn Huntsman over the years. Where are you going with the brand now?

**L'ROUBI:** We're taking product development to another level. When I arrived, it was completely manual and the tailors would cut patterns for each individual client. Now, we're using computer aided design – the only company doing this on Savile Row. Still, you can't replace the human touch: we first make the patterns by hand then model them computationally to ensure they will work as a three-dimensional piece. It's actually more creative because the traditions set limitations and parameters on the final design. I'm also working on a system to automate the client scheduling process – at any one time we might have 500 suits in progress. It's actually a direct application of my final year project at Imperial on production control management.

**IMPERIAL:** What's your relationship with your clients like?

**L'ROUBI:** I always compare it to being a private doctor – sometimes I just get a little too much personal information! In certain cases people are extremely confident but you realise when you start dressing them that it's just a façade. You do develop friendships and contacts for life, and that's lovely.

**IMPERIAL:** Any high profile clients you can talk about?

**L'ROUBI:** Not current clients, no. But I did dress Margaret Thatcher when she was going to the Reagan memorial – the last time she had a suit made. My sister pointed out that apart from her husband, no one had seen Thatcher like I had.

**IMPERIAL:** Any projects aside from running the business?

**L'ROUBI:** I recently designed the wardrobe for a film on the life of Nina Simone. I spent a long time researching and I had to study five decades, going from the freedom movement in the US up to the 1980s. It was incredible to see how clothes were worn to communicate different things – political views, civil rights, or music. Every decade had its way of dressing that reflected the challenges or the dynamics of the society at that time.

**IMPERIAL:** What are the style hallmarks of this era?

**L'ROUBI:** It's quite neutral and austere, perhaps reflecting the challenging times we're in. If you look at the world leaders, the most popular suit today is the same navy blue single breasted suit – what I call a 'Prime Minister suit'. It's almost that people don't want to distinguish themselves; they want to be neutral, sober, less flamboyant.

**IMPERIAL:** What's the hardest part of your job?

**L'ROUBI:** Managing clients' expectations. Fabrics naturally hang and move – they are materials. When you move, it moves and creases and crumples; it's a garment and that's how it behaves. I always say 'it's not a building, it's not a structure, it's fluid', but communicating that can be a challenge.

**+ ONLINE EXTRA:** Peek inside the Huntsman studios and see some of Roubi's work at [bit.ly/imperial-cutting-edge](http://bit.ly/imperial-cutting-edge)



## Eastern promise

Being among the first students at a new medical school in Singapore is an exciting journey into the unknown, says Jia Ying Tanoto Lim.

People often ask me why I decided to become a doctor; if there was a pivotal experience or defining moment that convinced me this was the path I wanted to take.

But for me there was no real epiphany — just a growing feeling that this was what I wanted to do, as I gathered experience volunteering and learned more about anatomy and biology at college. I particularly enjoyed working at a nearby nursing home for the elderly. I really enjoyed talking to the residents and listening to their stories. Many of them were really happy, content in the wisdom of their later years, and with so much still to contribute. But of course some of them were in poor physical health and I didn't know how to deal with their medical needs properly.

I think because of my experience there, I definitely favoured a more hands-on approach, so LKCMedicine seemed like the natural choice when it came to applying. It

offered things other medical schools didn't, like early clinical exposure and simulated surgery. Plus, LKCMedicine was set up by Nanyang Technology University and Imperial College London, in part to address the medical needs of Singapore's growing elderly population, so that fits nicely with my own philosophy.

### AT THE DEEP END

We only started at the School in August 2013 but already, nine months in, we've spent time at the Tan Tock Seng Hospital — the busiest accident and emergency department in the country. It was the sole treatment centre for the SARS epidemic that struck the country in 2003, so there's an awful lot we can learn just by observing and following.

We shadowed doctors in the general medicine department, learning how tuberculosis spreads. You begin to realise that there's much more to medicine than just the biological disease and symptoms, you have

to address the other outside influences and circumstances such as living conditions and medication compliance. You can't just assume patients will always take their medicine, which I think as students you take for granted.

We were also fortunate in being able to perform cardiac ultrasound on a simulated patient during one of our lab practicals. We had to learn how best to orientate the probe to get different views of the heart in order to see the valves opening and the chambers contracting. To be able to visualise the heart as more than a static 2D image in our textbooks is so helpful.

I was also struck by one of the simulated surgery sessions we sat in on at Tan Tock Seng Hospital. It was intended to show what happens in the aftermath of a stabbing or puncture wound and how to deal with the associated haemorrhage and shock in the patient. It was interesting to see how the doctors and nurses work together in that emergency scenario, constantly asking questions of one another. That will be us, sooner than we think.

### TRENDSETTERS

Being the first cohort of students in a brand new medical school has its advantages and disadvantages. There's no mentorship from our elder peers or junior doctors who have been through the school. But we don't feel like orphans – there's plenty of support!

Plus we get to decide the new traditions of LKCMedicine and see the culture of the school grow. We set up the LKCMedicine Society, which helped with the decoration and furnishings of the student lounges at the Mandalay and Yunnan Campuses, where we often eat lunch together.

Through the Society we've also done some community activities such as singing Chinese New Year songs to patients at Tan Tock Seng Hospital. We're currently exploring overseas volunteering opportunities with St Andrew's Cathedral to help with their monthly missions to Batam (Indonesia), providing primary healthcare to the villagers.

We've also decided to create a house credits system, where the five houses compete in friendly games such as captain's ball (a popular game in Asia similar to basketball), soccer and we even have a planned cookery competition coming up.

Occasionally we'll invite the staff to play or join in with us, which is fun and interesting to see them out of the classroom. I think they enjoy it too. It's all quite new for them as well and we're all on this journey together.

*Based on an interview with JIA YING TANOTO LIM, who is studying for an MBBS at Lee Kong Chian School of Medicine.*

PHOTOGRAPHY: LAYTON THOMPSON

ILLUSTRATION: DAVID FLECK



# WHO DIES OF THE FLU?



Flu: everyone's had it, and had it again. The virus rarely means more than a temporary inconvenience – except sometimes, when it kills. Why? Researchers at Imperial have led an unprecedented bid to find out.

WORDS BY DEBORA MACKENZIE • ART BY CRAIG ALAN

**W**E'VE ALL BEEN THERE. You get that achy feeling, bit of a chill, a cough. Not to panic, it's probably just the flu. It will be over in a few days.

But sometimes it isn't. The yearly winter flu epidemic kills 200,000–500,000 people worldwide. Most are very elderly. But every now and then a new strain of flu virus appears, to which many younger people have no immunity. This is a flu pandemic – and one circled the world in 2009.

It is thought to have killed 200,000 people worldwide that year. It initially hit the UK in two waves, in June and October, killing 474 people. In England alone it is estimated to have put 7,879 people in hospital, 1,700 of them in intensive care. The same virus hit Britain again during the winter flu season of 2010–2011, killing 602. In England 8,797 ended up in hospital, 2,200 in intensive care.

At the peak of that outbreak, one in five UK intensive care beds was occupied by flu patients fighting for their lives. In the three waves that hit Britain between 2009 and 2011, eight in ten of those who died were under 65; 107 were under 15.

"I've never seen anything like it," says Dr Jake Dunning, a researcher and clinician working at the St Mary's campus, who graduated in Medicine from Imperial in 2001. "There were so many people in their 30s and 40s in intensive care." Conditions including asthma, or being obese or pregnant, can make flu worse – but frighteningly, says Jake, around a third of the severe cases of pandemic flu had no obvious reason to be so sick.

And yet at the same time, research also partly done at Imperial has found that three-quarters of the people who caught that same virus never knew it: they didn't even get symptoms. So, two perfectly healthy people can catch exactly the same flu virus, and one dies while the other doesn't even get sick. How are they different? It's a question that matters for people caring for themselves and their families, and it also matters to governments planning for pandemics.

In April 2009, Professor Peter Openshaw, head of Imperial's Centre for Respiratory Infection – which had begun operating just that year – realised there was a once in a lifetime chance to answer that question. Reports of a nasty new flu were coming out of Mexico. Everything pointed to it becoming the first flu pandemic since 1968.

It was frightening – no one knew how bad it might be. "Remember how uncertain we all were," says Peter. "There were early reports of very severe cases. We didn't know if this was The Big One." A flu pandemic can be quite mild, or it can be like the one in 1918 that killed 1 to 2 per cent of those infected – or maybe even worse.

But it was also an opportunity to learn how to defend ourselves, by turning the big guns of modern medical research on a flu pandemic for the first time. In particular, says Peter, it can be easier to pick apart what makes some people sicker than others during a pandemic rather than in normal flu seasons. The latter involve several flu viruses, to which people have differing previous exposures and immunity, which affects whether and how badly they fall ill. But in a pandemic, many have no immunity to the new virus at all.

"We had a chance to see what happened with one infection operating in relatively virgin territory," says Peter. With variations in viruses and immunity reduced, the inbuilt differences between people that determine who gets severely ill might stand out.

"Peter rang round different labs asking what studies we could do if this thing kicked off," says Jake. Meanwhile the big UK research funding agencies – the Medical Research Council, the Department of Health, and the Wellcome Trust – called a meeting to discuss what research might be needed to face a pandemic. Peter proposed a collaborative effort to record medical histories and analyse

samples from people hospitalised with the new flu, to see what made them unlucky.

The plan was to recruit several hundred hospitalised patients. To get that many before the pandemic wave or waves ended, they would have to work at several hospitals. Medical staff would record what other conditions they had that affect flu, their symptoms, treatments, and final outcomes.

And they would take samples: blood, nose and lung fluids, urine and faeces, both early and late in the disease and, with luck, after recovery. The samples would undergo a host of analyses for viruses and bacteria, immune reactions, gene sequences from patient and virus – even patients' messenger RNA – to see what genes were turned on or off as they fought the infection.

Studies like this, combining data from symptoms and from genes in individual people, are surprisingly rare: clinicians and virologists often inhabit different worlds. It is just such a divide that the Centre for Respiratory Infections was meant to bridge. But first, they had to get their funding.

The proposal led by Peter was called Mechanisms of Severe Acute Influenza Consortium, MOSAIC, and it was the most ambitious project proposed at the funder's meeting that day. "Initially there was some scepticism," he says. In the end MOSAIC was granted £2.7 million by the Wellcome Trust. "At first we had only a restricted budget for 12 months, I guess because they thought we might not be able to do it."

He understands the trepidation. The beast they were studying wasn't waiting around: the first wave of the pandemic was over in July. A study this big normally takes a year to organise. The grant proposal went to the Wellcome Trust in late April. It got an unprecedented fast-track through scientific review and ethical approvals, and the grant was awarded in a record six months.

Normally that would be when managers started hiring staff, but MOSAIC had already been getting people and permissions in place for months. The first patient was recruited in December.

And then the second wave of the pandemic ended. It seemed like all the rush had been for nothing. A few patients were recruited and studied. But then the virus struck again the following winter, and the funders let the project continue. In the end, two-thirds of MOSAIC's subjects came from that 'third wave'. If the UK had not had one – and many countries didn't – MOSAIC would have started too late to learn much. The lesson for future outbreaks? "The process was fast, but not fast enough

for outbreaks like this," says Peter.

As a result, the UK has invented a new concept in research management: hibernation. Eight research projects totalling more than £3 million and designed to track and understand a pandemic as it is happening are now being designed, approved, and organised. They range from assessing the effectiveness of treatments and the virus's spread, to managing overstretched hospitals and communicating with the public. They will now wait – hibernate – until the next pandemic strikes.

Back in 2009, MOSAIC had other problems. Nine hospitals, in London and Liverpool, were involved, and each one needed different paperwork. Navigating such obstacles is an everyday job for Mary Cross, a research manager at Imperial. Even so, in its dash to capture the pandemic before it was over, MOSAIC encountered obstacles no one had realised were there.

The procedures required before the MOSAIC recruiting team could start asking patients to take part were different at each hospital. Some required staff to be tested for the antibiotic-resistant bacteria MRSA before they could work there collecting samples; some didn't. A 'research passport' meant to allow researchers at any hospital access to any other was not, it turned out, recognised by all hospitals. Approvals that were supposed to take 48 hours took weeks.

There has been some improvement since MOSAIC, says Mary. Research approvals by hospitals are now more standardised, and in theory work during a severe pandemic will be excused from some of the requirements.

In 2009, she says, "we were working around the clock". Besides the administrative nightmares, there was the simple, physical job of putting the right sample tubes, swabs, gloves and other equipment in bags for nurses to use with the next day's patients. Although a senior administrator, Mary put in late nights helping clinical staff fill the bags. "It was all hands on deck."

But studying a pandemic is, by definition, entering the unknown. "Usually you know how frequent a disease is, so you know how many hospitals over how much time you need to work in, to recruit enough patients," says Mary. No one knew that for the 2009 pandemic.

In the end, MOSAIC recruited 255 patients with suspected flu, of whom only 172 actually had flu and not some other cause of flu symptoms. In terms of linking immune signalling chemicals called cytokines to severity, says Peter, it is the



biggest study ever made. It showed what genes were turned on and off by different patients during the infection, and how the virus's genes changed over time – and it uncovered some real surprises.

Jake was Clinical Research Fellow for the study. Mostly, he recalls, that meant racing across London between hospitals and laboratories with a special secure container for patient samples on his bicycle – the fastest way to get them through the London traffic. "The hard bit was cycling in the snow." For eight weeks he got four hours' sleep a night.

"We had to refine procedures as we went along," says Jake, for instance asking nurses to record patient weight and height more routinely so the effect of obesity on severity could be tracked. "One legacy of MOSAIC is that we will be better prepared to do outbreak research the next time."

In fact Jake and Peter are now part of a global research consortium, called ISARIC, and a European network called PREPARE, working to develop standard protocols for doing this kind of investigation anywhere. "As long as we all get the same standard, core clinical data and get the samples in the freezer, we can analyse them later, pool data, and really dissect a disease," says Jake.

For MOSAIC, that analysis has now yielded a clutch of research publications to be published later in 2014. One exciting result has already come out. Researchers at the Sanger Institute near Cambridge discovered that a gene called *IFITM3* codes for a protein that helps mice fight off the flu virus. The MOSAIC team looked at their severely ill patients – and sure enough, they were nearly 20 times more likely than the British public generally to carry a mutation of *IFITM3* that didn't fight flu so well.

But the final answer to the question of why some people become severely ill with flu and some don't even have a cough must involve more than that one gene. "It will turn out to be a combination of unfortunate events," says Peter. "The particular virus, the patient's genes and immune response, maybe the bacteria that are also present."

That's hard to untangle even from exhaustive data on sick people, says Jake. But, he says, MOSAIC is being analysed with a clear focus on how it might improve the way patients are treated.

For example, it might give us a way to find people who are most at risk and prioritise them for pandemic vaccines or antiviral drugs. It may show us how to counter the unhelpful immune responses that can do much of the damage in flu, or how to shore up some people's faulty defences, perhaps via the *IFITM3* protein. We might learn how to boost immune reactions that limit the severity of disease even if we can't prevent infection. We might learn which bacteria in our lungs are most likely to attack us the minute our defences are lowered by a flu virus, and devise ways to stop them.

"MOSAIC allowed us to put the whole picture together – the patient's genes, the pathogen, the other pathogens that co-infect with it – and that's never been done before," says Jake.

But perhaps as important, it showed us how to do medical science in a new way, as Peter puts it, "in the teeth of a pandemic". Besides teaching us about flu, MOSAIC revealed much about our systems for regulating research, and how those must evolve to let us grapple with the next pandemic. The doctors, researchers and administrators who made it happen all hope those lessons will be learned in time. ■

DEBORA MACKENZIE is a science journalist who writes regularly for *New Scientist* and other publications. She specialises in writing about infectious disease, arms control, food production and complexity.

FOUR STOREYS  
HIGH→ **SENSOR AND  
COMMUNICATION  
TECHNOLOGY**

Some of the world's most advanced equipment for monitoring and controlling chemical processes is being trialled, including 250 sensors for monitoring conditions in the plant. Some sensors are wireless while others are powered by excess energy harvested from the plant. There are also four surveillance cameras, enabling students to monitor any aspect of the facility in real-time.

→ **PLANT POWER**

The Carbon Capture Pilot Plant is situated in the core of the building that is home to the Department of Chemical Engineering. The pilot plant demonstrates how a power station could capture carbon dioxide emissions, separating 1.2 tonnes of CO<sub>2</sub> per day from other gases in a continuous process that sees them separated and remixed again and again. The principles behind running this plant can also be applied to other industrial facilities, giving students valuable hands-on experience before they enter the workforce.

→ **REMOTE CONTROL**

Students can also dial-in to the plant control system using their iPads to monitor and operate the plant remotely. The idea is for undergraduates to learn how engineers in the future will be able work offsite and still communicate with staff to solve problems.

**+ ONLINE EXTRA:** Take a behind the scenes tour with TV presenter Robert Llewellyn as he chats with Dr Daryl Williams, Project Manager of the Pilot Plant, about the meaning of carbon capture and why it is an important weapon against climate change. [bitly.com/imperial-pilot-plant](http://bitly.com/imperial-pilot-plant)

# TALL ORDER

IMPERIAL'S £2 MILLION CARBON CAPTURE PILOT PLANT IS THE MOST SOPHISTICATED OF ITS KIND IN AN ACADEMIC INSTITUTION WORLDWIDE.

**THE REALLY COOL THING** about this four-storey high pilot plant of the future is that it provides a unique hands-on education experience for the College's undergraduate chemical engineers, who can actually run it themselves in a controlled and safe environment.

The plant uses the latest communication, computing and sensing technology provided by the power and automation technology company, ABB.

Imperial academics expect to train more than 8,000 undergraduates during the plant's predicted 25-year lifespan.

# CATALYST FOR CHANGE: THE CHEMIST BEHIND FAIR ACCESS



As admission for disadvantaged students to university continues to dominate debate in higher education, *Imperial* magazine catches up with alumnus Professor Les Ebdon, who became Director of Fair Access to Higher Education in February 2012.

WORDS BY IAN MUNDELL

ILLUSTRATION BY DAVID DESPAU

**As soon as Les Ebdon was proposed as a candidate to lead the Office for Fair Access (OFFA) in 2011, journalists, MPs and other people involved in education policy started to ask about his own experience of going to university. OFFA's mission is to ensure that English universities and colleges charging higher tuition fees also work to attract students from disadvantaged backgrounds. So, what kind of student had Ebdon been, back in the 1960s?**

He grew up on a corporation estate, attended Hemel Hempstead Grammar School and was the first of his family even to think of going to university. The attitude among his peers was that it was "not for the likes of us". Yet he aimed high and applied to Imperial.

This experience fits the role perfectly, although Ebdon has now told the story so many times that it has worn smooth. Speaking a year and a half in to his mandate, in the spartan office he uses when in London rather than at OFFA's Bristol headquarters, he goes through it again with good grace, but not much enthusiasm. He becomes more animated when the conversation turns to chemistry, the reason he wanted to go to university in the first place. "I think I chose chemistry because I liked explosions and colour changes," he recalls. "In chemistry you can see what's happening, in physics you can't."

Crucially, his school did more than just put on a show with science. "I had an excellent grounding in practical chemistry before I went to Imperial," he says. "I don't know if all grammar schools were like that, but it was a marvellous opportunity to have that quality of chemical training."

He chose Imperial for practical and academic reasons. "I grew up far enough outside London that I couldn't be expected to live at home, but not so far out that I couldn't get home for the weekend. That seemed to be important. And Imperial had an outstanding reputation."

He already had a strong idea of where a degree would take him. "I thought I would go into industry as a chemist," he says. "That was my expectation throughout my undergraduate period." When the time came to specialise, he chose analytical chemistry. "I discovered atomic spectroscopy and inductively coupled plasmas, and that was really exciting to me."

It is not, he agrees, the most glamorous area of chemistry. "At Imperial at that time you had Nobel Prize winners in organic chemistry in Sir Derek Barton in 1969, and in inorganic chemistry in Sir Geoffrey Wilkinson in 1973. Analytical chemistry was a bit

of a poor relation, but actually that suited me. I work best when there is something to prove."

The choice also played to his strengths in practical chemistry and a certain feeling about the future. "I have a strong strategic sense and I realised that analytical chemistry was going to come up very quickly. And so it has proved. I never regretted the decision."

The questions he is now asked about the difference between his background and that of his contemporaries at Imperial did occupy his mind when he first arrived on the campus. The student body in the 1960s seemed very different from the present situation where nearly 65% of first-degree undergraduates come from state schools.

"It was a much bigger jump than I thought it would be," he says. "I went there expecting other people to be similar to me, only to discover that nearly all of them had been either to fee-paying schools or direct grant schools, which existed in those days. And nearly all of them had done a third year sixth and were much better equipped in mathematics than I was. I'd only done pure mathematics, and therefore I had to learn applied mathematics quite quickly."

His background did have its compensations, though. "They were nearly all boys who had been educated in single-sex schools," he says, before pausing to measure his words. "Not all of them were well-equipped with social skills."

This initial feeling of difference was soon pushed aside by the excitement of living in London in the 1960s and the distractions of university life. He edited *Felix*, Imperial's student newspaper, and chaired societies: "I got involved in things." But in his present role, it does come back to him.

"I learned just how nervous and disoriented you can be when you go up to university, and how important it is for institutions to be welcoming and friendly, particularly to non-traditional students," he says. "That would have made a lot of difference to me and to people from similar backgrounds. I remember one guy left at the end of the first week. It was too much of a culture shock for him."

Towards the end of his undergraduate studies, Ebdon was still thinking of an industrial career. Then one company he was talking to mentioned that it also funded research studentships, and he started to think of staying in academia a little longer. After completing his BSc, in 1968, he remained at Imperial for a PhD on analytical atomic spectroscopy, which he completed in 1971.

By now he was committed to a research career, but he faced formidable obstacles if he was to do this as an academic. "Chemistry departments were trying to downsize in a world where you couldn't make redundancies, so there were just no academic opportunities in the United Kingdom."

So he looked overseas and found a place as a lecturer in chemistry at Makerere University in Uganda. As well as career considerations, he was also motivated by altruism. "I got involved in Third World and development issues when I was a student, and this seemed to be a marvellous opportunity to make a contribution."

Initially the move seemed to pay off. He was able to recruit research students and lay the groundwork for a Masters programme in analytical chemistry. He also discovered that he liked teaching, a side of academic life

of which he had limited experience up to that point.

But in 1972 Uganda's leader, Idi Amin, expelled the country's Asian community. "That radically changed the university, because many of the people who would have come on the Masters programme were Asian," Ebdon recalls. "It changed the nature of the country, and of course brought the British and Ugandan governments into direct conflict."

With family concerns weighing on top of the political uncertainties of remaining in Uganda, Ebdon started to look for a chance to return to England. The offer of a post as senior lecturer in analytical chemistry at Sheffield City Polytechnic was a godsend. As well as teaching, he immediately took steps to get his research career going again. "That's an Imperial legacy," he observes. "I've always had this drive to engage personally in research and an expectation that others would too."

His background also helped open the way to new research collaborations. "Local industrialists knew some of the work that had been going on at Imperial and talked to me about the possibility of applying it, and that's when I switched from being a pure analytical chemist – if you can ever be such a thing – to being a more applied one."

He worked on coal and steel analyses, and the newer area of environmental chemistry. "In Sheffield there were some very interesting pollution scenarios that we began to look at," he recalls. "That moved me into the environmental field and prepared me for the next step, which was going down to Plymouth, where there was no industry but there was plenty of environment."

At Plymouth Polytechnic he became a professor and later took on administrative responsibilities, ultimately becoming Deputy Vice-Chancellor when it was reborn as a university in 1992. He stopped teaching, but was careful to continue his research work.

"It kept me grounded, and also meant that I didn't have to tell people about the expectation to do research," he says. "If the Deputy Vice-Chancellor was publishing dozens of papers a year and pulling in a few million pounds of external grants, why were they sitting around saying they couldn't do anything?"

After a further decade of academic work, Ebdon decided that it was time for a decisive move into university management, becoming Vice-Chancellor at the University of Luton. "People were very surprised I took the job at Luton," he recalls, "because it wasn't in

particularly good shape at the time. But I thought it was somewhere I could put something back."

Under his management, the university's turnover rose from £38 million to £134 million. Research income trebled and student numbers rose from under 10,000 to over 25,000. It also changed name, becoming the University of Bedfordshire in 2006 when it took over the Bedford campus of De Montfort University. "I think we are still regarded as a case study of how to rebrand a university," Ebdon says.

He announced his retirement in 2011, at which point he was approached to become director of OFFA. Once again, this was a role in which Ebdon felt he could give something back to higher education. "I knew what access and wider participation was all about, and I was passionate about it because of my own personal experience."

Before ministers confirmed his appointment, he had to endure a minor media storm when a House of Commons committee declined to endorse his candidacy. While an uncomfortable initiation, this experience has not cast a shadow.

I THINK THAT'S THE ROLE OF A FLAGSHIP UNIVERSITY LIKE IMPERIAL. IT'S NOT JUST TO RECRUIT TO IMPERIAL, BUT TO RAISE THE NUMBER OF PEOPLE GOING INTO SCIENCE, ENGINEERING AND MEDICINE.



"The difficulty for my opponents is that I'm doing the job with none of the disasters that they said would befall the nation," he says. "And we are being successful. Not only are the numbers of applications from disadvantaged students at record levels, the numbers actually being admitted to the most selective universities are improving substantially."

Any university or college in England that wants to charge tuition fees above a certain level has to submit an access agreement to OFFA, setting out its plans for attracting disadvantaged students. Typically this involves offering bursaries and conducting outreach work with schools. If OFFA thinks these plans are not ambitious enough, it can refuse to endorse the agreement and so prevent the institution charging higher fees.

This is one of two sanctions Ebdon can apply to institutions, the other being to recommend a fine if commitments are not honoured. Speaking to MPs he referred to it as "the nuclear option", a phrase seized upon by his opponents in the press. Now he is more cautious. "Perhaps I should say there is only a monkey wrench, there are no small spanners," he jokes. "But the biggest tool we have is persuasion and negotiation."

So far OFFA has not had to use the monkey wrench. "It comes very close every year, there's no question about that," he says. "The longer I go without refusing one, the more people might say I've given in and am no longer standing by the principles I set out when I took the job. And that's certainly not true."

Instead, the higher education sector is very cooperative when it comes to widening access. "We have a generation of university vice-chancellors, many of them like me first-generation students from non-traditional backgrounds, and they get it," he says. "The other group who get it are those who have had experience in the United States, where social mobility is taken for granted."

While Ebdon cannot comment on the performance of individual institutions, he appreciates the position of his old college. "Imperial faces a real challenge, not only because it is highly selective but because it is highly selective in STEM subjects [Science, Technology, Engineering and Mathematics]," he says. "We also know that medicine is one of the most difficult areas in which to broaden access."

Yet he also sees London as fertile ground. "At one time schools in London were seen to be a bit of a disaster area, and now they are producing the highest rate of students from disadvantaged groups going on to university."

This is why he is pleased to see Imperial reaching out. "Maybe not everybody who catches the excitement of STEM at an Imperial outreach event is going to go to Imperial, but hopefully they are going to study STEM somewhere," he concludes. "I think that's the role of a flagship university like Imperial. It's not just to recruit to Imperial, but to raise the number of people going into science, engineering and medicine." ■

IAN MUNDELL is a journalist specialising in higher education and research, who divides his time between London and Brussels. A lapsed biochemist, he now spends his time studying the metabolic pathways of the body politic. Like Les Ebdon, he was the first person in his family to go to university.

# GOT THE BOTTLE?

➔ For over a century, the unwavering focus of the Royal School of Mines has been on a black, battered, metal bottle...

The annual gathering of two packs of miners all began in London one blustery December day over a 15-a-side oval ball game. Since 1902, members of the Royal School of Mines have been meeting their rivals from Cornwall, the Camborne School of Mines, almost every year to valiantly face-off at rugby—an English invention that historically has been the chosen game of Home Nations miners.

While the very first game finished in an “honourable draw”, the competition—now the second oldest rugby varsity match in the world—grew in prominence each year with both teams vying for the respect and glory of winning. Held alternatively in London and in Falmouth, the game includes waggish subplots and shenanigans as part of the mayhem. This was no exception in 1926 when a group of RSM students ‘acquired’ a 3-foot tall tin bottle from the top of a Bass-Charrington lorry. From that day forward, it has been known as “The Bottle Match” with the proud winning team retaining not only the title, but possession of the now rather battered and beloved bottle for another year.

Traditionally held during the month of February, the mud-splattered fields are not the only place the teams challenge each other. As time passed, additional sports were added to showcase the diversity of the colleges, and now includes football, mens and ladies hockey, squash, golf, netball and basketball. Despite this, the winner of the bottle hinges entirely on the outcome of the rugby match, with 2014 seeing the bottle retained by our very own miners.



“The hardest non-dirty game that I have ever played.”

1979 RSM PLAYER

“RSM are magic ... CSM are tragic.”

THE ONLY TIRADE OF VERBAL ABUSE — OF THE MANY FLORID TAUNTS — SUITABLE FOR REPRINT.

“The game proved to be very hard indeed ... Two CSM players had to be taken off concussed and one with a broken jaw. Doug McIntosh had to be led off with ten minutes to go with a twisted ankle.”

AS REPORTED IN FELIX, 27 FEBRUARY 1981

“Just got back from the #bottlematch and there were 6 streakers who ended up mud wrestling in the middle of the pitch at half time!!”

TWEETED 25 FEBRUARY 2012



“Due to the long-standing history of the competition and the large number of students and alumni that have been part of the Bottle Match, you don’t feel like you are winning it for yourself or even your team but for RSM and its associates from the past 150 years or so.”

RSM SPORTS OFFICER SAMANTHA JONES (MSCI EARTH SCIENCE AND ENGINEERING 2010)

“It is incredibly important to point out every single failing that any CSM player has. Do this in a loud voice and be incredibly blunt about it. They need to know. Megaphones are a great way of getting your point over.”

TIPS AS NOTED BY NAT ELLIOTT-GREEN (MSCI EARTH SCIENCE AND ENGINEERING 2013) AND ALEX KARVELAS (MSCI EARTH SCIENCE AND ENGINEERING 2012, MSC 2013)



<p><b>STATS &amp; FACTS</b></p> <p>Age before beauty / Royal School of Mines Established : 1851</p> <p>Camborne School of Mines Established : 1888</p>	<p>Getting blotto / Since the 1950s, players on the winning side were presented with personal tankards from Union Corporation/Gencor. This tradition continues with the tankards provided by Michael West and the Mining Journal.</p>	<p>Celebrate keeping the bottle where it belongs / Stop by the Union Bar for a pint and to view the Bottle's place of honor among the Union's impressive historic tankard collection.</p>	<p>Top RSM winning final scores /</p> <table border="1"> <tr><td>1998</td><td>26-0</td></tr> <tr><td>1980</td><td>24-0</td></tr> <tr><td>2012</td><td>22-0</td></tr> <tr><td>1938</td><td>20-8</td></tr> </table>	1998	26-0	1980	24-0	2012	22-0	1938	20-8	<p>The beastly results /</p> <table border="1"> <tr><th>Total matches</th><th>RSM victories</th><th>CSM victories</th><th>Draws</th></tr> <tr><td>118</td><td>46</td><td>37</td><td>7</td></tr> </table> <p>Note: There are 28 mysterious missing years from the tally...</p>	Total matches	RSM victories	CSM victories	Draws	118	46	37	7	<p><b>+ ONLINE EXTRA</b></p> <p>See a selection of images from past inglorious Bottle Matches and share your own vivid tales of the match at: <a href="http://bit.ly/bottle-match">bit.ly/bottle-match</a></p>
1998	26-0																				
1980	24-0																				
2012	22-0																				
1938	20-8																				
Total matches	RSM victories	CSM victories	Draws																		
118	46	37	7																		

As the robots returned to their labs at the end of the first Imperial Festival in 2012, the College turned its mind to finding ways of engaging the public on a more regular basis. Recognising that no festival is complete without its own fringe, we launched a series of themed monthly research events. These transformed the College's Main Entrance — the only publicly visible exhibition space on Exhibition Road — into a destination for visitors looking for evening entertainment with a difference. Fringe events also provide staff and students with a platform to pilot ways of connecting public visitors to their research.

# Fringe

## » Benefits



[↖] **CUTTING CLOSE TO THE BONE:** We teamed historical samples from the Pathology Museum at Charing Cross Hospital with keyhole surgery demonstrations to help visitors learn more about their bones. The programme included opportunities to sample a range of chocolate bars to illustrate symptoms of brittle bone disease.



[↑] **WHAT MAKES ME ME?** An evening on the science of identity proved a fitting way to get to know some of our new neighbours in White City. Local businesses, residents and school students were among visitors to the Fringe as it went on tour for the first time to Imperial West.



[↑] **MAKE A DATE WITH DISCOVERY:** Imperial Fringe events typically attract crowds of 300–500 people over the course of a themed evening to take part in debate, interactive experiments and tours of research facilities. Activities are designed to encourage one-on-one conversations with researchers as well as crowd participation.



[↑] **ARTS EXPERIMENT:** ArtsFest Fringe creates partnerships between student societies and researchers, like this mash-up between the Music Technology Society, electrical engineers and their interactive musical tabletop.



[↑] **OUT AND ABOUT:** Imperial's public engagement tricycle provides an unusual, mobile platform to connect people with research. Here, the Mayor of Kensington and Chelsea finds out about solar sails as the trike takes to the streets to pedal and peddle science to South Kensington visitors, as part of a local Celebration of Science.



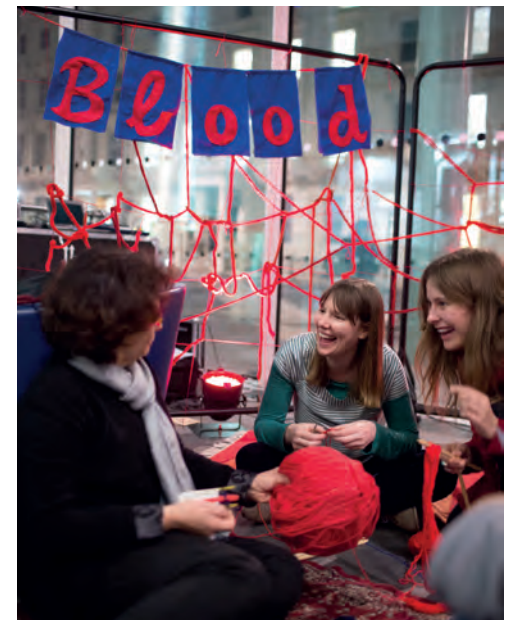
[↖] **YOUR NUMBER'S UP:** Over 300 people turned up to the Fringe about big data to find out about what Imperial is doing to address some of the challenges created by the ever-increasing amount of information being generated, such as who owns it, and how should it be stored and used. This Fringe was organised in the run-up to the launch of Imperial's Data Science Institute.



The programme included a tour of the College's computing facilities, and a collaboration with a dance company to explore how cancer develops as a result of errors in our DNA data. Demonstrations about ecology, finance and astronomy, and a citizen science project to capture real-time data from visitors featured in the interactive exhibits.



[↖] **FESTIVE FRINGES:** December Fringe events are designed to connect visitors to seasonal research including work related to food, drink, liquids and comets. Displays include an ice-cream-generating thermodynamics display, an entire Christmas dinner recreated in cake, the messy delights of non-Newtonian liquids, and the opportunity to knit an artery and chat with a cardiovascular scientist as part of the Blood Lines project.







“My department was so cool. Every year lecturers let loose in the Chem Eng Show, with men dressing as women and even dancing ‘Gangnam style’. In one of the final exams students were allowed to come dressed up – I went as Pippi Longstocking, with gravity defying hair.”

—Grace Chan (MEng Chemical Engineering 2012)



**RACING GREEN REUNITED**

Engineering alumni, students and staff from the College’s Racing Green project gathered to reminisce about motor-racing and vehicle-building escapades, while catching up on Racing Green developments. The project has sparked lifelong passions and swayed career paths, taking some as far as Formula 1.

**RIVETING RIVALRIES**

**Crack Open the Pimm’s** Imperial cruises home to victory with the Prince Albert Challenge Cup at the Henley Rowing Regatta in July 2013.



**High Spirits** In Bottlematch – the world’s 2nd oldest varsity rugby match – the mighty Royal School of Mines retained the Bottle after a tense draw with the Camborne School of Mines.



**March Madness** Imperial Medics trounced College 37–11 to win back the JPR Williams Cup in front of a raucous crowd at Twickenham Stoop.



**good reception**



It’s official: Sir Keith is the “huggiest” President & Rector in Imperial history as demonstrated by his enthusiastic squeeze with 94-year-old Dr Hiralal Patel (Mechanical Engineering 1941, PhD Aeronautics 1945)

**HONOURING GENEROSITY**

Historic impact

Staff and students from the College thanked the largest ever gathering of alumni and supporters at the annual Donor Thank You Event.



The event marked a significant fundraising milestone as 2012–13 saw the highest number of individuals donating to Imperial compared to any previous year. More than 4,500 individuals donated to Imperial, equating to a 25% increase on 2011–12. Sir Keith said: “Those who have benefitted from your generosity say thank you.”



“I was a student here and I had a wonderful time. When I came my education was all free, and I think that if I were coming now I just wouldn’t be able to stand the thought of debt. I thought it would be quite nice to give a helping hand to some current students.”

—Judith Farr (Physics 1962)



SAN FRANCISCO



DELHI

**GLOBAL GATHERINGS**

From Manhattan to Melbourne, Bangalore to Berlin, thousands of alumni plugged into Imperial’s global network at scores of special events.

“The network of people is so important – in fact it was the friendly environment that drew me to Imperial ... the support of friends was crucial, and some of my closest friends now are Imperial alumni. It is great to have that common thread and experience.”

—Natasha D’Silva (MSc Centre for Environmental Policy 2010)



NEW YORK



KOLKATA



LOS ANGELES

**IMPERIAL WEST TAKES OFF**

Researchers, business and government leaders joined Imperial staff for the launch of the vision for Imperial West, the College’s new 25 acre research and innovation campus in White City, west London. Global academics, industrialists and entrepreneurs will co-locate with Imperial people to create value from ideas on an unprecedented scale.



Mayor of London Boris Johnson channels his inner Harry Potter by trying an invisibility cloak Imperial physicists are developing using metamaterials.

**DROP IN AND RELAX**

Mr Koh Boon Hwee (Mechanical Engineering, 1972), was on hand in July to formally open the new Alumni Visitor Center on the South Kensington Campus. The Centre offers Imperial’s 170,000 alumni across the world a welcoming base in London where they can enjoy free wi-fi, complimentary refreshments, a lounge area, newspapers and magazines, a left-luggage service, and a bookable meeting room.



**SOUND ADVICE**

Young alumni from Mathematics and Life Sciences met with current students in October to talk about their careers so far and their experiences with their current and recent employers.



“It was a pleasure ... I felt I had ‘paid it forward’ in a practical way – something I would recommend and would do again.”

—Dr Erika Cule (Life Sciences 2008, MSc 2009, PhD School of Public Health 2013)



## PITCH PERFECT

**THE TECHTONICS**, Imperial's premier *cappella* group, are no strangers to improvised performances — whether busking in Portobello Road market, orchestrating 'flash mob' marriage proposals or jamming at parties. But they've never sung anywhere quite like the anechoic chamber in the Centre for Bio-Inspired Technology — a noise free environment used for testing sensors and devices. "Now that was a really interesting experience," says Dr Eugene Chang (PhD Bioengineering 2014) who co-founded the group in 2008. "We were doing some harmonies, but it was impossible to hear the person in front of you, because if the sound wave isn't moving in your direction it just gets stopped dead at those grooved surfaces."

A *cappella* in its most basic form involves singing without instrumental accompaniment — although many groups use their voices to emulate instruments and percussion. The Techtonics — whose name is a three-way play on technology, plate tectonics and the tonic musical key — have garnered a reputation on the circuit for adventurous, experimental arrangements. "Imperial has a very wide range of people who like a diverse range of sounds," says Eugene. "That's helped to forge our unique identity and also draw in new members who are dynamic and interested in trying new things." With their debut album *Groundbreaker* behind them, the group is now taking its sound to the spiritual home of college *cappella* with a tour of the US East Coast, this summer.

**+ ONLINE EXTRA:** See how the Techtonics made one couple's day in this video: [bit.ly/techtonics](http://bit.ly/techtonics)  
Listen to the album at: [www.thetechtonics.co.uk/music/albums/groundbreaker/](http://www.thetechtonics.co.uk/music/albums/groundbreaker/)



PHOTOGRAPHY: DAVE GUTTRIDGE/THE PHOTOGRAPHIC UNIT

## Match maker

**Paediatrician Kenneth Hugh-Jones (St Mary's Medical School, 1946) pioneered the development of bone marrow transplants for children, saving hundreds of young lives.**

⇒ Kenneth Hugh-Jones, who died in May 2013 aged 89, led innovations in bone marrow transplants and was paediatrician to Anthony Nolan, whose name was given to the world's first bone marrow register.

Ken, or HJ as he was best known, began his medical studies at St Mary's Medical School in 1941. He was remembered as an exuberant student, once doing permanent injury to his back by jumping off a thirty foot sand dune during a post exam holiday. Embarking on his career in Poole, Dorset, his subsequent appointments included time with the Royal Army Medical Corps in Palestine and Tripoli before he joined Westminster Children's Hospital in 1966.

In 1970 he oversaw the first successful bone marrow transplant for immunodeficiency disease in the UK. Transplant techniques were soon extended to the treatment of childhood leukaemia, aplastic anaemia and the inherited blood condition thalassaemia major. Following a decade of discoveries by Ken and his colleagues to advance paediatric bone marrow transplantation, by the 1980s patients with inborn errors of metabolism and other genetic conditions were also benefiting.

The success of bone marrow transplantation relies on finding a close match between the tissue type of the patient and a donor. In 1974 the mother of one of Ken's patients, Anthony Nolan, identified the pressing need for a register to match unrelated donors with patients requiring transplants, and created the Anthony Nolan Bone Marrow Register.

Sadly for Anthony no donor could be found and he died aged 8 in 1979 from the rare blood condition, Wiskott-Aldrich syndrome. The Trust bearing his name



Dr Kenneth Hugh-Jones (St Mary's Medical School, 1946) 1923–2013

today supports an active research programme and manages a register containing details of more than 500,000 potential donors, allowing more patients access to treatments developed by Ken's team.

For Ken's own children growing up, he was the dynamo who taught them outdoor pursuits, in his element organising sailing races with 20 or more Mirror dinghies on their annual family sojourns in France. Ken's first wife Denise, also a doctor, died in 1986, and in 1988 he married artist Ruth Heppel.

Retiring in 1995, Ken became a trustee of the Cogent Trust, a charity supporting research into bone marrow transplantation. Towards the end of his life he took on the role of warden at his local village church, continuing to direct his considerable energy towards helping others.

## Model career

In 1946 sixteen-year-old John Stollery (BEng Aeronautics 1951, MSc Aeronautics 1952), keen builder of model aeroplanes, attended an interview for a job with *Aeromodeller Magazine*. Describing the intricacies of the Wakefield class model which he'd brought along, John made such an impression that the editor urged him to go back to school and apply for a university place to study Aeronautics. He took the advice and went on to graduate from Imperial with an MSc in Aeronautics in 1952 and became Lecturer in Aerodynamics at the College in 1956.



Professor John Stollery (Aeronautical Engineering 1952) 1930–2013

ILLUSTRATIONS: KIM WELING

In the late 1950s John helped the pioneering Bluebird race car team to design the British Bluebird K7 and CN7 — water and land speed record breakers respectively. Later, he developed the 'Gun Tunnel', a hyper-sonic wind tunnel that advanced understanding of high energy flows, invaluable information during the Cold War race to produce the fastest aircraft and facilitate manned space flight.

Spending his latter career at Cranfield University from 1973, John also served as Chief of the Ministry of Defence Technology Board. In recent years he again made time to construct and fly model aircraft and, ever the experimenter, pursued a new interest in pottery. John died on 28 June 2013 aged 83.





**STEPPING DOWN MEMORY LANE**

**Denise Powell**  
*(BSc Metallurgy and Materials Science 1973)*

Over the course of one summer Saturday afternoon, seven members of my Materials and Metallurgy 1973 cohort had free rein of the Alumni Visitor Centre for our 40-year reunion. We spent the afternoon drinking coffee, taking photographs, and talking, talking, talking... It was absolutely perfect.

The last time we met as a group was seven years prior so there was an awful lot to catch up on. Interestingly, we had far more stories to tell

about our personal lives than our careers.

As we took steps down memory lane, we reflected on our small course cohort of ten as an eclectic mix of folk. We were also the only course at the time with more female students than males. Despite being a bit of a hotchpotch of a team, we moved about as a swarm; going between lectures, having coffee breaks and most importantly, always being there to help each other out. While our studies were intellectually very hard, I never remember feeling adrift because there were always people to lean on.

The Alumni Visitor Centre was a delight to use for our reunion because it's a space on campus where alumni are made to feel special. It's comfy, airy, and it has just the right touchdown facilities. It's a great place to go if you want a rest, or to catch up on emails. I'll definitely be back; it's the place to go when you're in London!

“A great idea, this will literally create a College ‘open door’ to alumni.”  
—Chris Mountier  
*(BSc Chemistry 1984)*



→ **ALUMNI DISPATCHES**

Nestled within the bustle of Imperial's South Kensington Campus, a space has been specially created for all alumni to enjoy. Recent visitors share their experiences.



**A HOME ON CAMPUS**

**Dr Paulina Chan** *(PhD Electrical Engineering 1977)*

The first time I visited the Alumni Visitor Centre was last November when I had numerous meetings scheduled at Imperial. I sat down on the comfy sofa and immediately found myself across the table from another alumnus who was also an international student many years ago. Our instant bond was our connection with Imperial. There are no strangers in the Alumni Visitor Centre — when conversation starts with anyone there, we usually discover we have something in common.

Another great experience was meeting fellow students from Hong Kong. While sipping frothy cappuccino and English tea, we planned events for our mentoring programme which is developing valuable professional and personal networks among alumni mentors and student mentees from Hong Kong. Thanks to the free wifi we could instantly post our photos on Facebook as a show-and-tell for those in Hong Kong!

During my latest visit to London the Alumni Visitor Centre was my home-office-in-town, my conference and reception room. The friendly and welcoming members of staff are constant fixtures and it provides a precious social club for Imperial alumni and their guests. It's great to have a home on campus.

Imperial is the platform for my academic education but also my personal growth. The influence of my professors and contemporaries, the associations with international networks of alumni and friends, and the spirit of innovative culture have all equipped me to be a transdisciplinary professional and a global citizen of the world.

“A fantastic space — I really enjoyed my visit and particularly enjoyed the free refreshments and impressive facilities. I would recommend this to my network.”  
—Katherine Lamont *(MBA 2009)*



**COME BY FOR A VISIT**

The Alumni Visitor Centre provides an exclusive space for visiting Imperial alumni and their guests to relax, meet friends and colleagues and catch up with the latest developments at the College. The Centre can also be privately booked by alumni. It is located in the main entrance of the South Kensington Campus on Exhibition Road.

For enquiries or to make a booking:  
*Email:* [alumniculture@imperial.ac.uk](mailto:alumniculture@imperial.ac.uk)  
*Phone:* +44 (0)20 7594 1925  
*Web:* [www.imperial.ac.uk/alumni](http://www.imperial.ac.uk/alumni)



**IMPRESSING THE INVESTORS**

**Dr Florent Dauchy** *(MBA 2012)*

I'm in the process of setting up a new high-end food company so at the moment I'm learning an awful lot about speciality mushrooms. We've secured some of the initial funding for the business so now we're building a mushroom farm. It's sort of like a 'Blade Runner' lab. It will be a room where we can control the humidity, and the temperature — basically, where we can fix the seasons. It's like science fiction but there are no chemicals because they'd ruin the taste.

I've been using the Alumni Visitor Centre to host all sorts of meetings for the business, and as a space to have some quiet time to work out the finer points. Every time my boss comes into town we plan at least two days here to brainstorm. She was super impressed by the centre and that's saying something; she's an economist who has been on some of Obama's advisory boards.

If you're a start-up you're mostly on your own so it's great to be able to use the facilities here. In my office at home there's no conference room and there are no people around. Being based at Imperial helps at face value too — it's about who I am and where I've come from.

I like working at Imperial because it's a geeky place — especially for me, since my background is as a scientist.