

PLUGGED IN Life as a blogging professor // **SPLASH** : Water polo and London 2012

Voyages of particle discovery ➔ **KEEPING UP WITH MASCOT RIVALRIES** ➔ **A grand passion for aviation**

IMPERIAL

THE MAGAZINE OF IMPERIAL COLLEGE LONDON

Winter 2012–13



brains trust

Together on the frontline of the fight with MS



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Imperial College London



FROM THE PRESIDENT & RECTOR

Hungry for experiences that stretch them and nourish them, Imperial students go well beyond the nerd

Our 2012–13 *University Challenge* team jokingly referred to the reputation of Imperial students as nerds who can fix a computer but can't appreciate a good novel. They went on to **thrash the competition in their first match** – their countless winning responses to arts and humanities questions giving them the edge.

I've watched Imperial students tussle on the sports pitch and sing enchantingly in the Royal Albert Hall and am continually in awe of their wide-ranging talents. Each October when I welcome the new cohort to campus, I urge them to **try the many doors open to them** at Imperial. They slip easily between new discoveries and Imperial College Union's enticing offer to join, for example, the ranks of kickboxing barbershop quartet singers.

Matching the first-week enthusiasm of our students is both a privilege and a challenge for those who shape their experiences. We need to both stimulate their interests and equip them for their next step beyond Imperial. A new programme named *Imperial Horizons* aims to do just that.



IMPERIAL HORIZONS
A new programme designed to broaden students' education and enhance their professional impact.



STUDENT EXPLORERS
Over the summer members of Imperial College Caving Club helped discover Slovenia's longest cave system.

We've had an excellent response, with undergraduates from all departments taking the course. One option synthesises expertise from across Imperial, with researchers sharing how they are solving problems relating to climate change, global health, energy and water supplies. They ignite discussions among students who wrestle with the issues, considering points of philosophy and policy that they would not normally touch on in their studies.

With a focus on science, engineering, medicine and business, Imperial is distinct among UK universities. But specialisation does not equate to narrowness in vision. Indeed, through our research institutes, we are well placed to pull together multidisciplinary teams who are able to tackle the inter-related challenges facing society from different standpoints and armed with different knowledge and insights. *Imperial Horizons* should prepare graduates to make their own valuable contributions as good communicators and team players **with a firm grasp of the bigger picture.**

Beyond their formal studies, Imperial College Union plays a vital role in feeding the broader interests of our students. Each year they lay on a feast of opportunities to sample new experiences. Just last summer, members of the Caving Club became **the first to tread the floor of the longest cave in Slovenia** as they dived deep into its underground passages. The College also caters for the musical and sporting talents of students, providing facilities and practical support that have helped orchestras to win national prizes and athletes to become Olympians (*see page 15*).

An alumnus was recently overheard saying that she hoped her son would grow up to be a nerd like her. Imperial students and graduates may well enjoy the stereotype, but **the reality is infinitely more colourful.**

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

Spoilt for choice

Imperial, so rich in discoveries, innovations and the pursuit of learning can make choosing what to write about in these pages an almost overwhelming task.

Every academic is attempting something original in their research and, being Imperial, this often goes hand-in-hand with solving a real life problem or addressing a societal challenge, such as the hunt for new treatments for multiple sclerosis described on page 22.

Students are signing up for exciting new courses like the MSc in Sustainable Energy Futures (page 18) and offering to road test – and then improve – the new ways of learning that professors are developing (page 26).

At the same time Imperial is not hiding this splendid light under a bushel, but doing quite the opposite and putting on interactive shows for the public, for example through the annual Festival and Alumni Reunion advertised on page 17 (with a taster from 2012 on page 38).

All of which goes to make the job of editing and producing *Imperial* the magazine a great privilege. Luckily we have been able to secure more excellent writers and artists whose work appears in this issue (page 6), brought to you by our wonderful and tireless features editor Natasha Martineau and our fabulous creative director Beth Elzer.

We will soon be looking to recruit an editor to join our team – so if you too are excited by what's happening at Imperial and have what it takes to help capture it and put it on the page, then please drop me a line at t.miller@imperial.ac.uk. Until the summer, I hope you will find much to enjoy in this edition.

TOM MILLER *Biology 1995*



Behind the scenes → Professor Richard Reynolds discusses multiple sclerosis with Imperial Creative Director, Beth Elzer. Read the story on page 22.



the INBOX

BRIEF UPDATE

Love the new-look magazine. I was particularly interested in the article on protective gear for soldiers (*Spring 2012, In Brief*), sparked by my son's work for DSTL (Defence Science and Technology Laboratory). His project team have developed protective anti-blast underpants for troops. Hopefully these types of injuries are now less severe.

TINA JAMES

(Chemical Engineering and Chemical Technology 1980)

RAYS OF INSPIRATION

Thanks for a splendid edition of *Imperial*. I thought that you may be interested to know that I have been responsible for the design and delivery of a 'silver sundial' for the Olympic Park, in the Great British Garden.

DAVID M. BROWN

(Aeronautics 1961)

Editor's response → For more Olympic and Paralympic coverage involving *Imperial*, see pages 7, 15, and 41.

PENICILLIN – THE MIRACLE MOULD

Our Spring 2012 issue featured a case of mistaken fungal identity.

Dear Sir, Working in what was colloquially known as our 'bugs department', Alexander Fleming held up my hand one day and remarked, "there's more goodness in the sweat of your hand than a bottle of penicillin, which will be forgotten in 100 years. The lysozymes and opsonins in your hand will be there for another million years". How wise he was!

DAVID MILLER MBBS

(St Mary's Hospital Medical School 1949)

COMING HOME TO ROOST

Just to let you know that a reader of the parakeet article (*Spring 2012, In Brief*) got in touch with information that sounds very promising for finally finding my missing north London roost. I'm so pleased!

HANNAH PECK

(MRes Life Sciences 2009)

WE'RE TWEETING!



No sign of 007 at the Imperial College graduation ceremony in the Royal Albert Hall. Probably for the best.

@STEPHEN_CURRY

Professor of Structural Biology

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

SUBTERRANEAN STORIES

In the Spring 2012 issue, we asked for your tales of the tunnels that run beneath the South Kensington Campus.

I was resident in Tizard Hall in the '60s and one of our oddball actions was to visit the tunnels. In those days, Southside had vertical shafts linking all the floors together to provide vertical service ducts. One night we went up the shaft to see if we could get out onto the roof of Southside but had to 'freeze' outside Doc Cameron's toilet (which backed onto the shaft) while one of his children was sick.

Downwards took us to a service corridor running under the pavement and through a door to a sub-vertical shaft that linked Southside to the main boiler room in Mech Eng. Our route took us towards Civils and then to the old basement of the Imperial Institute. Part of the Institute was still standing and supporting the Queen's Tower. Then up a magnificent old staircase to a small room at the base of the tower to a door giving access to a spiral staircase going up the tower. The door was often locked but this was no problem, as over the door was a small concrete roof and leading off the roof a slot about 750mm x 250mm wide. By lying on your side and letting your feet dangle into fresh air, it was possible to wriggle through the slot and onto the staircase. The views from the top of the tower were great!

COLIN STEWART

(Civil Engineering 1967)

I was fortunate to live in Southside (Selkirk) from 1964–66. I seem to remember that our entry was in the basement by the lift shaft at the west end of the building. I cannot remember how much of the old Imperial Institute remained, but there were still bits of furniture and hundreds of copper printing plates in the basement area around the Queen's Tower foundations, some engraved, some more like woodcuts. We took some and managed to produce beautiful prints of plants and animals, in the style of the

old drawings in the *Illustrated London News* of earlier days. I guess today they would be worth a fortune, but the few we each kept vanished over the years as moving took its toll on possessions.

We could get to the RSM and, I think, almost to the basement of the Royal Albert Hall, and certainly down to the Science Museum. The one easy exit was Southside, to which we always came back, once to be confronted by one of the wardens and guests who had come down a level too far. Diplomatically, they saw nothing.

NICK FERN

(Mining and Mineral Technology 1965, PhD 1968)

We accessed the tunnel system from the Imperial Institute, then home to the examination laboratories and also to a basement cafe referred to as 'Dirty Dicks', in the hope of gaining entrance to the Queen's Tower.

One of our earlier discoveries was the possibility of gaining access to the Royal College of Science (RCS) via a route underneath Imperial Institute Road (now Imperial College Road), which led into the laboratory stores managed by the redoubtable Mr Croker. He could be bypassed by a branch which led to the basement of the Post Office on the corner and thence across Exhibition Road to the Mathematics Department.

However, a more exciting possibility arose when another branch was discovered which led directly underneath the Inorganic Analysis Laboratory at the back of the RCS. Via a hatch in the roof of the tunnel it was possible to make a direct entrance (or disappearance) to or from adjacent benches.

Later on it was found that much of the tunnel network could be traced from above ground following a light fall of snow. To us it seemed logical that the tunnels should have had an access to the underground walkway from South Kensington station but we were never able to find one...

MARTIN HUMPHREY

(Physics 1989)



AND TO ALL OF YOU WHO WROTE IN REGARDING THE SWISS-BRANDED WHOOPEE CUSHION...

Thank you to everyone who got in touch to point out that the image on the front cover (*Spring 2012*) of an inflatable operating theatre featured the Swiss flag rather than the Red Cross. It wasn't a case of political correctness, subliminal messaging or, as one reader ventured, sheer ignorance. The Red Cross is a protected emblem: in order to ensure universal respect for it, the Geneva Conventions forbid any unauthorised use.



FACEBOOK COMMENT

“The magazine is a good, interesting read and the new layout and informal style works well. Not sure diary will allow a trip back to South Kensington though. Really can't believe it was 20 years ago – the mind boggles – so a big hello to all former friends, lecturers and staff. Happy times!”

@ARVIND SALWAN
(MSc Humanities 1993)

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By email • imperialmagazine@imperial.ac.uk
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AND NOW A FEW
WORDS FROM OUR
CONTRIBUTORS

Education journalist **JANET MURRAY (1)** writes mainly for *The Guardian*. A former secondary school teacher, she now teaches journalism at Goldsmiths, University of London. For this issue of *Imperial* she peered into the technology gap between educators and students to discover how the College is developing new approaches to learning (page 26). Although she claims to be a late adopter of technology, she made headlines when she recruited the first journalism apprentice via Twitter @jan_murray.

ALISON GODDARD (2) is tempted to apply for the MSc in Sustainable Energy Futures herself now that she has learned more about



the course in the process of writing the feature on page 18. She was *The Economist's* first online science editor, and is a former science correspondent and education correspondent for that paper. An Imperial alumnus (Physics 1993, MSc Science Communication 1994), she is the author of a forthcoming biography of Luc Hoffmann, an environmentalist and green philanthropist.

SAM WONG (3) (*Saving brains*, page 22) completed an MSc in Science Communication at Imperial in 2009

after his first degree, in Natural Sciences, left him compelled to tell stories about medical research rather than go into the lab himself. He spent a year at the British Heart Foundation before returning to Imperial to join the Communications and Development Division. He now spends his days learning about the latest discoveries from the Faculty of Medicine and disseminating them through the media.

Artist **ANDREW(&REW) WILSON (4)** (*Careering ahead*, page 16) says he's

been drawing since he was in his mother's womb. Influenced by Japanese manga comic book illustrations, he's an avid video gamer whose day job sees him working for US video game company, Valve. He has worked in media ranging from lithography to ink washes. These days he draws using tiny bits of colour in Photoshop. He says, "Afonso's varied and always beautiful work was an honour to illustrate".

London-resident digital illustrator and graphic

designer **ARUNAS KACIN-SKAS (5)** is a 25-year-old multimedia art studies graduate, who hails from Lithuania. His detailed and complex illustrative style, wryly depicts the flows and infrastructures of everyday life, and ably suits the *A matter of course* feature (page 18) about learning technologies. Arunas works at creative agency The Design Surgery and also freelances. His work has been featured in several *The Times* supplements, and in *Dwell* and *Modus* magazines.

PLUG INTO

IMPERIAL

GET THE HEADLINES THROUGH YOUR HEADPHONES

Hear the latest research straight from our scientists and catch up with news from around campus with the Imperial podcast, presented by Gareth Mitchell of the BBC World Service and Imperial's Science Communication Group. Download it and listen on the move or find us on Imperial's YouTube channel.

For more information: WWW.IMPERIAL.AC.UK/PODCAST



PHOTOGRAPHY: (ALISON GODDARD) PHILIPPA GEDGE PHOTOGRAPHY; (SAM WONG) THOMAS ANGUS

in brief

EVENTS + DISCOVERIES

ROAD TO RIO

It was impossible not to marvel at the spectacle of the Olympic and Paralympic Games in London this summer. Not just at the sporting prowess on display, but also the technology that powered athletes like 'Blade Runner' Oscar Pistorius and David 'Weirwolf' Weir to glory inside the stadium. That technology might seem like a futuristic vision lifted from the pages of a science fiction novel, but for a group of Imperial students, it is everyday reality as part of the Rio Tinto Sports Innovation Challenge. Integrated into the existing curriculum for engineering students, it challenges them to design, build and implement Paralympic sporting equipment that can also make a tangible contribution to healthy lifestyles for people with disabilities.

Led by the Department of Bioengineering's Dr Dominic Southgate (Mechanical Engineering 2005, PhD Bioengineering 2009), pictured left with a ski designed for athletes with a through-ankle amputation, the students have been working with Paralympians including TeamGB Javelin-thrower Scott Moorhouse. Projects include a wearable coaching aid that gives tactile feedback to blind athletes when moves are correctly executed, and equipment for a new form of clay pigeon shooting, where athletes aim shotguns by moving only their heads.

Speaking about the potential, Dr Southgate said: "London 2012 saw a huge leap forward in the technology used by Paralympic athletes. The projects our students are working on today could well be informing the technology seen on the track and in the pool at Rio in 2016".



State of the nations

Imperial's *Ethos* sports centre was transformed into an elite training camp for some of the world's fittest people during London 2012. Fourteen Olympic teams trained at the centre, including many of the top 20 triathletes, making use of Imperial's location near to the event's venue in

Hyde Park. Among those who used the facilities were Olympic Triathlete Champions – Alistair Brownlee (Great Britain) and Nicola Spirig (Switzerland). Eleven medals were won by athletes who used *Ethos*, which would rank 23rd in the final medal table if the sports centre were a

nation. Imperial students Melanie Wilson (Medicine) and Adam Scholefield (Engineering) competed in rowing and water polo respectively, while alumnus Alexandra Rickham (MSc Environmental Policy 2006), took bronze in the SKUD 18 Paralympic Sailing.

INTERNATIONAL CONNECTIONS

► **Alexandra Rickham:** Born in Jamaica and also competed at Beijing 2008.

► **Melanie Wilson:** Grew up in Hong Kong and has worked in Kenya.

► **Adam Scholefield:** Born in Leeds and played for PVSK in Hungary.

• THE RISE OF CHINA AT IMPERIAL

Imperial's strong relationship with China is reflected both in its numerous academic links and the significant contributions of Chinese staff and students to the Imperial community. The last year has seen a number of developments which are strengthening that relationship:



STATE COUNCILLOR VISITS

Madame Liu Yandong paid a visit in April. A member of China's Politburo, and the country's highest ranking female politician, Madame Liu toured the South Kensington Campus and learnt more about the College's links with China.



AGREEMENT SIGNED WITH TSINGHUA UNIVERSITY, BEIJING

In July, the President & Rector signed an agreement with the President of Tsinghua University Professor Chen Jining (PhD Civil and Environmental Engineering 1992). It will build a platform for collaboration within the areas of engineering and technology transfer.



NEW CHINESE SCHOLARS

The first cohort of students to benefit from an agreement between Imperial and the China Scholarship Council joined the College. Fifteen full scholarships are enabling some of China's best students to study towards a PhD at Imperial.



I cringe when it is called the God particle."

– TOM KIBBLE

10,000 BRAINS • 100 COUNTRIES

€7.5 billion project has involved over 10,000 scientists and engineers from over 100 countries.

A 27KM DONUT IN THE GROUND

The LHC lies in a tunnel 27km in circumference, as deep as 175m below ground, and spanning the border between Switzerland and France.

IS YOUR HEAD SPINNING YET?

Tens of petabytes of data are produced each year. 1.5 petabyte is the size of 10 billion photos on Facebook.

AND IT'S JUST REALLY COOL

The Large Hadron Rap has had more than 7.5m views on YouTube. Watch it: www.youtube.com/watch?v=j5oZssEojtM



What a difference half a century makes

When a young academic named Tom Kibble first walked the halls of the Department of Physics (now also known as the Blackett Laboratory) in the late 1950s, he could hardly have imagined that a theory he proposed would, some 50 years later, be regarded as fundamental to one of the most significant discoveries mankind has made. Scientists working at CERN's Large Hadron Collider in Geneva including Professor Jim Virdee (Physics) declared in July 2012 that they have identified a particle they are 99.999 per cent certain to be the elusive Higgs boson. The Higgs boson is believed to convey mass to the fundamental particles that form the building blocks of the universe, and the newly identified particle has a large mass, around 125 times the mass of the proton particle that is used as a standard unit of measure of mass for all particles. Without evidence of its existence, physicists could not fully underpin all the laws that explain the interactions between the universe's elementary particles.

Tom's 1964 research paper written with two American colleagues predicted the existence of a particle with physical properties like the Higgs boson. It was initially ignored by much of the scientific community. "No-one paid any attention and it had hardly any citations in the first three years," Tom, now Professor, Kibble recalls, but in 2008, *Global conservation laws and massless particles* was selected as one of the most important papers of the last 50 years by leading journal *Physical Review Letters*.

Commenting on the current interest, Tom says: "There is something slightly surreal about realising that something you were involved in nearly 50 years ago is once again the centre of attention, but it was a very interesting development." Earlier this year, Tom was awarded a Royal medal by the Royal Society. Founded by King George IV in 1825, the Medal is awarded to just three top scientists each year for the most important contributions in the physical, biological and applied or interdisciplinary sciences.

PHOTOGRAPHY: (TOM KIBBLE) MIKE FINN-KELCEY; (LHC TUNNEL) MAXIMILIEN BRICE, CERN

FROM BENCH TO BEDSIDE



LEVEL BY LEVEL

► **GROUND** // Wellcome Trust-McMichael Clinical Research Facility – a space for Principal Investigators across the College to run early translational medical trials

► **ONE** // Cancer Research Centre – bringing together chemists, biologists and engineers looking at new ways of tackling cancer, such as molecular imaging techniques that help doctors match treatments to patients and methods to reduce the toxicity of radiotherapy

► **TWO** // MRC Clinical Sciences Centre – housing next generation gene sequencing machines which are helping to develop improved methods for preventing, diagnosing and treating common problems such as heart disease and raised cholesterol.

► **THREE TO FIVE** // A major theme for heart scientists on these floors is regenerative medicine using stem cells to make new heart muscle to replace the cells that are damaged in a heart attack and don't grow back.

► **THREE** // NHLI Heart Science, British Heart Foundation Labs

► **FOUR** // NHLI Heart Science and Myocardial Function

► **FIVE** // NHLI Vascular Science

A new £66 million flagship facility which will expand and accelerate the translation of scientific discoveries into new ways of preventing, diagnosing and treating diseases, has opened on the Hammersmith Campus. The Imperial Centre for Translational and Experimental Medicine combines laboratory space for up to 450 scientists with a dedicated facility for evaluating and developing new medical treatments through clinical trials. The opening of the Centre, built over four years with support from the British Heart Foundation, Imperial College Healthcare NHS Trust, the Medical Research Council and Wellcome Trust, by George Osborne, Chancellor of the Exchequer in May 2012, marks the fruition of the College's largest ever investment in research facilities.

PHOTOGRAPHY: THOMAS ANGUS



Roll over Beethoven, DJ Darwin is in the house

Do away with the DJ and cancel the composer. A computer program powered by Darwinian natural selection and the distinguished musical tastes of 7,000 website users may be the answer to creating the perfect pop tune. Scientists including Imperial's Professors Armand Leroi and Austin Burt, and Dr Bob MacCallum, have devised a way of producing music from noises without a composer. They programmed a computer to produce loops of random sounds and analyse the opinions of musical consumers, who decided which ones they liked. The result is music filled with many of the sophisticated chords and rhythms familiar from modern songs. The research, first published in June 2012 in the journal *Proceedings of the National Academy of Sciences*, could help explain why popular musical trends continuously evolve and why traditional musical forms can persist for thousands of years. Take part at: darwintunes.org



4,000+

Number of people in England in 2010 that had a pacemaker fitted to keep their heart beating regularly.

Scientists at Imperial studying the effects of adrenaline on the heart have identified a family of proteins, dubbed 'Popeye proteins', which play an essential role in allowing the heart to respond to stress. These findings could help develop new treatments for abnormal heart rhythms. No spinach required.

Educating innovators

THIRTY YEARS OF INNOVATION
DESIGN ENGINEERING

A joint Master's course run by Imperial and the Royal College of Art, now named Innovation Design Engineering, was celebrated by a recent special exhibition marking its 30th anniversary that brought alumni back to the College to showcase their work. Over the last three decades the course has been producing a new type of designer: one who is focused on innovation, with refined design skills and a mastery of engineering and technology.

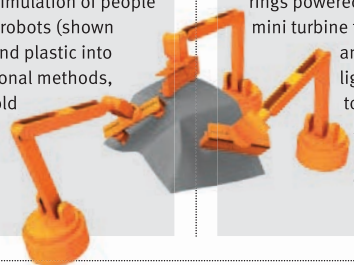
FOLDING WHEELS

Duncan Fitzsimons, Clara Gaggero and Adrian Westway (MA(RCA)/DIC Mechanical Engineering 2007) established Vitamins design and invention studio after graduating. The products they have developed include the folding wheel, pictured above, which makes for easier travel and storage of wheelchairs. Thanks to their ingenuity, a folded wheelchair can now fit in an overhead locker on a plane. The folded wheel takes up only 12 litres of space – half the volume compared to the 22 litres when it is circular and in use.



BENDING BOUNDARIES IN DESIGN

Best described as robotic origami using plastic and metal instead of paper, the revolutionary Robo-Fold system is the result of 15 years' experimentation by Gregory Epps (MA(RCA)/DIC Mechanical Engineering 2007). Manufacturing at a large scale is done with giant robot arms – normally used in car manufacturing – that are programmed to follow a simulation of people folding paper with their hands. The robots (shown right) gently bend sheets of metal and plastic into shapes hard to achieve by conventional methods, to form creative designs of household items such as door handles and shelving, and decorative interior facades.



'HUMANE' FISHING

Each year, fishermen return over seven million tonnes of unmarketable fish, dead, to the sea. Dan Watson's (MA(RCA)/DIC Mechanical Engineering 2011) multiple award-winning SafetyNet is an innovative trawling system that exploits the natural behaviour of different species and ages of fish to ensure that only marketable fish are caught. The SafetyNet has rings powered by an in-built mini turbine that act like an 'exit sign', lighting up to enable under-sized fish to escape capture.



PHOTOGRAPHY: (FOLDING WHEEL) VITAMINS; (ROBO-FOLD) NICK PUCKETT, DIRECTOR, ALTN RESEARCH + DESIGN; (SAFETYNET) DAN WATSON; (KELLEHER + HUMPHRIS) THOMAS ANGUS; (NEILSON) DAVE GUTTRIDGE, THE PHOTOGRAPHIC UNIT;

LET US INTRODUCE YOU TO...



A number of new faces have joined Imperial's senior staff in recent months:

- 1. Professor Dermot Kelleher, Principal of the Faculty of Medicine.** Dermot has over 30 years' experience in research, teaching and medical leadership. He is a pioneer in the field of immune response and infectious disease, and joins Imperial from the School of Medicine at Trinity College Dublin.
- 2. Professor Debra Humphris, Pro Rector (Education).** A leading innovator in higher education and healthcare, Debra was previously Pro Vice-Chancellor (Education and Student Experience) and Professor of Health Care Development at the University of Southampton.
- 3. John Neilson, College Secretary and Registrar.** John joins Imperial after 30 years working in government, including six as Director of the Research Base in the Department for Business Innovation and Skills. Prior to starting at the College John was most recently Director of Financial Management in the Ministry of Defence.
- 4. Simon Harding-Roots, Chief Operations Officer.** Simon joins from Treasury Holdings Group and is responsible for maintaining and developing the College's infrastructure. His initial focus is on developing a space masterplan, to shape Imperial's campuses for future generations.

PREDICTING RISK IN BREAST CANCER



Dr James Flanagan from the Department of Surgery and Cancer has uncovered the first strong evidence that epigenetic changes in a gene can be associated with breast cancer risk, and can be detected many years before a cancer develops.

His research involved 640 women with breast cancer and 741 controls who enrolled in three previous studies starting in 1992. Blood samples donated by them, on average three years before diagnosis, were analysed to see if the alteration of single genes by a process called methylation could predict an increased breast cancer risk.

He found that the women with the highest level of methylation on one area of a gene called ATM were twice as likely to get breast cancer as women with the lowest level. The findings provide strong evidence that looking at this type of alteration on individual genes could be used in a blood test to help assess breast cancer risk.

Return of the GEDI

If you believe the boasts of contestants on the reality TV show The Apprentice they were born winners, blessed with the entrepreneurial gene and a natural flair for financial success.

The reality, as anyone with genuine experience in business will know, is a little more complex. Many factors may help or hinder entrepreneurial spirit, and its contribution to the economy. Now a group of academics, including Imperial's Professor Erkkö Autio from the Business School, have attempted to review the entrepreneurial health of 78 countries in the Global Entrepreneurship and Development Index (GEDI).

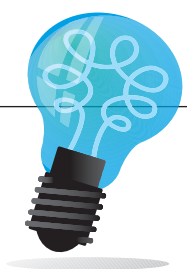
GEDI aims to capture the context of entrepreneurship by indexing attitudes, actions and aspirations, to understand the ingredients of entrepreneurship and explore what policy levers can be pulled to help promote it.

As the ranking above shows, the US and Australia come out best for entrepreneurial performance, whilst the UK lags behind in joint 14th place, trailing near neighbours Sweden, Switzerland, Belgium and Denmark. Whilst the UK scores strongly for its level of start-up activity, the index suggests more needs to be done to encourage individuals to invest in new businesses and to give entrepreneurs easier access to finance.

Professor Autio said the UK could close the gap on the US and Australia, if the "bottlenecks" the index identified were addressed.

"The good news is that there does not seem to be anything wrong with the formal support system. The UK could significantly improve its performance through well-targeted policy measures, especially those encouraging individuals to invest in start-ups."

The 2012 GEDI uses mid-2010 data drawn from the Organisation for Economic Co-operation and Development, the World Bank and Babson College in the US. The authors are now looking at how regions and cities compare in relation to entrepreneurship.



- 1 United States
- 2 Australia
- 3 Sweden
Canada
Switzerland
- 6 Iceland
Denmark
- 8 Belgium
- 9 Netherlands
Taiwan
Norway
- 12 Singapore
- 13 Austria
- 14 Finland
France
Germany
Ireland
Israel
United Arab Emirates
United Kingdom

NOT JUST THE FEVERED FEW

One hundred million new treatments for Neglected Tropical Diseases (NTDs) in Africa have been made possible following renewed support from the British government.

The Schistosomiasis Control Initiative (SCI) and the Partnership for Child Development, both based at Imperial, will play a key role in a global push to eliminate infectious tropical diseases, working in partnership with the Centre for Neglected Tropical Diseases at Liverpool School of Tropical Medicine.

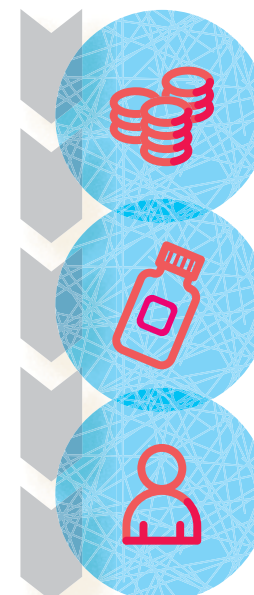
The funding – £25 million over four years – will provide treatments to protect 40 million people from schistosomiasis in at least eight African countries, including Uganda, Tanzania and Zambia.

Schistosomiasis is caused by a parasitic worm infection which invades the body during contact with contaminated fresh water. It leads to chronic ill health, damages internal organs, impairs the growth of children and causes more than 200,000 deaths a year in Africa. Intestinal helminths – parasitic worms – are common in children who live without clean water and sanitation.

The SCI was set up at Imperial in 2002 to deliver treatments for schistosomiasis and other NTDs to people in sub-Saharan Africa at high risk of serious disease. It was recently rated as one of the top two charities globally for achieving impact with donations by American-based independent charity evaluator, GiveWell.

"The public support is critical to allow us to reach out into new countries and alleviate the suffering these diseases inflict."

Professor Alan Fenwick,
Director of the Schistosomiasis Control Initiative (SCI)





Forecasting the future

In days gone by, predicting the future was the preserve of soothsayers and crystal ball-gazers. Nowadays things are a little different, at least at Imperial, where looking ahead to the world of the future is based on research and reason. The 2032 Tech Foresight conference, hosted by Imperial Business Partners in July 2012, brought academics and industry together to look at how current technological breakthroughs might evolve over time and the impacts that these could have on how companies operate in the future.

With new technology come fresh moral and ethical questions, as panel member Dr Simon Schulz, Director of the Neural Coding Laboratory in the Department of Bioengineering, explained:

“We discussed technologies which could, in the future, pose

all kinds of opportunities – and dilemmas – for industry; for instance, brain-computer interfaces are likely to offer many improved ways for workers to interact with information. However, might they also offer more dubious temptations; by allowing businesses to monitor – and dictate – an employee’s work ethic?”

So what can society look forward to in the next 20 years? The output of the conference discussion would suggest: DNA sequencing while you wait, the first person to live to 140, progress towards a doctorless healthcare system in which diagnosis is done by machines, and the possibility that our brains could be kept alive in perpetuity.

The next conference will be held in May 2013. To learn more visit: www.imperial.ac.uk/imperialbusinesspartners/2032

AWARDS AND HONOURS FOR IMPERIAL STAFF



QUEEN'S BIRTHDAY HONOURS

Adjunct Professor Sir Tom Hughes-Hallett, Executive Chair of the Institute of Global Health Innovation, received a knighthood for his services to palliative care. From the National Heart and Lung Institute **Professor Margaret Hodson** was awarded an OBE for her services to respiratory medicine, while **Professor Duncan Geddes** (Charing Cross and Westminster Medical School 1970) received a CBE for his services to medical research, charity and education. **Mr David Nott**, an Honorary Clinical Senior Lecturer in the Department of Surgery and Cancer, who is also a Wing Commander in the Royal Auxiliary Air Force, received an OBE in the military honours for his medical work in war regions. Former College Secretary **Dr Rodney Eastwood** was made an MBE for his services to education.

ROYAL ACADEMY OF ENGINEERING

Professors Bill Lee, Department of Materials; **Wayne Luk**, Department of Computing; **Jane Plant**, Department of Earth Science and Engineering; **Hugh Spikes**, Department of Mechanical Engineering (PhD Mechanical Engineering 1971); and **Eric Yeatman**, Department of Electrical and Electronic Engineering (PhD Electrical and Electronic Engineering 1989) were elected as new Fellows of the Academy in 2012.

ROYAL SOCIETY

Emeritus Professor Tom Kibble FRS from Physics and **Emeritus Professor Andrew Holmes FRS** of Chemistry received the Royal Medal. From Physics, **Professor Jenny Nelson** won the Royal Society Armourers and Brasiers' Company prize, for excellence in materials science and technology, and **Professor Roy Taylor** won the Rumford Medal, for important discoveries in the field of thermal or optical properties of matter. **Professor Molly Stevens**, Departments of Materials and Bioengineering (CAS 2005), was awarded a medal and prize following her selection to deliver the 2012 Clifford Paterson Lecture.

SPECS

899KG

Weight is similar to a Clydesdale



2.9M X 2.7M X 2.2M

Size is roughly the equivalent of a Mini Cooper



≈ 4CM PER SECOND

Top speed is 2.5 x faster than a snail



4.8 KG OF PLUTONIUM-238 DIOXIDE

The power source is 20 packed in 32 cubes, each about the size of a marshmallow



CURIOSITY ROCKS!

The rising tide of diabetes in the Middle East

The figures speak for themselves; diabetes is one of the most pressing healthcare issues in the Middle East. The official opening of the second Imperial College London Diabetes Centre (ICLDC) in Al Ain in the United Arab Emirates, took place in May 2012 and provides world class standards of patient care and research. The launch of the new facility follows the establishment of the first ICLDC in Abu Dhabi in 2006 and is an extension of the partnership agreement between Mubadala Healthcare and the College. Research programmes are being developed to understand more about diabetes and why there is such a high prevalence of the condition in the country, to provide new insights into how diabetes can be prevented.

PHOTOGRAPHY: (CURIOSITY) NASA/JPL/CALTECH



One in five people in the Middle East are now living with diabetes, a number expected to increase to 1 in every 3 by 2030.

2ND

The worldwide ranking of the UAE for diabetes prevalence. 40% of residents over 60 have diabetes and the number is expected to increase over the coming years.

50%

Half the people with diabetes in the UAE are unaware they have the condition.

\$5.5 BILLION

Amount the region spends annually on diabetes, accounting for 14% of its total healthcare expenditure.

REDUCE, REUSE, REINVENT

Small changes in our behaviour can have a big impact on the environment. Imperial researchers are busy working to make our lifestyles more sustainable in all sorts of ways.

1. / Plastic fantastic

Co-founded by Visiting Professor Vernon Gibson (Chemistry), spin-out company Plaxica is converting sugars, such as cereals and sugar cane, into the next generation of plastics. These new biopolymer-based materials have a lower environmental footprint, and comparable thermal and mechanical properties to oil-based plastics, such as nylon. They could have a large impact on the use of nylon in products like plastic bags, without compromising the performance that consumers expect.

2. / Mini motors

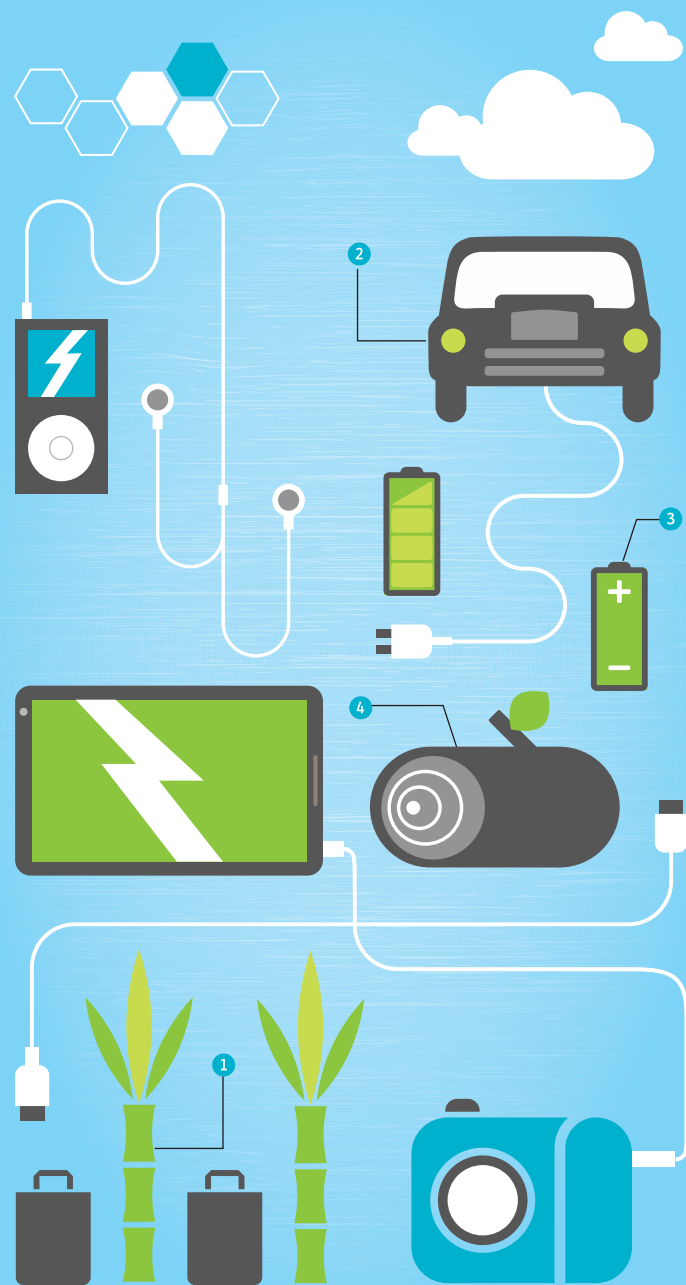
Whilst hybrid vehicles are increasingly popular, they are still limited by the size of the batteries and motors required to run them. By developing engines and motors that are lighter and smaller without compromising on power, the co-founder of spin-out Evo Electric, Dr Michael Lamperth (MSc Mechanical Engineering 1996, PhD 1999) of the Department of Mechanical Engineering, has developed electric motors that are already in use in vehicles like the iconic London taxi cab.

3. / Silicon saving

Award-winning start-up company Nexeon, founded by Professor Mino Green (Electrical and Electronic Engineering), has developed a new type of rechargeable battery with twice the energy capacity of those currently available. Nexeon uses new technology to stabilise silicon, so that it can be used as a viable alternative to carbon in the battery body, extending both the lifespan and performance of this essential everyday technology.

4. / Fungal fuel

Biofuels are an attractive sustainable alternative to diesel and petrol but the crops that produce them take up land that could be used for food. Founder of spin-out company Mycologix, Life Sciences' Professor Richard Murphy (PhD Pure and Applied Biology 1981), is using his 20 years of research to demonstrate how wood can be broken down by brown rot fungi, turning it into a low cost, efficient source of biofuel and reducing competition for agricultural land.



260 million tons
of plastic are produced
each year



0.2%
of the world's oil production
is used to make plastic bags



3.3%
of the road fuel used
in the UK is biofuel

Olympic odyssey

For an Olympian the routine becomes extraordinary, says PhD student Adam Scholefield (Electrical and Electronic Engineering 2007).

The GB kit slowed me down, out of the water. Each journey I made during the Olympic fortnight meant people jostling, snapping photos and grilling me about my sport. No-one knew my name but there was instant celebrity status in wearing this blue-white-blue version of the Union flag.

Many athletes chose to give the opening ceremony a miss, put off by its length, but walking round the track of the blazing stadium, I wouldn't have been anywhere else. The invisible crowd made the most amazing noise. Country boundaries were dissolved as the athletes were drawn into a massive circle, singing the lyrics: "Na na na, na-na na na, Na-na na na, hey Jude". We were in this together, fired up to be the best we could possibly be.

When the news came in December 2011 that, for the first time since 1956, Great Britain would compete in water polo, I was quietly confident I'd be put forward for London 2012. I was vice captain of the GB national team and for two years I'd put my PhD studies on hold to play for the professional club PVSZ in Hungary. Over that time my fingers had been wrinkly for at least four hours a day as I honed my techniques in the water, and gym sessions were almost as regular as mealtimes.

During the Games, the training routines I'd done for years became extraordinary. Stretching alongside multiple medal-winning swimmer Michael Phelps was surreal – my consolation for failing to coincide with the synchro team, which was the goal on training days.

The cheers as we lined up to go out for our first match were crazy and generated extreme nerves. We were the youngest water polo team at the Olympics, competing against players from countries where kids grow up watching matches on TV and long for the stardom attached to the sport. We were also in the 'Group of Death', alongside Hungary, the US and Serbia, the respective winners of gold, silver and bronze in Beijing 2008.

While we felt under immense pressure, there was no space for anxiety in our play. We were solid in some games, but made frustrating mistakes. The unwaver-



ing support we encountered across all our matches made five successive defeats easier to taste. Even when we were behind and the crowds could have been critical of us, their roars continued.

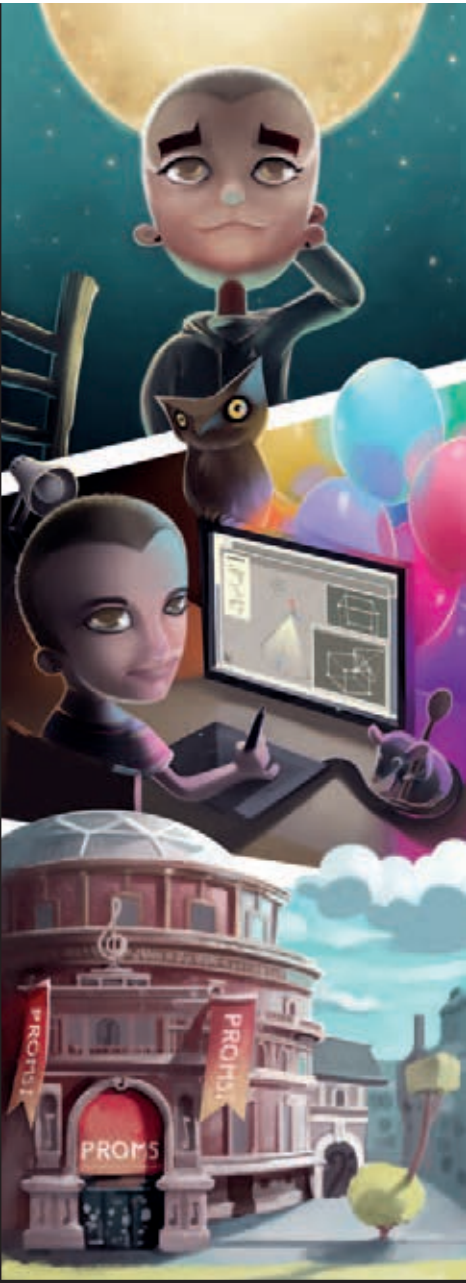
In a host country unfamiliar with the ins and outs of water polo, the media latched on to the sport's unsporting side. Players know the unwritten rules of the game and accept that no part of the anatomy is safe underwater. Beneath the surface you can't be seen so if you put your head down there, you are going to get hit. While the cameras zoomed in on any blood spilt and the crowds appeared shocked, punches, kicks and grabs are everyday occurrences in the world of water polo – Olympic matches were no different.

For many athletes who had spent years perfecting their physique, a burger and fries

at sunrise brought down the curtain on their Olympic performance. As I joined the McDonalds party at 05.00 after a night of celebrations, I broke a cycle that has been my life for so long. It's been hard, as I love my sport, but the pause has given me time to focus on my PhD – I now spend 14 hours a day absorbed by imaging techniques.

Before the Olympics my supervisor would say I should be looking for a real job. Now, having watched me in London, he's pushing me to play more water polo. Whether in a place in the 2014 Water Polo European Championships or in a position in academia or a tech company, I'll be immersing myself fully in whatever comes next.

Based on an interview with ADAM SCHOLEFIELD (Electrical and Electronic Engineering 2007) who is studying for a PhD in imaging processing.



LIGHTWORK

REFLECTIONS ON SHADOWY FORMS

Coding sunshine, starlight and shadows, Afonso Salcedo (MSc Computing 2002) creates animated worlds unbound by conventional optical laws.

⇒ IMPERIAL: What does a lighting artist do?
AFONSO SALCEDO: It's the process of creating the final image you see on screen, the mood, atmosphere and emotional depth that bring life to a specific shot. It's about the little details, the things that normally go unnoticed but create a world that is believable and that the viewers connect to emotionally.
IMPERIAL: Take me through the life of a project.
SALCEDO: Typically you spend some time creating a basic lighting set-up that will work as a draft version for a sequence of shots that happen in the same set. You then start going into the minute details of individual shots to fulfil the creative vision of the director: the eye highlights, shadows, reflections, fog. In live action, you're bound by the physical properties of light but in an animated movie everything is created from scratch.
IMPERIAL: What's been your most challenging project?
SALCEDO: Every project I've ever worked on seems insanely daunting and impossible in the beginning, and so easy and effortless a month after it's done.
IMPERIAL: What inspires you?
SALCEDO: Anything and everything. Day to day I am constantly observing and appreciating all the little details around me: how a museum displays artworks, how a performing artist composes their show, how a photographer captures a story with just one image. It's grabbing inspiration from everything you see. You learn how to create a space in your mind where you are open to really looking at the world around you.
IMPERIAL: Were you a typical computing student?
SALCEDO: I don't think so. I didn't want to do any programming or technical computing things, so I had a bit of a hard time keeping myself motivated. I loved London though, and Imperial was perfectly placed to be surrounded by incredible people, the best of the best. During the summer, I would always go to the Royal Albert Hall to watch the Proms for inspiration. That was my creative escape from computers at the time! When I graduated from Imperial Studios and danced every day. That helped me connect with the creative and artistic side of London, and helped me fall in love with the city once again.
IMPERIAL: What do you think the future holds for animation?
SALCEDO: The technology keeps evolving at such a pace that live action and animation are not that different anymore. It is becoming way more accessible, so it will be great to see new movies and ideas from all corners of the world: competition will only drive new ideas forward. I wish animated films could be considered for cinematography Academy Awards.
IMPERIAL: What film are you most proud to have worked on?
SALCEDO: Working alongside a creative team of five others, I was the creator of the *It Gets Better... Love*, Pixar short that became a viral sensation on YouTube with more than 1.3 million views. I had this idea that with the power of the Pixar brand we could create something honest, genuine and heartfelt that would hopefully influence a lot of kids and families worldwide, and bring hope and optimism to anyone who's ever been bullied.
IMPERIAL: Do you think film makers and studios have a social responsibility?
SALCEDO: Not necessarily. I think film has the power to influence social responsibility and to educate people, but it should also be pure entertainment – almost a means of escape from the reality of day-to-day life. I think there's space for both, and I'm glad that studios like Pixar aren't afraid of doing both.

+ ONLINE EXTRA: Read more of the interview and see some of Afonso's work at www.imperial.ac.uk/imperialmagazine

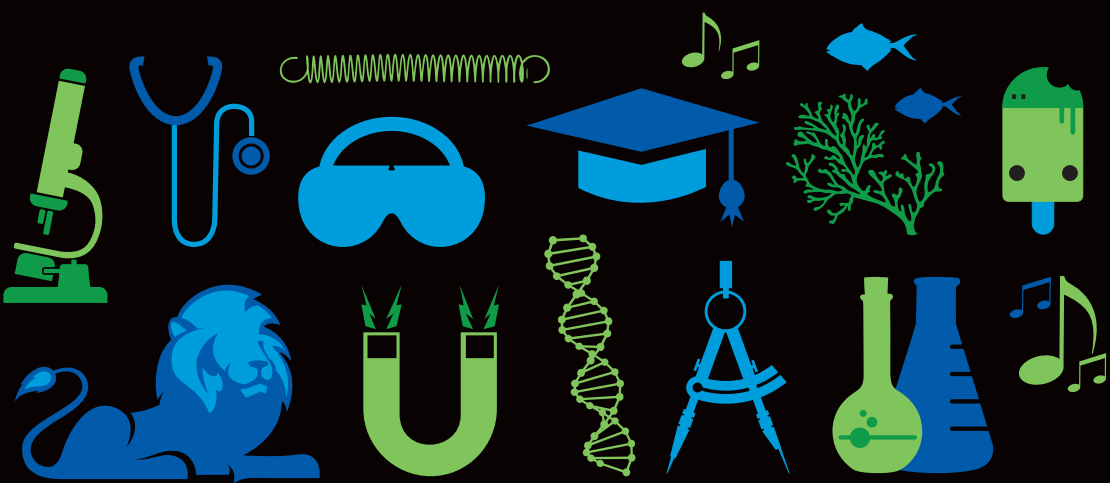
DIRECTOR'S CUT

OCCUPATION	LOCATION	FAVOURITE FILM	INFLUENCES
Animation lighting specialist. Formerly of DreamWorks Animation, Pixar, and Framestore.	San Francisco, California	2001: A Space Odyssey Literally everything is perfect.	Everyone I've met at Pixar and, of course, my parents, sister and partner.
	HOMETOWN		
	Porto, Portugal		

ILLUSTRATION: ANDREW (B&W) WILSON

MAKE A DATE WITH DISCOVERY

IMPERIAL FESTIVAL



It's back! The Imperial Festival returns for a second year of hands-on research, interactive talks and street performances for adult and family audiences. Come and explore the best science and arts on offer from Imperial staff and students: try your hand at surgery, dance to new beats, and quiz our soapbox scientists.

→ ALUMNI REUNION

Saturday 4 May 10.00–18.00

Catch up with the College, reunite with old friends and make new connections at this year's reunion for alumni and their families. The programme includes a private view of the Festival Research Zone and exclusive social events. Details and tickets: www.imperial.ac.uk/alumni/reunion

A special invitation

www.imperial.ac.uk/festival

FRI 3 MAY 16.00–22.00 **SAT 4 MAY 12.00–18.00**

A MATTER OF COURSE

As Imperial's MSc in Sustainable Energy Futures celebrates its 150th graduate, ALISON GODDARD explores what went into developing this unique approach to interdisciplinary teaching and the production of a new energy and business savvy generation of graduates.

ILLUSTRATIONS BY ARUNAS KACINSKAS

Peals of laughter drift through the foyer of the Electrical Engineering Building. Glasses are raised and clinked. Past and present students are in good cheer as they meet on the eve of Imperial's Alumni Reunion to mark the fifth anniversary of the MSc in Sustainable Energy Futures. Course director Dr Andy Heyes praises the assembled company for their achievements: completion of a programme that is unique, both within the College and the wider world; and an impressive employment record. The buzz of conversation resumes and laughter spills forth once again.

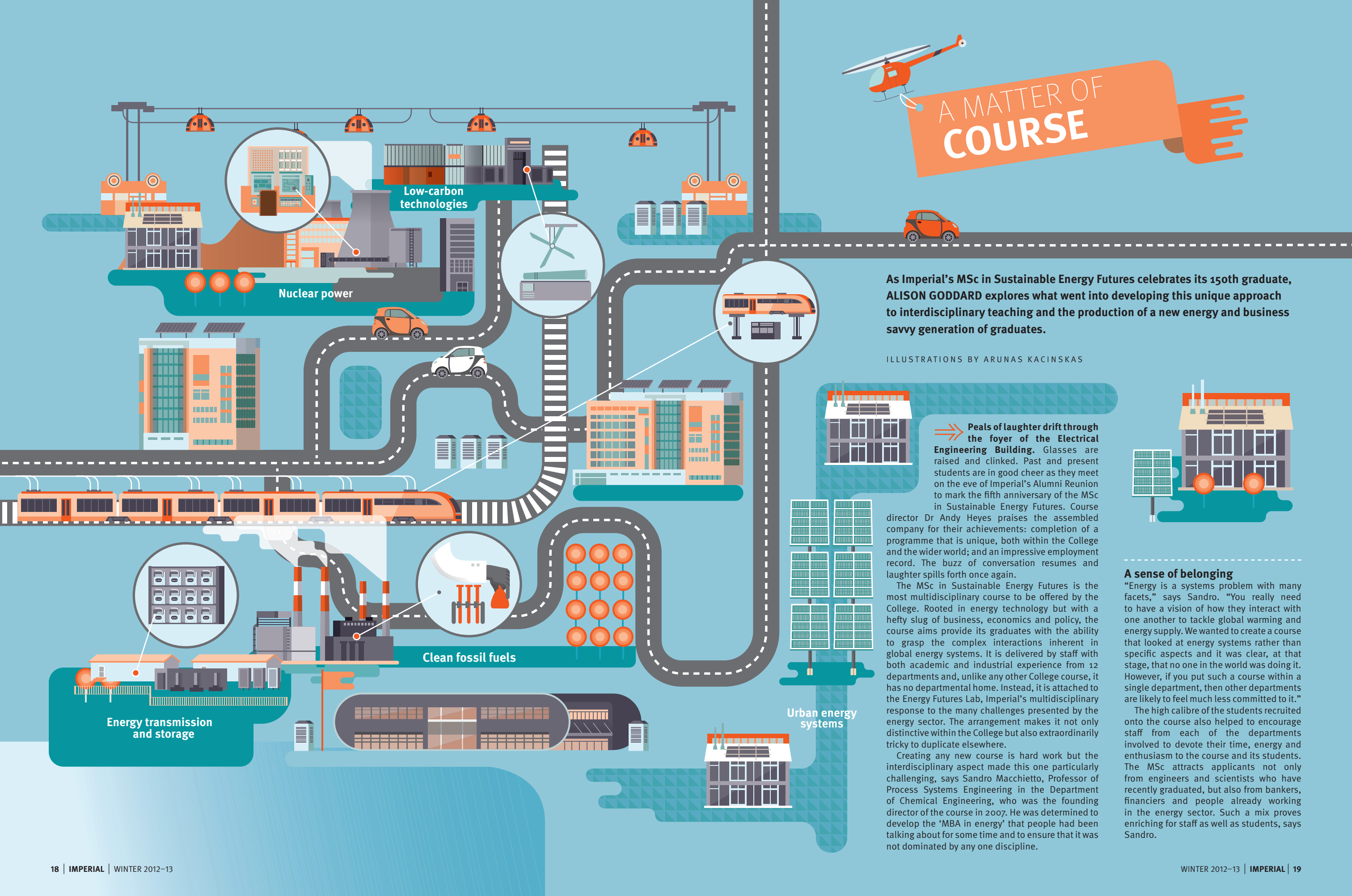
The MSc in Sustainable Energy Futures is the most multidisciplinary course to be offered by the College. Rooted in energy technology but with a hefty slug of business, economics and policy, the course aims provide its graduates with the ability to grasp the complex interactions inherent in global energy systems. It is delivered by staff with both academic and industrial experience from 12 departments and, unlike any other College course, it has no departmental home. Instead, it is attached to the Energy Futures Lab, Imperial's multidisciplinary response to the many challenges presented by the energy sector. The arrangement makes it not only distinctive within the College but also extraordinarily tricky to duplicate elsewhere.

Creating any new course is hard work but the interdisciplinary aspect made this one particularly challenging, says Sandro Macchietto, Professor of Process Systems Engineering in the Department of Chemical Engineering, who was the founding director of the course in 2007. He was determined to develop the 'MBA in energy' that people had been talking about for some time and to ensure that it was not dominated by any one discipline.

A sense of belonging

"Energy is a systems problem with many facets," says Sandro. "You really need to have a vision of how they interact with one another to tackle global warming and energy supply. We wanted to create a course that looked at energy systems rather than specific aspects and it was clear, at that stage, that no one in the world was doing it. However, if you put such a course within a single department, then other departments are likely to feel much less committed to it."

The high calibre of the students recruited onto the course also helped to encourage staff from each of the departments involved to devote their time, energy and enthusiasm to the course and its students. The MSc attracts applicants not only from engineers and scientists who have recently graduated, but also from bankers, financiers and people already working in the energy sector. Such a mix proves enriching for staff as well as students, says Sandro.



Peering ahead

For example, Anthony Dixon enrolled on the MSc in Sustainable Energy Futures in October 2009, 25 years after completing his degrees in physics and philosophy from the University of Western Australia, and two decades after receiving an MBA from Harvard Business School. “After Harvard, I spent 15 years in financial markets, but I always intended to pursue a second career in the environment. It is what I am passionate about,” he says. “When I left banking, I focused initially on doing what I knew: offering financial advice to companies in the renewable energy sector and it might have been possible to go on doing that with not much more than a dilettante’s knowledge of the technologies and the issues but I wanted to get much deeper into the underlying science. So the MSc was a way to scratch my intellectual itch and get rigorous.

“I was surprised to find how much I enjoyed being back in an academic environment: it was like a part of my brain woke up again. I liked the fact that it was so multidisciplinary. It was also a pleasure and a privilege to be taught by so many people who are world leaders in their field: Imperial is packed with them. And of course it was interesting and great fun to be in

class with people much younger than me. That sort of diversity is a great benefit to groups I think – whether they are classes, teams or the workplace.

“The degree was also helpful to my career transition: it gave me added credibility in the subject and, while

I was still on the course, I was offered the job of Chief Executive Officer of a start-up biodiesel company in Hong Kong. As a start-up with significant capital still to be raised, the company needed someone with financial markets experience, as well as technical knowledge and an understanding of the big picture, in order to articulate a strategic direction to investors. I was excited to be coming to work in Asia again. Countries in this region, with the exception of China and Japan, are not as advanced

as Europe or the United States in terms of the deployment of renewable energy technology and supporting policies, so there is a lot of opportunity here.”

Sabine Ziem gained her degree in philosophy and economics from the London School of Economics and then held various leadership roles at AIESEC, an international youth-run organisation to develop management and leadership skills. While working as a sustainability consultant for an oil company in Colombia, she realised she needed a more technical background, so, in October 2010, she enrolled on the MSc. She now works for E4tech, an energy consultancy based in London and Lausanne. “Our projects cover diverse energy issues, but go deep into each of them,” she explains. “On the course we did something similar: it gave us an overview with depth, it was a good preparation for the workplace.”

Dylan Rebois graduated in mechanical engineering from the University of Maryland and won a Marshall Scholarship, offered to high-ability Americans to pursue graduate study in Britain. He enrolled on the course in October 2011. Many of the other courses he considered would have given him only a technical grounding, he says, but the Imperial course offered both breadth and depth. The mix of students and staff enhanced their conversations: “It is helpful to have people who deal with issues and know how feasible the proposed solutions really are. I couldn’t have anticipated the central role my peer group would play in the learning experience,” he adds.

Structural integrity

Not only does the course offer a diverse range of disciplines, expertise and people, it also has a unique structure to enable the mix. The 40 students who enrol each year take three compulsory foundation courses in the autumn term to provide them with a common toolset, language and analytical skills. The foundation courses cover energy economics and policy, energy systems technology, and methods for the analysis of energy systems.

Blazing a career trail

Five years on, the course is succeeding in its aim to develop a generation of graduates equipped to work not only in the energy industry but also the investment sector and both public and private organisations. Graduates have pursued careers with financial services firms such as J.P. Morgan, management consultancy companies including McKinsey, with governmental organisations such as the Tanzanian Ministry of Energy and Minerals, and

with energy companies including ABB, BP, Exxon Mobil, Gazprom, Schlumberger, Shell and Total. Many have also joined smaller consultancies such as London-based Element Energy and EnergyExcel, start-up companies and other small businesses.

Graduates also help support each other’s careers, thanks to a community of alumni that Andy has helped establish and maintain. More than half of the course graduates remain connected to the

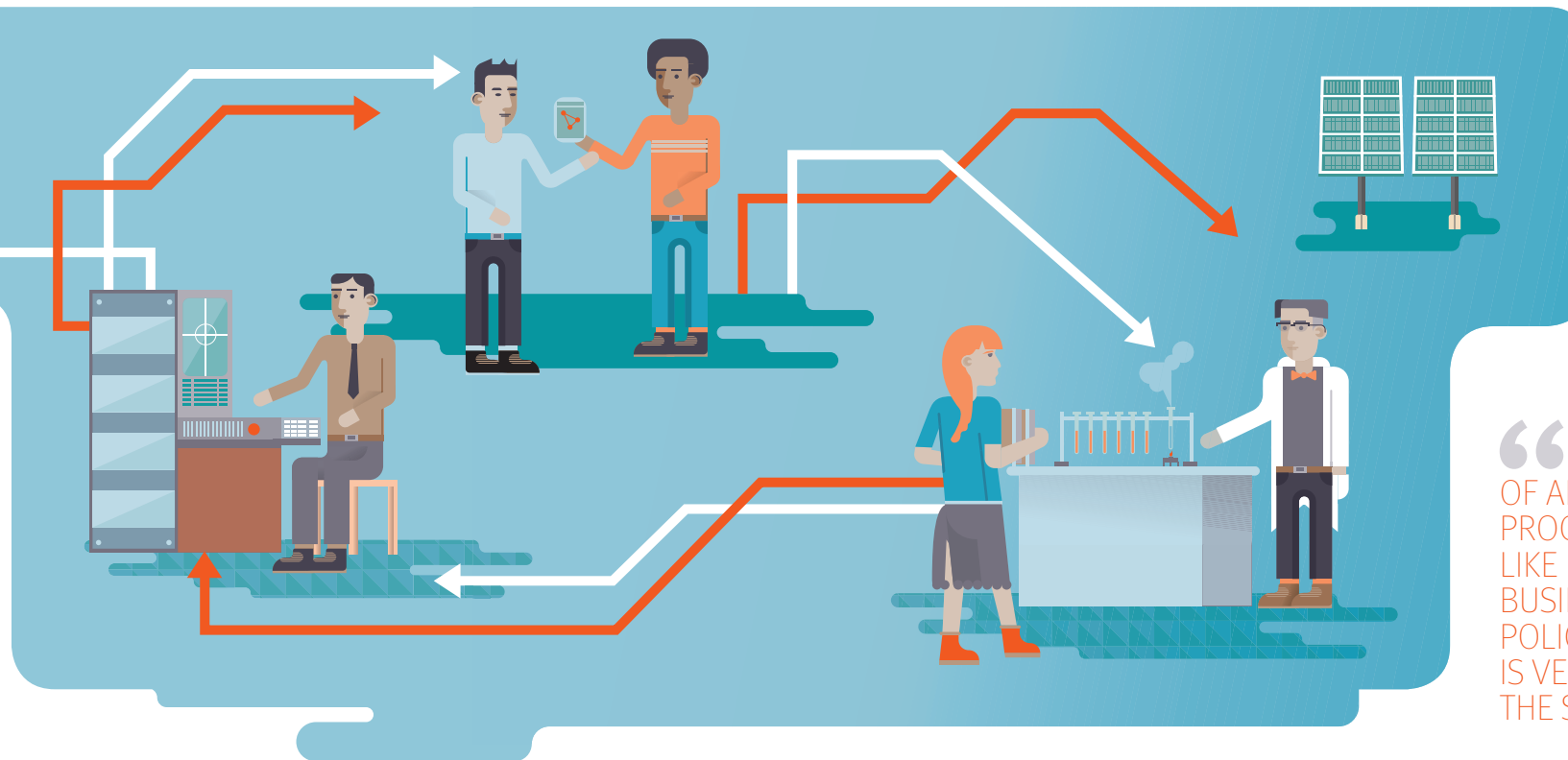
“I DON’T KNOW OF ANY OTHER PROGRAMME LIKE IT. ENERGY, BUSINESS AND POLICY: THE MIX IS VERY RARE IN THE SECTOR.”

College through this network and can be called upon to support and advise existing students – as well as to toast the success of the course on its fifth anniversary.

In recognition of his work to establish the MSc in Sustainable Energy Futures, Sandro received a Rector’s Award for Excellence in Leadership and Management in 2008. The following year the College won the Institution of Chemical Engineers Education and Training Award in recognition of the course.

Dr Ray Orbach, director of the new Energy Institute at the University of Texas at Austin and a former under-secretary for science in the United States Department of Energy, chairs the strategy board that oversees the operations of the Energy Futures Lab. He says, “What I love about the programme is that the entire College is involved with the curriculum, both in the sciences and the business arena, and the students are required to work at a postgraduate level in science as well as policy. The quality of the students needs to be noted: they will do so well in their careers and it is to the College’s credit. I don’t know of any other programme like it.

“Energy, business and policy: the mix is very rare in the sector. In America this would be a very unusual programme. I was so impressed by the course that I have invited Andy over here [to Texas] to see if we can project it onto the American system, I find it so exciting.”



“I couldn’t have anticipated the central role my peer group would play in the learning experience.”
— Dylan Rebois
(MSc Sustainable Energy Futures 2012)

Around 100,000 people in the UK have **multiple sclerosis** and, while several treatments exist to treat early attacks, there is currently nothing to stop the disease from progressing. Over the last decade, Imperial scientists have contributed to major advances in our understanding of the condition by studying post-mortem brain tissue. Now they are taking new treatment strategies to patients for the first time.

❖ SAM WONG ❖ THOMAS ANGUS

Walking along a beach while on holiday in Devon with her sister in 1996, Jane began to feel pins and needles in her feet. As she trod on the stones, the tingling became painful, and it became clear that something was wrong. When she returned home, the pain went away, but three weeks later it came back. Her doctor sent her for tests at Charing Cross Hospital. A few months later, at the age of 38, she was told she had multiple sclerosis (MS).

"It was the end of the world when I was first diagnosed," she says. She didn't tell her children at first because she didn't want them to be worried. "When I got the blue badge for the car, they said, 'why do you have this? There's nothing wrong with you.'" Gradually, her legs grew more unsteady and walking became more difficult.

Sixteen years on, Jane can still walk but she relies on the aid of a stick. Working from her home in west London, she keeps up a successful career as a journalist, but travelling to meet people becomes harder each year. Her appearance is healthy and her demeanour positive, but the disease, and the knowledge that it will continue to get worse, can't escape her mind for long.

"I do think about it every day and have done since I was diagnosed," she says. "It stops you thinking about the future in a warm comfortable way, or being able to picture the 'Saga poster old age', which is a loss. It's a sort of bereavement."

FRIENDLY FIRE

Jane's symptoms are the result of her brain coming under attack from her own immune system. Her immune cells, whose job is to protect her body against microbial invaders, have instead set their sights on a fatty substance called myelin, which wraps around her nerve fibres. Gradually they are tearing apart this myelin insulation, leaving her neurons unable to carry electrical signals

efficiently. The reason for the attacks is still a mystery.

Most sufferers start to experience symptoms between the ages of 18 and 40. Many drugs designed to quell the immune system are available to prevent attacks in the early phase of the disease, known as relapsing-remitting MS, but Jane has entered the phase called secondary progressive MS, in which symptoms steadily get worse. So far no treatment has yet been shown to prevent the slow progression of disease that might eventually mean she has to use a wheelchair.

That could be about to change. Jane has just had her first infusion in a clinical trial being run by Imperial researchers in the MS clinic at Charing Cross Hospital, part of Imperial College Healthcare NHS Trust. She was either given the drug Tysabri (natalizumab) or the control, a saline solution, but neither she nor her doctor knows which.

"People told me you can tell if you're getting the drug because it just feels different," she says. "Obviously I hope I'm not on a placebo, but I didn't really feel anything or notice any side effects."

KEEPING IMMUNE CELLS AT BAY

Tysabri is already approved for treating early attacks of MS, but it's still unclear how these attacks are related to progression of the disease or whether this drug could help at later stages. The trial has been based on results of research by Professor Richard Reynolds' group, at Imperial's Hammersmith Campus, which offer clues as to why MS progresses.

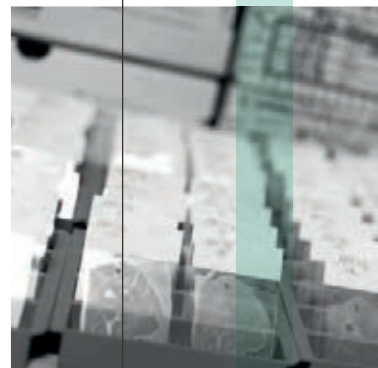
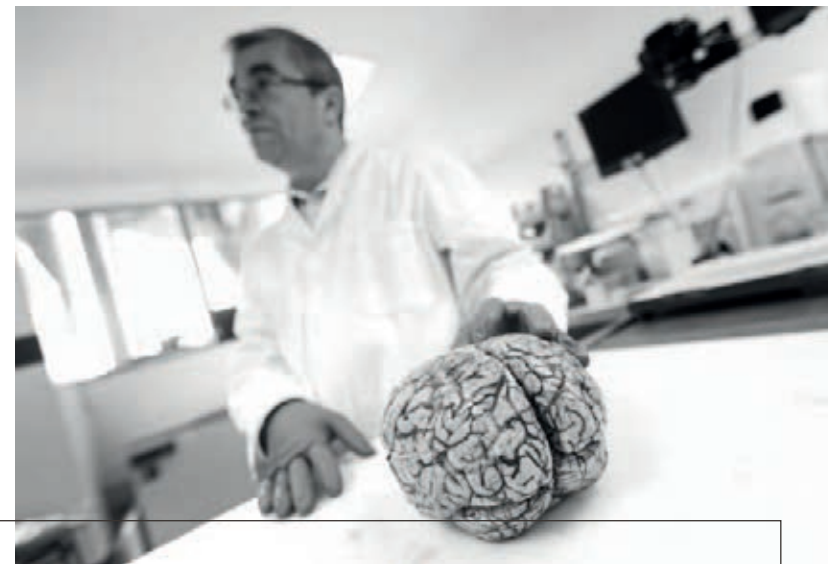
"The early attacks of MS seem to involve a rapid influx of immune cells into different parts of the brain," Richard says. These cells normally circulate in the bloodstream, moving out when they are summoned to sites of infection. In MS, they migrate in large numbers into the brain and cause inflammation. The cells must first stick to the blood vessel wall before they can pass through it into the brain. In these early stages, Tysabri works by stopping immune cells from sticking to the walls of blood vessels.

By looking at post-mortem brain tissue donated by patients, Richard's team discovered that in the later stages of MS, the inflammation is no longer caused by immune cells moving from the bloodstream into the brain, but by immune cells that are trapped in the tissues that surround the brain and in the brain itself. "The data suggest that if we can dampen those cells down and stop their movement once they get into the brain, we might stop that slow progression," he says. "We need to see whether Tysabri can also do this, and in two years' time we should know whether or not it works."

KNOWLEDGE BANK

To find out what goes wrong in the brain of an MS patient, you need to look inside it. Richard has been collecting brains since 1998, when the MS Society funded him to set up a tissue bank at Imperial. He and his colleagues travelled the country, meeting groups of patients and their families, asking

SAVING BRAINS



Multiple sclerosis usually starts to affect sufferers between the ages of 18 and 40 and in some patients, symptoms steadily get worse into old age. Dr Richard Nicholas (right, centre) is Director of the MS Clinical Trials Unit at Charing Cross Hospital, where around 1,200 patients have taken part in research studies in the last four years. Their progress is monitored closely using questionnaires and tests of vision and coordination. Studying post-mortem brain tissue has enabled scientists to better understand what goes wrong in MS patients. Professor Richard Reynolds (above, centre) set up the MS Tissue Bank at Imperial in 1998. Dr Paolo Muraro (far right) is investigating new treatments based on stem cells.

them to consider donating their organs for science when they die.

“I think we’ve visited something like 170 groups over the years,” he says. “We go and tell them about the research that’s going on in MS, how it’s helping develop new drug treatments and why we need human tissue to do that.”

The response has been extremely supportive. “We found that people with MS and their families are very much behind this idea. They don’t think, ‘ooh no, I can’t do that’. They’re hungry for knowledge and they want to contribute to that knowledge.”

A similar scheme was set up by Parkinson’s UK a few years later, and now the collection for the two diseases together numbers more than 1,000 brains, making it one of the largest in the world. Almost 10,000 more people have pledged to give their brains, ensuring a steady supply of about three brains a week. The brain tissue isn’t just used for research at Imperial; it’s also sent around the world to enable other scientists working on MS and Parkinson’s to study.

“WE FOUND THAT PEOPLE WITH MS AND THEIR FAMILIES ARE VERY MUCH BEHIND THIS IDEA. THEY DON’T THINK, ‘OOH NO, I CAN’T DO THAT’. THEY’RE HUNGRY FOR KNOWLEDGE AND THEY WANT TO CONTRIBUTE TO THAT KNOWLEDGE.”

LOSS OF NERVE

The insights gained from studying these specimens have been significant. It’s now clear that far from being simply a disease of the nerve fibres’ myelin coating, there is also extensive damage to the nerve cells themselves.

“When we cut sections of the brain and actually count the neurons in various parts of the brain tissue, we can see that the numbers have reduced quite substantially,” Richard says. This loss of nerve cells is called neurodegeneration, which is a feature that is common to Alzheimer’s, Parkinson’s, and motor neurone disease.

“It’s very much changing the way we think about how the disease progresses over time and how we can treat it. Most of the drug treatments that are available now, based on the previous 10 years’ research, are drugs that dampen down the inflammation in the brain – what are called immune-modulatory drugs. Instead, we’re now beginning to think about how to protect the neurons from degeneration, which is something that’s really just started for MS.”



Previous page: Dr Paolo Muraro and Professor Richard Reynolds examine slices of brain tissue donated by a patient with MS. Above left and centre: Each brain is dissected according to a fixed protocol and the slices carefully organised so that researchers can examine damage in different areas. Above right: Dr Richard Nicholas tests patient Clive Challis’ hand control.

“We’re learning — we’re at the front end of things. **WE TAKE THE PATIENTS WITH US.**”

DR RICHARD NICHOLAS

approach: obliterating the immune system with chemotherapy or radiation, and replacing the misfiring cells with new ones grown from a patient’s own stem cells. One of those researchers is neuroimmunologist Dr Paolo Muraro, also based on the Hammersmith Campus.

“We call this ‘rebooting’ the immune system because it essentially aims to start the immune system anew,” he says. “The hope is that any aberrant immune cells that have developed in the MS patient would be wiped out by the immunosuppression and would not be regenerated and, therefore, there would be a prolonged remission from any inflammation. Hopefully lifelong, but we don’t know yet.”

So far, around 600 patients worldwide have had this treatment in small trials. The results for patients with early-stage MS have been promising, but the safety and efficacy of the procedure is still being established. Paolo is now working with an international team of scientists to devise a protocol for a major trial that would give a more definitive answer.

The type of stem cells that replace the harmful immune cells are called haematopoietic stem cells (HSCs). They’re found in the bone marrow, but they also circulate in the blood in low numbers. Some drugs, including Tysabri, seem to increase the numbers of HSCs in the blood in some patients, and it’s been suggested that mobilising stem cells in this way could help tissues to repair themselves.

A recent study by Paolo’s group found that patients whose circulating HSCs increase in response to Tysabri have fewer relapses, less disability, and fewer brain

lesions visible on MRI scans compared with those who don’t respond to the drug in this way. The reason for this is unclear, but if this observation is confirmed in larger studies, it could be a useful personal indicator of the drug’s success. For instance, doctors might consider taking a patient off treatment if the numbers of stem cells in their blood don’t increase.

NURTURING CHEMICALS

HSCs are one of two types of stem cells that reside in the bone marrow. The other, mesenchymal stem cells (MSCs), are another promising treatment possibility. They form a supportive tissue that shelters the HSCs in the bone marrow, but they can also be taken out and grown in culture to large numbers. Scientists initially thought that they could transform into new neurons or new myelin-producing cells and replace cells that were damaged in the MS brain. It turned out that this didn’t happen, but they did demonstrate a number of other properties that could make them useful in treatment.

They actually produce a range of chemical factors, some of which alter the behaviour of immune cells, and some of which protect nerve cells and encourage repair. “The idea,” explains Paolo, “is that by taking MSCs from the bone marrow, growing them to large numbers and giving them back to a patient, we could aim to reduce the inflammation, or hopefully stop it. Even without turning themselves into other cells, they could still help in another way.”

Paolo’s group is about to start giving MSC treatment to patients in the UK arm of a trial that will involve a total of 150 patients

across Europe. It will be five years before the results are known.

INTELLIGENT THERAPY

Some scientists think that stem cell therapies, while informative about possible mechanisms for repair in the brain, are too complex and expensive to ever be used widely. But Paolo believes the costs will come down as technology improves, and that cells have certain qualities that make them a more intelligent therapy than drugs could ever be.

“It’s possible and desirable that we could gain a detailed knowledge of what cells do, isolate molecules that they produce and deliver them in drugs,” he says. “But one thing that would be hard to replicate with conventional drug therapy is the fact that certain cells used in cell therapies, such as MSCs, have a so-called therapeutic plasticity. This means that the cells adapt their behaviour depending on the environment that they are in.”

Some studies have shown evidence that the more inflammation there is in the body, the more MSCs suppress the immune system. “They don’t just switch on and off; they have a continuous variation in their biological behaviour. This makes them an order of magnitude more advanced in their refinement compared to any drug that we use. I don’t know if science will be able to replicate that.”

INTO THE UNKNOWN

Paolo and Richard work closely with the staff at the MS clinic at Charing Cross Hospital to get promising treatments from the lab to patients as quickly as possible.

In the last four years, around 1,200 patients with MS have enrolled in research studies at Charing Cross. The director of the MS Clinical Trials Unit, Dr Richard Nicholas, sees finding new treatments as an integral part of his job as a clinician. “There are increasingly effective treatments for relapsing-remitting MS, but we can do little to help patients with secondary progressive MS,” he says. “You have to sit in front of people every day who are getting worse, so you constantly ask: ‘why can’t we do something about it?’”

This determination to improve patients’ lives leads him to a wide range of collaborators, at Imperial and beyond, whose ideas are ripe for clinical investigation. “We are one cog,” he says. “We work with people who are much cleverer than us.”

While some of the studies are showing promising results, inevitably, some don’t go so well. Such occasions are hugely disappointing for patients, scientists and funders, but no one is about to give up on looking for better treatments. Jane took part in a trial six years ago that was abandoned when the treatment proved ineffective. This time around, she has her fingers crossed that Tysabri might stop her getting worse, or perhaps even improve her condition.

Meanwhile, Richard Nicholas is working hard to recruit more volunteers who might benefit from Tysabri and contribute to our understanding of how it could be developed as an effective treatment. As ever in science, it’s a step into the unknown. “We’re learning – we’re at the front end of things. We take the patients with us.”

+ ONLINE EXTRAS: View a slideshow of the brain bank and research labs: www.imperial.ac.uk/imperialmagazine



► GENERATIONS OF ◀ LEARNING

How might today's educators respond to their students' changing relationship with technology? *Imperial* magazine investigates the College's new approaches to learning.



A decade ago, turning up to a lecture with a handful of "good quality transparencies" was usually enough to keep students engaged, says Omar Matar (Chemical Engineering and Chemical Technology 1993), Professor of Fluid Mechanics and chair of Imperial's e-Learning Strategy Committee. But advances in mobile technology, particularly in smartphones and tablets, mean today's learners have higher expectations of how staff will use these technologies. Most regularly access information from a variety of media sources, particularly social networking platforms like Facebook and Twitter, which can make traditional teaching methods look uninspiring and outdated in comparison.

Competitive advantage

At the same time, the recent hike in UK undergraduate tuition fees – now around £9,000 a year in many institutions – means universities feel under increasing pressure to improve learner experience. As David Lefevre (MSc Computing Science 2002), Director of the Educational Technology Unit at Imperial's Business School puts it: "If students don't get what they want, they'll become critical".

When it comes to technology, many higher education institutions are lagging far behind the business world. As a part-time journalism lecturer myself, I'm reminded of this every time I find myself handing out wads of paper-based course materials or queuing for the photocopier. While colleagues are happy to share resources, there are few mechanisms in place to make this happen quickly and efficiently. I feel I am constantly

duplicating work, writing lesson plans and resources that probably already exist – and delivering the kind of teaching I experienced as a student, almost 20 years ago.

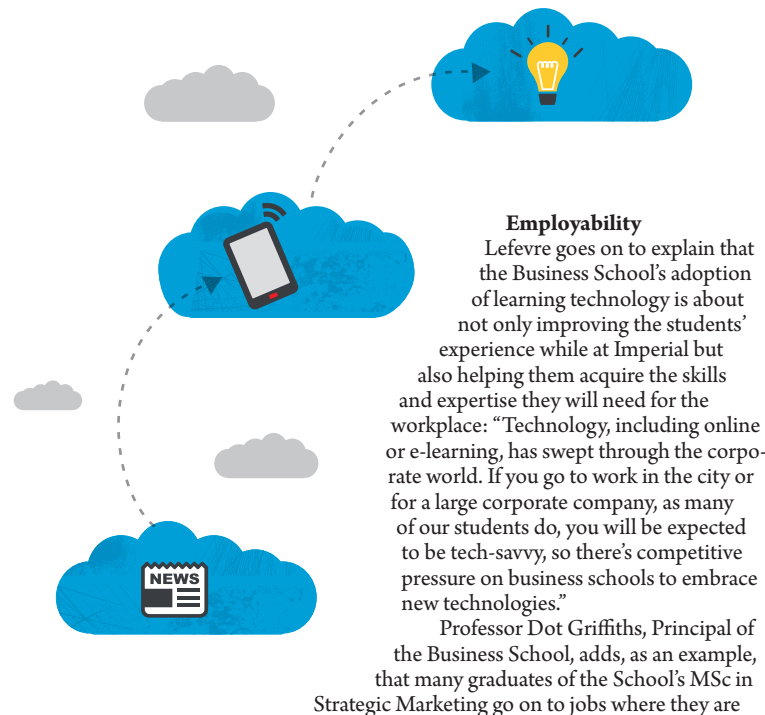
If universities want to keep pace with business in an increasingly competitive marketplace, they need to up their game, says Matar. "The range of technology that people come across in their everyday lives means that attention spans are becoming shorter and shorter. If we don't try to work with that, we are not going to be able to capture students' interest, and quite frankly, we are going to fall behind."

Business needs

At the Business School, this year staff are giving an iPad to the majority of students and uploading course materials to a central social media hub. In the past, students could access lecture notes and PowerPoint via the College's virtual learning environment, but many complained it was "slow, cumbersome and difficult to navigate", says Colin Love (MBA Management School 1995), Programme Director of the School's MSc in Strategic Marketing. Now when students arrive at a lecture, slides and other materials are available on their tablet immediately. "Last year, we didn't give out a single piece of paper," says Love.

At around £300 each, the initial outlay for iPads might sound steep, but balanced against savings on printing and paper, it has turned out to be surprisingly cost-effective. Love has calculated that posting content to the hub as well as Facebook and Twitter saves the 10kg of paper that an average marketing postgraduate student is likely to use on a year-long course. It has also proved to be a big time saver. As Love explains: "Before we went paperless, if I saw something interesting in print that was relevant to the course, I'd come in, get a pair of scissors, cut it out, put it on the photocopier, run off 100 copies and take it to a lecture with me. Now I can capture the page on the iPad while I'm on the train and send it through to the communications hub... and the quality is perfect."

WORDS BY JAN MURRAY // ILLUSTRATIONS BY BETH ELZER



required to commission websites or use customer relationship management systems. "They can't do this unless they have an understanding of how websites are built and hosted. They certainly won't be able to have intelligent conversations with technical people unless they have some understanding of how technology works."

Personal touch

Griffiths also points out that technology can help create a more personalised approach to teaching and learning. This is particularly relevant for her faculty, as unlike subjects such as computing or physics, which tend to attract students with a first degree in that subject, business studies can appeal to learners from a variety of disciplines. As a result, it is not uncommon for students to need to brush up on specific areas, like maths, that they feel rusty on in preparation for starting the course.

For these students, short e-learning courses can be very effective, says Griffiths. "It's very difficult to learn subjects like that [maths] very intensively and quickly. They're usually best taught bit by bit and we find that students do much better at these pre-study courses if they do them online, at their own pace."

E-learning can also be a great way to give learners individual feedback, which as Lefevre points out is "a burning issue" in higher education at the moment, as well as a priority for the College. "Business school students want more feedback than universities are providing, and those studying at Imperial are no exception. We encourage our lecturers to use simulations, quizzes and interactive exercises in their teaching as much as they can, giving students greater opportunity to get feedback on how they are doing."

Standardising medical training

Over at the School of Medicine, staff have been exploring the potential of e-learning as a way of standardising the quality of learning experience, for example in respiratory medicine. The programme for this topic used to involve two lectures – one on breathlessness and one on pulmonary embolism – followed by practical experience in a hospital environment. The problem was that students were sent to different hospitals, which meant their hands-on experience and exposure to specialists could vary dramatically.

In an attempt to give students a more 'uniform' experience, Martyn Partridge, Professor of Respiratory Medicine at Imperial, developed e-learning modules on diagnosing respiratory disorders, emergencies and each of the common lung diseases, timetabled for students to review at regular intervals during their training. Evaluation

showed that transfer of knowledge to the students was the same whether they were taught in the traditional manner or used e-learning, but that those using e-modules were better at interpreting data.

The School has also explored the potential of virtual world technology, building a respiratory ward in Second Life and populating it with patients. Visually appealing and engaging, the virtual environment allows students to listen to 'real' breath sounds, order investigations and even diagnose patients. As Ashish Hemani, e-learning project manager in Medicine points out, this was not intended to replace face-to-face teaching, but to complement it as "a kind of preparatory study, so that when students go to see patients, they are more confident".

Research-led teaching

In the Department of Electrical and Electronic Engineering (EEE), Reader in Personal Robotics Dr Yiannis Demiris has developed a research-led teaching approach to give undergraduates the chance to learn from participating in his cutting-edge robotics research, and from having their work evaluated by real end users. As Dr Demiris explains: "This helps the students get more excited about the end result, as they're not just jumping through hoops for me as the lecturer. They are also producing real technologies."

“Before we went paperless, if I saw something interesting in print that was relevant to the course, I'd come in, get a pair of scissors, cut it out, put it on the photocopier, run off 100 copies and take it to a lecture with me. Now I can capture the page on the iPad while I'm on the train and send it through to the communications hub...and the quality is perfect.”

Fourth year students on the Electronic and Information Engineering undergraduate course are required to design and build their own interactive robots and put them to the test with members of the general public. Recent projects have included robotic recycling bins, receptionists, buskers and even a robot guide for blind people. The course, now entering its third year, has proved so popular with students that it received Imperial's highest student online evaluation score in 2012, and also earned Demiris Excellence in Teaching Awards from the President & Rector, as well as from the Faculty of Engineering. He adds: "Many students continue working on their projects just for their own interest long after the course has finished and grades have been awarded."

New challenges

Working with new technologies rarely comes without challenge. Getting the robots to a stage where they can be evaluated by end-users within the time frame of university teaching requires a significant engineering effort, which in turn means group work. The biggest challenge with large group projects, says Demiris, is "separating those that worked hard from those who took more of a back seat." Staff have addressed this by giving each student individual components of the robot design that they are solely responsible for and asking them to submit an individual design report for their work. Students are also required to attend both individual and group interviews, where they are questioned about their work.

In the Business School, staff have found that going paperless can also bring its own, new problems. "If you post a course message across multiple social media channels, you soon receive a whole raft of messages from the students in return," points out Lefevre. "One challenge for universities moving in this direction is how to deal with this. How do you respond to everyone if you're getting so many messages each week?"

In the School of Medicine, evaluation of projects based on new technologies has highlighted some teething problems. While a randomised control trial showed a slight increase in understanding from those who had taken up the respiratory e-learning option, evaluation of the Second Life respiratory ward showed that although it was highly interactive, the learning process was less well suited to the skills of year three medical students for whom it was originally designed, and the College has therefore decided not to roll it out any further.

"This isn't necessarily a bad thing," says Partridge. The evaluation of the Second Life project has also highlighted some important lessons about usage, with students being far more likely to use resources that are easy to access when they are on the move, via smartphone or tablet.

"We need to embrace the value of technology in enhancing the student experience," says Partridge. "At the same time, no single learning experience is right for all subjects or students and it is important to review the role of technology, so we can compare it to more traditional methods. That process is in itself valuable."

Partridge now also works as Senior Vice Dean at the new Lee Kong Chian School of Medicine in Singapore, the joint medical school between Imperial and Nanyang Technological University, due to take its first cohort of students in August 2013. The School has a major interest in technology-enhanced learning: all students will be issued with iPads pre-loaded with learning resources for each half-day of teaching, along with software that will enable them to evaluate each session as soon as it has finished, and to record any work-based assessments. Students will also have access to an e-portfolio similar to the one already used by Imperial students.

With each student visiting the communications hub up to 10 times a day, there is little doubt that the iPads and paperless approach are proving a big hit with learners at the Business School. Love, who recently received a President & Rector's Award for Excellence, awarded annually to staff who have made outstanding contributions in teaching, pastoral care, research supervision and supporting the student experience, says other departments are considering a similar approach.

Initially piloted last year with 70 students, the new approach to teaching and learning has now been rolled out to 750 students in the 2012 intake to the Business School's postgraduate programmes. Love says: "This time last year, we were pretty much the first UK business school to issue iPads to our students. Now I think we have the largest and most ambitious such project in the country – it's pretty revolutionary."



MASCOT SHOWDOWN

AN ENTHUSIAST'S GUIDE TO IMPERIAL'S LONG RIVALRIES

Imperial has an age-old tradition of mascotry, symbolising its spirit and character. Mascots are either 'inviolable' (they can't be stolen) or 'violable' (they can be swiped and then held for ransom). The kidnapping of mascots is a game of skill, cunning and opportunity played by the various students' unions to raise money for well-deserving, student-run charities (RAG). Imperial College Union President 2011–12, Scott Heath, described it as an "adults' game of hide and seek". Those caught attempting to steal have faced retaliation, such as being covered in motor oil, wood chips and a can of lasagne, before being set free. Don't say you weren't warned.

➤ **SHARE** your mascot memories and see photos of our collection online at: www.imperial.ac.uk/mascots



★ BOANERGES ★ Version II

FIRST MASCOT
'20

PAST INCARNATIONS: Bo' I was a 1908 Rover purchased in 1920
CURRENT: Bo' II is a 1902 James and Browne purchased in 1934 for £40
OWNER: City & Guilds College Union
STATUS: Ⓢ Inviolable



➤ In 1924 Bo' I was left at No. 10 Downing Street – its gearbox filled with gravel and carrying a lifesize effigy of the Prime Minister holding a giant biscuit, either in protest against the knighthood of a biscuit maker or due to a gift of a Rolls-Royce to the PM by a lord.

Boanerges means 'sons of thunder'

★ SPANNER ★ Version II

FIRST MASCOT
'37

PAST INCARNATIONS: Spanner I (1937), Spanner II (1964)
CURRENT: Spanner II is a 4ft long brass hand tool weighing in at 64lbs (33kg) that fits neatly around the bolts of Tower Bridge
OWNER: City & Guilds College Union
STATUS: Ⓢ Violable



➤ Spanner III was cast in the Bessemer Lab in 1961 unbeknownst to the RSM Union. The first Spanner was lost to King's, and the second broke when sat on by a Guildsman after being recovered from being buried in the Putney towpath.

Spanner – the largest tool available – is wielded in defence of Bo'

★ MIKE ★ Version I

FIRST MASCOT
'52

PAST INCARNATIONS: Herbert, a cast metal phoenix (1952), Lamppost, Queen's Tower (1958)
CURRENT: Mike (1966) is a 4ft long, 170lb (77kg) micrometer that measures minute distances
OWNER: Imperial College Union
STATUS: Ⓢ Inviolable



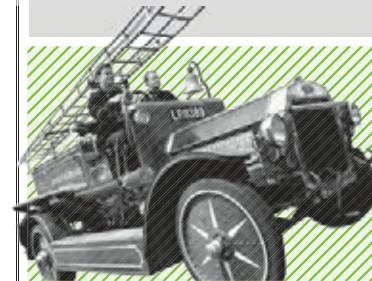
➤ The Rifle Club saved spent cartridge cases to make Mike in 1966. Designed in the Royal College of Science, cast in the Royal School of Mines and machined in the City & Guilds' College, Mike was a truly collaborative effort and is more useful than a lamp post.

The first college to steal Mike was UCL

★ JEZEBEL ★ Version I

FIRST MASCOT
'55

PAST INCARNATIONS: None
CURRENT: Jez is a 1916 Dennis "N" Type fire engine named after a Phoenician princess of Sidon
OWNER: Royal College of Science Union
STATUS: Ⓢ Inviolable



➤ In 1965 at Imperial, the Queen Mum almost became a victim of Jez's new paint job, having her pristine white gloves saved from the stain of scarlet coach paint by one of its quick thinking keepers who shouted "Don't touch, Ma'am. It's still wet!" Gallantry at its finest.

Jez weighs five tons and has 55 sq ft of brass to polish

★ CLEMENTINE ★ Version II

FIRST MASCOT
'55

PAST INCARNATIONS: Clementine I (1955) was a 1919 Aveling & Porter five-ton steam roller
CURRENT: Clementine II is a 1926 Morris "T" Type truck purchased in 1960
OWNER: Royal School of Mines
STATUS: Ⓢ Inviolable



➤ Clem used to belong to the Courage Brewery Estate and is therefore a fitting mascot for the students of the Royal School of Mines, who are very fond of the more than occasional tippie. She is a yearly participant in the historic London to Brighton Run.

Clem runs like a charm and continues to pass her MOT

★ THETA ★ Version IV

FIRST MASCOT
'58

PAST INCARNATIONS: Theta I (1958), Theta II (1964), Theta III (1970)
CURRENT: Theta IV (1975) is a 7ft long thermometer, weighing over 100lbs (45kg)
OWNER: Royal College of Science Union
STATUS: Ⓢ Violable



➤ Theta can be dismantled into four separate pieces and hidden in separate locations around campus. Once completely violated, tradition states that the Theta must be completely reassembled before being tossed into the Round Pond in Kensington Gardens.

The original Theta was made from a balcock stuck onto a broom handle

★ DAVY ★ Version I

FIRST MASCOT
'58

PAST INCARNATIONS: Mitch the Michelin Man (1958), Davy I (1965)
CURRENT: Davy II (1975) is a 3ft high, 132lb (60kg) brass and aluminium mining lamp
OWNER: Royal School of Mines
STATUS: Ⓢ Inviolable



➤ A ransom demand for Davy II included at least two complete rugby teams spending the night in front of Big Ben. Photos were to be taken every hour with the clock in the background, showing them holding the student newspaper *Felix* and *The NewStandard*.

Rumour has it Davy once was buried under the Queen's Lawn

★ BOLT ★ Version I

FIRST MASCOT
'68

PAST INCARNATIONS: None
CURRENT: Bolt is a steel shackle with a chrome bolt passing through it, mounted on concrete and weighing 68lb (30kg)
OWNER: City & Guilds College Union
STATUS: Ⓢ Violable



➤ Bolt has been kidnapped with his faithful companion Spanner on a number of occasions through the years, resulting in various ransom demands. An outrageous one was for £1,320 – 10 times the combined weight of Bolt (68lbs) and Spanner (64lbs).

Bolt fits into the other end of Spanner – a match made in heaven

★ DERRICK ★ Version I

FIRST MASCOT
'79

PAST INCARNATIONS: None
CURRENT: Derrick is a Ner-a-Car classic motorbike built in 1926, the last year of its production
OWNER: City & Guilds College Union
STATUS: Ⓢ Inviolable



➤ Derrick is a male motorbike and the name was intended to complement Bo'. Suggestions not chosen include 'Peep', 'Geste' and 'Locks'. The vote swung towards Derrick, inspired by the deeply respected (cough, cough) 1978 Tarzan movie starring the actress Bo Derek.

Derrick is a local boy, made in Kingston-upon-Thames in 1926

★ PHOENIX ★ Version I

FIRST MASCOT
'09

PAST INCARNATIONS: None
CURRENT: A costume representing the mythical sacred firebird, Phoenix was originally created for the annual Varsity match between Imperial College and Imperial Medics
OWNER: Imperial College Medics Union
STATUS: Ⓢ Violable



➤ Phoenix's head was stolen in 2011 with a ransom demand that included a £200 donation to RCSU RAG, the ICSM President streaking in Beit Quad with only the Phoenix head on and a department-wide email stating that "RCSU is better than ICSMSU".

Phoenix struts his stuff by dancing on the sidelines at sports matches

★ VICTORIA AND ALBERT ★ Version I

FIRST MASCOT
'10

PAST INCARNATIONS: None
CURRENT: Since ancient times lions have been revered in mythology and legend for their power and strength. Just like Imperial athletes, but much more hairy.
OWNER: Sport Imperial
STATUS: Ⓢ Inviolable



➤ Victoria and Albert are apt names given that Imperial is a part of Albertopolis, with a statue of Queen Victoria standing in the College's main entrance. These towering costumed mascots rally the crowd's spirit at Varsity sports matches.

Victoria and Albert are our youngest – and plushest – mascots

BODY of KNOWLEDGE

► Human dissections are a vital part of every doctor's training, but the experience might be a little different for medical students from the iPad generation. Meet Melanie, a virtual cadaver that can be sliced and viewed from any angle on a touchscreen table.

01 ✖ PICTURE PERFECT Based in the Department of Surgery and Cancer on the St Mary's Campus, the table's powerful rendering engine combines graphics and CT scans to produce a realistic image of a human body. Students can interact with the image by swiping a finger over the screen to rotate and slice the body or enlarge the view. Skin, organs, bones and blood vessels can be added or removed so the viewer can focus on whichever systems they want to look at.

02 ✖ NO SUBSTITUTE The table, made by US firm Anatomage, was bought for \$60,000 in 2011, and is the first of its kind in Europe. Melanie has obvious advantages over a real cadaver. "With a body you can only dissect it once, whereas the table boots up and starts as many times as you want," says Dr Philip Pratt of the Hamlyn Centre for Robotic Surgery, pictured to the left. Unfortunately for squeamish medical students, it won't replace cadavers completely. Handling a real corpse is important for students to develop technical skills and professional attitudes.

03 ✖ CLINICAL APPLICATIONS Imperial researchers are exploring applications of the technology that go far beyond the teaching of anatomy. CT scans from a patient can be uploaded onto the table and displayed as an interactive 3D image, instead of the slices that doctors normally look at. Since the arrangement of blood vessels varies from person to person, this display is invaluable to surgeons when they have to clamp the vessels before removing part or all of an organ, such as a kidney.



PROFESS

WHEN STRUCTURAL BIOLOGIST STEPHEN CURRY STARTED BLOGGING, HE DIDN'T ANTICIPATE TRIPS TO THE HIGH COURT OR INTO THE HEART OF GOVERNMENT. HERE HE REVEALS HOW PLUGGING HIMSELF INTO THE PUBLIC DOMAIN HAS ADDED NEW PERSPECTIVES TO HIS PROFESSORIAL LIFE OF RESEARCH AND TEACHING.

Words by
STEPHEN CURRY

Illustrations by
SHOTOPOP

Many people outside academia don't seem to know what to make of professors. This was driven home to me a few years ago in a conversation with one of our undergraduate students. Though no stranger to professors, having been taught by several during his degree course at Imperial, he was incredulous when I informed him that Professor Curry regularly took the 52 bus from Victoria train station on his way to work. Somehow he saw professors as a class apart – not like ordinary mortals.

The revelation gave me pause for thought: professorships are much more numerous than they used to be – the days of one prof per department are long gone – but clearly they retain some mystique. I wouldn't wish to diminish the position, but sense that a reality check is in order.

When I was promoted to professor back in 2007 my parents asked me how my job would change as a result. I was surprised at the question; as anyone familiar with academia will know, apart perhaps from an increase in committee work, I expected my primary duties of research and teaching to remain largely the same.

But something did change. When called upon to deliver my inaugural lecture, I had the chance to reflect on the journey that led to promotion, which was mainly devoted to the structural analysis of virus proteins and protein-drug interactions; but more importantly, I started to consider what I might do with the position. As I did so I felt able to relax a little and began to enjoy the sense of *arrival*.

There was no let-up from the pressure of maintaining the funding

and momentum of my research group – the projects, the papers, the grant applications – or from the demands of undergraduate teaching, which is often a pleasure to deliver but a struggle to prepare: there never seems to be enough time to get everything done. You might think that 20 years in the business would have taught me how to balance this tension with professorial poise but you would be wrong.

Nevertheless, amidst this ongoing mêlée, the freedom that came with being a professor offered me an opportunity to enlarge my scientific activities. In 2008, as I was finalising yet another grant application, I found myself stalled in front of my computer trying to concoct 400 words on my plans for how I might engage broader audiences with my research. This part of the form had always troubled me. I had no problem with the implied duty to reach out to the public to give a good account of how I was planning to spend taxpayers' money, but had few ideas, beyond visiting my children's school, of how to go about it. But around that time, I had become dimly aware of the scientific blogosphere and began to think that a blog might be an easy way both to fulfill my duty to the citizenry and to demystify the idea of professor.

It was a risky move because even now people look quizzically at you if you confess to blogging. "Graffiti with punctuation" is how the gruff scientist in the movie *Contagion* dismisses blogging. That view still has many real world proponents, who tend to see it as an insular, narcissistic activity. Within the scientific community blogging is still sometimes seen as a distraction from the real business of research.

So, despite enjoying the new-found sense of academic freedom that came with elevation to the rank of professor, I dithered. Fear of losing scientific respectability wasn't the only impediment. Starting a blog may be technically straightforward – all you need to do is log on and begin typing – but for a scientist who has only previously published research papers, the immediacy of blog writing feels strange, even dangerous. There is not the protection of peer review by colleagues who will catch your more egregious errors before publication. So I hesitated on the edge of the blogosphere, that great ocean of free expression, testing the waters at first with my toe by leaving comments on other people's blogs. Finding that these weren't beaten back by an adversely critical reaction, that in fact some people took what I wrote seriously, I eventually took the plunge and started my own blog: Reciprocal Space.

Since then, I have never looked back. I found that once you start, it's difficult to shut up. The great thing about writing a blog is that you get instant feedback from your readers,

or at least those who take the trouble to leave a comment. And although the blogosphere is commonly supposed to be populated by trolls and hecklers, this simply isn't the case. Among those interested in science, there is a growing community with a keen appetite for direct interaction with scientists. I had a positive initial reaction to my scrawlings on science and life in the research lab and soon developed a degree of self-confidence – I hesitate to call it courage – about sharing my views online.

I was surprised to discover that sitting down at my keyboard to write took me out into the world in ways that I never imagined and helped to redefine how I see my role as a scientist and professor. At first I didn't recognise myself.

Before long I found myself banging on the door of *The Guardian* newspaper demanding – and getting – the right of reply to

columnist Simon Jenkins who, riffing off the non-appearance of a bird flu epidemic, had castigated scientists as a self-appointed clerisy that considered itself above criticism. I wrote to remind him that the rigours of peer review of our papers and grant applications regularly serve to keep scientists grounded in reality and, occasionally, painful humility.

In May 2010 I went to a meeting for those angered by a High Court ruling that science writer Simon Singh

(Physics 1987) had a libel case to answer when he wrote that the British Chiropractic Association (BCA) had "not a jot of evidence" to support its claims that spinal manipulation was an effective treatment for childhood asthma.

Picking up on that issue in my blog and joining in with the noisy campaign to challenge the BCA, I found myself in the High Court listening to Singh's barrister debate the finer points of what constitutes scientific evidence with three of the most senior judges in the land. It was almost surreal to witness science dissected in a courtroom but a salutary reminder that it reaches well beyond the confines of the laboratory.

As support for Singh, who eventually won his case, transformed into the Campaign for Libel Reform I found myself in parliamentary committee rooms absorbing the testimony of a wide range of interest groups, several of them scientists, science writers and journal editors. They each recounted examples of the pernicious effects of the archaic defamation law of England and Wales, under which a threat of libel can be issued with little or no evidence of damage and throws the burden of proof on the defendant. Because they are so expensive to defend, even if you win, libel writs are often used to stifle legitimate scientific debate. Science as a discipline depends critically on the cut and thrust of argument but where that clashes with powerful commercial interests, such as in the treatment regimes of chiropractors or the management of drug trials of pharmaceutical companies, wealthy organisations can silence critics with the mere threat of a libel action.

There is little doubt that the scientific dimension to the campaign helped to propel it up the political agenda and, astonishingly, the UK's coalition government is now shepherding a new Defamation Act through parliament that offers much stronger libel protection for science (and many other areas of public life). I cannot claim to have played a major part in the campaign but have given steady written and personal support; seeing it from close quarters has been an education in legal and political processes.

Like I said, once you get a taste for these things it is difficult to stop. When, in September 2010, Vince Cable, the new Secretary of State for Business, Innovation and Skills, sought to justify

❖❖❖ **"Among those interested in science, there is a growing community with a keen appetite for direct interaction with scientists."**

a warning that scientists would have to take their share of impending budget cuts by declaring “something in the order of 45%” of publicly funded research to be “not of excellent standard”, I did not hesitate. Former MP Dr Evan Harris and I wrote a stern rebuttal of Cable’s claim in *The Guardian* and immediately joined a small band of like-minded scientists, led by cell biologist Dr Jenny Rohn, to found the *Science is Vital* campaign. It is a testament to the power of blogging – and Facebook and Twitter – that within 42 frantic days we had amassed a petition of over 35,000 signatures, lobbied parliament and rallied with over 2,000 supporters right outside the doors of the Treasury to protest the threatened cuts to the science budget. Harnessing grassroots support was an important fillip to behind the scenes efforts by more august bodies such as the Royal Society to lobby the government. It led to direct talks with Minister for Universities and Science David Willetts and – it still seems incredible – to significant protection of UK spending on science spend.

The science budget for 2010–14 was fixed in cash terms and so is being eroded by inflation. There is no doubt that pressure on funding is much more intense than in recent years – many working scientists seem gripped by a grim determination to weather the recession. But I was immensely heartened by our ability, through *Science is Vital*, to mobilise support, not just from scientists, who were only about half the signatories on the petition, but from large swathes of the UK population.

As with the libel reform campaign, the experience of leaping from the keyboard into the public domain has brought home to me how standing up for something can make a real difference. Something I thought would be difficult turned out to be quite straightforward. I hope my efforts might also have made blogging more respectable within science, by showing something of its potential to energise dialogue, both amongst scientists and with the wider public. With increasing frequency I bump into colleagues who tell me they have read my blog, something that is always satisfying to hear because although I might now be less shy of offering an opinion in public, part of me feels little different from the diffident undergraduate I was 30 years ago. The openness of the form, I tell them, gives blogging a scholarly edge: writing in public disciplines your thinking and challenges it by exposing you fully to the counter-views of your commenter critics.



❖❖❖ “The experience of leaping from the keyboard into the public domain has brought home to me how standing up for something can make a real difference.”

Of late, the focus of my writing has looped back into academia. A post I wrote last year to assert the importance of mathematics in the training of life scientists sparked an enormous response that is now helping me, in my role as Director of Undergraduate Studies, to organise a rethink of our curriculum.

Most recently I have been exploring the issue of ‘open access’, a revolutionary approach to publishing research papers that makes the scientific literature freely available to readers. It is an obvious innovation in a web-connected world that enables the taxpayer to access the research that they have paid for. With luck, open access should enrich the technological dimension of political discourse as our society turns to face serious problems, such as climate change, energy generation, food supply and the medical demands of an ageing population.

Open access is backed by the government, but it is a complex policy that is inflaming cultural and budgetary conflicts among scientists, who feel tethered to an established journal system that is increasingly unaffordable. The innovation is by no means a done deal, so I have been writing extensively about open access this year, trying to unpick its Gordian knot of issues for myself and anyone who cares to read.

Having plugged my professorial self into the public domain, I am increasingly called on for comment in the press and on the radio. How things have changed. A few months ago I found myself in a booth at the BBC studio in Westminster, staring down at the microphone in front of me, waiting for the ‘voice of Radio 4’, Eddie Mair, to cue me in as the professorial expert to another discussion on open access and wondering: “How did I get here?”

Structural biologist PROFESSOR STEPHEN CURRY works on virus replication, using X-ray crystallography to determine protein structure and function. He is also Director of Undergraduate Studies in the Department of Life Sciences and teaches on the BSc in Biochemistry course. He blogs about the place of science in the world at <http://occamstypewriter.org/scurry>



CERN Courier

Born in the foothills of Mount Kenya, now commuting between the foothills of the Alps and London, Imperial’s Professor Tejinder Virdee is a well-heeled citizen of the world. Over the last 30 years his work as a particle physicist has taken him around the globe while championing a border-crossing experiment that has changed the face of physics and our understanding of the Universe.

➔ **TEJINDER’S GLOBETROTTING BEGAN** when he was a postgraduate at Imperial, with trips to America’s national accelerator laboratory in Stanford to collect data for his PhD (Physics 1979). “At the time, few universities offered this kind of opportunity for a young student to travel on the job, but there were only a few places where you could do large scale particle physics experiments,” he explains.

These early experiences inspired Tejinder to move from London to the European Organization for Nuclear Research (CERN) in Geneva, Switzerland, where he pioneered new approaches to high energy physics. By 1989 CERN’s Large Hadron Collider project was beginning to get going. Tejinder worked with colleagues to develop the proposal for an experiment that, in 1993, was chosen over stiff competition from scientific rivals as the best way to detect the now famous Higgs boson particle.

And so it was that this young experimentalist and self-made inventor of particle

detectors found himself as deputy project leader of the Compact Muon Solenoid (CMS) experiment – the project to design a new particle detector that has since become known as the ‘united nations of science’, involving over 3,000 scientists and engineers from 40 countries.

The experiment called for input from institutions and governments in many countries, which Tejinder and his colleagues set off to visit one by one. “We had grand scientific goals, and went on a journey of discovery to countries such as Brazil, China, India, Iran, Korea, New Zealand, Pakistan, Ukraine, USA and more,” he recalls. “Everyone treated us really well, and each trip held a new surprise. In Beijing we were taken to the Forbidden City before our meeting. In Taiwan I found myself in the middle of an earthquake. And in India we stayed in a makeshift bed and breakfast where the villagers still hand weave beautiful shawls.”

The scale of the CMS project meant it would take almost 20 years to complete. One of his early trips turned up a key component for the detector in the form of lead tungstate crystals in the former USSR. “I knew these would be perfect for measuring the high energy photons so vital in our search for understanding how elementary particles acquire mass,” Tejinder remembers. “Manufacturing the crystals turned out to be our biggest challenge. It took 20 visits to Russia and earned me an open visa, but we eventually got them grown in an ex-military factory outside Moscow – a production that ran round the clock for 10 years.” It also turned out to be the project’s biggest contract, worth 50 million Swiss francs. “We initially settled in US dollars, but the changing economy meant that final payments were

made in Russian roubles.” It turned out to have been a good investment though, as it was in these very crystals that CMS detected the strongest signal for the new boson.

All the while he was away, Tejinder kept up strong connections with Imperial: “I have always felt part of the Imperial family,” he says. “It is one of the few places in the world that could have let me do the research I wanted. Everyone has been very supportive and we are known the world over as a leader in particle physics.”

After almost two decades at the helm of CMS, Tejinder now devotes his time to extracting the science from CMS and spending more time at Imperial. His home remains in Geneva with his wife Vatsala, who works for the United Nations. “When I’m travelling I stay in hotels, but it’s much more pleasant when you have your own place to go to. London is refreshing and I can focus on teaching.” It’s also a chance for him to catch up with his children, Oxford astrophysics doctoral student Jasmeer (Physics 2009) and primary school teacher Natisha, who both moved to the UK for university after growing up in Switzerland.

So where next for Tejinder? He was just back from a meeting in Edinburgh with only a small suitcase when *Imperial* magazine met up with him. He left promptly to board a plane to Corsica to talk about the results on the recently discovered Higgs-like boson, to be followed by a CMS symposium in Lisbon, Portugal, and then on to Krakow, Poland to discuss the future of particle physics. “This is an exceptionally busy time for me,” he laughs. “It’s hard to say no to these invitations. It’s always exhilarating to share my passion for particle physics.”

IMPERIAL FESTIVAL & ALUMNI REUNION

As plans for the 2013 Imperial Festival and Alumni Reunion get underway, *Imperial* magazine takes a look at what we got up to last year. Hands-on research, dance classes, live music and children's workshops kept adult and family audiences busy, while alumni got to reunite with old friends and make new connections.



SOAPBOX SCIENCE PhD students took to their soapboxes to debate scientific issues with Festival visitors, such as whether the carbon cost of flying can be justified, or should we be trying to live for longer? Medicine postgrads Alice Brown and Katerina Seich al Basatena (left) made the case for how best to communicate science with the public.



JUMP Imperial College Road sprang to life with student societies showcasing their skills. The Parkour Society reached new heights with their gravity defying moves.



TALKS OF THE TOWN Visitors enjoyed lectures from world-leading researchers throughout the day, including sessions on how our bones work, how Britain became an island, digital technologies and entrepreneurship.

1,000
REGISTERED
ALUMNI & THEIR
GUESTS



EXPLOSIVE EXPERIMENTS From the very big to the very small, the Festival Research Zone marquee was packed with interactive demonstrations, experiments and opportunities for alumni, families, staff and students to quiz scientists and engineers about their work. The highlight for one family was "the interactive, hands-on things, because they show you how science works and you can take part in it".



SING The Festival music stage buzzed with performances from College musicians such as the Techtonics a cappella group (right), and DJ78 and his wind-up gramophones.

ALUMNI NETWORKS Alumni from across the globe enjoyed opportunities to catch up while the Festival programme kept their families amused. The 2013 Alumni Reunion includes a private view of the Festival Research Zone as well as exclusive social events.



280
RESEARCHERS
PRESENTING

THE ODDITIES OF PHYSICS Friends of Imperial teamed up with Department of Physics staff and students to produce a show of "the strangest, most intriguing and nerdiest feats that science has to offer". Alumni and Festival visitors of all ages were kept entertained with acts inspired by particle physics, relativity and classical mechanics.



QUEENS TOWER EGG DROP Imperial's Reach Out Lab challenged younger visitors to design, build and test a contraption to protect an egg dropped from the first floor of the Queen's Tower. Other inspiring activities included making planispheres and polymer worms.



SEEING ISN'T BELIEVING Bioengineering student Richard Pangonis navigated the Festival Research Zone marquee using a device developed for visually impaired Paralympic sailors as part of an undergraduate sports innovation design project.



7,000
VISITORS

BIOFUEL BIOLOGY PhD student Ben Reeve demonstrated how he is using *E. coli* to develop synthetic biofuels, with the help of a cuddly version of the bacterium.



POP UP SURGERY. Technologies for training surgeons were put to good use in Imperial's inflatable operating theatre, where medical dramas unfold and wannabe surgeons can get to grips with surgical procedures.

DANCE Student dance groups including Belly Dancing (right) and Funkology ran workshops, gave visitors opportunities to put their new skills into practice, and staged special performances in the Dance Tent throughout the Festival.



POP MUSIC Exploding stripy paper bags added drama, entertainment and audience participation to Imperial College Symphony Orchestra's performance of Tchaikovsky's 1812 Overture.

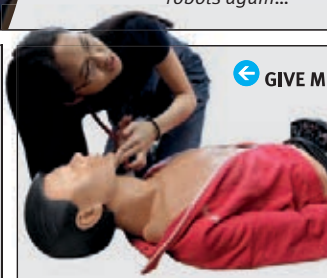


HAND IN HAND "I wanted to thank Imperial Festival. You kept three generations of my family entertained all day. Two weeks later, the only thing anyone wants to do is to come back and talk to the robots again..."

QUESTION TIME Imperial Consultants invited visitors to put burning questions to College researchers and find out how their work has solved real-life problems from surveillance robots to squeaking windscreen wipers and drying mangoes.



GIVE ME A BEAT. Can you breathe? The Imperial College student division of St John Ambulance, IC LINKS, gave lessons in life saving, as they taught visitors the basics of first aid and resuscitation, and invited them to try out what they learnt on the resident dummy.





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ALUMNI RECEPTIONS

1 / In July 2012, President & Rector Sir Keith O'Nions hosted an alumni reception in Shanghai at the Swissotel Grand for alumni living in the region.

2 / The President & Rector visited Houston in September 2012, as well as New York, San Francisco and Boston, hosting alumni receptions in each city.

3 / The alumni event in Shanghai attracted over 100 Imperial graduates to hear the latest updates on activities in London and share stories of their time at the College.

4 / The New York event, which also featured representatives from Imperial College Rugby Club, who were in the US on tour, was held in the British Consulate on 13 September.

5 / July 2012 marked the 30th birthday celebrations for ICAAHK, celebrated at the Hong Kong Bankers Club with a dinner attended by around 200 alumni.



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6 / Face painting, jousting and dancing the night away featured at this year's uncommonly sunny Silfest, the student-run music festival held every year at Silwood Park Campus in Berkshire.

7 / We welcomed over 2,200 prospective students and 1,400 parents at the undergraduate Science and Engineering Open Day on 28 June 2012.

8 / More than 5,000 graduates and 12,000 guests celebrated their success at the 2012 graduation ceremonies at the Royal Albert Hall.

9 / After limbering up at Imperial's *Ethos* sports centre, British triathlete Alistair Brownlee won Olympic gold as brother Jonny took bronze.

10 / British Paralympic swimmer Ellie Simmonds trained at *Ethos* before winning gold in the 400m freestyle and 200m individual medley.



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GOODRECEPTION



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11 / Prime Minister David Cameron was one of the speakers at the Global Health Policy Summit, hosted by Imperial's Institute of Global Health Innovation.

12 / The President of Mozambique, Armando Guebuza, visited the College to learn more about research links between Imperial and Mozambique, including HIV prevention and helping tackle the parasitic disease schistosomiasis.

13 / The Department of Chemical Engineering launched its new ChemEng Discovery Space, including labs and a fully functioning pilot plant, with tours and talks.

14 / Professor Sir Konstantin Novoselov FRS, joint recipient of the 2010 Nobel Prize in Physics, gave the 2012 Kohn Award lecture on his discovery, graphene, and what the future holds for it.



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15 / Alumni attended the Legacy Lunch with the President & Rector at his home.

16 / Last summer, Kadhim Shubber (Physics 2012) raised £3,000 for the Rector's Scholarship Fund by cycling from John O'Groats to Land's End on a tandem... with a skeleton.

17 / Dr Richard Lee (Chemical Engineering 1960, PhD 1964) visited with Sir Keith O'Nions and three current Lee Family Scholars: Zichen Xue (Earth Science and Engineering), Yu Luo (Physics) and Shouhua Chen (Mechanical Engineering). Since 2002, the Lees Charitable Foundation has provided 10 full PhD scholarships for top students from China and Hong Kong.



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18 / Rio Tinto and Imperial signed an education partnership, which includes scholarships and support for teaching.

19 / The Lee Kong Chian School of Medicine, the joint medical school being developed by Imperial College London and Nanyang Technological University in Singapore, held its ground-breaking ceremony in May 2012.

UP↑ IN THE AIR

“WHEN I WAS A LAD GROWING UP NEAR GATWICK, I had this recurring dream that I would suddenly become airborne and go flying round the countryside,” says Martin Pettifer, a technician in the Mechanical Instrumentation Workshop in the Department of Physics. “My whole life I’ve been obsessed with the sky,” he admits.

Martin qualified as a pilot by the age of 21 and has been doing aerobatics in vintage planes, and passing on his passion by working as a flying instructor, at the weekends ever since.

He relishes a challenge; whether that be in his weekday role – making tiny prototypes from start to finish for academics to enable them to do their experiments with lasers or cryogenics – or looping the loop in a WWII Tiger Moth. “I prefer flying older planes, as their lack of technology makes them a real handful to fly,” he explains.

Martin would love to use his expertise to build his own plane one day but dismisses making one from a kit, in favour of doing it from scratch. “The problem is that would take up to 15 years and, for me, that’s valuable flying time I’m not prepared to sacrifice.”



PHOTOGRAPHY: DAVE GUTTRIDGE. THE PHOTOGRAPHIC UNIT

Master of mobility

The meshing of engineering and medicine was the bedrock of a career in which Hugh Glanville (St Mary’s Hospital Medical School 1942) transformed the lives of thousands of people with mobility issues across the UK.

Professor Hugh Glanville, who died in December 2011 at the age of 95, was tempted into medicine by the promise of sport alongside study. A school friend told him how much he was enjoying his training at St Mary’s Hospital Medical School, highlighting the excellent rugby team. On gaining a place, Hugh went on to learn from Sir Alexander Fleming, or ‘Old Flem’ as the undergraduates called him, and on one occasion received penicillin from the drug’s discoverer as treatment for a minor ailment.

After serving in the Westminster Dragoons during the Second World War, Hugh joined the fledgling NHS as a junior doctor, and began to specialise in rehabilitative medicine, working to improve the lives of people who had suffered severe injury and physical impairment. In 1953 he was asked to move to Salisbury to help set up the UK’s first rehabilitation service, something he described as the second best thing he did in his life, the first being his marriage to his wife, Estelle.

Hugh brought to the role his enthusiasm for engineering, having always enjoyed tinkering with motors and engines. He converted an old Nissen hut in the grounds of Odstock Hospital into a workshop to explore how machinery could be better applied to improve patients’ mobility, working on the development of prosthetic limbs.

The approach he honed throughout his clinical work was cemented when he founded the Wessex



Professor Hugh Glanville (St Mary’s Hospital Medical School 1942) 1916–2011

Rehabilitation Centre at Salisbury District Hospital in 1956. He went on to become the UK’s first Professor of Rehabilitative Medicine at the University of Southampton 14 years later.

Hugh’s willingness to explore and embrace new techniques led him to introduce functional electrical stimulation (FES) to the UK in the 1970s. The treatment deploys electrical currents to activate nerves in limbs affected by paralysis, helping patients to regain speech and mobility.

Hugh drew most satisfaction from seeing the people he treated rebuild their lives. Patients say that FES has enabled them to do things that previously seemed distant dreams. The benefits of Hugh’s work are still felt today, championed by the National Clinical Centre for FES which opened in 2007 and currently treats around 2,500 people a year.

Hugh is survived by Estelle, daughters Margot and Felicity, his grandchildren and his brother John (St Mary’s Hospital Medical School 1953).



ILLUSTRATIONS: DONNA MCKENZIE

Dr Janet Folkes (PhD Metallurgy and Materials Science 1985) 1959–2012

Academic adventurer

Alumna Janet Folkes (PhD Metallurgy and Materials Science 1985) excelled in science but was happiest exploring the skies.

Janet, who died aged 52 in January 2012, came to Imperial to take a PhD in the laser surface treatment of titanium and titanium alloys, graduating in 1986. Her supervisor, Dr William Steen, recalls her quiet determi-

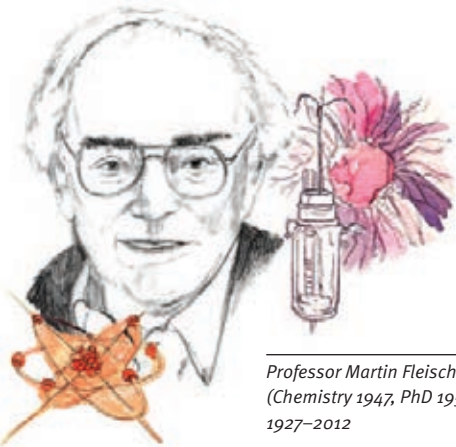
nation, but added that Janet also took life by the scruff of the neck.

Her subsequent career took in both academia and industry, and she settled as a senior lecturer in manufacturing engineering at the University of Nottingham.

Janet was an adventurer with a passion for ballooning, setting over 50 world records. Among her triumphs, she stayed

airborne for over 69 hours with her co-pilot Dr Ann Webb, achieving the longest hydrogen gas balloon flight by an all-female crew in the 2009 Gordon Bennett race launched from Geneva.

Describing the grip that ballooning held on her, Janet said: “Up there you see the sunrise and the sunset. Flying puts your worries in perspective”.



Professor Martin Fleischmann
(Chemistry 1947, PhD 1950)
1927–2012

In search of cold fusion

A visionary chemist, **Martin Fleischmann (Chemistry 1947, PhD 1950)**, briefly turned the world of nuclear energy on its head.

The significant contributions to modern electrochemistry of alumnus Professor Martin Fleischmann, who died in August 2012 aged 85, were eclipsed by his claims in 1989 to have achieved cold fusion. If correct the development would have met the world’s energy needs overnight.

While out hiking in the early 1980s Fleischmann and his colleague Stanley Pons puzzled over how nuclear fusion could be achieved at room temperature. Their contemplation of a new experiment into cold fusion was foreshadowed by Fleischmann’s doctorate from Imperial, investigating how hydrogen diffused through platinum. Using an electrical current they aimed to facilitate the absorption of hydrogen atoms from water into a cathode of palladium. The theory was that the hydrogen atoms would fuse together, releasing a burst of energy.

After years working on the experiment, the team discovered one morning that overnight their equipment had melted a hole the size of a dinner plate in the lab bench. “It had obliterated itself,” Fleischmann is said to have recalled. The evidence of significant heat release led to the university’s shock public announcement four weeks later that cold fusion had been achieved.

Imperial physicist Professor Steve Rose, who was working on hot fusion at the Rutherford Lab at the time, recalled how the news provoked furore in the worlds of science and industry. There was significant scepticism that fusion could be achieved without blisteringly high temperatures. Other scientists were unable to evidence nuclear activity when recreating the processes and Fleischmann and Pons, who continued with the research until 1995, could never reproduce the results.

The shadow cast by the cold fusion episode risks obscuring Fleischmann’s substantial achievements as an electrochemist. Subsequent generations of instrumentation of his design are still used in laboratories throughout the world to control ‘potential’, which he first recognised as important to determining the rate of electrode reactions. He also developed spectroscopic methods used to give new insights into materials at a molecular level, in particular surface enhanced raman spectroscopy.

Despite the disrepute caused by his work in the field, Fleischmann remained a champion for the potential of nuclear fusion. In an interview published by *New Scientist* in 2009, he reflected: “I think unless we get fusion to work in some fashion we are doomed, aren’t we?”

He is survived by his wife Sheila, son Nicholas and daughter Vanessa.

In memoriam

It is with regret that we announce the death of the following alumni of Imperial College London and the constituent medical schools and Wye College.

Alumni are listed according to their year of graduation. When an alumnus has obtained more than one degree from the College they are listed according to the graduation year of their first degree. Where indicated by a dagger (†) the alumnus was also a member of staff. Where indicated by an *, obituaries are available online at www.imperial.ac.uk/alumni/obituaries. Printed copies of obituaries are also available on request from matters@imperial.ac.uk.

1930s

- Mr John R. Ewans (Mechanical Engineering and Motive Power 1937, Aeronautics 1938)*
- Mr John Grensted (Electrical Engineering 1933, DIC 1934)
- Dr William Hewitt (St Mary’s Hospital Medical School 1945)
- Dr Kaspar S. Hocking (Biology 1935)*
- Dr Derrick J. Littler (Physics 1939, PhD 1956)*
- Dr Alfred F. Millidge (PhD Chemistry 1936)
- Mrs Margaret Morten née Norris (Wye College 1939)*

1940s

- Dr John Attenburrow (Chemistry 1943)
- Dr Robert (Robin) Armatage (St Mary’s Hospital Medical School 1946)*
- Mr Louis Badone (Metallurgy 1945)
- Dr Charles E. Bagg (Westminster Medical School 1946)
- Mr Roderick K. Barnes (Physics 1943)
- Dr Derek F. Bedford (St Mary’s Hospital Medical School 1948)
- Mr Peter A. Branch (DIC Chemical Engineering and Applied Chemistry 1942)
- Dr H.R. Claff (Westminster Medical School 1941)
- Mr Glascott E. Dawson-Grove (Geology 1949)
- Dr Alan Duffield (Mechanical Engineering 1948, PhD 1953)
- Mr Jeffrey Edelman (Botany 1948)
- Dr John B. Enticknap (Charing Cross Hospital Medical School 1945)
- Dr A.J. Essex-Cater (Charing Cross Hospital Medical School 1948)
- Dr Desmond L.B. Farley (St Mary’s Medical School 1944)
- Dr Geoffrey E. Ficken (Chemistry 1949, PhD 1952)
- Professor Hans (Martin) M.F. Fleischmann (Chemistry 1947, PhD 1950)
- Mr Dennis A. Gerhold (Metallurgy 1946)
- Mr Terence H. Gibbons (Mechanical Engineering and Motive Power 1944)*
- Dr Hugh J. Glanville (St Mary’s Hospital Medical School 1942)*
- Mrs M. Goodale (Wye College 1948)
- Mr David Grant (Mechanical Engineering and Motive Power 1945)

- Mr Richard M. Hadfield (Chemistry 1943)
- Mr Douglas W. Haigh (Chemical Technology 1940)*
- Mr William B. Hall (Metallurgy 1947)*
- Dr Gerald H. Hargreaves (Chemistry 1943, PhD 1945)
- Mr Bryan Hildrew CBE (MSc Mechanical Engineering 1948)*
- Mr Peter H. Hutchinson (Electrical Engineering 1941)*
- Mr Wei Lu Huang (MSc Electrical Engineering 1947)*
- Mr Thomas D. Jones (Civil Engineering 1948)*
- Mr Ernest J. Kaye (Electrical Engineering 1942)*
- Dr Euan C.B.S. Keat (Charing Cross Hospital Medical School 1943)*
- Mr Adrian Pelly (Wye College 1940)

- Dr W.H.R. Rees (Charing Cross Hospital Medical School 1949)
- Mr John Rendall (Metallurgy 1941)
- Mr Stanley E. Richardson (Mathematics and Mechanics 1942, DIC Aeronautics 1943, DIC Computing and Control 1972)
- Mr Frederick D. Robinson (Geology 1947)
- Mr John Rudd (Electrical Engineering 1943)
- Professor Arthur J. Rutter (Botany 1938, PhD 1941)
- Mr Kenneth H. Sargent (Chemistry 1945, MSc 1948)
- Mr Jack Schofield (Mechanical Engineering and Motive Power 1946)*
- Mr Peter Selwood (Geology 1949)
- Dr Maurice Sevik (DIC Aeronautics 1945)*
- Dr Margaret J. Pleasance née Thornley (Botany 1945)
- Mr Jack Tolman (Electrical Engineering 1944)
- Mr Derek C. Topham (Wye College 1948)
- Mr Ian B.A. Turnball (Civil Engineering and Surveying 1941)
- Mr James W.R. Twyman (Civil Engineering and Surveying 1943)*
- Mr Jack A. Waller (Civil Engineering and Surveying 1947, DIC 1956)*
- Mr Robert H. Walpole (Civil Engineering and Surveying 1942, DIC 1947)*
- Mr John E. Wardill (Chemistry 1946, DIC 1954)
- Mr David Wickham (Wye College 1949)
- Mr David M. Yuill (Chemical Engineering and Applied Chemistry 1944)

1950s

- Mr John E. Arregger (Chemical Engineering and Applied Chemistry 1952)
- Dr Albert E. Ashcroft (Westminster Medical School 1957)
- Mr John D. Austin (Mining 1953)
- Surgeon Commander Peter J. Banfield (Westminster Medical School 1957)
- Dr Michael H. Benn (Chemistry 1954, PhD 1957)*
- Mr Graham H. Booth (Electrical Engineering 1953)*
- Mr Donald G. Bowtell (Geology 1952)
- Dr Kevin Browne (Charing Cross Hospital Medical School 1956)
- Gp Capt. S.J. Carter (Charing Cross Hospital Medical School 1955)
- Professor Ian C. Cheeseman (Mathematics and Mechanics 1949, PhD 1951)
- Mr Michael J. Cooper (Wye College 1957)
- Dr John S. Cornes (Westminster Medical School 1951)
- Mr John D.H. Reddick (Geology 1951)
- Dr Iain C. Dow (St Mary’s Hospital Medical School 1952)
- Dr James L. Down (Chemistry 1956, PhD 1959)
- Mr Richard A.G. Downes (Chemical Engineering and Chemical Technology 1959)
- Dr Maurice V. Driver (Charing Cross Hospital Medical School 1951)
- Dr A.J. Earl (Westminster Medical School 1958)
- Dr Geoffrey Evans (St Mary’s Hospital Medical School 1958)
- Dr Norman Evans (Aeronautics 1957)
- Dr Roy G. Fender (St Mary’s Hospital Medical School 1951)
- Dr Paul M. Forster (St Mary’s Hospital Medical School 1952)
- Dr Norman R. Fraser (PhD Zoology and Applied Entomology 1952)
- Dr John R. Gough (St Mary’s Hospital Medical School 1950)
- Dr A.B. Gray (Westminster Medical School 1955)
- Mr John A. Greenwood (Aeronautics 1959)
- Mr Ernest J. Grossman (Mechanical Engineering 1952)
- Mr Maurice C. Hately (Electrical Engineering 1952)
- Mr Dennis F. High (Electrical Engineering 1950)
- Dr Colin B. Hobbs (Westminster Medical School 1953)
- Mr Ian P. Husbands (Chemical Engineering 1954)
- Mr Peter J. Hyslop (DIC Civil Engineering 1959)
- Mr William R. Ingram (Botany 1954)
- Mr Albert Jackson (Mechanical Engineering 1955)*
- Dr Richard J.B.H. Jones (St Mary’s Hospital Medical School 1950)
- Dr Seth Jones (Charing Cross Hospital Medical School 1954)
- Mr Gerald Kaye (Physics 1957, PhD 1960)

- Mr Andrew Kopec (DIC Civil Engineering 1957)
- Mr Hoi-Wai Leung (MSc Civil Engineering 1954)
- Mr Martin Lovering (Chemical Engineering 1957)
- Mr Bruce P. MacKenzie (Electrical Engineering 1951)
- Mr Alan J. Marles (Mechanical Engineering 1950)
- Mr Brendan G. McKeown OBE (DIC Geology 1956)*
- Dr Colin G. McKerron (Charing Cross Hospital Medical School 1958)
- Mr Richard J. Meader (DIC Civil Engineering 1957)
- Mr Raymond C. Morgan (Aeronautics 1957, DIC 1958)*
- Dr R.A. Neve (Wye College 1956)
- Emeritus Professor Denis O’Kelly (MSc Electrical Engineering 1952)
- Mr Martin Olive (Chemical Engineering and Chemical Technology 1953)
- Dr Edward M. Orton (Charing Cross Hospital Medical School 1952)
- Dr M.F. Porter (St Mary’s Hospital Medical School 1953)
- Dr Vincent Pratt (Westminster Hospital Medical School 1957)*
- Mr Tom Ridley (DIC Civil Engineering 1954)*
- Mr Derek J.W. Rose (Botany 1951)*
- Mr Peter S. Rose (Electrical Engineering 1959)
- Eur.Ing. Royston J. Froud (Electrical Engineering 1959)
- Mr G.F.C. Selby-Lowndes (Physics 1955)
- Dr Amalendu Sen (PhD Chemical Engineering and Chemical Technology 1959)
- Mr Graham P.J. Shepherd (Chemical Engineering 1954)*
- Mr Peter L. Sidey (Physics 1950)
- Mr Geoffrey R. Snelling (Chemical Engineering and Applied Chemistry 1951)
- Dr Peter H. Swinhoe OBE (St Mary’s Hospital Medical School 1952)
- Mr Cyril R. Taylor (Aeronautics 1955)*
- Mr Ian J. Taylor (Chemical Engineering 1957)
- Mr Arnold J. Versteegh (Electrical Engineering 1952)*
- Dr David J. Ward (Chemistry 1958, PhD 1961)
- Eur.Ing. James Wendon (Mechanical Engineering 1958)

1960s

- Dr Adrian J. Almond (St Mary’s Hospital Medical School 1963)
- Mr David P. Anderson (Civil Engineering 1963)
- Dr John A. Anderson (Westminster Medical School 1967)
- Mr Nigel A. Butt (DIC Geology 1964)
- Dr Walter E. Duckworth (Mathematics 1960)
- Dr Peter Dunn (Mechanical Engineering 1968, PhD 1972)*

- Mr James R. Ellis (Mining and Mineral Technology 1965, MSc Geology 1976)*
- Emeritus Professor Kenneth J. Barnes (PhD Physics 1963)*
- Dr Otto S. Frank (Charing Cross Hospital Medical School 1963)
- Mr Patrick M. Gamble (Geology 1967)
- Mr Lawrence Goodhand (Chemistry 1963)
- Dr Roger M. Henson (Chemistry 1962, PhD Chemistry 1965)*
- Mr Jeffrey Kay (Physics 1960)
- Dr Philip J. Kingston (Westminster Medical School 1965)*
- Dr Michael J. Losty (Physics 1965, PhD 1968)*
- Dr William MacMillan (PhD Chemical Engineering and Chemical Technology 1962)
- Mr Michael J. Matthews (Mining and Mineral Technology 1961)
- Dr Barry D. Perrott (Westminster Medical School 1961)
- Mrs J.J. Pitts née Cundy (Wye College 1964)
- Dr Beverly J. Rathcke (MSc Botany and Plant Technology 1968)
- Dr David W. Robinson (St Mary’s Hospital Medical School 1964)
- Dr Peter J.Y. Scott (St Mary’s Hospital Medical School 1960)
- Mr Charles N. Sutton-Smith (MPhil Computing and Automation 1969)
- Mr Brian D. Steel (Chemical Engineering and Chemical Technology 1968)
- Dr Christopher D. Walker (St Mary’s Hospital Medical School 1961)
- Dr Michael A. Williams (Metallurgy 1967, PhD 1971)

1970s

- Dr David A. Binder (Mathematics, PhD 1976)*
- Dr David T. Elliot (Physics 1970, PhD 1973)
- Mr Jonathan G. Goodman (Mining and Mineral Technology 1972, MSc Wye College 1979)
- Mr William Honeyman (MSc Geology 1974)
- Professor Jeremy R. Jass (Westminster Medical School 1975)
- Dr Raymond H. Jones (St Mary’s Hospital Medical School 1974)
- Mr Alfred F.H. Knight (MSc Computing and Control 1977)
- Mr Malcolm (Mac) A.C. Newton (Civil Engineering 1975)*
- Mr Angus I. MacInnes (MSc Civil Engineering 1979)
- Dr Stewart E. Male (PhD Physics 1975)
- Mr Joseph D. Sykes (Wye College 1979)
- Mr Richard P. Trehane (Wye College 1972)
- Dr Jill B. White (St Mary’s Hospital Medical School 1974)
- Mr Johan J. Zethraeus (MSc Botany and Plant Technology 1977, MSc Wye College 1997)

1980s

- Mr Tassos Anastasiou (Electrical Engineering 1989)
- Mr Robert K. Birrell (MSc Humanities 1983)
- Mr George Davis (MSc Management Science 1982)
- Mr Michael Isaacs (MSc Computing and Control 1980)
- Mr John A. Jones (MSc Geology 1983)
- Mrs Gwen J. Luker née Griffiths (Mathematics 1980)
- Mr Simon E. Rust (Wye College 1986)
- Mr Darius C. Webber (MSc Management Science 1986)*

1990s

- Mr Ebrahim Amanollahi (MSc Civil Engineering 1994)
- Mr Roger Carless (Computing 1997)
- Mr Ashley D. Collins (Computing 1992)*
- Mr Russell L. Crockford (Wye College 1992)
- Dr Christiana Dymiotis-Wellington (MSc Civil and Environmental Engineering 1996, PhD 1999)
- Mr Ivan A. Hiscox (MSc Earth Resources Engineering 1995)
- Mrs Sofia I. Jourdan (Computing 1997)
- Mr Nimish Shah (MSc Computing 1992)*
- Dr Pavel Pinkava (PhD Physics 1990)
- Professor Gunnar Thorsen (Earth Resources Engineering 1997)*

2000s

- Miss Elsa Carneau (Biology 2006)*
- Dr Joseph I.M. Footitt (PhD National Heart and Lung Institute 2011)†

Students

- Mr Nishil Shah (Civil and Environmental Engineering)
- Mr Marcin Makowski (Chemical Engineering)

Staff

- Emeritus Professor David Binnie (Physics)
- Sir Christopher Booth (Medicine)
- Mr Allan Larson (Catering)
- Ms Wendy Surridge (Planning)
- Dr Jonathan Weaver (Materials)

➡ To enquire about leaving a legacy to Imperial in your will, please contact Clare Dadds on +44 (0)20 7594 6132 or email c.dadds@imperial.ac.uk

ALUMNI DISPATCHES

From South Kensington to Northern California, Imperial's alumni associations will help you find our community wherever in the world you might be. Get in touch and they'll be pleased to welcome you.

01 / This year's Alumni Reunion had a festival twist.

LEON LABOVITCH (WYE COLLEGE 1975):

Dressed to kill in their party frocks, my daughters Leah (5) and Emma (3) were given free rein to enjoy the Alumni Reunion and Imperial Festival. We enjoyed **splendid music**, dancing and festivities, a superb lunch and the children's orchestral concert. And what a surprise that was!

Richard Dickens, conductor of Imperial College Symphony Orchestra, had an alluring array of music planned, including Tchaikovsky's 1812 Overture. We were as amazed as everyone when all the kids in the audience were invited to the podium to try their hand at **conducting**.

Leah and Emma with baton in their hands took us through the grand finale of **crashing cymbals and drums**, accompanied by popping bags that had been supplied free to the audience. Smiles on their faces lasted for days afterwards, and what better way to introduce children to the great classics?

At lunch we sat next to some of the older, pre-WWII alumni, one of whom had had an illustrious career in rocket science before the term '**rocket scientist**' was even invented. Others had graduated more recently, and were happily swapping stories of their lives, experiences and studies at Imperial. We loved the atmosphere, as well as the buildings and fun activities.

Heading out of the building at the end of the day, Imperial **balloons** in hand, the orchestra's conductor recognised his budding prodigies and gave them a pat on the back – a very nice ending for Leah and Emma and our day at the Alumni Reunion.

02 / The ICAAHK's 30th anniversary was the icing on the cake.

ADRIAN SOU (CIVIL ENGINEERING 1999, MSc MANAGEMENT SCHOOL 2002):

The 30th Anniversary Dinner of the Imperial College Alumni Association of Hong Kong was the grand finale of alumni activities for the year, bringing together a gathering of alumni of all ages and across various disciplines. A total of 135 alumni and guests celebrated at the Bankers Club in

Central, dining on a sumptuous menu of **Chinese delicacies**.

Our Chairman, Dr Leonard Chow (Mechanical Engineering 1984), kickstarted the event with a welcome note, recollecting his own memories of Imperial – including revising for his final exam whilst watching the European Cup Final. Sir Keith O'Nions, President & Rector, followed with a **congratulatory note** to ICAAHK and an update on the latest Imperial developments – the new campus at Imperial West, an alumni visitor centre at the South Kensington Campus, and the new President/Provost leadership model.

A highlight of the evening was a **violin performance** by Heidi Luk (Life Sciences 2010). Heidi really set the crowd alight towards the end when she gave an impromptu encore of the can-can.

The dinner concluded with the participants in very high spirits, and the presentation of a **memorial album** to mark the occasion. The evening has truly brought this year's activities to a climax, and with brimming enthusiasm we look forward to seeing even more alumni turn out for the diverse programme of events planned for the coming year. Last but not least, Happy 30th Birthday to ICAAHK!

03 / The west coast had the sunshine.

PARRIS HAWKINS (MANAGEMENT SCIENCE 1979):

Año Nuevo State Park is something of a hidden gem, located along the 70-mile stretch of sparsely inhabited **California coast** between San Francisco and Santa Cruz. It is also the sit of the largest mainland breeding colony in the world for the **northern elephant seal**. With the weather sunny but cool with an ocean breeze, we set off from the visitor centre to the beach.

About half way we stopped at a ranger station for a discussion of the elephant seal life cycle and mating habits. I can honestly say that in both regards the elephant seals give humans a run for their money. The seals come ashore twice per year (once to mate and once to moult), and spend the rest of the year hunting across the Pacific.

After the return walk to the visitor centre to enjoy a **picnic** lunch, our day continued with a short drive down the coast to Waddell Beach. There we walked and watched **kite surfers** displaying their high speed acrobatics.

For most travellers, this was the end of the trip, but a few intrepid souls continued with a **bike ride** to Berry Falls – a popular waterfall in a redwood forest with pools at the base, and rock faces on both sides cloaked in moss and ferns. The biking was pleasant, mostly in the shade, with the last mile covered on foot as the path narrows to a trail. The day ended with dinner in the nearby town of Davenport.

WITH THANKS for contributions from alumni associations in Hong Kong and Northern California.

→ Find out more about alumni groups at Imperial: www.imperial.ac.uk/alumni/alumni-groups

→ Contact us if you'd like to be profiled in the next issue: imperialmagazine@imperial.ac.uk



QUESTIONS? Alumni membership is free. Contact us for help with issues concerning membership or services.

Email: alumni@imperial.ac.uk

Phone: +44 (0)20 7594 6138

Post: Alumni Office, Imperial College London, SALC Mezzanine, Level 5
Sherfield Building, South Kensington Campus, London SW7 2AZ, UK

Web: www.imperial.ac.uk/alumni

ILLUSTRATION: (ELEPHANT SEAL) CATHY HUBBARD

calendar

EVENTS + MEETINGS + OCCASIONS

21 FEBRUARY →

DATE WITH DISCOVERY

Imperial Fringe

Join us for February's Imperial Fringe, part of a series of monthly evening events exploring the unexpected side of science.

www.imperial.ac.uk/festival/fringe
South Kensington Campus, London



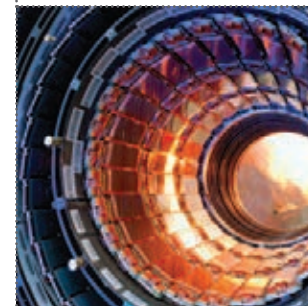
27 FEBRUARY →

PETER LINDSAY
MEMORIAL LECTURE

Nature, nurture or neither?

A public lecture from geneticist and popular science writer Professor Steve Jones (UCL).

www.imperial.ac.uk/events
South Kensington Campus, London



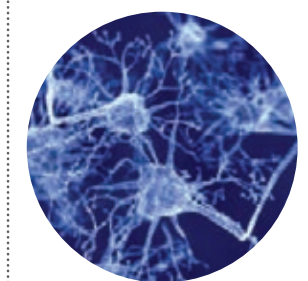
← 13 MARCH

PUBLIC LECTURE

Tom Kibble: breaking ground by breaking symmetries

Nobel laureate and University of Texas professor Steven Weinberg talks particle physics.

bit.ly/kibble80
South Kensington Campus, London



← 14 MARCH

FRIENDS OF IMPERIAL

Breaking into your brain

Dr Aldo Faisal (Bioengineering) talks about how computing, engineering and physics can help us understand our brains.

bit.ly/breakingintoyourbrain
South Kensington Campus, London

17 APRIL →

INAUGURAL LECTURE

Parkinson's disease: a car crash in the brain

Meet new professor David Dexter (Medicine) as he explores his research and role in the UK's Brain Bank.

www.imperial.ac.uk/events/inaugurals
South Kensington Campus, London



→ 1 MAY

GRADUATION

Postgraduate Graduation Ceremonies

Postgraduates return to celebrate their achievements and begin their journey as Imperial alumni.

www.imperial.ac.uk/graduation
South Kensington Campus, London



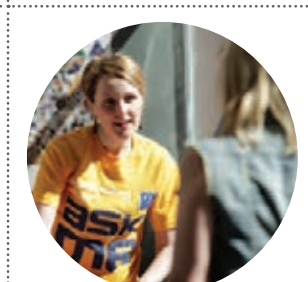
← 3-4 MAY

FESTIVAL

Imperial Festival 2013

It's back! The Imperial Festival returns for its second year, including Saturday's Alumni Reunion.

www.imperial.ac.uk/festival
South Kensington Campus, London



← 27 JUNE

COME AND VISIT

Open day

Prospective undergraduates and their parents are invited to come along and find out what it's really like to study at Imperial.

www.imperial.ac.uk/visit
South Kensington Campus, London

→ THROUGHOUT THE YEAR

ON THE ROAD

Imperial visits you

President & Rector Sir Keith O'Nions will be visiting alumni across the globe throughout the year.

www.imperial.ac.uk/alumni/events



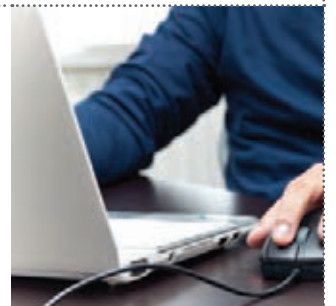
ANYTIME →

PUBLIC LECTURES

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www.imperial.ac.uk/events/catchup



For more details on Imperial College events, visit: www.imperial.ac.uk/events

Sign up and receive the e-Bulletin every fortnight by emailing: imperial-events-join@imperial.ac.uk



Relax in the
weekend's
best moments.

Charles Day out for a Sunday stroll
with his dog, Echo, in Washington DC.
Charles is the online editor at *Physics Today*
and an Imperial alumnus (BSc Physics 1984).

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