KING'S College LONDON

report

NUMBER 16 2008

COVER:
Welcoming the dragon: King's links with China.
PHOTOGRAPH:
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King's College London is one of the top 25 universities in the world (*Times Higher* 2008) and the fourth oldest in England. A research-led university based in the heart of London, King's has 19,700 students (of whom more than 6,600 are graduate students) and some 5,400 employees.

King's has an outstanding reputation for world-class teaching and cutting-edge research. The College is in the top group of UK universities for research earnings, and is a member of the Russell Group of the UK's leading universities.

King's has a particularly distinguished reputation in the humanities, law, social sciences, the health sciences, natural sciences and engineering, and has played a major role in many of the advances that have shaped modern life, such as the discovery of the structure of DNA. It is the largest centre for the education of healthcare professionals in Europe and is home to six Medical Research Council centres.

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The King's College London *Report* reviews the College's work each year by featuring a sample of the research and teaching currently taking place in the College. It is the Principal's report to the College Council. This edition of the *Report* covers the academic year 2007-8.

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Building on success

The Principal, Professor Rick Trainor, reflects on King's achievements in 2007–8.

The academic year 2007-8 marks the tenth anniversary of the two major mergers that helped to create the modern King's College London. In 1997 the Institute of Psychiatry joined the College and in 1998 the United Medical and Dental Schools of Guy's and St Thomas' Hospitals became part of King's. Out of these mergers came major reconfigurations of King's estate (from Kensington and Chelsea to Guy's and Waterloo) and greatly enhanced opportunities for King's to further raise its international standing both in its traditional areas of excellence and in the fields of medicine, dentistry and the life and health sciences.

The extent to which the College has been able to build upon the benefits of these developments is reflected in its rapid rise in the prestigious *Times Higher*-QS World University Rankings: from 96th in the world in 2004, to 73rd in 2005, 46th in 2006, 24th in 2007, and now up to 22nd in the world and fifth in the UK in the 2008 rankings, published in October. These rankings are particularly significant because they show how highly the College is rated by thousands of academics and graduate employers around the world, a factor that also led to King's being short-listed for the *Times Higher* 'University of the Year' in 2008. Another 'first' this year was our position as the most successful university in England for PhD completion rates for UK and EU students.

Success in fundraising has also followed the strength gained through these mergers: over the last year the capital fundraising for the Cicely Saunders Institute of Palliative Care has been completed and construction is now underway. Meanwhile, in the field of neuroscience, we have achieved 90 per cent of the capital required to build the cutting-edge Maurice Wohl Clinical Neuroscience Research Institute. Our gratitude to all those who supported the College in 2007-8 is acknowledged on pages 74 and 75.

Left: Professor Trainor welcomed the Prime Minister to King's twice in 2008. **Above right:** The Chairman, Lord Douro, conferred the first-ever degree of King's College London on anti-apartheid campaigner Helen Suzman DBE OM in February. **Below:** The Principal and Chairman with Kofi Annan, who gave the Commemoration Oration in May.

Academic Health Sciences Centre

Another measure of King's rising status is our key role in discussions aimed at forming an academic health sciences centre, a structure which brings together a leading university institution with its partner NHS trusts to form a nucleus for world-leading research, teaching and clinical services. Our announcement in April of our intention (subject to negotiations and necessary approvals) to form an Academic Health Sciences Centre with the Guy's and St Thomas', King's College Hospital and South London and Maudsley NHS Foundation Trusts, aims to ensure that patients will benefit from breakthroughs in medical science and receive leading-edge treatments at the earliest possible opportunity.

Also marking King's increasing standing was our first use this year of the powers granted by the Privy Council to award the College's own degrees, rather than those of the University of London (of which, none the less, King's remains an active member). In July it was one of my more unusual duties as Principal to host a full-scale fashion show at the Strand for the exciting new King's academic dress designed by Dame Vivienne Westwood, and the sight of students in these bright colours at this year's degree ceremonies symbolised our optimism and confidence about King's future.

Visitors

The number and variety of important visitors to King's this year again reflect our prestige as a

world-leading university institution in the heart of London. We have twice welcomed the Prime Minister to the College, and it was at King's that Gordon Brown chose to make his important announcement about the future of the NHS in January. In September 2007 our most famous alumnus, Archbishop Desmond Tutu, gave extra significance to the College's awards ceremony by receiving the first ever award for alumnus of the year. In May 2008 the former Secretary General of the United Nations Kofi Annan gave the College's Commemoration Oration and received an honorary degree. Other recent visitors to King's events have included members of the Cabinet and Shadow Cabinet; several ambassadors; the Senior Lord of Appeal, Lord Bingham of Cornhill (also a commemoration orator); the Government's Chief Scientific Advisor; the First Sea Lord and Chief of the Naval Staff; the Head of the Diplomatic Service, and writers AS Byatt, Ian McEwan and John Irving.

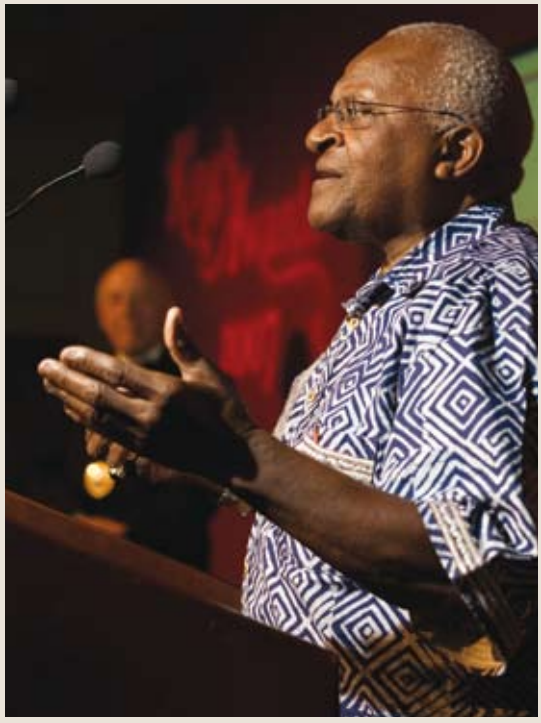
In February 2008 we were delighted that Lord Douro, who became Chairman of the College Council in October 2007, was able to confer the first King's College London honorary doctorate – and indeed the first-ever degree of King's College London – upon Helen Suzman DBE OM in South Africa. Among those whom it was my pleasure to welcome to the College as recipients of honorary degrees and fellowships in 2007-8 were Professor Colin Blakemore FRS, HRH The Duchess of Cornwall, Professor Deborah Greenspan, Dame Nancy Rothwell FRS, Viscount Runciman of Doxford (Garry Runciman FBA) and Dr Mark Walport FMedSci.

Universities UK

An extra dimension for me this year has been my role as President of Universities UK, the organisation that represents the heads of all UK universities, which has involved me in representing UK universities internationally, alongside my principal-ship of King's. In January I joined a delegation, led by the Prime Minister and including 25 leading British business figures, which visited China and India, and in April I led a group of UK Vice Chancellors to India to discuss increasing collaboration as India expands its higher education sector. ■

An extra dimension for me this year has been my role as President of Universities UK, the organisation that represents the heads of all UK universities.

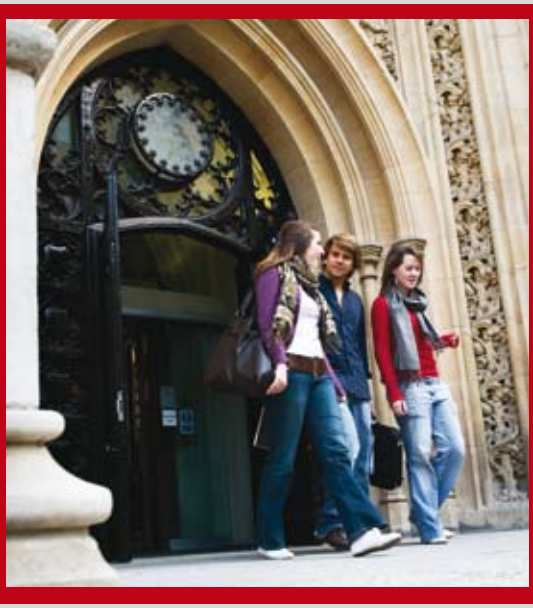
Left opposite: The Principal introduces Dr Sarah Stockwell of the Department of History, co-convener of the conference on *Palestine, Britain & Empire:* 1841-1948, to HRH The Princess Royal at the Strand in May.
Below: Students wore the new King's College London academic dress for the first time at the College's degree ceremonies in 2008.
Bottom left: Dame Vivienne Westwood, who designed the new King's gowns, was awarded an honorary fellowship of King's in July.
Bottom right: In September 2007 Archbishop Desmond Tutu received the College's first-ever award for alumnus of the year.



News in brief 2007-8

Top of the world

King's position as one of the world's leading universities was reinforced in October 2008 when the prestigious *Times Higher*-QS World University Rankings placed the College 22nd in the world, up from 24th in 2007 and 46th in 2006. The ranking confirms King's as a centre of global academic excellence for both research and teaching and is particularly impressive because it shows how the College is rated by thousands of academics around the world. The table brings together the views of academics and graduate employers with data on the ratio of staff to students, citations of academic work, and international staff and students. Among UK universities King's was ranked fifth (up from sixth last year).



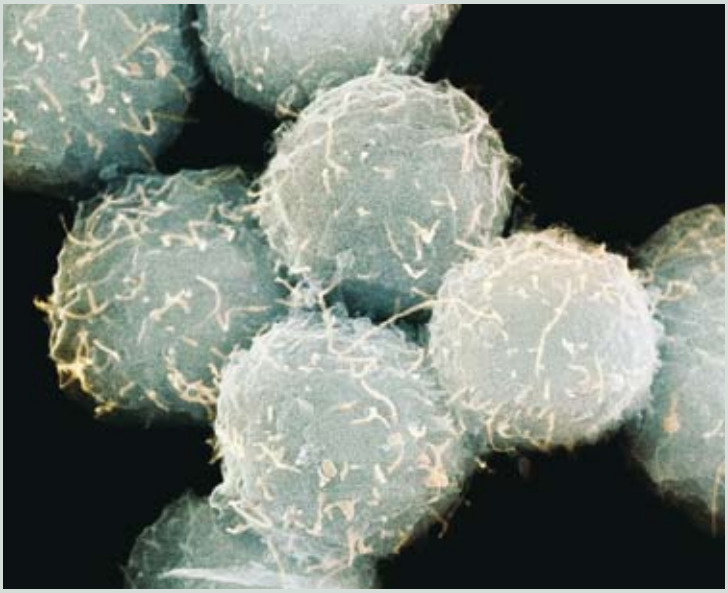
ALFREDO FALVO

EMBRYO RESEARCH APPROVED

King's was one of only two institutions in the UK to be granted permission in January by the Human Fertilisation and Embryology Authority to create hybrid animal embryos by fusing human cells with animal eggs. King's scientists including Dr Stephen Minger will be able to use these embryos to boost research into some of the most debilitating and untreatable diseases, including Alzheimer's, Parkinson's and Spinal Muscular Atrophy. They can now derive human embryonic stem cells using adult cells from patients with genetic forms of neurodegenerative disorders. Instead of using human eggs, the researchers will remove the nuclei from animal eggs and replace them with cells from the patients, thus creating cloned stem cell lines that contain the same genetic mutation that results in these neurological disorders. Leading stem cell scientist Dr Alan Colman – part of the team that created 'Dolly the sheep' – joined King's as the new Director of Stem Cell Research in May.

KOFI ANNAN

Kofi Annan, former Secretary General of the United Nations and Nobel Peace Prize winner, gave the King's annual Commemoration Oration at the College in May. Mr Annan

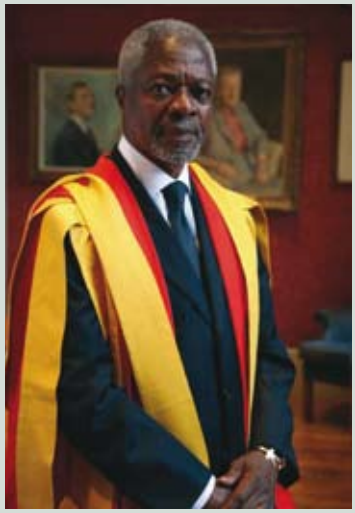


SCIENCE PHOTO LIBRARY

Stem cell research at King's is investigating Alzheimer's and Parkinson's diseases.

The ranking confirms King's as a centre of global academic excellence for both research and teaching.

TEMPEST



Kofi Annan received an honorary doctorate of King's on his visit to the College in May.

spoke to an audience of staff, students and invited guests about the major achievements and continuing challenges for Africa. He also received the second honorary degree to be awarded by King's since the College gained the power to award its own degrees in place of those of the University of London.

£20M REDEVELOPMENT AT THE STRAND

A major refurbishment of the top three floors of the 1970s Strand Building was completed in summer 2008. This second phase of the redevelopment of the Strand Campus also included a new language laboratory for the Modern Language Centre and the re-roofing of the north range of the King's Building, and cost more than £20 million. The newly-designed quarters for departments including Physics, History and Gerontology show how tired 1970s accommodation can be transformed into sustainable and flexible academic space. Environmentally-friendly features include a folded, perforated, brass 'veil' hung outside the building to reduce solar gain; movement detectors for lighting, heating and cooling, and the installation of new glazing to moderate noise and pollution. Individual climatic control in the offices, with virtual metering, enables energy consumption to be tracked in every office.

DAVID TETT

The view from the refurbished top floors of the Strand Building.

Global centre for medicine & health takes shape

In April King's announced plans for the College to join with the Guy's and St Thomas', King's College Hospital and South London and Maudsley NHS Foundation Trusts to create an Academic Health Sciences Centre. Bringing together one of the world's leading research-led universities and three of London's most successful National Heath Service foundation trusts aims to create a Centre that integrates world-leading research, teaching and clinical service – so that patients benefit from breakthroughs in medical science and receive leading-edge treatment at the earliest possible opportunity.

PHIL SAYER

The colours of the newly designed hoods indicate the College's Schools of study and levels of degree.

Degree powers

PHIL SAYER

Dame Vivienne Westwood with students modelling her new gowns for King's.

New academic dress for King's has been designed by Dame Vivienne Westwood to mark the first year that the College has awarded its own degrees rather than those of the University of London, following the grant of degree-awarding powers to the College by the Privy Council. The College's 20 new gowns and hoods are a reworking of the traditional academic robe, and Dame Vivienne has commented that her aim was to link the past, present and future. They were launched at a catwalk show in the Great Hall at the Strand Campus in July and were first worn by graduates at the degree ceremonies later the same month. The colours of the new hoods indicate the College's Schools of study and levels of degree, and a unique feature is the King's College London lion button on each shoulder.

It takes 140 litres of water to make a single cup of coffee.

'VIRTUAL WATER' CONCEPT HONOURED

The concept of 'virtual water', devised by Professor Tony Allan of King's Department of Geography (see *Report* 15, 2007) led him to be named the Stockholm Water Prize Laureate for 2008. The award was conferred upon Professor Allan by HRH Crown Princess Victoria of Sweden in August. Professor Allan's concept measures all the water that is involved in the production of foods and industrial products. Behind a single cup of coffee, for example, 140 litres of water have been consumed to grow, produce, package and ship the beans. For a single hamburger, an estimated 2,400 litres of water are needed. Application of the virtual water concept has shown how water-intensive commodities can be traded from places where high returns to water can be achieved to economies that cannot produce so efficiently.

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Professor Tony Allan received his award from HRH Princess Victoria of Sweden.

KING'S LEADS EDUCATION RESEARCH

Academics from the College's Department of Education & Professional Studies won two of the five awards available from the Economic & Social Research Council for research to help the next generation of schoolchildren to develop the mathematics and science skills that are needed to keep the UK competitive within the international context. Together, the two projects will bring £1.4 million to King's for research in this area. One team is investigating how to increase schoolchildren's competence and confidence in algebra and multiplication, and the other is seeking to discover how young people's educational and occupational aspirations are formed. There is now considerable evidence that children's attitudes to school science in the UK begin to decline from the age of 10, and that most pupils have broadly determined their future career path by the age of 14.

CHAIRMAN OF COUNCIL

The Marquess of Douro became the new Chairman of the Council of King's on 1 October 2007. Lord Douro is an Oxford graduate whose career in business, includes roles as Chairman of Sun Life & Provincial Holdings (UK) Ltd (1995-2000); founder and Deputy Chairman of Thames Valley Broadcasting (1975-84); Deputy Chairman of Guinness Mahon Merchant Bank (1988-91) and Chairman of Framlingham Group plc (1993-2005). Since 1990 he has been Chairman of Richemont Holdings UK Ltd. Lord Douro was a member of the European Parliament from 1979 to 1989 and played a significant part in the entry of Spain and Portugal into the EU. He is a member of the English Heritage Commission and has served in the past on the councils of the Royal College of Art and the University of Surrey. He is the eldest son of the eighth Duke of Wellington. The first Duke was one of the founders of King's and famously fought a duel (whilst Prime Minister) over his role in the establishment of the College.

The Marquess of Douro became the new Chairman of the College Council in October 2007.

The Prime Minister chose King's to unveil his plans for the future of the National Health Service.

Medals for Olympic threesome

Two King's graduates and one current student won silver for the UK in the Beijing Olympics – all in the same boat. Katherine Grainger MBE, Frances Houghton and Annabel Vernon rowed together with team-mate Debbie Flood in the quadruple sculls event. Katherine, who is currently completing a PhD in Law at King's, became the first British woman to win medals at three consecutive Olympic Games and is Britain's most successful female rower, having also won the World Championships four times. She was awarded an MBE for services to sport in 2006. Frances graduated with a BA in Hispanic Studies in 2003 and is also an Olympic medallist and three times World Champion. Annabel, who graduated with a King's MA in International Relations in 2007, had also achieved a gold medal at the 2007 World Championships.

Left: The two King's graduates and one current student who won silver medals in the quadruple sculls event in the Beijing Olympics in summer 2008 were Katherine Grainger MBE (Law), Frances Houghton (BA Hispanic Studies 2003) and Annabel Vernon (MA International Relations 2007).
Above: Katherine Grainger received the Principal's award at the King's Awards Ceremony, 2008.

GREG FUNNELL

The Prime Minister at King's in January.

PRIME MINISTER

Prime Minister Gordon Brown has visited King's twice in 2008. In January the Prime Minister chose King's to unveil his plans for the future of the NHS, warmly praising the College's Florence Nightingale School of Nursing & Midwifery for its 'outstanding professionalism, excellence in research and world leadership in the training of nurses'. In February the Prime Minister returned to King's to launch the Cicely Saunders Institute of Palliative Care: the world's first international academic

institute to focus specifically on the care of those with terminal illnesses.

THE WORM TURNS

A species of tapeworm new to science (*Oochoristica whitfieldii*) has been named after Professor Phil Whitfield, Vice-Principal (Students) at King's and internationally renowned parasitologist. The tapeworm, which lives in the gut of black

iguanas of Mexico, was discovered by Dr Sergio Guillen-Hernandez, Head of Marine Biology at the University of Yucatan, a former PhD student of Professor Whitfield. Professor Whitfield commented: 'It is a great honour to have one's name chosen for a new animal species.' His own research seeks to understand the mechanisms that bring about and modulate the penetration of human skin by the invasive cercarial larval stages of the parasite *Schistosoma mansoni*. These parasites infect more than 200 million people in over 70 countries worldwide.

KING'S ENVIRONMENTAL ACHIEVEMENTS

King's has become one of the first 12 organisations in England and Scotland to achieve the Carbon Trust Standard, a new certificate for those who can prove they are tackling climate change and have made genuine reductions in their carbon emissions. King's is one of the first universities in the country to have 100 per cent of its electricity sourced from renewable large-scale hydro generation and has received a 'Green Gown' Award for sustainable construction methods used in the refurbishment of a major building at the Strand Campus. In January 2008 the King's Environmental Research Group published its research demonstrating that the London Congestion Zone may have had a modest effect on the health of the capital's inhabitants, and in September 2007 the Principal was appointed one of 15 'London Leaders' by the London Sustainable Development Commission.

INGRID RASMUSSEN

The London Congestion Zone may have had a modest effect on the health of the capital's inhabitants, King's research shows.

Above left: Vice-Principal Phil Whitfield. Below right: A new member of the tape worm family has been named.

SCIENCE PHOTO LIBRARY

£2m for medical humanities

King's has won a highly prestigious award from the Wellcome Trust to support research in medical humanities. Over five years the College will receive around £2 million to establish an international centre of excellence in this emerging field. Brian Hurwitz, King's Professor of Medicine & the Arts, and his colleagues will undertake multidisciplinary studies involving philosophy, literature, film, history and art history, as well as medicine, nursing and psychiatry. Under the umbrella 'The Boundaries of Illness' they will look at personal and cultural representations of health and illness and the boundaries between them, exploring people's experiences of health and their responses to illness. They will also develop a research collaboration with Columbia University's Narrative Medicine program, based in the College of Physicians and Surgeons, New York.

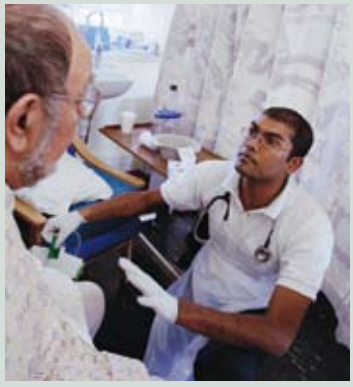
KING'S COLLEGE ARCHIVES

Learning to bandage: an insight into the history of nurse training.

KING'S TOP FOR MRC FUNDING

King's received more funding from the Medical Research Council (MRC) than any other university in 2006-7, with an income from this source totalling nearly £23.7 million. The College is home to six MRC centres, specialising in environment and health; in social, genetic and developmental psychiatry; in developmental neurobiology; in the allergic mechanisms of asthma; in neurodegeneration research, and in organ transplantation. Also linked with these is the College's Biomedical Research Centre, funded by the National Institute for Health Research. All are focused on research that can be translated into treatment for patients.

PHIL SAYER



Top for medical research funding.

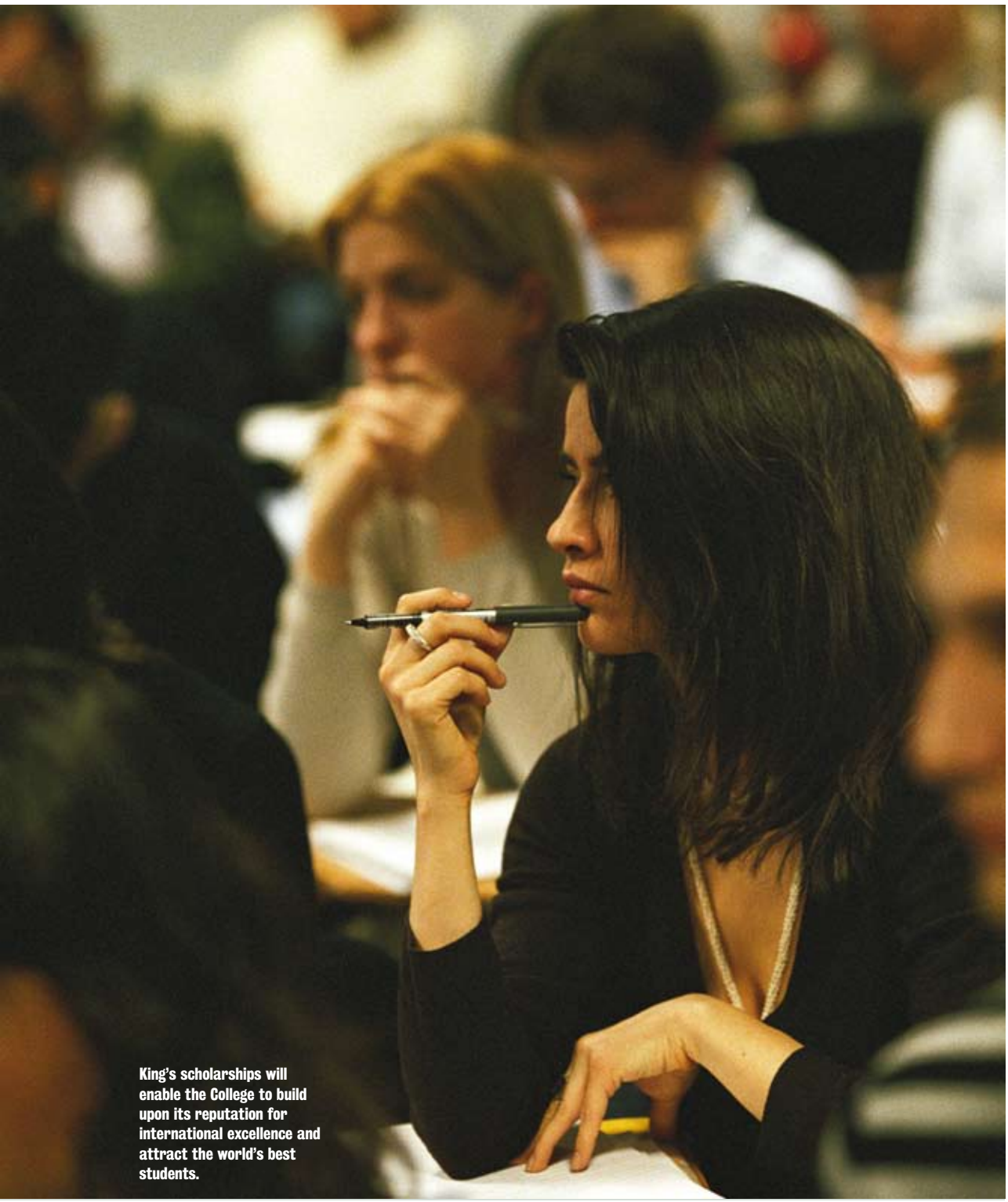
COMPLETE SUCCESS

King's is the most successful university in the country in terms of PhD completion rates. The first report of the Higher Education Funding Council for England to provide this data for individual higher education institutions, published in October 2007, showed that King's achieved a completion rate of 92 per cent for home and EU students: of the 190 students who started, 174 completed their theses between 1999 and 2005.

SCHOLARSHIPS

In February the King's Graduate School announced a package of over 100 new graduate studentships and bursaries, including 15 PhD and 20 taught master's scholarships targeted at the US, India, Pakistan, China, Malaysia, Hong Kong, Singapore, Russia and selected countries in the Middle East and Africa. With these and the King's International Partnership Scholarships, which will encourage mobility between King's and its key global partners, the College will continue and build upon its reputation for international excellence and attract the world's best students.

King's is the most successful university in the country in terms of PhD completion rates.

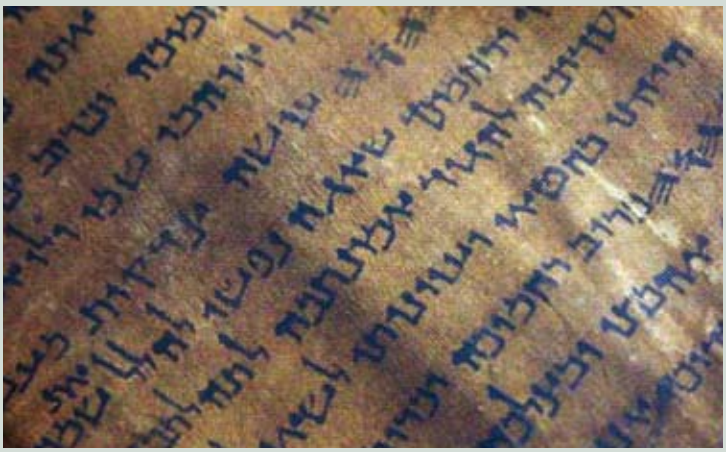


PHIL SAYER

King's scholarships will enable the College to build upon its reputation for international excellence and attract the world's best students.

DIGITISING THE DEAD SEA SCROLLS

The Dead Sea Scrolls – the oldest-known copies of the Hebrew Bible or Old Testament – are being digitised by a team led by King's Centre for Computing in the Humanities. The scrolls were written between 250 BCE and 68 CE and discovered in 1947 on the northwest shore of the Dead Sea. They throw immensely important light on the origins of both Judaism and early Christianity and consist of thousands of extremely brittle fragments which have not been photographed since the 1950s. The Israeli Antiquities Authority has convened an international committee of experts, led by Simon Tanner of King's, to digitise them for the web, bringing one of the great treasures of the world out of the museum and within easy reach for anyone who wants to see them.



IAA

Digitising the Dead Sea Scrolls will make them available to many more people.

Graduating from the war zone

The first graduates of a unique course, including military personnel who have studied while serving in a war zone, graduated from King's in July. The *War in the Modern World* MA, offered by the Department of War Studies, is the College's only entirely non-residential web-delivered master's programme, with no rival in the quality and richness of its online content, and with academics providing continual feedback throughout the course. Students gain an understanding of military campaigns and operations since 1945, in the light of the wide-ranging economic, social, technological and political changes in the world between World War II and today.

Major Nicholas Dymond of the British Army Logistic Corps graduated from the *War in the Modern World* MA after studying while on duty in Afghanistan and Iraq.

LARGEST-EVER GENETICS STUDY LAUNCHED

Four research teams at King's will play a leading role in continuing the largest-ever study of the genetics behind disease, focusing on common disease areas and learning difficulties in children. A seven-fold increase in the number of samples to be analysed will allow researchers to look at 25 diseases such as multiple sclerosis, schizophrenia and asthma, as well as studying the genetics of learning problems in children and individuals'

This will be one of the most ambitious studies ever undertaken, aiming to analyse DNA samples from 120,000 people.

responses to statins. With £30 million funding from the Wellcome Trust, this will be one of the most ambitious studies ever undertaken, aiming to analyse DNA samples from 120,000 people, the largest number of individuals ever to be studied. It will bring together leading research groups from 16 institutions in the UK and internationally.

KEATS STATUE AT GUY'S

Romantic poet John Keats, who studied to become an apothecary at Guy's in 1815-16, has been commemorated by a bronze statue near the Colonnade at the Guy's Campus. The statue by Stuart Williamson was commissioned by the Guy's and St Thomas' Charity and the Friends of Guy's and unveiled in October 2007 by Andrew Motion, Poet Laureate and Keats biographer. Other literary giants who have graduated from King's include Virginia Woolf, Thomas Hardy and Arthur C Clarke.

Mozart portrait discovered

COURTESY OF CHRISTIE'S

This portrait of Mozart is the most important artefact connected with the composer to come to light in the last 200 years.

A previously unknown portrait of Mozart has been authenticated by King's Professor Cliff Eisen, a world expert on the composer. Painted in oils, the portrait shows Mozart in profile in a red jacket that corresponds to one described by the composer to his father in 1782, even down to the buttons. It is the single most significant Mozart artefact to come to light in the last 200 years and could be worth several million dollars. The portrait's provenance, letters from Mozart and his family, and archival documents including Salzburg wills and estate auction records have all helped to authenticate the portrait, which was probably painted by Joseph Hickel, painter to the Imperial Court of Austria, about 1783. It was previously owned by the family of Johann Lorenz Hagenauer, the Mozarts' close friend and one-time landlord in Salzburg, and was bought in 2005 by an American collector who was unaware of its significance until the Hagenauer connection was established.

The CHINA connection

King's links with China are growing rapidly in many areas, including collaboration between the College's Department of Pharmacy and the Shanghai Institute of Materia Medica on studies of traditional Chinese medicine.

BSIP, DELOCHE/SCIENCE PHOTO LIBRARY

Herbalists in a traditional pharmacy in Kaifeng, China.


MARK DE FRAEYE/ SCIENCE PHOTO LIBRARY

MORE THAN THE SUM

Traditional Chinese medicine often relies for its effects on a mixture of compounds. Professor Peter Hylands, Head of the Department of Pharmacy, explains how his work in this field is showing that the whole may be more than the sum of its parts.

Traditional Chinese medicine (TCM) has developed over several thousand years and is a well-established treatment in China and other Eastern countries. Western medicine is starting to incorporate Chinese approaches into drug discovery programmes, and the public use of Chinese medicine itself in the West is growing. The size and growth potential of the latter market is significant, with recorded sales of 14 billion US dollars in 2006. However, several factors (notably the regulatory environment in Western countries) restrict its growth.

Scientists at King's are collaborating with leading Chinese institutions by applying emerging technologies to the solution of a number of problems in this field. One serious issue is the development of robust and reliable analytical methods for the quality control of TCM products – a prerequisite for meaningful clinical studies and subsequent regulatory approval. The established analytical methods are largely reductive, relying on the chromatographic separation of the constituents of the plants, but such methods ignore the known importance of the effects of mixtures of compounds – a principle on which TCM is founded. The work I am leading at King's has been exploring non-reductive approaches to product specifications, using high field nuclear magnetic resonance spectroscopy to analyse and evaluate spectroscopic data using statistics. This method has the advantage of considering all the components of the medicine, rather than each compound individually.

Discovering new drugs

We are also using TCM at King's as a tool for discovering new drugs. If a traditional Chinese remedy has a reputation for being safe and effective (a reputation often gained over millennia of use), then it's likely to repay pharmaceutical investigation. Dr David Barlow, Tom Ehrman and I have created a database of many thousands of compounds from plants used in TCM and used a computer-based screening method to discover potential new drugs. The first results were published in 2007 in a series of three articles in the American Chemical Society's

Journal of Chemical Information and Modeling, and these three papers were among the 20 most downloaded articles from the journal's website in 2007.

One of these papers uncovered hitherto-undescribed patterns of biological activity in certain herbal products, which reflect the traditional categories used to describe the use of TCM but do not translate easily into Western medical terminology. For example, plant medicines described as useful to 'invigorate blood' in TCM terminology are often used to treat pain and ulcers. It turns out that these medicines are active against 5-lipoxygenase and cycloxygenase-2 enzymes (Western targets for anti-inflammatory and pain-relieving activity), and act as sodium channel blockers (another Western target for the treatment of inflammatory pain), among other actions. This result can not only be looked upon as validating the TCM terminology and TCM use but could also provide new leads for conventional drug discovery.

This work is being extended through a £90,000 collaboration with the prestigious Shanghai Institute of Materia Medica, funded as part of the Innovation China United Kingdom initiative (see opposite). Scientists from the two institutions are working together to develop and commercialise an extended database and to refine its capability to discover potential new drugs.

We have also established a joint laboratory between the Department of Pharmacy and the College of Pharmaceutical Sciences at Zhejiang University, Hangzhou. Professor Bob Hider and I are undertaking collaborative work with our Chinese partners in the chemistry of medicinal and natural products, and it is expected that this interaction will lead to more joint work both in research and teaching. Another major recent achievement is the award of a grant of one million euros for a project called *Good Practice in Traditional Chinese Medicine Research in the Post-genomic Era*, which will develop a framework of research methodology and establish international guidelines and priority areas for the future. The consortium of workers from 11 European countries, with collaborators from China, will be led by Dr Qihe Xu of King's College Hospital Medical School. ■

CREATIVE CHINA: VISUAL CULTURE, ARCHITECTURE AND DESIGN

King's and the Victoria & Albert Museum collaborated to organise a two-day international conference in June 2008 to explore current developments in Chinese visual culture, design and urbanism in relation to China's rapid economic development and social change. Leading academics and professional experts from China, Europe and the UK explored fine art, photography and film as well as graphic design, fashion, product design, architecture and urban planning, including the themes highlighted in the V&A's 'China Design Now' exhibition, such as changing cultural identities and emerging new practices in art and design.

PRINCIPAL TO CHINA X 2

The Principal visited China twice during the 2007-8 academic year. As President of Universities UK, he was a member of the delegation accompanying the

Ji Ji Panda. Toy figure from the V&A 'China Design Now' exhibition, 2008.

The FCO collection comprises nearly 60,000 books, pamphlets, reports, typescripts and manuscripts estimated to be worth some £4.5 million.

FCO/FOYLE SPECIAL COLLECTIONS

Top: 'Seaou-Koo-Shan, from the East': an illustration from Henry Ellis's *Journal of the proceedings of the late embassy to China* (London: John Murray, 1817). Bottom: A banqueting room in a Mandarin's house near Canton, an illustration from James Wathen's *Journal of a voyage, in 1811 and 1812, to Madras and China* (London, 1814).

Secretary of State for Innovation, Universities and Skills (John Denham) on a visit in October 2007, and in January 2008 Professor Trainor accompanied 25 leading British business figures, including Virgin boss Sir Richard Branson and CBI Director-General Richard Lambert, on Prime Minister Gordon Brown's visit to China and India. Following a UK-China business summit in Beijing, the delegation visited Beijing's People's University and attended an event to hear about preparations for the Beijing Olympics. Professor Trainor described the visits as 'a unique opportunity to advance both King's and UK universities in the emerging new markets of China and India and to underline the central importance of UK higher education to our bilateral relationships'.

THROUGH DIPLOMATIC EYES

Rarely-seen books on the history of China form part of the historical library collection of the Foreign and Commonwealth Office (FCO) which was transferred into the care of King's College's Foyle Special Collections Library in November 2007 by Sir Peter Ricketts KCMG, Permanent Under-Secretary and Head of the Diplomatic Service.

FCO/FOYLE SPECIAL COLLECTIONS

Arguably the most important library collection to be acquired by the College in its history, the FCO collection comprises nearly 60,000 books, pamphlets, reports, typescripts and manuscripts, estimated to be worth some £4.5 million. Spanning over four centuries, the FCO Library offers matchless coverage of Britain's role as a trading nation, imperial and diplomatic power and as a member of the Commonwealth. It is a major resource on the development of diplomacy, exploration, slavery, warfare and the history of the British Colonies that will, for the first time ever, be fully accessible to the research community.

Among the items concerning China are 17th, 18th and 19th century accounts which describe in richly-illustrated detail the travels of Western visitors to China. These volumes formed part of an exhibition mounted by the College Archives in the Spring of 2008 to coincide with the Mayor of London's *China Now* festival.

UK–CHINA KNOWLEDGE TRANSFER

King's is one of five UK universities, and more than 20 from China, which came together in November 2007 to form *Innovation China UK*: the first higher education partnership for transferring

> China is one of the countries to benefit from the King's international scholarships introduced in summer 2008.

research and knowledge between the two countries. It will help to bring ground-breaking research to the commercial market in areas such as energy; climate change and sustainable environment; infectious diseases; biomedicine and drug discovery including traditional Chinese medicine; nanotechnology and material science, and space technology. Led by Queen Mary, University of London, the project has been awarded £5 million in funding by the UK Higher Education Innovation Fund, and China is providing complementary funding through its Ministry of Science Technology.

STUDYING CHRISTIANITY IN CHINA

The Centre for the Study of Christianity in China (CSCIC) moved in April from its temporary base in Oxford to become part of the Centre for Theology, Religion & Culture at King's. CSCIC was founded in 2005 to respond to the rapid growth of interest in Christianity in the Chinese academy and to form partnerships with scholars inside and outside China who are active in the field of Sino-Christian studies. The Centre intends in time to expand its work into the study of Asian Christianity more generally.

Dr Chris Hancock, Director of CSCIC, says, 'The Centre's arrival enables King's to reconnect with its own history and links with China. Sir George Staunton MP (1781-1859), a founder of the Royal Asiatic Society, one of the first translators of Chinese books into English and a major figure in encouraging the study of Chinese in Britain, was a member of the first Council of the College and the prime mover in establishing the first Chair in Chinese at King's in 1847.

'In 2007 CSCIC promoted the bicentenary of the arrival of Dr Robert Morrison FRS (1782-1834)

FCO/FOYLE SPECIAL COLLECTIONS

Below left: An image of Jesuits from Jean Baptiste Du Halde's *Description géographique, historique, chronologique, politique et physique de l'empire de la Chine et de la Tartarie Chinoise* (Paris, 1735).
Below: There were 232 Chinese students at King's in 2007–8.

in China. Morrison was the first Protestant missionary to live in mainland China and the leading sinologist of his day. Staunton, who spent part of his childhood in China, played a key role in supporting Morrison's work in Canton, and his establishment of the chair in Chinese at King's fulfilled Morrison's hope that British missionaries and officials would learn some Chinese before they arrived in the East.'

CHINESE STUDENTS AT KING'S ...

There were 232 students from China (plus another 178 from Hong Kong) at King's in 2007-8. These comprised 101 undergraduates; 90 master's and 41 graduate research students from mainland China (an increase of 38 from 2006-7). The College offers a foundation programme for Chinese students who want to study humanities or social science programmes, and China is one of the countries to benefit from the King's international scholarships introduced in summer 2008 (see page 12).

... AND KING'S STUDENTS IN CHINA

Graduate students from King's and representatives of the Students' Union (KCLSU) were selected to visit Nankai University, Tianjin, in November 2007 to attend the 10th Challenge Cup National Competition of Chinese College Students' Extracurricular Academic & Scientific Achievements. There were more than 1,000 entries for the 2007 competition, and the King's group was one of only 300 selected: one of fewer than 10 from outside China. They presented four projects, three based on their PhD research (on heat-induced mortality in cities due to global warming; on brain injury, and on the Chinese banking system) and one on changes in the governance structure of KCLSU. They gave interviews to local and national radio, television and newspapers and were presented with a shield for their contribution to international co-operation at Tianjin's Olympic Stadium. King's and Nankai University are establishing links which will lead to exchanges and joint graduate programmes.

LAW SCHOOL LINKS WITH TSINGHUA

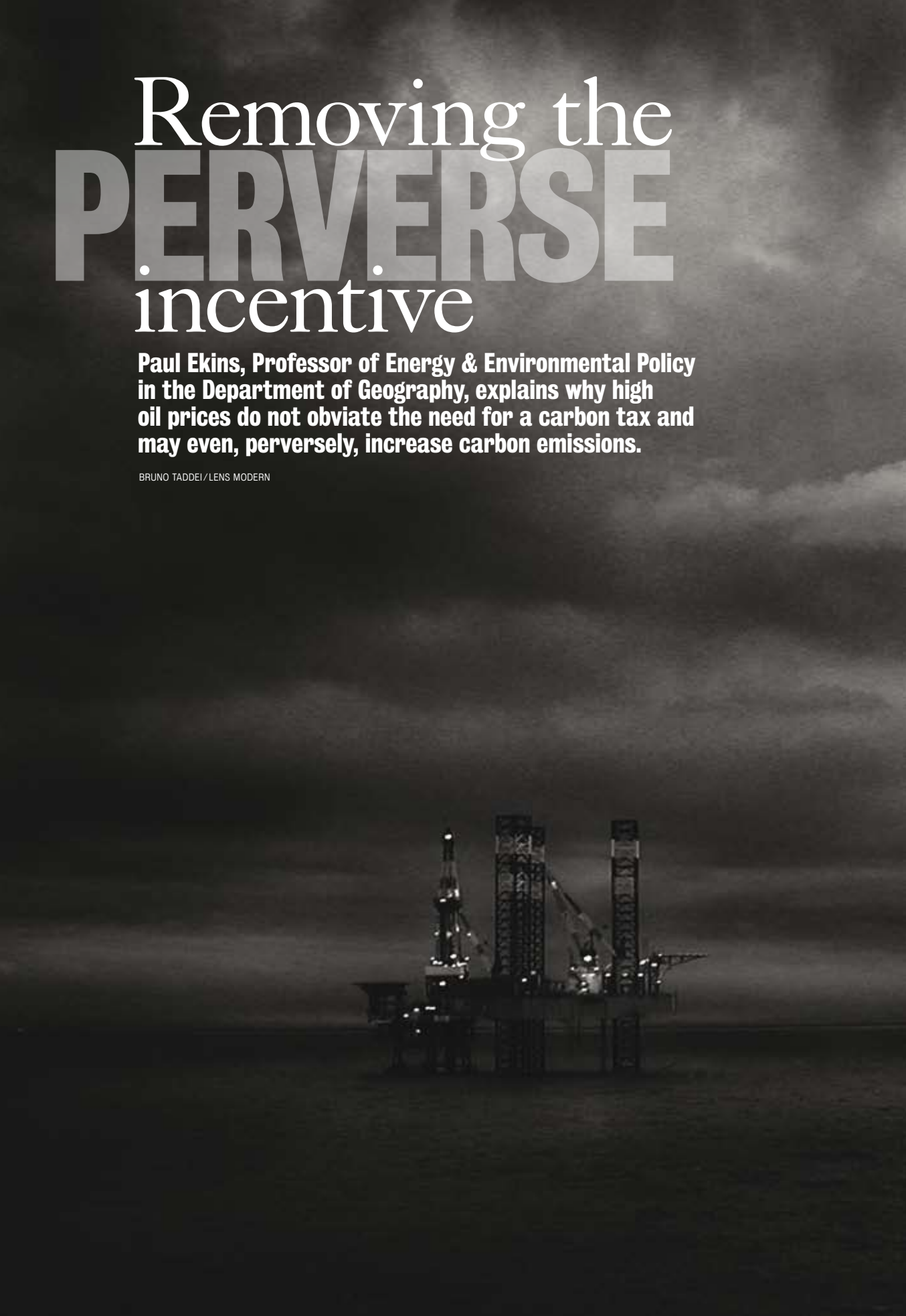
A ceremony at Tsinghua University, Beijing, in September 2006, attended by King's Principal Professor Rick Trainor and Professor John Phillips, then Head of King's Law School, marked the initiation of an agreement between the two law schools. Since then Tsinghua has accepted a minimum of five King's students each year on its LLM in Chinese Law and King's has accepted at least five Tsinghua students on its LLM degree. King's also provides a scholarship each year for a highly qualified Tsinghua student to undertake the LLM degree in London. King's Professor Jan Dalhuisen has taught modules in Financial Law at Tsinghua and Professor David Llewelyn has lectured there on Intellectual Property Law, while professors from Tsinghua have attended conferences at King's.

Alessandro Spano, a research student from King's, was a visiting researcher at Tsinghua Law School in 2006, and in 2007 was invited back as a visiting scholar. 'Alessandro's work, which involves an analysis of the relevance of the EU experience upon the development of a competitive market environment in China, has very much cemented links between the Schools, and he has been an excellent ambassador for the School', commented John Phillips. The current Head of the Law School, Professor Timothy Macklem, visited Tsinghua in November 2008 to further develop the co-operative arrangement.

Removing the PERVERSE incentive

Paul Ekins, Professor of Energy & Environmental Policy in the Department of Geography, explains why high oil prices do not obviate the need for a carbon tax and may even, perversely, increase carbon emissions.

BRUNO TADDEI/LENS MODERN



With an eye on oil prices, some have said that a carbon tax is not now necessary, because the oil price is doing the job. This judgement is profoundly mistaken.

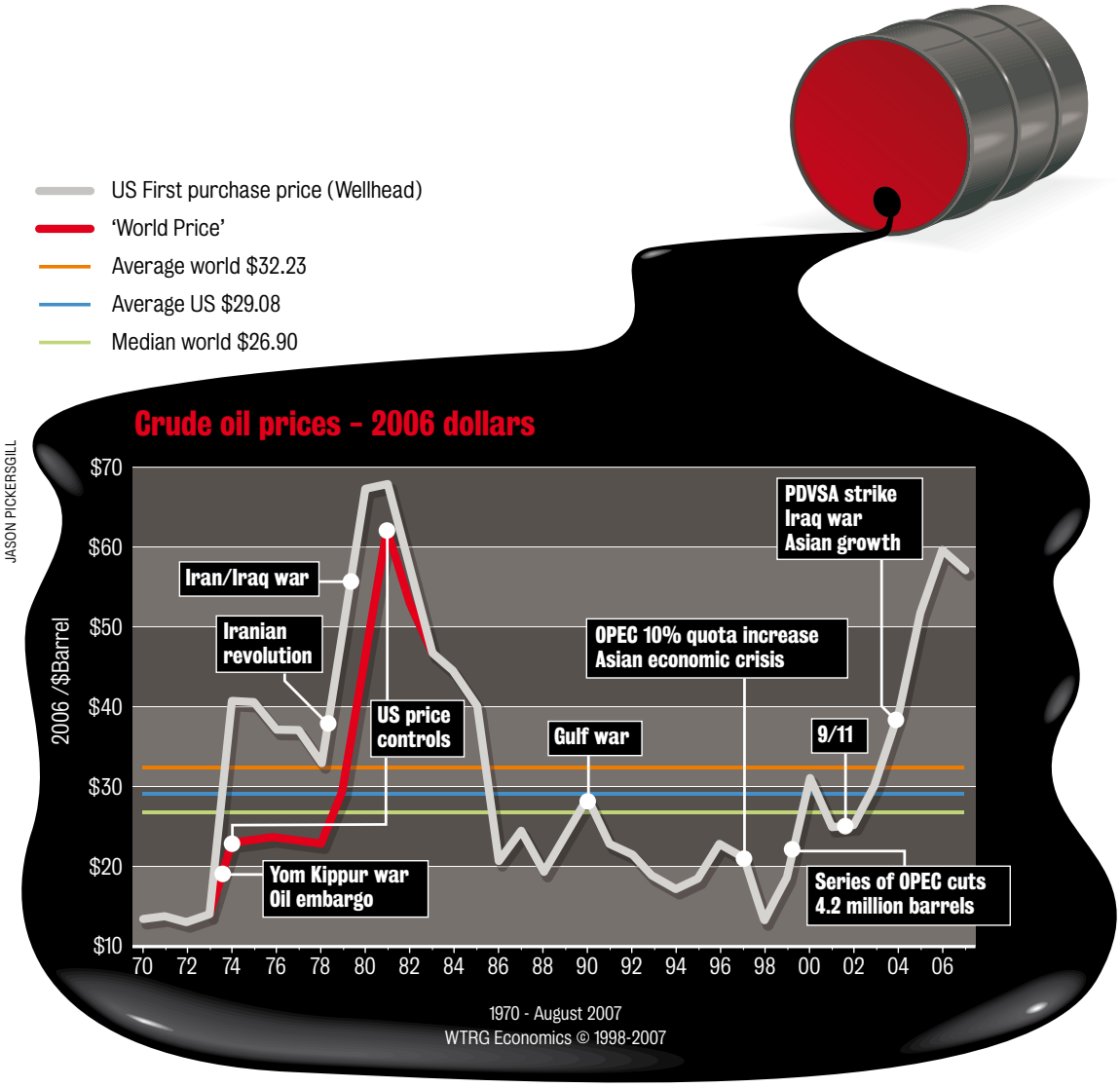
These are torrid times for energy markets, and for energy futures more generally. Oil prices have reached levels in real terms now comparable to those in 1980, and gas prices are being pulled up in their wake. At the same time, practically everyone has now got the message that, as Sir David King recently spelled out at King's (see page 28), climate change is a serious threat to the future of humanity. The hunt is therefore on for effective, preferably not too painful, ways of squeezing carbon out of the energy system. Often these two issues are discussed separately, but in fact each is deeply relevant for the other, with profound implications for policy that are not obvious.

One of the main messages of the *Stern Report on the Economics of Climate Change,* published in November 2006, was that an essential element in tackling climate change was the pricing of carbon emissions. Europe and the UK have in fact taken a lead in this, with the setting up in 2002 of the UK ETS, followed in 2005 by the much larger EU Emissions Trading Scheme (EU ETS). The EU ETS only involves about half of Europe's carbon emissions, but this has been enough to kick start a global market in carbon that is now a growing part of most of the world's financial sectors.

Low-carbon investment

Although this is a remarkable policy innovation that has been put in place very quickly, the price of carbon is still nowhere near high enough to drive the kind of low-carbon investment that will be necessary to get the global emissions cuts that the scientists say we need in order to have any prospect of relative climate stability, and the price's volatility and uncertainties about the future of the carbon

Hauliers' protests against high fuel prices have brought London's traffic to a standstill on several occasions.



JASON PICKERSGILL

market are additional constraints on such investment. For this reason, many policy analysts, including myself, have advocated a carbon tax, at global, European and/or national levels, depending on political feasibility. The aim of this would be to put a floor under the price of carbon in the carbon markets, and to give a price to those emissions that are not currently in a trading scheme and may not be so for many years. In response, with an eye on oil prices, some have said that a carbon tax is not now necessary, because the oil price is doing the job. This judgement is profoundly mistaken.

Of course, it is true that a high world oil price will have an effect on oil demand, as would a high carbon tax, but there the resemblance between these two issues ends. First, and most obviously, a high oil price makes oil more expensive, not carbon. The high oil (and associated gas) price has increased the use of relatively high-carbon coal, and driven a veritable investment rush into 'unconventional' oil such as tar sands, the extraction and refining of which is far more energy (and therefore carbon) intensive than oil itself. It is therefore quite possible that a high oil price will, overall, increase rather than reduce carbon emissions.

A high carbon tax would remove this perverse incentive for high-carbon fuels. Second, a carbon tax has quite different economic implications to an increase in the oil price. With an increasing UK carbon tax, the extra revenues from the tax (expressed in higher prices for fossil fuels) would go to the government, and, for a given level of public expenditure, would allow other taxes, say

> It should be recognised that oil prices are still far lower in relation to income than they were in 1980, because of economic growth over the last quarter century.

on incomes or profits, to be reduced, a tax shift from 'goods' to 'bads' which has been called environmental tax reform (ETR) and which is widely regarded as desirable. In fact, in its *Statement of Intent on Environmental Taxation* when it was elected in 1997, the new Labour Government committed itself to such a tax shift, which has unfortunately so far failed to materialise.

KING AT KING'S WARNS ON CLIMATE CHANGE

Professor Sir David King, then the Government's Chief Scientific Advisor, issued a stark warning on climate change at the College's annual Fison lecture in October 2007. In one of his last lectures before stepping down from the government advisor post, Sir David outlined an action plan for getting an international agreement on climate change. 'The weight of scientific evidence is now established beyond all reasonable doubt', he said. 'The implications for people across the planet will be profound. The need for action is now urgent – we must act, and quickly, both to reduce the future impacts of climate change and to adapt to those impacts that cannot be avoided.'

King's has a long tradition of excellence for environmental research, and in 2005 established the Centre for Environmental Assessment, Management and Policy (CEAMP) to provide a focal point for environmental research at the College and a portal for the public and private sectors to access the research and skills of a wide range of people working at King's within the areas of environmental assessment, management and policy. For more information see www.kcl.ac.uk/projects/ceamp/index.html

GREG FUNNELL

UK needs

In contrast, the revenues from higher oil prices leave the UK, which is now a net oil and gas importer, and enrich oil exporting countries and oil-extracting companies. Unless the UK receives the revenues back in investment, higher oil prices will therefore make it poorer, while a carbon tax will not. If higher energy prices are required in order to reduce carbon emissions, then it is very desirable economically for the UK for these to be the result of carbon taxation rather than market-driven world oil price rises.

Third, burning fossil fuels causes climate change, and the justification for a carbon tax therefore remains whatever supply/demand imbalances, geopolitical uncertainties or anything else may be doing to world oil prices. It is an elementary insight from environmental economics that, where there is an environmental externality – an (often negative) environmental effect that is not included in prices – the policy instrument to adjust for it, with a tax being the typical recommendation, should be in addition to the market price, whatever it may be, rather than affected by it.

The issue in the UK may be illustrated with the example of fuel duty. This acts as a proxy for a proper carbon tax, and its level, in the absence of such a tax, should be independent of oil price movements because it is there to reflect the carbon externality, and perhaps any other externality, related to fuel use. The 'Fuel Duty Stabiliser', recently proposed by the UK Conservative Party, whereby the fuel duty would be adjusted down (or up) when the oil price went up (or down), is misguided because it conflates, and therefore confuses, the two issues of the market price of fuel, and the duty which is charged to reflect its damage to society and the environment.

There are two other issues which make it desirable to maintain policy on fuel duty, or on energy taxes generally, separate from price movements. The first is the need for stable government revenues and, indeed, the desirability of increasing the proportion of government revenue that is derived from taxing environmental damage ('bads') as opposed to incomes or profits ('goods'), as noted above. Reducing fuel duty when oil prices

An Indonesian student jumps over a burning tyre during a protest in Jakarta over government fuel price increases.

rise runs the risk of reducing revenues from this source (the final outcome is not clear in advance because the higher oil price increases revenues from VAT), just at a time when, if there is a downturn in economic activity, tax revenues may be reduced from other sources as well.

Bite the bullet

There is also a political dimension, linked to the destination of revenues, to the share of tax in the final price of oil and other energy sources. If fuel duty goes down when oil prices go up, oil producers have no incentive to keep prices down in order not to reduce demand, because they will know that if they increase the price of oil, the price increase to the consumer will be moderated by the fall in duty. All that happens is that the oil producers get a larger share of the retail price. They therefore have an incentive to increase the oil price until the fuel duty has been reduced to zero. While the UK by itself is not large enough for this effect to be significant, if fuel duties across Europe were to be reduced when world oil prices went up, then one can seriously imagine that this would affect the behaviour of major oil producers when they were setting prices.

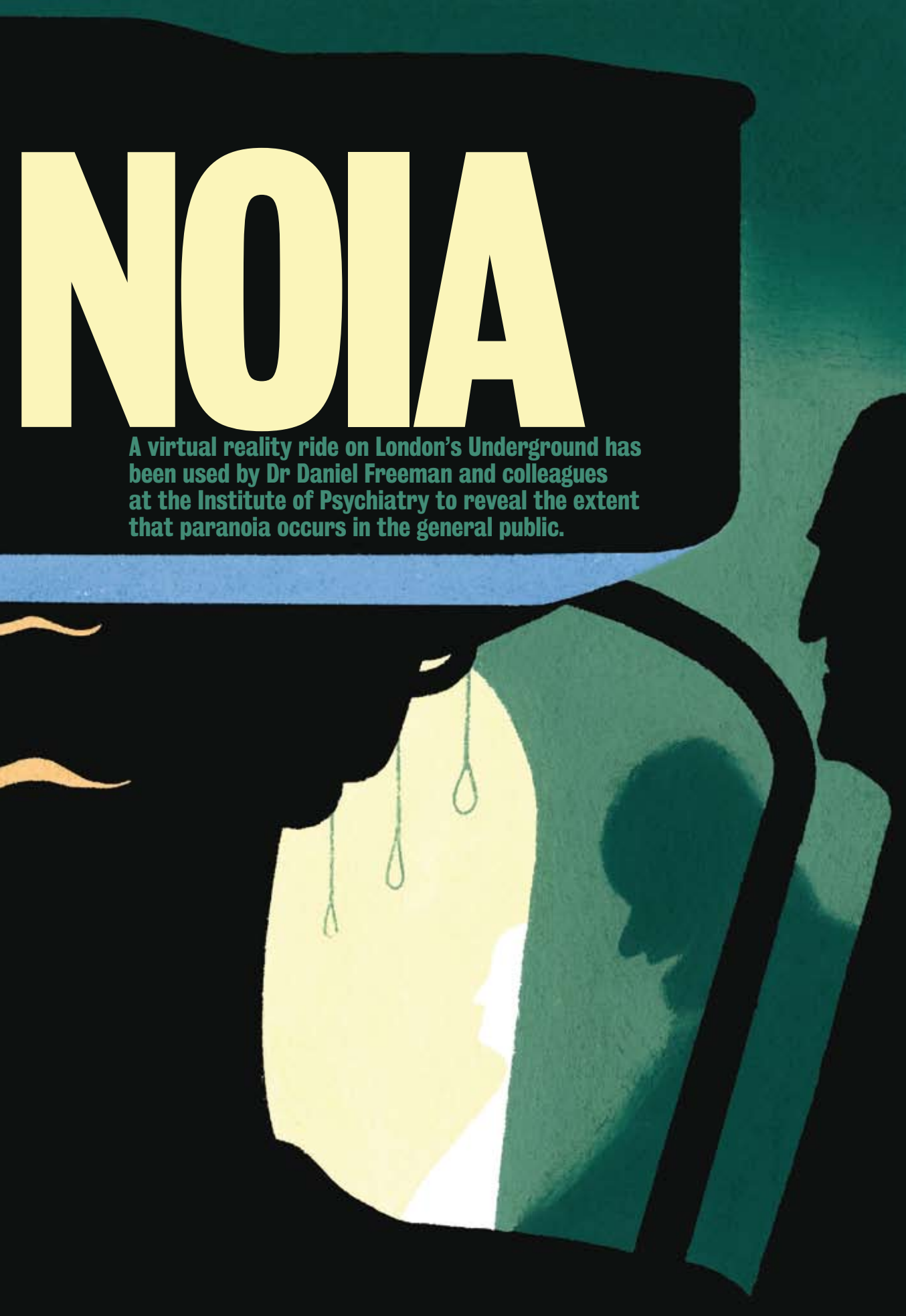
All these considerations argue for keeping policy on energy and carbon taxes quite separate from whatever the oil price and other energy prices are doing. This is not an easy political message, because naturally when oil prices go up there are calls on politicians, from those whose lives or businesses are oil-dependent, to reduce energy taxes to ease the pain. But it should be recognised that oil prices are still far lower in relation to income than they were in 1980, because of economic growth over the last quarter century, and we are using far more of it now than we were then.

If demand for oil has to be dramatically reduced, both because of climate change considerations, and because of prospectively more binding supply constraints, then we would do better to bite the bullet now and change our lifestyles and economy to be far less oil-intensive, and an escalating carbon tax would give the clearest possible signal of this desirability. The one thing that is certain from the message coming from the climate scientists is that the pain will be far greater, and more long lasting, if we fail to respond to and limit the damage from climate change by greatly reducing our carbon emissions. ■


Virtual Tube ride tests
PARA
GEOFF GRANDFIELD

NOIA

A virtual reality ride on London's Underground has been used by Dr Daniel Freeman and colleagues at the Institute of Psychiatry to reveal the extent that paranoia occurs in the general public.



Images from a computer simulation of a ride on a London Underground train. Wearing virtual reality headsets, 200 volunteers walked around a virtual carriage in a four-minute journey between stations, encountering neutral computer people (avatars) who breathed, looked around, and sometimes met the gaze of the participants. The simulation enabled Dr Daniel Freeman and his colleagues to study how different people interpret exactly the same social situation.

We may be living in a uniquely paranoid age. Catalysed by the 9/11 attacks of 2001, fears about terrorists, pickpockets, muggers, burglars, child abductors, drug dealers, immigrants and hoodies with knives have reached a new intensity, with parents now so fearful that many children never go out alone. Research by Dr Daniel Freeman shows that around a quarter of us are having regular paranoid thoughts, making paranoia almost as common as anxiety and depression.

Until recently, researchers have been unable to study paranoia (exaggerated fears about threats from others) in laboratory settings, relying instead on questionnaires that cannot distinguish between genuine and unfounded paranoid thoughts. Now Dr Freeman's Wellcome Trust-funded research project has developed a means of studying paranoid thoughts by studying reactions in a computer simulation of a four-minute ride on a London Underground train. The results of the study were published in April in the *British Journal of Psychiatry* and subsequent work has also been featured in the academic journals *Schizophrenia Bulletin, Schizophrenia Research and Psychological Medicine.*

Recreating social situations

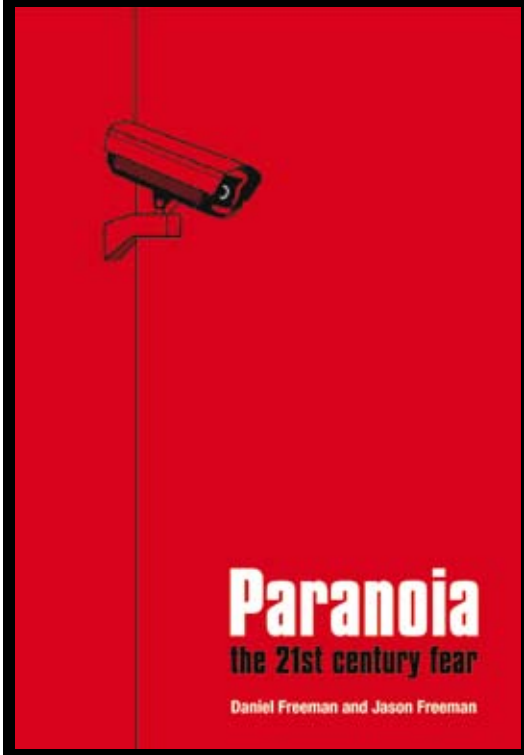
'Paranoid thoughts are often triggered by ambiguous events such as people looking in one's direction or hearing laughter in a room, but it is very difficult to recreate such social interactions', says Dr Freeman. 'However virtual reality allows us to do just that: to look at how different people interpret exactly the same social situation. It's a uniquely powerful method to detect those liable to misinterpret other people.'

Wearing virtual reality headsets, 200 volunteers, broadly representative of the general population, walked around a virtual London Underground carriage in a four-minute journey between station stops. The carriage contained neutral computer people (avatars) that breathed, looked around, and sometimes met the gaze of the participants. One avatar read a newspaper, another would occasionally smile if looked at. A soundtrack of a train carriage with train noise and background voices was played.

Dr Freeman and his colleagues found that those taking part interpreted the same computer characters very differently. The most common reaction was to find the virtual reality characters friendly or neutral, but almost 40 per cent of the participants experienced at least one paranoid thought. The participants were extensively assessed before entering the train ride, and it was found that

THE PRIZE ...

Dr Freeman was awarded the 2008 May Davidson Award from the British Psychological Society's Division of Clinical Psychology for his work on paranoia and will be giving a keynote lecture at the Division's annual conference in December 2008.



...AND THE BOOK

***Paranoia: the 21st century fear*, by Daniel Freeman and his brother Jason Freeman, was published by Oxford University Press in October. It explores what paranoia is; what causes it; whether some people are more prone to paranoia than others; whether we are more paranoid now than we used to be; how we should deal with our paranoid thoughts, and how we might reduce the amount of paranoia in our society.**

At the heart of all social interactions is a vital judgement whether to trust or mistrust, but it's a judgment that is error-prone.

those who were anxious, worried, had low self-esteem and focused on the worst-case scenarios were the most likely to have paranoid thoughts.

Spooking me out

One participant who experienced paranoid thoughts said, for example: 'There was a guy spooking me out – tried to get away from him. Didn't like his face. I'm sure he looked at me more than a couple of times though might be imagining it.' Another thought, 'A girl kept moving her hand. Looked like she was a pickpocket and would pass it to the person standing opposite her.' Another felt trapped between two men in the doorway. 'As a woman I'm a lot more suspicious of men. Didn't like the close proximity of the men. The guy opposite may have had sexual intent, manipulation or whatever.' And another noticed, 'There's something dodgy about one guy. Like he was about to do something – assault someone, plant a bomb, say something not nice to me, be aggressive.'

In the past, Dr Freeman comments, only those with a severe mental illness were thought to experience paranoid thoughts. 'But now we know that this is simply not the case. About one-third of the general population regularly experience persecutory thoughts. This shouldn't be surprising. At the heart of all social interactions is a vital judgment whether to trust or mistrust, but it's a judgement that is error-prone. We're more likely to make paranoid errors if we're anxious, ruminate and have had bad experiences from others in the past.'

Paranoid thoughts appear to be more likely to develop in settings such as on public transport, where people can feel trapped and observed, and can't hear what others are saying. People who feared terrorism on the Underground tended to report more paranoid thoughts in the virtual train, possibly reflecting the after-effects of the London bombings on 7 July 2005. The researchers also found, however, that people who regularly used the Underground experienced fewer paranoid thoughts in the virtual train.

Fear of one another

'Paranoid thinking is a topic of national discussion, given increasing public attention to threats such as terrorism', Dr Freeman comments. 'It sometimes seems as if the one thing that unites the diverse peoples of the world is our fear of one another. Worries about other people are so common that they seem to be an essential – if unwelcome – part of what it means to be human.'

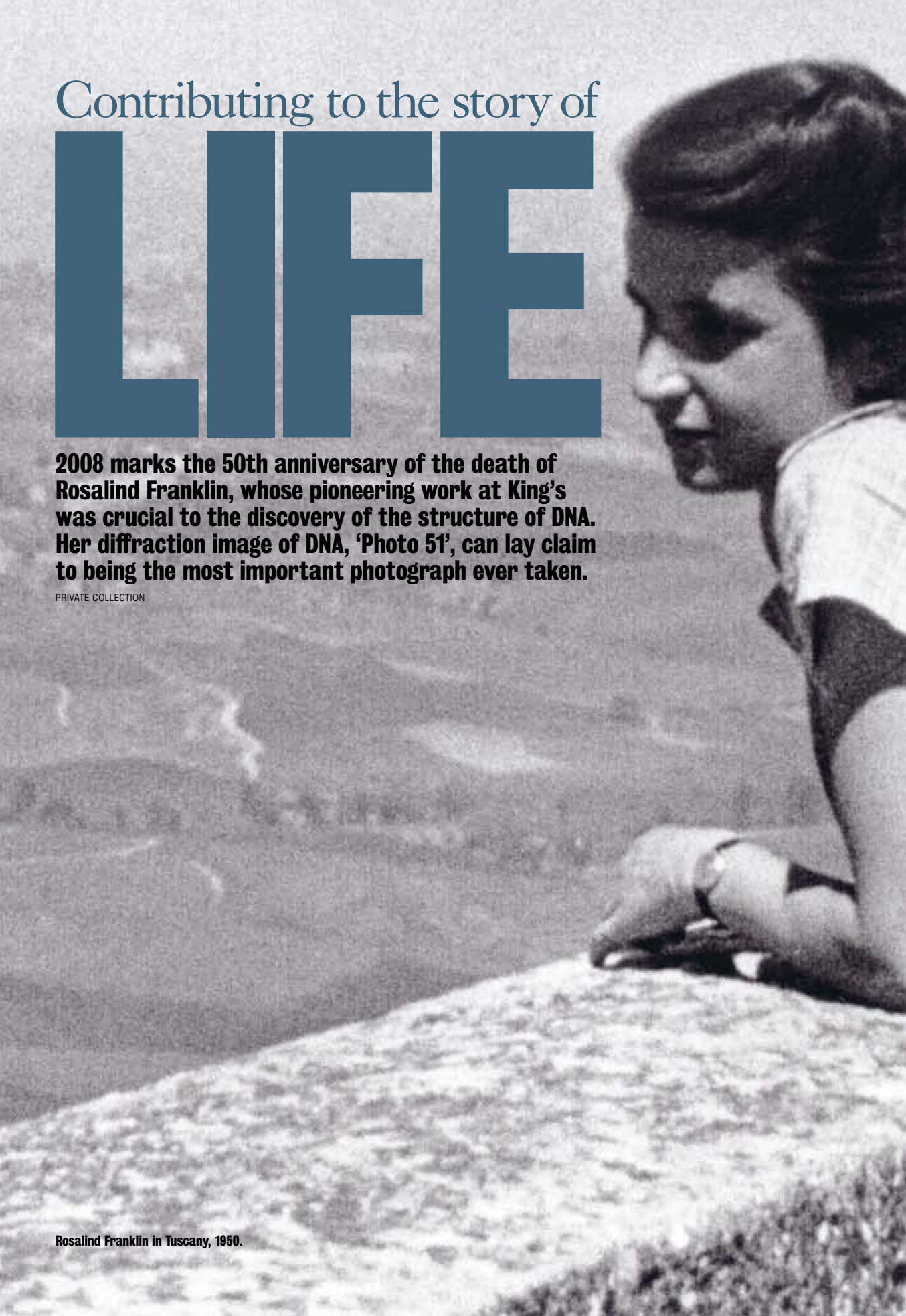
Paranoia is increasingly being treated using cognitive behavioural therapy (CBT), and in the future virtual reality may be used as a tool in the clinical assessment and treatment of paranoia, allowing patients to test out their fears in virtual worlds rather than in the real one. ■

Far left: One in three of the general population regularly experiences persecutory thoughts.
Left: Volunteers wearing virtual reality headsets walked around the virtual carriage of the train allowing patients to test out their fears in virtual worlds rather than in the real one.

Contributing to the story of LIFE

2008 marks the 50th anniversary of the death of Rosalind Franklin, whose pioneering work at King's was crucial to the discovery of the structure of DNA. Her diffraction image of DNA, 'Photo 51', can lay claim to being the most important photograph ever taken.

PRIVATE COLLECTION



Rosalind Franklin in Tuscany, 1950.

X-ray diffraction has been described as like shining a light through the crystals of a chandelier, so that the pattern of light diffracted on a wall makes it possible to guess the shape of the chandelier.

Rosalind Elsie Franklin was born on 25 July 1920 in Notting Hill, London. Both her parents came from established Anglo-Jewish families and her father was a merchant banker. She won a scholarship to St Paul's Girls' School and took her degree in natural sciences at Newnham College, Cambridge, in 1941. Because of wartime constraints, she did her PhD thesis on an industrial problem with coal with the Coal Utilization Research Association. In 1947 she moved to the Laboratoire Central des Services Chemiques de l'Etat in Paris, where, using X-ray diffraction techniques, she discovered the fundamental distinction between carbons that turn into graphite on heating and those that do not.

Randall

In January 1951 Franklin came to King's at the invitation of John Randall (later Sir John), to use her X-ray diffraction expertise in the new Biophysics Unit at the Strand. At that time it was not at all clear that DNA (deoxyribonucleic acid) was the key hereditary substance, let alone that it has a double helical structure that enables genes to replicate themselves because each of the molecule's two complementary strands can assemble a duplicate of its partner.

X-ray diffraction has been described as like shining a light through the crystals of a chandelier, so that the pattern of light diffracted on a wall makes it possible to guess the shape of the chandelier. Before Franklin arrived at King's, Maurice Wilkins (Randall's deputy) and Ray Gosling (Wilkins' PhD student) had already developed new types of microscopes and cameras and obtained a supply of highly-purified DNA that enabled them to capture images showing the molecule's crystalline structure. Franklin was asked by Randall to undertake a systematic X-ray study of DNA, and Gosling was placed under her supervision. However, as Aaron Klug remarks in his article on Franklin in the *Oxford Dictionary of National Biography*: 'Randall left an unfortunate ambiguity about the respective positions of Wilkins and Franklin'.

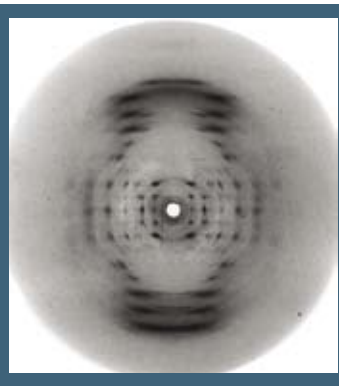
A and B forms

By controlling and varying the water content of the DNA specimens, Franklin was soon able to show that the molecule could exist in two forms (A and B). In May 1952 she and Gosling captured the famous 'Photo 51' of the B form which showed a clear X-shaped pattern and might have confirmed the earlier hypothesis of King's Alec Stokes that DNA had a helical structure. Franklin, however, concentrated in her analysis on the A form which did not seem to be helical, and the poor relations between her and Wilkins meant that Wilkins felt himself to be driven out of the DNA research.

Meanwhile, in Cambridge, Jim Watson and Francis Crick had begun to experiment with helical models of DNA. On 30 January 1953 Watson came to King's and had a heated argument with Franklin in her laboratory, after which Wilkins took him aside and showed him the crucial photo 51. Asked later whether he should have 'let the cat out of the bag' in this way, Wilkins commented: 'I think

'PHOTO 51'

Diffraction images of DNA captured at King's by Maurice Wilkins and Ray Gosling in 1950 (right) and by Rosalind Franklin and Ray Gosling in May 1952 (far right). The 1952 image, 'Photo 51', showed a clear X-shaped pattern and confirmed the earlier hypothesis of King's Alec Stokes that DNA had a helical structure.



KING'S COLLEGE LONDON ARCHIVES

PRIVATE COLLECTION

science isn't supposed to be kept in bags. Any more than cats. Science ought to be an open activity where you work as part of a community.'

At Cambridge Watson and Crick were also given an unpublished MRC report on Franklin's work, which confirmed their view that DNA was a double helix and enabled them to build a correct model of the molecule in February 1953. This was checked by the King's scientists before the results were published in *Nature* in April. Franklin's

Above: **Franklin's notebooks, showing her hypotheses about the three-chain or two-chain helical structure of the DNA molecule.**
Left: **Professor Maurice Wilkins, who received the Nobel Prize in 1962 for his work on DNA.**

PRIVATE COLLECTION

Left: Rosalind Franklin in Norway in the 1940s.
Below: The Principal with Professors Ray Gosling, Ellen Solomon and Noreen Murray at the celebration of Franklin's life and work.
Bottom: Franklin's work unravelled the double helix structure of DNA.

COMMEMORATING FRANKLIN, AT KING'S AND ELSEWHERE

Over 200 guests, including members of the Franklin and Wilkins families, helped to celebrate the life and work of Rosalind Franklin on 14 April 2008 at King's Strand Campus. Speakers included Professor Noreen Murray FRS, Emeritus Professor of Molecular Genetics of the University of Edinburgh, who came to King's as an undergraduate at the time that Rosalind Franklin was leaving; Professor Ray Gosling, who worked as a PhD student with both Rosalind Franklin and Maurice Wilkins and went on to have a distinguished career culminating as Professor in Physics Applied to Medicine at Guy's Hospital Medical School, and Professor Ellen Solomon, the current Head of the Division of Genetics & Molecular Medicine at King's. Brenda Maddox, Franklin's biographer, joined the platform to answer questions.

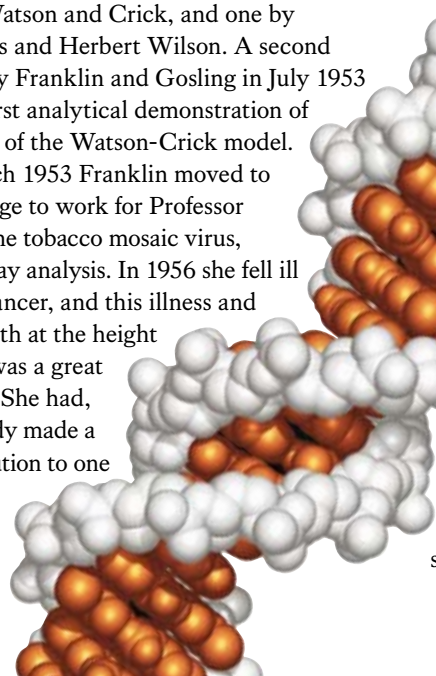
The College's Franklin-Wilkins Building in Waterloo, opened by HRH The Princess Royal in 2000, is a London landmark whose name commemorates two of the UK's most distinguished 20th-century scientists. There is an annual Royal Society Rosalind Franklin Award, funded by the government to promote women in science, engineering and technology, and a Rosalind Franklin University of Medicine and Technology in Chicago.

Online exhibitions and school packs about the King's work on DNA have been created by the College Archives, and a podcast features first-hand accounts and memories of Franklin and Wilkins recorded with their families, colleagues and friends. See http://www.kcl.ac.uk/about/history/archives/dna/

DAVID TETT

unpublished notebooks of February 1953 demonstrate that by then she had accepted that the structure of DNA was helical and had worked out important aspects of the pairing of the strands: results which were published in *Nature* alongside the paper by Watson and Crick, and one by Wilkins, Stokes and Herbert Wilson. A second *Nature* paper by Franklin and Gosling in July 1953 provided the first analytical demonstration of the correctness of the Watson-Crick model.

In mid-March 1953 Franklin moved to Birkbeck College to work for Professor JD Bernal on the tobacco mosaic virus, again using X-ray analysis. In 1956 she fell ill with ovarian cancer, and this illness and subsequent death at the height of her powers was a great loss to science. She had, however, already made a crucial contribution to one of the most important discoveries of the 20th century and helped to lay the foundations of structural molecular biology.



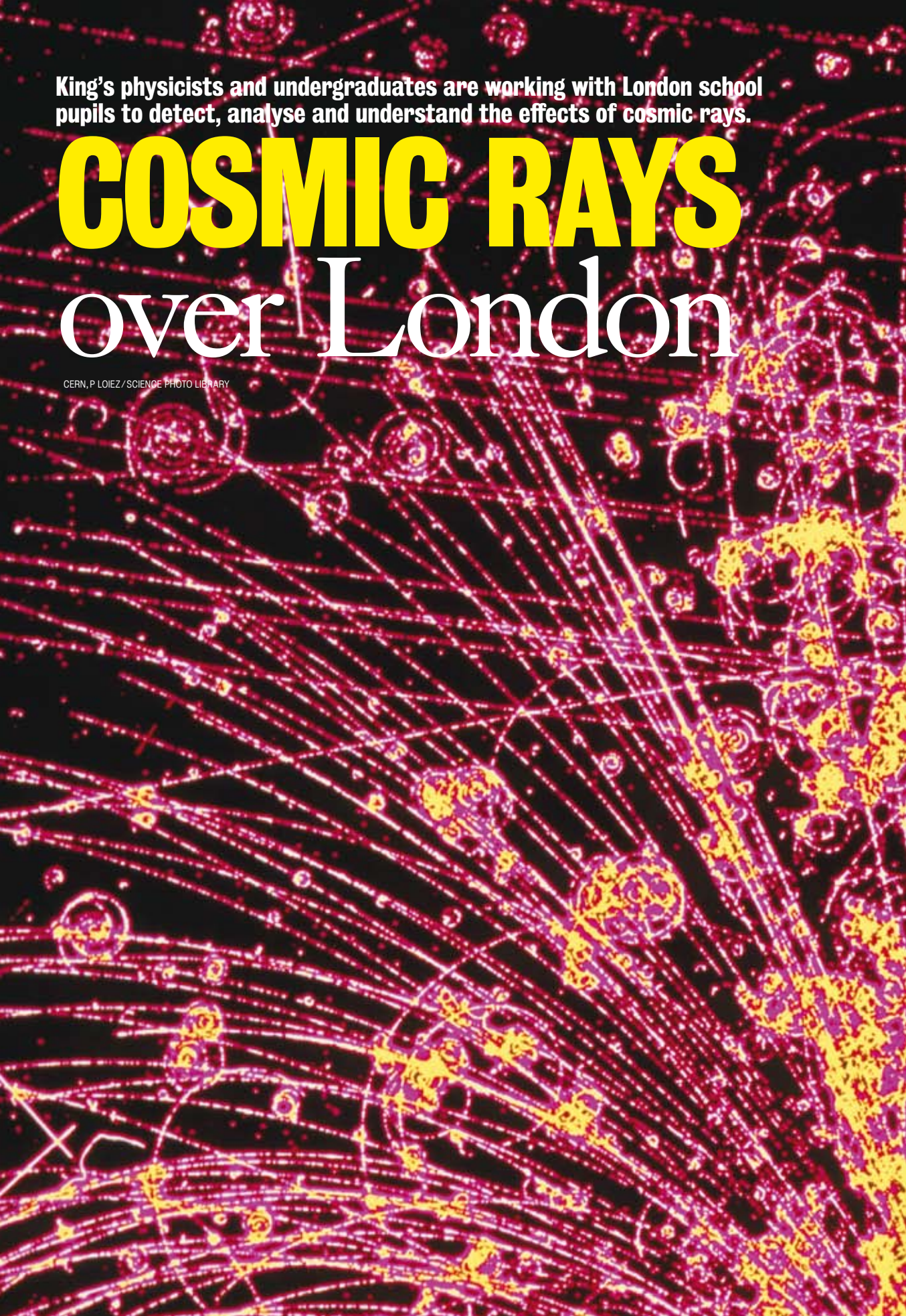
SCIENCE PHOTO LIBRARY

Aaron Klug writes of Franklin as 'single-minded and uncompromising in her work'. But, he added, 'she was not austere, she had a sense of fun, and was a woman of wide culture, at home in several European countries and the USA. She loved travel, took walking and cycling holidays abroad, and was a good mountain climber.' Ray Gosling has described 'an intensity about her, and an awkwardness in conversation'.

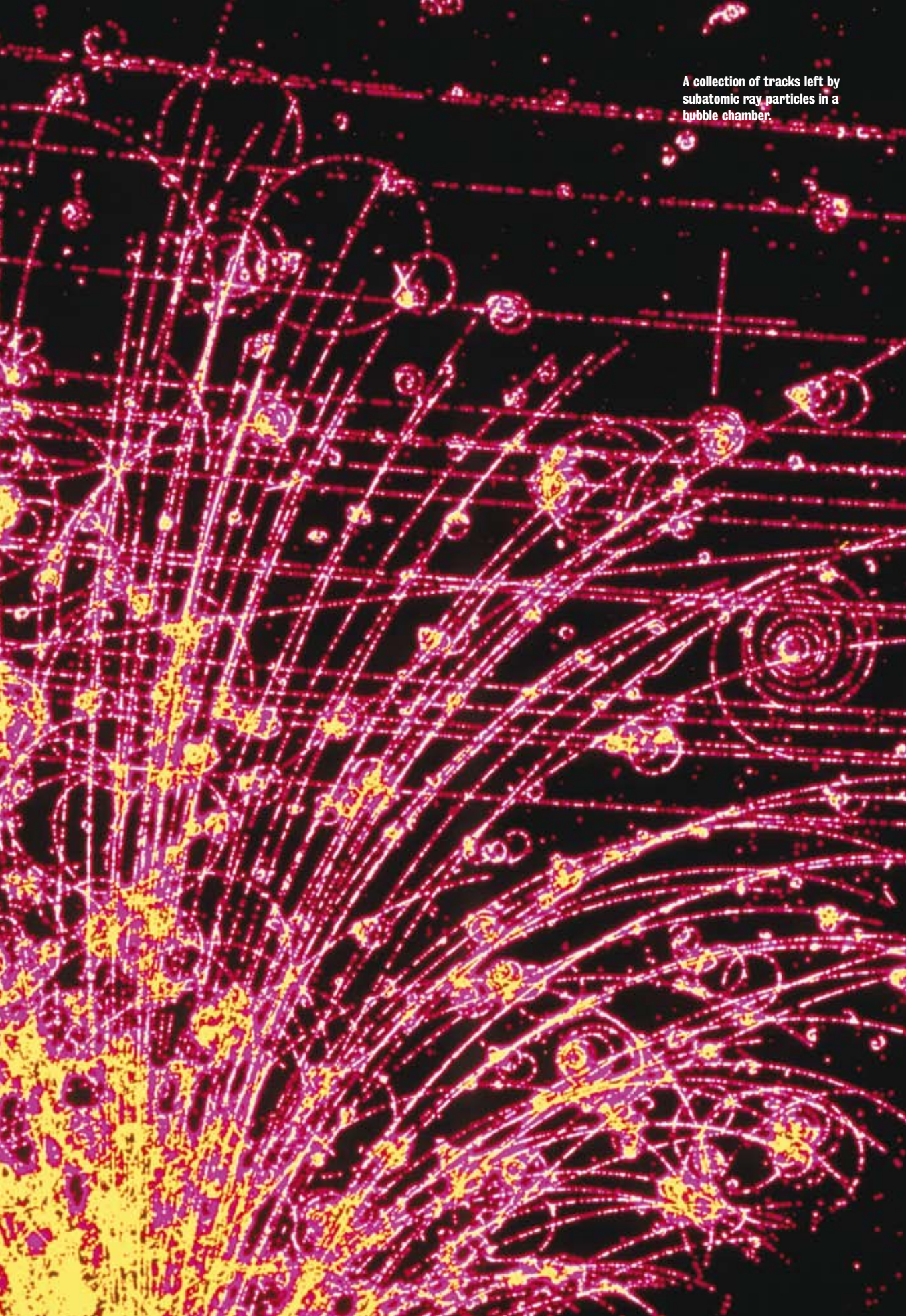
In 1962 Watson, Crick, and Wilkins were awarded a Nobel Prize for their work on DNA. The Prize is never given posthumously, so the question of whether Franklin should have been included did not arise. Since her contributions were crucial to the achievement, however, it is difficult to see how she could have been denied a share. ■

King's physicists and undergraduates are working with London school pupils to detect, analyse and understand the effects of cosmic rays.

COSMIC RAYS over London



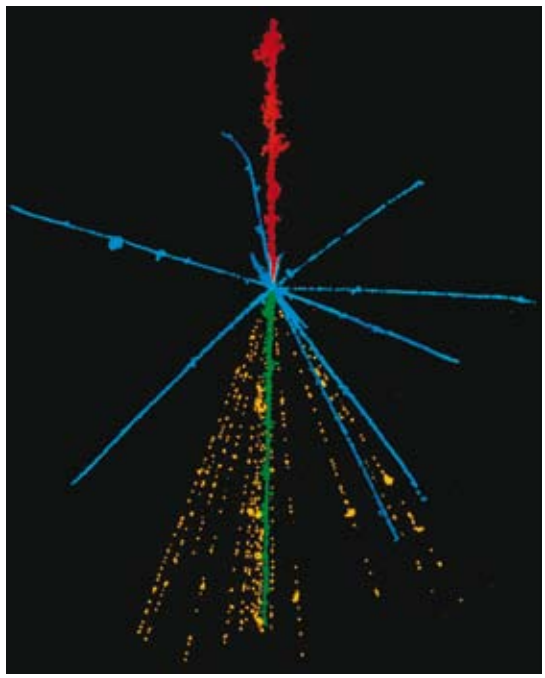
CERN, P LOIEZ / SCIENCE PHOTO LIBRARY



A collection of tracks left by subatomic ray particles in a bubble chamber.

Top: A false colour emulsion photo of a cosmic ray sulphur nucleus (red) colliding with a nucleus. The collision produces a spray of other particles: a fluorine nucleus (green), other nuclear fragments (blue) and 16 pions (yellow).

Below: Electronic display of an event in which four cosmic ray muons have passed through a proton decay detector. Faint flashes of light emitted by the passage of charged particles are shown as coloured stars and flashes.



C POWELL, P FOWLER & D PERKINS/SCIENCE PHOTO LIBRARY

IMB COLLABORATION/SCIENCE PHOTO LIBRARY

Cosmic rays are sub-atomic particles from space that are continually bombarding the earth. They are crucial to interpreting some of the most violent events that take place in the universe, and understanding their behaviour has important implications for the manned exploration of space.

'The term "ray" is a misnomer, since cosmic particles arrive individually, not in the form of a ray or beam', explains Professor Alan Michette, who is heading the project at King's to collect information about these particles. 'When they hit the earth's upper atmosphere they collide with gas molecules and cause millions more particles to be produced. Some of the particles in these showers reach ground level, and they pass through objects – including human bodies – at a rate of several thousand per minute. On earth this process is imperceptible, and any damage caused is very quickly repaired by the body's natural mechanisms. For astronauts, however, the radiation environment of deep space does not offer the same protection as the earth's atmosphere, and the potential damage that could be caused by cosmic rays, such as cataracts or cancers, is an important consideration in the plans for interplanetary travel.'

Range

Cosmic rays are generated by the sun, by sources such as neutron stars, supernovae and black holes in the galaxy in which the earth is located, and also by events in the far reaches of the universe. 'The range of their energies and numbers is enormous', points out Michette. 'Cosmic rays of the lowest detectable energy (about a million times higher than the electrons in an old-style TV tube) generate millions of particles a second, most of which will reach the earth. High-energy cosmic rays have the same level of energy as a ball served by a tennis ace: equivalent to a speed of around 100 kilometres per hour (by comparison, the world's highest energy particle accelerator could only propel the same tennis ball about four millimetres in a week).'

Low-energy cosmic rays generate enough particles for a few hundred to pass through each human body every second, without causing any perceptible damage. Although the highest-energy rays generate about 200 billion particles in their showers, the number of these particles to reach the earth is much lower, and showers from cosmic rays of the highest energy will, on average, pass through only eight Londoners a year: still with no lasting damage to the people concerned.

'We don't know where these really high energy cosmic rays come from, or how they acquire such energy, and it's for this reason it's important to study them', Alan Michette adds. 'The higher the

Below: Cosmic rays are sub-atomic particles from space that are continually bombarding the earth. When they hit the earth's upper atmosphere they collide with gas molecules and cause millions more particles to be produced. Some of the particles in these showers reach ground level and pass through objects – including human bodies – at a rate of several thousand per minute.

MARK GARLICK / SCIENCE PHOTO LIBRARY

energy of the initial cosmic ray, the larger the area over which its influence will be felt on the ground. Placing detectors over as large an area as possible does, therefore, allow fundamental studies to be made about the universe's generation of energy. It makes sense to place detectors in a variety of settings, such as schools, and this has the added benefit of involving many more members of the community in the excitement of scientific research.'

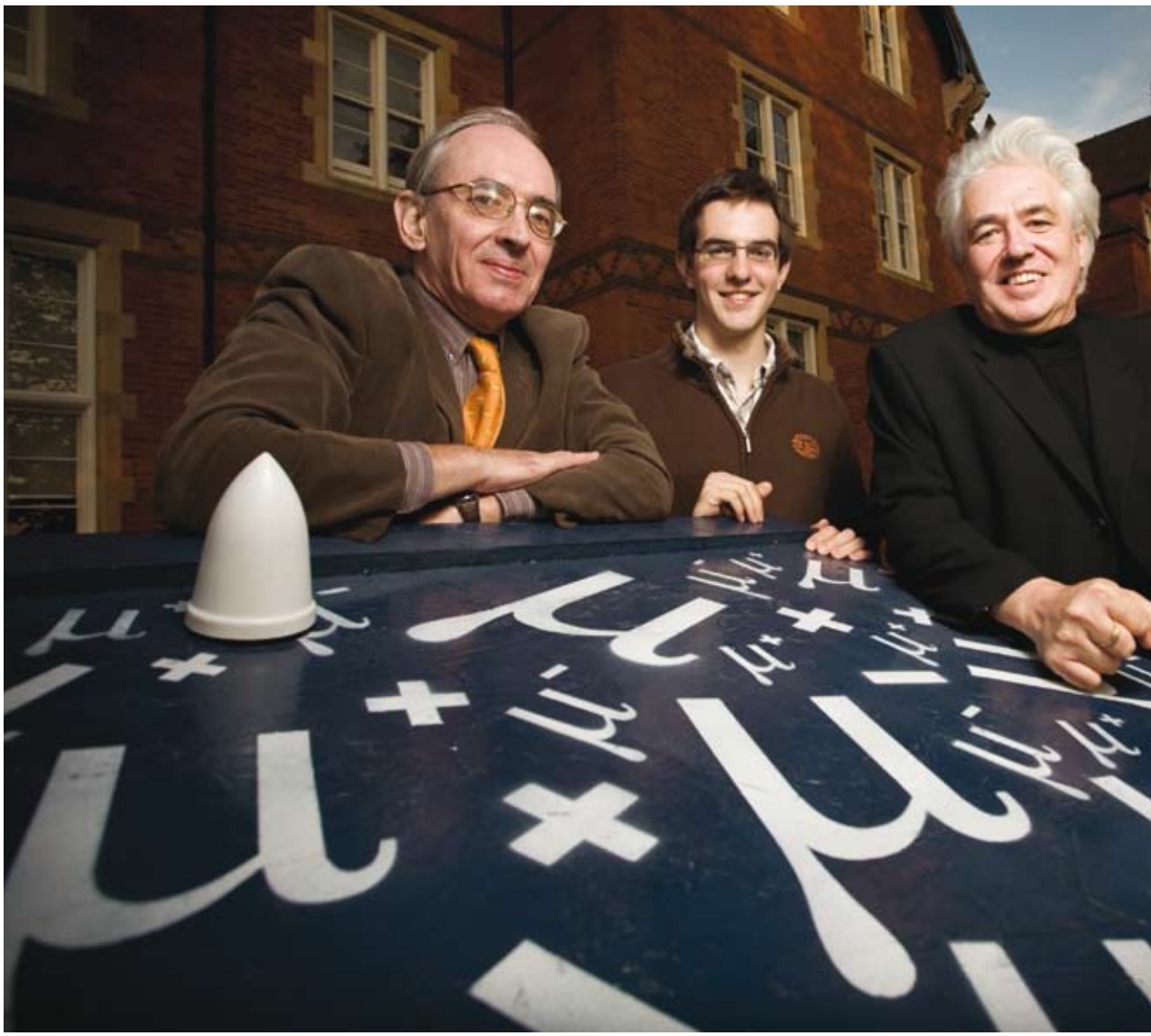
Using financial resources provided by King's former students and friends, through the King's Development Fund, a first set of detectors has been constructed by undergraduate physics students at the College as part of their project work.

Each set of detectors consists of three panels of plastic 'scintillator', which emit flashes of light when cosmic ray shower particles pass through them. This light is then amplified and collected, under computer control; and the intensity of the recorded light provides information on the numbers and energies of the detected particles. The data is then stored for later analysis.

In August the first set of three detectors was placed in the grounds of Highgate School, where

Showers from cosmic rays of the highest energy will, on average, pass through eight Londoners a year.

GREG FUNNELL



the pupils will be running and maintaining them and analysing the data collected. King's Physics graduate Jasper Pandza, who has taken part in the College's undergraduate ambassador scheme with the School, describes the pupils as 'really excited and enthusiastic about the prospect of being involved in real science, and about gaining hands-on experience of making and analysing real scientific measurements'. The pupils will, for example, be able to discover, from the angle at which the particles hit the three detector panels, the direction from which the primary cosmic ray came. They can also study correlations with atmospheric pressure and thunderstorms, and collect data about the difference between the day and night rates of particle arrivals.

David Smith, Head of Physics at Highgate, is enthusiastic about the scheme. 'I've long wanted to become involved in such a project, since hearing about one of the North American arrays during a visit to the US. These experiments relate directly to the GCSE and A level syllabuses, and

Above: **Professor Alan Michette (left); King's Physics graduate Jasper Pandza and Professor James Pinfold, with the cosmic ray detector recently installed at Highgate School.**

Left: **Visiting school students view a cosmic ray detector at King's.'**

enhance pupils' learning through direct experience'. At Highgate in fact it's not only the science students who have become involved, but also those studying art and design, who have provided attractive and innovative detector housings.

Community involvement

The King's/Highgate detectors are the first of their kind to be used in Britain, as previous projects in this country have been entirely research-oriented and have not attempted to involve the community. The principle of community involvement has, however, been used in other parts of the world, notably in Alberta, Canada, where James Pinfold (currently a visiting professor at King's) originated and set up the first such detector array in 1998, helping to bring about an upturn in interest in studying science at university. Schemes have since begun in the USA, Mexico, Holland, Poland, the Czech Republic, France, Italy, Germany and Finland, and other similar projects will soon be starting elsewhere in the world.

Money donated through the College's Development Fund is funding a series of public meetings, with the aim of getting many more schools involved, in the London area and beyond. More detectors are being assembled in the Department of Physics, and will soon be deployed. 'We'd like to set up a gigantic array, using GPS (Global Positioning System) to link schools around the world', James Pinfold says. Alan Michette adds 'This would enable our students and school pupils to be involved in experiments which could make really important contributions to scientific discovery in this field'. ■

Creating **CULTURAL** collaborations

Close working links with London's cultural organisations are the most recent aspect of King's long-standing ability to bring together the worlds of academia, practitioners and the professions, as Keith Hoggart and Trudi Darby demonstrate.

The Enlightenment Gallery at the British Museum.

Over the last 20 years King's has been forming strategic links with organisations from the arts and cultural sector which, because of King's central London location, are often quite literally the College's neighbours.

Whether enabling doctors to work as professors as well as clinicians; encouraging eminent practising lawyers to lecture in the Law School, or deploying academics in the College's Music Department to contribute programme notes for London's opera houses, King's has long been distinguished for fostering a close relationship between academia, practice and the professions.

Masters in partnership

Over the last 20 years King's has been pursuing this aim by forming strategic links with organisations from the arts and cultural sector: organisations which, because of King's central London location, are often quite literally the College's neighbours. The first step, in 1990, was a partnership with the Royal Academy of Dramatic Art (RADA) for a joint master's degree in *Text and Performance Studies*, in which the College teaches students how to read dramatic texts and RADA enables them to explore how the texts can be performed. This programme has provided the model for further MAs: in *Shakespeare: Text and Performance*, and in *Creative Arts in the Classroom* (for teachers), both taught jointly with Shakespeare's Globe Theatre in Southwark, and, most recently, in the *Eighteenth-Century Studies* MA with the British Museum and the *Early Modern English Literature: Text and Transmission* MA with the British Library.

In another collaboration with the Globe Theatre, Professor Gordon McMullan of the English Department is investigating the extent to which the plays of Shakespearian London were shaped by the spaces for which they were written and the implications this might have for new writers in the reconstructed Globe. Professor Max Saunders, also of the English Department, is supervising research into the Imperial War Museum's archive of written, 1960s memories of the First World War, exploring this material from the perspective of life-writing, rather than as military or social history. This project has attracted a collaborative award from the Arts and Humanities Research Council, and two other AHRC awards are funding English postgraduate research at the Globe and at the National Portrait Gallery. The second of these helped to create the exhibition *Brilliant Women:*

COMBINED ENLIGHTENMENT

The MA in *18th-century Studies* is jointly taught by the British Museum and the King's departments of English, History, American Studies, Comparative Literature, French, German, Music and Philosophy, led at King's by Dr Clare Brant of the Department of English. Making imaginative use of the Enlightenment Galleries at the Museum, it explores ways of looking at the idea of 'Enlightenment', then and now. Students are encouraged to use the resources of other institutions close to King's, including the Royal Society, the National Portrait Gallery and the Hunterian Museum at the Royal College of Surgeons. An 'Enlightenment Swap Shop' in April 2008 provided an opportunity for an exchange of ideas between scholars, curators and students of the 18th century.

KING'S RARE BOOKS TC376 SME

Right: The new MA in 18th-century studies celebrates technical achievements of the time, such as this 1759 lighthouse on the Eddystone Rocks.

Academics from King's Department of American Studies contributed to the British Museum's exhibition of American prints, which included Robert Gwathmey's *Hitchhiker* (1937).

Eighteenth Century Bluestockings (see right).

Alan Read, the College's Professor of Theatre, collaborates both with theatre practitioners and architects through his *Performance Architecture Location* project which has found a new use – as a performance space – for the former Anatomy Museum at the Strand Campus, complete with its gallery formerly used for displaying medical specimens. In the Classics Department Dr John Pearce is supervising a project evaluating the impact of the metal-detected data collected through a scheme, led by the British Museum, which records archaeological objects found by members of the public. And academics from King's

OUT OF THE SALON

The *Brilliant Women* exhibition, which ran from March to June 2008 at London's National Portrait Gallery, was the first to explore the culture, impact and identity of the Bluestockings and their followers, who forged new links between gender, learning and virtue in 18th-century Britain. 'The Bluestockings were so-called after the botanist Benjamin Stillingfleet', explains Dr Elizabeth Eger, Lecturer in 18th-century and Romantic Literature at King's, who co-curated the exhibition with Dr Lucy Peltz, 18th Century Curator at the NPG. 'He came to a salon hosted by Elizabeth Montagu, literary critic and hostess, wearing the blue woollen stockings worn by working men, instead of more formal white silk. The term subsequently became associated with these conversation parties, which included both women and men. Through Montagu's encouragement and patronage of women's writing, the term became associated specifically with women who sought a life of the mind. By the 1770s, the professional achievement of female writers and artists began to challenge traditional stereotypes of female accomplishment, and the public presence of "the Blues" drew attention to the need for equality between the sexes.'

TEXT AND TRANSMISSION

The partnership with the British Library provided by the MA in *Early Modern English Literature: Text & Transmission* enables students to study some of the masterpieces of early modern English literature – including Shakespeare – in their original editions (print and manuscript). 'Students will also learn how to read early modern handwriting, to transcribe neglected literary manuscripts and rare printed texts, and to edit them for the modern reader', explains course leader Dr Sonia Massai. 'They'll have privileged access to the holdings and expertise of the British Library, allowing them to study literary texts in their original editions and learn about how they were first produced, read or performed. This was a period in which the rise of print, the steady growth of a literary market and the advent of commercial playhouses radically altered the structures of aristocratic patronage and coterie circulation associated with the production and reception of literary works.'

NATIONAL PORTRAIT GALLERY, LONDON

'Characters of the Muses in the Temple of Apollo' by Richard Samuel (1778). An exhibition of 18th-century Bluestocking culture was co-curated by Dr Elizabeth Eger from the Department of English.

PROCURATORIA DI SAN MARCO/CAMERAPHOTO ARTEVENICE

KING'S SPECIAL COLLECTIONS DS103 BRI

Below: King's Centre for Hellenic Studies collaborated with the Royal Academy for its *Byzantium* exhibition, which included this incense burner from San Marco, Venice. **Bottom:** King's History Department helped to organise a conference marking the 60th anniversary of the British withdrawal from Palestine. This print showing the Palestine pavilion from the British Empire Exhibition is from a Foreign and Commonwealth Office collection which came to King's this year (see page 21).

American Studies Department have contributed to events connected with the British Museum's exhibition *The American Scene: Prints from Hopper to Pollock*, which ran between April and September 2008.

Joint insights

In the Department of Geography, Dr David Green is working with the Museum of London to gain understanding of the relationships between urban growth and the management of water in 18th and early 19th-century London. In Music, Professor Daniel Leech Wilkinson is investigating a collection of tapes at the British Library Sound Archive documenting the rehearsals, concerts and broadcasts of Sir Charles Mackerras over many years, enabling him to explore the differences between music-making recorded in studios and concert halls, with and without editing and post-production.

In May, to mark the 60th anniversary of the British withdrawal from the Palestine mandate, King's History Department joined with the British Empire & Commonwealth Museum and the Institute of Commonwealth Studies to organise *Palestine, Britain & Empire: 1841-1948* – a public conference that was opened by HRH The Princess Royal, Chancellor of the University of London.

In July, a two-day military history conference jointly organised by the College's Department of War Studies and the Imperial War Museum considered *Allied Fighting Effectiveness in North Africa and Italy, 1942-1945*. International academics presented the latest research on aspects of the campaigns on land, sea and in the air, providing new insight into an important and understudied area of the Second World War. And, as the *Report* went to press, experts from King's Centre for Hellenic Studies were collaborating with the London Centre for Arts and Cultural Enterprise and the Royal Academy in sponsoring a series of events to accompany the epic RA exhibition, *Byzantium 330-1453*, which runs from October 2008 to March 2009.

A further dimension of King's successful links with the cultural sector is its MA programme in *Cultural and Creative Industries*: one of only a handful of tertiary level programmes in the UK that examine this socio-economic sphere and its history and provide the knowledge to facilitate

JO MIESZKOWSKI

Ian McEwan read from his prize-winning novel *Atonement* at King's in December, at an event hosted by Professor Anne-Marie Rafferty, Head of the School of Nursing & Midwifery. The novel draws on the experiences of a nurse at St Thomas' Hospital in the 1950s.

careers in these industries. The MA involves students in working for a short period as interns in a commercial or public-sector cultural organisation. And typical of the College's interests in both the world of the arts and the world of health is a 'Nursing and the Arts' module, in which King's nursing and midwifery students can explore the relationships between nursing, illness, health-care in a broader sense, and the arts. This is an element of the *Culture and Care* strategy which has recently seen the College's Florence Nightingale School of Nursing & Midwifery forging links with a number of arts organisations with the assistance of King's Business.

Nursing & Midwifery has also hosted public readings by high-profile writers, and in December Ian McEwan read to a capacity audience from his novel *Atonement*, which is set partly in St Thomas' Hospital.

Engaging the public

A common factor in all our links with the cultural sector is encouraging public engagement with the university and with the arts. Whereas in the opera projects for nursing students (see right), it's the staff of English National Opera's Baylis Programme who facilitate the workshops, in the case of study days for ENO audiences, the College has provided the teaching, the expertise and a convenient location. For a study day at the Strand (about ten minutes' walk from ENO's home at the Coliseum) on Benjamin Britten's opera *The Rape of Lucretia* the ENO fielded Dame Janet Baker talking about working with Britten while Dr Sonia Massai from King's Department of English explained the literary background to Britten's libretto. A study day on *The Turn of the Screw,* held at the Guy's campus, brought together academics from King's

MICHELE TURRIANI AND ENO

DESIRE, DISEASE AND DEATH

A performance of Verdi's *La traviata,* followed by a special workshop at the London Coliseum, provided the perfect dramatic setting for 28 King's nursing students to discuss and reflect on the subjects of death and dying, denial, concealing illness from loved ones, and the resurgence of tuberculosis in 21st-century London. The participants wrote and acted out several different versions of Violetta's death, with music underscoring and direction provided by professional staff of English National Opera's Baylis Programme. These new scenes included the themes of respect, privacy and dignity, romanticised ideas of last-minute reprieve from death, and reflections on how someone can be prepared for their death.

Ian Noonan, Lecturer in Mental Health, who developed the 'Nursing and the Arts' module, comments: 'This workshop, and the subsequent ones on Puccini's *La bohème* and Britten's *Death in Venice*, brought together nursing students who were only a few weeks into their initial training, postdoctoral researchers and lecturing staff. By singing and acting together, we could all explore the ways we use our voices in comforting, caring, teaching, instructing and advocating, and consider issues of tone, pace, rhythm and volume of speech'.

Next year students will be tackling child protection issues in Britten's *The Turn of the Screw*, and honourable death and suicide in Puccini's *Madame Butterfly*.

This representation of the map of Shanghai by Liu Zhizhi illustrates contemporary Chinese design, as explored in the conference on *Creative China*, organised by King's and the V&A.

departments of English, Psychiatry, Nursing and Music with participants from the ENO.

The Nursing projects demonstrate that this kind of involvement with cultural organisations is not limited to the arts and social science side of the College, and Dr Mark Miodownik, a materials scientist from the Division of Engineering in the School of Physical Sciences & Engineering, has been intriguing visitors to Tate Modern with his podcast on the many materials that artists use (see www.materialslibrary.org.uk)

Beyond London

Looking further afield than London, the College's Centre for Brazilian Culture & Society works with Boulevard Books to translate Brazilian fiction, as well as hosting its own Writer in Residence programme and researching into Brazilian music. Most recently the Centre for Culture, Media & Creative Industries has set up the *Asian Cultural Industries* series, on topics ranging from high-level policy to the influence of Manga and Anime, and has successfully run a conference with the Victoria and Albert Museum: *Creative China: Visual Culture, Architecture & Design*. Beyond London, the exciting three-dimensional creations of the King's Visualisation Lab are in demand from cultural organisations in many different countries, and the charter which the Lab has promoted for this work is setting standards internationally (see above right).

In all these cases, what King's is looking for is an exchange between the particular expertise that comes from in-depth, academic study, and the life of the subjects we study. A typical case is the Arden edition of Shakespeare, which is edited from our English department (see *Report* 14, 2006). Actors value the texts we produce; editors gain enormous insight from what actors have to say about texts in performance. We are the lead institution in the London Centre for Arts and Cultural Enterprise (LCACE) which is a partnership of eight London universities and is one

WHAT CAN THE MATTER BE?

A podcast about materials, science and art for the Tate Gallery, created by Dr Mark Miodownik and his team in the Materials Research Group at King's, became the most popular download on iTunes' arts programmes when it was launched last year. The audio tour tackled ideas such as what a painting sounds like; how your sense of touch might change the way you see a work of art; what makes the hum in Tate Modern's turbine hall; what the sound is inside a piece of sculpture, and the fractal patterns in Jackson Pollock's paintings.

SUSTAINING CREATIVITY

The creative industries are the success story of London's economy, but how to sustain London's position as a creative capital was one of the concerns of the 60 delegates at a half-day seminar, *Who's shaping the future for the creative industries?* held at King's in January 2008. In her address Margaret Hodge MP, Minister of State for Culture, Media & Sport, described the agenda for the creative industries is being 'at the heart of Government'. Organised by King's Business and the Economic & Social Research Council, the conference was chaired by the broadcaster and author Mark Lawson and included a presentation by Professor Christian Heath, Professor of Work and Organisation in King's Department of Management.

We are able to foster collaboration with the arts sector, encourage dialogue, promote the exchange of ideas and help academics and practitioners to develop their talents by working together.

The images above and below right were created by King's Visualisation Lab (KVL). Above: Actors enacted scenes from ancient Roman comedy wearing full-scale masks derived from three-dimensional scans of ancient terracotta miniatures. These performances were then captured and placed into virtual reconstructions of ancient theatres modelled by KVL. The captured movements will also be used in Second Life to animate virtual actors.

Below right: The World Heritage site at the Roman Villa of Oplontis, near Pompeii, Italy, has 100 rooms and is the largest, best preserved and most sumptuously decorated Roman villa ever to be discovered. The virtual model prepared by KVL is creating a digital three-dimensional model of the existing state of the villa and a hypothetical reconstruction of what it was originally like when fully furnished and functioning.

SEEING IT IN THE ROUND

Three-dimensional visualisations of objects, places and events are an increasingly important part of the work of museums, historic buildings, archaeological sites and other cultural organisations. They can, for example, recreate a performance in a historic theatre, or enable people to examine an artefact that is too fragile to be handled, or hypothetically reconstruct what an ancient villa was like when furnished and functioning.

All these ventures come from the portfolio of the King's Visualisation Lab (KVL), which joined the College's Centre for Computing in the Humanities in September 2005 and is now the world leader in this area under its Director, Professor Richard Beacham.

Building on this expertise, an important recent KVL project is creating an international charter aimed at establishing internationally-recognised principles for the use of three-dimensional visualisation by researchers, educators and cultural heritage organisations. The 'London Charter' was conceived, pioneered and drafted by Dr Hugh Denard of the Visualisation Lab and drafted in consultation with people engaged in this work from many different countries. The Italian Ministry of Culture has adopted it as a standard for projects under its guidance, and the UK Arts and Humanities Research Council (AHRC) recently described it as having 'interdisciplinary ramifications for anyone planning to do academically rigorous work on 3D visualisation, and is thus at the heart of making ICT relevant for the humanities more generally'.

of our neighbours in Somerset House. Through LCACE we are able to foster collaboration with the arts sector, encourage dialogue, promote the exchange of ideas and help academics and practitioners to develop their talents by working together. LCACE is merely one example of how academic interests and the professional world of the arts can come together so that both benefit. ■

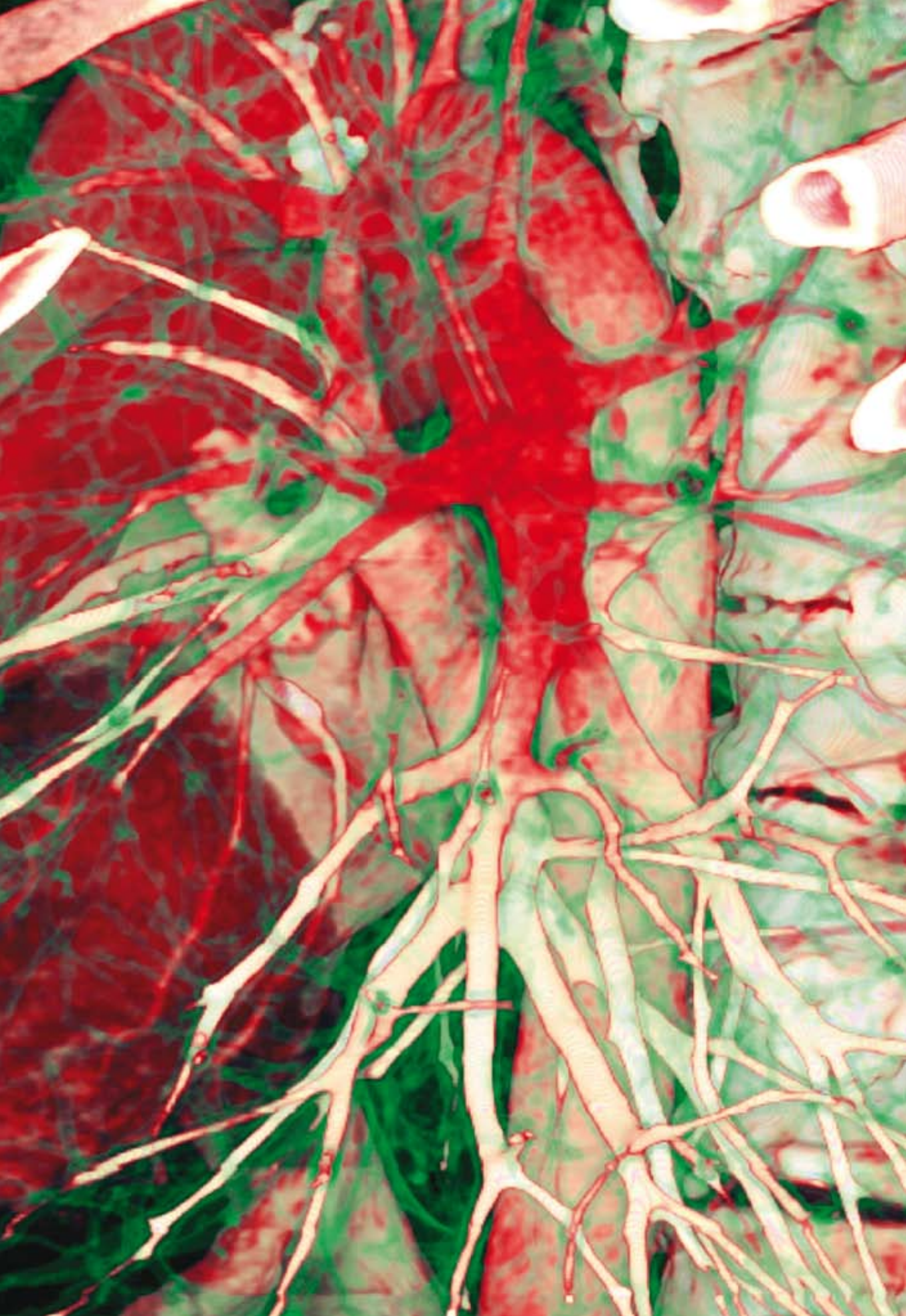
Professor Keith Hoggart is Vice-Principal with special responsibility for the College's four arts and sciences Schools and also for External Affairs. Dr Trudi Darby is Deputy Head of Administration for Arts & Sciences.

Developing a **CLEARER** image

Medical imaging research at King's is inventing new means of diagnosing, monitoring and assessing patients' conditions.

ANTOINE ROSSET / SCIENCE PHOTO LIBRARY

A coloured 3D scan of a chest, produced by a CT scanner which uses a thin X-ray beam to scan around the patient, collecting data from different angles to create an image which shows a 'slice' through the body.



An array of sophisticated imaging options draws on many kinds of science to enable patients' conditions to be quickly diagnosed, monitored and fully assessed.

Once doctors had little to help them in diagnosis other than their own eyes, ears and senses of touch and smell. Now an array of sophisticated imaging options draws on many kinds of science to enable patients' conditions to be quickly diagnosed, monitored and fully assessed, and further means of 'seeing' into the body and its functions are being rapidly developed, with King's as a world leader in this field.

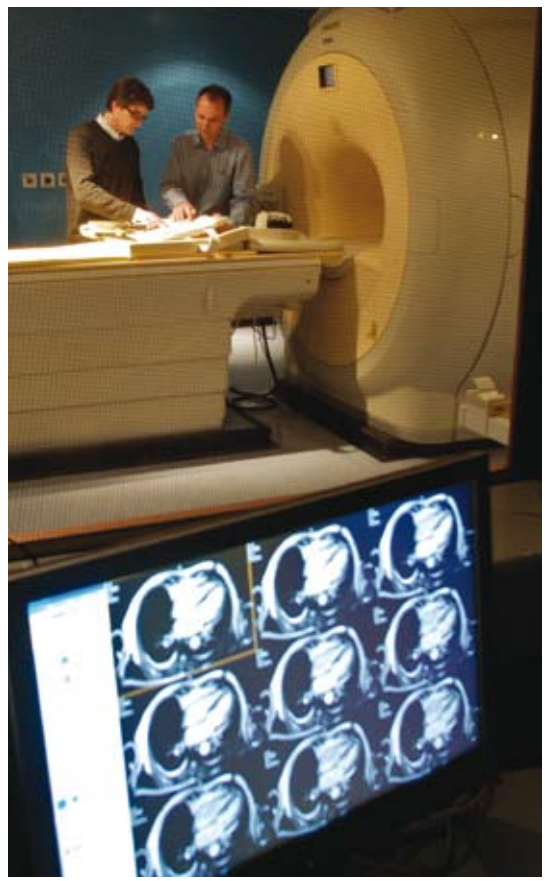
In November 2007 a new £10 million Imaging Centre opened at St Thomas' Hospital, providing dedicated facilities for Magnetic Resonance Imaging (MRI), Positron Emission Tomography (PET), Ultrasound and X-ray imaging. The College's Division of Imaging Sciences, based in the newly refurbished wing of the Rayne Institute, brings together some 70 researchers whose expertise spans disciplines from computer science, medical physics and mathematics to chemistry, biology and medicine. This breadth of skills, and the new Centre's state-of-the art facilities, put King's in the forefront internationally in imaging research, particularly in the fields of organ transplantation, heart disease and cancer.

Bringing it together

Reza Razavi, Professor of Paediatric Cardiovascular Science and Head of the Division of Imaging Sciences, comments: 'Areas in which we're making particularly rapid strides are in imaging the plaque that causes heart attack and stroke, using new specific magnetic resonance dyes; new ways of more accurately measuring the blood flow to the heart, which allows us to diagnose patients who may need intervention for coronary artery disease, and developing the means to visualize the blood flow inside the heart and its vessels in three dimensions.

'Synergy between different disciplines is crucial for medical imaging. For example, a new scanner that combines MRI and PET allows doctors to see anatomy and function in the same patient at the same time. Research on bone metabolism is drawing on the expertise of the Osteoporosis Unit, the PET Centre and Nuclear Medicine in order to understand the mechanisms of osteoporosis and assessing the efficacy of novel treatments. New work on image-guided intervention, in which medical images assist in performing a procedure involving the insertion of a medical device inside the body, draws on our expertise in real-time MRI, novel device technology and advanced image processing and visualization techniques.

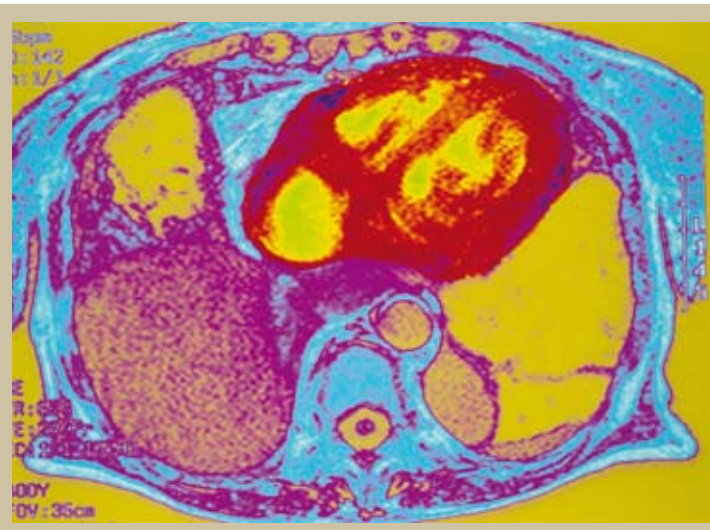
'Other kinds of synergy are also vital. We cultivate strong links with large imaging equipment manufacturers and the pharmaceutical industry, as well as with small and medium enterprises and university start-up companies that are developing new devices and computational methods. Absolutely crucial is our very close working relationship with our partner NHS foundation trusts (Guy's & St Thomas', King's College Hospital and the South



PHIL SAYER

Professors Eike Nagel (left) and Tobias Schaeffter with the 3T magnetic resonance scanner in the new Imaging Centre at St Thomas' Hospital.

THE LANGUAGE OF IMAGING



BSIP DUCLOUX/SCIENCE PHOTO LIBRARY

Coloured MRI scan of a horizontal section through the chest, showing a healthy heart.

Positron emission tomography (PET) is a nuclear medicine imaging technique which produces a three-dimensional image or map of functional processes in the body. Radioactive tracers are injected into the body and accumulate in areas which are metabolising fast, emitting rays which can be reconstructed as images of function. Used primarily in heart disease and cancer, this process enables doctors to see if tissue is working properly at the chemical level rather than just what it looks like anatomically. Changes can often be seen long before they are evident in the patient's anatomy. The resulting images are often combined with computed tomography (CT) images, created from X-rays that measure the density of each part of the body. By doing this, it is possible to map the functional image of the tracers in the body onto an anatomical image to provide further information.

Magnetic resonance imaging (MRI) works by placing the body in a very strong magnetic field and then measuring changes in radio frequency to generate a picture of water density in the body. It is commonly used to visualize the anatomical structures and function of the body's organs.
In particular, it provides much greater contrast between the different soft tissues of the body than does PET/CT, making it especially useful in brain, musculo-skeletal, heart and cancer imaging.

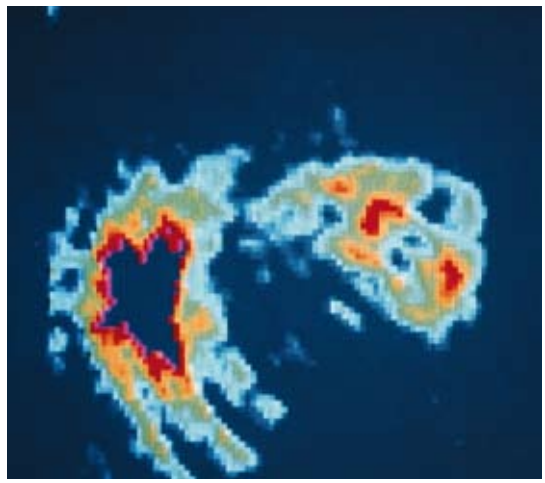
The world's first *PET and Nuclear Magnetic Resonance (NMR) dual acquisition (PANDA) system* was developed at King's, in collaboration with UCLA, to provide doctors with anatomical and molecular information at the same time. For example, PET scanning may show that a small region of tissue is not functioning correctly at the molecular level (perhaps because it is a tumour). The MR image acquired at the same time allows the anatomical region to be accurately located within the body. Researchers at King's are developing new tracers that can be detected by both MR and PET at the same time.

London and Maudsley) and this is being strengthened as part of the new Academic Health Sciences Centre (see page 7) which emphasises the importance of research in improving patient care.'

Biomedical physicist Rene Botnar joined King's in 2007 as Professor of Cardiovascular Imaging. His fascination with heart imaging began when he saw stunning images of his own heart generated by Computed Topography (CT) scanning. He views the heart as the most beautiful organ in the human body and also one that, because it is continually pulsing, poses a great challenge to imaging physics.

'Atherosclerosis is a disease of the wall of the blood vessels that supply the heart with oxygen', he explains. 'It can be caused by high cholesterol, smoking, high blood pressure and diabetes. When fatty material such as cholesterol is deposited in the vessel wall the body generates an inflammatory response to remove these unwanted foreign molecules and restore its normal working. If this protective inflammatory response goes awry, excessive inflammation can cause the body to continuously bring in blood-born monocytes (white blood cells) to the site of injury. When these

PET scan of the human heart, showing the effect of a blood clot on blood flow in one of the coronary arteries.



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develop into macrophages (a type of white blood that takes in foreign material) which digest lipoproteins (fatty material), this can lead to the thickening, weakening and potentially to the rupture of the wall of the blood vessel: the main cause of stroke and irreversible injury to the heart.

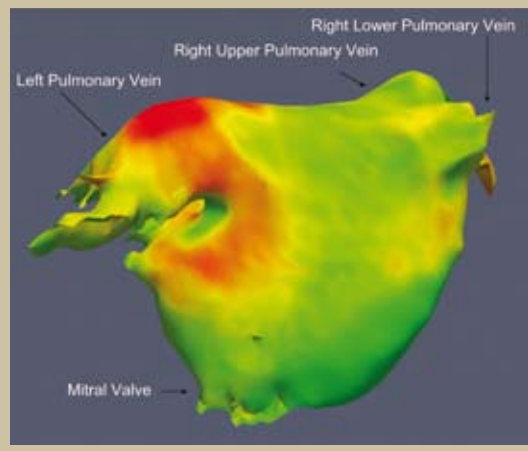
'A diseased vessel usually expands before it starts blocking the blood flow to the heart muscle, but this process is difficult to detect with current diagnostic imaging tools. We're therefore focusing our research on the early detection of these changes. We've found that the combination of very strong magnetic fields, in MRI, and tiny "detectives", called molecular imaging agents, allows us to look beyond the structure and function

MaRGiTA

Professor Tobias Schaeffter and his team are developing techniques which will greatly improve the diagnosis and treatment of cardiac arrhythmias. This condition causes the heart to beat irregularly and can lead to strokes, heart failure or sudden death. It is a major problem that currently affects some five per cent (over one million) of the UK population, and is increasing because of population ageing.

'The diagnosis and treatment of cardiac arrhythmia is usually performed under X-ray guidance', Professor Schaeffter explains. 'However, X-ray offers no 3D information and provides no soft-tissue contrast for the cardiologist performing the operation. This is especially important for the guidance during ablation (a type of treatment in which parts of the heart muscle are burned to stop arrhythmia). It requires great skill and can lead to surrounding tissue being damaged, and, because the procedure takes several hours, both the patient and medical staff receive significant exposure to radiation.

'A new £1 million grant from the Technology Strategy Board and Philips Healthcare is enabling us to develop the first Magnetic Resonance (MR) guided arrhythmia therapy procedure, using a novel catheter device under MR guidance, which avoids radiation completely. We will also be developing non-invasive MR techniques to visualise and quantify the outcome of ablation for arrhythmia.' This research programme, entitled MaRGiTA (Magnetic Resonance Guided Therapy of Cardiac Arrythmia), was negotiated and will be supported by specialists in intellectual property, business development, financial and legal issues from King's College London Business Ltd. The new devices and MR-biomarker will be commercialised to generate revenue for Philips and the College, and this commercial exploitation will also benefit the National Health Service, since more patients will be treated, with improved results and at lower overall costs.



A magnetic resonance (MR) image of the cardiac surface of the left atrium, with a colour overlay demonstrating the effect of ablation (a treatment in which parts of the heart muscle are burned to stop arrhythmia).

GOING WITH THE FLOW

Eike Nagel, Professor of Clinical Cardiovascular Imaging, joined King's in 2007. He has established new MRI methods to measure the precise amount of blood flowing through vessels to the heart and to visualize the effects of blood-flow reduction. Several of these techniques are now being used routinely in the clinic, making King's a world-leading centre for clinical MRI.

Professor Nagel believes that dividing his time between research and clinical roles is essential for the success of this translational approach. 'It's only if we understand disease processes that we'll be able to develop the best treatments, and only if we can detect disease early that we'll be able to apply the treatments at the right time', he says. 'Consequently, research in biomedical imaging is a truly translational task.

'One of the most exciting areas we are currently working on is what is called myocardial perfusion imaging (the measurement of the blood flow to the heart muscle). Whereas existing methods have only low spatial resolution and require the use of radiation, this technique offers the possibility of assessing this flow quantitatively and in fine detail. For the first time we're able to measure differences between the endocardial and epicardial blood flow (ie in the inner and outer areas of the heart). We can then predict the significance of any narrowing of the coronary artery, which reduces the amount of blood flow to the myocardium, and we can also assess the state of the network of small vessels which distribute the blood into the myocardium once it has flowed through the artery. Such measurements will give us a better understanding of patients who suffer from conditions such as diabetes, enlargement of the left ventricle of the heart and diseases of the myocardium. Using these methods, we hope to understand why some patients develop heart failure whereas others don't.'

A sequence of coloured MRI scans showing a thrombus in the left ventricle of the heart.

ZEPHYR / SCIENCE PHOTO LIBRARY

of the body and to directly visualize its biological and molecular processes. The expansion rate of the vessel wall can be measured using a magnetic resonance dye that is taken up by the non-cellular part of the tissue, and biological plaque activity can be detected using nanometre-sized particles that are absorbed by macrophages, which are excellent markers for local inflammation and therefore potentially a good measure for plaque instability.

'Currently, we're testing these novel agents to learn more about the way this disease develops, and we hope to translate this research into treatment for patients within the next five years. This may then enable us to look beyond the conventional angiogram, which only displays the blood in the heart vessels, and to highlight the biological processes in the vessel wall that are responsible for heart attacks and stroke.' ■

Demonstrators in Dungiven, Northern Ireland, march past British troops on 6 February 1972 to lay crosses on the steps of the local Royal Ulster Constabulary headquarters, in memory of 13 people killed by British troops on Bloody Sunday (one week earlier).

BANGED to rights?

Aileen McColgan, Professor of Human Rights in King's School of Law, grew up in Northern Ireland during the height of 'the troubles'. Having recently worked as a legal adviser to the Forum tasked with advising on a Bill of Rights for Northern Ireland, she describes the tortuous progress towards a human rights settlement for the jurisdiction.

Part of the Good Friday Agreement package was a commitment to a Bill of Rights for Northern Ireland.

Northern Ireland recently emerged from a period of intense civil strife over a period of decades, during which thousands of people were killed both by the warring factions within Northern Ireland itself (so-called 'Republicans' and 'Loyalists') and by the RUC (Royal Ulster Constabulary) and British troops, and through the IRA bombing campaign in England. Human rights abuses were endemic, including internment without trial; the killing of unarmed civilians on Bloody Sunday in Derry in 1972; the operation of alleged 'shoot to kill' policies by police and military personnel; atrocities perpetrated by paramilitaries, some of whom were also military personnel, and the use of the 'five techniques' of torture which (following the adverse decision of the European Court of Human Rights in the *Ireland v UK* case in 1978) the UK government vowed never to re-use, but which have subsequently re-emerged in the context of Iraq.

The end of the troubles was marked by the 1998 Belfast (Good Friday) Agreement and the St Andrews Agreement in October 2006. Part of the Good Friday package was a commitment to a Bill of Rights for Northern Ireland. Early efforts to settle the content of this document were unsuccessful, however, and consultation documents issued by the Human Rights Commission in 2001 and 2004 did not result in finalised proposals at that stage. The Commission, itself established as a result of the Good Friday Agreement, was tasked by statute with advising the UK government on the scope of a Bill of Rights supplementary to the rights provided by the European Convention on Human Rights and entrenched in UK law by the Human Rights Act, 1998.

'Particular circumstances'

Key issues of disagreement ranged from the nature of the 'particular circumstances' of Northern Ireland to be reflected in the Bill of Rights, to the role of minority rights and their interrelationship with equality. The Good Friday Agreement stated that the document was to reflect the 'particular circumstances' of Northern Ireland, but opinions range widely as to how broad or narrow these circumstances are: in particular, whether they relate predominantly to the sectarian nature of Northern Irish society or whether they also include the economic and social legacy of the conflict and its antecedents.

As to the conflict between 'minority rights' and equality, the issue there concerned resistance to the fair employment and treatment legislation by which the British government, prompted by the United States, had attempted to desegregate Northern Irish employment and service provision, with a view (in significant part) to tackling entrenched Catholic disadvantage. It was argued by many Unionists that the legislation disadvantaged Protestants, primarily because it sought to eliminate the overwhelmingly Protestant nature of the Northern Irish police force by requiring appointment from a pool which consisted of equal numbers of Catholics and others.

Forum

In December 2006 the Secretary of State for Northern Ireland decided to establish a Forum on a Bill of Rights in order to collect together Northern Irish politicians and representatives of civic society for the purposes of putting together a document which would advise the Human Rights Commission as to the desirable contents of a proposed Bill of Rights. The findings of the Forum were not to be binding on the Commission or on the Minister, but would serve as an indication of the variety of views as to the correct nature and scope of such a Bill.

The Forum took some time to be established, with early stages being characterised by disagreement as to the proper make-up of the body. In March 2007 an external chair was appointed by the Minister: Chris Sidoti, a human rights lawyer and activist, who is currently Director of the International Service for Human Rights. There were 14 political representatives (three each from the largest political parties: the Democratic Unionist Party (DUP), Sinn Fein, the Ulster Unionist Party (UUP) and the Social Democratic and Labour Party (SDLP), and two from the Alliance Party). There were two church representatives (one Catholic and one Protestant)

A 1990s gable-end mural in Belfast giving a peace message to British troops in Northern Ireland.

and seven representatives from community/ voluntary organisations including the children's and young people's sector, the Gay, Lesbian, Bisexual and Transgendered (GLBT) sector, and the disability, ethnic minorities, older and women's sectors. Two further representatives were from the business sector; one was from the human rights/ non-governmental organisation (NGO) sector, and there were two trade union representatives.

In addition, and partly to counter complaints about the exclusion of the 'Loyal Orders' (that is, the Orange orders who are very influential among many Unionist/ Protestant communities), 'official observers' were appointed. These included the Northern Ireland Human Rights Commission itself, to which the Forum report was to be provided; the Equality Commission for Northern Ireland; the Ulster Scots Heritage Council, the Grand Orange Lodge of Ireland and the Green Party.

Separate groups

The Forum, thus constituted, was quite clearly not suitable to be a drafting body, and it was decided to establish a number of working groups to draw up proposals concerning, respectively, children and young people, women, criminal justice and victims, economic and social rights (including relevant equality issues), 'culture and identity and language', civil and political rights (including relevant equality issues) and the 'preamble, enforcement and implementation'. Each of the working groups had a convenor and equal civic and political representation, together with a legal adviser. Over a period of about nine months the working groups took community soundings and drew up reports which went, in early 2008, to the full Forum for debate.

In the end an enormous document was collated and handed over to the Human Rights Commission at the end of March 2008. Unfortunately the document indicated precious little agreement between the political parties. Their views as to the appropriate content of a Bill of Rights for Northern Ireland ranged from (at one extreme) little more than a right for members of the Orange Order to march down Catholic streets to (at the other) a full 'bells and whistles' guarantee of economic and social rights. It is hard to see whether the task of the Human Rights Commission in attempting, once again, to find a compromise potentially acceptable to all has been significantly advanced.

Having said this, it was my own experience as a legal adviser to the Women's Working Group that a great deal of value could be wrought from the various international human rights provisions. Women have borne much of the suffering engendered by the Northern Irish conflict, largely behind closed doors, and (as evidenced by the 1976 Nobel Prize for Peace), many have shown great dedication to ending the violence. The hopes and expectations of today's women should be taken seriously in any human rights resolution of the conflict. If embraced by Northern Ireland's politicians, the principles underpinning these international provisions could bring some real benefits to Northern Ireland in general, which at present is marked by sectarianism, division and inequality – though not, thankfully, by the worst of the human rights abuses with marked the Northern Ireland in which I spent my childhood. ■

students with a passion...

get together with KCLSU

KCLSU | Student Groups

Peter Ellender, Vice-President, Communications, at King's College London Students' Union (KCLSU), describes a year of diverse student achievements.

Student diary 2008

Student influence and involvement in the College and in London extends well beyond the Union itself to some 7,000 (more than one in three) of King's students who are 'involved': that's to say, active in various student groups and activities. We are proud of all they have accomplished this year, in many diverse areas.

Volunteering

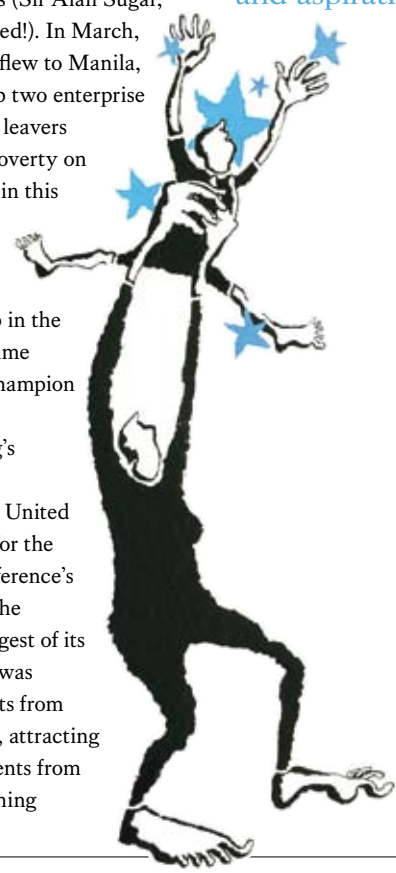
In 2005 KCLSU became only the second university in the UK (and the first in the Russell Group) to be awarded the 'Investing in Volunteers' standard, and volunteering among King's students has gone from strength to strength in the wake of this. There has been a 23 per cent increase in volunteers since last year, and more than 500 students now give their time to volunteer, donating some 4,000 hours in 2007-8 to working on a number of local and international projects.

Amongst these are: *Shine* (working with school children to raise academic achievements and aspirations); *Streetlaw and law mentoring* (raising awareness of how the law affects young people and inspiring them to study law); *Sexpression* (raising awareness of sexual health in schools); *Children's Theatre Workshop* (using performing arts to provide children with new skills and confidence); the *Kenyan orphan project* (improving the healthcare of the community in Kisumu, Kenya); *Mildmay* (supporting patients in an HIV/Aids hospital in East London); *Tenteleni* (assisting in the provision of educational opportunities for deprived children in Africa), and *Medical Justice* (visiting detainees in asylum centres to provide support and mental health monitoring).

One of KCLSU's newest groups is *KCL Students in Free Enterprise* (SIFE) which sets up sustainable projects that create economic opportunities for others and enable students to develop their entrepreneurial skills (Sir Alan Sugar, you have been warned!). In March, five King's students flew to Manila, Philippines, to set up two enterprise projects with school leavers currently living in poverty on rubbish dumps, and in this year's SIFE UK national competition KCL SIFE was runner-up in the semi-finals and became 'National Rookie Champion of the Year'.

In February King's hosted the London International Model United Nations (LIMUN) for the first time in the conference's nine-year history. The conference is the largest of its kind in Europe and was organised by students from London universities, attracting more than 800 students from 80 universities spanning 25 countries.

... Shine (working with school children to raise academic achievements and aspirations)...



BELLE MELLOR

...*Roar* has produced some of its biggest and best issues to date...

Diwali

The King's College London Diwali show is now in its 15th year and has earned a reputation as the biggest and best student-based charity Diwali event in the UK. This year it has continued to work with other universities and cultural organisations to develop the style of East and West fusion in performing arts, and the 2007 show, at the IndigO_2 in Greenwich, provided the opportunity for talented young men and women to display an awe-inspiring array of dances, catwalks and musical performances. All the major religious groups in KCLSU held awareness weeks during the year, demonstrating the diverse profile of students at King's. Events included lectures, debates and discussions, and celebrations of food and culture from all corners of the international community.

The Dance Society is KCLSU's biggest society, and in March 2008 their superb show 'Unleashed' sold out at the Greenwood Theatre on the Guy's Campus three nights in a row.

...the biggest and best student-based charity Diwali event in the UK...

BELLE MELLOR

Roar

As editor of the student magazine, I'm delighted to say (without blowing my own trumpet!) that during my time *Roar* has produced some of its biggest and best issues to date, and has achieved true editorial independence for the first time in its long and often notorious history.

In September 2007 KCLSU achieved one of its greatest triumphs when, in competition with some of the UK's top charities, it won the 'Most Improved Trustee Board' award at the annual Third Sector Excellence Awards. KCLSU was hailed as 'a beacon steering the [student union] sector in the right direction'. The award is a testament to the hard work of KCLSU staff and officers over the last three years, and shows how our governance model of a trustee board working closely with a chief executive officer has provided an effective means of changing student lives at King's for the better.

Rant Week

For the second year running the Student Council held a 'Rant Week', allowing hundreds of King's students across all the campuses to voice their needs and concerns. This will enable the Council to make important recommendations n how the College and KCLSU can do more for students who live at home (whether through choice, because of the economic realities of life in central London, or for religious or cultural reasons). Thanks to a generous donation from King's alumni via the College's Annual Fund, KCLSU will also become the first students' union in the country to offer an 'e-petitioning service', giving students another means of feeding into the policy decisions made by their union in a far simpler and more accessible way.

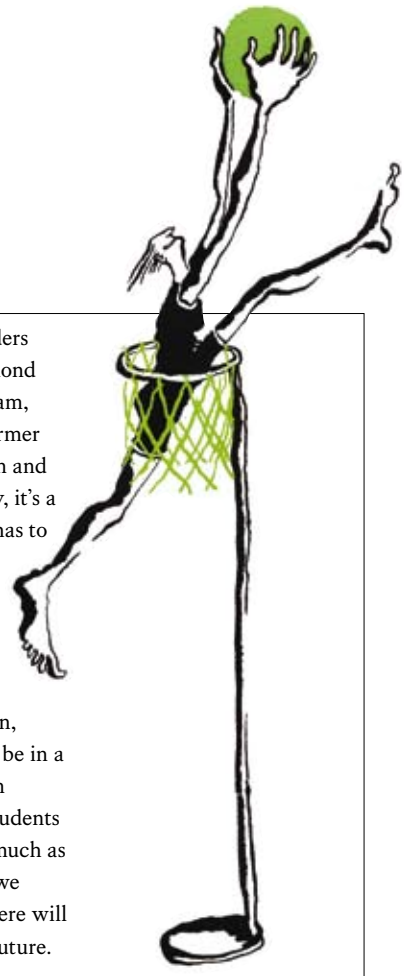
Nankai

KCLSU President Adam Farley and Jo Williams, Vice-President, Representation, also presented our governance model at the Challenge Cup research competition at Nankai University, Tianjin, China. Although many students' unions have a reputation for campaigning on issues in other countries, KCLSU is almost certainly the only students' union which has presented a vision of democracy in China and lived to tell the tale!

KCLSU is a long-standing advocate of reform of the National Union of Students, but unfortunately our attempts to achieve governance reform on a national scale were unsuccessful, as our proposals fell short by just 13 votes at the NUS national conference. However, our influence on a national level didn't end there, as a number of King's students were selected to sit on an interview panel as the Department of Innovation, Universities and Skills sought a Director of Higher Education Strategy and Implementation.

Highlights

My personal highlight of the year was attending a black-tie event to raise funds for KCLSU, which featured King's alumnus Rory Bremner and his unparalleled array of impersonations. The £15,000 raised by the event is being invested in tools that will enable KCLSU to provide proactive and practical advice on managing money and budgeting – helping students learn how to successfully handle their own finances whilst in higher education. The sabbatical officers have also had the privilege of rubbing shoulders with the likes of Archbishop Desmond Tutu, respected judge Lord Bingham, Prime Minister Gordon Brown, former UN Secretary General Kofi Annan and the Duchess of Cornwall. Honestly, it's a tough job, but I suppose someone has to do it ... As KCLSU approaches its centenary year, we enter what is a crucial phase for our development as a student community and as a students' union. Students face a future which is politically uncertain, yet at KCLSU we are fortunate to be in a prime position to take a lead role in shaping what it will look like for students both nationally and at King's. As much as there is to celebrate in our past, if we continue to develop as we have, there will be much more to celebrate in our future.



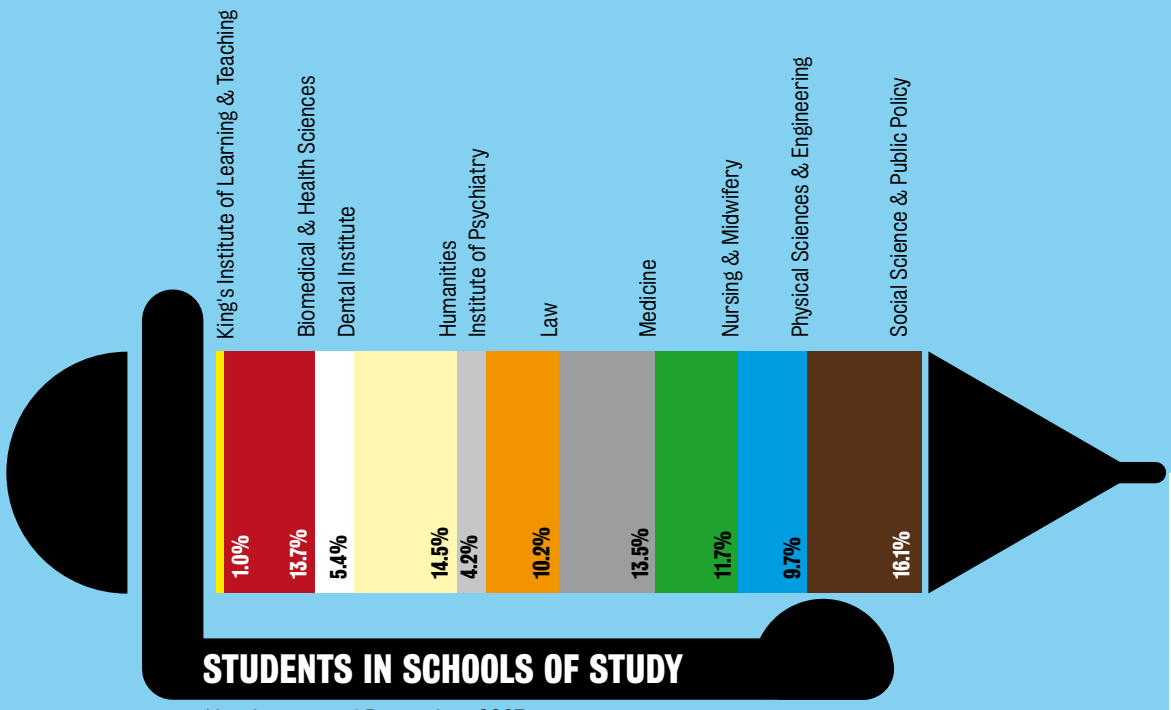
Sport

King's teams were again very successful in the BUSA (British Universities Sports Association) and ULU (University of London) leagues, with outstanding successes in badminton, hockey, basketball, netball and rugby. The combined ULU scores of the King's College London (KCL) and King's College London Medical School (KCLMS) teams were enough to make King's the top sporting university in London when compared with other institutions that have separate medical teams. The fourth annual Macadam Cup, which pits KCL teams against those of KCLMS, was held in February at the Berrylands sports ground, with 280 students in 26 teams in a competitive but ultimately good-natured event. Once again the trophy returned to KCLMS and the Guy's Campus. ■

... outstanding successes in badminton, hockey, basketball, netball and rugby...

... Once again the trophy returned to KCLMS and the Guy's Campus...

Facts & figures



Headcount on 1 December 2007

School	Campus	Number of students			
		Undergraduate	Graduate		Total
			Taught	Research	
Biomedical & Health Sciences	Guy's, Waterloo	2,186	287	237	2,710
Dental Institute	Guy's, Denmark Hill, Strand, St Thomas'	880	114	69	1,063
Humanities	Strand	2,155	428	281	2,864
Institute of Psychiatry	Denmark Hill	72	444	320	836
Law	Strand	968	974	60	2,002
Medicine	Guy's, Denmark Hill, St Thomas'	2,149	294	221	2,664
Nursing & Midwifery	Waterloo	2,098	158	44	2,300
Physical Sciences & Engineering	Strand	1,472	291	153	1,916
Social Science & Public Policy	Strand, Waterloo	1,093	1,686	390	3,169
King's Institute of Learning & Teaching		19	170		189
Total graduate students			**6,621**		
Grand total		**13,092**	**4,846**	**1,775**	**19,713**

DIAGRAMS: PETER GRUNDY

22
King's is one of the world's top 22 universities (*The Times Higher*-QS university rankings 2008)

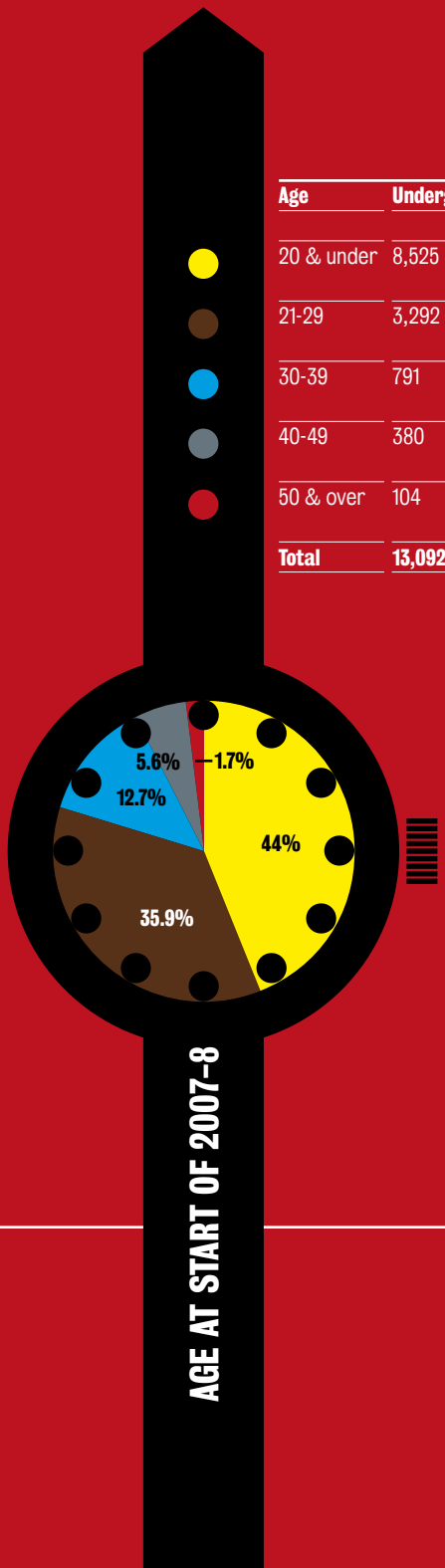
1
King's is number one for PhD completion rates for UK and EU students

9
Nine people associated with King's and its constituent institutions have won the Nobel Prize

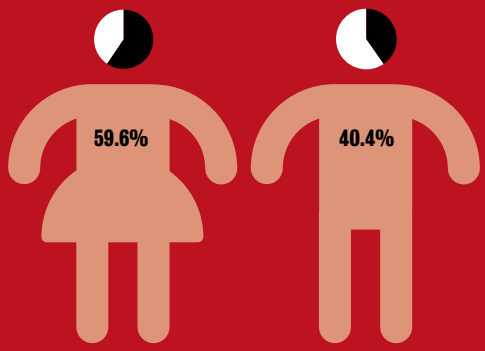
24
King's subject areas received the highest rating available in the Research Assessment Exercise

STUDENT NUMBERS BY AGE 2007–8

Age	Undergraduate	Graduate		Total
		Taught	Research	
20 & under	8,525	145	1	8,671
21-29	3,292	2,758	1,031	7,081
30-39	791	1,237	484	2,512
40-49	380	544	182	1,106
50 & over	104	162	77	343
Total	**13,092**	**4,846**	**1,775**	**19,713**



STUDENT NUMBERS BY GENDER 2007–8

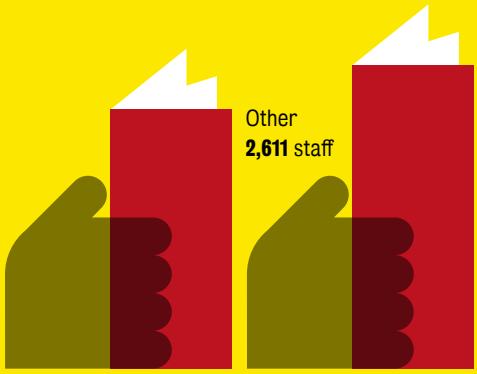


Gender	Number of students			
	Undergraduate	Graduate		Total
		Taught	Research	
Female	8,174	2,621	948	11,743
Male	4,918	2,225	827	7,970
Grand total	**13,092**	**4,846**	**1,775**	**19,713**

1 in 5
students at King's is from outside the UK

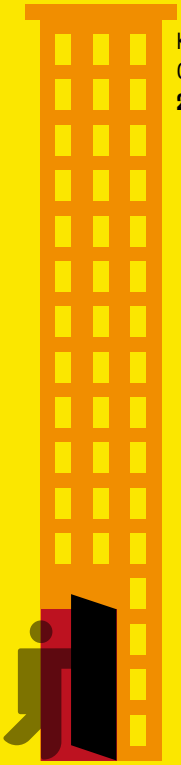
140
countries are represented by students at King's

550
£550 million has been invested in King's campuses in the last 10 years



STAFF

on 31 October 2007,
(excluding senior students,
honorary and
occasional employees)



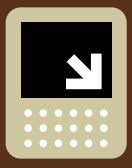
STUDENTS IN HALLS OF RESIDENCE

on 1 December 2007

Finances

Income and expenditure
for the year ended 31 July 2007
In 2007 King's was once again awarded an 'AA-' financial credit rating from Standard & Poor's

Income	**£000**
Funding Council grants	137,747
Tuition fees and education contracts	76,274
Research grants and contracts	109,926
Other operating income	75,363
Endowment income and interest receivable	8,858
Total income	**408,168**



Expenditure	**£000**
Staff costs	251,268
Depreciation	19,092
Other operating expenses	125,626
Interest payable	9,901
Total expenditure	**405,887**

Surplus on ordinary activities	**2,281**
Taxation	1
Surplus after depreciation of assets at cost, disposal of property and tax	**2,280**

Acknowledgements 2007-8

We are grateful to all those who have generously supported the College over the last academic year. Support from individuals, grant-making trusts and other organisations has opened up new areas for clinical and academic research, established scholarship opportunities for our students, and created new academic posts and better facilities. We thank all our supporters (including those who prefer to remain anonymous) who are helping us to fulfil our vision for the College. In particular, we warmly acknowledge the support of the following:

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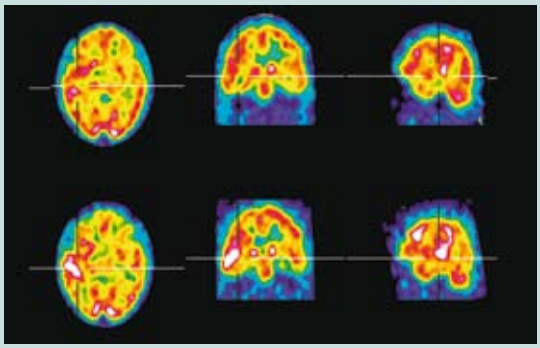


EPILEPSY CHAIR AND RESEARCH

The support of Paul Getty III has made possible a new Chair at the Institute of Epileptology which will enable King's to develop a programme of multidisciplinary research and continue to build on our world-leading reputation in this field, developed over more than a century.

STUDYING RADICALISM AND VIOLENCE

The International Centre for the Study of Radicalisation and Political Violence (ICSR) at King's is the first global centre for knowledge and leadership addressing these issues. It will produce world-class research and organise regular high-level meetings and outcome-driven dialogues on security. This is the first initiative in this area in which Arab and Israeli academic institutions are openly collaborating and it has received support from both the Atkin Foundation and Mr Henry Sweetbaum.

Action Medical Research

Action on Addiction

Alzheimer's Brain Bank UK

Alzheimer's Research Trust

Alzheimer's Society

Arthritis & Rheumatism Council

Arthritis Research Campaign

The Association for International Cancer Research

Asthma UK

Mrs Celia Atkin

The Atlantic Philanthropies

Banco Espírito Santo

Mr Maurice Bekhor

Ms Valerie Beynon

Breakthrough Breast Cancer

Breast Cancer Campaign

British Heart Foundation

British Skin Foundation

Burdett Trust for Nursing

CAFOD

Cancer Research UK

The late Miss Ida Cole

CORE (The Digestive Disorders Foundation)

Dr John Crocker & Mrs Josephine Crocker AKC FKC, née Frearson

Dansac Ltd

Diabetes Foundation

Diabetes UK

The Dinwoodie Settlement

Mr Bill Dodwell

The Rosalind Driver TQ/ KCL Trust

The late Dr William S Dunbar

Dystrophic Epidermolysis Bullosa Research Association

Epilepsy Research UK

Fight for Sight

Foundation for Allergy Information & Research

Friends of Guy's Hospital

Friends of King's College London (Canada)

Friends of King's College London (Hong Kong)

Friends of King's College London (USA)

Sir Ian Gainsford FKC

Bill and Melinda Gates Foundation

The John & Lucille van Geest Foundation

Generation Trust

Mr Paul Getty III

Dr Terence Gibson

Douglas Glanfield Memorial Trust

GlaxoSmithKline Research & Development Ltd

The late Mr Alfred Goddard

Guide Dogs for the Blind Association

Calouste Gulbenkian Foundation

Guy's and St Thomas' Charity

Guy's and St Thomas' Kidney Patients Association

High Q Foundation

MAURICE WOHL INSTITUTE

This new £45 million project, to be sited at the Denmark Hill Campus, will bring a bold new approach to a range of neurological and psychiatric conditions which affect millions and for which there are currently few effective treatments. These include stroke, dementia, Parkinson's disease, motor neuron disease, brain tumours, epilepsy, schizophrenia and depression. The Institute is to be named the 'Maurice Wohl Institute' in recognition of the support of the Maurice Wohl Charitable Foundation.

COLIN WHYEMAN

ALUMNI AND STAFF GIFTS

Gifts of all sizes have made a real difference to staff and students (such as these in the College Chapel Choir) over the last 12 months. Last year over 2,000 alumni and former staff supported the College through the Annual Fund and other funds. These gifts allowed us to disburse more than £500,000 in small grants to priority projects and student support where it was needed most. Alumni and staff legacies added a further £108,000.

The late Dr Helen Hudson FKC

Human Frontier Science Program

Professor Barry Ife CBE FKC

Infertility Research Trust

Juvenile Diabetes Research Foundation International

KCL Development Trust

King's College Hospital Charitable Trust

King's Medical Research Trust

Alicia Koplowitz Foundation

Kirby Laing Foundation

Mr William Kwan FKC

Leukaemia Research Fund

Leverhulme Trust

The Levy Foundation

MacArthur Foundation

Macmillan Cancer Support

Andrew W Mellon Foundation

Motor Neurone Disease Association

Moulton Charitable Trust

Northern Rock Foundation

Nuffield Foundation

Oak Foundation

Parkinson's Disease Society

PF Charitable Trust

Pfizer Inc, Global Research and Development

The late Mrs Eunice Phillips

Psychiatry Research Trust

The Rayne Foundation

Research into Ageing

Mr Steven Rhodes AKC

The Gerald Ronson Foundation

The Jeremy and John Sacher Charitable Trust

Edmond J. Safra Philanthropic Foundation

Mrs Lily Safra FKC

Cicely Saunders International

Dr Angela Scott

Ms Rena Shulsky

The late Mrs Barbara Spickernell

Stroke Association

Mr Henry Sweetbaum

Miss Alison Taylor

Tommy's The Baby Charity

Tubney Charitable Trust

Professor Bob Walton

Wellchild

Wellcome Trust

The Garfield Weston Foundation

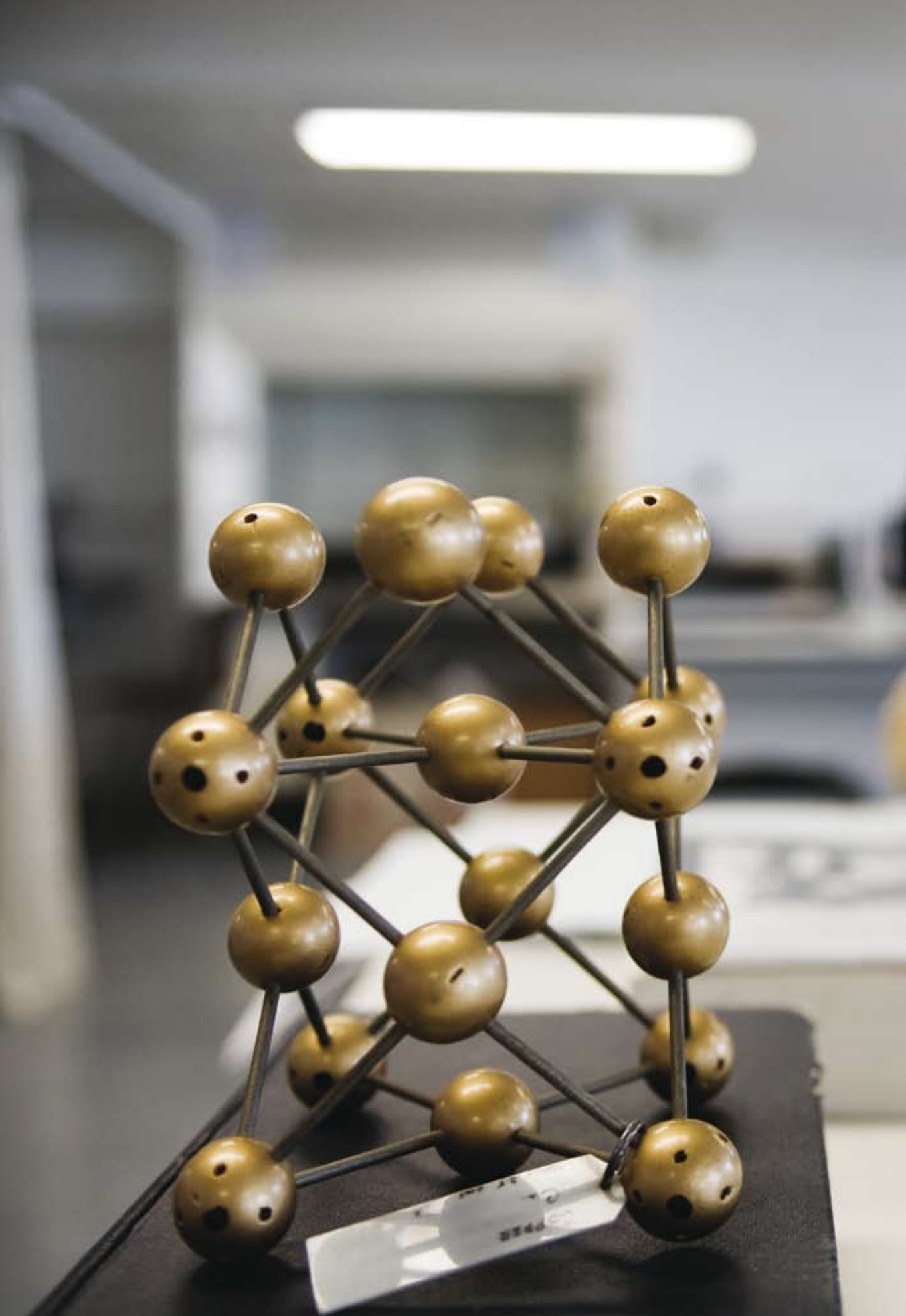
The Williams School of Church Music

Mr Christopher Wiscarson FKC

Maurice Wohl Charitable Foundation

Charles Wolfson Charitable Trust

The Wolfson Foundation



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ALFREDO FALVO