

ELUCIDATING THE BRAIN



# report

NUMBER 17 2009

**COVER**

*Elucidating the brain.*

Neuroscience and other research on the brain at King's includes searching for a reliable means of diagnosing Alzheimer's disease: see page 38.

**PHOTOGRAPH**

Model of the head and brain

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Wellcome Images

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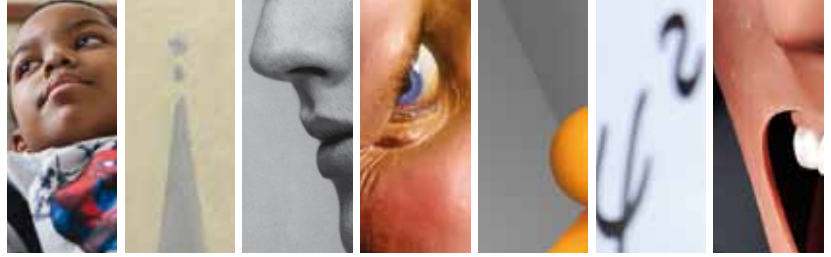
**K**ING'S COLLEGE LONDON is one of the top 25 universities in the world (*Times Higher Education* 2009) and one of the oldest in England. A research-led university based in the heart of London, King's has more than 21,000 students from nearly 140 countries, and more than 5,700 employees.

King's has an outstanding reputation for providing world-class teaching and cutting-edge research. In the 2008 Research Assessment Exercise for British universities, 60 per cent of its research was deemed to be of world-leading or internationally-excellent standard, and more than half of the College's academic staff work in departments that are in the country's best 10 per cent in their field. King's is among the top seven UK universities for research earnings and has an overall annual income of more than £485 million.

King's has a particularly distinguished reputation in the humanities, law, the sciences (including a wide range of health areas such as psychiatry, medicine and dentistry) and social sciences including international affairs. It has played a major role in many of the advances that have shaped modern life, such as the discovery of the structure of DNA and research that led to the development of radio, television, mobile phones and radar. It is the largest centre for the education of healthcare professionals in Europe. No university has more Medical Research Council Centres.

King's College London and the NHS foundation trusts of Guy's and St Thomas' Hospitals, King's College Hospital and the South London and Maudsley are part of King's Health Partners, a pioneering global collaboration which combines the best of research, clinical excellence and world-class teaching to deliver groundbreaking advances in physical and mental healthcare.

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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 2008-9.

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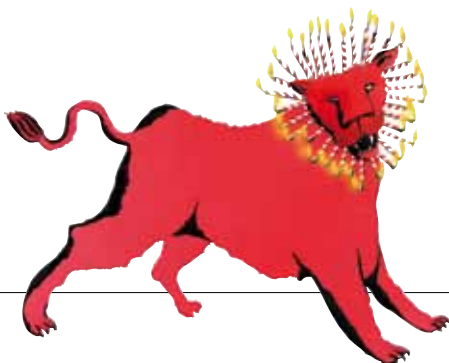
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**Acknowledgements**

Gifts to King's from individuals, grant-making trusts and other organisations.



# Strength in partnership

*The Principal, Professor Rick Trainor, reflects on developments at King's in 2008-9.*



The academic year 2008-9 was marked by many outstanding achievements at King's, and also by our determination to take steps to preserve and enhance our leading position in the UK and internationally during the tough times that are ahead for all UK universities.

In terms of league tables, King's has been recognised for the third year running as one of the world's top 25 universities, and our ranking of 23rd internationally and sixth in the UK confirms the College's reputation as a centre of global academic excellence in both research and teaching. The College also saw a dramatic rise of 16 places in the Shanghai Jiao Tong world university chart between 2008 and 2009: from 81<sup>st</sup> position to 65<sup>th</sup>. This table compares 1,200 higher education institutions worldwide, but does not include universities' performance in arts and humanities subjects. Our success (not least in arts and humanities) in the 2008 Research Assessment Exercise, with 60 per cent of our research deemed to be of a world-leading or internationally excellent standard, is further testament to our research talent and progress.

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## King's Health Partners

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This has been a particularly important year for partnerships between the College and other institutions. Among the news items which follow I am especially pleased to record the accreditation by the Department of Health's international expert panel of King's Health Partners as one of the UK's first five Academic Health Sciences Centres. This highly prestigious and pioneering collaboration between the College and three of London's most successful NHS Foundation Trusts will (as the feature on page 12 demonstrates) enable researchers, teachers, clinicians and healthcare professionals to work more closely together and will mean that King's remains at the forefront of innovation in this area.



*Mme Valérie Pécresse, the French Secretary of State for Higher Education and Research, with the Principal at King's in January 2009.*

**Our ranking of 23rd internationally and sixth in the UK confirms the College's reputation as a centre of global academic excellence in both research and teaching.**

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### Somerset House

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Just as the *Report* went to press, in December 2009, we were able to announce that King's and the Somerset House Trust are to work together in an historic partnership to provide a new cultural hub for Londoners as well as an extension to the College's existing Strand Campus, delivering innovative research and teaching. This means that King's will acquire the East Wing of Somerset House, one of London's most beautiful and iconic buildings, providing a unique opportunity for a London arts complex in a building which will bridge the worlds of higher education, policy and the arts, together with a new home for the College's School of Law.

A third significant kind of partnership for King's this year reflects the increasing importance of the international dimension of our work. The College's most recent international university partnership, with Jawaharlal Nehru University in New Delhi, was signed at the end of 2008, enabling the two institutions to develop research links and student exchanges. King's also has partnerships with the University of North Carolina at Chapel Hill; with the National University of Singapore, and with Hong Kong University. In November 2009 we were delighted to sign a memorandum of understanding to pursue a fifth strategic partnership with the University of California, San Francisco.

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### Across the disciplines

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University research that makes a real difference to the world is increasingly reaching across traditional subject disciplines to work in collaboration. The operations of King's sixth Medical Research Council centre, the MRC-HPA Centre for Environment & Health (featured on pages 20-25) show the wide range of expertise that is required to understand and reduce air pollution. The award of £10.5 million by





*The Principal at the Union League Club, New York, in October 2008, during a series of panel debates on American foreign policy hosted by King's in the USA in the run-up to the presidential election.*

the Wellcome Trust and the Engineering & Physical Sciences Research Council to our new Centre of Excellence in Medical Engineering will promote integration between clinicians, biomedical scientists and world-class engineers to find high-tech solutions to medical challenges. Two other major new research centres at King's – the Centre for Biomedicine & Society and the Centre for the Humanities & Health – are bringing together the humanities and the social and biomedical sciences to work on the interface between medicine, science, society and the arts (see page 7).

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### Philanthropic support

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Our goal at King's is to build on these and our many other accomplishments and formidable current advantages to be consistently recognised as an outstanding university institution comparable in all respects with the best in the world. It is especially pleasing that these aspirations are attracting substantial philanthropic support, and that our success in fundraising has grown in strength over the last year. We have received large gifts, in particular, in support of our world-class research into cancer, and notably for the ground-breaking work

**I remain confident that we can achieve demanding financial targets in an intelligent and strategic manner**

at the new Breakthrough Breast Cancer Research Unit which focuses on some of the most aggressive and poorly-understood forms of the disease. Meanwhile, in the field of international public policy, as reported on page 61, the African Leadership Centre welcomed its first cohort of student fellows in October 2009, thanks to generous philanthropic support. Our alumni, parents and friends continue to donate to a wide variety of projects at King's, and our gratitude to all those who supported the College in 2008-9 is acknowledged on pages 61-62.

Our aspiration to be in the first tier globally will not, however, be easily achieved in the context of the severe economic downturn, including further public sector cuts as the government tackles a significant national deficit, resulting in large reductions in funding for all UK universities. In spring 2009 the College



*HRH The Princess Royal, Chancellor of the University of London, opened the Clinical Research Facility for nutritional studies at St Thomas' Hospital in October 2008.*



*Boris Johnson, Mayor of London, was one of the panellists in the edition of Radio 4's Any Questions? broadcast from the College's Waterloo Campus in March 2009 to celebrate the centenary of King's College London Students' Union (KCLSU).*

therefore conducted a thorough analysis of our academic and professional services activities in order to manage the immediate financial challenges, reduce costs and support new investment. This review was driven by five core principles: ensuring that the College avoids becoming burdened by a large and accumulating deficit; aiming not simply to weather a financial storm but also to build upon our recent achievements and create an even stronger College; basing our future strength on demonstrable excellence in research, while using that research excellence to reinforce rather than detract from teaching and innovation, and ensuring that any restructuring and reforms do not disadvantage our students but instead enhance their overall experience at King's.

It is evident to all of us in higher education that the next couple of years will

be difficult, but I remain confident that we can achieve demanding financial targets in an intelligent and strategic manner, raising income as well as reducing costs, and keeping in mind our commitment to the highest standards in research, teaching and knowledge transfer. Those universities that respond most imaginatively and boldly to the challenges of economic downturn and reductions in public expenditure will be best placed to respond to the opportunities provided by the eventual upturn in the economy and the subsequent recovery of public finances. It is important to the future of King's that when those developments occur the College is clearly positioned among the sector's leaders. ■

# News in brief 2008-9



## World top 25

For the third year running King's has been recognised as one of the world's top 25 universities in the *Times Higher-QS* table. The ranking brings together staff:student ratios, citations of research, assessments of universities' attractiveness to staff and students, and the views of graduate employers and of more than 9,000 academics across the world. King's also rose 16 places in the Shanghai Jiao Tong world university league table: from 81st to 65th. This table counts Nobel Prizes, highly-cited researchers, articles in *Science* and *Nature*, and per capita academic performance, but does not include strengths in arts and humanities. King's was also shortlisted for the UK 'University of the Year' in the *Times Higher* awards in autumn 2008.

## Research assessment

In the 2008 Research Assessment Exercise (RAE) for British universities, 60 per cent of research activity at King's was deemed 4\* and 3\*, ie as world-leading or internationally excellent. In total, 91 per cent of the College's research activity entered for the RAE is internationally recognised, and recent analysis of HEFCE research funding shows that King's comes fifth in the country in terms of funding per academic.



## Somerset House

The College has acquired the East Wing of Somerset House, one of London's most beautiful and iconic buildings, which will provide a unique opportunity for an arts complex in a building which will bridge the worlds of higher education, policy and the arts as well as a new home for the College's Law School. King's is to work together with the Somerset House Trust to provide a new cultural hub for Londoners and an extension to the College's existing Strand Campus. The signing of the 78 year lease sees the conclusion to one of the world's longest-ever property negotiations. Since the College was built next to Somerset House in 1829 it has been in various discussions to expand into one of the wings of Somerset House itself. Now, some 180 years later, this will finally become a reality, as the East Wing, which was previously occupied by the Inland Revenue, is developed. The ground floor will provide space for cultural activities open to the public, curated by Somerset House Trust. There will also be areas for studies in arts, culture and continuing education, and a learning centre. The top two floors of the building will be converted into accommodation for the College's School of Law, which has enjoyed a tradition of excellence for more than 175 years and is recognised as one of Europe's premier law schools.



*HRH The Princess Royal at the opening of the Clinical Research Facility, with Lord Douro, Chairman of the College Council.*

## HRH opens nutritional studies facility

A centre that provides a more comfortable environment for patients and encourages them to participate in clinical studies on nutrition, obesity and heart disease has been opened at St Thomas' Hospital by HRH The Princess Royal, Chancellor of the University of London. The new Clinical Research Facility includes a five-bed ward, laboratories and a kitchen and eating area where staff can conduct nutritional studies. This will make it easier for a wide range of health professionals and scientific colleagues to explore the impact that diet and other factors may have on a patient's condition. The centre has been made possible through support from Tate & Lyle, the British Heart Foundation and the Guy's and St Thomas' Charity.





## National student champions

King's 'Students in Free Enterprise' team won the UK national championship in April 2009, beating more than 30 other university teams and receiving a standing ovation for their work. The King's team presented three of their 30 student-led volunteering projects. *Foundations* paired victims of local knife and gang crime in South London with a student buddy on a six-week work placement to rebuild confidence. *Orchard Bounty* worked with 25 young adults with special needs to produce apple juice from a dedicated orchard, while *Born in Manila* trained 28 unemployed waste pickers to turn the resources around them into jewellery.

## KCLSU centenary

The King's College London Students' Union and the College's Alumni Office have been celebrating the centenary of the first official general meeting of the student society of King's, held on 4 December 1908. Celebratory events during 2009 included a dinner, a club night and the hosting of BBC Radio 4's *Any Questions?* at the Waterloo Campus.



## New centres cross the divide

King's launched two major new centres in 2009 which reach across the disciplines to bring together arts, humanities, and the social and biomedical sciences. The Centre for Biomedicine & Society (CBAS) hosts the only social science-led Wellcome Trust Biomedical Ethics Strategic Award in the UK, on the ethics of translational research. Other projects include the politics of the global bio-economy (particularly regenerative medicine in Europe, India and China); innovation in the use of medical devices, and the reconfiguration of identities through new personalised genome testing. CBAS offers an MSc in Medicine, Science & Society, and one of the world's few Intercalated BScs for medical students in this subject. An MA in Bioethics & Society, run jointly with the Centre of Medical Law & Ethics at King's will start in 2010. The Centre for the Humanities & Health engages scholars from literature, philosophy, history, the visual arts, film studies, clinical psychology, psychiatry, nursing and medicine, and its research, funded by a Wellcome Trust Strategic Award, has six interlocking strands around 'The Boundaries of Illness'. It is developing a new MSc in Medical Humanities.



## King's Health Partners

King's Health Partners (KHP) was accredited in March 2009 as one of the UK's first five Academic Health Sciences Centres (AHSCs). KHP is a pioneering collaboration between the College and three of London's most successful NHS Foundation Trusts (Guy's & St Thomas', King's College Hospital and the South London & Maudsley). It unites world-leading research, medicine, healthcare and education to improve health and well-being for patients in London and internationally. In June King's Vice-Principal Professor Robert Lechler, who led the Partnership's successful bid for AHSC status, was appointed to the directorship of KHP, and in October Lord Butler of Brockwell was appointed as KHP's first independent Chair. Robin Butler served as private secretary to five prime ministers, as Head of the Home Civil Service from 1988 to 1998, and as Master of University College Oxford until 2008.

**The work of King's Health Partners is featured on page 12.**



## International partners

King's now has four partnerships with other universities worldwide and has recently signed a memorandum of understanding with a fifth. The partnership with Jawaharlal Nehru University (JNU) in New Delhi, signed in December 2009, will initially focus on comparative world history, global cultural and literary studies and international relations, and will enable the two universities to develop joint research links and a strong student exchange scheme. A partnership with Hong Kong University (HKU), signed in May 2009, will establish a five-year dual degree programme in law, as well as a framework for future joint PhD programmes in science subjects. King's other existing partnerships are with the University of North Carolina at Chapel Hill and with the National University of Singapore, and in November 2009 the College signed a memorandum of understanding to pursue a strategic partnership with the University of California, San Francisco.



## TwinBank

King's scientists are creating the world's largest database of twins in order to investigate the genetic and environmental origins of disease and behaviour. The College already has a Department of Twin Research & Genetic Epidemiology, but TwinBank aims to be ten times larger than any other twin database, to hold the records of 300,000 pairs of twins and to collect DNA and health data on twins through the NHS. By comparing identical and non-identical twins, researchers will be able to determine the relative contributions of nature and nurture to human development, transforming research into obesity, heart disease, autism, mental illness and cancer.

## New gene link to baldness

A study co-ordinated in King's Department of Twin Research has identified two genetic variants which, when present together, increase the risk of male pattern baldness seven-fold. *Androgenic alopecia* is a heritable disorder with no obvious evolutionary advantage, affecting around 40 per cent of men. The mechanisms involved may be shared with common medical disorders such as coronary heart disease, hypertension and insulin resistance.



## Famous figures come to the Strand

A larger than life-size group of characters have joined the Strand streetscape, brightening up one of London's main arteries. The King's 'hall of fame' features nearly 50 famous people associated with the College during its 180-year history. Reaching up to two metres tall, the head-and-shoulders images are mounted on vinyl in the Strand windows and stretch 90 metres between Somerset House and Surrey Street. They range from the first Duke of Wellington, who fought a duel while Prime Minister in defence of his role in the foundation of King's, to current PhD student and three-times Olympic rowing medallist Katherine Grainger, and include five of the College's nine Nobel Prize winners, such as Archbishop Desmond Tutu and Sir James Black, together with WS Gilbert of Gilbert and Sullivan; Lord Lister, founder of antiseptic surgery; Romantic poet John Keats; satirist Rory Bremner, and Dame Cicely Saunders, founder of the modern hospice movement.



### King's joins climate change campaign

King's was one of the first four universities to sign up to the 10:10 campaign to cut the UK's carbon emissions by 10 per cent in 2010, joining some of the biggest names in business, the arts, sport and politics. King's is also one of only 11 UK universities to be recognised as a Carbon Trust Standard Bearer. The College has already reduced its carbon emissions by over 8,000 tonnes from the 2004 baseline, and now recycles more than 60 per cent of its controlled waste. It has also won major awards for the sustainable refurbishment of its buildings.

### Top for health funding

King's is the most successful higher education institution in winning grants from the Department of Health. Between 2005 and 2008 almost £18 million was awarded to King's scientists, representing 20 per cent of the Department of Health's total spending at universities over three years. Among the projects that have received grants at King's are the Comprehensive Biomedical Research Centre; the Comprehensive Cancer Imaging Centre and the Global Child Dental Health Taskforce.



### £10.5 million for Medical Engineering Centre

King's has been awarded more than £10 million by the Wellcome Trust and the Engineering & Physical Sciences Research Council for a new Centre of Excellence in Medical Engineering: one of four in the UK. The funding will develop integrated teams of clinicians, biomedical scientists and world-class engineers so they can find high-tech solutions to medical challenges. Engineers are already at the forefront of medical innovation, benefiting millions of people with tools such as implants and prosthetic limbs, devices to monitor the physiological state of patients and instruments such as the implantable pacemaker. The future links between medicine and engineering are crucial for advances in fields such as genetics, where tissue engineering could use patients' own cells to correct degenerative disease, and imaging, where new technologies may predict stroke and heart attack, improve early detection of cancer, help surgeons perform less invasive operations and play a role in the diagnosis and treatment of psychiatric illness.



### Allergy and asthma labs

New laboratories for the MRC & Asthma UK Centre in Allergic Mechanisms of Asthma at King's were opened at Guy's Hospital in October 2008. The investment by the College, the Guy's and St Thomas' NHS Foundation Trust and Guy's and St Thomas' Charity will address the rising epidemic of allergy and asthma in the UK. The new research facilities will allow the Centre's activities to expand, including a focus on environment and respiratory health and the impact of the introduction of London's low emission zone. Allergic diseases have increased threefold in 20 years, and asthma affects one in 12 people in the UK. The number of children with asthma has risen six-fold in 30 years, and treatment costs the NHS more than £996 million a year, with 12.7 million working days lost from asthma annually.



*The US Supreme Court's Chief Justice Roberts (left), New Zealand's Chief Justice Dame Sian Ellis, and the President Elect of the UK's Supreme Court, Lord Phillips (right) at King's in July 2009.*

## World's judges at King's

The world's leading judges took part in a three-day conference at King's just before the opening of the first UK Supreme Court in October 2009. Organised by the Centre of European Law at King's and the Royal Courts of Justice, *Legal boundaries, common problems and the role of the Supreme Court* took a fresh look at the current and evolving role and function of supreme courts and constitutional courts. Other participants included the Lord Chief Justice of England and Wales, Lord Judge, and the chief justices of Ghana and New Zealand.

## Achievements recognised

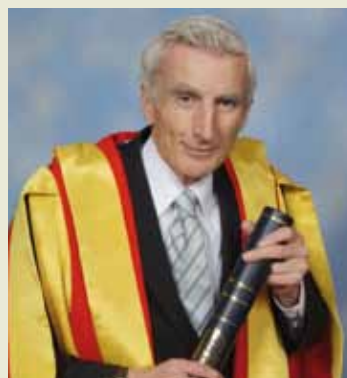
Professor Ellen Solomon, Head of the Cancer Genetics Research Group, and Professor Phil Whitfield, who has retired as Vice-Principal (Students) after a 40-year career at King's, have been presented with Lifetime Achievement awards by the College. Professor Anne Marie Rafferty, Head of the Florence Nightingale School of Nursing & Midwifery, received a CBE in the 2009 New Year's Honours for her exceptional services to healthcare.



*Mario Vargas Llosa, one of Latin America's most significant novelists, and a former member of staff and Fellow of the College, delivered a keynote speech at King's in October 2008.*

## Visitors to King's

King's attracts many visitors and speakers of distinction. In 2008-9 these included the Prime Minister, Gordon Brown; Secretaries of State the Rt Hon Hilary Benn and Ed Balls; Ministers of State Dawn Primarolo and Jim Knight; the Shadow Chancellor of the Exchequer George Osborne, and David Willetts, Shadow Secretary of State for Innovation, Universities & Skills. Bestselling authors at King's included Mario Vargas Llosa, Sir Terry Pratchett and Michael Morpurgo. Fact-finding visits were paid by Mme Valérie Pécresse, the French Secretary of State for Higher Education & Research and Dr Paula Risikko, Finland's Minister of Health & Social Services; and other visitors included General Martin Luther Agwai, Force Commander of the UN African Union Mission in Darfur; General Sir David Richards, Head of the British Army; Sir Peter Ricketts, Permanent Under-Secretary of the Foreign & Commonwealth Office, and Head of the Diplomatic Service, and Dr Barry Cockcroft, the Chief Dental Officer.

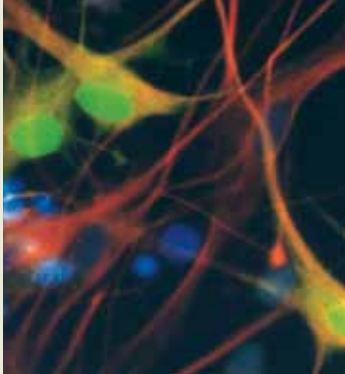


*Lord Rees of Ludlow, the Astronomer Royal, President of the Royal Society, and Master of Trinity College, Cambridge, received an honorary doctorate of King's in November 2008.*

## Honorary degrees

In November 2008 the College held its first full-scale ceremony for the award of its own honorary degrees, rather than those of the University of London. Recipients were Professor Michael Bishop, Nobel Laureate and Chancellor of the University of California; Professor Peter Brown FBA, a leading Late Classical and Medieval historian and Professor of Princeton University; Dr James Lovelock CH CBE FRS, a key figure in thinking about life and climate change and developer of the Gaia theory; Baron Rees of Ludlow OM Kt PRS, the Astronomer Royal, President of the Royal Society, and Master of Trinity College, Cambridge; Professor Junji Tagami, Dean of the Tokyo Medical and Dental University; Professor Romila Thapar, Emeritus Professor in History at the Jawaharlal Nehru University, and Professor Tu Wei-Ming, Professor of Chinese History & Philosophy at Harvard University.





### Stem cells without embryos

Research published in *Nature* in October 2008 from the Wolfson CARD Laboratory at King's, in collaboration with the University of Tübingen, shows that pluripotent human stem cells can be generated without requiring human embryos. The generation of human embryonic-like stem cells from biopsies of the adult male testes may provide simple and non-controversial access, not currently available to individual cell-based therapy, without the ethical and immunological problems associated with using human embryonic stem cells. The research used 22 samples to extract a type of cell called the 'sperm precursor cell'. These were then manipulated chemically in the laboratory into a state more similar to cells found in the embryo, which can go on to produce all the cell types in the body. Although the cells seem to have many, if not all, the properties of embryonic stem cells, there is still considerable work to be done in terms of differentiating these cells and testing them in animal models of disease.



### First dental anxiety service

The UK's first health psychology service for adults with dental anxiety has been launched at King's. Working together with colleagues in the Department of Sedation & Special Care Dentistry, the King's psychologists will use cognitive behavioural therapy to change patients' attitudes to attending the dentist, receiving a dental injection and taking children to the dentist. Dental fear can have a great impact on people's oral health, causing them to delay seeking treatment and to avoid opportunities for advice on how to look after their teeth. The service will also provide the opportunity to develop teaching and research in the field of dental fear.



### New museum of life sciences

The extinct marsupial Tasmanian wolf *Thylacinus* and the *Sphenodon* lizard with light-sensing pineal organ or 'third eye', as well as this skeleton of a swan, are among more than 2,500 plant and animal specimens to be found in a new Museum of Life Sciences that has been opened at the Guy's Campus of King's. For the first time, the new museum will allow specimens from the collections built up by the various constituent institutions that now make up King's College to be displayed together in dedicated exhibition space, so they can be viewed by the whole College and can be taken out of the display cupboards and used in current teaching and practical classes. The Museum of Life Sciences has been established through generous anonymous donations totalling more than £30,000, plus a contribution from the College, through an initiative led by the College's Development & Alumni Office.



PHOTOGRAPHY: KINGIS HEALTH PARTNERS, PHIL SAYER, CHRIS GEORGE

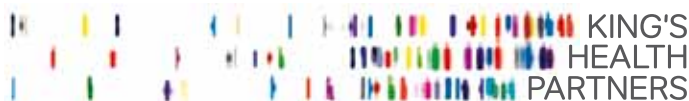
# FROM BENCH TO BEDSIDE, & BACK



*King's Health Partners (KHP) is a pioneering collaboration between King's College London, as one of the world's leading research-led universities, and three of London's most successful NHS Foundation Trusts. It unites world-leading research, medicine, healthcare and education in order to bring about improvements in health and well-being for patients, in London and world-wide.*

*A major focus of KHP is on 'translational research': enabling research discoveries to be effectively converted or translated into new treatments for patients as quickly as possible – and ensuring that the outcomes for patients feed back into further research and into the education of future clinicians and researchers.*

*The Cardiovascular Clinical Academic Group (CAG) of King's Health Partners is one of the country's leading centres for the study and treatment of heart and circulatory disease and shows translational research in practice.*





JO MIESZKOWSKI

### The Director's story

Professor Ajay Shah is a clinician scientist whose busy working life provides an example of the close relationship between the development of academic research, the treatment of patients, and the education of the next generation of students, researchers and clinicians.

A major part of his time is taken up with his role as Director of the British Heart Foundation Centre of Research Excellence at the Denmark Hill Campus of King's College, but one or more days a week may also see him on call to treat heart attack patients at King's College Hospital, next door.

Another day may catch him in the laboratory at the James Black Centre, close to the Hospital, carrying out his own research into the causes of heart failure; and the remaining days may find him lecturing to students, supervising PhD candidates or planning future courses.

The establishment of King's Health Partners means two important things to Professor Shah. 'One is that it is enabling us to develop the UK's leading high-quality environment for research, education, and clinical care and innovation in heart disease', he explains. 'We aim to be THE place that people come to when they want the best in heart treatment, research or teaching.

'The other is that it reinforces the cycle that links basic scientific research with translational research and with clinical research, innovation and care, which then connects back to basic education and research. In this way important clinical questions can be addressed by academic research, and our students can be taught by people whose research and clinical expertise is making a real difference to patients.'



Patients from south-east London and beyond who suffer heart attacks are rushed to King's College Hospital or St Thomas' Hospital to be treated by Professor Shah and his clinical colleagues, using a new technique called primary angioplasty.

'We were the first centre in the UK to establish primary angioplasty for all heart attack patients', Professor Shah explains. 'It has already saved hundreds of lives and revolutionised the outcome for these patients, and it is now spreading to hospitals all around the country.'

Angioplasty involves a half-hour keyhole procedure, under local anaesthetic, in which a small balloon is inserted and inflated to unblock the artery whose narrowing or closure caused the heart attack. The re-opened artery is then reinforced with a stent. Most patients can be back at home again within three days of treatment. 'This treatment is vastly superior to the old therapy with clot-busting drugs, which often failed to re-open blocked arteries', Professor Shah says.

Professor Shah's experience in the operating theatre and by the bedside feeds directly into his own research on fundamental questions about why heart failure still occurs after a heart attack in many patients, even after successful treatment by angioplasty, or in patients whose aortic valve has been blocked or narrowed. His research aims to develop new drugs to further improve the outcome for patients at risk of heart failure.

Meanwhile other researchers in the King's Cardiovascular Division and BHF Centre are using many innovative technologies such as those involving proteomics, stem cells and imaging, to make further advances in treating heart disease. 'And beyond that, we are working hard to bring in knowledge from other disciplines, such as bioinformatics, maths, physics and engineering, to develop new treatments. Recruiting bright PhD students with expertise in these areas is an important part of our strategy.' ■



... important clinical questions can be addressed by academic research, and our students can be taught by people whose research and clinical expertise is making a real difference to patients



PAUL GRUNDY

The James Black Centre





How can one be certain that a cell really is a stem cell?



JO MIESZKOWSKI

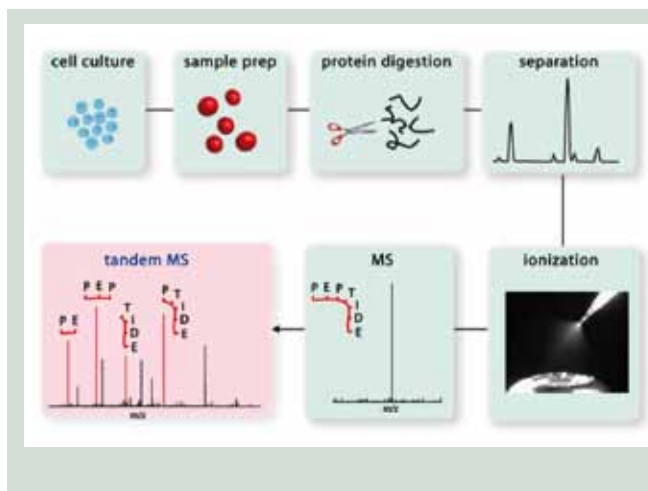
**The researcher's story**

Dr Manuel Mayr is Head of Proteomics at the BHF Centre at King's. He is analysing proteins – the molecules of life – to find better ways of using stem cells to improve the success rate of heart bypass operations by growing new sections of blood vessel to replace or repair damaged arteries.

'Stem cells are already used in clinical trials for treating patients after heart attacks', he explains. 'But how can one be certain that a cell really is a stem cell? In practice, scientists and clinicians tend to infer that a cell is a stem cell if it tests positive for particular protein markers that are thought to be indicative of their stem cell potential. According to our latest research, some of these markers are not reliable.

The advent of novel technology allows us to screen thousands of proteins and this "proteomics"-led approach contributes towards a better classification of stem cells.

'Our results suggest that cells used in some clinical trials may have been masquerading as stem cells, but were actually a different type of cell. We need to develop new ways of purifying stem cells and be sure that they are actually able to contribute to the repair of heart tissue before they are tested in trials on people. Within the King's BHF centre, we are very fortunate to have state-of-the art proteomic equipment and funding possibilities that allow us to utilize the latest technologies for our research.'



A diagram showing a typical proteomic workflow: proteins are prepared from cell cultures and cleaved into peptides. These peptides are separated by liquid chromatography and sprayed into a mass spectrometer. The mass spectrometer first records the mass of the intact peptide (MS) and then induces a fragmentation process (tandem MS). The peptide fragments unambiguously identify the protein.





**The funder's story**

Professor Peter Weissberg is Medical Director of the British Heart Foundation, which funds the BHF Centre of Research Excellence at King's.

'Every year heart and circulatory disease causes more than one in three deaths in the UK', he points out. 'Our mission is to play a leading role in the fight against cardiovascular disease so that it is no longer a major cause of disability and premature death. Our investment in four Centres of Research Excellence is helping us towards that goal, and we were delighted to award King's £9 million over six years from 2008.

'King's has brought together a team of scientists and clinicians from a wide variety of scientific disciplines to focus on different aspects of heart disease and to train a new generation of researchers. In particular their strengths in structural and cellular biology provide a real opportunity for "bench-to-bedside" translational research into new treatments for heart disease. The BHF believes that the Academic Health Sciences ethos at King's can only add value to the BHF Centre of Research Excellence and facilitate the interaction between laboratory science and patient care.'

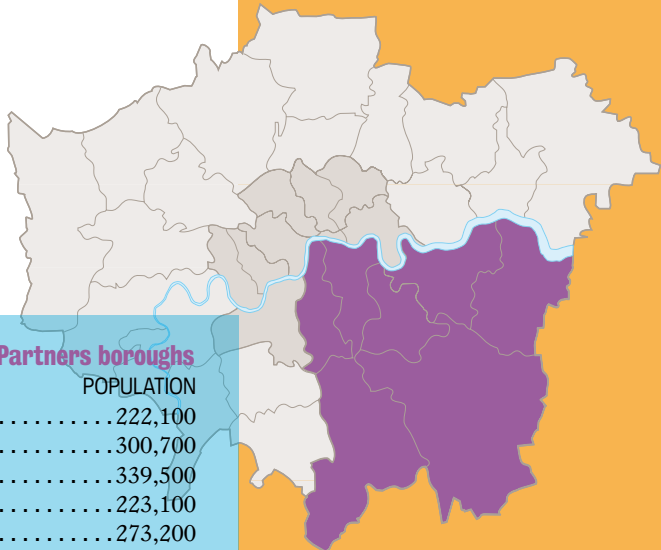


Every year heart and circulatory disease causes more than one in three deaths in the UK

**Introducing King's Health Partners**

King's Health Partners was one of the UK's first five Academic Health Science Centres (AHSCs) to be accredited by the Department of Health in March 2009. It brings together King's College London with the NHS Foundation Trusts of Guy's and St Thomas'; King's College Hospital, and the South London and Maudsley, which between them include seven hospitals and over 150 community-based services, and have a joint annual turnover of some £2 billion. It has access to around 60 per cent of London's population, or around five million people, and serves a larger number of patients than any other AHSC. The diversity of its population base provides a microcosm for studying world health issues and developing treatments of international benefit.

Strengths in neuroscience, psychiatry and mental health, together with complementary disciplines such as medical and molecular genetics, public health sciences and imaging, enable King's Health Partners to deliver better health and well-being for the mind and body, for the whole person. This combination of strengths helps to attract significant support from a wide range of partners, including many of the world's leading pharmaceutical companies and biotech industries.



**King's Health Partners boroughs**

POPULATION

Bexley	222,100
Bromley	300,700
Croydon	339,500
Greenwich	223,100
Lambeth	273,200
Lewisham	258,500
Southwark	274,400
<b>Total</b>	<b>1,891,500</b>





TAVI offers a new treatment option for high risk patients

JO MIESZKOWSKI



JO MIESZKOWSKI



**The clinicians' story**

*Olaf Wendler (left) and Martyn Thomas.*



Transcatheter Aortic Valve Implantation (TAVI) is another new and highly innovative operating technique pioneered in the King's Health Partners Cardiovascular CAG.

‘TAVI offers a new treatment option for high risk patients with aortic stenosis – a narrowing of the aortic valve which connects the heart to the major blood vessel carrying oxygenated blood to the body’, says Mr Olaf Wendler, Clinical Director for Cardiac Services and Consultant Cardiothoracic Surgeon at King’s College Hospital.

‘The TAVI programme at King’s started in August 2007 as part of the largest European feasibility trial for this technique, and so far more than 140 implantations using the Edwards Sapien™ valve have been performed at King’s and St Thomas’ hospitals, making the King’s Health Partners programme the largest in the UK.’

Instead of open-heart surgery, keyhole surgery is performed through a leg artery (the so-called ‘transfemoral’ approach) or through the apex of the heart (the ‘transapical’ approach). ‘This avoids the opening of the patient’s breast bone and the temporary by-passing of their own heart and lungs by a machine’, explains Dr Martyn Thomas, Clinical Director for Cardiac Services and Consultant Cardiologist at St Thomas’ Hospital. ‘TAVI has therefore the potential to reduce the side effects of the operation and can be a particularly helpful treatment for patients – such as those who are older and have other health conditions – for whom conventional surgery would be very high-risk.’

‘The excellent interaction between cardiac surgeons with a particular expertise in aortic valve surgery and interventional

cardiologists with a track record in driving innovative technique brought our Centre into the spotlight when this technique was introduced in the UK’, Olaf Wendler comments. A larger multidisciplinary team, including cardiologists with a particular interest in imaging; cardiac anaesthetists; research nurses; technicians and specialised nurses for pre- and post-operative care was formed and this guaranteed that strengths from all different areas could contribute to the programme.

‘We are convinced that this is the reason we were able to achieve excellent results and shorten our learning curve’, Wendler adds. In addition to successful contribution to the first trials, the academic side of the programme is analysing impact on heart function and patient outcomes, supported by research fellows, and clinical and academic data has been presented at national and international meetings.

King’s Health Partners is currently seen as a centre of excellence for TAVI treatment. ‘In our centre we facilitate teaching for other clinical groups who develop new programmes’, points out Martyn Thomas. ‘We act as supervisors in other centres to assist with their first implantations and have been invited to become primary investigators in forthcoming trials and European registries. This is enabling us to pursue further development of this technique at our campuses and also to offer these new techniques to our patients.

‘Our experience at King’s Health Partners shows that, with the adequate support of a multi-disciplinary team, excellent clinical and academic results can be achieved.’ ■



JO MIESZKOWSKI

**The patient's story**

Bernie Irvine describes how angioplasty treatment from Professor Shah saved his life.

‘The treatment I received at King’s College Hospital was simply outstanding. Professor Shah and his team were absolutely brilliant and did a wonderful job of saving my life, for which I shall be eternally grateful, as is my family. Before my heart attack, I had no history of any heart problem, although I have been asthmatic since childhood. As to what caused it, I can now honestly say it was my life-style – I was a heavy smoker and drinker and ate a lot of junk food with very little fruit and vegetables. I wasn’t the most active person in the world either! I also think stress played a factor – that day (9 October 2008) had been particularly bad.

‘I was first taken to Princess Royal Hospital, in Farnborough, where they discovered I was actually still having the heart attack. So I was then taken to King’s, where Professor Shah and his team were waiting. From the moment I met him, he just filled me with so much confidence with his calming and reassuring manner. I knew that I’d get through this. He asked “Do you know who I am”, and I replied “Yes. You’re the man that’s going to save my life.” This was greeted with a positive nod. That gave me the courage to “let go” and let them do their job.

‘On the day of the attack I had two stents placed via my groin into my arteries. I was in hospital for a week and on the seventh day I had another two stents put in. The staff were so professional and reassuring. They made the stay more bearable.



You’re the man that’s going to save my life



KING'S HEALTH PARTNERS

‘Because of my heart attack, I developed diabetes and angina. I’ve also gained weight due to the steroids, and find I get breathless because of this. I’ve been on diets to bring my weight down, without much success. But I have successfully stopped smoking as a direct result of the attack.

‘My life is good. I got married in March this year, and have recently started back to work as a self-employed driver. I also dabble in buying and selling antiques.

‘I have a second chance of life; my kids still have their dad and my then fiancée got to marry me!’ ■



FOR MORE INFORMATION ABOUT KING'S HEALTH PARTNERS

[www.kingshealthpartners.org](http://www.kingshealthpartners.org)







I study the function of more than 20,000 genes and 20 million potential interactions during cardiac response to stress



JO MIESZKOWSKI

**The student's story**

Ignat Drozdov is a PhD student supervised by Professor Shah and Professor Christos Ouzounis, Head of the Centre for Bioinformatics at King's. With first degrees in physics and music from American University, Washington DC, he is one year into his PhD on Redox signalling networks in cardiac response to stress.

'Rapid and ubiquitous genome sequencing allows scientists to monitor expression levels of thousands of genes in conditions such as cancer, diabetes, or heart disease', he explains. 'When applied to the study of cardiac response to stress (eg hypertension), these technologies make it possible to explore how genes interact with each other and identify key mechanisms that either protect the heart or lead to heart failure. The end product of such studies will not only result in molecular understanding of heart function, but may also elucidate novel treatments that could be tailored to individual patients – a much more effective alternative to a one-treatment-fits-all approach.'

Ignat's knowledge of physics and ability to model a real-world system using mathematical concepts is a valuable adjunct to experimental biology. 'In my research I study the function of more than 20,000 genes and 20 million potential interactions during cardiac response to stress.

'I integrate mathematical modelling of this system with validated biological data (eg transcript/protein expression levels, gene sequences, and known protein-protein interactions) to create a reliable overview of heart failure. Further assessment of



this model may lead to identification of novel drug targets, assessment of patients' response to treatment, and more thorough understanding of molecular signalling cascades in the heart.

'I feel very privileged to be working with multi-disciplinary experts to help to understand why heart failure occurs and how it can be prevented. The thrill of experiencing the genomic era in medical research first-hand, on more than one occasion has placed me at the centre of a fast-paced science fiction story rather than the reality of modern day research.' ■



# THE AIR THAT WE BREATHE

*'Earth hath not anything to show more fair'  
wrote William Wordsworth of the view from  
Westminster Bridge, after he saw it early one  
morning in 1802, 'all bright and glittering in the  
smokeless air'. Now, however, poor air quality is  
responsible for up to 3,000 premature deaths in  
the capital each year, and a new research centre  
has just been established close to Westminster to  
tackle the problem.*



*Claude Monet, The Thames below Westminster (c 1871).*

© THE NATIONAL GALLERY 2009



**A**ir pollution kills more Londoners than traffic accidents – and reduces the life expectancy of the average Londoner by more than eight months’, points out Professor Frank Kelly, Director of the Environmental Research Group at King’s and Deputy Director of the new MRC-HPA Centre for Environment & Health, based in Waterloo. ‘Wordsworth might not have known it, but London is a prime location to study the impact of air pollution on health, and here in the capital we are, quite literally, in the middle of a huge public health experiment.’

In the 1950s, the deadly smog hanging over the capital was a mixture of smoke and fog. ‘Fifty years on, the air may look cleaner, but the problem hasn’t gone away’, Professor Kelly explains. ‘Today’s haze is a complex mix of traffic and industrial pollutants including tiny particles and gases such as nitrogen dioxide and ozone which also pose a significant danger to our health. Traffic pollution contributes to respiratory and cardiovascular diseases and is a major player in the increasing incidence of childhood asthma.’

Earlier this year, King’s and Imperial College won £5 million from the Medical Research Council and the Health Protection Agency to investigate the damage that our modern living and working environment is doing to our health. Overall, the research will analyse the effects of traffic fumes, noise from overhead aircraft and chemicals in the environment such as the by-products of disinfection in the water supply. It will focus particularly on vulnerable people, including children and the elderly, and how environmental factors outside their control could be increasing their risk of respiratory problems, heart disease and cancer.

At King’s the work will concentrate on the impact of poor air quality on people’s

London’s Low Emission Zone has changed pollution patterns in the capital.



## The ‘omics’ of health and environment research

**Genomics** measure an individual’s genetic make-up.

**Proteomics** gauge how the production and clearance of proteins in the body is changed following exposure to specific pollutants.

**Metabonomics** chart the whole body’s metabolic response to changes following exposure.

health. ‘My aim is to bring scientists from different but complementary backgrounds and disciplines together and to enable them to work on the major public health issue of urban traffic pollution’, Professor Kelly says. ‘Our plans include conducting epidemiological studies involving large numbers of people living and working in London, and detailed analysis of the pollutants they are exposed to each day. The researchers will use new tools in areas such as mapping, modelling, toxicology, genomics, proteomics and metabonomics to answer questions such as which pollutants people are being exposed to, what their reactions are to these and how this may lead to tissue injury and disease development in future years.’

### Monitoring

The King’s team has been monitoring air quality across London’s 33 boroughs since 1995 when the London Air Quality Network (LAQN) was established (see [www.londonair.org.uk](http://www.londonair.org.uk)). This Network now has over 160 monitoring sites, and Professor Kelly has already been instrumental in advising the government on ways to reduce pollution in London. ‘The introduction of the Low Emission Zone has deterred the worst polluters from the city’, he says. ‘And already the positive effects of the Congestion Charging scheme are being seen. In a recent study we showed that the scheme is helping to reduce pollution levels in the most deprived areas of London, and that this is increasing life expectancy.’

But cutting air pollution by reducing the number of vehicles is not enough, and traffic pollution will remain a fact of city life for many years to come. Professor Kelly is therefore keen to understand how individual pollutants cause health problems, so that changes can be made to fuels to reduce our exposure to the worst culprits.





The air quality monitoring station in Marylebone Road, one of London's busiest streets.

### High six

The new Centre brings the number of Medical Research Council centres at King's to six – more than at any other university. The six centres are:

- **MRC-HPA Centre for Environment and Health**
- **MRC & Asthma UK Centre in Allergic Mechanisms of Asthma**
- **MRC Centre for Developmental Neurobiology**
- **MRC Centre for Neurodegenerative Research**
- **MRC Social, Genetic and Development Psychiatry Centre**
- **MRC Centre for Transplantation**

'Every breath we take has the potential to introduce dangerous gases and particles into our lungs. To improve understanding in this area, we'll be using advanced mapping and modelling techniques which can assess the actual exposure of individuals to a range of air pollutants. This improved "exposure assessment" information will assist our understanding of individual responses to specific pollutants and help clarify the links between environmental exposure and health outcomes.'

### Size matters

Other members of the team are focusing on the tiny particles emitted from vehicle exhaust and from brake and tyre wear. The smallest particles in the air are less than 10 micrometres (a hundredth of a millimetre) in diameter, and this 'particulate matter' or PM10 can penetrate deep into the lungs. However, it's not just size that matters when it comes to causing health problems, but also the make-up of the particle, as the team have demonstrated. They have developed a synthetic assay system that mimics the lining fluid on the surface of the lung and the protective molecules it contains, and this toxicological assay is used as a read-out to test air samples containing different pollutants from a range of urban and rural settings.

'The results show that it's not the size of the particles per se, or their concentration, but their biological toxicity that has



JO MIESZKOWSKI

### in my view

**Simon Birkett** is the founder of the Campaign for Clean Air in London. 'In my view, the excellent London Air Quality Network (LAQN) and King's Environmental Research Group (ERG) form the "bedrock" on which all air quality matters in London are founded', he says. 'The Campaign for Clean Air in London began its work in 2006 by studying levels of air pollution recorded on local LAQN

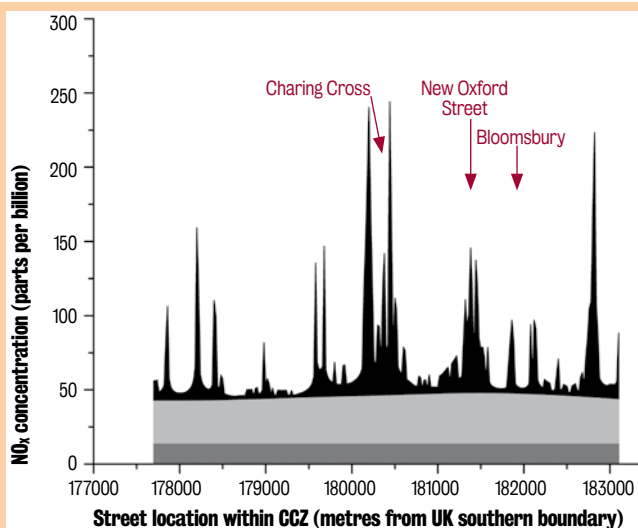
monitoring stations. I was amazed to find reliable air quality monitoring information readily available on the internet and updated every few minutes. Better still, when I had questions, I was delighted to find a helpful and highly professional team at King's keen to assist me.

'After more than three years of campaigning, my respect for King's ERG continues to

grow. In no other team, have I found greater passion, breadth and depth of expertise and commitment to communicating clearly and in innovative ways the trends in air pollution and its harmful effects on Londoners. For example, the LAQN was the first to report formally that levels of dangerous airborne particles have been rising in London at a mean rate of 0.4 per cent

per year since the late 1990s.

'In the years up to the London 2012 Olympics, in part as new air quality laws "bite", I hope to see monitored levels of air quality improve and many lives saved, all built on the success of the ERG at King's.'



A diagram showing oxides of nitrogen (NO<sub>x</sub>) by source within the London Congestion Charging Zone (CCZ). NO<sub>x</sub> arriving from outside London are shown in dark grey; London background NO<sub>x</sub> in light grey, and NO<sub>x</sub> arising from vehicles on the local road in black. Inhalation of oxides of nitrogen causes a range of respiratory symptoms and leads to increased susceptibility to respiratory infection.



An analyst from King's Environmental Research Group examines emissions from the exhaust of a diesel vehicle to measure the presence of contaminating metals.

### iPhone air quality



The King's Environmental Research Group has developed an iPhone/iPod touch application which allows people to access air quality readings from across London while on the move: a first step towards real-time air pollution measurements being provided to mobiles. The application is available free of charge through iTunes and allows users to navigate to any site in the London air quality network in three taps. See <http://www.londonair.org.uk/london/asp/news.asp?NewsId=iPhoneUpdate>

significant effects on our health', Professor Kelly says. 'Metals such as copper and iron are the worst offenders, and when they stick to the outside of PM10s the result can be highly toxic. I hope this research will lead to legislative changes that will encourage car manufacturers to develop engines, brake linings and tyres that emit lower levels of the worst pollutants.'

### Susceptibility

Even though these tiny particles are toxic to our lungs it appears that some of us are a lot better at defending ourselves from damage when we inhale pollutants than others. This so-called susceptibility to air pollutants is a subtle outcome, and very sophisticated techniques are required to detect different responses between individuals. Here again, modern technologies have been developed which help researchers identify susceptible people. The technologies of genomics, proteomics and metabonomics, combined with large epidemiological studies, will put the Centre's activity at the cutting edge of environment and health research.

Professor Kelly believes that the breadth of research taking place in the MRC-HPA Centre for Environment & Health will ensure that London continues to lead the drive to improve air quality in our cities. 'With all eyes on London as it prepares for the 2012 Olympics, this comes at an opportune time', he says. 'Air quality was a hugely important issue at the Beijing Games, and the establishment of this Centre provides the UK with a world-class research facility, capable of assessing the impact of environmental factors on human health, which will greatly enhance our ability to provide accurate and timely advice to government for the Olympics and for many other purposes in the years to come.'



FOR FURTHER  
DETAILS OF THE  
MRC-HPA CENTRE FOR  
ENVIRONMENT & HEALTH  
[www.environment-health.ac.uk](http://www.environment-health.ac.uk)

# The right environment for innovation

King's College London Business Ltd provides a gateway for business and the public sector to access the wealth of knowledge and expertise available at King's College London. King's Business has a successful record of enabling academics to develop the results of their research to attract commercial partners, including a number of environmental projects. These include some that have received proof-of-concept funding, facilitated by King's Business, from Innovation China UK (ICUK) of which King's is a founding partner. ICUK is the first UK-China collaboration programme to promote joint innovation and knowledge transfer between British and Chinese universities and other national research institutes.



**The forest fire and smoke pollution monitoring system** was developed by a team led by Martin Wooster, Professor of Earth Observation Science in the Environmental Monitoring & Modelling Group of the Department of Geography. Professor Wooster won the King's Award for Innovation in 2009. The project, which is funded by ICUK, allows the Chinese National Satellite Meteorological Centre access to the wild fire detection algorithms and software developed at King's, and enables the King's team to access real-time data from Chinese satellites in order to develop a forest fire emissions monitoring system covering China and Asia. This information will be sent back to the UK to act as a component of a global fire emissions monitoring system being developed by King's and its collaborators for the purposes of global atmospheric monitoring and air quality forecasting. The research was originally developed to exploit European satellite data for the purposes of quantifying smoke emissions from fires in Africa and Southern Europe (such as the huge fires in Greece that occurred in 2007 and 2009). However, its success led to it currently being tested on US satellite data covering the Americas. The information available from the Chinese satellites is an important step in building the world-wide coverage necessary for a truly global system.



**The Novel Early Flood Warning System (NEWS)** was developed by Dr Hannah Cloke and Dr Yi He from King's Department of Geography working with colleagues from Hohai University, China. NEWS, which was awarded proof-of-concept funding by ICUK for development from a research prototype into a commercial system, will be the first commercially viable multi-purpose early flood warning system to take account of both climate change and corresponding hydrological effects. It will be able to warn of floods in the short-term (a few hours) and in the medium-term (a few days), and will also provide risk analysis, which is currently unachievable with conventional models and software. The software has already been demonstrated successfully in the Upper Severn and Upper Huai river catchments.



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# *A castle of one's own*

**Recent research in the College Archives has revealed the previously undiscovered breadth, depth and length of Virginia Woolf's studies at King's Ladies' Department between 1897 and 1901. Dr Anna Snaith and Dr Christine Kenyon Jones describe their findings.**

With thanks to Frances Pattman and the staff of King's College London Archives for their assistance and archival expertise.





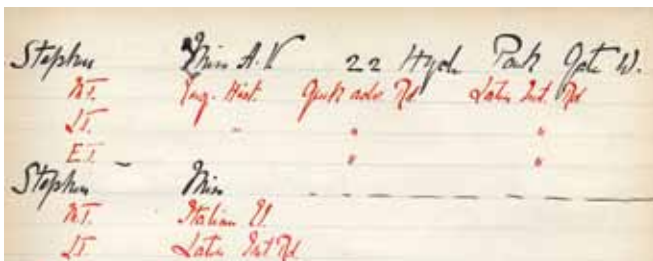
Virginia Woolf (née Stephen) in 1902, just after finishing her studies at King's Ladies' Department.

Late 19th-century  
furnishing fabric  
by Owen Jones for  
Warner & Co.

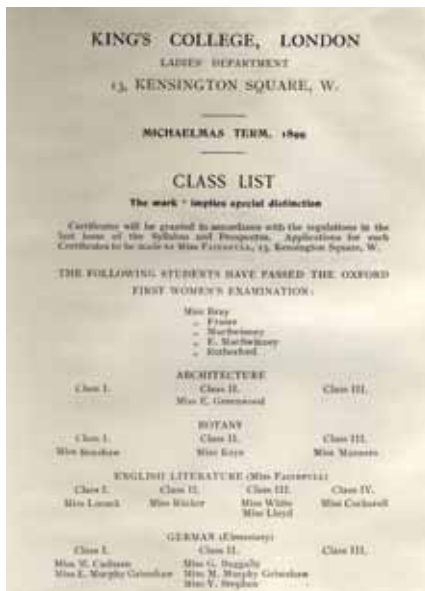
© V&A IMAGES/VICTORIA AND  
ALBERT MUSEUM, LONDON



Virginia Woolf's well-known claim that 'a woman must have money and a room of her own if she is to write fiction' reflects her constant concern for women's independence and education. She read and wrote widely about the historic exclusion of women from higher education and the prejudices that persisted even after colleges opened their doors to women, and her novels are full of female characters lamenting the insecurity and constraint bred by their lack of education.



Registrations for 'Miss AV Stephen' (Virginia) and 'Miss Stephen' (Vanessa) from the King's Ladies' Department register.



Class list showing Virginia Stephen's result in a German examination from the Michaelmas term of 1889.

Given this, it is curious that Woolf's own formal education has received relatively little attention. Recently examined records in King's Archives reveal that Woolf had much more first-hand experience of women's higher education than either she or her biographers have acknowledged. They show that her studies at King's College Ladies' Department extended over nearly five years, took her up to degree level in some subjects and brought her into direct contact with some of the early reformers of women's higher education.

The impression given by Woolf's biographers and indeed by Woolf herself is

that she was almost entirely self-educated. Her nephew Quentin Bell's biography depicts a typical day as one in which the young Virginia was left alone in the nursery at the top of the house reading Greek. Writing in 1932, Woolf claimed, 'Partly from reasons of health I was never at any school or college. My father allowed me to read any book in his library when I was a girl; and it was a large library'. In the same year she described herself as having been an 'uneducated child reading books in my room'.

The King's records show, however, that Adeline Virginia Stephen, as she then was, studied for a range of subjects at King's Ladies' Department for nearly five years between the ages of 15 and 19, reaching examination level standards in some of them, and that her sister Vanessa (later Vanessa Bell) also studied there from 1898 to 1900.

## Kensington

The Ladies' Department at 13 Kensington Square was part of King's College London, which in 1871, in response to the growing movement for women's higher education, had launched its 'Lectures for Ladies' in Richmond. This enterprise then moved to Kensington and was formally constituted as part of the College in 1885. By the time Virginia was there, the Ladies' Department had over 500 students and was offering a wide variety of courses at a range of educational levels, including preparation for the degree examinations of London and Oxford universities. In 1902, just after Virginia left, the Ladies' Department became the King's College Women's Department and, in 1910, King's College for Women. The arts and sciences departments of King's College for Women were merged with the 'main' King's College in 1915, when the women students joined their male colleagues at the Strand.

A vivid picture is provided by Lilian Faithfull (1865-1952), the Vice-Principal of King's who was in charge of the Ladies' Department from 1894 to 1907. In her memoirs she describes how

*[w]omen and girls of all ages from seventeen to seventy came to the lectures, some only to do one course, once a week, and some to several. Old ladies followed a favourite Professor and came year after year. [...] Married women arrived gasping for a 10 o'clock lecture, having snatched an hour with difficulty from their household duties at that time in the morning.*



'A room of one's own': a bed-sitting room at King's Hall, a 'house of residence' for students at the Ladies' Department, photographed for *The Girls' Realm* in 1899.



OXFORD UNIVERSITY LIBRARY

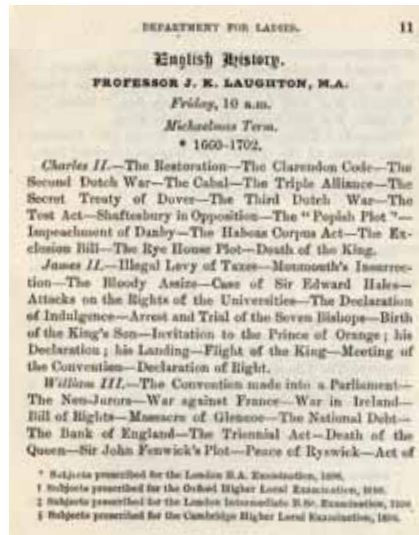
*And there were innumerable girls who had just left school and were anxious to continue their education, and others who were in the hands of governesses unable to teach them this or that subject, and glad to supplement their lessons by lectures.*

The subjects Virginia was enrolled for were History (Continental and English), German, Greek and Latin. Her sister Vanessa also studied Latin, and took classes in Italian and art.

## History

English and Continental History were taught by Professor (later Sir) John Knox Laughton (1830-1915): naval historian, Nelson expert and Professor of Modern History at King's, whose lectures in the years Woolf attended covered the period from 1558 to 1789. These topics are described in the Department's syllabus as 'Subjects prescribed for the London BA Examination, 1898', and it is clear that Laughton's lectures were pitched for students studying at degree level, although a considerable amount of further reading and written study would have been necessary to acquire the standard needed to pass these exams. Virginia seems to have gone at least some way down this route, writing to her brother Thoby about beginning her studies in October 1897: 'I have to write essays upon historical subjects for my history class, and on Tuesday I am going to have my first essay given back to me with the masters [sic] corrections'.

Between the autumn of 1899 and the spring of 1901 Virginia studied German at the Ladies' Department, achieving exam passes in 'German (Elementary)' and 'German Grammar and Reading'. These



KING'S COLLEGE LONDON ARCHIVES

Ladies' Department syllabus showing the history lectures by Professor John Knox Laughton that Virginia attended in 1897-8.

were College rather than University exams, but the German Grammar and Reading class did include subjects prescribed for the matriculation (or entrance exam) of the University of London degree.

From autumn 1897 to summer 1900 Virginia took Greek with George Charles Winter Warr, Professor of Classical Literature at King's: one of the foremost Greek scholars of his day and a prime mover in the establishment of the College's 'Lectures for Ladies'. Her studies with Warr included Sophocles' *Oedipus Coloneus* and Book II of Thucydides' *History of the Peloponnesian War*, which were prescribed for the final pass BA examinations of the University of London.

In November 1897 Virginia's father Leslie Stephen (the founding editor of the *Dictionary of National Biography*, who had himself studied at King's between 1848 and



1850) wrote to his friend George Warr:

*My daughter is attending your Greek class. I hope you will allow me to give you one hint. She has been in a very nervous state, wh[ich], though [...] explicable, has given me some anxiety. I have allowed her to go to the class, for wh[ich] she was very anxious; because I think that it does her some good to have the occupation. [...] I should be grateful if you would just remember this & let her off with light work.*

## Breakdown

Leslie Stephen had reason to be concerned about his daughter's health. In 1895, following the death of her mother, she had suffered a serious breakdown, and her illness was exacerbated by the death of her half-sister, Stella, in July 1897. However his fear that the classes would be too much for Virginia, and his dismissive focus on the therapeutic nature of his daughter's study, underestimates the vigour with which she pursued her studies and the pleasure she derived from the intellectual stimulation.

In 1898 Virginia wrote to her cousin:  
*I find that my beloved Warr gives his Latin classes on a day which is impossible for me, so that I mean to go to Miss Pater's Intermediate Latin class, on Tuesdays at 2. You only do reading Virgil – with her – w[ould] you come to that? I should think it was quite amusing.*

This was the beginning of Virginia's studies with Clara Pater (1841-1910), whose teaching fostered her lifelong engagement with Classical literature. The history tutor, Miss Craddock, in Woolf's 1937 novel, *The Years*, is modelled in part on Pater, as is the figure of Julia Craye in her short story 'Moments of Being: "Slater's Pins Have No Points"' (1928), where the erotic desire and adoration Fanny Wilmot feels for her teacher perhaps speaks of the attraction Virginia felt for the independent, educated woman who mentored her early in her life. Pater had tutored students in classics at Oxford; had been Vice-President of Somerville College, Oxford, and was active in the promotion of higher education for women. The 'Latin Intermediate Reading' classes that Virginia and Vanessa took with her in 1898-9 studied Virgil's *Aeneid* Books IX and X, and Book X of Livy's *History of Rome*, which were 'prescribed for Intermediate BA, London 1899'.

In autumn 1899 Virginia began studying Greek as well as Latin with Pater, and the Greek Intermediate class she took with



Virginia and her father Sir Leslie Stephen in 1900. Leslie Stephen also studied at King's (1848-50).

Pater that term read Plato's *Ion*, another subject prescribed for Intermediate London BA exams. By the summer of 1900 Virginia was referring to Pater as 'perfectly delightful' and describing herself as 'feeling a little triumph over the Latin language as though I had stolen a march on it – great rough beast that it is'. 'As for Greek', she wrote to her cousin, 'it is my daily bread, and a keen delight to me'. In spring 1901 Pater was forced to resign from class teaching at the Ladies' Department on health grounds, but Virginia's private studies with her were registered through King's until the end of 1901.

## House of residence

The copies of the Department's syllabuses and magazine (published two or three times a year between 1896 and 1914) which are now in the King's Archives provide descriptions of the activities and facilities there. In 1897 the Department opened King's Hall, a 'house of residence' for students at 28 Kensington Square, run by Lilian Faithfull's sister Eveline, 'late student of Somerville College Oxford'. 'The House is arranged on the usual College principles. Each student has one bed-sitting room fitted up as a study, besides having the use of general sitting-rooms', the Department's syllabus for 1899-1900 explained.

There was a busy extra-curricular life, including hockey, tennis, boating and bicycling clubs and a gymnasium class, a Ladies' Orchestra, a Browning Society and a dramatic club which aimed to give performances once a term. A King's College Guild supported the Women's Settlement in Stratford in the East End. There was a literary and debating society in which 'party spirit' ran high, and in 1901 a society for scientific discussion was formed.



FOR MORE INFORMATION  
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women.html](http://www.kcl.ac.uk/college/history/women.html)





KING'S COLLEGE LONDON ARCHIVES

Lilian Faithfull, Vice-Principal of King's and head of the Ladies' Department from 1894 to 1907.

Some features in the magazine hint at discussions held at the Ladies' Department that may have contributed to Virginia's later thinking and writing on women's lives and work, such as a 1900 article on 'College Education for Women' by Lilian Faithfull, who had been an undergraduate at Somerville College, Oxford, and had taught at the women's residential Royal Holloway College in Egham for five years before she came to King's. When she left King's in 1907 she followed Dorothea Beale as Principal of Cheltenham Ladies' College.

### Fernham College

Faithfull's discussions of the benefits of women's education to some extent prefigure Woolf's portrait of Fernham College in *A Room of One's Own*. Faithfull describes how, in the 'resident colleges',

*[t]he greater part of each day is spent by the student in her own room. Sometimes girls prefer to work together, but as a rule they seem to find that solitude conduces to concentration, and that a self-imposed isolation is advisable. This solitude in a corporate life is surely most valuable, and the necessity for it is too often forgotten in home life. [...] The possession of a castle of one's own is, perhaps, the first keen joy of College life.*

Woolf was never in residence at the King's Ladies' Department, and she had to wait until her move to Bloomsbury for a real 'room of her own', but she must have enjoyed the freedom and female company

found in the Ladies' Department's communal spaces.

A 1898 excerpt from the Ladies' Department magazine reads as though it comes straight out of Woolf's *Three Guineas*, which dwells on the economic disparity in the funding for men and women's colleges:

*An anonymous friend has given £15,000 towards the liquidation of the College debt [...] We in Kensington, are, however, just a little envious. A quarter of that sum would enable the Committee to make all sorts of improvements in the Ladies' Department, – perhaps even to found Scholarships, and to supply the Library with some of the many books of reference of which we stand so sorely in need.*

For Woolf, however, such poverty was something of a blessing, and she wrote in *Three Guineas*:

*The aim of the new college, the cheap college, should be not to segregate and specialize, but to combine. It should explore the ways in which mind and body can be made to cooperate; discover what new combinations made good wholes in human life [...] People who love learning for itself would gladly come there.*

King's Ladies' Department was certainly diverse in its constituency and adventurous in its aims, and it is curious that Woolf did not draw more explicitly on her experience there in her writing. Perhaps she preferred to think of herself as an autodidact, and felt that her real learning had taken place outside institutional walls. ■

## in my view

**Dr Anna Snaith** is Reader in Twentieth-century Literature in the Department of English at King's. She is currently editing *The Years* for the Cambridge University Press edition of Woolf's work.

'I have a long-standing research interest in Virginia Woolf. To discover that substantial new archival material relating to Woolf's

education is housed at my own institution has meant an enormous amount to me. Archival and autobiographical records about this early part of Woolf's life are sparse, and this new evidence relating to her nearly five years of study in Classics, History and German at King's College Ladies' Department significantly alters our understanding of her early life.

Educational reform for women was at the heart of Woolf's feminism and it is fascinating to discover her links to King's College, a pioneering institution in this context.

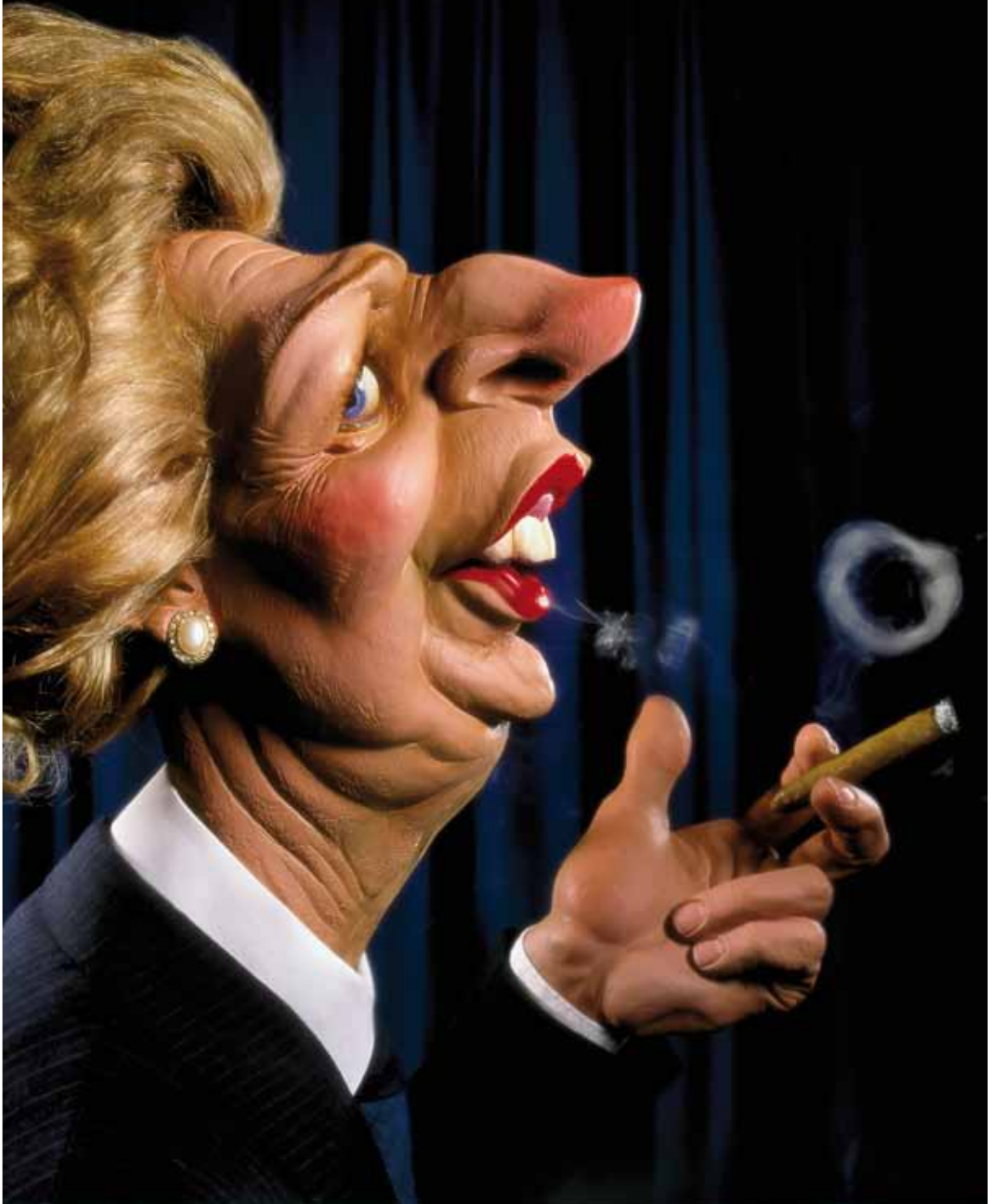
'Our findings are causing some excitement in the Woolf world. They will be published in *Woolf Studies Annual* in 2010.'



JO MIESZKOWSKI

FOR MORE INFORMATION ON KING'S COLLEGE LONDON ARCHIVES [www.kcl.ac.uk/iss/archives/](http://www.kcl.ac.uk/iss/archives/)

Margaret Thatcher  
as Prime Minister  
(*Spitting Images*, 1987).



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THATCHER'S  
BRITAIN  
OR  
BRITAIN'S  
THATCHER?

*Richard Vinen, Professor of History,  
ponders on his recent book, published to  
critical acclaim in May 2009.*



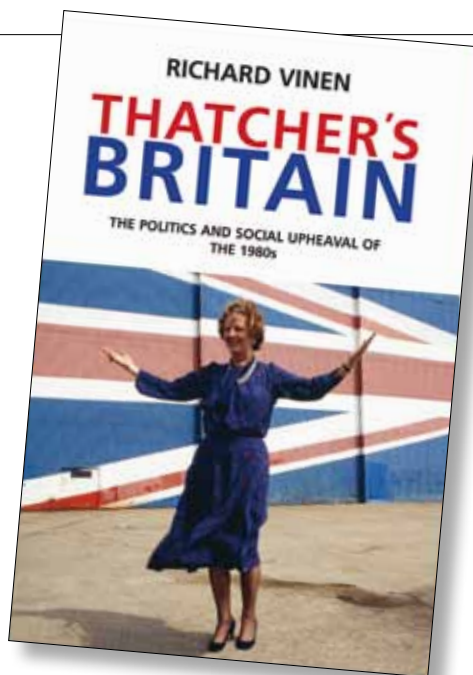
If I could change one thing about *Thatcher's Britain* (Simon and Schuster, £20) it would be the title. 'Thatcher's Britain' has a Dave Spartish feel of left-wing polemic about it. More seriously, it suggests that Thatcher was responsible for everything that happened in Britain during the 1980s, and that British politics had been a smooth mill pond of consensus and continuity until the brick of the 1979 election splashed into it.

Nothing could be further from the truth. Margaret Thatcher's election as leader of the Conservative party, in 1975, did not mark a sharp break. She became leader, almost by default, because no more major figure was willing to challenge Heath. Tory front benchers did not feel optimistic about their chances under her leadership. Indeed, they seemed to be on the defensive during the late 1970s. Far from seeking to pave the way for a radical government of the right, their aim was often to prevent the country from moving to the left. 'Elective dictatorship' sounds like a phrase coined by the centrist opponents of Thatcherism; actually it was coined in the mid 1970s by Lord Hailsham (later Thatcher's Lord Chancellor) to express the need that he saw for constitutional safeguards against dramatic political change. Conservative front benchers occasionally fantasised about privatisation, but their real concern was that there might be more nationalisation.

### Stumbling into government

The Conservatives stumbled into government in 1979. The election result was more of a defeat for Labour (undermined by the strikes of the previous winter) than it was a victory for the Tories. Much of what the Thatcherites seemed to promise in 1979 fitted with the orthodox opinions of the British establishment – the kind of opinions that had been expressed in the Finnieston report on the state of British engineering (commissioned by the Labour government in 1977) or in the leaked dispatch of

March 1979 by Sir Nicholas Henderson (the British ambassador to Paris) on 'British Decline: its Causes and Consequences'. The Conservatives saw salvation in Europe: in the sense that they were keen advocates of British membership of the EEC and in the sense that they thought that Britain ought to become more like France or West Germany. They also had a technocratic



vision of the British economy. They thought that its future lay in manufacturing industry and they believed that certain kinds of state intervention, such as the encouragement of technical education or even the use of subsidies to encourage 'industries of the future', might be useful. This was the last roll of some very well-used dice. John Hoskyns, the most intelligent of Thatcher's advisers, went home early on the night of the 1979 election victory. He wrote in his diary: 'I somehow could not get excited about the victory celebrations because I knew that the chances of the new government achieving anything where so many had failed were small.'

The fears that Hoskyns expressed were well-founded, and he himself soon resigned as Margaret Thatcher's adviser, convinced that the government had failed. Margaret Thatcher's first two years in office saw a deep recession. Young men in inner cities rioted, industrialists grumbled and the patrician 'wets' inside the Cabinet dripped ostentatiously. As it turned out, however, adversity was the making of Thatcherism. The severity of the crisis lent an air of drama to everything that the government did. High unemployment – something that the government had not planned or wanted – played into its hands. Throughout the previous decade, ministers had been haunted by the symbolic significance that they attributed to an unemployment figure that exceeded one million – ministers in the Heath government had backed away from its early free-market policies because they were frightened that unemployment

Young men in inner cities rioted, industrialists grumbled and the patrician 'wets' inside the Cabinet dripped ostentatiously.





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Margaret Thatcher and her ministers at the Conservative Party Conference in 1988.

would reach this level. Under Thatcher, unemployment rose to two and then three times this figure. This gave the highly misleading impression that the government knew what it was doing. One might, echoing Lady Bracknell, say: ‘one million unemployed might have looked like incompetence; two million unemployed looked like a policy’. Recession improved productivity – if only by exercising a brutal cull of the less profitable companies – and unemployment began to scare some trade unionists into thinking that they would prefer to cross picket lines than join dole queues.

Thatcherism did not develop in a political vacuum. In some ways, the most

important changes of the early 1980s were those that happened on the left. The Labour Party, under Michael Foot, changed more dramatically than the Conservative Party under Thatcher. Labour turned away from Europe, nuclear weapons and the Atlantic Alliance. This increased the sense of polarisation in British politics. It helped Thatcher by reducing the electoral appeal of Labour. Left-wing attacks often gave the Thatcherite thinking an appearance of coherence that it did not really possess – the term ‘Thatcherism’ owed much to an article that was published in *Marxism Today* in 1979. Similarly, Labour attacks on ‘monetarism’ gave the impression that the government had a novel ideology, though monetarism was, in fact, a pretty good description of the economic policy practised by Denis Healey, the Labour Chancellor, in the mid 1970s.

### Invasion

Another kind of adversity helped form Thatcherism. The Argentine invasion of the Falklands, which looked like a disaster when it first happened, turned Thatcher into a victorious warrior queen. This broke much of the opposition to Thatcher in her own party – all of those ex-Guards officers on the Tory benches found it less easy to sneer at Thatcher after British forces retook the Falklands. It also helped give her a very large majority in the 1983 election and, this time, the large majority was seen as a mandate for a new kind of policy. This meant, in particular, privatisation: the most important of the Tory legacies because it was the most difficult to reverse.

The Prime Minister meets personnel aboard HMS Antrim in January 1983 during her five-day visit to the Falkland Islands.



SVEN NACKSTRAND/AFP/GETTY IMAGES



© JOHN HARRIS (REPORT/DIGITAL.CO.UK)

### Compromise and tactics

What did Thatcher herself bring to all this? She was not an exponent of radical thinking for its own sake. Indeed, it is worth comparing her with Enoch Powell (sometimes regarded as the godfather of Thatcherism) precisely because Powell did take every idea to, and sometimes beyond, its logical extreme. Thatcher once snapped at Powell: 'In strict academic logic, the Honourable Gentleman is right; in everything else, he is wrong.' The remark says much about both of them. Thatcher knew how to wait, to compromise and make tactical retreats. She backed down in her first confrontation with the miners because she knew that she might not win; she kept men like Peter Walker, who disagreed with much of her economic policy, in the Cabinet. Thatcher's particular ability, however, was to combine pragmatism in what she *did* with a radical tone in what she *said*. She adopted a radical tone on issues, such as crime and race, which had electoral appeal but which did not necessarily bind her to particular policies when in government.

What went wrong? In part Thatcher became a victim of her own success. By 1989 the government had achieved things beyond the wildest dreams of 1979. The National Union of Mineworkers, which had haunted the nightmares of so many middle-class people (not all of them Thatcherites or even Tories) since 1974, was now broken.

Thatcher's particular ability, however, was to combine pragmatism in what she *did* with a radical tone in what she *said*.

Police charge picketing miners at Orgreave coke works during the miners' strike in Sheffield in June 1984.

Nationalised industries had been sold off. Most astonishingly, Soviet soldiers in central Europe were packing their kitbags and going home. At this giddy moment of apparent triumph, Thatcher's ability to distinguish between radical rhetoric and pragmatic action deserted her. In particular, she began to talk tough on Europe. This was not one of the vague 'value' issues, such as restoring the death penalty, on which Thatcher could pretend to be a rebel opponent of her own establishment Cabinet. Europe was central to economic policy. Turning against Europe turned Thatcher against some of her most important ministers and split the Tory party for a generation.

### Legacy

I am sceptical about drawing too many lessons for the present because my whole aim has been to root the study of Thatcherism in its times and to stress that it is not some political essence that can be poured on the politics of the twenty-first century. Thatcher's legacy lives on in the acceptance of free-market economics but,

in other respects, politics has changed in ways that suggest victories for what would once have been described as the extreme left – look at the things that leading Tories now say about Gay rights, for example.

One curious legacy of Thatcher has been to produce complacency on the part of her opponents. English left-wingers often seem to think that accounting for their own failure means blaming everything on Mrs Thatcher. Wallowing in the luxury of defeat (and one should say that ‘defeat’ in this context has been much more comfortable for left-wing university professors than for, say, Yorkshire miners), left-wingers have not asked themselves whether it would have been a good thing if Britain had introduced import controls during the early 1980s or expanded the number of coal fired power stations in the late 1980s. Both these policies were advocated by Thatcher’s critics at the time.


Thatcherism may be over as a political project, but it is just becoming interesting as a subject of historical research. The Cabinet papers for the period after 1979 will be released over the next 10 years (more quickly if the 30-year rule is reformed),



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Police and pickets during the strike at Lea Hall colliery, Staffordshire.

and the Thatcher Foundation will continue to make the most important documents available on line. I aim to exploit these opportunities in my own research and teaching. In particular, I now teach a course on ‘Britain’s Thatcher’ – the title that I should have used first time round. ■

 in my view



DAVID REES

**David Torrance**, author of *‘We In Scotland’ – Thatcherism in a Cold Climate* (2009), reviewed *Thatcher’s Britain* in the *Scotsman* on 7 May 2009, describing it as ‘a marvellous book: well-written, lucid, balanced and devoid of the rather unpleasant bias present in so many tomes about Mrs Thatcher or Thatcherism.’

‘Vinen’s book is’, he says, “‘designed to be dispassionate”, and dispassionate it certainly is. He weighs up each aspect of the Thatcher legacy in thematic chapters, and more often than

not concludes that what happened was either unavoidable, in some cases inevitable, and often involved considerable bravery on the part of the Cabinet, and particularly the Prime Minister.

‘Although Vinen doesn’t tell the reader much about Thatcher as a human being, he does add valuable, and often original, insights into her historical legacy. Correctly sceptical about accounts which hinge on acceptance or rejection of the “post-war consensus”, he prefers to see “Thatcher as the defender of the

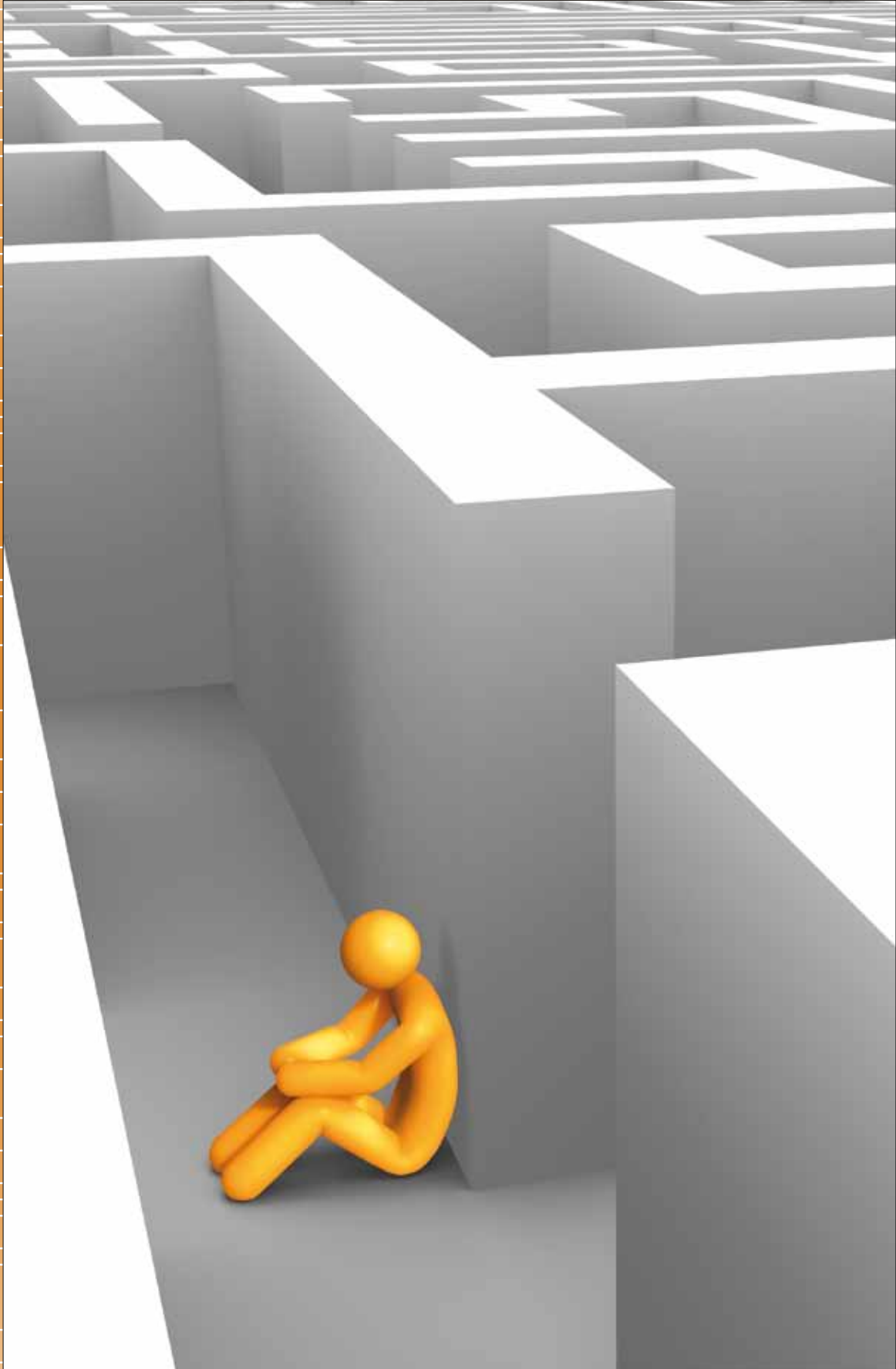
post-war consensus ... against the ‘progressive consensus’ of the late 1960s and early 1970s”.

‘*Thatcher’s Britain* is, therefore, a concise and sensible assessment of the most controversial, and arguably one of the most successful, premierships in this nation’s modern history. That Vinen is, or was, not a natural sympathiser is especially significant, confirming a growing historical consensus that Thatcherism did more good than harm, as much in Scotland as in the rest of the UK.’



**FOR FURTHER DETAILS OF PROFESSOR VINEN’S RESEARCH**

**[www.kcl.ac.uk/schools/humanities/depts/history/staff/academic/vinen.html](http://www.kcl.ac.uk/schools/humanities/depts/history/staff/academic/vinen.html)**





# *Diagnosing the Alzheimer's brain*

**Finding a way of diagnosing Alzheimer's disease through a biomarker, such as a brain scan or blood test, is coming closer, and opens up possibilities for arresting or even preventing the illness. Simon Lovestone, Professor of Old Age Psychiatry at the Institute of Psychiatry at King's, reviews current progress.**

**H**uge efforts are being made to improve services for people with dementia, with early diagnosis being a key part of the government's strategy. This is for good reason, because early detection and early diagnosis are critically important for people with dementia and their families. Early diagnosis allows families to plan, patients to come to terms with their condition and both to get early support and help from services. Advances are also very rapidly being made in the understanding of Alzheimer's disease (AD), with clinical trials now well advanced for 10 drugs designed to prevent early pathological changes and another 50 or so drugs in earlier phases of development.

This is all very promising, and a far cry from the situation a decade or two ago when AD was rarely identified early, and when the prospect of treatments designed to affect the disease itself was not on the agenda. However, as both developments in services for patients and research move, together, towards early diagnosis and hopefully one day intervention, then the limitations of our current practice to diagnose and monitor AD become ever more apparent.

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### Problems

Despite the progress that has been made and the optimism about developments in research in this area, there remains one outstanding problem. We cannot diagnose Alzheimer's disease early or accurately. Actually, it is worse than this, because there are not only difficulties in diagnosis but

**A biomarker is any characteristic that can be measured that reflects the disease process: it could be the result of a brain scan, or of a biochemical test of spinal fluid or blood.**

also considerable problems in measuring progression. At present at least, the notion of predicting who will get AD remains something of a pipedream. These problems could seriously hinder and potentially even derail the progress that is being made both in the delivery of services for patients and in the research drive towards therapies that can treat the disease. At present diagnosis is an entirely clinical activity and, when faced with a person in clinic with mild memory problems, the best a clinician can do is to administer a cognitive test and then wait six months or a year to see if the condition gets worse.

If this remains the only means of diagnosis, the drive to find interventions that can be delivered at an early stage in the disease might falter. Equally, clinical trials, hugely expensive already, are seriously hampered by the difficulties created by having a cognitive test as the only measure of output. Patients learn how to do well in such memory tests and have good days and bad days, and this makes these tests problematic, even if they are the best we have. Some years ago we did a study which showed that some patients apparently improve on the most commonly-used cognitive test in dementia over the course of a year by more than the known effects of the best drugs for Alzheimer's available today. If the 'wobble' in the test is greater than the expected effect of a drug, then this tells us we have a problem.

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### Biomarkers

Because of this, one of the most exciting and fast-moving areas of research in Alzheimer's over the past few years has become the search for biomarkers. A biomarker is any characteristic that can be measured that reflects the disease process: it could be the result of a brain scan, or of a biochemical test of spinal fluid or blood. A biomarker might make diagnosis more accurate; it might help in predicting which patients with memory problems are most likely to get Alzheimer's, or it might be used to measure the extent or progression of the disease. Any or all of these would be useful in clinical trials. A biomarker for better diagnosis would mean more accurate inclusion of patients into trials. A biomarker for prediction might help to decide which patients would best respond to a given treatment – selecting sub-groups of patients in this way is known as stratification. Finally the ultimate target for biomarkers is a test that could measure



disease progression and even substitute for (or more likely complement) clinical assessment. Such a biomarker is known as a surrogate. Any of these would make clinical trials more accurate, shorter, more powerful and potentially cheaper. Any of these biomarkers would therefore accelerate the process of finding a better treatment for this devastating disease.

The most advanced technologies in the hunt for biomarkers are brain scans – either MRI, or molecular imaging of pathology using PET (positron emission tomography). We have been working on a major trial in Europe, partnered with a large US study, to find the best technique for the automated analysis of regional differences in the brain. We can achieve 85 per cent or more accuracy on brain scans: close to the typical accuracy of a clinician using cognitive tests.

### Blood test

But brain scans are still expensive, and for various reasons not all patients can be scanned. So we have also spent the past eight years working on a blood test. Using two-dimensional gel electrophoresis and mass spectrometry, we identified a series of proteins in blood, including factors involved in immune regulation, which seemed to be different in AD. We then went on to confirm this in a large study. This work was subsequently replicated by others, and we are now working with commercial partners and in a study funded by the Medical Research Council to develop better and more robust assays of these proteins for use in very large scale clinical studies.

However, one of the problems with the approach we have used is that we are comparing people with AD ('cases') to people without it ('controls'). This is the standard approach, but it is a flawed experimental design, because one of the things we know for certain about AD is that it is a very slowly progressive disorder and some people we label as controls are almost

### Dementia will double, report says

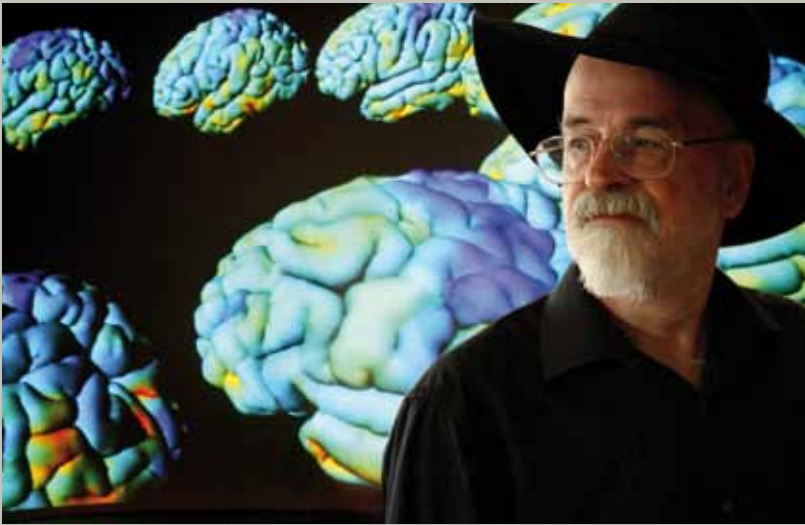


The number of people with dementia and Alzheimer's will nearly double in the next 20 years, from 35 million to 65.7 million, and will then nearly double again to 115.4 million in 2050, according to the 2009 *World Alzheimer's Report* prepared by a research team led by Professor Martin Prince of the Institute of Psychiatry at King's. These updated figures represent a 10 per cent increase over the previous figure for the prevalence of global dementia, reported in 2005. The change is driven mainly by new information from recent studies in low- and middle-income countries. The proportions of older people expected to be affected are now significantly higher than previously estimated for three world regions: South Asia, Latin America and Western Europe.



A coloured axial magnetic resonance imaging (MRI) scan of the brain of a 65-year-old patient with Alzheimer's disease, with the front of the brain at the top. The degenerative progression of the disease has caused atrophy in both halves of the brain, but especially at the upper right and upper left (in the areas coloured orange) and in the ventricles (shown in blue in the centre).





BBC/ABC MEDIA

## Terry Pratchett: living with Alzheimer's

Sir Terry Pratchett was filmed visiting the Institute of Psychiatry at King's in his two-part documentary, *Living with Alzheimer's*, screened by BBC2 in February 2009. The best-selling author has early-onset Alzheimer's which he is determined to tackle head-on. In the two-part series Sir Terry confronted his uncertain future, and the camera followed his progress as he explored cutting-edge science and alternative treatments and

met other Alzheimer's sufferers. Professor Lovestone described Sir Terry's immense courage in making the programme. 'We were delighted to have the opportunity to show him our pioneering research, and grateful to him for highlighting the importance of continued research into this devastating illness. Many of our team are fans of his work and they were thrilled to meet a potential recipient of the benefits of their research.'

certainly suffering from Alzheimer's – they just don't know it yet. Including these people in our studies weakens the scientific power and the ability of the study to find changes that indicate the disease.

### Protein

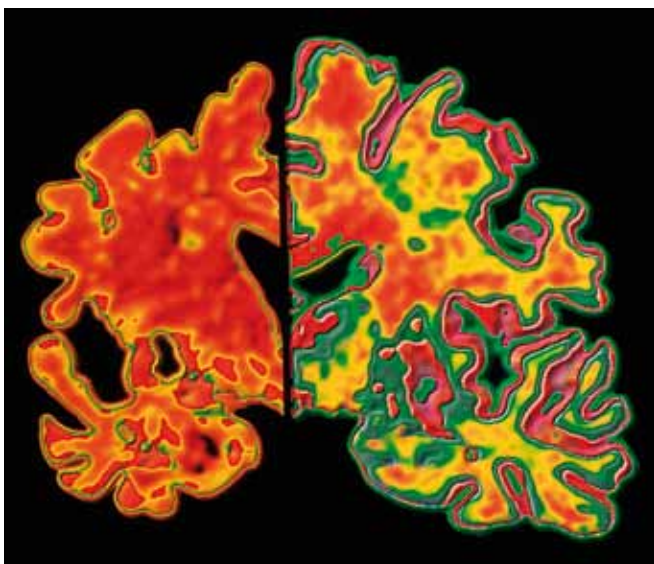
To overcome this problem we used a novel approach where we only examined people with Alzheimer's, but this time compared those with more aggressive disease to those with a more indolent development of it, and also compared people whose disease was verified through imaging, with those whose was not. Using these two approaches, we identified one protein common to both, and went on to show that in mouse models of Alzheimer's and in people this blood protein was a marker of pathology in the brain. At the same time, two very large collaborative studies (one of which we are part of) have shown in over 30,000 people that the protein we have identified is also a genetic risk factor for dementia. This is very exciting, and is powerful evidence backing

**We have shown convincingly that such biomarkers using blood tests or brain scans are possible.**

up our studies. As with our earlier studies we are collaborating with a large diagnostics company to develop a test that might be widely used in biomarker studies.

This work, and that of other groups doing similar studies around the world, is advancing the case for biomarkers in Alzheimer's disease. We have shown convincingly that such biomarkers using blood tests or brain scans are possible, and there is no doubt that when we have such markers they will be very useful both in drug trials and in the clinic. Work such as this brings one step closer the future we all hope for, when Alzheimer's disease can be confidently identified before it has begun to cause a real problem for the patient and when treatments can be started that will slow or even halt its progression. ■





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A computer graphic of a vertical slice through the brain of a patient suffering from Alzheimer's disease (on the left) compared with a normal brain (on the right). The brain of the Alzheimer's disease (AD) sufferer is considerably shrunken and more deeply folded, because of the degeneration and death of nerve cells. The causes of AD are poorly understood but are associated with the formation of plaques of an insoluble protein (amyloid) in the brain and decreased levels of the neurotransmitter acetylcholine. AD is incurable, but the symptoms can be treated with drugs that raise acetylcholine levels.

The John and Lucille van Geest Foundation has supported Professor Lovestone's work on biomarkers for Alzheimer's disease over several years, and in 2009 pledged more than £400,000 to support his programme to develop a blood test for the disease. The King's Development Office is seeking to match this sum through other donations and so fully fund the programme. The Foundation was established by the late John van Geest CBE and his wife, the late Lucille van Geest MBE, and has made grants of more than £18 million since 1977. Some 75 per cent of the Foundation's expenditure is applied to medical research, with the other 25 per cent being used for welfare purposes.

## in my view



John CS Breitner is Professor in the Department of Psychiatry and Behavioral Sciences in the University of Washington School of Medicine, and Director of the Geriatric Research Education and Clinical Center of the VA Puget Sound Health Care System in Seattle, USA. He is Study Chair for the Alzheimer's Disease Anti-Inflammatory Prevention Trial (ADAPT).

He describes Simon Lovestone as 'a force of Nature', adding: 'It's rare indeed to find someone so diverse in his

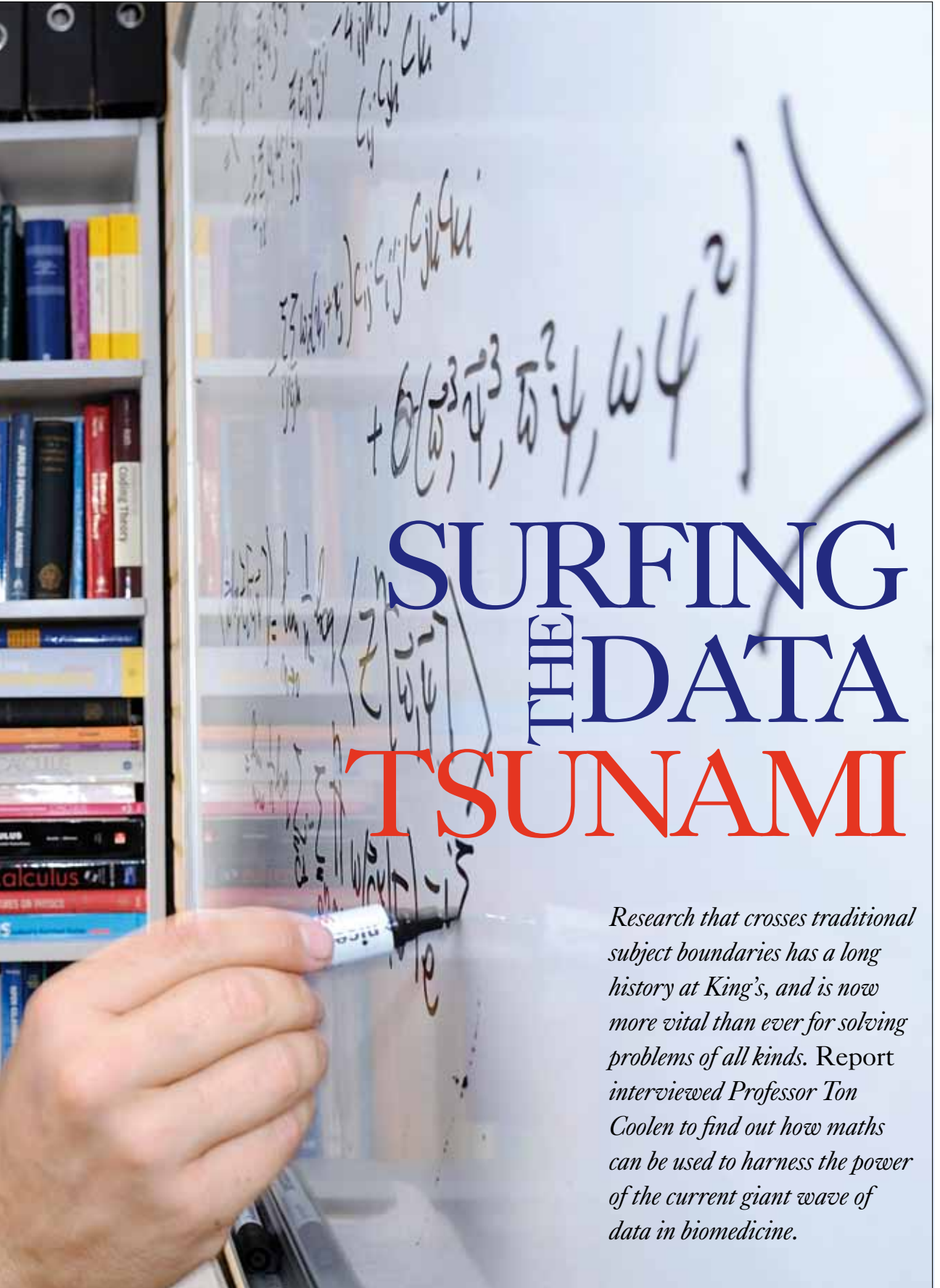
interests, showing excellence in virtually all his pursuits, be they clinical care, education and training, or research. His research portfolio is astonishing in itself – from clinical trials to molecular genetics to imaging consortia to molecular pathophysiology of Alzheimer's disease to the search for biomarkers for same. Using the latest in technological advances, he is fearless in tackling the thorniest problems posed by this disease. I'm thinking here particularly of his search for peripheral

biomarkers of AD pathogenesis. Paradoxically, the urgency of this quest has increased in the past year or two as the value of *central* biomarkers (that's to say, cerebrospinal fluid markers) has become more apparent. Similarly useful markers from blood or saliva would represent an enormous advance. As someone who attempts trials of agents for prevention of AD, I follow Simon's biomarker work closely and hope earnestly for its success.'



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# SURFING THE DATA TSUNAMI

*Research that crosses traditional subject boundaries has a long history at King's, and is now more vital than ever for solving problems of all kinds. Report interviewed Professor Ton Coolen to find out how maths can be used to harness the power of the current giant wave of data in biomedicine.*



In 1953, cracking the code of the DNA molecule took the combined expertise of a physicist who had migrated into chemistry (Francis Crick); of a former ornithologist who forsook birds for viruses and molecules (James Watson), and of two physicists who had turned to solving biological problems using X-ray crystallography (Nobel Prize winner Maurice Wilkins, and Rosalind Franklin, both from King's). This crucial cross-disciplinary approach was encapsulated in the Biophysics Unit founded at King's by John Randall 60 years ago, and is a key feature of today's Randall Division of Cell & Molecular Biophysics at King's.

One of the latest recruits to the Randall Division is Ton Coolen, Professor of Mathematics in King's School of Physical Sciences & Engineering. Over the past two years a half-time post in the Randall Division, funded by a fellowship from the Engineering and Physical Sciences Research Council (EPSRC), has enabled him to develop ways of applying mathematical analyses to biological problems such as understanding cellular signalling systems in normal and cancerous cells. *Report* asked him about his work.

### **REPORT: How does a mathematician come to be working in cancer research?**

**TC** As an applied mathematician, I've always enjoyed working on problems of a biological nature – my first ever research paper was on photo-pigment kinetics in the retina. My connection with cancer research came later. For several years I'd been involved as a volunteer in cancer-related activities, representing patients and carers in a London cancer hospital. About three years ago I met a number of researchers in the biomedical sciences here at King's and found that there were many problems in post-genome cancer research where mathematical tools could make a significant impact. I became involved in several biomedical research collaborations, generated by a spontaneously emerging multi-disciplinary research team at King's, and found these to be extremely enjoyable, rewarding and fruitful.

### **R: Is it new for mathematicians to be involved in solving biological problems?**

**TC** Mathematicians have always worked on biological problems and have contributed in the past to, for example, genetics; population dynamics and the evolution of eco-systems; the analysis of pattern formation (the shapes of biological entities); predictions of the spread of diseases; the analysis of cell metabolism, and the modelling of information processing in the brain – and many more!

What's changed, however, is that in recent years we've experienced a 'data tsunami', comparable to the one that transformed physics in the late 16th and early 17th century. We now have unprecedented and continually increasing amounts of sophisticated (and expensive) high quality data, such as genetic information, high-resolution in-vivo images of cell processes and large-scale population data. Just as the availability of extensive and precise astronomical observations in the 16th century paved the way for Kepler and Newton to revolutionise physics, the present storm of data in biomedicine has the potential to revolutionise medicine, provided we manage to use these data effectively for understanding the complex biological systems from which they are extracted.



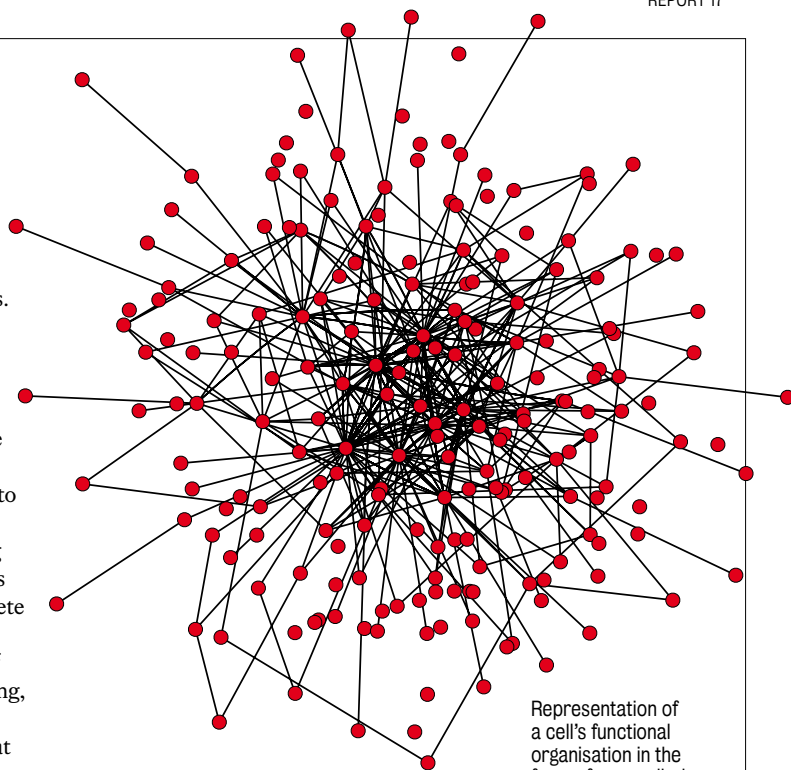


**R: King's has recently won a £4.5 million grant from the Biotechnology and Biological Sciences Research Council (BBSRC) to research how new cancer drugs could match medication more precisely to individual patients. How can maths contribute to this new targeted therapeutics in cancer research?**

**TC** Cells are extremely complex entities. Their behaviour is controlled by a large number of nested microscopic reaction processes, involving tens of thousands of different species of complicated molecules. The reason why even now the default treatment for most cancers is still chemotherapy – the equivalent of trying to repair a watch with a hammer – is that as yet we have only a limited understanding of how a cell controls its behaviour and its response to stimuli. Even having a complete list of a cell's components would not be enough: if we want to have any chance of repairing the system when it's misbehaving, we need to understand how these components work together. Much of what goes on inside a cell is still a black box.

In cancer research, one important role of mathematics is therefore to predict quantitatively how the shapes and the reaction rules of its interacting molecules give rise to a cell's functioning at a macroscopic scale. Upon testing such predictions experimentally, we can decide whether or not our present assumptions regarding the contents of the black box are true, and refine our picture in stages. If successful, we can then also work our way back, and predict in a more targeted manner which microscopic intervention(s) would be needed to affect a desired change in the cell's behaviour.

A second important application area of mathematics is the detection of patterns and relationships between variables that can be measured in patients (for example, genetic information, concentrations of specific proteins), and the likely progression of their disease and their response to treatment. The rationale is that even if we don't yet know in detail the contents of the black box, we can still hunt for regularities between the input and the output of the box. If we can extract such patterns reliably, we can target medical interventions to those patients who are most likely to benefit from them (and prevent many others from undergoing treatments that reduce their quality of life without significant benefit).



Representation of a cell's functional organisation in the form of a so-called 'interaction network'. Each node (red) represents a protein species, and each line marks pairs that have the ability to attach to each other. Much information about the differences between cell types and their (anomalous) functioning can be obtained from a mathematical analysis of the topologies of such networks.

**R: Why is effective collaboration between different kinds of scientists now more essential than ever?**

**TC** The sheer complexity of post-genome biomedicine prompts us to work in multi-disciplinary teams. If one spends a vast sum on a sophisticated new house, one would prefer to have experts carrying out each building task (as opposed to the bricklayers doing also the electricity, roofing, plumbing, and tiling ...). Similarly, in 21st century biomedical experimentation one needs molecular and cell biologists (for their knowledge of cellular structures, and the execution of gene interventions); structural biologists and bio-informaticians (to advise on which molecules to target for measurement); physicists and engineers (for building imaging and data collection equipment); computer scientists (for fast data collection and image processing), and mathematicians (for statistical data analysis). The interpretation of the results of experiments, in terms of what they tell us about the processes underlying our observations, again requires biologists, physicists, mathematicians and bio-informaticians. It's impossible for anyone to be an expert in all these fields simultaneously, so without effective collaboration between different kinds of scientists the work can't be done at the standard required, and no serious progress will be made.



FOR FURTHER DETAILS  
OF PROFESSOR COOLEN'S  
RESEARCH  
[www.mth.kcl.ac.uk/~tcoolen/index.html](http://www.mth.kcl.ac.uk/~tcoolen/index.html)

**R: Are there other examples of the way this is happening in research at King's?**

**TC** There are very effective multi-disciplinary collaborations here, because the College has the advantage of simultaneous strength in biomedicine and in the mathematical and natural sciences, as well as access to vast amounts of biomedical data via its clinical partners. One example is the EPSRC-funded Optical Proteomics Consortium, which involves (bio) physicists, medics, bio-informaticians and mathematicians. There are similar multi-disciplinary collaborations and networks in, for instance, medical imaging, and in basic cellular and molecular biology, often working in association with teams from other UK universities.

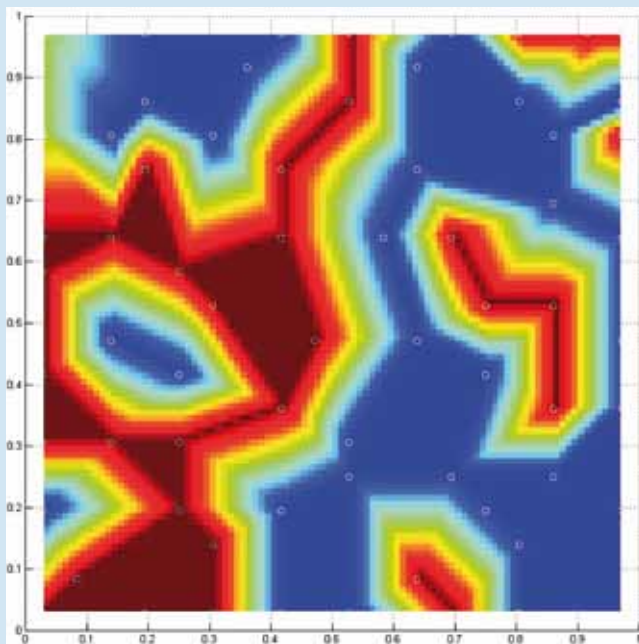
**R: Tell us about the new PhD programme in Systems Biomedicine.**

**TC** The programme was created to prepare a new generation of scientists for working on biomedical problems in multi-disciplinary teams. We'd like our new researchers to be comfortable with such teams, to have a basic awareness of the methods and styles of disciplines other than their own, and to form informal multidisciplinary networks of peers at an early stage in their careers.

Our guiding principle was that we shouldn't take away any time from the PhD candidates' training in their primary disciplines. In the UK the time available for doing a PhD is often modest compared to that available overseas, and even

this limited time is under pressure from increasing bureaucracy. Secondly, we see no benefit in training people who know a bit of everything but have no area in which they are specialists; we need our young researchers to be experts in their own fields, but want them to work efficiently with experts from other fields. So we have chosen to extend the PhD training period of each participating student by six months, and to invest this extra time in a programme of lectures, seminars and apprenticeships. The lectures and seminars give overviews of disciplines of relevance in biomedical research, but presented in a way that makes them accessible to all. The apprenticeships are three-month placements that take the students to departments other than their own, where they participate at the work-floor level in research, carrying out small projects and/or 'shadowing' local PhD

The opportunity for these students to climb over the fences that surround the traditional disciplines enriches their training by allowing them to find out how adjoining disciplines work and think.

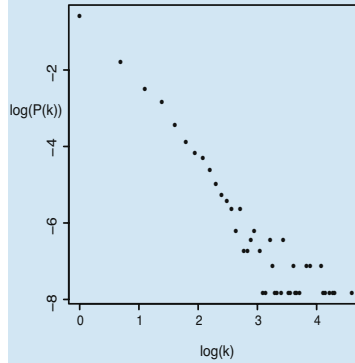


This image shows the result of using mathematical methods to extract predictive patterns from a large number of tumour cell measurements (for example, the concentration profiles of specific proteins, and cell shape information). At the end of the process each tumour is mapped to a point in this plane, and one looks for regions that consistently correspond to either a good (blue) or poor (red) response to a specific treatment, as an aid to individualising cancer medicine.

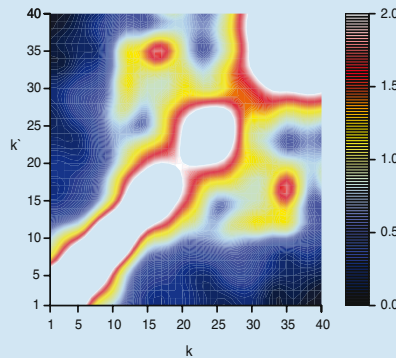
students. Computer scientists get a taste of biomedical experiments, experimentalists get a taste of manipulating mathematical equations, and so on.

Last year we had eight PhD students following the programme, spanning a broad spectrum of topics from four different Schools of the College (Biomedical & Health Sciences, Medicine, Physical Sciences & Engineering and the Institute of Psychiatry). We have a similar number this year. The opportunity for these students to climb over the fences that surround the traditional disciplines enriches their training by allowing them to find out how adjoining disciplines work and think. Student feedback indicates that our candidates value and enjoy this experience, and it will undoubtedly benefit the effectiveness of the College's multi-disciplinary biomedical research teams in the future. ■

### Degree distribution



### Degree-degree correlations



The structure of a network (a collection of nodes and links between them) can be characterised by the statistics of its 'degrees', i.e. the number of partners of each node. One can, for instance, plot how many nodes have a given number of partners (left above). Similarly one can show in a colour plot the extent to which partner preferences of nodes depend on their respective degrees (left below). Do high-degree nodes tend to be connected to low degree nodes? Or do they perhaps prefer linking to other high-degree nodes? The answers to such questions provide valuable information on the organisation principles behind networks.



JO MIESZKOWSKI

### in my view

**Hanna Milewicz** is on the new PhD programme in Systems Biomedicine. Her PhD topic concerns understanding how T cell proteins interact with each other when entering the cell cycle. She took her first degree in biopharmaceutical technology at the University of Applied Sciences at Giessen, Germany.

.....

'This novel and unique multi-disciplinary biomedicine PhD programme is the main reason I chose King's', she says. 'Scientists tend to look at research projects only from

one perspective, because there is a communication barrier between different disciplines, but this PhD allows scientists from many traditional disciplines to collaborate.

.....

'The T cells in the blood (a specific kind of white blood cell) are typically in a 'resting' state, but when triggered by a stimulus such as a pathogen they become activated and enter the cell cycle. During this activation hundreds of proteins interact with each other – a process which is complicated and poorly understood. Based

on bioinformatical analyses and wet-lab experiments, we've been able to generate protein interaction networks of T cells. In my research, I'm aiming to understand how those proteins interact with each other and what functional role they have.

.....

'In co-operation with the Randall Division, at King's, where I'm currently being trained in fluorescence lifetime imaging microscopy, I'm planning to develop an optical imaging method to visualise specific protein interactions in T cells in real time. I chose this research

topic because I'm interested in leukaemia research and at the same time I wanted to work in a multi-disciplinary way.

.....

My research involves not only carrying out traditional wet-lab experiments but also the opportunity to co-operate with bio-informaticians, physicists and medical scientists. This gives me the chance not only to understand, for instance, the mechanism natural killer cells are using to kill a target cell, but also how a laser or a multiphoton microscope works.'

.....





Based in the Franklin-Wilkins building of King's Waterloo Campus, the new £2.2 million London Dental Education Centre (LonDEC) provides highly sophisticated equipment and a congenial environment for training London dental professionals and for developing leadership skills in dentistry.

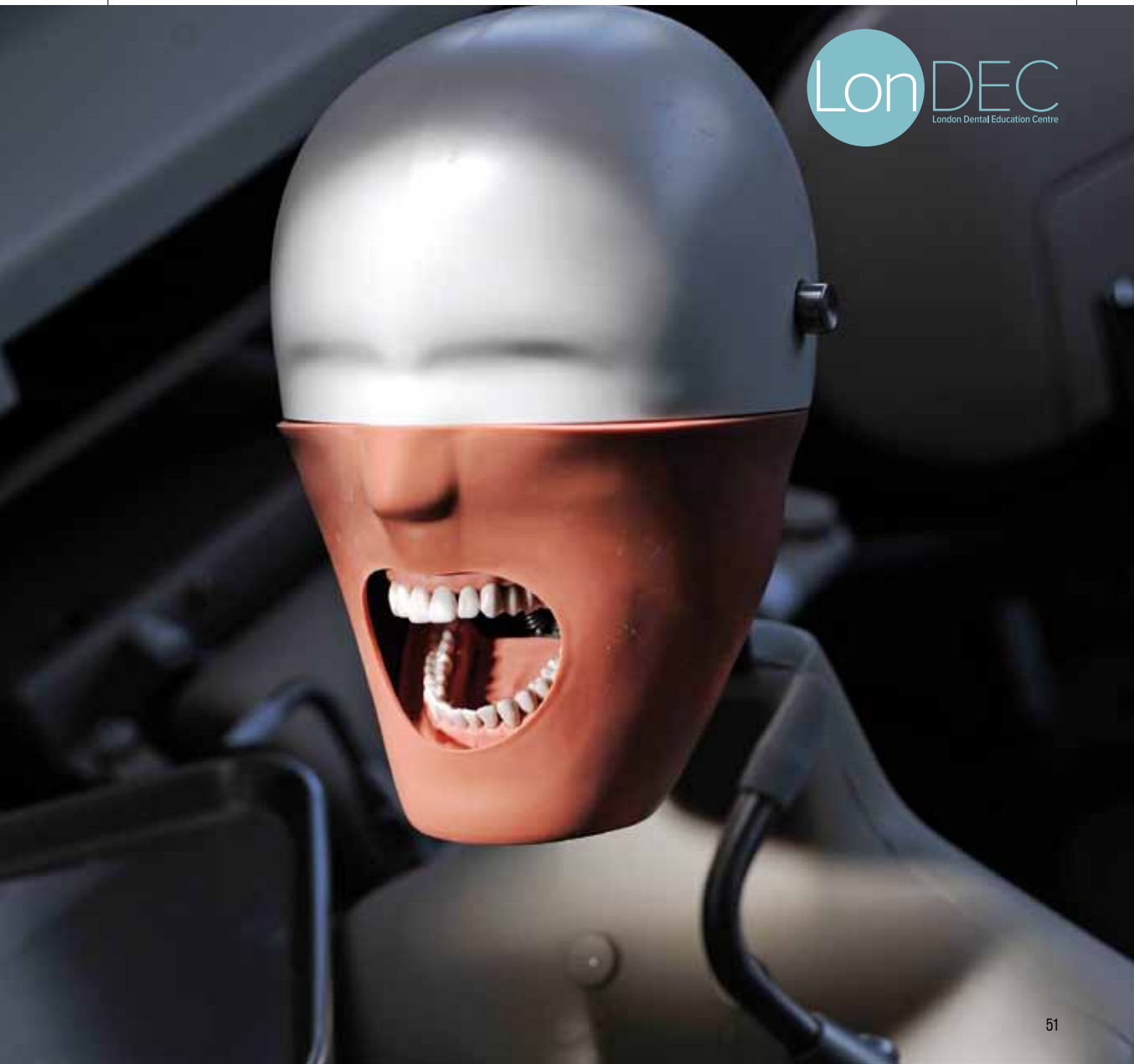
The Centre's dental skills training room is equipped with 27 dental workstations, including state-of-the-art 'phantom heads', and it also offers nine operating microscopes of the kind required for high quality dentistry.

PHOTOGRAPHY BY SAMUEL KIRBY, PHILIP SAYER AND BRIAN LLOYD DUCKETT.



# MASTERING DENTISTRY

*The opening of LonDEC at King's Waterloo Campus offers dentists world-class facilities for continuing professional education in the heart of London.*





A 'model' patient who can be programmed to choke, panic and have a heart attack is one of the high spec facilities available for training dental professionals at LonDEC.

The realistic mannequin, named 'iStan', is part of a theatre-style, fully equipped dental surgery in which dental professionals can practise their skills and learn how to cope with emergency situations. Also available for training is a full suite of the facilities for infection control that are required in modern surgeries, and the opportunity for dentists and dental team members to learn together about the key areas of decontamination and infection control which can improve patient safety.

As well as being the training base for some of the master's degree programmes run by the King's Dental Institute, LonDEC's facilities for lectures and hands-on training are also available for hire.

Contact Bill Sharpling, Director, LonDEC at [bill.sharpling@kcl.ac.uk](mailto:bill.sharpling@kcl.ac.uk)



LonDEC is a joint enterprise between King's and the NHS London Deanery, which is responsible for the management and delivery of postgraduate education and professional development for all London's doctors and dentists up to consultant level.

LonDEC was opened in July by Health Minister Ann Keen MP: pictured left, with Professor Nairn Wilson, Dean and Head of the Dental Institute and Deputy Vice-Principal (Health), and Liz Jones, Dean of Postgraduate Dentistry at the NHS London Deanery.



### in my view .....



**Dr Kyle Hogg**, a dental practitioner from Michigan USA and faculty member of the University of Florida College of Dentistry, Jacksonville, is also a second-year master's degree student on the King's blended learning programme, studying towards a Master's in Clinical Dentistry in Fixed and Removable Prosthodontics.

'LonDEC provides an ideal environment for both hands-on and didactic education', he says. 'The Centre integrates cutting edge technology, excellent equipment, and a dedicated staff to really enhance your learning experience. Having qualified in the United States, I can say that LonDEC is a facility superior to any other that I have encountered.'



**FOR FURTHER DETAILS ABOUT LonDEC**  
[www.kcl.ac.uk/schools/dentistry/about/org/centres/londec/](http://www.kcl.ac.uk/schools/dentistry/about/org/centres/londec/)



# STUDENT DIARY 2008-9

*Emily Rowe, Vice-President, Academic Affairs, at King's College London Students' Union (KCLSU), describes the year from the student point of view.*



The year got off with a bang as usual with the annual Welcome Weeks, the highlight of which was our first ever Welcome Fair to be held off-site. Over the two days of the fair, held in a spacious marquee next door to Waterloo Campus, more than 6,000 new students got a taste of all that was on offer through KCLSU. The breadth of student activity at King's goes from strength to strength, and there are now over 200 different sports clubs, societies, volunteering and campaigning groups for students to join, all supported by KCLSU.



**trophies and winners among the sports teams...**

## Trophies

As the year went on, students showed tremendous dedication to their chosen groups. Trophies and winners among the sports teams included King's Rugby winning Varsity (the annual grudge match against University College London) for the first time in five years. Other groups have been recognised nationally. KCL SIFE (Students in Free Enterprise) won the SIFE national championships for their work in developing sustainable projects which create economic opportunity for others, while the Afro-Caribbean Society won the National Union of Students' Black Students Campaign of the Year award ahead of stiff competition from many other universities. 'KCL Marrow' were also recognised by the Anthony Nolan Trust for their outstanding contribution to the Trust's life-saving work. Students at King's are clearly some of the most altruistic around: in addition to their studies, they spent more than 52,000 hours volunteering in their spare time, which is twice the national average.

Working in conjunction with various student activity groups, KCLSU organised a number of education and awareness campaigns for students, highlighting



other campaigns included ‘Smashed’ around alcohol awareness...

key issues that affect young people. ‘Play Safe’ was supported by KCL Sexpression, a student group working for better sexual health education. As part of ‘Get Well Now’ a campaign to highlight the benefits of physical activity, healthy eating and stress reduction, the martial arts groups opened up their training sessions to all students. Other campaigns included ‘Smashed’ around alcohol awareness and ‘Get Ahead’, encouraging students to develop soft skills in order to aid their careers.

Adventure

KCLSU has also been able to launch a number of new initiatives this year to cater for the ever-diversifying interests of students. The recreational sports programme was a huge success, with over 300 students competing in the King of King’s five-a-side football tournament – a great platform to build on further over the coming year.

cycling from Vietnam to Cambodia...

A number of partnerships with national charities such as Sense (supporting Deafblind people), the British Heart Foundation, and Crisis (for single homeless people) have also been established. These links have opened up opportunities – such as running the London Marathon or cycling from Vietnam to Cambodia – to students who want to set themselves an adventurous challenge whilst fundraising for these important causes.



ILLUSTRATIONS BY BELLE MELLOR



**D**eveloping online services for students has been a key theme for KCLSU this year. In September the KCLSU Student Calculator ([www.kclsu.org/calculator](http://www.kclsu.org/calculator)) was launched in response to an increasing need for students to learn financial planning skills. The calculator is an innovative tool that interactively provides proactive advice for users on managing both their money and time whilst studying. Just a month later KCLSU was the first students' union in the country to introduce epetitioning ([www.kclsu.org/epetitions](http://www.kclsu.org/epetitions)), allowing any King's student to petition KCLSU or the College on any issue.

Nearly 2,000 students have signed online petitions over the course of the year on issues ranging from bicycle rack space to changes to teaching in the School of Law.

Finally, after a year-long process, an entirely new KCLSU website ([www.kclsu.org](http://www.kclsu.org)) was launched to much acclaim in July. The new website allows students to access key information much more easily as well as giving them the ability to add their own content. All these projects were made possible thanks to funding from the King's College London Annual Fund and 'An evening with Rory Bremner': an event organised by the King's Development & Alumni Office in October 2007.

**our centenary year**



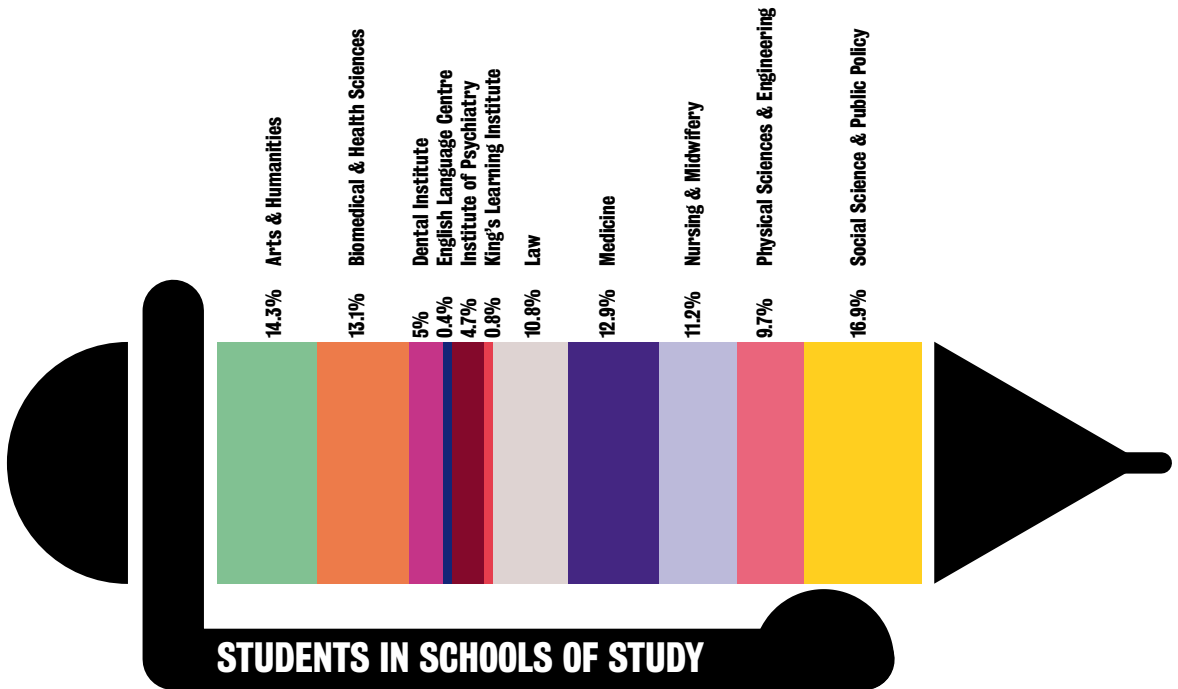
**an increasing need for students to learn financial planning skills...**

### Centenary

2008-9 has been our centenary year, and with various celebration activities being held throughout the year, it has been fantastic to re-connect with many ex-students who have been involved with the Union over the years. A personal highlight for me was the black tie dinner and charity auction (which raised over £2,000 for the KCLSU Sports Volunteering Fund) held in the Great Hall at Lincoln's Inn. With over 30 past KCLSU executive officers and more than 100 current students in attendance, it was a chance to reminisce about times gone by, celebrate all that KCLSU has achieved and hear how it continues to provide support for students at King's. ■



# Facts & figures

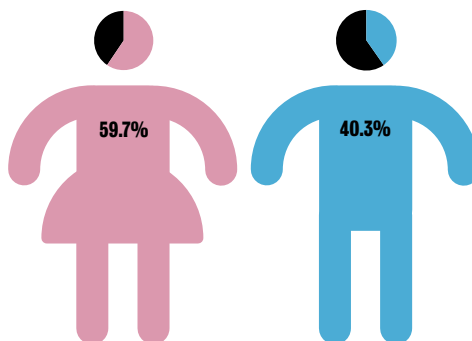
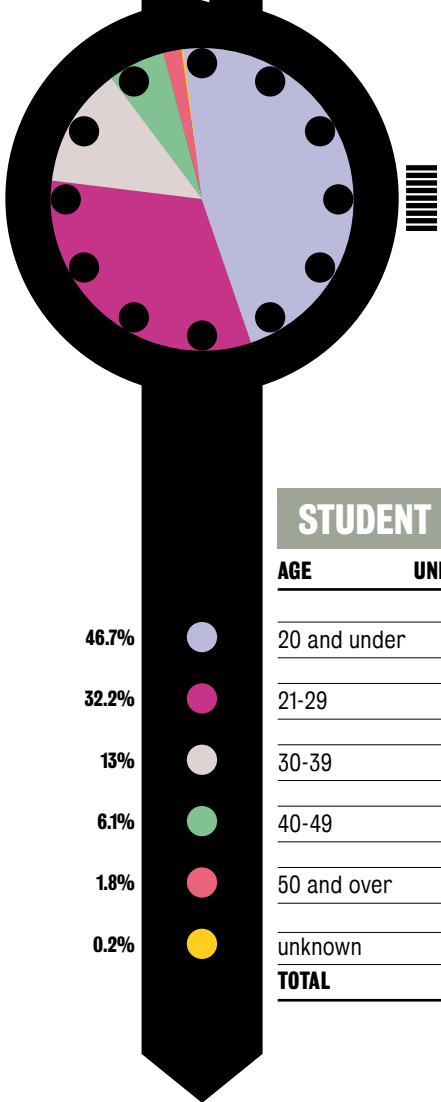


## STUDENTS IN SCHOOLS OF STUDY

Headcount on 1 December 2008

SCHOOL	CAMPUS	NUMBER OF STUDENTS			Total
		Undergraduate	Graduate Taught	Graduate Research	
Arts & Humanities	Strand	2,171	542	318	3,031
Biomedical & Health Sciences	Guy's, Waterloo	2,203	313	256	2,772
Dental Institute	Guy's, Denmark Hill, Strand, St Thomas'	842	155	68	1,065
English Language Centre	Strand	83			83
Institute of Psychiatry	Denmark Hill	94	549	355	998
King's Learning Institute	Waterloo	41	131		172
Law	Strand	1,143	1,075	67	2,285
Medicine	Guy's, Denmark Hill, St Thomas'	2,177	292	262	2,731
Nursing & Midwifery	Waterloo	2,018	284	59	2,361
Physical Sciences & Engineering	Strand	1,577	328	154	2,059
Social Science & Public Policy	Strand, Waterloo	1,165	1,964	440	3,569
		<b>Total graduate students</b>		<b>7,612</b>	
<b>GRAND TOTAL</b>		<b>13,514</b>	<b>5,633</b>	<b>1,979</b>	<b>21,126</b>

AGE AT START OF 2008-9

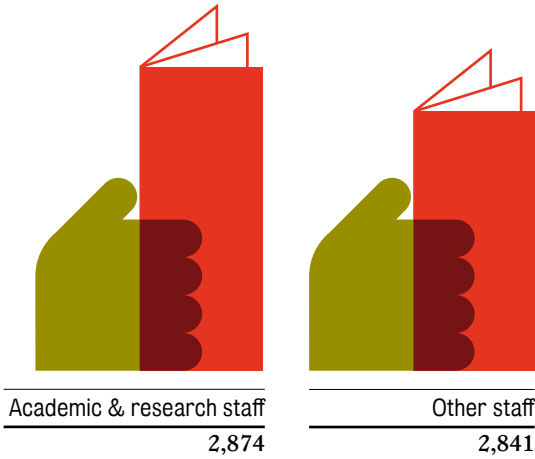


### STUDENT NUMBERS BY GENDER 2008-9

GENDER	UNDERGRADUATE	GRADUATE		Total
		Taught	Research	
Female	8,403	3,157	1,046	12,606
Male	5,111	2,476	933	8,520
<b>TOTAL</b>	<b>13,514</b>	<b>5,633</b>	<b>1,979</b>	<b>21,126</b>

### STUDENT NUMBERS BY AGE 2008-9

AGE	UNDERGRADUATE	GRADUATE		Total
		Taught	Research	
20 and under	9,844	30		9,874
21-29	2,376	3,292	1,132	6,800
30-39	765	1,444	537	2,746
40-49	393	692	203	1,288
50 and over	106	172	107	385
unknown	30	3		33
<b>TOTAL</b>	<b>13,514</b>	<b>5,633</b>	<b>1,979</b>	<b>21,126</b>



**STAFF NUMBERS 2008-9**

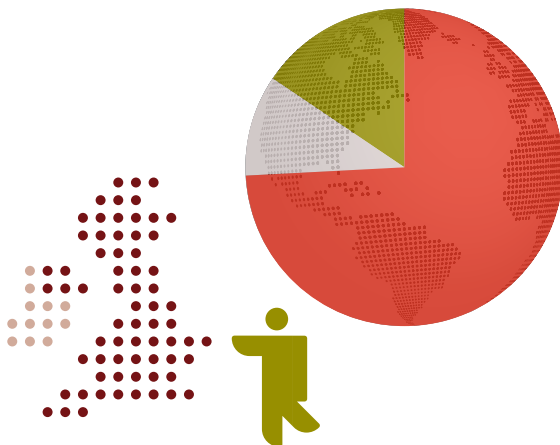
on 10 October 2008 (excluding senior students, honorary and occasional staff), King's had a total of 5,715 staff.



Nine people from King's and its constituent institutions have become Nobel laureates

STUDENT DOMICILE		%
United Kingdom	15,708	74.3
European Union	2,174	10.3
Other countries	3,244	15.4
<b>TOTAL</b>	<b>21,126</b>	

**STUDENTS' COUNTRY OF DOMICILE 2008-9**



**1 in 4** students at King's is from outside the UK

King's students in College residences  
2,605

King's students in University of London intercollegiate residences  
729

King's students in Liberty Living accommodation  
59

**STUDENTS IN HALLS OF RESIDENCE**

On 1 December 2008, a total of 3,393 King's students were in halls of residence.

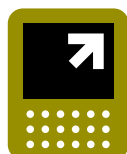


# Finances

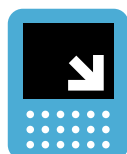
## INCOME & EXPENDITURE

for the year ended 31 July 2008 and the year ended 31 July 2009.

**In 2009 King's received a financial credit rating of 'AA' from Standard & Poor's.**



	2008-9	2007-8
	£000	£000
<b>INCOME</b>		
Funding Council grants	150,207	144,970
Tuition fees and education contracts	100,480	84,594
Research grants and contracts	134,955	118,865
Other operating income	88,197	88,388
Endowment income and interest receivable	11,783	11,054
<b>Total income</b>	<b>485,622</b>	<b>447,871</b>



<b>EXPENDITURE</b>		
Staff costs	303,084	275,665
Depreciation	21,631	21,377
Other operating expenses	147,503	136,511
Interest payable	12,665	10,866
<b>Total expenditure</b>	<b>484,883</b>	<b>444,419</b>



Surplus on ordinary activities	739	3,452
Taxation	(5)	(7)
Surplus on ordinary activities after taxation and before exceptional items	734	3,445
Surplus on disposal of property	–	5,717
<b>Surplus after depreciation of assets at cost, disposal of property and tax</b>	<b>734</b>	<b>9,162</b>

# Acknowledgements

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:



*An alumni reunion at the Strand Campus.*

## Donations buck trend

Donations from alumni, staff and friends to the College's Annual Fund showed record growth in the year from August 2008. The Fund enables alumni and friends to recall their own student days and renew their ties with their department or School by making annual gifts that provide teaching

innovations, extra-curricular activities and scholarships for students. This year the Fund made grants and awards of over £325,000, including one award to the College's student-run Anatomical Society for seminars, career events and student-led learning activities, and support for the International Student Network website which will offer information and a supportive presence for overseas students on a wide range of issues and activities.



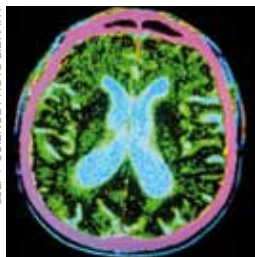
*Dr Funmi Olonisakin, Director of the Conflict, Security & Development Group at King's, which includes the African Leadership Centre, with General Martin Luther Agwai, Force Commander of the UN African Union Mission in Darfur, at King's in September 2008.*

## African Leadership Centre

With the support of the Carnegie Corporation of New York and the Foundation Open Society Institute (Zug), King's has established an African Leadership Centre which will work closely with African partners and institutions to create a new generation of young, talented African leaders who will bring about transformative and positive change in the continent. Through a training and mentoring programme, the Centre will seek home-grown

solutions to African issues, promote long-term efforts to build capacity in peace, security and development and provide a forum for sharing ideas and a platform for transferring knowledge.

*ACADIA Pharmaceuticals Inc  
ACE Study Tours  
Alzheimer's Research Trust  
Alzheimer's Society  
Amyotrophic Lateral Sclerosis Association  
Arthritis Research Campaign  
Association for International Cancer Research  
Asthma UK  
The Atkin Foundation  
Atlantic Philanthropies  
Autism Speaks  
Beit Memorial Fellowships for Medical Research  
James Black Foundation  
Mr John Black  
EE Blackwell Trust  
Breakthrough Breast Cancer  
Breast Cancer Campaign  
Bristol-Myers Squibb  
British Heart Foundation  
British Lung Foundation  
British Skin Foundation  
Mr and Mrs John Burton  
Cancer Research UK  
Carnegie Corporation of New York  
Clifford Chance LLP  
Clare Duffield Foundation  
John S Cohen Foundation  
Mr Stephen Conway  
Mr Dennis Cope  
CORE – The Digestive Disorders Foundation  
Department of Health  
Diabetes Foundation  
Diabetes Research & Wellness Foundation  
Diabetes UK  
Dimpleby Cancer Care  
The Dinwoodie Settlement  
Mr Bill Dodwell  
European Foundation for the Study of Diabetes  
Esmée Fairbairn Foundation  
Foundation for Allergy Information & Research  
Fight for Sight  
Friends of Guy's Hospital  
Friends of King's College London (Canada)  
Friends of King's College London (USA)  
T.F.C. Frost Charitable Trust  
Sir Ian Gainsford FKC  
Bill & Melinda Gates Foundation  
The John & Lucille van Geest Foundation  
Mr Paul Getty III  
Douglas Glanfield Memorial Trust  
GlaxoSmithKline Research & Development Ltd  
Guy's & St Thomas' Charity  
Guy's & St Thomas' Hospital Kidney Patients' Association  
Mrs Elizabeth Hart  
The Heaton-Ellis Trust*

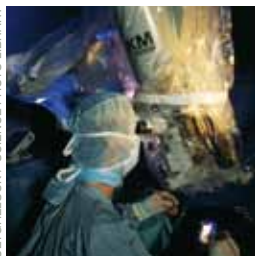


*CT scan of the brain of a patient suffering from Parkinson's disease.*

## Parkinson's disease and neurodegeneration research

Research at the College into Parkinson's and other neurodegenerative diseases is extremely broad, and aims to address all aspects of alleviating the effects of these destructive conditions. It includes developing an understanding of disease

neuropathology using models and imaging in human patients and the clinical application of cutting-edge science techniques such as the use of neural stem cells to repair damaged brain tissue. The support received from Mrs Lily Safra and The Edmond J. Safra Philanthropic Foundation for Parkinson's disease and neuroscience research at King's has enabled a range of these projects to be undertaken. In recognition of this support, annual lectures are held at the College to showcase innovative Parkinson's research from around the world.



*A surgeon performing a brain operation using a robotic microscope system.*

## Chair in Robotic Surgery

Medical robotics is a specialism of the Centre for Mechatronics & Manufacturing Systems at King's. The focus of the Centre's research is on the creation and study of miniaturised force sensors for robot-assisted minimally invasive surgery, and the identification of the mechanical properties of soft tissue –

principally for tumour detection. The aim is to assist surgeons performing keyhole surgery and provide them with tactile feedback from the operating site inside the patient's body. The support received from John Black, Stephen Conway, Dennis Cope and Sir Harry Solomon has enabled the technology to be applied in surgery to remove tumours of the prostate.

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