

INTRODUCTION

I decided to step down as Chairman of Council at the end of 2006, so my introduction to this annual report is also my farewell. I hope readers will forgive me if, as well as performing the Chairman's standard duty of commending the report to you as a concise but lively account of the year, I take the opportunity to do two things: to express thanks and to reflect briefly on the nature and condition of the University.

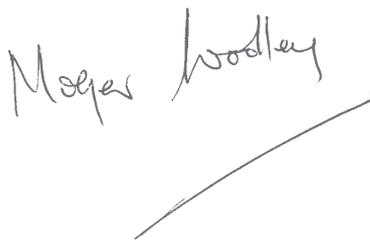
First, the thanks. I thought the University was a very special place when I was a student here a long time ago and I think the same now. An organisation like this runs principally on talent and commitment – qualities that the University has in abundance. This is true whether one considers the academic and support staff, the undergraduate and postgraduate communities or members of Council. The latter are often-unsung heroes. They perform a vital role in strategic matters and in chairing committees, as well as in dealing with appeals, grievances and other challenges. As Chairman, I have always had complete confidence in them, just as I have in all those who work so hard to make the University thrive. My warm thanks to them all.

Second, the reflections. I believe that the prime reason for the University's success and high standing is that it is driven by a consistent set of values and that it always strives for quality. This may seem like a simple formula, but in a world of relentless change and formidable challenges it is all too easy to be deflected from one's basic goals and beliefs. I have no doubt that the University will experience some tough times in the future, just as it has before, but I am confident that the combination of prudence and ambition that has characterised its strategic approach during my tenure will keep it among the UK's foremost academic institutions.

My very best wishes to my successor, Jim Foulds, and to all members of Council; to Eric Thomas, with whom it has been a great pleasure to work; and to everyone with a stake in the next chapter of the University's history.



Dr Moger Woolley
Chairman, University Council



FOREWORD



Given Moger Woolley's forthcoming departure from the chairmanship of Council, I should like to forego my usual overview of the year and leave this report to speak for itself. Instead, I should like to pay tribute to Moger on behalf of the whole University community.

The fact that the University is in such good shape and that it enjoyed another highly successful year in 2005/06 is due in no small measure to his fine stewardship of Council. He has brought to the role a wealth of experience of how organisations succeed, a profound understanding of strategic financial management, an unshakeable commitment to the University and a clear vision for its future.

No vice-chancellor could have hoped for a steadier hand on the institution's governance or a wiser source of advice. It has also been a great deal of fun to work with him.

The University will always be deeply grateful to Moger for his immense contribution.



Professor Eric Thomas
Vice-Chancellor

RESEARCH AND ENTERPRISE

The quality and range of research and scholarship at Bristol continue to match, and often surpass, those of any comparable institution. The University also maintains its fine track record in encouraging enterprise and putting new knowledge to work for the benefit of the economy and society.

Spacecraft, heal thyself

A spacecraft could soon be able to 'heal' its own punctures and leaks, after work in the Department of Aerospace Engineering led to exciting advances in developing a new material – a self-healing 'skin' – as part of a European Space Agency project.

Dr Ian Bond and Dr Richard Trask took inspiration from human skin, which heals a cut by exposing blood to air, causing it to form a protective scab. The new material contains hundreds of hollow glass filaments thousandths of a millimetre wide. Half of the filaments are filled with an epoxy polymer or resin, the other half with a chemical agent that reacts with the polymer to form a very strong substance. The filaments are designed to crack when the material is damaged, causing both chemicals to leak out and plug the crack.

Having successfully tested the material in a vacuum that simulates conditions in space, the researchers are now developing stronger materials and will test them in even more extreme conditions, such as very high temperatures.



Right:
A rocket
motor at
NASA's
Kennedy
Space Center,
Florida.



Disabled facilities grant: no more means testing

Research by a team from the School for Policy Studies and Bristol City Council led to an announcement in Parliament in October 2005 that will dramatically improve the lives of seriously disabled children and their families: they are no longer subject to means testing if they need to adapt their homes to care for a disabled child.

Average-income families were faced with a choice between heavy debt or unsuitable housing. They can now apply for a Disabled Facilities Grant (up to £25,000) for ramps, stairlifts, level-access showers and home extensions, without a means test. This follows a similar change in Northern Ireland and Wales.

The Bristol team's research was commissioned by the Office of the Deputy Prime Minister in conjunction with the Department of Health and the Department for Education and Skills. Following the publication of the Bristol report, 'Reviewing the Disabled Facilities Grant', Housing Minister Baroness Andrews announced that the recommendation in regard to disabled children would be implemented without further consultation.

Frances Heywood from the School for Policy Studies, who co-ordinated the work, said: 'It is not often that policy researchers are lucky enough to see a direct change in Government policy as a result of their work... England owes a great debt to those in Northern Ireland and Wales who led the way.'



Right: Several pieces of cartilage grown from stem cells at Southmead Hospital.

Stem cell breakthrough

Osteoarthritis sufferers have new hope of an effective treatment after a breakthrough in stem cell research at Bristol. Professor Anthony Hollander and his team at Southmead Hospital have successfully grown human cartilage from a patient's own stem cells for the first time ever.

Stem cells are self-renewing and can be turned into any cell type in the body. The team took stem cells from the bone marrow of pensioners with arthritis who were undergoing NHS replacement operations. In about a month, they grew the cells into a half-inch length of cartilage. The new technique should overcome rejection problems, because the patient's own stem cells are used to create the cartilage; and using adult bone marrow should help to dispel ethical concerns about the use of human embryos.

Following this work (funded by the Biotechnology and Biological Sciences Research Council and the Arthritis Research Campaign), transplant trials on NHS patients could begin within ten years. The breakthrough will have no effect, however, for sufferers of rheumatoid arthritis.

Picture of Tudor Ireland gets upgrade

Ireland in the Tudor period was not as backward as historians have assumed, according to research by Dr Evan Jones and Susan Flavin in the Department of Historical Studies.

The traditional view is that Ireland was economically underdeveloped before the reconquest under Queen Elizabeth I in the 1570s. Most have argued that the brutal English colonization of Ireland did at least allow Ireland's economy to develop. But the new research, which uses Bristol's customs accounts to reconstruct Bristol's trade with south-east Ireland during Henry VIII's reign, suggests a more complex picture, with a growing percentage of Irish trade being controlled by Irish merchants in Irish ships; industries such as textile manufacture developing rapidly; and a boom in imports of consumer luxuries from England, from spices and spectacles to silk stockings and playing cards.

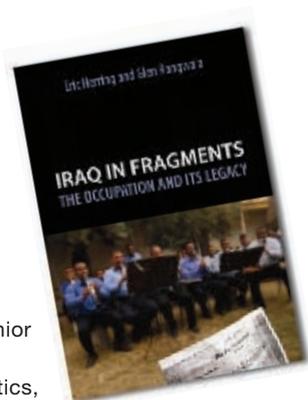
Most Irish records were destroyed when Dublin's Public Record Office was burned down during the Civil War of 1922-23, making the Bristol customs accounts the best set of records for analysing the development of Ireland before the Elizabethan conquest. The Economic and Social Research Council is now funding a project to investigate how Bristol's trade with Ireland developed throughout the sixteenth century.

Below: detail from 'Anglia' in *Theatrum Orbis Terrarum* by Abraham Ortelius, published in 1574. Ireland, or 'Hibernia', makes only a sketchy appearance.



New study dissects Iraq

Iraq in Fragments, a new book co-authored by Dr Eric Herring, senior lecturer in the Department of Politics, argues that the US-led occupation of Iraq has resulted in a fragmented state, with no consensus on where overall political authority lies and too many incentives for unregulated power struggles, corruption and violence. Placing contemporary Iraq within the context of regional, global and US politics, Dr Herring and co-author Dr Glen Rangwala (University of Cambridge) demonstrate how the politics of co-option, coercion and economic change have transformed the lives and allegiances of the Iraqi population. The book is published by C Hurst & Co and Cornell University Press.

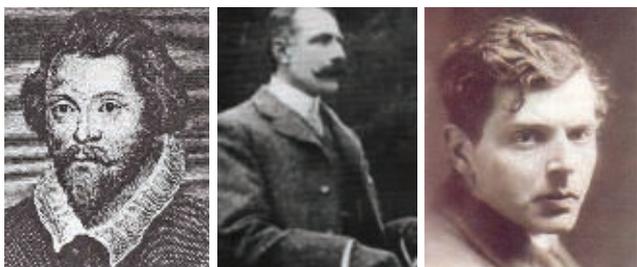


Overture for new centre

March 2006 saw the launch of the Centre for the History of Music in Britain, the Empire and the Commonwealth (CHOMBEC). The Centre, housed in the Victoria Rooms, promotes knowledge and outreach ranging from international research to Lifelong Learning study days. Its first director is Professor Stephen Banfield.

CHOMBEC has a threefold research mission. Its international project is the history of music in the British Empire, drawing on the work of Professor Banfield and others in the Faculty of Arts; nationally, it boasts expertise in English music from William Byrd to 20th-century film music and contemporary music aesthetics; and its regional brief is the history of music in the West Country. The Centre also hosts international conferences, concerts, seminars and lectures, beginning with the third conference of the Bristol Institute for Research in the Humanities and Arts, on the American and British Musical.

Below: Composers whose work is the subject of study by members of CHOMBEC (left to right): William Byrd; Edward Elgar; Ivor Gurney.



A helping hand from nanoscience

Bristol scientists are working with colleagues at the University of Glasgow to develop a new tool in nanoscience: the Dynamic Holographic Assembler (DHA). The instrument will be used to manipulate and assemble nano-scale objects using focused beams of light generated by a hologram. The instrument should have diverse applications in nano-scale science and technology, such as the assembly of electronic circuits or the manipulation of micro- and nano-structures.

The project's leaders are Professor Mervyn Miles in Physics and Professor Daniel Robert in Biological Sciences, in collaboration with the optics group at the University of Glasgow. It will be based at the University's new £9.2 million Nanoscience Centre, due to be completed in early 2007. The project is funded by £2.4 million from Research Councils UK and will engage the expertise of the liquid crystal group at QinetiQ Malvern.

'Gasp impulse' key to cot death

Cot death may be caused by a failure to gasp, according to research by Dr Julian Paton in the Department of Physiology, published in *Nature Neuroscience*. Dr Paton and colleagues discovered a subset of cells in the brain that can generate nervous impulses, which appear essential for gasping. These cells have been termed 'pacemakers'. The work confirms a theory widely discussed in recent years, and shows 'that pacemaker cells in the brain appear responsible for gasping but not normal breathing,' says Dr Paton.

Using a unique method developed in Bristol, Dr Paton collaborated with two other experts in respiration – Dr Jeffrey Smith (NIH, USA) and Professor Walter St-John (Dartmouth, USA) – to discover how gasping works. They found that many different types of brain cells are essential for normal breathing, but only a small subset of these is required for gasping or autoresuscitation. If normal breathing stops, this backup system induces gasping, restoring oxygen supplies and kick-starting the heartbeat.

Dr Paton's team found that these pacemaking cells depend on a unique protein that forms a tiny pore in the cells' membrane. When oxygen levels are low, this pore widens to allow sodium ions to enter the cell, so that gasping can occur automatically. A genetic defect in this protein could therefore prevent gasping.



Right: An aerial view of part of the district around the World Trade Center, six days after the 9/11 attacks

Terrorism under the microscope

As part of the commitment of the Worldwide Universities Network (WUN) to tackling the 'grand challenges' of the 21st century, several of WUN's member institutions, including Bristol, launched a centre dedicated to reducing the global threat of terrorism.

The International Center for the Study of Terrorism (ICST), based at Pennsylvania State University, brings together experts from both



sides of the Atlantic and from other countries to investigate the root causes of this worldwide phenomenon, understand its long-term effects on society and identify new ways of safeguarding individuals, organisations and communities. Initially, the centre will address a neglected aspect of counter-terrorism: the psychology of terrorism, from radicalisation and recruitment to media representation and profiling.

WUN is a group of 17 universities that pool their research strengths to address topics of major significance, from climate change to wireless communications. Bristol Vice-Chancellor Professor Eric Thomas is currently the Chair of WUN.

New Enterprise winners

The 2006 New Enterprise Competition was won by SensaGest (formed by postgraduates Ian Anderson and Paul Duff from the Department of Computer Science), for a state-of-the-art nurse call system for patients with spinal cord injury. The system, operated with minimal hand movement, is connected to a wearable computer which relays alerts to a paging device. The device detects changes in conditions, such as a wet bed, and relays this information to a care worker. It can also be programmed for easier communication and control of bedside devices.

Full Economic Costing (fEC)

Full Economic Costing for research was introduced across the higher education sector in September 2005, completing the first phase in the introduction of an entirely new methodology for an institution to cost all its activities. The University was well prepared, and principal investigators were able to use the newly developed in-house costing tool to prepare their grant applications according to the new regulations. A new version of the tool will shortly replace the paper-based system currently used to obtain internal approval of a research proposal. The University is already seeing increased income per project grant. The fEC project is now focused on costing our teaching activities and major operations such as the Library Services. For more information, go to www.bristol.ac.uk/fec.

Bristol calls the Roll

The University launched an Enterprise Roll of Honour in March, to celebrate some of the enterprising and inspirational successes of its graduates. One former student at the launch was Coffee Republic founder Sahar Hashemi (below), who built her company into one of the UK's most recognised high-street brands with a turnover of £30 million.

The event included a display containing press cuttings, photographs, signed memorabilia and other information showcasing some of the entrepreneurial talent that has come out of the University. Also featured was an 'Emerging Entrepreneurs' showcase promoting up-and-coming businesses formed by Bristol undergraduates.



IN WITH THE SET CROWD

SETsquared, a joint venture between the universities of Bath, Bristol, Southampton and Surrey helping knowledge-based entrepreneurs in southern England, provides office space at a low rent, plus free access to support services (including experienced advisers, funding routes and investors), and guidance from business support organisations and industry sector specialists.

Spinout companies from the University of Bristol continue to join the SETsquared programme during their incubation stages. The new arrivals in 2005/06 included the following three companies.



Tidal Generation

A company set up by three Bristol graduates is developing turbines to generate electricity from tidal flows. Tidal Generation Ltd, formed by Chris Huxley-Reynard, George Gibberd and Tania Lake, has an innovative concept for a fully submerged turbine (artist's impression above) capable of producing enough electricity to power 650 homes. The company was awarded a grant from the South West Regional Development Agency in March 2006, to fund work on detailed specifications and costs. A prototype will be installed at the European Marine Energy Centre in the Orkney Islands.

Mista

Mista is developing a suite of mobile software applications that produce 'interactive digital mediascapes', enabling users to access audiovisual 'tours' of places as they move through them (a screenshot of one such tour appears above right). The technology will also enable visitors to attach their own text, images and video to these virtual landscapes, as a kind of commentary or guide for others. Mista, whose CEO is Tony Rush, a Visiting Fellow in the Department of Computer Science, has already launched Sharing Places (<http://sharingplaces.com>), which shows the idea in development.



Imetrum

Imetrum enables scientists and engineers to make precise measurements quickly and reliably, both in the laboratory and in the field, using video-based, non-contact precision measurement. The company, formed by Dr Kevin Potter in the Department of Aerospace Engineering and Dr Chris Setchell in the Department of Computer Science, has spent over 15 years developing into the Video Gauge suite of products and services. Its patented technology has a wide range of applications, such as 'measuring the motion of a suspension bridge, the stiffness of a locust's wing or the Poissons ratio of a plain old steel test specimen'.

The Video Gauge:
 Non-contact
 Real-time
 0.002% strain resolution
 Functions as strain gauge, extensometer, accelerometer, goniometer, LVDT...

The Video Gauge - The 'all-in-one' instrument for measuring displacement & strain

The Video Gauge
 The Video Gauge is a video-based instrument for measurement of displacement & strain on materials, components and structures.
 A high resolution digital camera monitors the object under test. The Video Gauge will measure any sort of object by being repositioned under any sort of load, tension, compression, bending or a combination.
 Our patented digital image processing algorithms measure to 1/200th of a pixel. This equates to a displacement resolution of 1/200,000th of the field of view. For a view size of 100mm, the displacement resolution is better than 1 micron. This represents a strain resolution better than 0.002%.
 The Video Gauge can be supplied either as a complete system including PC, camera, lens & lighting or as purely software to be installed on your own PC.
 We also offer a video processing service in which you provide us with a video of your test and we will process the video for you.

Benefits
 • The non-contact method you will use even when ordinary methods could be used
 • Simple to use & quick to set up with little or no sample preparation required
 • Measures 2D strain (tension, compression, shear), Poisson's ratio, bend angle, displacement, velocity, acceleration
 • Replaces many other measurement instruments such as strain gauges, extensometers, LVDTs, accelerometers or goniometers
 • Suitable for destructive testing
 • Real-time operation & graphical display of results
 • Multiple simultaneous measurements
 • Suitable for wide range of sample sizes: from very large to microscopic

IMETRUM
 VISUAL MEASUREMENTS

Visit www.imetrum.com for further information

GRANTS

The University attracted a total of £95 million in grants from funding bodies in 2005/06. This included the following:



£3,982,000 from the Engineering and Physical Sciences Research Council to establish the Bristol Centre for Complexity Sciences. Complexity Science deals with large networks of many smaller elements that interact to produce behaviour that cannot be predicted by looking at just one or two elements. The Centre, under its director, Professor John Hogan, aims to provide a highly interdisciplinary four-year training programme for 15 high-calibre postgraduate students per year. The funding covers four years, during which the centre hopes to attract up to 60 students, as well as provide funding for several new members of staff.

£395,806 to the Centre for Buddhist Studies (Department of Theology and Religious Studies) from the Arts and Humanities Research Council for a collaborative research project on Buddhist death rituals of Southeast Asia and China.

£2.5 million to a consortium led by the Graduate School of Education from the Department for International Development for a research project entitled 'Implementing Quality Education in Low Income Countries'. Other consortium members are the universities of Bath, Dar es Salaam (Tanzania), Witwatersrand (South Africa) and Cape Coast (Ghana) and the Kigali Institute of Education (Rwanda).

£650,000 from the Tubney Charitable Trust to the Division of Farm Animal Science (Department of Clinical Veterinary Science). The grant is being paid over four years to fund a project that aims to reduce lameness in dairy cattle. David Main is the principal investigator.

£8.9 million to the Avon Longitudinal Study of Parents and Children (ALSPAC, also known as the Children of the 90s) from the Wellcome Trust and the Medical Research Council to continue its study of 14,000 children based in Bristol in order to follow them through their teenage years. (Image above, second from left, shows Professor Jean Golding, retiring head of ALSPAC, with her successor, Professor George Davey Smith, and some of the Children of the 90s cohort.)

£400,000 to the Department of Exercise and Health Sciences from the National Prevention Research Initiative for two projects studying the physical activity of children and older people in Bristol.

£3.5 million to the Statistics Group (Department of Mathematics) from the Engineering and Physical Sciences Research Council for a project entitled 'SuStaln' – Statistics underpinning Science, Technology and Industry. Its aim is to develop statistical tools to help solve problems in science, technology, medicine and society in general.

£1.2 million to Professor Stephen Halford FRS in the DNA-protein Interactions Unit (Department of Biochemistry) from the Wellcome Trust, and a further £200,000 to Dr Mark Szczelkun from the BBSRC, to fund work on restriction enzymes (which can act like scissors on chromosomes and cut these extremely long fibres into manageable pieces, and are thus essential for many tests on DNA). Szczelkun and Halford are also members of a new trans-European consortium that has just been awarded €3 million by the EU to establish a Marie Curie Research Network to train postgraduate researchers in this important area.