

nonesuch

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SPHERE:
WATCHING OUT
FOR YOUR HEALTH

THE RED PLANET:
A DRY RUN

BRISTOL:
A LOVE LETTER



University of
BRISTOL

Welcome



First there were gorillas, then Banksy, and this summer Bristol was in the international spotlight again for the astonishingly successful 'Gromit Unleashed' (p7). And so it is very appropriate that we have included a love letter to the city by Rachel Schraer (BA 2013); a blog post that received more than 10,000 shares on Facebook this July (p18).

Although we clearly share a deep affection for Bristol, I don't recognise some of the city Rachel describes so well. But then, she just graduated this year, and I graduated in 1975. Enough said! I do hope you enjoy Rachel's blog and that you will share your own thoughts about Bristol on our LinkedIn alumni webpage.

This academic year has got off to a tremendous start with alumni events as far afield as Cambridge, Dubai, Tokyo and, of course, Bristol. We will be showcasing some of the University's newest buildings at our next Alumni Weekend, 4-6 July 2014. I hope to see you there: please gather your Bristol friends together now, and save the date.

Bill Ray

Bill Ray (BSc 1975)
Chairman of Convocation,
Bristol's Alumni Association

alumni@bristol.ac.uk

Eric Thomas

Professor Eric Thomas (Hon LLD 2004)
Vice-Chancellor

A knighthood is, I think, aptly named an 'honour.' After learning of my own this summer, I have been happily surprised by how exciting and delightful the experience has been.

My 'service to higher education' includes chairing Universities UK, a medical academic career, and writing a Government White Paper on philanthropy. But my primary service for the last 12 years has been to the University of Bristol, which is ranked consistently among the top 100 global universities, and where student places are some of the UK's most sought after.

The whole Bristol community – its staff, students and alumni – make this University great. Examples abound in this magazine. A Bristol alum is now Prime Minister of Malta (p2); another is a potential NASA astronaut (p3). One PhD student examines war-torn Sri Lanka (p21); another develops morphing airplane wings (p25). Bristol academics are empowering people with health conditions to live at home (p11), and exploring green energy sources (p4). What an extraordinary community of achievers!

Bristol University's mission of learning and discovery is realised through the work of our students, staff, alumni and friends. So of course I am proud to accept a knighthood, and I also consider it an honour shared with you.

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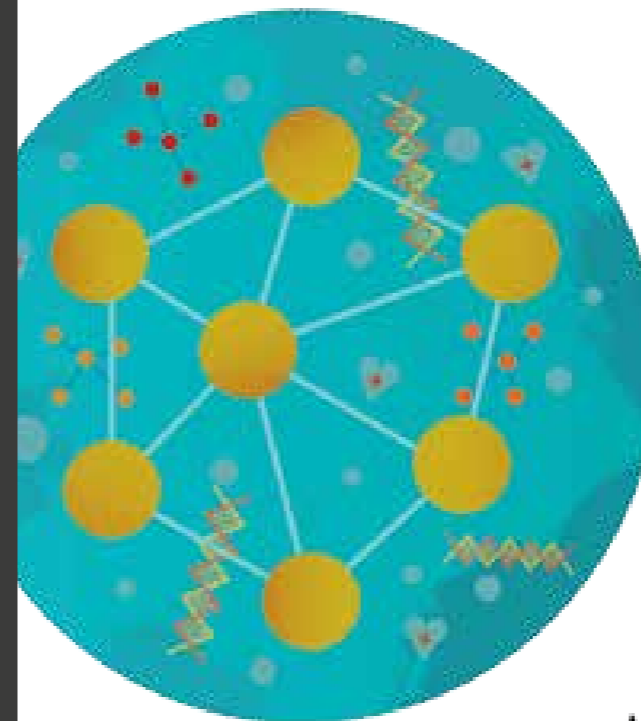
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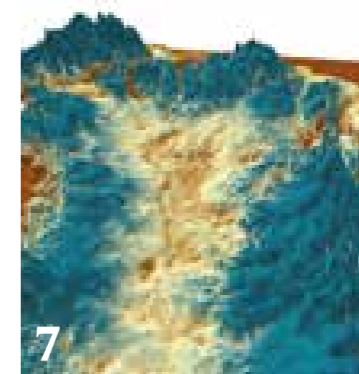


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nonesuch

Autumn 2013

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Regulars



Endangered: Beware of wildlife

Television

Niall McCann (BSc 2004) has been rubbing shoulders with the world's *Biggest and Baddest* animals, as part of a six-part wildlife documentary series first aired this summer.

Following McCann's debut in 2011 where he presented the hit documentary *Lost in the Amazon*, he's been travelling to remote locations around the world in search of encounters with some of the most fearsome animals on earth. The series, which aired on the Animal Planet channel this year, shows McCann being charged at by a tiger and wrestling with anacondas, crocodiles and giant hogs in order to look at the roots of their conflicts with the human race.

But biologist McCann has been no stranger to danger in the past. After studying zoology at Bristol, he voyaged across the Atlantic in 2007, covering 3,000 miles in a rowing boat. He has climbed in the Alps, cycled the highest road in the world, skied across Greenland and canoed down the Yukon river. McCann has devoted over 12 years to advocating conservation programmes for some of the most critically endangered animals on our planet.



Leading Malta

Politics

Joseph Muscat (PhD 2008) was elected as Malta's second youngest Prime Minister in the March 2013 general election.

As leader of the Labour Party, Muscat had implemented extensive party reform, including changes to the party's formal name and emblem. Muscat, aged 39, won with a margin of 36,000 votes, which is considered a landslide in Malta and represented a major shift from the Nationalist Party, who had been in power for 15 years.

Away with words

Journalism

Nishtha Chugh (MSc 2011) has been shortlisted in the prestigious Guardian International Development Journalism Competition 2013.

Chugh's news feature 'Donkey power: changing lives one battery at a time' was among the final 12 drawn from nearly 600 features entered into the competition, the highest number in its six-year history. The competition aims at highlighting many crucial issues facing the developing world, which are often overlooked or underrepresented by the media.

Chugh was flown to a fully sponsored foreign assignment in Rwanda to explore and write about changing male attitudes towards women and domestic violence in Rwanda, alongside Women for Women International, an organisation that empowers women in war-torn countries.

With other finalists, Chugh will see her article published in a *Guardian* supplement, after the announcement of the winner at an awards ceremony in November 2013. Chugh said: 'What I studied in Bristol's School of Sociology, Politics and International Studies has immensely helped me hone my expression and deepen my understanding of the global development and security issues, which inspired me to write'.



Reaching for the stars

Science

Anne C McClain (MSc 2005) was announced as part of NASA's new team that will help the agency to push the boundaries of exploration.

From over 6,000 applications, NASA chose eight astronaut trainees, including Major McClain (MSc 2005) who works as an OH-58 helicopter pilot for the US Army. NASA said: 'Half of the selectees are women, making this the highest percentage of female astronaut candidates ever selected for a class.' The group will receive a wide array of technical training at space centres and remote locations around the globe to prepare for mission explorations in space, including an asteroid and Mars. Will Bristol alumni one day be represented in 160+ countries globally – and other planets too?



Ain't no mountain high enough

Sports

In August, six mountaineers from the University of Bristol achieved a world first by conquering the Djangart mountain range.

The team, made up of Bristol alumni and students, climbed seven ascents on the Djangart mountain range, which is on the border between Kyrgyzstan and China. Three of these mountains were over 5,000 metres high, and previous attempts by other mountaineers to scale them had all failed.

Current fourth-year students Harry Kingston, Harry Bloxham and Alistair Docherty met graduates Ross Davidson (MEng 2013), Clay Conlon (BSc 2011) and George Cave (MEng 2011) at the University of Bristol Expeditions Society (UBES) and the University of Bristol Mountaineering Club (UBMC). With many European alpine trips and remote exploratory mountaineering in the Russian Altai already under their belts, this trip was their first major attempt at new, challenging, alpine-style routes in an unexplored region of the world.

Illustration © Alberto Antoniazzi

Turning for gold: the 2014 Sochi Paralympic Games

Sports

Anna Turney (BSc 2002), Paralympic ski racer, will represent GB in the 2014 Sochi Paralympic Games.

In 2006 Anna Turney broke her back snowboard racing. Determined not to be defeated, Turney decided to become a Paralympic ski racer, and after three years' training she propelled to success, coming sixth in the Vancouver Paralympics and fourth overall in the Europa Cup 2013.

Now Turney has her eyes fixed on gold at the next Paralympics in Russia in March 2014. Turney said: 'I compete in the same disciplines as Olympic ski racers. On the same runs, and the same courses. But I do it without the use of my legs. For me, gold at the Winter Paralympics 2014 would be a huge personal success, and for all of us another decisive victory over adversity'.



Alumni breaking ground

Achievements



Professor Tessa Morris-Suzuki (née Morris) (BA 1972), a scholar of Asian studies, has been awarded a prestigious Japanese international award, the Fukuoka Prize, for outstanding contributions to academia, arts and culture in Asia.

Dame Victoria Sharp DBE (LLB 1978) has been promoted from the High Court to the Court of Appeal. She is one of seven women of the 38 Lord Justices of Appeal and has risen to the second most senior court in the English legal system after just four years on the bench.

Stephen Briggs (BSc 1982) directs the conservation project Alvecote Wood, which was recently awarded first prize in the Royal Forestry Society's Small Woodlands Excellence in Forestry Awards for its outstanding planting, regeneration of oak trees, open days and use of woodland produce.

Ed Woodward (BA 1993), Manchester United's Executive Vice-Chairman, now has overall responsibility for the football club. Woodward was promoted to the top operational role at Old Trafford in a boardroom restructure this summer, after the retirement of CEO David Gill.

As the controversy over fracking rumbles on, attention is turning to another, cleaner underground energy source: geothermal. But its greatest potential is in areas where drilling can be risky. Dr Juliet Biggs is investigating one such area: the East African Rift in Ethiopia.

Ground force

By Nicola Temple

It's late afternoon and the falling sun casts a warm blanket across the bleached landscape. There are no cars and no skyscrapers, only a few modest mud huts and several small herds of cattle, yet there is a deafening roar in the air.

Dr Juliet Biggs, Lecturer in the School of Earth Sciences, is standing a few yards from a geothermal well located in the caldera of the Alutu volcano in Ethiopia. A tower of high-pressure steam is erupting out of the well head, the plume rising some 30 feet into the air. But this unleashed power is only a taste of the potential that lies below.

The well descends 2.3km into the Earth, where it taps into an aquifer with a temperature of around 320°C. The steam is created when the groundwater is heated by the surrounding rock, which has itself been heated by magma seeping up through cracks in the Earth's crust.

The grass and trees surrounding the well head are coated in crystals, formed when dissolved hydrothermal minerals in the steam precipitate out in the air. This steam also carries the hope of reliable, clean, renewable energy, which could deliver power to the 85 per cent of Ethiopians who don't currently have access to affordable power of any kind.

Fractured earth

The potential for geothermal energy is greatest in areas of geological turmoil, where tectonic forces create fractures that allow magma to intrude into the Earth's crust. The East African Rift zone is one such area: a 6,400km trail running through Djibouti, Ethiopia, Kenya, and Tanzania, along which Africa is splitting apart by nearly an inch each year. Nearly 100 volcanoes have formed here over the last 10,000 years, and although some are still active today, others have been assumed to be dormant.

Biggs started studying this region in 2005 as part of her PhD studies. A series of small earthquakes in the area prompted her to use satellite techniques to try to understand the underlying geological processes behind the seismic activity.

'What we saw from those initial images,' says Biggs, 'was that it wasn't just a few small

earthquakes, but an extremely large event. A 60km long, 10m wide wall of magma was penetrating into the Earth's crust.'

If a major event such as this could virtually go unnoticed, was other activity in East Africa being overlooked? Biggs used radar satellite imagery from the last two decades to look for deformations – inflations and deflations – of the Earth's surface. She found that some of the volcanoes may not be as dormant as once thought.

Monitoring unrest

Typically before a volcano erupts it may begin to inflate, there may be a series of small earthquakes, and it can start to release gases. All this activity causes the Earth's surface to lift and subside. By comparing radar satellite images taken at different times, Biggs tracked these deformations in the Earth's crust. She found that the Alutu volcano had two large uplift episodes, rising 15cm in 2004 and 10cm in 2008.

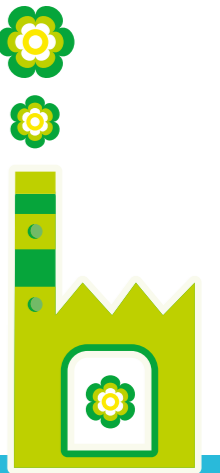
It is this unrest that has brought Biggs to Ethiopia to set up ground-based GPS equipment on Alutu and nearby Corbetti, the two volcanoes in the region that have shown the most activity. There are no records of either of these volcanoes erupting, but thick deposits of ash and craters, which span 10km or more, are evidence of an eruptive past. Biggs is one of several members of Bristol's Volcanology Research Group who have projects here, examining the geophysical processes that are causing these deformations.

There are nine GPS stations altogether, spread across the two volcanoes; each is equipped with an antenna and data recorder powered by two solar panels and a car battery. The recorders collect a GPS signal from the satellites every 15 seconds, and this data is incorporated into the context of the rift's overall movement.

The results will help fill a void of information about the potential hazards associated with these volcanoes and should assist the Ethiopian government in its emergency planning for the thousands of people who farm these flat and fertile lands.

Informing industry

The team's findings will also be of great interest to the geothermal industry. The Alutu-Langano Geothermal Plant, based



Geothermal energy explained

The Alutu-Langano Geothermal Plant is known as a binary plant due to its use of a secondary fluid in the generation of electricity.

The steam from the wells is carried to the plant along huge pipes. At the plant, the steam is used to heat a secondary fluid, which has a much lower boiling point. This secondary fluid then vaporises, producing steam that turns the turbines to generate the electricity.

The global capacity for geothermal energy production in 2012 was 11.4 GW, with the US, Philippines, and Indonesia being the top three global producers. Ethiopia's current capacity ranks it 20th among global producers, but the expansion currently underway could quickly bring it into the top 10.



Above Dr Elias Lewi (left) from Addis Ababa University and Dr Juliet Biggs set up GPS monitoring equipment at the Alutu-Langano Geothermal Plant

within the caldera of Alutu, was established in 1998, and the plant is now ready for expansion, with deep borehole drilling expected to start on both Alutu and Corbetti within the next year. The new data generated by the Bristol team could not only help target areas of high geothermal production, they could also provide useful insights into the effects the drilling activities are having on the region.

‘We know from the fracking industry that these activities can put stresses in the ground, and cause micro-earthquakes and changes in the circulation patterns of the groundwater,’ says Biggs. ‘So we’re interested to see what effects the drilling and the increased geothermal production may have on the natural system that we already know is experiencing big deformations.’

Biggs and her colleagues have been working with the Ethiopian Electric Power Corporation, who run the geothermal plant on Alutu, and with Reykjavik Geothermal, an Icelandic company who were awarded a licence to carry out geothermal exploration at Corbetti and estimate that the field could become one

of the world’s largest geothermal sites. ‘There is an obvious synergy between the datasets and logistics collected by the geothermal industry and the work we’re doing,’ she says, ‘so the relationship has been beneficial on both sides.’

Full steam ahead

The United Nations Environment Programme estimates that the East African Rift has the potential to produce some six GWe (GigaWatts of electricity) or more, raising the hope that geothermal energy may help lift Ethiopia and its neighbouring rift countries out of poverty and help provide inexpensive, clean energy to its people, as happened in Iceland during the previous century.

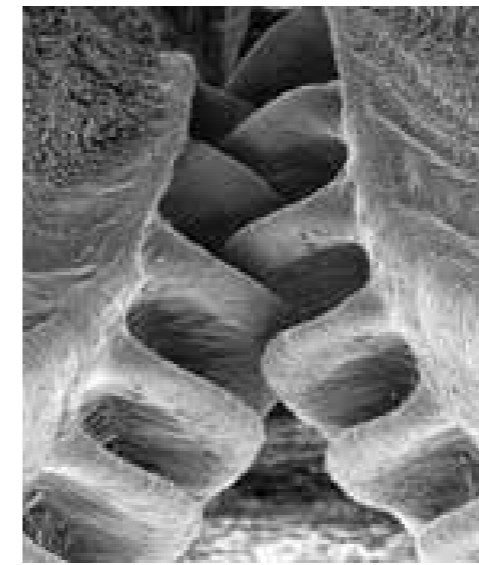
It’s data from researchers like Biggs that could help direct the most expensive component of geothermal development – the drilling – to hotspots of geothermal energy. It’s a good example of how building stronger links between industry and research can ensure geothermal energy is developed in a cost-effective way, with benefits for industry, developing countries, and the planet. ●

Bringing Ethiopia to Bristol

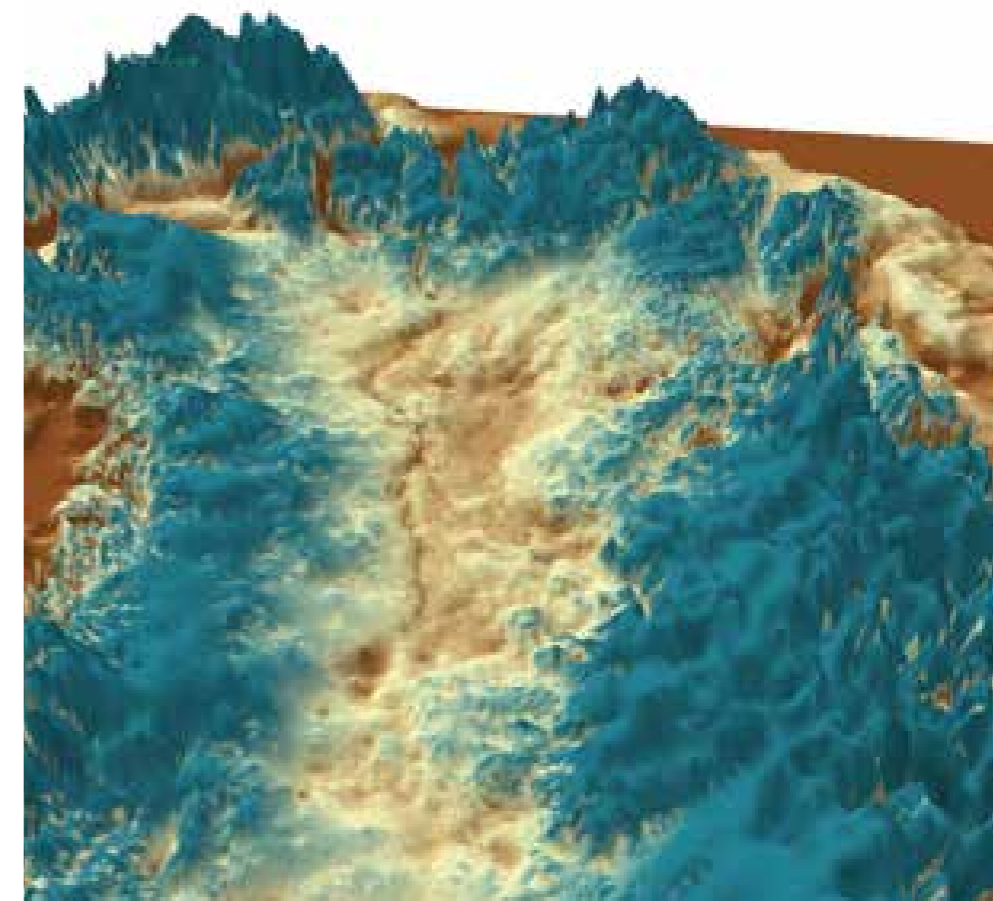
The University’s Cabot Institute and the Natural Environment Research Council (NERC) hosted a two-day workshop in August that brought together researchers working on volcanoes in the East African Rift with members of the geothermal energy industry in Ethiopia, Kenya, Iceland, and the UK.

The event was an opportunity for participants to share information about what data are being collected and how they can be used to improve geothermal production and reduce risk and uncertainty associated with geothermal development in these areas. bristol.ac.uk/cabot

Photo © Nicola Temple



Insect gears © Burrows/Sutton // Mega-canyon © Jonathan Bamber // Penguin © Paul Fongans // Gromit © Nick Riddle



In pictures

**Snapshots
Life and work at Bristol**

Clockwise from top left:

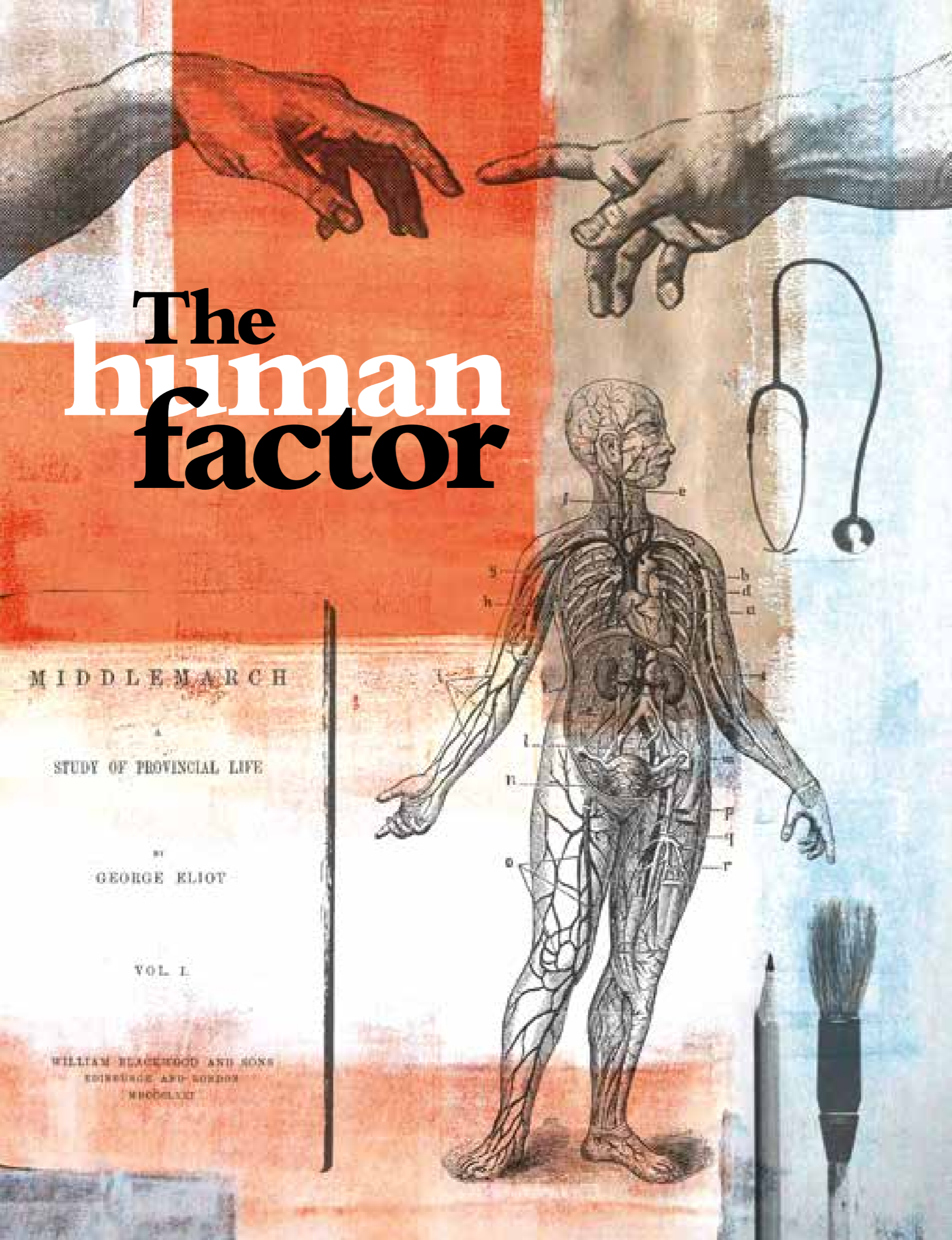
FAB GEARS // The first natural example of a functioning gear mechanism has been discovered in the hind legs of a common insect. // bristol.ac.uk/news/2013/9736.html

IMAGINE THE ECHO // Mega-canyon uncovered beneath Greenland by a team led by Bristol’s Dr Jonathan Bamber. // bristol.ac.uk/news/2013/9688.html

PENGUINS LAND IN BRISTOL // The world’s penguin experts came to Bristol in September for the eighth International Penguin Conference. // bristol.ac.uk/news/2013/9686.html

OVERSEAS SERVICE // The University’s first graduation celebration in China drew more than 200 students from across the country to Beijing. // bristol.ac.uk/news/2013/9297.html

DOG ALMIGHTY // Julie Vernon’s Golden Gromit, one of 80 statues installed around Bristol and the region for Gromit Unleashed, keeps watch outside the Victoria Rooms. // bristol-culture.com/gromit-unleashed



The human factor

MIDDLEMARCH

STUDY OF PROVINCIAL LIFE

BY GEORGE ELIOT

VOL. I

WILLIAM BLACKWOOD AND SONS
EDINBURGH AND LONDON
NEW YORK

Feature

‘Clinical’ is a word with baggage. We want our doctors to be thoroughly versed in clinical skills, but not to be the other kind of clinical: cold, detached, aloof. The intercalated BA in Medical Humanities gives medical students at Bristol an opportunity to complement their practical skills with an awareness of the human condition as expressed in philosophy, literature, and art. Here three people describe the programme from their own perspectives.

Putting literature into practice

Dr John Lee
Senior Lecturer in the Department of English, and iBAMH Director



Every October, our Philosophy and English students are joined by around a dozen medical students. They aren’t just sitting in – they’re taking a one-year BA that requires them to step aside from their clinical training and become students of literature and philosophy. All of our students show a thoughtfulness and commitment to their work, but these medics bring an extra dimension.

The diagnosis

Medicine was one of the great success stories of the 20th century, but many began to feel that the roots of that success – the great advances in knowledge – had become problematic. Knowledge threatened, cuckoo-like, to push out the teaching of the more spiritual, ethical, and imaginative aspects of medical practice.

Many universities, including Bristol, responded to a call from the General Medical Council for a greater role for the humanities and more options for self-chosen study. Many short courses were introduced. At Bristol we went further, and launched a whole-year course, the intercalated BA in Medical Humanities (iBAMH).

At the core of the degree, which first ran in 2006–7, is the academic study of medicine and its influence, via three topics: the philosophy and history of medicine; the philosophy of natural and social science; and literature and medicine. The students also write a dissertation on a medical humanities subject.

Alongside this runs a series of seminars and projects called the Oakhill programme. This, importantly, is looser in structure and not subject to examination. It features seminars demonstrating how art is used therapeutically (for instance, using music to help treat autism, cerebral palsy, and other life-limiting conditions), plus a pastoral element, in which the students reflect on their experience of the humanities, medicine and medical practice.

Responding to treatment

There is, of course, some irony in all of this: what is the prescription for overworked medical students? More work. But is the prescription working?

The students, at the end of their year, generally think so. The feedback is overwhelmingly positive. And I have never received so many compliments from colleagues about how rewarding it is to teach a particular group of students.

Why might this be? It’s partly because seminars tend to benefit from having students with different backgrounds but common points of interest. But it’s more than that. The typical iBAMH student seems to make different demands of literature. One student I was supervising for her dissertation had worked in a hospice. She was very impressed with the hospice workers’ understanding of grief, and their continued ability to show compassion to patients and their families. She wondered whether she could do the same, and whether she could endure, over many years, experiencing the grief of others. She wrote her dissertation on dramatic tragedy. Might tragedies be a resource for the health professional having to deal with grief on a day-to-day basis?

iBAMH students tend to write dissertations that explore how literature might be of practical value to them. They relate their reading to their lives, which is what I would like all my students to do, but iBAMH students seem to do it to a greater extent and, often, more successfully. Asking medical students to work at a finalist’s level in English and Philosophy within a year is a very tall order, but they do very well. In two of the last four years, for instance, an iBAMH student has either won outright or shared the prize for the best dissertation in English.

A new prescription

This practical and personal attitude towards literature is, I’m sure, partly responsible for their academic success – that, and the Oakhill programme, which students consistently mention as being central to their experience of the year.

The latter has been the biggest surprise to me. After all, Oakhill is a non-assessed component with no direct link to the academic programme. But perhaps we have more confidence in our students’ abilities, and should be a little more inventive in making space for learning that has no obvious aims or clear outcomes. The problem is that it is hard to argue for such spaces in advance – and yet such an education seems to deliver the aims and outcomes that, we all seem to agree, we want.

Feature

Culture, context and critique

Dr Trevor Thompson
Reader in Healthcare
Education and a Bristol GP



As soon as our medical students arrive at Bristol, we ask them whether they have done a humanities A-level. A good third raise their hands. **Medicine, after all, is both an art and a science.** The art of medicine is represented by a strand running throughout the core curriculum, but for some the call feels more pressing. The iBAMH helps them to answer it.

So what does the course have to offer of value to the doctors of tomorrow? First of all, there's context, especially that of history – the evolution of the hospital, for example. Looking at history tends to encourage a certain humility, as we unpick the political forces that have shaped today's institutions.

Then there's cultural awareness. Literature provides potent points of reference for the study of medicine, whether it's the emergence of the profession (*Middlemarch*), its dark side (*Frankenstein*), or the complexities of patienthood (Gwyneth Lewis' *A Hospital Odyssey*). Contact with great writing guides students towards a better sense of the human situation that they will meet daily in the clinic.

Finally there is the notion of critique – of using the tools of philosophy to ask hard questions: What constitutes evidence, and how do we justify our claims for its validity? How do we judge quality of life? Studying the philosophy of science helps our students to frame better questions and to become more critical readers of published research.

Our students do very well in this programme. They enjoy it immensely. Whether they are better doctors as a result is hard to prove but if, as Plutarch wrote, 'the mind is not a vessel that needs filling, but wood that needs igniting', these students are certainly smouldering.

'COMING BACK TO MEDICINE,
I FELT REJUVENATED'

New tools

Katie Hall
Fourth-year medical student



I hadn't done English A-level, and I'd never explored literature before, so I loved the idea of spending a year studying it. We'd just done two intensive years of pre-clinical medicine, with a high volume of things to learn. I found I was depersonalising a lot of what I was learning, just to get through it. The BA gave me a chance to regain the 'human' perspective.

The iBAMH was a different learning environment – we had to contribute to tutorials, in quite small groups, and our opinions mattered a lot. I wasn't very familiar with the concept of writing an essay about a novel or a poem, but I loved the process of researching it and weighing up the arguments.

I did my dissertation on shellshock in modernist literature, focussing on the character of Septimus Smith in Virginia Woolf's *Mrs Dalloway*. Woolf had quite a progressive take on shellshock that conflicted with the orthodox view at the time – she described something a lot closer to what we now call PTSD. Her own experience of mental illness probably gave her that insight.

The Oakhill programme was a great highlight. It tied together a lot of different things we'd been reading and related them back to medicine. We talked about what we'd learned and how it made us reflect on things that we'd experienced in the small amount of clinical placement we'd had.

Coming back to medicine, I felt rejuvenated; I had some new tools. I'd been a bit concerned that clinical work with patients might be quite hard emotionally, but the BA gave me ideas for processing it in a different way. I did a psychiatry placement in my third year and really enjoyed that. But I'm still keeping my options open.

Regulars

From Bristol to the BAFTAs

Freya Sterling interviews Peter Bridges (MEng 1998),
BBC Sound and Communications Engineer

I've always been fascinated by the technical side of stage productions, particularly sound. At school I was the one sitting at the side of the hall operating the PA system for all manner of events, from PTA meetings to the annual school musical. So when I came to Bristol to do a degree in electronic and electrical engineering, I quickly signed up to the Stage Technicians' Association (STA), which looks after the technical aspects of University performances.

The STA surrounded me with like-minded, passionate people and gave me the experience I needed to apply my skills in the real world. For major University productions we hired in sound and lighting equipment, giving me my first experience of dealing with outside suppliers and negotiating terms.

In 1998 an opportunity arose to get involved with a brand new Bristol University Radio Station: BURST FM. I jumped at the chance and found myself setting up a studio in St Paul's Church, Clifton, and rigging a radio link back to the main transmitter on the roof of the union. Since then, BURST has gone from strength to strength.

During my final year at Bristol, I had a work placement with the BBC. I experienced everything from research and development to maintenance engineering. My first job at the BBC was with World Service radio as a studio engineer. Over 1,000 applications had been received for six places. I've no doubt that my Bristol degree and involvement with STA and BURST helped me to secure it.

Later, I transferred to work in television and was asked to lead the sound team for BBC Sport's coverage of London 2012. My job was to design the sound and communication facilities at the International Broadcast Centre and to manage a team of sound staff. We built a temporary broadcasting centre in the Olympic Park just as complicated as a permanent BBC building.

'HAVING A SOLID THEORETICAL BACKGROUND IS FUNDAMENTAL TO UNDERSTANDING ANY TECHNOLOGY PROPERLY'

My work at the Olympics won me a Television Craft BAFTA earlier this year, one of the highest accolades in the industry. It was a heart-stopping moment to hear my name announced as the winner.

Since the Olympics, I have moved to another BBC department focused on the planning, design and delivery of the technology that supports programme makers. I'm also assisting with the design of the BBC's facilities for next summer's Commonwealth Games in Glasgow.

Broadcast technology, used by both programme makers and audiences, is changing faster than ever before. It's a really exciting time to be involved in the industry. Having a solid theoretical background is fundamental to understanding any technology properly. I've Bristol to thank for that.



Portrait © Stephen Shepherd



Where the heart is

Cover feature

We need new ways of thinking about healthcare. And where better to do it than a new institute that brings health researchers and practitioners together with engineers, chemists, and other experts to tackle pressing issues in health and medicine? **The Elizabeth Blackwell Institute** is doing just this through one of the University's flagship projects, **SPHERE**, a pioneering mix of technology and medicine that could transform the way people deal with long-term health conditions.

Cover feature

How do people feel about the SPHERE approach to healthcare?

Bristol-based Aardman Animations, together with Knowle West Media Centre, asked members of the public, and Aardman used some of their answers to create a short film.

bris.ac.uk/blackwell/animation



By Nick Riddle

Consider the situation. On the one hand is a set of complex social problems: an ageing population; a rising incidence of obesity and diabetes; growing numbers of people living alone; shrinking healthcare budgets. On the other is an array of striking new innovations in electronics and engineering: sophisticated sensors, wireless networks, energy harvesting, monitoring software, video analytics, data mining. What if these technologies could be harnessed to address those problems?

It was with this question in mind that Professor Jeremy Tavaré, Director of the Institute, and Professor Ian Craddock, a medical imaging expert in the Department of Electrical and Electronic Engineering, discussed how they could use the world-leading research in the Faculty of Engineering to address major 21st-century healthcare problems. Shortly afterwards, the Engineering and Physical Sciences Research Council (EPSRC) issued a funding call for interdisciplinary research centres, including medical health sensing – the very area that Craddock had identified. The two of them then led a successful bid for a £12 million grant, the largest ever awarded to Bristol by the EPSRC.

Christened SPHERE (Sensor Platform for HEalthcare in a Residential Environment), the project is now beginning to take shape: the development of a digital ‘home health assistant’ that would operate round the clock, monitoring someone with a health condition and watching out for physical warning signs.

SPHERE of influence

Take a long-term condition like diabetes, which can involve taking medication that in some patients can cause their blood sugar to dip dangerously low. This is a state that isn’t always easy to detect, especially by the patient, and it frequently comes on at night making detection even harder. But low blood sugar gives rise to certain physical signs – changes in the way someone moves,

for example – and a sensor system could register these and raise the alarm. In the same way, a sensor system could detect an overnight stroke by detecting small changes in the behaviour or facial expression of the patient on waking. The system could then automatically alert a carer or the patient’s GP to the problem.

Home help

Certain criteria were agreed at the outset: firstly, the aim would not be to develop brand-new sensors, but to adapt devices already on the market. Think of the components in gaming consoles or smart phones – devices that can sense movement, track velocity and angle, and monitor all kinds of subtle changes in appearance and behaviour. The SPHERE research will work towards something similarly all-in-one: a system with one set of sensors that can be configured according to need.

‘Our aim is to come up with algorithms that can extract meaning from video, such as emotional or physical states,’ says Craddock. ‘The algorithms would be able to figure out who the person is, what state they’re in, how mobile they are, and so on.’

The foundations for this work have already been laid by research groups in the Faculty of Engineering: innovations including technologies for networks of small, self-powered, wireless sensors, as well as a range of methods for extracting data from video, including gait and facial expression. SPHERE’s requirements offer these groups a fresh challenge: how can sensors get clear enough data in the complex, cluttered environment of the typical home, whose residents aren’t standing obligingly in front of the sensors all day? Solving these technical challenges will extend the field of health sensing, to the benefit of UK industry – not to mention the patients.

Sensing and sensitivity

Considering the patients’ viewpoint is another important prerequisite.

Why Elizabeth Blackwell?

The Elizabeth Blackwell Institute is named after a public health pioneer well known in the United States but much less well celebrated in the city and country of her birth.



Elizabeth Blackwell was born in Bristol in 1821 and became the first woman to receive a medical degree in the USA and the first woman to be entered into the UK’s medical register.

The Elizabeth Blackwell Institute for Health Research, co-funded by the Wellcome Trust and the University of Bristol, follows her lead by bringing together leading researchers from very disparate disciplines to collaborate on projects that can help deliver better health for the public. The Institute will also help foster collaborative approaches with patients, funding bodies, the NHS and industry.

bris.ac.uk/blackwell

Elizabeth Blackwell portrait courtesy of Archives and Special Collections on Women in Medicine, Medical College of Pennsylvania; Animation skills © Aardman Animations // Illustration © Jeffrey Bowman

‘In the future this kind of technology will be such a natural part of our lives, that we won’t worry about it being switched on, we’ll worry about it being switched off.’

‘We wanted to make sure that the conversation with patients, carers and the public happens from the word go,’ says Tavaré, ‘not in five years’ time when we’ve pulled all these wonderful gizmos together and patients suddenly say “Oh no, we’re not having that”’.

One can understand people’s concern at the prospect of being monitored inside their own homes, but no images would be sent anywhere, only the data extracted from significant footage. The involvement of Bristol City Council, Knowle West Media Centre and the local NHS services – not to mention a film commissioned from Aardman Animation – is ensuring that patients and their carers are informed and consulted about important details like this.

‘It’s not about doctors spying on their patients, but about people being able to generate information that they can then use, with our help, to improve their health,’ says Dr Sarah Purdy, Reader in Primary Health Care in the School of Social and Community Medicine, and a GP in the west of Bristol.

Purdy joined the SPHERE project through her involvement with Bristol Health Partners (BHP), a collaborative group set up by the University of Bristol, the University of the West of England and the city’s NHS organisations. Similarly concerned with bringing different disciplines to bear on pressing problems, BHP has developed Health Integration Teams, consisting of academics, clinicians, social workers and others, pooling their expertise to improve health care. Purdy leads one such team, tasked with trying to reduce the number of people admitted to hospital unnecessarily. The overlap with SPHERE’s mission is obvious.

‘The standard telehealth approach – talking to the patient on the phone – has had a mixed review in terms of how helpful it is in keeping people with long-term conditions out of hospital,’ says Purdy. ‘Our team concluded that it’s probably more effective for health professionals to

get monitoring information that they can assess and respond to. SPHERE takes that concept to the next level.’

Private eyes

Early dialogue with the public, carried out by Knowle West Media Centre and other partners, has indicated a high degree of interest in the project among patients and their families, with many asking to become involved in any research concerning their condition. For someone with long-term health problems, says Purdy, SPHERE brings the prospect of reassurance: ‘If you have a condition that could go into crisis at any moment, then a sensor system could allow you to continue living in your own home, which is hugely important. It also gives you the confidence that if something goes wrong, the alarm will be raised and somebody will come and check on you.’

The anxieties about invasion of privacy are still present, of course, but the SPHERE partners are determined to tackle the issue head-on. ‘I think people are capable of making decisions about the costs and benefits of “invasive” technologies, but they need to be informed decisions,’ says Craddock. ‘This is something we have to get to grips with as a society – the use of pervasive, internet-enabled sensor technologies – just as we had to cope with the advantages and drawbacks of the automobile, for example.’

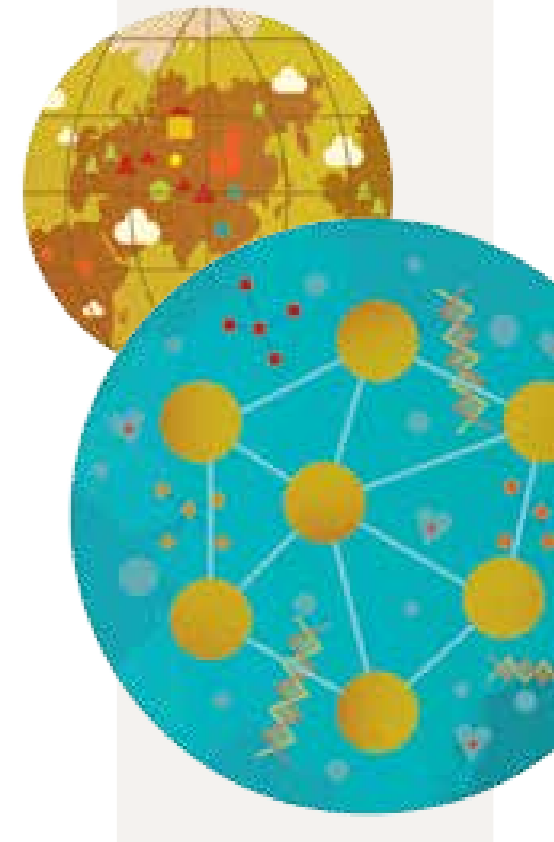
As SPHERE gets into gear, and connections continue to be made across disciplines at Bristol and its partner institutions, Tavaré is looking ahead to other projects for the Elizabeth Blackwell Institute to help co-ordinate. There’s a study on sleep and brain imaging; a plan for a large-scale stock-take of tens of thousands of new molecules invented by the UK’s chemists, some of which could lead to new drug discoveries; and a project looking at the health effects of future climate change.

‘We’ve made a good start with SPHERE,’ says Tavaré, ‘but now the hard work begins.’ ●

SPHERE in a nutshell

SPHERE is an interdisciplinary research collaboration led by the University of Bristol and the Universities of Southampton and Reading, working in partnership with Bristol City Council, IBM, Toshiba, and Knowle West Media Centre. Its director is Professor Ian Craddock.

SPHERE has been awarded a grant of £12 million by the Engineering and Physical Sciences Research Council.



Alumna's blog

Rachel Schraer (BA 2013) is a blogger who penned a love letter to the city of Bristol following her final exams in July. Do you recognise Rachel's Bristol? Join the conversation with other alumni at bristol.ac.uk/alumni/linkedin.

You can read more of Rachel's inspired blog at themajestyofsmallness.wordpress.com



Bristol,
give me
a signal

Bristol. City of squats whose graffiti is a more famous landmark than its cathedral, who has a bakery called Bread an' Ting, a home-ware store called Happytat and a stationery shop called Paper Gangsta; even your shop names have a sense of humour. Whose native Brizzle drawl involves referring to inanimate objects as 'he' or 'she' and tacking a random 'l' on after words that end in vowels, as though the very dialect is trying to turn every word into Bristol, a football fan's chant: Bristol, Bristol. You crazy bloody minx.

This is a city that met the everyday occurrence of a new Tesco opening with riots and firebombs: a stoned city, perennially laid back, outraged into action by the affront of the blue and red commercial beast squatting on its parade of independent businesses, its beating heart. They stretch all the way from Horfield Common down to the Attic Bar where Stokes Croft's sweet orgy of colour and life meets the dual carriageway – the longest parade of independent shops in Europe.

So what did you do? You set up the People's Republic of Stokes Croft. This is an area that is in essence just one long road, but you've got a People's Republic now. You, and China. And your own currency, the Bristol Pound, to keep money within local businesses (the fiver has a pretty shady looking tiger on it). You're a city of people who looked at the Bearpit, the ugly hollowed-out concrete eyesore of an underpass slap bang in the city centre, and stuck a statue of a bear in it, spray-painted the walls into cartoon oblivion and stencilled paw prints along the concourse. Now it's the only underpass I've ever seen with a ping pong table and an organic fruit and veg stall. Seriously, Bristol, what are you like?

And I can't explain quite why I've got so much love for this off-kilter West Country city, home to Inkie and Banksy, Massive Attack and the Stig, but I know that when I walk up Dighton Street from the city centre until I hit the looming miles of street art and I feel like I'm walking through a comic book, I'm home. I love your absurd pride around cider, the way that the legendary Cori Tap is famous for serving its 'exhibition' cider in half pints cos it's just that fucking potent and that even though I'm from London and I've lived in New York, you still have the best goddamn

nightlife I've ever seen. Even if your eclectic music scene does sometimes draw bands that describe their sound as the 'relentless sound of torrential drumming'. Torrential drumming. It was quite an apt description actually, but you know what, once I'd accidentally stumbled in there, wincing at the relentless torrential drumming, an old man taught me how to play the spoons and I've never looked back.

And on those crazy nights, those rogue occasions when you just don't fancy relentlessly torrential drumming, you can whoop your way from the earthy gin-soaked gloom of the Mother's Ruin all the way to Motion, whose nights don't pass out til 7, and you can queue past the concrete slab of a courtyard, rolls of barbed wire and sniffer dogs and feel like you're in a post-apocalyptic border town at the end of days. Or throw caution to the winds and truck it up to Lizard Lounge, a club smaller than your nan's kitchen, owned by the improbably named John Lounge, whose walls sweat and whose trademark lurid cocktail has no name other than the colloquially whispered, 'the Green Shit'.

I love that you're harmlessly, gloriously mad. I love that when the Highbury Vaults was graffitied with a tag featuring the word 'vandalism' with a heart for the 'v', the pub's manager was quoted as saying 'it's very nice, it highlights an otherwise white building'. I love the old woman who, on a rainy day, marched purposefully up to me, fighting with a recalcitrant umbrella against the wind, and said squarely to my face 'Ooh I 'ates brollies' before carrying on her way. The heavily dreadlocked man at 10 am in Sainsbury's who came up to my friend and shouted 'mmm BREEZERRR' in the thickest rhotic drawl you've ever heard. That I once ordered a vodka and coke in a hole-in-the-wall bar only to be told 'we don't do cocktails here, my babber'. And that your resident dj, DJ Derek, is a 70-odd-year-old man who still spins the sweetest reggae sets you've ever bumped to – apparently Massive Attack's Daddy G is a fan.

It's a city that still bears the scrawled markings of its slave trade past: the main shopping centre named after a dynasty of slave owners, the harbourside thrumming with a history that echoes of sugar, tobacco and human traffic in the shadow of the old Fry's chocolate factory,



Top Dancing Jesus by Walt Jabsco
Above Bristol Harbourside

and you can stroll down Black Boy Hill as it slopes gently into Whiteladies Road (I'm not being facetious, that's an actual geographical fact). But you've taken your historic mould and twisted and writhed from it in happy contortions.

It might be that for now, London's calling with its sensible career choices and temporary parental accommodation, and sure, it might be that with my glottally stopped-up London ear you'll always sound like pirate farmers to me, but Bristol. I'll come back and visit you. And I'll skank my way through bashment dives til dawn and I'll sit on Brandon Hill and watch the sun come up, and in the cold grey light I'll look down over your mishmash, inked Georgian splendour and I'll shout at the top of my lungs...

Bristol, give me a signal.

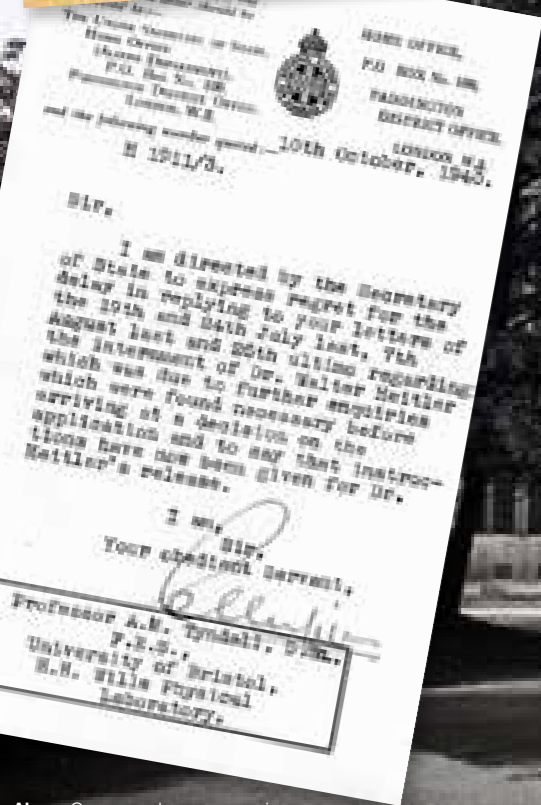
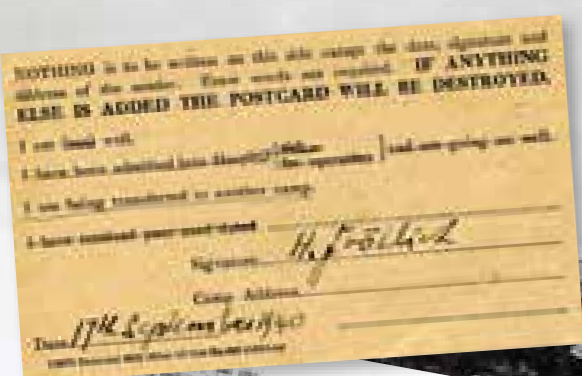


Regulars

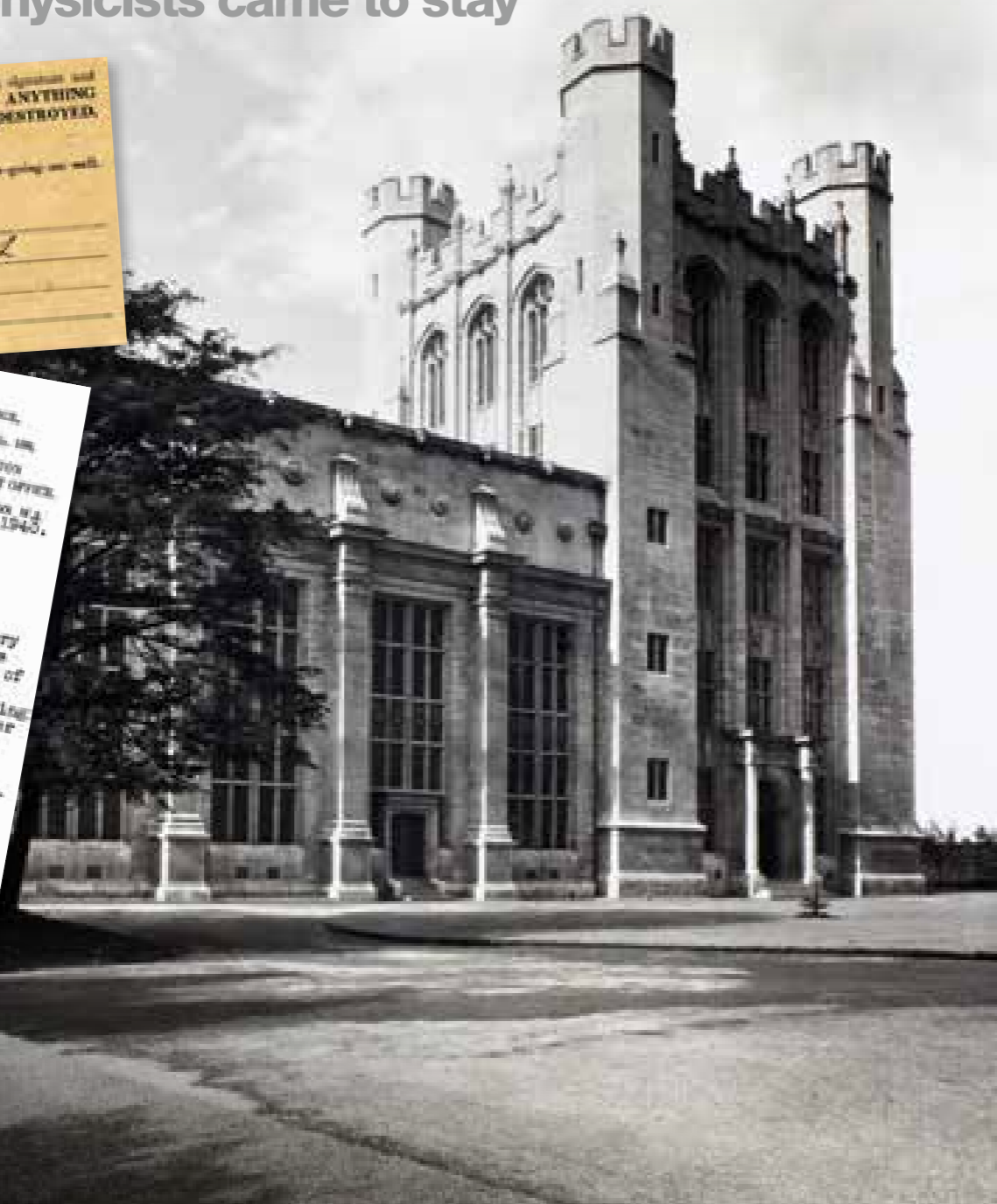
Eighty years ago, in September 1933, a German physics student named **Klaus Fuchs** (left) stepped off the boat at Dover with what remained of his possessions and travelled on to Clapton in Gordano, a village just west of Bristol.

What happened when...

...the German physicists came to stay



Above Correspondence concerning the Germans' internment included a curt postcard and a number of release letters
Main image The H.W. Wills Physics Laboratory in the early 1930s



By Nick Riddle

Fuchs was taking up an invitation from the Gunn family, who had heard of his plight from their au pair, a girl engaged to Fuchs' cousin. The Gunns, who were related to the Wills family, introduced him to the young Professor Nevill Mott. Mott hired him as a research assistant – a formative step in a career that led to Fuchs playing a key role in the Allies' development of the atomic bomb, not to mention achieving infamy as a Soviet spy.

Fuchs had fled Nazi Germany after his openly Communist sympathies made it too dangerous to remain; others, including many of his scientific colleagues, were Jews who had also seen the writing on the wall. Several of them followed the path to Bristol, with important consequences for the University – and for the history of modern physics.

City of refuge

'As a result of the rise of Hitler to power in 1933,' recalled Professor Arthur M Tyndall, Head of the Physics Department and Acting Vice-Chancellor of the University (1945-6), 'many physicists there found themselves out of their posts and in dire need.'

The British Academic Assistance Council had asked UK universities to find employment for some of these scholars. The Physics Department had already invited Walter Heitler, a physicist at Göttingen University, to spend six months at Bristol, under a scheme to attract promising researchers from overseas. 'In replying to accept the invitation,' Tyndall recalled, 'he said that it had been dismissed from his University post.'

Heitler's considerable reputation justified the offer of a permanent position in the Physics Department, and he stayed at Bristol for eight years. Tyndall, Mott and their colleagues, feeling strongly that they should do more, used a fund from the Rockefeller Foundation to enable two German students – of whom Fuchs was one – to complete their PhDs at Bristol. Subsequently a number of highly promising, Jewish German physicists began to arrive: Herbert Fröhlich; Heinz London; Kurt Hosieltz; future Nobel laureate Hans Bethe (briefly); and Hans Heitler, who joined his more famous brother Walter in 1938 (and who was routinely referred to by staff as 'Heitler's brother', a bit of friendly deprecation that he bore, it is said, with good humour).

The U problem

Many academics in the Physics Department were involved in military work of one kind or another. To call this research sensitive would be an understatement; the race was on to develop an atomic bomb. The Frisch-Peierls memorandum, written in March 1940 by two German physicists working at Birmingham University, stated that an atomic bomb could be constructed using about one kilogramme of fissionable uranium-235. Although it took another year for their paper to reach the United States, its findings were soon being discussed extensively in the UK physics community.

That same year, the Nazi invasion of France prompted a government crackdown on 'enemy aliens' in the British Isles. On 12 June, Tyndall wrote to GP Thomson, head of the committee for the British atomic bomb project:

'...Bristol and its surroundings have been declared a protected area and consequently, unless a special permit is given, certain German Jew refugees in my department must leave Bristol by Friday this week.'

He pointed out the special interest that the likes of Heitler, Fröhlich and London had in 'the U problem' (uranium fission for an atomic weapon), and the importance of the Bristol laboratory's research in nuclear physics that was feeding directly into the committee's work. Tyndall's urgent request for intercession concluded: 'I need hardly say that I am perfectly satisfied as to the integrity and loyalty of all these men.' Thomson did not share his outlook, as his reply demonstrated:

'I think that it is very important that as few of the German refugees as possible should be concerned in this work, as in the present state of things I do not, to speak frankly, feel too confident of any of them.'

The refugee physicists were duly excluded from the Bristol area. But worse was to come: by late June, Heitler and the others were sent to Prees Heath Internment Camp in Shropshire.

Notes from camp

Their brief letters to Tyndall from the camp expressed gratitude to him for continuing to campaign on their behalf, as well as a cheerful pragmatism. Hosieltz, for example, wrote on 10 August:

'Although it is, of course, my greatest wish to be able to return as soon as possible to Bristol and to continue my work, I hope just the same, that, if it is continued by Dr Potter, he can find his way through my notes.'

Their internment proved short: in early September, they began to be released, although not all at once. Mott writes that 'the most junior came out first, and the others one after another at intervals of a few weeks, and finally – understandably rather cross, the senior and most distinguished of them.' Instructions for Walter Heitler's release were delayed until 10 October, a full month later than that of his less eminent brother Hans.

Back to work

On their return, most of the refugees were granted permission to continue working in the Physics Department. They stayed on for varying periods before moving on to prestigious posts elsewhere.

And what of Klaus Fuchs (PhD 1936)? He had moved to Edinburgh University in 1938 and was sent to an internment camp in Canada. But in 1950, after working at the Manhattan Project and Los Alamos Laboratory, he became infamous as the 'atomic spy', having passed secrets to the Soviets. After serving nine years in Wakefield Prison, he moved to East Germany and led a highly successful scientific career until his death in 1988. ●



Top Walter Heitler
 Above Herbert Fröhlich

Archive materials courtesy of the School of Physics. With thanks to Dr Brian Pollard.

Taken

Eye on Shanghai

Doreen Stoneham (BSc 1962) has donated her father's photographs and papers – around one thousand of them – to the Department of History's 'Historical Photographs of China' project.



Above Jack Montgomery's Shanghai bus pass

Jack Montgomery served in the Shanghai Municipal Police from 1924 to 1938, when the British-dominated 'International Settlement' which it policed, and the city as a whole, faced a revolution, a major civil war, and two traumatic phases of the Japanese invasion of China.

Shanghai was not an easy city to patrol. Jack was one of 300 Britons serving alongside 2,500 Asian personnel during a period when the city caught the world's imagination as a free-wheeling 'paradise of adventurers', and as a site of ghastly conflict.

Some photographs were taken by Jack,

while others were purchased or commissioned. Amongst the latter are striking images of the struggles of communist revolutionaries, such as the workers' militia (above) shown in March 1927, victorious after seizing control of parts of the city. Within weeks these men had been betrayed by their erstwhile allies, led by Chiang Kai-shek, and massacred.

The collection shows, too, the catastrophic human consequences of full-scale warfare and modern aerial bombing that laid waste to swathes of China in 1932 and 1937.

visualisingchina.net

Feature

Bristol's PhD students push the boundaries of knowledge with world-changing results – as **Gilberto Algar-Faria's** work on war-torn Sri Lanka demonstrates. But the costs associated with postgraduate programmes are rising, and traditional funding sources are drying up. From medical breakthroughs to environmental uncertainty, can we really afford to put a price on postgraduate research?

The fight for funding



Feature

By Tom Henry

It may be that when the history of post-conflict resolution and reconciliation is written, Gilberto Algar-Faria's name features prominently among those offering solutions to nations emerging from war. Currently in the first year of his PhD at Bristol's School of Sociology, Politics and International Studies, Algar-Faria is analysing the fallout from the civil war between ethnic factions that plagued Sri Lanka for 25 years. His research looks at civil society, civil resistance and liberal peace-building methods and he is one of few Westerners to study this conflict which, when compared to Iraq, Afghanistan and the post-Arab Spring, does not get the attention it arguably deserves.

Although at the outset of his doctoral studies, Algar-Faria already sees implications for other conflict resolution situations. 'There are lessons to be learned from Sri Lanka across the world,' he says. 'There would be little point doing the research if there wasn't. Sri Lanka is in a post-insurgency environment. What happens when violent resistance has been crushed? Will civil society emerge again? These are interesting questions, not just for Sri Lanka but for other nations in similar positions.'

Algar-Faria is a highly capable PhD candidate, but lucky too. He receives a generous Alumni Studentship that includes course fees, a grant, and research expenses. And by working as a supervisor in the University's halls, he also receives discounted accommodation. However, many others are struggling: competition for places is fierce but funding is often hard to come by.

This is particularly true for Masters and other Postgraduate Taught (PGT) candidates. Budget cuts to UK research council grants and economic stagnation mean some sources of funding have almost completely dried up. Employers who may have sponsored an individual find they no longer have the money to do so. Students now have to make a hard choice between funding themselves or continuing in full-time work. Some may consider a part-time course – not always an ideal way of studying at a high level. And if you're looking for funding in the arts or humanities, you may be looking forever.

Zero hour

Then there is the 'undergraduate factor', a potential black hole for future postgraduate funding. 'We have a group of undergraduates who will graduate with higher debts than their predecessors,' says Angela Milln, Bristol's Director of Student Recruitment and Admissions. 'What no-one knows is what they will think about another financial commitment. There will always be students who can fund themselves or find other sources, but many others are aware of the debt hanging over them. This is potentially a very big issue for recruiting graduates to postgraduate qualifications.'

The situation is somewhat easier for candidates



Above Through postgraduate students and research, Bristol is able to face and address global challenges

looking for Postgraduate Research (PGR) positions, as the government (through the research councils) provides the bulk of funding. Ongoing funding at PGR level is good news for Bristol, which has an outstanding reputation for high-quality, challenging research, including pioneering advances in heart surgery, prevention of cot death and environmental monitoring in danger zones.

Bristol was firmly on Algar-Faria's PhD radar, after he became interested in a particular line of research while studying a Masters in Defence, Development and Diplomacy. But when he first applied – to Bristol and other universities – there wasn't any funding available. 'I had applied for a number of PhDs but although I received offers, none had funding attached. Friends advised me not to attempt a PhD without funding.'

Funding at Bristol did later become available, but it was only when another candidate withdrew that Algar-Faria secured the award. What would have happened if he hadn't received full funding? 'I'd have had to make some hard decisions,' he says. 'I don't think I could have committed to a PhD in a part-funded capacity. I might have continued working full-time and waited, but there's no doubt that stepping down from a full-time salary to being a part-funded, or unfunded, PhD student would have been very difficult.'

Stiff competition

'Research is vital to Bristol,' says Professor Sally Heslop, Academic Director of Graduate Studies and Director of the new Bristol Doctoral College. 'There is far more money available for home PGR students than home PGT students, but research councils have faced budget cuts so there are still challenges.'

'A big issue for home PGR candidates is that access to such funding is highly competitive. The money

for doctoral training already tends to be concentrated toward research-intensive universities like Bristol, and the trend towards awarding larger grants to fund centres or partnerships for doctoral training may further reduce the geographical spread of opportunity for PGRs in some disciplines. The research councils and other funders are encouraging universities to collaborate more to mitigate this, but the competition to secure these large doctoral grants – those that fund cohorts of students – is severe. Bristol has been very successful in securing such grants and hosts centres that are training the next generation of researchers in areas as diverse as nanomaterials, composite materials, neuroscience, social sciences (in collaboration with the Universities of Bath and Exeter) and food security (in collaboration with Rothamsted Research and the Universities of Bath and Exeter).'

Bristol's Doctoral College will facilitate and support doctoral training and researcher development across the University, as well as strategic positioning in an increasingly competitive environment. 'As funding streams have changed, our thinking has had to become more strategic to cope with new complexities,' adds Heslop.

Depending on their country of origin, international students can find it easier to access funding and Bristol's global reputation means there is no shortage of postgraduate candidates from abroad. Alex Boughton, Bristol's International Recruitment Manager, says recruitment from overseas is healthy, with many countries – including a growing number in South America – happy to welcome home PhD graduates with Bristol-facilitated research.

'Like all universities, we're looking for the brightest and the best,' says Boughton, 'but today academia is truly global. A talented international student with funding can go anywhere in the world. Bristol cannot afford to be complacent. That said, we do have world-class research institutions and excellent links with industry. Bristol is a very attractive prospect for the international student.'

In the balance

Bristol is, of course, one of the UK's most culturally vibrant cities, making it an appealing destination for younger postgraduate candidates too. But its popularity comes at a price. Jon Lightfoot, the University's interim Student Funding Manager, says Bristol is seen as an expensive city, particularly for accommodation. 'Rents can be high,' he says, 'and this is one of the biggest costs students face. Even with a grant, it can be a challenge.'

'As UK students find it harder to access funding, the balance has shifted towards international students, who often have generous support from their own countries,' says Angela Milln. 'While we welcome international students with open arms, we wouldn't want them to come here and find few British students on their courses. One of the key rewards of a university

education is meeting people from all walks of life, but if funding difficulties in England and Wales continue – or worsen – this may happen less.'

There are signs that the government is taking notice of these funding issues. In July, the Universities and Science Minister, David Willetts, announced that an extra £125 million will be available to support students from disadvantaged backgrounds in postgraduate study. But are such initiatives enough? Hopes are pinned on a strong economic recovery and the promise of greater investment, but there is still growing concern that future generations of undergraduates will choose full-time employment over postgraduate education.

Certainly, talking to Algar-Faria, one can't help but admire his tenacity in pursuing his passion, despite funding challenges. 'I am driven to undertake research that engages with real-life situations,' he explains. 'Through my academic work, I am able to engage with individuals on the ground in post-war and post-insurgency environments. In my view, working with these people is vital if I am to make a meaningful contribution to peace and conflict resolution in an academic and real world context.'

How a PhD pushes boundaries

Pioneering inventions and solutions to world problems all begin at universities. Each level of higher education demands a greater degree of specialism – and it's only at PhD level that students begin to impress upon, and eventually re-draw, the boundaries of human knowledge.

- School
- Bachelor's degree
- Masters degree
- PhD



Photos © Dan Rowley // PhD diagram was originally created by Matt Might and is explained in full at <http://matt.might.net/articles/phd-school-in-pictures/>

Regulars



In the city
The University in Bristol

The High School Project on Astrophysics Research with Cosmics (HiSPARC) introduces A level pupils in Bristol and elsewhere to real-world physics research by supplying their schools with cosmic ray detectors.

The origins and processes of these high-energy particles, which continuously bombard the Earth, are still not well understood. A large-scale international collaboration is studying the rates at which especially high-energy showers of these particles occur, and HiSPARC, which began as an initiative at Radboud University in Nijmegen, enables schools to contribute to the study.

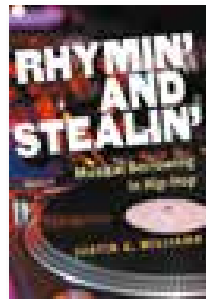
The detectors are delivered as DIY kits with either two or four detectors; the pupils build the systems themselves, and all the school needs to provide is power, a PC, an internet connection, and a spot on its roof to install the box.

'HiSPARC lets pupils conduct original research that can be published,' says Dr Jaap Velthuis, Senior Lecturer in the School of Physics, who co-ordinates the project in the South West. 'Four schools in Bristol and two in Bath currently have detectors installed, and more are coming online soon.'

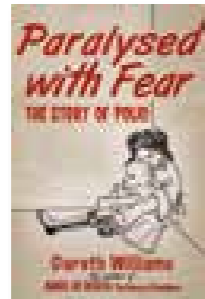
bristol.ac.uk/physics/research/particle/public/hisparc

Left Pupils from the Red Maids' School assemble the detector

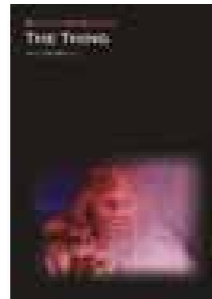
The plug New books (and a CD)



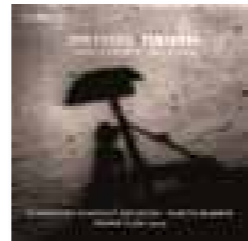
Rhymin' and Stealin': Musical Borrowing in Hip-Hop Justin Williams
Whether taking an old dance move for a breakdancing battle, quoting from a famous speech, or sampling a 1970s funk song, hip-hop borrows overtly from the past. Dr Justin Williams, Lecturer in Music, presents the first book-length study of musical borrowing in hip-hop, using examples from Jay-Z, Eminem, and others. This provides a framework for analysing hip-hop music and wider cultural trends. (University of Michigan Press)



Paralysed with Fear: The Story of Polio Gareth Williams
For much of the 20th century, polio inspired terror as the 'morning paralysis' which could disable or kill a previously healthy person. Gareth Williams, Professor of Medicine, tells the compelling story of mankind's struggle against polio, which became a battleground between good and bad science. Williams explores the profoundly moving experiences of victims alongside the medical and scientific landmarks in the history of the disease. (Palgrave Macmillan)



The Thing Jez Conolly
Dismissed on its release, John Carpenter's *The Thing* has become one of the most highly regarded examples of the 'body horror' genre. Jez Conolly, Arts Faculty Librarian, looks back to the film's antecedents and forward to the changing nature of its reception and the work that it has influenced. The book is topped and tailed by a full plot breakdown and an appreciation of its notoriously downbeat ending. ('Devil's Advocates' series, Auteur Publishing)



Tenebrae / Piano Concerto / Sea Change John Pickard
This CD features three orchestral pieces composed by John Pickard, Professor of Composition and Applied Musicology, and performed by the Norrköping Symphony Orchestra conducted by Martyn Brabbins. *BBC Music Magazine* described it as 'one of the most important contemporary orchestral CDs of 2013'. (BIS Records)

In the city' photocourtesy of the Red Maids' School, Bristol



Boldly going...

Feature

Ashley Dale is a PhD student in the Faculty of Engineering, working on a new generation of 'morphing' wing design. But he is also an astronaut – sort of – and an advocate for a manned mission to Mars. This summer he added to these credentials when he was selected to attend the International Space University, and ended up advising senior NASA officials on – not to put too fine a point on it – saving civilisation from the effects of a solar superstorm.



‘IT WAS AN
UNFORGETTABLE
EXPERIENCE’

By Ashley Dale

Strange environments are to be expected in space travel, and I’ve recently worked in a couple of very different ones. The first was a barren landscape of red cliffs and desert; the second was a series of rooms filled with astronauts and NASA directors.

My life on Mars

In 2011 I applied for an engineering position at the Mars Desert Research Station (MDRS), a facility run by the Mars Society in close collaboration with NASA and the European Space Agency (ESA), dedicated to developing field tactics and protocols for human expeditions to Mars. As a lowly first-year PhD student, I somehow managed to clear the hurdles required for getting a spot on this small, highly qualified, international crew, which included a NASA astrobiologist, a geologist/psychologist, an ESA artist, an ESA industrial designer, and a NASA aerospace engineer.

The station is located in a very remote area of the high-altitude Utah desert. Over two weeks, whilst constantly being

observed remotely, we conducted research, fieldwork, and hardware testing in a simulated Martian environment, and were also subjected to psychological studies, assessments of crew-selection procedures, and even tests to determine the best kind of foods for Mars explorers. My role as the crew engineer was to maintain the Habitat Module, greenhouse, spacesuit systems and the quad bike all-terrain vehicles, while also serving as an extra set of hands for various projects.

It was an unforgettable and intense experience that has forever shaped me and it gave me a kind of ‘calling card’ when the opportunity arose for another bit of space-themed exploration.

My God, it’s full of stars

One winter morning in 2013, I came across a poster advertising the National Student Space Conference, hosted by the School of Physics. I contacted the organisers to see if I could share my Utah experience. They quickly opened a slot for me in the conference, where I met a professor from the International Space University (ISU)

in Strasbourg. I’d never heard of it, but his description made it sound like *Star Trek’s* Starfleet Academy.

I was sceptical, but some research confirmed that the ISU is a genuine, prestigious organisation. Every summer they hold a two-month programme, in which young professionals from around the world are selected to participate in an intense crash-course on the space industry, led by the world’s experts. I applied, and to my surprise I was invited by the UK Space Agency to an interview, for a scholarship to attend. Next thing I knew, I was on the programme. So that put the PhD on hold... again!

When I arrived in Strasbourg, I snuck into the back of a low-lit lecture theatre with around a hundred very international and well-dressed thirtysomethings, all making notes on various electronic devices, while an ageing American man held forth about the International Space Station (ISS). When he started talking about his experiences in microgravity, it dawned on me that he was a former ISS astronaut. My doubts vanished immediately, and I began scribbling notes of my own.

The weather up there

My main project at the ISU, along with about 30 other participants, concerned radiation in space and the damage caused to satellites. I led two groups – not an entirely new experience for me, but delegating tasks to the likes of a professor from the Chinese Astronaut Space Centre, a US fighter pilot and a successful aerospace entrepreneur put things on a whole new level.

My first group identified the gaps in knowledge about space weather, the nature of the Sun, and its magnetospheric relationship with the Earth (see panel); the second tested a methodology I came up with for reducing the amount of radiation an astronaut or sensitive spacecraft instrument would receive. My proposal involved tailoring the interior architecture of a spacecraft to match the radiation profile associated with the specifics of the mission. In collaboration with Inspiration Mars, a group planning to send astronauts on a flyby mission around Mars in 2018, we found that this approach reduced the estimated radiation dosage for their astronauts by 36 per cent. If adopted more broadly in a space mission design process, this methodology could also, for example,

increase the life expectancy of a satellite or reduce a spacecraft’s mass (and therefore the cost of launching it).

The calibre of the ISU programme was beyond my wildest dreams, and I made a very strong network of contacts around the world. Had I not spotted that NSS conference poster, none of this would have been possible. My best to whoever put it there!

The British are coming

I’ll soon be returning to Mars – the simulation study, that is – when I lead a crew of scientists and engineers on another two-week expedition early in 2014. Having put out a call to British universities for project proposals, in an effort to help build ties between the UK and the MDRS, I elicited a great deal of interest, and will have some British PhD students coming with me.

We’ll be field-testing a robotic Mars rover, a solar-powered drone built to fly in the tenuous Martian atmosphere, some automated sample collection hardware, and some exciting prototype spacesuit technologies. We’ll also be conducting a feasibility study on making rocket fuel from the desert soil, and extreme weather testing of candidate micro-organisms for terraforming the Martian environment to something more hospitable for us.

The choice

Why so gung-ho about a manned Mars mission? My PhD is on future aircraft design, but while doing the research and looking at trends in the growth of civilisation, I quickly came to realize that we face a problem. It’s a very obvious problem, really: the planet we live on is finite, and its resources are limited. Pursuing ways to make aircraft ‘greener’ is commendable, but it’s not a long-term solution.

We must find the right balance between dealing with near-term and long-term problems. With the world spending seven times more on cosmetics than on its space agencies, I question whether we’ve achieved that balance.

We are faced with a critical branch point in our history: to survive, unless we spread – perhaps to Mars – we must devolve back to our pre-stone-age existence, back to living in lock-step with our environment. What we decide to do now will powerfully affect the destiny of our descendants. So here is the choice: grow, or stagnate and die. I think we should grow. ●



Above The Habitat Module

Mars
Distance from Earth
(depending on orbits)
Closest
34,000,000 miles
Furthest
249,000,000 miles



Main image Two members of the crew in the Martian landscape of Utah Above Suited to Mars: Ashley Dale

Main image © Ashley Dale // Habitat Module © Charlotte Poupon

The Sun’s dangerous moods

Only in recent years have we realised just how vulnerable our electronics-based infrastructure is to the mood of our nearest star.

In 1859, the Earth happened to be in the path of a solar superstorm known as the Carrington Event. The Northern Lights were visible as far south as Hawaii. The world’s telegraph systems – luckily the only electronics we had back then – were set alight by the surge of energy. If such an event were to happen today, the collateral impact would redefine the word ‘disaster’ in the minds of those who survived. With ice-core records showing Carrington-level events occur on average every 150 years, this is no idle concern. Two senior NASA directors who attended the conference were greatly interested in our group’s work, and we developed a document – explaining the problem, why we should care, and what we should do about it – which is being disseminated to governments, policy-makers, and industry players around the world.



Listings

Calendar November 2013 – July 2014

Unless otherwise stated, more information and booking details are available from bristol.ac.uk/alumni/events or by calling +44 (0)117 394 1046. The events programme is always being updated, so keep an eye on the website for the latest event news.



If you're organising an event for alumni and would like our help publicising it, please email alumni@bristol.ac.uk

November

**Saturday 16 November
Officers Training Corps
Annual Dinner // Bristol**

The Alumni Association of the Bristol University Officers Training Corps invites all former Bristol members and their guests to the fourth Annual Dinner, AGM and drinks reception.

December

**Thursday 5 December
Convocation Annual
Reception and Student
Awards // Bristol**

Learn more about current student life at Bristol from our outstanding students, members of Convocation and senior University staff.

**Friday 6 December
Institute of Greece, Rome
and the Classical Tradition
lecture // Bristol**

For this annual lecture, Bristol University's new Professor of Latin, Shane Butler, will present a fascinating talk on the subject of 'Deep Classics'.

Monday 16 December London Branch Carol Service // London

The London Branch of University of Bristol Alumni is organising an inaugural carol service to be held in the magnificent City of London Church, St Vedast (alias Foster). Traditional carols will be interspersed with seasonal lessons read by notable alumni, including the Chancellor of the University. The service will be followed by a drinks reception at a nearby wine bar.

January

**Saturday 25 January
Midlands Branch lunch
and AGM // Solihull**

The University of Bristol Midlands Branch of Convocation invite alumni based in the Midlands to join them at their annual lunch and AGM. For more information and to book, please contact Tim Drakeford (BA 1966) at timdrakeford@btinternet.com.

February

**Saturday 1 February
Wills Hall Association
Annual Reception // Bristol**

Enjoy drinks, canapés and good company at this annual reception held in the Warden's House. All Wills Hall Association members, current and former residents, and their guests, are warmly invited. For information and booking details please contact the secretary Charles Gunter at wills-hall-association@bristol.ac.uk.

July

**Friday 4 to Sunday 6 July
Best of Bristol Alumni
Reunion 2014 // Bristol**

The Alumni Reunion is your annual opportunity to come back to Bristol to visit old haunts and meet fellow alumni. The full programme of events (which includes the Convocation AGM) will be available online.

Convocation Elections 2014

Online nominations are now open for various posts including: Treasurer; members of the Convocation Committee; and Convocation Representatives on Court. Find out more at bristol.ac.uk/alumni/elections.

The deadline for completed applications, including the support of two nominators, is 31 March 2014. Email reminders of these opportunities and the application deadline will be sent to all alumni for whom Bristol holds current email addresses.

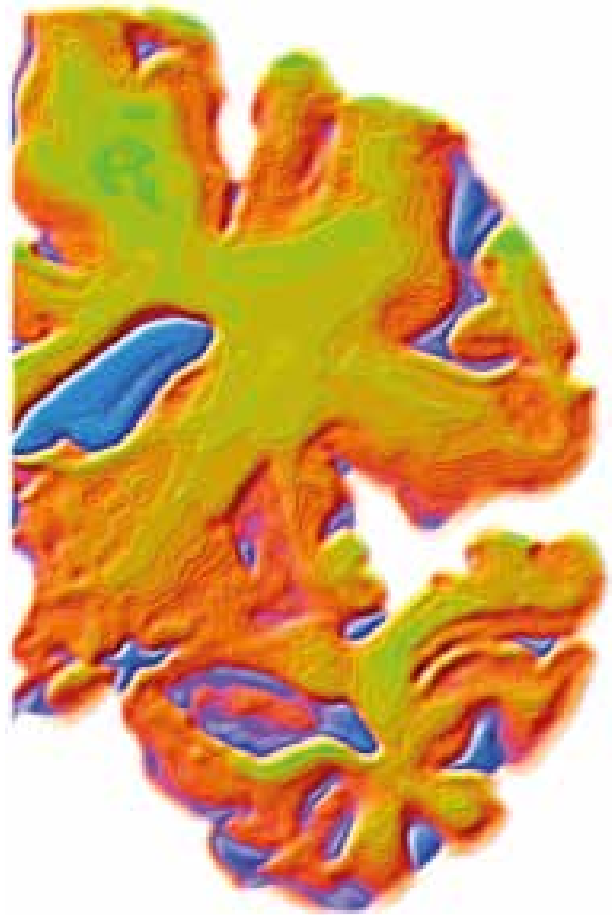
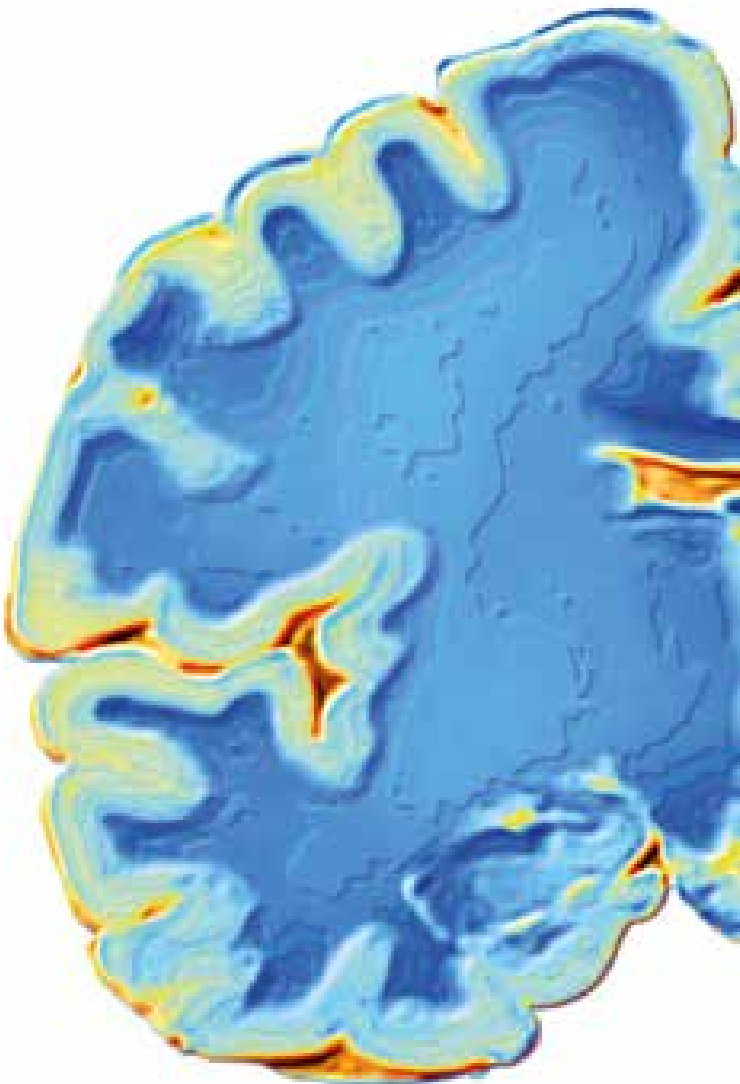
Online voting will take place from May 2014 until the eve of 4 July 2014. Postal ballots will be available on request by contacting the Campaigns and Alumni Relations team on +44 (0)117 394 1051, or at alumni@bristol.ac.uk.

Calendar illustration © Alberto Antoniazzi

Listings

The University extends its sincere condolences to the friends and families of those listed below for whom we have received notification of death.

- In order of degree date
- May Dallenger** (née Valentine) (BA 1940, Diploma 1941) died March 2012, aged 92
 - Dr David Patterson** (BSc 1942, MSc 1949, PhD 1951) died July 2013, aged 90
 - Dr John Valentine** (MB ChB 1942) died May 2013, aged 95
 - Peter James** (MB ChB 1943) died 2013, aged 92
 - Robert Williams** (BA 1943) died 2013, aged 90
 - Dr Albert Nethercott** (MB ChB 1944, Diploma 1966) died 2013, aged 92
 - Dr Hugh Preston-Thomas** (BSc 1944, PhD 1951) died August 2012, aged 87
 - Dr Norman Cook** (MB ChB 1945) died March 2013, aged 91
 - Dr Jean James** (née Tregear) (MB ChB 1945, MD 1973) died 2013, aged 91
 - Michael Comely** (BA 1947, Cert Ed 1948) died October 2012, aged 88
 - Harold Heywood** (BSc 1947, Cert Ed 1948) died January 2013, aged 94
 - Dr Clement Mills** (MB ChB 1947) died 2011, aged 86
 - Joan Pickering** (BA 1947) died January 2009, aged 82
 - John Rees** (Cert 1947) died 2013, aged 87
 - Glyndwr Young** (BA 1947, Cert Ed 1948) died March 2013, aged 92
 - David Stone** (BSc 1948) died March 2013, aged 85
 - Professor Gerald Fowles** (BSc 1949, PhD 1953) died September 2012, aged 86
 - William Edmonds** (BA 1949, MA 1952) died April 2013, aged 86
 - Desmond Hughes** (BA 1949) died April 2013, aged 91
 - Ronald Yelling** (BSc 1949, Cert Ed 1950) died February 2013, aged 86
 - Roy Grant** (BSc 1950) died June 2013, aged 90
 - Dr Christopher Brown** (MB ChB 1951) died January 2013, aged 92
 - Doreen Chedzoy** (née Brown) (BA 1951, Cert Ed 1952) died July 2013, aged 83
 - John Clark** (BSc 1951) died February 2013, aged 87
 - Arthur Petheram** (BSc 1951) died December 2012, aged 85
 - Carol Speed** (née Galley) (BA 1951, Cert Ed 1952) died March 2013, aged 82
 - Professor John Spence** (BSc 1951, PhD 1961) died March 2013, aged 83
 - The Rev Canon Allen Willett** (BA 1951) died May 2013, aged 93
 - Margaret Austen** (née Pyne) (BA 1952) died May 2013, aged 84
 - Dr Kenneth Barker** (MB ChB 1952) died February 2013, aged 94
 - Dr Peter Crook** (MB ChB 1952) died March 2013, aged 84
 - Michael Harrison** (BA 1952) died May 2013, aged 85
 - Dr Audrey Ridge** (née Stevenson) (MB ChB 1952, Diploma 1958) died May 2013, aged 83
 - Anthea Bradbury** (née Woods) (BA 1953) died February 2013, aged 82
 - Keith Crook** (BSc 1953) died April 2013, aged 81
 - Sylvia Crook** (née Pearson) (BA 1953) died April 2013
 - Angus Heron** (LLB 1953) died April 2013, aged 84
 - The Rev Mr Colin Furse** (BA 1954) died December 2012, aged 86
 - Robert Thomas** (BSc 1949, BVSc 1954) died July 2013, aged 86
 - Dr John Clarke** (MB ChB 1955) died March 2013, aged 81
 - Bin Ainuddin** (BSc 1956) died 2013, aged 84
 - Sheila Anderson** (LLB 1956) died January 2013, aged 77
 - Dr John Brown** (BSc 1956, PhD 1960) died April 2013, aged 85
 - Dr Desmond Evans** (PhD 1957) died March 2013, aged 78
 - Dr John Edmondson** (MB ChB 1958) died March 2013, aged 78
 - Dr Raymond Pope** (BSc 1958, Certificate 1959) died April 2013, aged 77
 - John Roberts** (BA 1958, Cert Ed 1959) died March 2013, aged 76
 - Colin Alcock** (BA 1960) died 2013, aged 76
 - David Farnworth** (BA 1960) died January 2013, aged 75
 - Michael J Gorman** (BA 1960) died September 2013, aged 76
 - The Rev Mr Michael Hambleton** (BA 1960) died 2013, aged 78
 - John Fisher** (LLB 1962) died 2011, aged 73
 - Ann Hurford** (BA 1962) died 2013, aged 73
 - Philip Jones** (BDS 1962) died May 2013
 - Ralph Nurse** (BVSc 1963) died March 2013, aged 73
 - Michael Preston** (BA 1963) died January 2013, aged 74
 - John Cornwell** (LLB 1965) died February 2013, aged 69
 - John Sikes** (BSc 1965) died March 2013, aged 70
 - Dr Clive Wulwik** (BSc 1966, MB ChB 1970) died March 2012, aged 66
 - John Hine** (BA 1967) died February 2013, aged 66
 - Dr Peter Spence** (BSc 1967, PhD 1975) died 2013, aged 68
 - Steve Bone** (BSc 1968) died 2013, aged 66
 - Dr Peter Hardwick** (BSc 1968, MB ChB 1971) died 2012, aged 67
 - Aiison Michell** (née MacFarlane) (BA 1968) died March 2013, aged 66
 - Robert McLeish** (BSc 1968) died February 2013, aged 65
 - Robert Pinson** (BA 1968) died December 2012, aged 65
 - Mary Shepherd** (BA 1968, Cert Ed 1971) died June 2013, aged 66
 - Bruce Ferris Harms** (MA 1969) died January 2013, aged 83
 - Margaret Sutherland** (née Nixon) (BA 1971) died 2013, aged 64
 - Keith Warren** (BSc 1972) died September 2012, aged 62
 - Dr David Milne** (MB ChB 1973) died December 2012, aged 62
 - David Selwyn** (BA 1973, MMus 1979) died April 2013, aged 61
 - Raymond Harris** (BSc 1978) died February 2013, aged 56
 - Andrew Robb** (BSc 1978) died February 2013, aged 56
 - Paresh Mashru** (BSc 1979) died 2013, aged 56
 - Nicholas Haycock** (BSc 1980) died January 2013, aged 55
 - Christopher Beesley** (BSc 1982) died January 2013, aged 52
 - Timothy Jackson** (BSc 1982) died March 2013, aged 51
 - Kevin Thorogood** (BA 1984) died January 2013, aged 50
 - Mark Williams** (BSc 1984) died January 2013, aged 49
 - Paul Tarran** (MEd 1985) died June 2013, aged 73
 - Johannes Van de Put** (BSc 1985) died January 2013, aged 49
 - Maria Crowley** (LLB 1987) died November 2012, aged 53
 - David Russell** (BA 1987) died February 2010, aged 45
 - Patrick O'Leary** (BSc 1988) died 2013, aged 49
 - Jonathan Joyce** (BSc 1994) died June 2013, aged 41
 - Dr Cliff Morgan** (Hon LLD 1996) died August 2013, aged 83
 - Stephen Smith** (BSc 1998) died February 2013, aged 38
 - Eleanor Pardon** (BDS 1999) died January 2013, aged 37
 - Dr Kenneth Heaton** (DSc 2001, MA 2003) died March 2013, aged 76
 - Siu Chung** (MSc 2003) died November 2012, aged 38
 - Rachel Humphreys** (MSc 2003) died April 2013, aged 42
 - Richard Morton** (MLitt 2006) died December 2012, aged 79
 - Emma Llewellyn** (LLB 2012) died March 2013, aged 22
 - Simon Nickau** (BSc 2013) died 2013, aged 22
 - Marcelin Fortes Da Cruz** (PhD 2005-2013) died 2013, aged 61
 - Anna Crossman** (BA 2011-2013) died June 2013, aged 20
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- Emeritus Professor Eric Bradford** died 2013, aged 94
- Emeritus Professor Mick Aston** died June 2013, aged 66
- Monica Cobb** friend and donor to the University, died March 2013
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- Please email any notifications of death to alumni@bristol.ac.uk



Everyone can leave a legacy

Anne Morris (BA 1952) left a legacy to the South West Dementia Brain Bank to support Bristol's pioneering research into causes and preventions of dementia.

'Dementia affects one in 14 people over the age of 65 and research into both treatment and prevention continues to be crucial. Anne's legacy has taken our research to the next level by providing us with more advanced technology for preserving and studying brain tissue so we can help patients and families, and identify new ways to treat the disease.'

Contact:

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Pat Kehoe Professor of Translational Dementia Research
and co-director of the South West Dementia Brain Bank