

Imperial

Winter | 2008-09

33

matters

Alumni magazine of Imperial College London including the former Charing Cross and Westminster Medical School, Royal Postgraduate Medical School, St Mary's Hospital Medical School and Wye College



Are we alone? The search for life on Mars



Seeing the light

Sir John Pendry talks optics, invisibility and perfect lenses

You ask the questions

Sir Roy Anderson under the microscope

Plus all the news from the College and alumni groups

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An artist's impression of the ExoMars rover which will be the European Space Agency's field biologist on Mars. Included in its exobiology payload will be a lightweight drilling system, a sampling and handling device, and a set of scientific instruments to search for signs of past or present life.

Imperial College London

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Corrections to issue 32 The picture on page 36 was incorrectly captioned. It actually shows Dr John Sherwood (front) and Dr Fred Aminzadeh, President of Society of Exploration Geophysicists

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Welcome

Welcome to the winter 2008–09 edition of our alumni magazine and thank you for allowing me to say a few words to you through these pages.

When I introduced the last edition of *Imperial Matters* I had just taken up the role of Rector of Imperial College London. The intervening few months have been very stimulating and exciting, with many new people to meet and much to learn.

As an alumnus, I have a long history with Imperial and have seen the fabric of the place undergo enormous change. If my student self were to find himself transported to today's Imperial, I suspect he would have real difficulties in finding his way about.

The essential character of Imperial, however, remains constant. As Rector, I have found myself surrounded by can-do people with a tremendous appetite for innovation and a global outlook.

To continue to attract first class staff and students, we must ensure that our environment and facilities are also first class. That is especially important for students, for whom our campuses are places to live and socialise as well as to work.

We are very aware that as generations change so too do their expectations and

the ways in which they work. Today's 18-year-olds have never known a world without the internet or mobile phones. They are far more likely to search for information online than to sit down with a book or a journal. And they expect their university to keep up with them.

That has implications for services across the College, but perhaps nowhere more than for the library. I'm sure that many of you will remember the Central Library, a major student facility on the South Kensington Campus.

This space has been extensively refurbished, and was reopened in October 2008 with vastly increased computer access plus flexible working spaces for both group and individual study.

It also boasts over 50 works of art generously donated to the College by Sussex artist Bob Brighton, creating a wonderfully modern and colourful environment. You can find out more about our new-look Library on page 14.

Other notable recent events include a visit from the Prime Minister who joined us in October 2008 to discuss the economic climate, and revealed in passing that he once applied for a job as a lecturer at Imperial. You can read about that and more in the news round-up,

which starts on page two.

Finally, I would like to say thank you to the 300 alumni who attended the reunion in September 2008. It was a marvellous event and a real delight to meet so many of you. For those unable to make it, you can read about the event's keynote speaker, Bebo co-founder and physics alumnus, Michael Birch, on page 22.

And thank you, also, to everyone in our alumni network who has welcomed me to my new role and sent in questions about my plans and aspirations for the College. My answers can be found on page 16. I hope you will continue to share your thoughts and opinions with me – it is always a pleasure to hear from you.

With warm regards,



Sir Roy Anderson



Gordon Brown visits Imperial



Prime Minister Gordon Brown visited Imperial in October 2008 to meet with academics, business leaders and MBA students and discuss the global financial crisis.

During the meeting, the Prime Minister revealed his plans for dealing with the credit crunch and restructuring the UK economy. He said that the government was not intending to cut investment in areas such as education and training and that the world economy was set to double in the next 20 years, adding “the opportunities are immense for those with talent and initiative”.

The meeting attracted key figures in business including Iain Conn, Director

of BP and Chair of Imperial College Business School Advisory Board, and Ian Coleman, Global Head of Emerging Markets at PricewaterhouseCoopers.

During Mr Brown’s introductory speech he described his special affinity with Imperial, saying: “I have seen the expansion of this College and how it leads the world in so many different fields.” He also revealed that it was the first place that he applied for a job as a lecturer when he left university in the 1970s.

In addition, Mr Brown met 10 MBA students from Imperial’s Business School to discuss the credit crunch and hear their views.

Greatest concentration of world-leading and internationally excellent research

Imperial College London is home to the greatest concentration of research rated world-leading and internationally excellent amongst all UK universities, according to the 2008 Research Assessment Exercise (RAE) results published in December 2008.

73 per cent of the College’s staff have had their research judged as world-leading or internationally excellent (4* and 3*), the highest percentage of all UK multi-faculty universities. The College also has six of the UK’s top-rated research areas (4*) in Chemical Engineering; Civil Engineering; Epidemiology; Mechanical, Aeronautical and Manufacturing Engineering; History; and Pure Mathematics.

Rector of Imperial College London, Sir Roy Anderson, said: “Imperial College London is very proud to be part of the UK university research success story. Imperial has once again demonstrated its commitment to, and achievement of, continued excellence, as it has in every previous RAE.”



New customer service initiative launched

Providing world class service is the aim behind Imperial’s new Customer Service Academy which was launched in December 2008. The initiative will focus on raising standards and providing excellent service to the College’s 13,000 students, 6,000 staff, partners, neighbours and visitors.

The Academy aims to raise awareness of the importance of meeting the needs and expectations of Imperial’s diverse customers.

Manager of the newly established Academy, Steve Rathborn, says an important element of the project is to influence attitudes across the College: “To be a truly great university it is important to match the high quality of research and teaching with high quality in every aspect of delivery. This programme will initiate a fundamental change in attitudes and awareness across the College by engaging and inspiring people at all levels”.

“The Academy will provide opportunities for teams representing service departments across the College to explore the focus and quality of what they provide and suggest ways of improving this on a continuous basis,” he added.

Half marathon in memory of Laurent and Gabriel

A group of biochemistry researchers from Imperial ran the Royal Parks Foundation's half marathon in October 2008 in memory of visiting students Laurent Bonomo and Gabriel Ferez, who were killed in July last year.

Laurent and Gabriel, from the Polytech' Clermont-Ferrand, France, were studying at Imperial's Department of Life Sciences as part of the Undergraduate Research Opportunities Programme (UROP), which provides opportunities for students to participate in research at Imperial.

The researchers raised over £5,000 for the charity Victim Support, an independent charity helping people cope with the effects of crime.



Awards and Honours

Chemist elected to Royal Danish Academy



Professor Alexei Kornyshev, Department of Chemistry, has been elected a Foreign Member of the Royal Danish Academy of Science and Letters, in recognition of his outstanding contributions to chemical physics and electrochemistry.

Lifetime achievement prize for Kafatos



Professor Fotis Kafatos, Division of Life Sciences, has been awarded a lifetime achievement prize by the Louis-Jeantet Foundation for his significant contribution to the development of European biomedical research on the world stage, and his exceptional research into the biology of the Anopheles mosquito – the carrier of the malaria parasite.

Freemont receives European honour



Professor Paul Freemont, Head of the Division of Molecular Biosciences, has been elected to the membership of the European Molecular Biology Organisation. Professor Freemont is among 51 renowned life scientists from across Europe whose excellence in research was acknowledged in 2008.

Lalvani lands top TB prize



The Royal College of Physicians' Weber-Parkes Medal has been awarded to Professor Ajit Lalvani, National Heart and Lung Institute. The medal is awarded once every three years for outstanding contributions to tuberculosis research and policy.

Optics honour for Professor Dainty

Professor Chris Dainty, Department of Physics, has been elected vice president of the Optical Society of America for 2009. Following his term as vice president, Professor Dainty will automatically become president-elect in 2010, and then the society's president in 2011, followed by a one-year term as past president.



Foyle Foundation's inspirational funding

The College's INSPIRE programme, which combines a Postgraduate Certificate in Education (PGCE) with specialised science communication training, has been expanded thanks to funding from the Foyle Foundation.

The programme has received £500,000 from the Foundation to help support the teacher training of 50 scientists over the next five years.

The Foyle Science Scholarships will be targeted at chemistry and physics postgraduates in particular due to the shortage of teachers with a

background in those subjects in London's state schools.

INSPIRE was launched at Imperial in 2002 with the aim of boosting science education in schools. Originally focused on postdoctoral researchers, the programme is now open to postgraduate students at the end of their research.

It is a full-time nine-month programme made up of seven months of standard PGCE training plus two months of training sessions and workshops on communicating science in engaging and accessible ways.



New identity for Imperial College Business School

In August 2008, the Business School at Imperial College London changed its name from Tanaka Business School to Imperial College Business School. The change was made to emphasise that the School is an integral part of the College by incorporating the Imperial College name directly into its title.

The renaming came after research suggested that its previous name was not strongly associated with Imperial College London. The School offers unique opportunities for staff and students through its close relationships with the engineering, science and medical disciplines at Imperial and the name change will enable the School to underline this positioning.

Imperial alumnus and benefactor Dr Gary Tanaka, after whom the School was formerly named, will continue to be recognised for his generous support with the naming of the School's accommodation as the Tanaka Building.

Innovation, entrepreneurship and design are placed at the core of the Imperial MBA

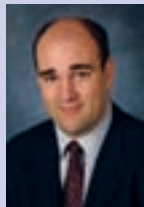


The Imperial College Business School became the first to place innovation, entrepreneurship and design (IED) at the heart of its MBA. The new mandatory IED course systematically brings together students, ideas and methodologies from the three disciplines to equip participants with a unique blend of skills. During the course, students work in teams on a real-world business problem or idea. Some ideas originate in

Imperial Innovations, the College's spin-out company, whilst others are contributed by corporate partners.

Projects owners are involved with the student team throughout the course and receive an entrepreneurial business case at the conclusion of the module. This presentation is suitable for pitching to a potential investor, or proposing corporate venture funding within a large organisation.

UK Innovation Research Centre launched



A new £2.8 million research centre focusing on how innovation can make businesses more competitive, improve the delivery of public services and help the UK meet its social, environmental and economic challenges began its plan of work in January 2009. The Centre is a collaborative project with the University of Cambridge's Judge Business School, based at both institutions.

The UK Innovation Research Centre will carry out new research for practitioners and policymakers to help them understand the key issues in all forms of innovation. This will equip them to better respond to a worsening economic climate that makes traditional research and development expenditure less attractive. The output of the Centre will also inform the way issues like ageing populations and climate change are dealt with, and particularly how businesses, products and public services will need to change and develop.

The Centre will ensure that new research on innovation in both the public and private sectors impacts on policy and practice. Dr Ammon Salter (pictured), director of research at the UK IRC and reader in innovation management at Imperial College Business School, outlines the research programme: "The Innovation Research Centre explores the relationship between innovation and business performance and how this affects both the national economy and the individual organisation. We're looking at how to best open companies to new forms of collaboration. We'll also be working with policy makers to develop new instruments and strategies to promote innovation and knowledge exchange."



How ancient Earth escaped a deathly deep freeze

The planet's present day greenhouse scourge, carbon dioxide, may have played a vital role in helping ancient Earth to escape from complete glaciation, said Professor Philip Allen, Department of Earth Science and Engineering, in a review for *Nature Geoscience* in November 2008.

Professor Allen and his team claim that the Earth never froze over completely during the Cryogenian

Period, about 840 to 635 million years ago. This is contrary to the 'Snowball Earth' hypothesis, which envisages a fully frozen planet locked in ice for millions of years.

They speculate that carbon dioxide played a key role in keeping equatorial oceans warm during this period. Professor Allen said: "This greenhouse gas probably saved ancient Earth and its basic life forms from an icy extinction."

New system to monitor Global Navigation Satellite Systems

Imperial and partners announced in December 2008 that they are developing a system to monitor Global Navigation Satellite Systems. These are a network of satellites, antennae, and Global Positioning Service (GPS) devices that help users to find their way. GNSS systems can be affected by failures, causing navigation problems for users.

Lead Imperial researcher Professor Washington Ochieng, Department of Civil and Environmental Engineering, said they are developing a system to monitor signal GNSS quality, and if failures occur, users can employ other navigation methods.

Professor Ochieng said: "Captains or pilots could switch to other computerised navigation tools to ensure the safety of crew, passengers or cargo is not jeopardised."

Official opening of bioengineering labs

World leading bioengineering education and research received a boost in October 2008, with the official opening of new £8.4 million facilities at Imperial.

The opening of the new facilities consolidates the Department of Bioengineering under one roof after years of being based in eight separate locations.

The new facilities provide room for the Department to expand its undergraduate, postgraduate and PhD programmes, as well as fostering scientific creativity. Professor Ross Ethier, Department Head, said: "Thanks to consolidation of this Department in one location, our researchers and students are set to benefit from closer interactions that will facilitate collaborative research and hopefully the next big scientific breakthrough in bioengineering."



Professor Ross Ethier

Imperial to help the UK to meet its carbon reduction targets



Imperial has signalled an increasing commitment in helping the UK meet its carbon reduction targets by investing more in research and development.

During the Energy Futures Lab Annual Lecture, delivered by Ed Miliband MP (pictured on the go-kart), Imperial's Rector Sir Roy Anderson said the College is increasing its investment in novel energy technologies.

He added: "We believe the innovation that industry needs to help solve global energy problems will be generated in the

university sector. We will play our part in helping the British government and industry to be as innovative as possible. As a first step in this commitment, we are very considerably expanding the funding and size of the Energy Futures Laboratory, so that it can carry out more research in this field."

In his lecture, Mr Miliband, Secretary of State for the Department of Energy and Climate Change, outlined the government's vision for securing sustainable and affordable energy for the UK.

Large waist almost doubles risk of premature death



Having a large waistline can almost double your risk of dying prematurely even if you are not overweight, according to a new study published by Imperial scientists in November 2008 in the *New England Journal of Medicine*. The study of over 350,000 people across

Europe provides strong evidence that storing excess fat around the waist poses a significant health risk.

Comparing subjects with the same body mass index (BMI), the risk of premature death increased in a linear fashion as the waist circumference increased. The risk of premature death was around double for subjects with a larger waist (more than 120 centimetres for men and more than 100 centimetres for women) compared to subjects with waists smaller than 80 and 65 centimetres for men and women respectively.

The research also supported earlier findings showing that a higher BMI is significantly related to mortality. The lowest risk of death was at a BMI of approximately 25.3 in men and 24.3 in women.

The research forms part of the *European Prospective Investigation into Cancer and Nutrition* (EPIC), one of the largest long-term prospective studies in the world. Professor Elio Riboli, European coordinator of EPIC, from the Department of Epidemiology and Public Health, said: "Although smaller studies have suggested a link between mortality and waist size, we were surprised to see the waist size having such a powerful effect on people's health and premature death."

Body clock link to diabetes



Diabetes and high levels of blood sugar may be linked to abnormalities in a person's body clock, according to a study published in December 2008 in *Nature Genetics* by researchers in the Section of Genomic Medicine. The study shows that a mutation near a gene called MTNR1B is associated with having an increased average blood sugar level and around a 20 per cent elevated risk of developing type-2 diabetes. MTNR1B forms part of a signalling pathway that controls the action of the hormone melatonin. This hormone regulates the circadian rhythm – the internal clock that controls sleeping and eating patterns – by responding to daylight and darkness.



Polio could be eliminated in Nigeria with new vaccine

A recently introduced polio vaccine is four times more effective at protecting children than previous vaccines and has the potential to eradicate type-1 polio in Nigeria if it reaches enough children, according to a new study

published by researchers from the MRC Centre for Outbreak Analysis and Modelling, in October 2008 in the *New England Journal of Medicine*.

Polio is highly infectious and Nigeria is one of only four countries in the world where it has yet to be eliminated. The study showed that with each dose of the recently introduced monovalent oral poliovirus vaccine, a child has a 67 per cent chance of being protected against type-1 polio, compared with an efficacy of 16 per cent for the standard trivalent vaccine.

Key AIDS figure joins new Institute for Global Health



A leading figure in the international fight against AIDS was announced in October 2008 as the first Director of the new Institute for Global Health at Imperial.

Dr Peter Piot (pictured), previously the Executive Director of UNAIDS, will spearhead the new institute's drive to find far-reaching solutions to health problems that blight underprivileged populations worldwide. He will lead and coordinate work to tackle traditional and new infectious diseases, such as AIDS, tuberculosis, malaria and neglected tropical diseases, which continue to be significant causes of premature death globally, especially in the poorest countries.

› More news online at www.imperial.ac.uk/news › Heart researcher wins 'Dragons' Den' medical award

£18 million for next generation of researchers

Three new Doctoral Training Centres (DTCs) to nurture the talents of the next generation of young researchers were established in Imperial's Department of Physics in December 2008 thanks to a funding injection of over £18 million. The funding is part of a £250 million award from the Engineering and Physical Sciences Research Council to create over 2,000 PhD studentships at universities across the UK.



Unlike traditional PhD programmes, DTCs enable PhD students to work with, and learn from, scientists across a variety of fields. They aim to produce a new generation of researchers with the interdisciplinary skills and expertise to tackle the major challenges facing the world today.

The DTCs will focus on three different areas of science and technology: plastic electronics, materials theory and simulation, and controlled quantum dynamics. Over the next five years 150 newly-funded PhD students in these three centres will carry out research in diverse fields including

developing plastic solar cells, and manipulating atom-sized components to make a new generation of super-small electronic devices.

Welcoming the awards, Rector Sir Roy Anderson said: "These new training centres will ensure that the College continues to produce innovative young researchers who have the breadth of interdisciplinary experience needed to meet the global demand for highly trained specialist scientists and engineers."

Researchers from the College's Faculty of Engineering are involved in two additional new DTCs led by Cranfield University and the University of Manchester.



Border control: how proteins permit entry to a cell

The means by which proteins provide a 'border control service', allowing cells to take up chemicals from their surroundings, was revealed in unprecedented molecular detail in a *Science Express* paper published in October 2008 by a team led by Professor So Iwata, Department of Life Sciences.

The scientists visualised the structure of a 'transporter' protein called *Microbacterium hydantoin permease* (pictured), or Mhp1, which lives in the oily membrane surrounding bacteria cells. They showed, for the first time, how Mph1 opens and closes like a gate to allow molecules across the membrane and into the cell.

Researchers encourage the public to discover their local environment



A national project to involve the public in the first ever community-led study of the natural world was launched at the Natural History Museum in November 2008.

Directed by Dr Linda Davies from Imperial's Centre for Environmental Policy, the OPAL (Open Air Laboratories) project will pioneer events across England giving people the tools and support to identify, monitor and record plants and wildlife in their local area.

As part of OPAL, Dr Sally Power, Department of Life Sciences, is running two projects which focus on the impact of air pollution on plants

and how droughts, changing rainfall patterns and biodiversity loss affect ecosystems' ability to carry out important processes. Dr Nick Voulvoulis, Centre for Environmental Policy, is running a project focusing on soil quality and the biodiversity of earthworms.

Imperial scientists are also running two region-specific projects: the OPAL London project which aims to increase understanding of climate change and weather in London, and the OPAL South East project which will invite local communities investigate the effects of traffic emissions on urban green spaces.



ICSO returns to Cadogan Hall

The Imperial College Symphony Orchestra returned to Cadogan Hall on 6 December 2008 for its first performance since clinching the title of Orchestra of the Year 2008 in *Symphuni*, the UK university orchestra competition.

The orchestra was joined by the choirs of Imperial College London and the Thomas Hardy School (THS) to perform Walton's thrilling *Belshazzar's Feast*. The players were also joined by internationally renowned cellist Raphael Wallfisch for a performance of Elgar's highly evocative *Cello Concerto*.

Sue Burn from THS said: "It was an amazing experience for everyone; to hear it all come together in such a beautiful building really made a day to remember. We were privileged to watch what can only be described as a master class in putting a concerto together in the afternoon rehearsal."

The orchestra's next concert takes place at the South Kensington Campus on 13 March 2009. For more information visit www.imperial.ac.uk/union/arts/orchestra.



Raphael Wallfisch

Imperial 22nd in UK university sports rankings

The 2007–08 sports season proved very fruitful for Imperial with its first appearance amongst the top 25 UK universities in the British Universities and Colleges Sport (BUCS) rankings. The position reflects the year's achievements across a range of sports.

With such top sporting institutions such as Loughborough and Bath to compete with, Imperial proved just how far it has come to reach 22nd, with first place wins in women's fencing, netball, tennis and volleyball and men's rugby, squash, tennis and waterpolo.

Our growing sporting success in BUCS over the last couple of years has no doubt been aided by the introduction of the Sports Partnership, an alliance between Sport Imperial, the College's sports department, and Imperial College Union. The partnership has standardised and professionalised the administration of student sport through a permanent partnership administrator, who manages the various processes involved such as arranging fixtures, providing coaching, competition entries and providing advice.

The 2008–09 season is looking promising so far and hopes are pinned on a top 20 position!

Race to the top at Henley

Two Imperial students were part of the winning Visitors Challenge Cup crew at Henley Royal Regatta last year.

Imperial students, Simon Hislop and George Whittaker, beat Martyrs Boat Club and Christ Church, Oxford, by one and a quarter lengths on 6 July 2008 in the final of the Visitors Challenge Cup, a coxless four event at Henley Royal Regatta.

Simon and George made up half of the winning crew with the other two members coming from Kingston Rowing Club. The composite crew beat Trinity College from the US on 4 July 2008 by three and a half lengths and went on to beat a London and Wallingford Rowing Club composite crew on 5 July 2008 easily.

Mathilde Pauls, another Imperial student, made it through to the Princess Royal Challenge Cup final but unfortunately lost by three and a half lengths in the end. For more information visit www.imperial.ac.uk/sports/news/henley2008.





Note from the Editor



Felix is certainly on a high at the moment and I, for one, intend to keep it that way. We have a tradition of being slightly quirky, entertaining and, at the same time, informative, and this is why so many students and staff read the paper. My aim this year, apart from trying to emulate Tom's performance last year, is to try and free the cat, so to speak. I felt that the paper was not as independent as it could have been and it is for this that I really want to push.

So look out, the next time you all hear from me there might be an interesting story for you. For now, enjoy the smaller bits of news the students have for you.

➤ Jovan Nedic, *Felix Editor-in-Chief 2008-09*

New look union

Over the summer, the Union received a facelift with *dB's* and *daVinci's* getting a new lick of paint and a brand new style. The aim of this work was to make *daVinci's* feel more like a bar than a canteen, and for *dB's* to be more like a nightclub. A new colour scheme has been employed with funky new wallpaper, and a new range of drinks have also been brought in, hoping to attract a larger audience to the Union bars. So if you're around College, stop by for a quick pint.

Felix scoops top prize at student media award

Members of the *Felix* team walked away from *The Guardian* Student Media Awards on 26 November 2008 with the top two prizes, and came runner-up in a further two categories.

Felix clinched the title of 'Student newspaper of the Year', whilst *I, science*, was runner-up in the 'Student magazine of the year' category.

The judges, who included *The Guardian* editor Alan Rusbridger, commented that *Felix* managed to clearly engage its audience, with well thought-out news pieces and a quirky sense of humour that made it stand out above the rest. As the result was announced there was a massive sense of excitement and sheer joy, with the members of last year's *Felix* team rushing onto the stage to collect their prize.

The *Felix* team barely had time to sit down and celebrate their award, before the 'Student journalist of the year' award was announced. Considered the top prize for an individual, this year's award was given to the 2007-08 *Felix* editor, Tom Roberts. Everyone's favourite Angry Geek came runner-up as 'Student columnist of the year'.

Clearly *Felix*, its contributors and its sister publications have very big shoes to fill this year, something which they are definitely planning on doing in the hope of a similar result next time.



The Felix team collect their award

Online archive of Felix



Past and present students around the world can now view all previous editions of *Felix* in an online archive.

Over the past several months, previously bound editions of *Felix* have been transferred into an electronic format, so that the hard copies of *Felix* can be handed over to the College archives for safe keeping.

Each individual edition has been made into a separate PDF and can now be found on the *Felix* website at www.felixonline.co.uk. By late March 2009, the archive will allow readers to search by issue number or year and, if that wasn't enough, readers will eventually be able to search for

any word they like across the whole range of issues!

So whether you were a Faculty Union President or cup winning sports player, you will be able to relive the good old times, as well as reminisce over the photos from your particular era.

The project would not have been possible were it not for a generous donation from the Imperial College Trust, as well as the help of many members of staff and students.



The Invisible Man

Since 1981, theoretical physicist Professor Sir John Pendry has been beavering away in the Department of Physics' Blackett Laboratory. During this time he's laid the groundwork for some of the most scientifically significant discoveries in optics.

by Zoë Perkins

As a theoretical physicist, Professor Sir John Pendry employs mathematical models to understand natural physical phenomena. “I believe in interacting very strongly with experimentalists,” he said, “so most of my theory either relates to some experiment that’s been done, or I want to suggest that somebody does do an experiment. I think that that is really at the heart of my sort of physics; I like that close contact with experimentalists.”

“Most recently I’ve been looking at light; how it behaves and how to control it. When I say light, I mean all sorts of electromagnetic radiation which also includes radar waves and terahertz radiation,” said Sir John.

Generally light is controlled using optical materials, for example glass and water both refract light; the properties that result from modifying the chemistry of these materials change the way that the material responds to light. However, the properties that can be created just by altering the chemistry of a material are limited, so Sir John has adopted an alternative idea; creating an artificial structure which has properties beyond those that are available naturally, referred to as metamaterials.

Sir John said: “Generally it is that case that if the laws of physics allow something to happen, it has usually happened somewhere in the natural world. Surprisingly the materials available in nature for controlling light are rather limited.”

Seeing the light

As long as the spaces between molecules in a material are much less than the wavelength of light, the way that any material responds to light is down to the average response of the molecules within the material. Provided that the artificial structure within the metamaterial is smaller than the wavelength of light, light will continue to pass through the material, however, the average response of the molecules will be different because of the artificial structure of the metamaterial.

Demonstrating his point, Sir John picked up a flat, plastic-looking disc of about 30 centimetres in diameter. “This works on radar waves,” he said, “you can see little black lines running through the metamaterial which are the ends of built-in, little copper coils. The properties of the lens are determined by how you shape the copper inserts, so instead of coils they could, for example, be wires.

“Of course, if you design the structure yourself then you could continuously grade the lens to make the metamaterial more refracting at the centre than it is at the edge.”

This discovery brought with it far reaching consequences for the world of physics, because as Sir John put it: “You can do strange things with metamaterials.”

“If you put a stick in a stream of water, the water just flows smoothly round the object and closes up the other side, so if you’re downstream of the stick then the water’s just flowing smoothly as if the stick wasn’t there.”

The key to invisibility is right in front of your eyes; a mirage refracts light in a continuous curve

The Invisible Man

Rewriting the laws of physics

Refraction is one of the fundamentals of scientific education; we all know that light bends when it passes from one material to another, or through a material that varies in density, which is caused by different refractive indexes, and nature has always dictated that light bends towards the normal (perpendicular to the surface).

Victor Veselago, a Soviet physicist, first predicted back in the 1960s that that a material that had a negative permittivity (a physical quantity that describes how an electric field affects, and is affected by, a dielectric medium) and a negative permeability (the degree of magnetisation of a material that responds linearly to an applied magnetic field) would also have a negative refractive index, which means that light passing through these materials could be bent past the normal. However, with no such material occurring naturally his theory remained untested. It was not until 1999 when Sir John and his team suggested how materials with these properties could be artificially created that the possibility of negative refraction was resurrected.

It was then that the debate got heated.

Negative refraction was thought to fundamentally defy the laws of physics, and as a theoretical physicist, Sir John's ideas were at that stage just that, theory. Physicists from around the world joined the debate, to-ing and fro-ing about the ins and outs of negative refraction, but that Sir John's paper, *Negative refraction makes a perfect lens*, has now been cited almost 2,000 times proves how widely accepted this theory has become.

Perfect focus

Sir John said: "People believed for a long time that the performance of lenses is just one of the laws of nature, but it turns out that if you build a lens with this hitherto inaccessible property of negative refraction and if you get the design exactly right, and it really does



Professor Sir John Pendry

have to be exactly right, then there is no limit to how finely you can focus light.

"Your ability to focus light is no longer limited by the wavelength of light, but by your ability to make the lens perfectly. So it's just like ordinary tasks, where you're not limited by a fundamental law, but just how well you can build a lens."

Of the potential applications of perfect lenses, Sir John said: "If you have a telephone conversation with America, or even Manchester, your voice is first turned into an electrical signal, but then it's turned into light which travels along an optical fibre across the Atlantic. That conversation between light and electricity is an unequal one because electricity goes into your computer on little wires which are 20 or 30 nanometres in diameter in the most advanced ones, but when it talks to light, the light goes across the Atlantic in a fibre that's 30 microns across – a thousand times thicker – and the reason is the wavelength of light. It's a conversation between a mouse and an elephant.

"What we'd like to do – and actually Stefan Maier, my experimental colleague, is working on these ideas – is to make materials which can manipulate light on the same scale as electrons."

Metamaterials don't just have one trick though.

Invisibility

Metamaterials can also make an object lose its shadow, which will make that object invisible.

"The easy bit is to stop an object from reflecting light. By making an object black, it doesn't reflect light, but if I threw a black ball around a bright room you'd still see it, and that's because you see its shadow," said Sir John, "To make something invisible you have to make it lose its shadow, just as Peter Pan did. It's not easy to do, but you can do it with metamaterials."

In October 2006, scientists from Duke University in the United States, working with Sir John, demonstrated the first ever working 'invisibility cloak' which was built using specially manufactured metamaterials.

Sir John explains the concept of invisibility as similar to water in a river flowing around a stick: "If you put a stick in a stream of water, the water just flows smoothly round the object and closes up the other side, so if you're downstream of the stick then the water's just flowing smoothly as if the stick wasn't there."

Applying the same concept to light, he said: "We all know that light travels in a straight line – it takes the shortest distance between two points – but what

"Your ability to focus light is no longer limited by the wavelength of light, but by your ability to make the lens perfectly."



THE ROYAL PARKS

A boy who lost his shadow; Peter Pan in Kensington Gardens

“If light goes on a little chicane around an object but emerges the other side, somebody downstream will believe that the light has travelled in a straight line. What you’d actually see is what’s behind the object, because that’s where the light has come from.”

we have to do is make light move in a continuous curve. If light goes on a little chicane around an object but emerges the other side, somebody downstream will believe that the light has travelled in a straight line. What you’d actually see is what’s behind the object, because that’s where the light has come from.”

In actual fact there are instances where light naturally travels in a curve; a mirage occurs when light passes from denser, cold air into significantly warmer air, or vice versa. The gradually changing refractive index of the air bends the light, so you might see cars seemingly reflected in a puddle of water on the road on a hot day.

Understanding how to go about cloaking an object is one thing, but a mirage is uncontrolled, so how do you harness the ability to bend light around an object? We’ve already established that you can build a specified refractive index into a metamaterial, so if you had the exact prescription for the refractive index needed to hide a particular object you could build a metamaterial accordingly. It was theoretical physicist Albert Einstein that developed the theory enabling this calculation.

Theory of relativity

Einstein’s general theory of relativity was proven by Arthur Eddington who showed, during an eclipse, that the exact position of stars near to the sun appeared to shift as the light from the

stars bent as it passed around the sun.

Sir John explained the application of Einstein’s work to metamaterials: “Einstein measured how much space was squashed or stretched by something called the metric. We take the apparatus that Einstein used – essentially he thinks of a coordinate system which is distorted by space and writes it as a coordinate transformation – and we use it to measure, not the metric, but the refractive index. It’s a simpler thing, less dramatic, but nevertheless that’s how we design a cloak.”

Engineering on the nanoscale

Visible light has a wavelength of approximately 500 nanometres – a thousandth of a millimetre – and because the structure of the metamaterial has to be smaller than the wavelength of the electromagnetic radiation to be refracted, to make an object invisible to the human eye would require engineering on a scale much less than that, just a few nanometres. Sir John said: “There are not many complex structures you can make on a scale of nanometres, so we’re not there yet, but we’re working on it.”

What the researchers at Duke University have demonstrated, however, is radar invisibility, which is possible because radar waves have a wavelength of three centimetres or so. They used theoretical designs, published in Sir John’s *Science* paper *Controlling Electromagnetic Fields* to build a small cloak, less than five inches across, which would provide invisibility in two dimensions.

To test the prototype cloak, the researchers aimed a microwave beam at it inside a test chamber between two metal plates, and then measured the electromagnetic fields both inside and outside the cloak. Their measurements showed that the electromagnetic waves separated and flowed around the centre of the cloak, as predicted by theory.


Of this first prototype, Sir John said: “Their first cloak only worked for one exact frequency of radar waves, so if you just retuned your radar kit it wouldn’t be invisible anymore. With one of my postdocs, I designed a broadband cloak which would work at many different frequencies which the Duke University researchers have now built.”

It’s no surprise that comparisons have been drawn to the invisibility cloak used by fictional character Harry Potter in J.K. Rowling’s novels, but Sir John doesn’t believe there’ll ever be a cloak quite like his: “There are some things about Harry Potter’s cloak that do violate the laws of physics, he can see out of it for one thing, which you could never do, and to build a cloak made of material would be almost impossible.”

The ground has been prepared very well for invisibility by Harry Potter and Peter Pan, but Sir John was keen to point out that the more scientifically significant discovery is the possibility of negative refraction.

“If you ask scientists which surprises them most, the perfect lens or the cloak, every scientist would say a perfect lens,” said Sir John.

In celebration of the extraordinary breadth and depth of the contribution Sir John has made to the world of physics a two-day symposium was held in September 2008; the far-reaching impact of his work was evident by the presence of academics from all over the world whose research is drawn from Sir John’s theory.

When asked what he considered the most significant of the awards he has received, Sir John responded: “Other scientists would say a Fellowship of the Royal Society was the most significant, but that’s in the little world that scientists inhabit. The nicest one was my knighthood, because my relatives knew about that. It’s just a nice recognition towards the end of your career that someone thinks that you’ve done ok.” 

When the major £11 million refurbishment of Imperial's Central Library was declared complete in July 2008 following two years of renovation, Director of Library Services Deborah Shorley and her team waited with bated breath to see what students and staff would think of their new study and work space.

Turning the page

by Naomi Weston and Liz Gregson

The first phase of the refurbishment programme started in July 2006 and involved work on the ventilation systems of the upper floors, which is ongoing. Phase two consisted of housing new ventilation units for levels one and three. In phase three the glass-fronted extension to the existing walkway looking out onto the Queen's Lawn was built and the whole of the ground floor

was completely redeveloped.

Trudy Breuss led the redevelopment project, and she comments: "The greatest challenge was probably maintaining normal library services in a quiet environment whilst being surrounded by a building site! It says a great deal about both the quality of the project team and the patience of the students that we managed to achieve this."

The work to the ground floor was driven by the changing work habits of Imperial's students and consultation with library users was a key aspect of the early stages of the project. The Library team conducted a survey with Imperial students to find out about their needs, and also undertook research into the changes that other libraries have made over recent years.

Supporting group study



Mobile zone

The largest area for group study is referred to as the mobile zone because it has moveable chairs, tables and screens that can be repositioned to define the space and accommodate many different configurations for group study.

C-screens

So-named due to their shape, the vibrant orange C-screens form alcoves which enable smaller groups of students to meet in semi-discrete areas for group discussions and study.

Library lounge

Tucked away in the far-corner of the ground floor, the library lounge is a small area designed for quieter study in a calm, relaxed and informal setting.

"I love the mobile zone. I love the colour in it. I love the quiriness of it, the fact that you don't quite know where you're going to go. You go around a corner and there's something else there. I think the students will love that as well."
Deborah Shorley, Director of Library Services

Deborah Shorley explains: “In the past we had a lot of problems in reconciling the needs of people who want really quiet study space and students who more and more want and need to study together and to talk as they do so. We wanted to produce a space that enables different ways of learning and studying, but at the same time would allow people to work quietly elsewhere.”

Architects A-EM worked with library staff to translate the identified requirements, and the resulting ground floor refurbishment has created a flexible and versatile learning space, enhanced IT access through the installation of 90 new computers, and incorporated several types of social interaction spaces equipped for group study and discussions. Additionally, with wireless internet access throughout and power blocks installed on many of the desks, there is now a much greater capacity to accommodate the increasing number of students who bring laptops into the library.


The work has led to real improvements in the way that Angus Brown, Team Leader in the Public Services team, and his team deliver services to library users. He explains: “The refurbishment has created a fantastic space in the centre of campus where students can come, meet, study and learn. There are an extra 400 study spaces and, for the first time, we will be

open 24 hours throughout the academic year, meaning that from October to June students can use the library when they want.”

Although the majority of funding for the refurbishment was provided by Imperial itself, philanthropic support of over £800,000 was raised towards the project, including over 150 Annual Fund gifts from alumni and friends of the College. Major donors to the project included the Wolfson Foundation, who funded the library’s new IT Learning Suite and Learning Café, the Lisbet Rausing Trust and Marit Mohn. In addition, over 50 abstract large-scale canvases were donated to the library by Sussex-based artist Bob Brighton, and are on display throughout the ground floor of the building.

The library was officially opened by Sir Roy Anderson on 2 October 2008, who told assembled guests: “Libraries are in many ways the heart of a university’s campus and they are certainly of considerable importance to students. We cannot expect students to flourish on our demanding courses if we do not provide high quality facilities that support their study. We now have a truly world class library, in which great thought has been given to the changing needs of the students of today and tomorrow, and which looks as marvellous as it functions.”

Several months on, Deborah Shorley is delighted with the new facilities.

She says: “We now have a twenty-first century library to reflect the changing way twenty-first century students work. Imperial students deserve the best and this has set a benchmark for the College.” 

➤ Watch a film about the new library at www3.imperial.ac.uk/news/libraryart.

Certain on-site library services are available to alumni at the Central Library:

- borrow up to six items at any one time;
- renew borrowed items and reserve new items (for collection from the library in person) online;
- walk-in access to certain e-resources in the Central Library (strictly for non-commercial purposes).

To make use of these services, you will need to visit the Central Library in person to be issued with a library card. On your first visit you will be asked to prove your alumni credentials by logging into your Interactive Alumni Services account.

If you have not yet registered for your Interactive Alumni Services account, please visit www.imperial.ac.uk/alumni/register.

Providing IT resources



Think tanks

The think tanks are formed by semi-transparent screens which create enclosed informal meeting areas. Each is equipped with a shared PC and large-screen monitor to facilitate group work.



Wolfson IT Learning Suite

The Wolfson IT Learning Suite, funded by the Wolfson Foundation, is an open access area equipped with 50 new student PCs.

Learning café

As well as providing much needed refreshments to those hard at work, particularly at times when nothing else on campus is open, the Learning Café is wireless enabled throughout for those who have their own laptops.

“An increasing use of laptops and reliance on the internet means that there is an emphasis on both supporting personal use and the provision of College PCs across the ground floor.”
Angus Brown, Team Leader, Public Services Library Team

Ask Sir Roy

› Interviewed by Zoë Perkins

Sir Roy Anderson took over the reins of Imperial College in July 2008. Following his first few months in office, we gave *Imperial Matters* readers the chance to pose their questions to the College's new Rector.



What were the influencing factors that led you to taking the top job at the College?

John Ballard (Mathematics 1968)

When it came up I really didn't have to think about it for a minute. I'm a great admirer of what goes on here. Imperial is a wonderful place, and an outstanding university, but most importantly, it's an institution which can react quickly to changing circumstances and can direct itself and its programme of research and teaching effectively and quickly. It's very unusual as a British university in the sense that it's halfway between a university structure and a major company, and it's this that enables us to make decisions so quickly.

You have the benefit of an in-depth knowledge of Imperial due to your previous association with the College [as a student and subsequently as an academic]. With this backdrop, what are your top three priorities in steering Imperial to scale even higher peaks?

Rajive Kaul (Materials 1971)

The first is people. Public organisations now have many more performance targets, so the burden on individual academics has grown quite considerably. My top priority is to make sure our brightest and best, and that's the vast majority of our academic staff, have the space and time to be effective – to think thoughts that nobody else has thought in a particular domain.

That means that our support staff must also be the best, and I'm pleased to say we are privileged by the quality of our support staff.

Number two; we are exploring ways that Imperial can make itself more independent of government funding. That includes securing a regular income from commercial activities and increasing the endowment fund and the strategic monies that Imperial has available to use as it sees fit, to direct our course through this troubled and difficult time.

I have always been a strong believer that some of the most exciting things in science and discovery occur at the boundaries between different disciplines, so my third priority is creating interdisciplinary institutes that reflect the now, not the past history of subject

divisions. We've already created institutes in the areas of biomedical engineering and climate change, among many others, but there will be more announced.

What are your thoughts on Imperial's strengths and weaknesses with respect to weathering the current global recession, and what edge do you consider that Imperial can bring into play to be best placed to take advantage of the eventual recovery?

Jim Platt (Mining Geology 1960)

Because of some very good decisions by the College, as far as can be judged at present, we have a stable financial position. Our investment income of course has suffered, but we had moved a fraction into cash from 2007, so not all our investments are in stocks and shares. We also have tight financial controls, so can monitor our day-to-day financial position. But, of course, we do rely on external sources – government, charities – for a large part of our income and we cannot therefore be immune from external financial shocks.

In this context, our number one strength is that we're able to react quickly. We're also involved in spinning out innovation and bright ideas into technical companies, so I think our major contribution to helping the UK economy through the recession is going to be doing much more of that – taking our innovative capabilities and turning them into inventions which then contribute to both employment and UK plc's economy.

I feel we are a very attractive brand as an institute of higher education, and in fact increasingly so since the devaluation of the pound versus the dollar and the euro. I suspect this year we will have a higher percentage of applications from overseas, of very well qualified students. We will probably not change the undergraduate mix – home and overseas – because we're funded dominantly, not totally, by the UK taxpayer. We have a responsibility and duty to train high quality UK nationals. But on the postgraduate and taught Masters courses we can contribute to the economy by taking more fee-paying overseas students. Not all universities will be in that position because they won't have as attractive a brand as we do. ➤

Ask Sir Roy

Here in Silicon Valley, we see many new ideas born and mature into successful companies with the help of Stanford University. What is Imperial doing in this aspect?

Ella Shum (Computing 1981)

Translation is one of Imperial's three core strategic themes and an area in which it has been extremely active.

To optimise our technology transfer activity, we created a company, called Imperial Innovations, which raised capital and listed on the London AIM stock market two and a half years ago. It has over 150 commercial licence agreements in place and over 80 spin-out companies in its portfolio. A number of these we judge are going to be very successful indeed.

In December last year, for example, the spin out company Thiakis, based on research into the hormonal basis of obesity carried out by Professor Steve Bloom, was sold to Wyeth Pharmaceuticals for a consideration of up to £100 million.

We own 52 per cent of Imperial Innovations and that's important for encouraging academics at the College to use this company for venture capital and management guidance.

We're the only university in Europe that has its own quoted venture capital vehicle. We're looking at opportunities to increase this area of activity so we can be even more successful at spinning out our discoveries and innovations into products.

What is your strategy and timescale for overtaking Oxford and Cambridge as the top university in the UK?

George Ong (Mechanical Engineering 1975)

As Imperial is only 100 years old, as opposed to an Oxbridge college of perhaps 600 or more, our major disadvantage is that we don't have their endowment wealth accumulated over many centuries.

However, our advantage is that we are in London. We're very close to Whitehall, the seat of government, and we're close to the head offices of many major companies. The second asset is that we're a very can-do place and we can direct, manage, design and act very quickly to changing national and global circumstances and opportunities.



The SARS epidemic was one instance where Sir Roy was called to action

In the current economic crisis, I think Imperial is well placed to translate invention or discovery into product. I believe that we're better placed than Oxford or Cambridge here; turning science into economic advantage and benefit to society is in Imperial's DNA.

The hardest hit by the current financial crisis will again be the poorest countries. Are there any special programmes to attract even more students from these countries so that the gap does not widen further?

Achim Lutter (Business School 1988)

Our alumni and a handful of philanthropists have contributed greatly to the scholarship support that we're able to offer high quality UK nationals, European and international students. We're looking for the brightest and the best, independent of where they come from, and we will constantly be looking for ways that we can increase our scholarship support.

Have you visited Asian countries before and, if you have, what impression have you got?

Shunichi Nakamura (PhD Civil Engineering 1986)

One of the privileges of my research life, working on infectious diseases, is that I've probably travelled to most nooks and crannies in the world. As a young man I was seconded to Myanmar by the World Health Organisation, where I

spent two months working in Yangon, and then I was asked by the Rockefeller Foundation to spend time in India and Thailand. Subsequently I've travelled quite extensively throughout Asia, whether for the AIDS epidemic, SARS epidemic, or pandemic influenza H5N1.

My first major overseas research project was in India, funded by the Rockefeller Foundation, with two very bright PhD students. That was a big project that ran for three years in the Pulicat villages, which are on the coast quite near Madras.

India, south east Asia, and China are all areas that I've worked in. I probably feel more comfortable in south east Asia than most regions of the world.

What is the College's vision and plan for raising its profile in China and increasing cooperation with Chinese institutions?

Henry Wang (MSc Chemical Engineering and Chemical Technology 1977)

We've had approaches from two major universities in China, and we are looking at the development of some collaborative research institutes.

China is not the only region of interest; India and the Emirates are also of deep interest to us.

We've been looking very carefully at Imperial's footprint overseas, and there are three potential options. There are the research collaborations that all of us have with colleagues overseas, and that will continue as always for a world class

institution; there are research units and faculties overseas; and then there is the option of a full Imperial campus overseas. I'm not saying that we're going to do all of them, but we'll be looking very carefully at each, and those issues will very much be part of the future development plans of the College.

What are the differences between being Chief Scientist at the Ministry of Defence and being an academic, indeed being Rector?

Trevor Stuart (Mathematics 1949, PhD 1951)

The Chief Scientist at the Ministry of Defence is a permanent secretary-level post, so you exist as one of the collection of senior mandarins in Whitehall. You'd get a view of everything that is happening across government, whether it's Treasury, Home Office, or elsewhere, so the advantage is that you really had an extraordinary knowledge of cross-government activity at a point in time.

It was an unusual period because the UK was very active in two theatres of war, Afghanistan and Iraq, so a lot of problems came up that had to be solved quickly. So I think the first difference for a research scientist is that you don't have the luxury of time and reflection. Problems had to be solved.

The breadth of the problems was huge – molecular biology right through to the design of an aircraft – and therefore you had to use a network of specialists in particular fields. I suppose in some ways it's similar to the role of Rector because you're dealing with a lot of different problems in science, engineering, business and medicine, so you rely extensively on the specialist expertise of your colleagues.

Universities are, of course, more consensual in the sense that consultation is absolutely essential. The Ministry of Defence has a very hierarchical structure so if you said "Do X", on average everybody jumped and X was done. Well, universities are not like that, it's more debate, discussion and consensus development.

The second element is the educational role. I do so like teaching, I always have

done – the contact with young people, transmitting knowledge and then debating issues. So I've continued to do a number of lectures, and that's a very enjoyable part of being back at Imperial.

What would you consider your most important research result and the impact it has had on society?

Lionel Baker (Physics 1952, PhD 1955)


I think it is probably two papers which were published jointly with Robert May in 1984. Unusually there were two articles published in consecutive issues of *Nature*, as part one and part two. It laid a theoretical framework for the study of infectious diseases dynamics, evolution and control using past mathematical approaches, but broadening it out across every single class of infectious agent, from viruses through to the tropical parasitic diseases. That theoretical framework then permitted detailed analyses of optimal control policies for particular infections, looked at what you should measure to understand these systems better, and the evolutionary and ecological dynamics of these organisms.

As an outcome of those two papers, a book [*Infectious Diseases of Humans: Dynamics and Control*] was written and published in 1991, again in collaboration with Bob May, which lays out the mathematical theory for the study of infectious diseases. It's a very large book I'm afraid – one of these tomes you can use to keep doors open!

What do you enjoy about playing croquet?

Sean Hughes (St Mary's Hospital Medical School 1965)

I like strategic games and croquet has elements of both skill and strategy; as a schoolboy I enjoyed chess very much as well.

The other reason is that during the early part of my research career, I spent the summers down at Silwood Park, which has a wonderful croquet lawn. I used to play with Bob May, Mike Hassell, Mick Crowley and John Lawton – a collection of theoretical ecologists. We used to do a lot of academic work actually on the croquet lawn, talking through problems. But of course it was intensely competitive! 

Biography in brief

- 1968** Gained a first class degree in zoology and went on to do a PhD in parasitology, both at Imperial
- 1971** After achieving his PhD he became an IBM biomathematics research fellow at the University of Oxford
- 1973** Became a lecturer in parasitology at King's College London
- 1977** Returned to Imperial as a lecturer
- 1982** Made Imperial professor aged 35
- 1984** Became Head of the Department of Biology
- 1986** Elected a Fellow of the Royal Society
- 1989–1993** Served as Director of the Wellcome Centre for Parasite Infections (at Imperial)
- 1993** Moved to the University of Oxford where he became Head of the Department of Zoology and Linacre Chair of Zoology
- 1993–2000** Served as Director of the Wellcome Centre for the Epidemiology of Infectious Disease (at Oxford)
- 1998** Elected a Founding Fellow of the Academy of Medical Sciences
- 2000** Returned to Imperial to set up and lead the Department of Infectious Disease Epidemiology
- 2004** Acted as Chief Scientific Advisor to the Ministry of Defence on secondment from Imperial until 2007
- 2006** Knighted in the Queen's Birthday Honours list
- 2008** Became Rector of Imperial College London

The Department of Earth Science and Engineering's Professor Mark Sephton is one of the multinational team involved in ExoMars, a European-led exploration mission to Mars. He spoke to *Imperial Matters* about the prospect of finding life on Mars.

What is the remit of your research as Professor of Organic Geochemistry and Meteoritics?



Organic geochemistry looks at the chemistry of organic molecules in rocks. In the same way that an ammonite or bivalve fossil in the geological record can be identified as having lived in a particular environment in which certain rocks were created, as an organic geochemist, I can use molecular fossils to get at similar information.

By looking for these molecules in rocks it's possible to identify, for example, an anoxic marine basin where lots of organic matter was deposited or a tropical swamp where land plants have accumulated and decomposed. Meteoritics also involves looking at rocks but this time the samples are meteorites that have arrived from space.

How do these two subjects overlap?

Meteorites are left-over building blocks from the early solar system that didn't go into making up planets. The most primitive meteorites are carbonaceous chondrites, which have up to about five per cent organic matter in them. They have all the compound classes that you associate with life – amino acids, carboxylic acids, nucleobases [the components of DNA] and sugar-type compounds. So that's where organic geochemistry and meteoritics coincide, in the study of these prebiotic organic molecules preserved from shortly after the birth of the solar system.

What is the purpose of studying the chemistry of organic molecules found in asteroids and Earth's rocks?

It is effectively forensic science in a geological context; we are going back in the geological record, trying to use the molecular remains of organisms as

indicators of what happened. We use this understanding to help us locate where source rocks for petroleum have been deposited and to predict where else oil is in a reservoir system.

We also look at biological evolution – which organisms appeared at what time, and which organisms disappeared – specifically extinction events. Consider the Permian-Triassic, Triassic-Jurassic, and Cretaceous-Tertiary extinctions where you lost major percentages of living species. The organic molecules that represent organisms just die out and are then replaced by new ones.

Another example, is when you look at a meteorite. You've got authentic, 4.6 billion-year-old organic matter, and it has all these compound class molecules that we see in living organisms. We're going to Mars in 2016, with the ExoMars mission, to look for organic matter there. We might see some organic matter on the surface

interviewed by Zoë Perkins

Life on Mars

An artist's impression of ExoMars descent module, which will be delivered to a specific location using an inflatable braking device or parachute system

which is non-life, having fallen on the surface from meteorites, so we need to be able to discriminate between this non-life organic matter and any living organic matter that may be present as well. The study of prebiotic organic matter is very important if you want to be able to conclusively recognise life.

So basically, if it's organic, I do it.

What is the ExoMars mission?

ExoMars stands for exobiology [biology outside Earth] on Mars; it's a life detection mission. It is the first flagship mission of the Aurora Programme, effectively the long-term vision of the European Space Agency (ESA), which eventually intends to send human beings to Mars.

The ESA is going to send a Rover which will try to understand the surface and the subsurface, and work out whether there's any biology present, what the hazards are, and potential benefits of the Martian environment to any sort of human mission. Once that's successful then you start to think about Mars sample return; the astronauts have said: 'If you want to put a human being on Mars and bring that human being back, don't you think you'd better try it first with a bit of rock?' We can then go to human space exploration of Mars.

What is your involvement with ExoMars?

I was invited on to the team because of my work on meteorites. It's a multinational team, which needed someone who could recognise non-biological organic matter so we don't get any false positives on Mars.

What is so significant about the ExoMars mission?

People think that we keep sending missions to Mars to look for life, but there have been very few which are exobiology missions. There were the two Viking missions in 1976 and Beagle II, which didn't make it to the surface successfully, in 2003. The third is ExoMars.

All the other missions that we keep hearing about only support the idea of life on Mars. They talk about water being essential for life, which is true, but they're not specifically life detection missions.

The Viking instruments came across things which were unexplainable at the time, thought to be because of the highly

oxidising nature of the Martian surface. ExoMars has a drill, so it can drill down beneath the oxidising layers and has a series of instruments so that if one detects life it can then be backed up by a second and third instrument.

This cross-checking nature gives the whole mission a high probability of a definite result. There won't be too much debate when the data comes back – we'll be able to say conclusively whether there is life or not.



The ExoMars Rover will be ESA's field biologist on Mars

How will you know if you've found life?

All life as we know it is based on amino acids. Meteorites also have amino acids, but because the organic matter in meteorites is produced by non-biological reactions there are about 80 types of amino acids, which are both left and right-handed in form [amino acids are chiral molecules, which are not superimposable with their mirror image, so exist in both left and right handed forms]. Life, however, is very specific; it has only 20 types of amino acid, which are all left-handed. So if we go to Mars and find left-handed amino acids then we've found life.

Even if we find life on Mars, it's possible that it originated from Earth and was transported to Mars, or conversely, it could have originated on Mars and been transported to Earth, leading to us. However, if we find dominant right-handed amino acids on Mars then we know that we're looking at a separate origination event – life started on Mars on its own.

An instrument called UREY, for which I was nominated European team leader in 2007, will look for these amino acids, as

well as polycyclic aromatic hydrocarbons, which are a sort of check, as non-biological organic matter has a lot of these.

There's also something called a Life Marker Chip (LMC), often called a pregnancy test for life because it uses similar technology, which tells you about the type of life that's present. So where UREY detects life, and confirms that it is life and not non-biological organic matter, then the LMC would then tell you what sort of life it actually is, for example, bacterial, algal, or something a little bit more ancient.

The launch is scheduled for 2016, what are you currently working on in preparation?

We're currently looking at the extraction process, because you can have the most sensitive instruments in existence, but they're no good if you can't get the molecules out of the rock first.

We're using a Sub Critical Water Extractor, which is like an espresso machine. We heat water, but keep it in its liquid form; when you change the temperature of the water, it changes the type of molecules that it can dissolve. At 100 degrees celsius you can take out your amino acids, but at 300 degrees celsius you can start to take out your hydrocarbons; so we can target specific compound classes. There's a great deal of variability, and different methods would be needed for different rock types, so we need to understand all the possibilities before we do it on Mars.

Why does it matter if we find life on Mars?

To go to one planet and find life raises the possibility that life's present elsewhere because you've got a 100 per cent success rate. It would mean that every time the right conditions and right chemicals are in place, then life would spring up.

I think the possibility of life in the solar system is discussed so much that people forget how absolutely unique the detection of non-terrestrial life would be, even if only the smallest bacteria. You can only do it once; as soon as someone's found evidence of simple life on another planet it will change the whole philosophical, social, and ideological landscape of science. **m**

Innovating the social experience

The College's newest entrepreneur on the block, Michael Birch, revealed the story behind internet success Bebo at the Alumni Reunion 2008.

> by Liz Gregson

"The internet is just the best environment to succeed in for someone like me. If you're from a science background, you can almost certainly be a coder and you can just be a one-man band. You can go from nothing, no financing, working from home or working part time in another job, and actually build something that's successful."



It might be surprising to discover that the man who today is one of the biggest success stories of the internet fell into computing by accident, but as co-founder of the social networking site Bebo, Michael Birch (Physics 1991) explains: “I left Imperial in a year that was a low for graduate employment opportunities and it was quite hard to get a job. My brother Paul, also an Imperial graduate, was working at an insurance company and told me about a job opportunity in programming.

“I thought that’s probably one of the dullest things I can imagine: programming’s for nerds, and insurance is just boring. But Paul pointed out that I didn’t have a job, so I thought ‘I’ll do this and kill a bit of time’.”

To his amazement Michael found that not only did he enjoy programming, he also developed a fascination for insurance. He continues: “I became really engaged with the computing side of it, building systems and analysing data from huge databases. At Imperial, my physics degree often felt more like a maths degree, but my job now involved a lot of actuarial modelling and I found all of the mathematics that I’d been studying useful.”

Eventually Michael quit and worked for a number of years as a freelance contractor, pausing briefly to marry Xochi, who he’d met at Imperial four years earlier when she was on a student exchange from the US. Then, as the internet bubble began to inflate, he and Xochi followed Paul into an internet start-up. He reflects: “It was a high risk thing to do – there were very few success stories here at the time and we didn’t know what we were doing. We had a background in programming and we’d been dealing in big database languages that didn’t work on the web, but we thought we could work this out one way or the other.”

From the very beginning, they believed that viral marketing, a term that enjoys common usage today but was a relatively uncharted concept in the late 1990s, was vital to their strategy. Michael explains: “Viral marketing in internet terms is where you effectively try to grow your site for free by getting your members to invite their friends. Part of the reason we were so excited by it was

because we had no money to spend on marketing and there was no other way for us to build a big site.

“A viral loop is created when a member invites another to use the site, who invites someone else, who invites someone else *ad infinitum*. There are many opportunities within the viral loop where you can tune the user experience to attain a viral factor above one, which means that you have a site that is growing. From our first website onwards, I approached this in a very scientific way, constantly analysing data to find ways to increase the viral factor, and I thank Imperial for that outlook.”

Viral marketing has been a theme that has run through all of the websites that the Birches have launched, and the post-launch growth of Bebo suggests that they eventually cracked it. In fact Bebo was not Michael and Xochi’s first foray into social networking websites. In 2003, a friend told Michael about a domain name, ringo.com, that was for sale on eBay. A huge Beatles fan, and cognisant of the potential of owning a generic but identifiable domain name, Michael bought it and set about thinking of a direction in which he could take Ringo.

The couple had by now relocated from the UK to Xochi’s home town of San Francisco and from here Michael came across Friendster, one of the first social networking sites to gain traction. He says: “I spent about half an hour on the site, navigating around, and I became totally engaged with it, I loved it. I thought this is the future – social networking – and I knew what I wanted to do with Ringo.

“To avoid copying Friendster too much, after half-an-hour browsing the site I decided that I wasn’t going to look at it again until I’d developed my own interpretation. I spent 13 days working on Ringo and I only went back to Friendster before pushing the live button to check that I hadn’t missed anything fundamental. I found that I hadn’t got ‘profile comments’, so I went back, spent about an hour adding them, and then went live.”

The site did well, attracting 400,000 members within a short space of time, making it the second biggest site in the US. It also succeeded in attracting the



Delivering the keynote lecture at the Alumni Reunion 2008



Michael and brother Paul (right) join a reunion attendee aboard RCS mascot Jezebel

attentions of rival companies, who quickly put themselves forward as potential buyers. Michael recalls: “I went to a small social networking conference, probably one of the first of its time, and two people there offered to buy our company. Then MySpace phoned the next day, so within a week of going out into the world we had three offers to buy our company.”

Ringo was sold three months after embarking on the initial development, bringing about a financial turning point in the fortunes of the Birches’ internet businesses. But the outcome was bittersweet for Michael: “I had seller remorse as soon as I’d sold it because then I watched social networking grow. I knew it was going to be big, but I didn’t

know how big, and I had agreed to a non-compete clause so I couldn’t jump straight back in.”

The day the clause expired, Michael and Xochi started to develop a new site. Bebo was born. “Everyone thought we were totally crazy,” recalls Michael, “but we did it because we thought we still knew more about viral marketing than other people. We switched our focus to engagement, determined to become good at building sites that people would spend a long time on each time they came, with a really high percentage of them coming back really often.

“I spent about three months developing the site, the longest I’ve ever spent developing something prior

to launching, and then we launched it as a full-on social network. The day after we launched it, we had 6 million page views, which stayed flat for about two months. Then the growth became exponential.”

By this time, Birthday Alarm, an earlier site, had become very profitable, enabling Michael and Xochi to inject cash into Bebo and hire staff.

As Bebo grew, the Birches built an innovative work space for their employees with significant space dedicated to a relaxed working environment and entertainment, including a DJ booth and dance floor, a pool table, table tennis, fustball and air hockey.

The virtual road to Bebo



Michael worked with brother Paul and wife Xochi to build several websites before developing Bebo. Not the smoothest of paths – at one point Michael and Xochi found themselves £300,000 down, with a twice re-mortgaged house and two small children – each site proved a vital step on the road to Bebo success.

Lemonlink “Probably the worst name for a website ever. If it was for a website that linked lemon growers, it might be quite a good name but it was nothing to do with that. The concept was that you build an address book on the web and you connect it with those of all your friends’ so you only ever have to update your own contact

details. Unfortunately only about 10 per cent of people who you ask to do this reciprocate, so you end up with an address book with only 10 per cent of your contacts in it, which is effectively useless.”

Babysitting Circle “When I was growing up, my parents were part of a babysitting circle in their local village, in which you babysat for other families and would receive tokens so that you could get babysitting hours back when you needed them. We took this online, but the problem was that we couldn’t build viral growth to it. We started spending money on advertising, the only time we ever did that, but it didn’t really work out.”

“Before we knew it,” Michael said, “we had 100 million page views per day and we needed a couple of hundred servers to cope. We became the biggest social network in Ireland, the biggest in New Zealand, and for a short period of time we were the biggest site in the UK by page view or time spent. We ended up having the highest engagement of any social network.”

Eventually an Irish, London-based venture capitalist caught sight, through his teenaged-daughter, of the success that Bebo was enjoying, and approached Michael and Xochi with a view to investing. In hindsight, this was the beginning of the end for Michael’s involvement in Bebo.

He reflects: “It was an interesting transition because we’d been going solo for seven years, a long hard slog, but I came to realise that I enjoyed that more than I did when Bebo grew into a bigger business with professional management, a lot more process, and many more meetings. I felt I’d done what I’d come to do, and when AOL approached us, we started thinking maybe it’s a good time to sell, that people who were interested in buying now wouldn’t necessarily be in the future. I think we were right on that one!”

Michael recognises the beneficial position in which the sale of Bebo has placed him and his family, giving them the financial freedom to focus on whatever they desire. And for Michael that means a return to coding, including

work with Charity Water, the US equivalent of Water Aid, to make their website ‘more viral’ to increase awareness, engagement and support for their cause. He has also worked with a television producer to launch a new site called wordia.com, a visual dictionary.


Another project involves developing an office space, similar to the original Bebo office, in San Francisco whereby desk space will be rented out by the month, at below-market rates, to small early-stage start-up companies. He explains: “Early stage companies can come in, meet other companies, and be part of an environment that’s fun and creative. If they get bigger than four people, they’re obviously doing too well, and then they have to get their own office and pay market rates.” It is a plan that he may try to replicate in London, where office space is four times more expensive.

He laments the lack of visible entrepreneurial success in the UK and is driven to improve the situation: “My message to the UK start-ups is simple: go to the best maths and computing departments at Imperial, Oxford and Cambridge, and find the best students and convince them that they should be joining you. Give them meaningful equity, so that they can actually go along that journey with you and succeed. The view of entrepreneurship seems to be changing, and I know that Imperial has one of the biggest entrepreneurial cultures in the UK, so there are a lot of

people wanting to do it.”

Michael cites his father, a qualified botanist and self-employed agricultural consultant, as the principal source of inspiration for his own eventual path. He explains: “My father wasn’t trying to be a rocket scientist, but he was an inventor and he’d always be coming up with very simple ideas.”

One of his father’s ideas was a new type of dental floss made from latex rubber which he called Go Between. He sold it to Wisdom, who brought it to market and Go Between was sold in chemists around the country, initially building a loyal fan base. Michael recalls: “I remember being very excited as a child going into Boots and seeing my dad’s product on the shelf. That was a great sense of reward for him, and I was very proud of my father for having got to that stage.”

In the family home, Michael’s bedroom was next door to his father’s office and he overheard to numerous telephone conversations: “He would phone people to convince them that they should work with his new idea; make it, sell it, stock it, etc. I was amazed that he could just cold-call people and try to convince them to do these things. It inspired me, and I wanted to be like that.” 

➤ View the film of Michael’s full lecture and find out more about the Alumni Reunion 2009 at www.imperial.ac.uk/alumni/events.

Friendly Wills “Next I worked with a lawyer to produce an online will-writing service. It was very simple – you’d go on to the site, and there’d be different steps of the process, and then at the end, you’d have a will which we would mail to you. It didn’t actually do badly.

We were charging about £30 per will, and we were advertising on Google. I think for every £15 we spent, we got about £30 income, so we were making a profit, although a rate of £30 a day was never going to cover our running costs.”

Birthday Alarm “Birthday Alarm, which we still own, sends you an email when it’s one of your friends’ birthdays. It is inherently

viral, because the first thing that you do if you want to be reminded of all your friends’ birthdays is find out when they are. When people respond, you get the opportunity to sign up more site registrations.

“We came up with an idea that you see on sites a lot now, to import people’s contacts for them by logging into the member’s email account, navigating to the address book and extracting all of the addresses. It makes it very easy to invite great numbers of friends in one go. Prior to introducing the functionality, we were getting about 10,000 members a day, and about 10 times that rate when we launched it. The peak for the site was about 250,000 members a day.”

Ringo “We bought ringo.com for \$1,500 on eBay, which is incredibly cheap for a domain name as good as that. We had no idea what we were going to use it for; we just thought this is a really cool name. I like generic names because you can use them to take your business in any direction that you want to. We decided on social networking and after programming for 13 days, we launched the site, seeding it by sending an email out to about 3 million Birthday Alarm members, gaining about 400,000 members over three months. At the time, in the early infancy of social networking sites, we were the second in size only to Friendster.”

Award-winning programmes

The Imperial College London Graduate Schools are working increasingly with the College's alumni to inspire, inform and motivate current Imperial PhD and MD(Res) students through their transferable skills training programme.

› by Caroline Hargreaves and Liz Gregson

The transferable skills training programme has twice been awarded the *Times Higher Education* (THE) Award for Outstanding Support for Early Careers Researchers for the Finish Up, Move On (FUMO) course in 2008 and, in 2006, for the Research Skills Development (RSD) course.

FUMO is an innovative two-day course for late stage PhD students. It provides specific skills development and guidance for students who are about to complete and helps them to face the post-PhD transition, be that into further research, a move into industry or something altogether different.

The key motivator for FUMO was the “schism between what employers think PhDs bring and the skills they actually have but are unable to communicate with employers”, which was highlighted by Janet Metcalfe, Head of Vitae and a judge at the 2008 THE Awards, in an article for THE in January 2007. The course was developed based on surveys of employer perceptions and in consultation with Imperial's Careers Service and the Business Development team. Students work in teams to carry out activities and sessions on writing a thesis, preparing for

the *viva voce* examination, self-awareness, career options, networking skills, leadership and entrepreneurship.

The full success of the course relies on the generous efforts of the College's alumni, who are called upon to lead discussion groups enabling students to gain beneficial insight into possible careers. These sessions finish with an informal networking reception, which provides the students with a chance to meet the speakers.

Dr Markus Huebscher (PhD Computing 2005), a mobile software engineer at Google, is an alumnus who volunteered at the course at the end of November 2008. He explained: “I worked on a very personal level with a small group of students and talked to them about how I got from Imperial to where

I am today. I tried to engage them by encouraging them to talk about what they are doing and how they've been coping with their PhDs.”

According to Markus, finishing the PhD is one of the hardest aspects of studying for a PhD, so this was what he chose to focus on with his group. He commented: “It can be a very difficult period, especially when you are just about to write up and you're wondering ‘is the thing that I've just spent three years doing worth anything?’ I think one of their major concerns is the *viva*. The students are not quite sure what it's going to be like.”

Bea Choi, a PhD student from the Faculty of Medicine, attended the course in 2008. She said: “The FUMO course is very insightful, for both those choosing to stay in academia as well as those leaving it. It is informative, practical and fun. Everyone was very approachable and very generous with their time, which helps in getting the most out of the course. I thoroughly enjoyed myself and would recommend this course to all PhD students.”

FUMO is funded by ‘Roberts money’, a funding stream that was set up



The THE Award is presented to the Directors of the Graduate Schools


following the Roberts Review in 2002 to support skills training and career development for PhD students and early career research staff. The course develops personal effectiveness, career management and skills associated with communicating, networking and team working. Feedback received indicates that the topics covered work effectively to equip participants with the skills to finish up their PhDs successfully and move on to the next stage of their careers

with a deeper understanding of their own career goals, much better able to clearly articulate their potential contribution to prospective employers.

Elaine Walsh, FUMO Course Director, said: "After the first pilot in 2006, we worked closely with colleagues and alumni to develop the course to its current form. Our participants are very busy with their research, so we pack as many valuable elements as possible into two days."

She added: "We are grateful to the

alumni who attend part of the course, giving students an invaluable insight into choices made by recent PhD graduates."

Catching up with Markus at the end of the first day of the course, he concluded: "A lot of these students feel like they are in a very uncertain position because they're not quite sure what is going to happen to them. I've been through that so it's nice to be able to reassure them about what's going to come, and the fact that they have a lot of potential." 

If you would be willing to come along to future FUMO courses to speak informally to participants, the Graduate Schools would love to hear from you. Alumni who have taken part previously have enjoyed the experience and the PhD students are always appreciative of those who make time to come.

They are specifically looking for graduates who completed their PhDs at Imperial, and who have a few years' work experience. Participation involves leading an informal 45-minute question and answer session with a group of around 12 students, in which you would talk to them about your career since leaving university, answer questions and give informal advice. You are then invited to a drinks and networking reception with the other course participants from 17.00–18.30. No preparation is required.

► If you would like to register your interest in attending, please email **Dr Caroline Hargreaves** in the **Graduate Schools** (caroline.hargreaves@imperial.ac.uk) with details of:

your name
your degree (department and year)
your current career



Graduate School programmes in Asia

The Research Skills Development course has been running in the UK for pre-transfer PhD students since 2004 and the first international version was held in Singapore in September 2008. Organised by Imperial's International Office and the Graduate Schools in collaboration with Nanyang Technological University (NTU), the course was attended by 44 students from Imperial College London, A*Star, National University of Singapore and NTU.

The usual three-day course was extended to five days, supplemented by additional sessions allowing participants to develop their research skills,

alongside increasing their awareness of other cultures and their understanding and interest in international collaborations. Sessions on networking, entrepreneurship and international collaboration, and a careers insight evening, were led by alumni and guest speakers from collaborating organisations, enabling the students to meet successful alumni and guest speakers working in academia, industry and the public sector in Asia.

Teo Swee Lian (Mathematics 1981), Deputy Managing Director (Prudential Supervision) for the Monetary Authority of Singapore, was a speaker at the careers insight evening. She says: "I was happy to help out as I have very fond memories of my time at Imperial. I also wanted to communicate that there are a multitude of roles in the financial industry, such as risk management or formulating regulatory policies to safeguard the financial system, which are for the betterment of the economy and society, and that young people with good analytical and quantitative skills can enjoy fulfilling careers in these fields."

There are plans to run the course again in 2009 in Singapore and to develop a similar course in Hong Kong. We would be interested in hearing from alumni from those areas who would be willing to come along and speak to participants:

- PhD alumni with experience in entrepreneurial activities, networking, academia and international academic collaboration to take part in an interactive presentation session;
- PhD alumni willing to lead a 45-minute session with a small group of students and talk to them about their careers since leaving university, answer questions and give informal advice.

► **Graduate School programmes in Asia**

To register your interest, please email **Jen Martin** in the **International Office** (j.martin@imperial.ac.uk) with:

your name
your degree (department and year)
your current career



Hands on

Professor Stephen Richardson speaks about settling into his new role as Principal of the Faculty of Engineering, which he took up in September 2008.

by Emily Ross

“You could say engineering is in my blood,” muses Professor Stephen Richardson. “When I was young I often visited my grandfather’s workplace, the silk printing works belonging to the London department store Liberty’s – he was a trained mechanical engineer and was the first to introduce me to the workings of huge machines.”

While his passion for engineering began at a young age – his parents enjoy relating how he unscrewed all the screws from his playpen and escaped – his decision to study chemical engineering was inspired by a Professor of Chemical Engineering at Imperial who was a friend of his mother. The professor introduced him to the world of chemical engineering and suggested it might be something he would like to pursue.

This suggestion led Professor Richardson to an association with the

College that today spans 37 years. He studied for his BSc and PhD in the Department of Chemical Engineering, and after a brief spell at Cambridge he returned in 1978 to take up a position as lecturer.

Over the years Professor Richardson has progressed to senior management level roles: from Director of Undergraduate Studies in 1995, to Head of the Department of Chemical Engineering, and now his current role as Faculty Principal which he took on last September.

He describes his style of leadership: “My aim is to lead by example, so if I expect other people to do things I should

also do them myself, in some measure. For example: I still teach, I do admin, I do consultancy work and I still conduct some research. A balanced diet is what you need in this job.”

Professor Richardson’s principal research interest is safety, specifically the depressurisation of vessels and pipelines, particularly those associated with oil and gas production, and development of the computer program BLOWDOWN, which has since been used in the design of over 300 installations worldwide.

He describes his new role as a huge learning curve, but says he is excited

“My aim is to lead by example, so if I expect other people to do things I should also do them myself, in some measure. For example: I still teach, I do admin, I do consultancy work and I still conduct some research. A balanced diet is what you need in this job.”

“There are still some research projects which are just Chemical Engineering or just Engineering but they are increasingly few. However, if you are not absolutely fantastic at your core subject then being multidisciplinary won’t help you – you have to maintain your expertise.”



Professor Richardson leading a first year class in engineering design

about being head of a Faculty in which 79 per cent of the research has been rated as ‘world leading’ or ‘internationally excellent’ in the 2008 Research Assessment Exercise.

However, he says there’s no time for complacency: “When you are at the top there are only two places to go – either stay the same or go down. With the economic circumstances we need to keep on our toes.”

Professor Richardson is a keen teacher and is fondly described by his students as the ‘machine-gun’ – a nickname he gained because when he gets excited about a subject he talks quickly. Despite his natural speed he is a firm believer in good science communication and is not in favour of bamboozling his students.


When asked where the Faculty is going, Professor Richardson points to a lot of multidisciplinary research:

“There are still some research projects which are just chemical engineering or just engineering but they are increasingly few. However, if you are not absolutely fantastic at your core subject then being multidisciplinary won’t help you – you have to maintain your expertise.”

Professor Richardson is particularly excited about ‘urban energy’ – a collaboration between the Faculties of Engineering and Natural Sciences looking at smarter ways of running cities in terms of energy, the environment and economics. He also highlights robotic surgery – the high profile collaboration between the Department of Computing and the Faculty of Medicine fronted by Lord Darzi – as a key research area of the moment.

Bio-research is another field which is likely to expand over the next five years.

Professor Richardson says that biomedical, biochemical and bioelectrical engineering research are all set to grow. He also talks about developing the Faculty’s nuclear research. He says: “If the UK does decide to invest in nuclear energy then this will be a massive opportunity for us. We have real expertise here.”

While the economic downturn is worrying for everyone at the College, Professor Richardson is optimistic about the future for engineering graduates. He says: “While opportunities in the City will be smaller there are still lots of options. I want to see our students go on to be CEOs of companies, school teachers inspiring more kids to do engineering, and chief engineers on major projects – graduates at Imperial still have the very real opportunity to make a difference.” 

Around 200 members of Imperial staff with an interest in teaching and learning came together for the College's first Education Day in December 2008.

› by Emily Ross and Naomi Weston

Innovative teaching

Students using an operation simulator to practice keyhole surgery

The College's first Education Day was developed by the Pro Rector for Education, Julia Buckingham, and the Centre for Educational Development (CED). A series of lectures took place throughout the afternoon, given by Imperial academics who spoke of different teaching methods they have adopted. Subjects included the use of simulation in teaching medicine and the EnVision programme which fosters initiatives in engineering education.

Speaking on the day, Rector Sir Roy Anderson noted that while Imperial is known for being a research intensive university, staff shouldn't forget that the College is equally excellent at teaching. He said: "I hope we will continue to do more to stimulate creativity in education".

Robert Winston, Professor of Science and Society, also spoke about the challenges of communicating science. He discussed the relationship between

scientists and the media and how this can be both useful in order to get messages out to the public as well as detrimental as a result of misleading headlines and inaccurate reporting. Using video clips from his BBC1 series *Child of Our Time* he showed how devices such as case studies can be useful tools for the effective communication of complicated scientific processes.

In addition to the lectures, over 30 posters were on display at the event illustrating many of the different initiatives that departments and academics have introduced to their courses. Among the varying teaching methods presented was a clinical e-learning programme with e-lectures, video podcasts and online quizzes enabling students to identify gaps in their knowledge.

Demonstrating that there is commitment across the College to using

innovative methods to inspire students, in his speech on Education Day, the Rector also highlighted the Teaching Excellence Awards presented on 24 November 2008. He said: "I was privileged to present 14 awards for excellence in teaching to academics from all of the College's faculties. It was wonderful to highlight the inventiveness and dedication of those involved in learning and teaching. The awards clearly illustrated the link between excellence in teaching and excellence in research. Students here thrive in a challenging, research-driven environment."

› Read abstracts of all posters displayed at Education Day 2008 at www.imperial.ac.uk/edudev/cedevts/educationday.

Interview with Pro Rector for Education Julia Buckingham about Education Day

Why are teaching and learning so important for Imperial?

We have an incredibly important role in educating the next generation. Great teaching and great research go hand-in-hand. I suspect that if any of our academics were asked what inspired them to become scientists, most of them would pinpoint a teacher who enthused them and drew them into their area of expertise. Of course, many of our students will not pursue careers in science, but whatever they choose to do, they will have had the excitement of learning about cutting edge science and being taught by some of the world's leading scientists – and a research-led education is something that stays with you for life, not just for Christmas!

Who inspired you as a student?

That is difficult, there were quite a few, but if I had to select just one, it would be my tutor in Sheffield, Iain Chester-Jones. He was an amazing scientist and teacher – I always remember him telling me about his first 'big discovery' and how excited he was about it; I found that very inspirational. His tutorials were a bit chaotic sometimes but were always challenging and fun – above all they opened up a whole new field of biology for me and had a very big influence on my future career.



Why did you decide to hold Education Day?

There are lots of opportunities to discuss education within the various College committees, for example, I chair the College's Strategic Education Committee which is responsible for developing our educational strategy. However there is no forum outside the committee structure for academics and others who work with students to discuss teaching and related issues with colleagues from other disciplines in the way there is for research. I thought a symposium would provide this platform.

What were the aims of the day?

To discuss strategic issues and innovative approaches to teaching. We started with strategic issues; how to select the best students, and the importance of communicating science effectively to the public. Then we heard about some of the challenges faced by

different disciplines – for example teaching clinical skills to medical students and physics to first year undergraduates. This was an opportunity to learn from each other and to share best practice.


What is the value of innovative approaches to teaching?

There is no doubt that students' approaches to learning have changed over the years. We too must move with the times, be open to testing and evaluating new methodologies and taking advantage of new technologies. I don't think that e-learning will ever be a substitute for face-to-face teaching but it is a very powerful tool and has enormous potential for further development.

What was the purpose of the poster presentations?

We felt it was particularly important to encourage informal discussions during the coffee breaks, and the posters, created by staff who had been awarded teaching grants, provided a fantastic focus for discussion and debate. On the day the atmosphere around the posters was delightful—the noise levels reflected the enthusiasm.

Is there going to be another Education Day?

Absolutely! We want it to become an annual event and from the feedback we have had from across the College and the Rector, there is a lot of support for it. 



Undergraduate physics students using clickers to take part in an interactive lecture

Stay connected

On the pages that follow, we are pleased to bring you news about two new on-campus benefits that we have recently introduced. Alumni are now entitled to significant discounts at Imperial's Sports Centre, *Ethos*, and on professional short courses given by Imperial's Centre for Professional Development.

At the end of the UK and international pages you will find a calendar of forthcoming events which are either being specifically organised or which alumni are welcome to attend – a useful tool for diary planning over the coming months. You may wish to take note of the date of this year's annual alumni reunion, particularly if you graduated in a year ending in a nine. Watch out for further information in the spring.

We were pleased to welcome a

new member of the team in November 2008. Birgitta Hall joined us from Community Service Volunteers, and her work at Imperial College will focus on supporting the alumni relations activities of those of you who live overseas, including

the work of our many international alumni groups, whose recent news you can read about on pages 34–36. Birgitta, pictured standing on the left, looks forward to meeting many of you in the coming months.

It would be great to hear from you if you have any questions or suggestions about alumni relations activities. You can get in touch with us by email at alumni@imperial.ac.uk or by calling +44 (0)20 7594 6138.

Alumni Relations team



Professional rejuvenation

Even a seasoned professional needs to keep up to date with the latest developments and advances in the workplace, and for professionals working in science, technology, healthcare and management, Imperial's Centre for Professional Development could be just the job. What's more, as an Imperial alumnus, you can benefit from a 10 per cent discount on the cost of all courses offered.

The centre delivers a diverse range of intensive short courses for

professionals, given by leading authorities from both within and outside the College. Formerly known as the Centre for Continuing Education, it was established in 1987 to provide a focus for the College in addressing the educational needs of professionals in the most recent research. Since then the centre has expanded and, alongside professional courses in science, engineering and medicine, today it also offers professional training in marketing, financial administration and management.

Most courses last from three to five days, although some continue for a number of weeks and others are provided on a modular basis, over several months. The majority are delivered at the South Kensington Campus. Every year over 50 courses are presented, and the portfolio regularly evolves to ensure that it keeps pace with the latest and most innovative industry developments.

Currently courses are offered across a broad range of disciplines including

subjects as diverse as fuel cells, climate change, medical ethics and mining for bankers. Upon completion, participants are awarded a Certificate of Attendance and, for some of the courses, participation is also recognised by the Institution of Mechanical Engineers, Institution of Civil Engineers, British Computer Society and the Continuing Medical Education Scheme run by the Royal College of Physicians.

For a full list of courses and details about how to register, visit www.imperial.ac.uk/cpd. You will need to quote your alumni membership number to claim your 10 per cent alumni discount. If you do not know this, you can find it on the data carrier that was posted with this magazine or, if you no longer have the carrier, please contact the Alumni Relations team on +44 (0)20 7594 6138 or at alumni@imperial.ac.uk, giving your full name, date of birth, degree details and residential postcode.



An email for life

Did you know that, as an Imperial alumnus, you are entitled to register for an Imperial College London email forwarding address? The service redirects emails sent to your forwarding address to any other email address that you specify and is one of the ways that Imperial can help you to keep in contact with your former classmates and College friends, as well as with Imperial itself.

There are many advantages to signing up for an Imperial email forwarding address, not least because it makes you instantly identifiable as an Imperial graduate to potential employers, colleagues and other business contacts. In addition, the fact that it is a forwarding address means that you have one less email account to check and maintain.

A forwarding address also enables continuity of email contact, meaning that, particularly if you are a recent graduate, you can publish the email forwarding address on research papers, business cards and *curricula vitae* in the knowledge that the address will not change, even if, at some point in the future, your job or personal email provider does. As long as you remember to link the forwarding address to your new email address, you will continue to receive messages as normal.

Signing up for a forwarding address also makes it easier for the College to remain in touch with you and vice versa. Not only that, but, because the forwarding address takes on a common format (**firstname.lastname<start year>@imperial.ac.uk**), the system also enables you to predict the forwarding addresses of your former classmates and Imperial friends.

It couldn't be easier to enable your Imperial email forwarding address. Simply log into your Interactive Alumni Services account, navigate to the Interactive section, and click on the 'email forwarding' link in the right hand menu. Here you will be asked to specify the email address (e.g. yahoo, hotmail) you would like email messages to be

forwarded on to. You can amend the forwarding address at any time, so if you move jobs or change email provider you can continue to use your Imperial address uninterrupted. You can also disable the service here too.

If you haven't yet registered for your Interactive Alumni Services account, you can do so by visiting the Registration page on the alumni website:

www.imperial.ac.uk/alumni/register. Here you will be asked for a few details which will enable our database to recognise you as an alumnus,

including your alumni membership number which can be found on the data carrier that was posted to you with this issue of *Imperial Matters*. If you no longer have the carrier, please contact the Alumni Relations team on +44 (0)20 7594 6138 or at **alumni@imperial.ac.uk**, giving your full name, date of birth, degree details and residential postcode.

From 2006, students enrolling at the College have been given an email address in the same format that is used by the email forwarding service, which means they can keep the same contact email when they leave Imperial, when the address will turn into a forwarding address after six months. However, with over 7,500 recent and not so recent alumni already using the email forwarding service, we hope that alumni from all eras will continue to sign up for their forwarding addresses and that the number of forwarding addresses in use



Sporting chance

If it is a while since you bid farewell to your student days at Imperial, you may be unaware of the College's recently refurbished sports centre, *Ethos*, which opened its doors in January 2006 and boasts a number of state-of-the-art facilities, including an exercise studio, 25 metre pool and 75-station gym.

Membership of *Ethos* is available to individuals external to the College. So if you live or work in the South Kensington area, *Ethos* could be just the ticket for keeping fit and healthy.

The types of private memberships on offer are off-peak, weekend and summer, meaning that private members can make use of facilities within the centre at times when fewer students and staff will be using them. As an alumnus of the College, there are also significant discounts available to you if you take out off-peak or weekend memberships: £500 per annum rather than £600 and £350 per annum rather than £450 respectively. Life memberships, which offer unlimited use of all of the centre's facilities, can also be purchased.

Other facilities at *Ethos* include a sauna and steam room, badminton and squash courts, massage capsules and comprehensive sports injury treatment services. The centre also boasts a 9 metre climbing wall, complete with overhangs and a small chimney section. For avid climbers, the centre also offers a climbing only membership.

You can find more about *Ethos* and the memberships available to alumni at **www.imperial.ac.uk/ethos**, or by emailing **ethos@imperial.ac.uk**, or calling +44 (0)20 7594 6660.



Welcome to our new alumni

Imperial College London's Commemoration Day ceremonies, held in the Royal Albert Hall in October 2008, saw the graduation of over 2,100 undergraduate students, making these the largest graduation ceremonies that Imperial has ever held. More than 1,100 graduated with an Imperial College London degree, becoming the first

undergraduates to do so since the College became an independent university in July 2007.

Congratulating the graduands, Imperial's Rector Sir Roy Anderson (pictured above right) urged them to use their skills and knowledge to address the world's most pressing challenges, most notably climate change and international financial stability. "The world that you have inherited will present your generation with major challenges. You in this hall today are the members of that generation who are well-placed to confront and overcome them," he said.

Sir Roy also outlined the major issues facing the College, including the challenge of identifying the best applicants amidst an increasing number with top grades and whether to develop Imperial's 'footprints' overseas.

This year's Outstanding Achievement Award was presented to fourth year medical student Sukhpreet Dubb for his commitment to widening access to Imperial and its medical school.



Engineering a network



Sixty companies and 1,500 students took part in a successful engineering careers fair on 23 October 2008, which was followed by a networking reception for

engineering alumni and students.

Alumni heard from the new Principal of the Faculty of Engineering, Professor Stephen Richardson (pictured above), for the first time since he had taken up the post the previous month. Professor Richardson, who is also an alumnus of Imperial's Department of Chemical Engineering and Chemical Technology, gave a brief address about recent changes in the Faculty, which was followed by an evening of networking.

Over 100 students joined the reception to learn from alumni about their career experiences and to make valuable networks, while it gave alumni the opportunity to connect with the current student body. Feedback from both students and alumni was very positive, and included some great ideas for making the event even better next year!

The event was hosted by the Engineering Chapter, and generously supported by npower and the City and Guilds College Association.



Mixing chemicals 40 years on



September 2008 marked 40 years since the Chemical Engineering class of 1971 began their undergraduate degrees at Imperial in 1968.

The group met in the Department of Chemical Engineering and Chemical Technology, which provided a perfect venue for them to reacquaint themselves with their fellow classmates, acknowledge long-standing friendships and enjoy being together once again on old turf. For many returning, this reunion marked their first visit back to the College since graduating.

Of the 65 students who began the course, 53 were located. Terry Knott, who, along with colleagues Martin Braithwaite, Martin Davies, Rob Holton, Roger Wiltshire and Tony Wragg (all Chemical Engineering 1971), organised the event, said: "We could not have achieved this success rate without the aid of technology. Being able to search the internet and

follow up with email was unheard of when we began at the College."

Thirty-six of the classmates and their partners from as far afield as New Zealand, Australia, South Africa, the USA and France returned to the College in September, and were joined by several of their lecturers.

Following an afternoon in the Department of Chemical Engineering and Chemical Technology and a champagne reception, the group adjourned to the Polish Club on Exhibition Road for a lengthy and enjoyable dinner. Discussions turned to careers and while many of the group still practise as chemical engineers, it was discovered the spread of careers across the class of 1971 includes distinguished academics, accountants, authors, doctors, photographers, stockbrokers and even a knight of the realm!

ICSM Alumni going from strength to strength

The inaugural Imperial College School of Medicine (ICSM) Alumni AGM was held on 18 September 2008. As well as looking back at the previous academic year, the group discussed key elements of the organisation that it will take forward in 2008–09. The class of 2008 joined ICSM Alumni in record numbers; now armed with a strategy, we should see the group go from strength to strength.

Najette Ayadi O'Donnell, Vice President (Alumni and Careers) of the Imperial College School of Medicine Students' Union, would like to hear what former St Mary's, Charing Cross, Westminster and ICSM alumni are up to, and is especially keen to hear from anyone willing to write for the *ICSM Gazette*. You can contact Najette at na704@imperial.ac.uk.



Elegant RSMA annual dinner

An annual event since 1873, the Royal School of Mines Association's Annual Dinner was originally named the RSM Old Students' Dining Club.

There was a return to elegance for November's dinner with a black tie dress code for the event, which was held in the ballroom of Exhibition Road's Polish Club, *Ognisko*.

Alumni sponsorship subsidised the cost of student tickets, both from those attending as well as those that were unable to join the group. Alumni, guests and students alike enjoyed the evening, which included a very entertaining talk given by guest speaker Mark Burrige (Geology 1990), Chief Executive Officer of Cambrian Mining.



Walking in a winter wonderland



“O little town of Bethlehem, how still we see thee lie!” rang out from the South Kensington Campus on 11 December 2008 as alumni and their guests were led in song by the Imperial College Chamber Choir.

The Main Dining Hall was transformed into a winter wonderland, complete with a beautifully decorated Christmas tree, for the event.

The choir, directed by Jessica Gillingwater (Biochemistry 2007), sang a range of carols including *Once in Royal*

David’s City, Hark the Herald Angels Sing, and O Come All Ye Faithful. Over 150 alumni and their guests joined in the sing-along, while enjoying mulled wine, mince pies and other festive treats.

The Imperial College Chamber Choir is a small auditioned group of singers, who sing a broad range of repertoire from Renaissance to the Swingle Singers, and perform three concerts annually as well as participating in many smaller events such as the annual carol service.



Friends launch online lecture podcasts

Each year, the Friends of Imperial College run a packed programme of lectures and behind-the-scenes events, with the aim of enabling the public, alumni, supporters and local people to have access to the very latest developments at the College, in terms that a non-specialist can understand. In a bid to make their events more accessible to even more people, the Friends have begun to record their lectures which can be accessed from their website at www.friendsofimperial.org.uk.

In the past events section of the website, you will already find two lectures: *The eleven dimensions of the unifying theory* delivered by Professor Michael Duff, Abdus Salam Chair of Theoretical Physics, and *The eco cities of China - can they teach us a lesson?* given by Peter Head (Civil Engineering 1969), Director of Arup.

RCSA celebrates 100 years

On 9 December 2008, 100 years to the day after the Royal College of Science Association’s founding dinner, the association’s current members met at the same venue, the Criterion on Piccadilly, to mark the occasion.

“Unfortunately even with the benefit of his time machine, H.G. Wells was not able to attend on this occasion,” said committee member David Legg (Physics 1979) of the first RCSA President.

Each diner was presented with a personalised commemorative booklet prepared with the assistance of Anne Barrett from the College’s Archives, which included not only the evening’s menu but also that for the dinner exactly 100 years earlier and the papers for the inaugural meetings of the association.

The dinner also marked the inauguration of the RCSA centenary three-handled pot, which was charged by John Sanderson (Physics 1962), President of the RCSA. The pot will be presented to the Royal College of Science Union.



Current president and past president, MC Black, charge the three-handled pot

Three decades and four Rectors

Held in the Council Room at 170 Queen's Gate, the City and Guilds College Association Christmas Luncheon once again drew a capacity attendance. Professor Dame Julia Higgins, CGCA President 2008–09, extended a warm welcome to the members and guests attending, including the guest of honour Professor Stephen Richardson, Principal of the Faculty of Engineering.

The company then heard Dame Julia talk on the subject of *Three decades and four Rectors – My 32 years at Imperial College*. She gave an insight into her long and varied career at Imperial, and particularly into the way that the engineering disciplines have interacted with other parts of the College during this period.

All of this was followed by a sherry reception, a traditional Christmas lunch and mince pies. Conducted in the style and tradition for which 170 Queen's Gate is known, the lunch was conducive to festive discussion and seasonal cheer.



Outside 170 Queen's Gate



John Sanderson presents Daniel Burrows with his prize

In recognition of achievement

Many of the College's groups and associations award prizes in recognition of the academic achievements and contributions made by students here. Since July 2008, the following prizes have been awarded:

The Peter Harding Memorial Award 2008, for demonstrating sustained commitment and outstanding contribution to the Royal School of Mines and Imperial College communities, was awarded posthumously to Bill Harman. Bill, who died in August 2008, was a technician in the Department of Mining, later the Department of Mineral Resources Engineering, for over 40 years, as well as a member of the Chaps Club. The prize of £150 is to be donated to Great Ormond Street Children's Hospital.

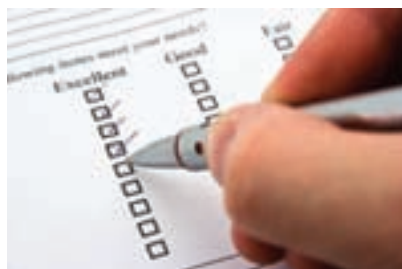
Daniel Burrows, a fourth year physics student, was presented with the Royal College of Science Prize by President John Sanderson following the Commemoration Day ceremonies.

The Charing Cross and Westminster Alumnus Society Prize in General Practice was awarded to Charlotte Burns (Medicine 2008) on the basis of her work in the field and her finals result.

➤ A calendar of events taking place in both the UK and overseas in the next six months can be found on page 37 of *Imperial Matters*.

➤ If you would like more information about joining one of Imperial's UK alumni groups, please visit www.imperial.ac.uk/alumni/groups, email alumni@imperial.ac.uk or call +44 (0)20 7594 6130.

Finding the way forward



After the Royal School of Mines Association AGM in the summer of 2008, John Sharpley (Geology 1953), RSMA President 1986–87, handed the current President, Kurt Budge (Mineral Resources Engineering 1992), a copy of his message from the annual journal of that year. Surprisingly very little has changed during the intervening 20 years; John's call for alumni to join the association and engage with it back then, is still being made today.

In the last issue of *Imperial Matters*, we brought you details of the RSMA survey that was being conducted to look at the best way for the association to serve its members, and an overwhelming 850 RSM alumni (not all members) responded.

Paul Holmes (Mineral Resource Engineering 1994), RSMA Honorary Secretary, said: "The most telling fact was that alumni commented that they didn't know the purpose of the association, despite the RSM constitution having stood the test of time.

"It's clear that the RSMA committee has fallen short in communicating with alumni how it works towards the constitution's objectives and how it stays relevant to alumni, and the undergraduates that still join the RSM and graduate with an ARSM (Associateship of the Royal School of Mines). This we intend to change with your engagement and financial support, enabling the Committee to harness the resources it needs to serve RSMA members and students, and act upon the findings of our recent survey."

Further details of the RSMA survey were included in issue nine of *Imperial Engineer*, the magazine for members of the City and Guilds College Association and the Royal School of Mines Association. For more information visit www.imperial.ac.uk/engineering/about/alumni/imperialengineer.



Promoting London science in China

An event in Beijing organised by the London Mayor's Office and London Development Agency gave an Imperial alumnus the opportunity to talk about the collaborative opportunities that the 2012 Olympic Games could offer to London and China.

The *London Science in the City Forum* took place during the second week of the 2008 Games, and Henry Wang (MSc Chemical Engineering 1977) was invited to speak on the subject of skills and talent for London's science base. The forum focused on how London's science base will contribute towards the Olympics in 2012, and how to instill greater collaboration between the UK and China, including between universities that undertake research into sports science and biomedicine, and who work directly with sports professionals.

Imperial College Asia Forum 2009

Alumni and guests are invited to take part in the College's first Asia Forum, celebrating the College's strong links within the region. With a theme of *Twenty-first century city – infrastructure and sustainable urban living*, the forum will take place in Tokyo on 23 May 2009.

The forum, organised in association with the South Kensington Kai (Imperial's Alumni Association in Japan) and Tokyo University, will draw upon the breadth of experience and knowledge

of Imperial academics, including Sir Roy Anderson, distinguished alumni from the region, and representatives from Tokyo University.

The programme will include discussions around a wide range of topics, including energy, urban development, finance and health.

To receive details on how to book for this event, contact the Alumni Relations team at alumni-international@imperial.ac.uk.

iHola, alumni in Spain!

Mahesh Mahbubani (Electrical and Electronic Engineering 1995) is seeking to establish an alumni group in Spain. Other alumni in Spain wishing to become involved in developing activities can contact Mr Mahbubani through the Alumni Relations team at alumni-international@imperial.ac.uk.

Alumni get together down under

The New South Wales Alumni Association hosted a seminar and reunion on 16 November 2008. Speakers were International Ambassador and Senior Principal Sir Peter Knight and Dr Joe Herbertson (PhD Metallurgy and Materials Science 1975), Principal of Crucible Carbon, a Newcastle-based research consultancy.

Over 60 guests were treated to presentations on the ramifications of climate change and practical solutions as well as an informal talk on recent happenings at Imperial.

Elsewhere in Australia, the Imperial

College Alumni Association of Western Australia held a successful brunch hosted by Alan Dickson (Mining and Mineral Technology 1968) on 21 September 2008. This event, which marked the group's 58th social to be

held over the last 30 years, was well attended by over 15 alumni and their partners. The group welcomed two new alumni and their partners: Mark Neville (Chemistry 1983, PhD 1987) and Bryan Bowden (Geology 1998).



Events in Sydney (left and right) and Perth (centre)

Sampling the tastes of Heidelberg

The Imperial College Club of Germany's Annual General Meeting took place on 13 September 2008 in Heidelberg.

Dariusch Khanzadeh of Siemens AG opened the meeting with a topical presentation about the current economic crisis facing Europe. His presentation was followed by Niklaus Weissenstein (Mathematics 2004) from Accenture who spoke about IT frameworks which will ensure future competitiveness.

Following the conclusion of the meeting, guests visited Weingut Clauer to participate in the local *Weinfest*. Mr Clauer took the group on a tour of his vineyards and cellars where he emphasised the need to

innovate with bio-wines to keep ahead of the market. The following day the group was taken on a guided walk through the Heidelberger Schloss providing a perfect end to a successful event.



At Weingut Clauer

Committee changes



There have been various committee member changes within the international alumni associations over the past few months.

Fabien Schmitt (Mechanical Engineering 2000) was elected as new president of the Imperial College Alumni Association of Northern California. Mary Goodman (Aeronautics 1960) and Scott Lieberman (Aeronautics 2001) were also elected to the committee.

In Singapore, Tan Hang Cheong (Computing and Control 1978), Lee Yew Wei (Electrical and Electronic Engineering 2005) and Yap Tiong Peng (MSc Bioengineering 2003) joined the alumni association's executive committee, while several alumni stepped down. The association would like to express its appreciation to Oh Lock Soon (MSc Civil Engineering 1993), Dennis Ling (Business School 2003) and Han Neng Hsiu (Electrical and Electronic Engineering 2003) for their excellent services to the association. Thanks also go to Professor Wong Limsoon (Computing 1998) and Timothy Toh (Mechanical Engineering 1994, MSc 1995) for their contribution as Honorary Auditors.

Elsewhere, Lars Steinke (Physics 1996) has become the new Secretary of the Imperial College Club of Germany, and Professor Paul Cheung (Electrical Engineering 1973, PhD 1976) has stepped down as Chairman from the Hong Kong group.



Dinner in honour of Professor Mary Ritter

Singapore events

With numerous events taking place over the past months, members of the Imperial College Alumni Association of Singapore have been spoiled for choice. After a breakfast event with visiting alumnus Syamal Gupta (DIC Mechanical Engineering 1965), Chairman of Tata International in India, the Association also hosted a dinner for Professor Mary Ritter, Pro Rector for Postgraduate and International Affairs, at the Pines Chinese Restaurant on 1 September 2008.

The following day, four Imperial alumni were on hand at the Imperial College London Graduate Schools Transferable Skills programme at

Nanyang Technological University, where they shared career insights with students. Later in the month, alumnus Ku Swee Yong (Chemistry 1994) hosted an MBA talk on the state of the residential market in Singapore.

The annual reunion of the Association was held on 5 October 2008, organised by Toh Poh Joo (Mechanical Engineering 2000). Around 50 alumni and partners attended this, the second such get together.

For more information on the Imperial College Alumni Association of Singapore, contact the Alumni Relations team at alumni-internation@imperial.ac.uk.

Imperial alumnus develops potential cancer breakthrough

Alumnus Dr Emmanuel Skordalakes (PhD National Heart and Lung Institute 1998) has been involved in a major medical breakthrough that may provide a vital step towards blocking a chemical that causes the growth of many cancers.

Dr Skordalakes of Philadelphia's Wistar Institute heads the team that has unpicked the structure of telomerase, an enzyme which is at work in more than nine out of ten types of tumour. He commented to BBC news that "a drug that deactivates telomerase would likely work against all cancers, with few side effects".

The Wistar Institute, the US's first independent medical research facility, was founded in 1892 and is named after Caspar Wistar, a prominent eighteenth century Philadelphia physician.



Fair opportunities in Taiwan

Dr Piers Baker and Jennifer Martin from the Imperial International Office represented the College at the British Council Education Fair held in Taiwan on 1-2 November 2008. During their time in Taiwan, a small dinner gathering was held where the visitors exchanged views and news with some of the College's Taiwanese alumni.



CASE Circle of Excellence Award

Emma Jones of the Office of Alumni and Development accepts the Circle of Excellence 2008 Silver Award from the Council for Advancement and Support of Education (CASE), for Imperial College's International Ambassador Scheme.



North American Exiles enjoying Lake Placid

North American Exiles weekend a roaring success

The 34th annual Imperial College Exiles North America East reunion was held, with great success, at the Crown Plaza Lake Placid resort in upstate New York, over the weekend of 27-28 September 2008. Organised by Michael Barron (Mechanical Engineering 1962), the weekend was attended by around 40 members and partners, and included an enjoyable combination of golfing, hiking, dinner and drinks. The autumn colour on display at Lake Placid was described as 'utterly awesome!'

North American alumni based in the east of the US or Canada should visit www.mccannscience.com/icenae.htm for more details about the 2009 event.

Event Calendar

March 2009 – July 2009

Head of the River alumni reception

Watch the eights' Head of the River race with coaches and old crewmates

Saturday 21 March; Imperial College Boathouse, London, UK

www.imperialboatclub.co.uk; +44 (0)20 8788 3563

Cheese and wine tasting evening

Join fellow alumni at Whole Foods Market

Wednesday 25 March; High Street Kensington, London, UK

www.imperial.ac.uk/alumni/cheeseandwine;

+44 (0)20 7594 6130

Ambassador event in South Africa

Professor Dot Griffiths and Ebrahim Mohamed

Monday 30 March; Johannesburg, South Africa

www.imperial.ac.uk/alumni/events; +44 (0)20 7594 6131

Geotechnical lecture series

Organised by the Imperial College Alumni Association of Greece

Wednesday 1 April, Monday 4 May and Tuesday 5 May; Athens and Thessaloniki, Greece

pangaea@otenet.gr

Brewery tour for Singaporean alumni

Visit the Tiger Brewery with fellow alumni

Thursday 9 April; Asia Pacific Breweries, Singapore

www.icaas.org

GOLD alumni drinks

Social gathering for graduates of the last decade

Thursday 23 April; Motion Bar, Victoria Embankment, London, UK

www.imperial.ac.uk/alumni/GOLDdrinks;

+44 (0)20 7594 6130

The first tune – the evolution of music

A Friends of Imperial College lecture by Dr Armand Marie Leroi

Thursday 30 April; South Kensington Campus, London, UK

www.friendsofimperial.org.uk;

+44 (0)20 8440 0999

Quiz night

Pit your general knowledge against other alumni

Tuesday 12 May; South Kensington Campus, London, UK

www.imperial.ac.uk/alumni/quiz; +44 (0)20 7594 6130

Professor Lord Robert Winston

A Friends of Imperial College lecture

Wednesday 13 May; South Kensington Campus, London, UK

www.friendsofimperial.org.uk;

+44 (0)20 8440 0999

City and Guilds College Association AGM and President's Evening

For members of the CGCA

Wednesday 20 May; South Kensington Campus, London, UK

www.cgca.org.uk; +44 (0)20 7594 1184

Asia Forum 2009

Our first Asia Forum celebrating the College's strong links within the region

Saturday 23 May; Tokyo, Japan

www.imperial.ac.uk/alumni/asiaforum;

+44 (0)20 7594 6131

Behind-the-scenes at the Porter Institute

Visit the Porter Institute developing plant based liquid fuels

Tuesday 9 June; 58 Princes Gate, London, UK

www.friendsofimperial.org.uk;

+44 (0)20 8440 0999

Summer Ball 2009

Great acts and DJs, dinner, fireworks, funfair and more

Saturday 20 June; South Kensington Campus, London, UK

www.imperialcollegeunion.org.uk

Pre Henley Royal Regatta reception

Meet Imperial's rowers, old friends and wish the crews good luck for Sunday's racing

Saturday 4 July; Henley-on-Thames, Oxfordshire, UK

www.imperialboatclub.co.uk; +44 (0)20 8788 3563

International Conference on Boundary Element Techniques

Co-sponsored by the Imperial College Alumni Association of Greece

Wednesday 22 to Friday 24 July; Athens, Greece

pangaea@otenet.gr

> Save the date!

The next Alumni Reunion will take place on Saturday 26 September 2009.

Visit www.imperial.ac.uk/alumni/reunion2009 for more information.

> For a full events listing, visit www.imperial.ac.uk/alumni/events

catch up

1950s

John Norman

Physics 1953

I have been fortunate to enjoy a career in both science and the arts; I used my acoustics knowledge (thank you Dr Stephens!) in the making of church organs, and I eventually became managing director of an organ company which had the royal appointment. After falling out with my chairman, I then joined IBM where I learned all about computers and computer networks. I later started up, designed and ran a customer magazine for IBM for four years, but at the same time moved back into the church music world. I am now chairman of the British Institute of Organ Studies, which owns an online database detailing almost every pipe organ in the UK. My professional work as a consultant has included organs in the chapel of the Houses of Parliament and the new organ in Worcester Cathedral.

1970s

Timothy Bradbury

Chemical Engineering 1974

I joined the BP refinery at Grangemouth on graduation, and then moved 'upstream' to BP in Aberdeen, working onshore and offshore in production engineering. I went to Jakarta as petroleum engineering manager, later joining southern North Sea gas operations near Hull, before two years in Papua New Guinea commissioning a new gas field, then to Abu Dhabi for three years, and on to Alaska as operations manager for Prudhoe Bay, back to Aberdeen as Forties field manager, then to South Carolina looking after a PTA plant. Now that BP Chemicals has been bought by INEOS, I'm looking after supply chain for the polyolefins business, based in Lyndhurst, Hampshire. My family is still in Aberdeen, so I commute most weeks, but I'm always on the move throughout Europe visiting our eight manufacturing plants.

Julian Cooch

Physics 1979

I've worked in the nuclear industry all my life and across most of the nuclear fuel cycle. I am currently managing projects associated with nuclear fuel supply.

John Monk

Biology 1974

Judy and I have two children; James is a research physicist working on the Large Hadron Collider at CERN, based at UCL. Gemma is a physiotherapist, married, lives in Derby and is about to make us grandparents. I worked for 33 years in trading standards and environmental health, and I am now semi-retired. I enjoy travel, sports of many descriptions and photography. We still live in Enfield.

1980s

Kojo Montford

MSc Biology 1985

I have retired from active service and now live in Medie village, near Nsawam in Ghana, with my wife Lucy. I would be pleased to hear from all my classmates.

Peter Thomas

Mathematics 1987, MSc 1988

For the last 12 years I have been working for Chubb Insurance, a US-based, but multinational insurance company. I work in IT and currently I am responsible for management information across Chubb's Asia Pacific, Canadian, European and Latin American regions. More career information can be viewed at www.linkedin.com/in/peterjamesthomas if anyone is interested. In my spare time I enjoy rock climbing and mountain biking.

1990s

Roongrueng Bhidayasiri

PhD Mechanical Engineering 1998

Due to political tension in Thailand and a decade of public service, I have decided to quit politics and I am now enjoying a new role in a financial advisory business

Spotlight on Anne-Marie Warris

Anne-Marie Warris (PhD Chemical Engineering 1982) has been appointed as the Chairman of the International Standards Organisation's Technical Committee 207, Subcommittee 1 (ISO/TC 207/SC1).

ISO/TC 207 is the umbrella committee under which the ISO 14000

series of environmental management standards are being developed; subcommittee 1 is specifically responsible for producing standards and guidance documents related to environmental management systems. Anne-Marie had previously been UK principal delegate to the sub-committee since November 2000.

Anne-Marie joined Lloyd's Register Group in 1989 and is one of their leading environmental and climate change experts. She was board member of the International Emission Trading Association from 2000-04, and is currently Vice Chair of the UK Emission Trading Group. She is also involved in the International Accreditation Forum as secretary to the committee which has developed the accreditation guidance for ISO14065 and the European Union Emission Trading Scheme.



as a Chief Executive Officer of NewAsset Advisory Co Ltd. This company focuses on risk management, tools and economic value strategies for business. Apart from this, I spend a lot of my free time furnishing my estate with house, office and gardens.

Werner Freystaetter

Civil and Environmental Engineering 1998
In April 2008, I became the team leader of the research and development team maintaining BasWare eInvoices’ electronic invoicing hub in Espoo, Finland. In 2007 this service delivered eight million electronic invoices to more than 1,400 receiving companies saving a sizeable forest from the paper mill. You can also find me on *LinkedIn* for further networking.

Dimitrios Glitsos

MSc Biological and Medical Systems 1993
Twenty years on and I am still in London, running the rat race in the square mile.

Anton Gorostiaga

Aeronautics 1993
I have worked in Spain, the US, and Belgium. Currently, I’m an engineer at ITP, which is an aero engine manufacturer in Bilbao, Spain, although I have brief spells in Derby. I married in 2003, and we have one son who was born in October 2006.

Ivan Irlam

Biology 1990
Bridget, also of the class of 1990, and I are happily married, with one child, Jordon, now 10. Currently I’m a full time parent, but I’ll be starting my photography business soon.

Andrew Jenkins

Physics 1991, PhD 1994
I post-doctorated at Imperial, the University of Chicago and Cornell University before becoming an assistant professor at Emory University in Atlanta. My first Ro1 got funded in 2006; my research laboratory is interested in the molecular mechanisms of anaesthesia and synaptic inhibition. I’m married to Meag — no kids yet, but we do have two dogs called Fenway and Twickers.

Mavji Patel

Biology 1994, PhD 1997
I started as a science teacher in a high school in 2001; I’m still at the same school.

Alisdair Philp

Biology 1997, PhD 2001
Alisdair recently joined Des Moines University as an Assistant Professor in the Department of Biochemistry and Nutrition, having previously been with Howard Hughes Medical Institute.

Thorsten Pohl

Aeronautics 1997
Since 1998, I’ve been working for Opel, General Motors Europe Engineering, assembling FE models for various simulations, e.g. crash, fatigue, etc. We’re based in Rüsselsheim which is between Frankfurt and Mainz in Germany. My wife Petra and I have two children, Hendrik, born in 2003, and Hannah, born in 2005.

Warren Sherliker

Electrical and Electronic Engineering 1996, PhD 1999
I’ve recently moved up to Harrogate which is going great, as I’m out in the countryside most weekends, with the Peak District or the Yorkshire Dales to choose from. If anyone is up this way feel free to get in contact, it’s an ideal place for a short break from London!

Naem Siddiqi

Civil Engineering 1990
I am a global product manager for credit scoring at SAS Institute, where I have been for eight years. I wrote a book on credit risk scorecards about two years ago, and I travel to Asia and Europe almost monthly, meeting old classmates on occasion.

2000S

Johan Lampinen

Physics 2002, MSc 2003
Since the summer of 2008, I have been working for ABB in Sweden as a manager for the DC motors technical department. The job includes current orders, research and development and after sales matters; a true global environment with customers all over the world. Applications include ski lifts, steel mills, sugar centrifuges, >



Spotlight on Stephen Spinelli

PhD Business School 1994
On 5 October 2008, Stephen Spinelli was officially installed as Philadelphia University’s 11th President.

Stephen Spinelli’s academic regalia (shown above) was designed by two Philadelphia University students and features the colours of the University’s six schools in its piping, as well as the colours of the academic institutions that he attended; McDaniel College in Maryland where he obtained his BA, Babson College in Massachusetts awarded his MBA, and Imperial College London where he received his PhD.

Speaking at the first graduation ceremony he presided over as President, he said: “This regalia is a representation of the academic graduations I have experienced in my life. It details where I have been, and will remain a special part of every Commencement [graduation] ceremony over which I will preside.”

Spotlight on Jocelyn Siddle Brown

The Kauffman Fellows Programme selects and develops next generation global leaders in the venture capital industry. In 2008, Jocelyn Siddle Brown



(Business School 2005) was the only member of the global programme to be selected for a placement in the UK.

Jocelyn has joined Finance Wales plc, a provider of commercial funding to businesses in Wales, as part of the California-based fellowship programme. She will focus on early stage investment during her two year secondment based at Finance Wales' Cardiff headquarters.

"The excellent training I received through the Venture Capital and Entrepreneurship MBA electives [...] was vital in demonstrating the skills and enthusiasm required by the Kauffman Programme," said Jocelyn.

She has previously worked at Imperial Innovations, the technology transfer arm of Imperial College London.

and also the motor for the aerial cableway to the Christ the Redeemer statue atop Corcovado Mountain in Rio de Janeiro.

Laura Nixon-Corfield

Chemistry 2007

In September 2008, I started a new job as a Pancreatic Medical Technical Officer at St Mary's Hospital in Manchester.

Terry Pollard

Business School 2003

I have now left Oxford Catalysts to return to Isis Innovation in Oxford, where I am working to help commercialise new technologies from across the UK. I am also involved in advising on technology commercialisation to companies and research institutions in all parts of the world.

Francisco Rodriguez Sanchez

PhD Mechanical Engineering 2007

Since my PhD, I have been working in low-cost technologies for developing countries. This work has taken me to West Africa to design, produce and test technologies that have the opportunity to increase the income of the world's poorest. This endeavour is not charity, it's business. Almost half of the world's population, more than 2.8 billion people, live off less than \$2 a day (according to World Bank). However, these people are

the most eager and value conscious consumers and represent a tremendous neglected market for new products and business opportunities.

Scott Silverthorn

Earth Science and Engineering 2002
Oh I keep moving... I am now living back in Dorset, still working for the same people though!

Samuel Wolfenden

Aeronautics 2005
I recently moved into a flat in Perivale, West London. I'm still working for Pepsico, out in Reading, currently as Pricing Manager for the Walkers Crisps brand. It would be great to catch up with any old classmates I'm not already in touch with.

➤ Make sure you keep us updated with your life post Imperial; we would love to hear from you. Visit www.imperial.ac.uk/alumni/catchup to view updates from other alumni or to submit your own update. Alternatively you can write to us at *Imperial Matters*, Imperial College London, Level 2 Faculty Building, South Kensington Campus, London SW7 2AZ.

Awards and Honours

The New Years Honours list recognises outstanding achievement and service across the whole UK community. In the 2009 honours, 10 Imperial College alumni were recognised:

Dr Maggie Aderin-Pocock (Physics 1990, PhD Mechanical Engineering 1993), Managing Director of Science Innovation Ltd, was awarded an MBE for services to science.

George Band (DIC Geology 1958) received an OBE for services to mountaineering and charity.

Professor Leslie Ebdon (Chemistry 1968, PhD 1971), Vice-Chancellor at the University of Bedfordshire, was honoured with a CBE for services to local and national higher education.

Barry Haseltine (Civil Engineering 1954, DIC 1955) was appointed an MBE for services to the construction industry.

Colonel Timothy Hodgetts (Charing Cross Hospital Medical School 1987) was appointed a CBE in the New Years Honours for service personnel and defence civilians.

Terry Kivlin (Civil Engineering 1970) was honoured with an MBE for services to skills and the community in King's Lynn.

Dr Nigel Lightfoot (St Mary's Hospital Medical School 1968), Chief Advisor to the Health Protection Agency, received a CBE for services to public health.

David Moorhouse (Civil Engineering 1967), Chair of Lloyds Register, was awarded a CBE for services to the maritime industry.

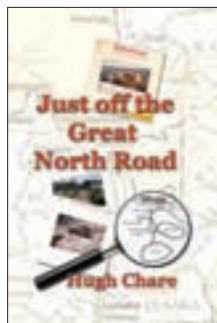
Dr Edward Palfrey (St Mary's Hospital Medical School 1976), Medical Director at Frimley Park Hospital NHS Foundation Trust, was recognised with an OBE for services to healthcare.

Professor Richard Williams (Mineral Resources Engineering 1982, PhD 1985), Pro-Vice Chancellor at the University of Leeds, was honoured with an OBE for services to science and engineering.



books

Just off the Great North Road



Hugh Chare
(Mining and Mineral Technology 1970)
The Great North Road starts at Victoria Falls on the border of Zambia and Zimbabwe and runs generally north east

through Zambia to Lusaka and on to the Tanzania border at Tunduma. It is one of the major arteries of commerce for Zambia and of Central Africa.

In *Just off the Great North Road* it is 1972 and James and Katrina Martin take an overseas leave from their jobs in the Zambian Copperbelt town of Kitwe and return to be given the opportunity to work on a start up copper mining operation in Zambia just off the Great North Road.

The job is complicated by border closures, freedom fighter encounters and shortages of everything from parts to basic food. James and Katrina overcome these difficulties and build on the relationship they started in the first book of this series, *Chaya four one!*

Trafford; ISBN 978-1425168155



The Last Taboo: Opening the Door on the Global Sanitation Crisis

Maggie Black and Ben Fawcett
(MSc Civil Engineering 1981)

Except in schoolboy jokes, the subject of human waste is rarely aired. We talk about 'water-related' disease when most are sanitation-related – in short we don't mention the shit.

A century and a half ago, a long, hot summer reduced the Thames flowing past the Houses of Parliament to a 'Great Stink', thereby inducing MPs to legislate sanitary reform. Today, another sanitary reformation is needed, one that manages to spread cheaper and simpler systems to people everywhere; 2.6 billion people currently lack toilets of any kind.

In the byways of the developing world, much is quietly happening on the excretory frontier. In 2008, the International Year of Sanitation, the authors brought this awkward subject to a wider audience than the world of international filth usually commands. They seek the elimination of the *Great Distaste* so that people without political clout or economic muscle can claim their right to a dignified and hygienic place to go.

Earthscan; ISBN 978-1844075430



more books by alumni >

> Recently published Imperial College alumni and their books are also listed on the alumni website at www.imperial.ac.uk/alumni/books.

Onions and other Vegetable Alliums by Jim Brewster

This fully revised, expanded and updated edition of *Onions and other Vegetable Alliums* relates the production and utilisation of these familiar and important vegetable crops to the many aspects of plant science underpinning their production and storage technologies. Jim Brewster (Wye College 1966) gives an insight into how these methods are being applied in the breeding of improved crops.

CABI; ISBN 978-1845933999

New Clinical Genetics

by **Andrew Read** and **Dian Donnai**
New Clinical Genetics provides the reader with a concise summary of post-genomic human genetics and guidance as to how our current understanding can be utilised in clinical practice.

Andrew Read and Dian Donnai (St Mary's Hospital Medical School 1968) have linked genetics and clinical practice throughout using realistic case scenarios which are discussed throughout the book.

Scion; ISBN 978-1904842316





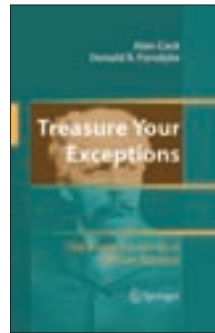
The Box of Whistles: Organ Case Design – its History and Recent Development

John Norman (Physics 1953)

In the last 40 years, the revival of interest in organ case design has almost equalled the glorious flourishing of the art in the late 17th century, yet, so far, little has been documented. This recent development in which the battle between modernism and tradition remains quite unresolved is fully assessed in John Norman's comprehensive historical survey.

Published in 1921, Andrew Freeman's *English Organ Cases* is the standard work on organ case design; John Norman brings the discussion up to date with *The Box of Whistles*. The book focuses on British organs, tracing the development of organ case design from the Gothic and Renaissance periods right through to the present day.

Lavishly illustrated, the volume features 250 photographs and line drawings. Azure; ISBN 978-1902694313



Treasure Your Exceptions: The Science and Life of William Bateson

Alan Cock and **Donald Forsdyke**

(St Mary's Hospital Medical School 1961)

William Bateson brought the work of Mendel (and much more) to the attention of the English-speaking world and he commanded the biological sciences in the decades after Darwin's death in 1882. To understand these years we must first understand Bateson.

Through examination of the life of a major contributor to this revolution in biology, the authors of this volume reconcile the genocentrism of George Williams and Richard Dawkins with the hierarchical thinking of Richard Goldschmidt and Stephen Jay Gould. The anti-Darwinian arguments of Bateson are only now, a century later, gaining recognition. At last, evolutionists can present a unified front to their creationist opponents.

Springer; ISBN 978-0387756875

Highway Traffic Monitoring and Data Quality by Michael Dagleish and Neil Hoose

Make the most of traffic data collection and assessment efforts with the first book on state-of-the-art monitoring and analysis methods that are blazing new trails in traffic management. Authors Michael Dagleish and Neil Hoose (Civil Engineering 1985) give you a hands-on understanding of the latest sensors, processors, and communication links for everything from vehicle counts to urban congestion measurement.

Artech House; ISBN 978-1580537155

Encyclopaedia of Statistics in Quality and Reliability by Fabrizio Rugerri, Ron Kenett and Fred Faltin

An essential reference for statisticians, engineers, and quality professionals in industry, academia, and government, *Encyclopaedia of Statistics in Quality and Reliability* offers an essential knowledge source in an area where one is sorely needed. Ron Kenett (Mathematics 1974) and co authors provide a practical orientation with a large selection of case studies.

WileyBlackwell; ISBN 978-0470018613

Modular Forms: A Classical and Computational Introduction by Lloyd Kilford

Lloyd Kilford (Mathematics 1999) presents a graduate-student-level introduction to the classical theory of modular forms and computations involving modular forms, providing a balanced overview of both the theoretical and computational sides of the subject. It includes applications of modular forms to the theory of quadratic forms, the proof of Fermat's last theorem and the approximation of π .

Imperial College Press; ISBN 978-1848162136

Checkpoint

Lisa Saffron (MSc Centre for Environmental Technology 1990)

Inspired by a tour of Israel and the Palestinian territories with the Compassionate Listening Project, *Checkpoint* is the story of ordinary people living in a conflict zone, each struggling to make sense of a situation where it's not clear who is the victim and who is the terrorist.



On 2 October 2002, the Shapiro family's comfortable life in an Israeli suburb is shattered by a tragedy that sets each member on a journey of self-discovery. Easy-going Yigal, a corporal in the Israeli Defence Force, forms an unexpected alliance with Aisha, a fiery Palestinian teenager. Yigal's unquestioning mother, Ruth, reconnects with her estranged friend, Vivi, who passionately supports the Palestinian cause. David, Yigal's father, deepens his relationship with zealous settlers in the occupied West Bank and Orli, Yigal's younger sister, makes a decision about military service.

AuthorHouse; ISBN 978-1434354921

Colourimetry: Fundamentals and Applications

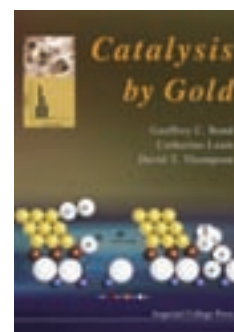
Noboru Ohta and Alan Robertson
(Physics 1962, PhD 1966)

Colourimetry, the science of quantitatively describing colour, is essential for colour reproduction technology. Using mathematical techniques, colourimetry creates standards by which to measure colour, ensuring fidelity across media and allowing accurate colour mixing.

This book is a comprehensive and thorough introduction to colourimetry, taking the reader from basic concepts through to a variety of industrial applications. Set out in clear, easy-to-follow terminology, it explains fundamental principles such as colour specification, the CIE (International Commission on Illumination) system, and colour vision and appearance models.

This is an ideal reference for practising colour engineers, colour scientists and imaging professionals working on colour systems. It is also a practical guide for senior undergraduate and graduate students who want to acquire knowledge in the field.

WileyBlackwell; ISBN 978-0470094723



Catalysis by Gold

Geoffrey Bond, Catherine Louis and David Thompson
(Chemistry 1955, PhD 1958)

Gold has traditionally been regarded as an inactive catalytic metal. However, the advent of nanoparticulate gold on high surface area oxide supports has demonstrated its high catalytic activity in many chemical reactions.

Gold is active as a heterogeneous catalyst in both gas and liquid phases, and complexes catalyse reactions homogeneously in solution. Many of the reactions being studied will lead to new application areas for catalysis by gold in pollution control, chemical processing, sensors and fuel cell technology.

This book describes the properties of gold, the methods for preparing gold catalysts and ways to characterise and use them effectively in reactions. The reaction mechanisms and reasons for the high activities are discussed and the applications for gold catalysis considered.

Imperial College Press; ISBN 978-1860946585

Macrobrachium: The Culture of Fresh Water Prawns

by **Michael New**
Freshwater prawn farming enjoys impressive growth in India and has also benefited from the recent setbacks in marine shrimp farming. In *Macrobrachium: The Culture of Fresh Water Prawns*, Michael New (Botany and Plant Technology 1954) analyses the fast pace of freshwater prawn farming and gives an insight into the prospects of making freshwater prawns a prime contributor to aquaculture in India and elsewhere.

Macmillan India; ISBN 978-0230635647

Project Reviews, Assurance and Governance

by **Graham Oakes**
Project Reviews, Assurance and Governance is about learning from your mistakes and understanding what's really going on with your projects.

In order for reviews and assurance to provide you with this information and learning, you need to perform them effectively. Built around a number of models, Graham Oakes (PhD Geology 1988) has compiled a blend of conceptual and the practical advice.

Gower Publishing; ISBN 978-0566088070

» If you would like to submit details of a book for a future issue of *Imperial Matters*, please email matters@imperial.ac.uk or write to *Imperial Matters*, Office of Alumni and Development, Imperial College London, Level 2 Faculty Building, South Kensington Campus, London SW7 2AZ. Please include a short synopsis and a cover image (preferably in high resolution jpeg format).

in memoriam

It is with regret that we announce the death of the following alumni of Imperial College 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 an *, obituaries are available online at www.imperial.ac.uk/alumni/obituaries.

1930s

- Mr K.J. Allright (Wye College 1937)
Dr Henry E. Bentley (Charing Cross Hospital Medical School 1939)
Mr Colin D. Brereton (Civil Engineering 1934)
* Mr George N. Davison (Electrical Engineering 1933)
* Professor Emyln H. Lloyd (Mathematics 1938, PhD 1942)
Mr Ivan K. Nixon (Civil Engineering 1948)
Mr Christopher P. Sames, FRCS (St Mary's Hospital Medical School 1937)
* Dr John K. Whitehead (Chemistry 1938, MSc 1940)
Mrs Esther Wightman née Lyster (Wye College 1937)
Mr Geoffrey Wood (Civil Engineering 1932)

1940s

- Mr Paul H.F. Andrew, FICE (Civil Engineering 1943, DIC 1947)
* Dr C.D. Baker, FRCP (Westminster Medical School 1941)
Dr Silvio Benaim, FRCP, FRCPsych (Westminster Medical School 1948)
* Mr Richard P. Boswell (MSc Aeronautics 1948)
Dr Reginald H. Clark (Chemical Engineering and Applied Physical Chemistry 1948, PhD 1951)
Dr Dennis H. Eastland (Chemical Engineering and Applied Physical Chemistry 1946, PhD 1949)
Mr Robert G. Everitt (Mathematics 1944)
Mr Peter J. Fenton (Electrical Engineering 1945)
Mr John H. Fleming (Civil Engineering 1943, DIC 1950)
* Mr Raymond S.M. Frohnsdorff (Chemistry 1944)
Mr John W. Holman (Civil Engineering 1943)
* Dr John G. Howells (Charing Cross Hospital Medical School 1943)
* Dr Stanley L. Kaye (Charing Cross Hospital Medical School 1942)
Mr Norman J. Keen (Chemistry 1949)
Emeritus Professor Geoffrey S.D. King (Chemistry 1944)
Dr Robert W. Lyle (St Mary's Hospital Medical School 1948)
Professor Norman F. Morris, FRCPG (St Mary's Hospital Medical School 1943)
* Professor Emeritus Ralph W. Nicholls, OC, FRSC (Physics 1945, PhD 1948)
* Commander Douglas A. Pask, OBE, VRD, FICE (Electrical Engineering 1941)
Dr David G.B. Riddick (St Mary's Hospital Medical School 1948)
Dr M. Roper (St Mary's Hospital Medical School 1946)
* Mr Alexander C.E. Sandberg (Civil Engineering 1943)
* Emeritus Professor Derek W. Saunders (Physics 1945)
Mr John Schofield (Civil Engineering 1948)
Mr Roy P. Sheppard (Mining 1945)
Dr Anthony A. Vickers, FRCR (St Mary's Hospital Medical School 1942)
* Mr Kenneth R. Welling (MSc Aeronautics 1946)
Mr Raymond E. Wigg (Mechanical Engineering 1941, DIC Aeronautics 1942)
* Mr John F. Wilson (Civil Engineering 1948)
Mr Geoffrey A. Wilton (Electrical Engineering 1944)

1950s

- Dr Graham W. Arnold (Wye College 1957)
* Mr Robert D. Bagnall (Wye College 1959)
Dr John R. Ball, FRCS (St Mary's Hospital Medical School 1958)

- * Mr Kenneth D. Barritt (Physics 1951)
Mr Bernard W. Buckroyd (Mathematics 1952)
Mr Stuart R.B. Chambers (Wye College 1956)
Mr George A. Collins (Geology 1950)
Dr Vasudeo P. Damle (PhD Botany and Plant Technology 1951)
* Mr Michael J. Day (Civil Engineering 1952)
Mr Geoffrey Fishwick (Civil Engineering 1952)
Mr Peter Flatley (Metallurgy 1952)
* Dr Duncan Gardiner (Chemistry 1958, PhD 1961)
Dr Donald Gough (PhD Chemistry 1950)
Mr Arthur Green (Physics 1958)
* Miss Margaret B. Halstead (Physics 1950)
Dr John W. Hamlett (Charing Cross Hospital Medical School 1951)
Mr Peter H. Huckin (Geology 1956)
* Dr Peter V. Hunt (Westminster Medical School 1958)
* Air Vice-Marshal Frederick C. Hurrell, CB, OBE, FRAES (St Mary's Hospital Medical School 1952)
* Professor Jacek Jarzynski (Physics 1957, PhD 1960)
Dr Tom R.M. Keeble (Westminster Medical School 1959)
Mr Martin A. Kennelly (Chemistry 1954)
Mr Albert B. Kostandi (Geology 1951)
Mr Brian R. Lawes (Physics 1953)
Dr Phillip J.W. Lee (Wye College 1958)
Dr Arnold M. Luther (Westminster Medical School 1951)
Dr Donald H. MacDonald (PhD Civil Engineering 1955)
Mr Leonard A. Massam (Physics 1953)
Dr A.A.D. Moore (St Mary's Hospital Medical School 1954)
* Mr Dennis J. Moore (Electrical Engineering 1956)
* Mr Arthur R.C. Morphy (Mechanical Engineering 1952)
Mr A.H. Mount (Wye College 1957)
Dr Bertram Owen-Smith, FRCS (Westminster Medical School 1950)
Dr Dorothy Sanderson (Westminster Medical School 1953)
Professor Bruce M. Sayers (Electrical Engineering 1957, Emeritus Professor of Centre for Cognitive Systems)
Dr Allen Shelton (Mechanical Engineering 1950, PhD 1954)
* Mr Geoffrey D. Smithers (Mechanical Engineering 1957)
Dr Michael Speight (St Mary's Hospital Medical School 1955)
Dr David Staig (Westminster Medical School 1955)
Dr John K. Stonham (Westminster Medical School 1957)
* Dr Peter B. Storey, FRCP, FRCPsych (St Mary's Hospital Medical School 1953)
Mr Robert W. Strong (Electrical Engineering 1954)
Professor Peter R. Vaughan (Civil Engineering 1956, DIC 1959, PhD 1963)
* Mr Robert J. Weeks (Electrical Engineering 1957, DIC 1958)
Dr H.L. Young (St Mary's Hospital Medical School 1952)

1960s

- * Professor Dennis Anderson, OBE (Mechanical Engineering 1960, Emeritus Professor of Energy and Environmental Studies)
Dr Alan Childs (PhD Geology 1966)
* Dr Frank Ellis (Chemistry 1969, PhD 1972)
Mr Barre W. Goldie (Mining 1961)
Dr Christopher A. Green (Physics 1966, PhD 1972)
Mr Martin E. Hutchinson (Wye College 1961)
* Dr David A. Langtry (Mining and Mineral Technology 1963, PhD 1966)

- * Mr Brian P. Last (Electrical Engineering 1960)
Dr George Murdie (PhD Zoology and Applied Entomology 1965, former Biology Lecturer)
Mr Andreas C. Papadakis (Electrical Engineering 1965)
Mr Richard A. Potts (Mining and Mineral Technology 1966)
Dr Alison M. Watson (Westminster Medical School 1969)
Mr Eric A. Willett (Chemistry 1950)
Dr Fred J. Wilson (Westminster Medical School 1962)

1970s

- Mr Peter N. Amey (Aeronautics 1976)
Dr Peter J. Beever (Electrical Engineering 1971, PhD 1974, former Electrical and Electronic Engineering Lecturer)
Mr David J. Colbert (Civil Engineering 1972)
Mr Stephen F. Colton (Wye College 1978)
Mr Paolo P.C. Ferrando (MSc Civil Engineering 1972)
Ms Caroline M. Fraser (Physics 1978)
Mr David Green (Mathematics 1973)
Mrs Patricia A. Mann née Davies (Botany and Plant Technology 1976)
Mr William D.L. McCarthy (MSc Management Science 1977)
Dr Pius A. Okelo (PhD Electrical Engineering 1970)
* Dr Jorg D. Schroppel (MSc Chemical Engineering 1972)
Mr Muhammad A. Shelly (MSc Geology 1979)
Mr Krzysztof L. Smagacz (Mechanical Engineering 1970)

1980s

- Mr Philip A.J. Townend (MSc Civil Engineering 1987)

1990s

- Mr Mark J. Catterall (Wye College 1992)
Dr Hugh J.A. Coni (St Mary's Hospital Medical School 1990)
Dr Michael A. Cousins (MSc Physics 1997)
Mr Ajitsingh Media (Civil Engineering 1992)
Dr A.P. Gabrielle Sinnadurai née Dolan (MSc Computing 1994, PhD 1998, Head of Teaching Associates, Computing)

2000s

- Dr Catherine Hasan (School of Medicine 2001)
Dr Catherine M. Mullany née Bowen (School of Medicine 2002)
Mrs Catherine E. Pointon née Turner (MSc Biological and Medical Systems 2000)
Mr Alexander J. Wright (Earth Science and Engineering 2002)

Members of Staff

- Dr Edward G. Broadbent (former Visiting Professor, Mathematics)
Professor Milija N. Pavlovic (Professor, Civil and Environmental Engineering)
Professor Carl Pearson (former Senior Lecturer, St Mary's Hospital Medical School)
* Professor Robert Stoneley (Emeritus Professor of Petroleum Geology, Earth Science and Engineering)



Fighting for survival

Some of the world's most serious diseases were profiled in *Survival*, a nine part series aired on the BBC at the end of 2008. Each episode looked at how diseases such as TB, HIV, malaria and schistosomiasis affect the poorest communities in developing countries. Imperial's Schistosomiasis Control Initiative supported the series through a grant from the Bill and Melinda Gates Foundation.

Alumni in the UK can watch the programmes online at www.survival.tv.

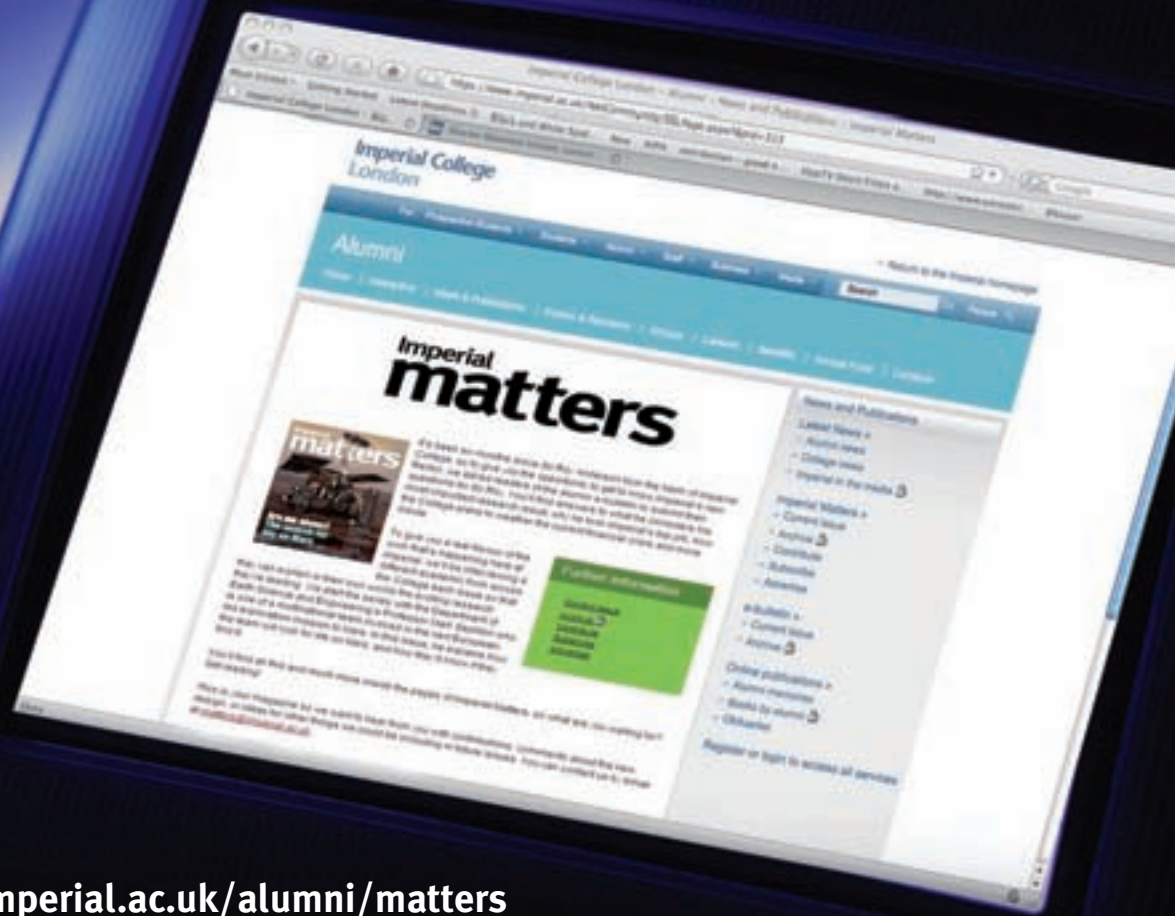
NATHAN HARRISON

Imperial College London

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