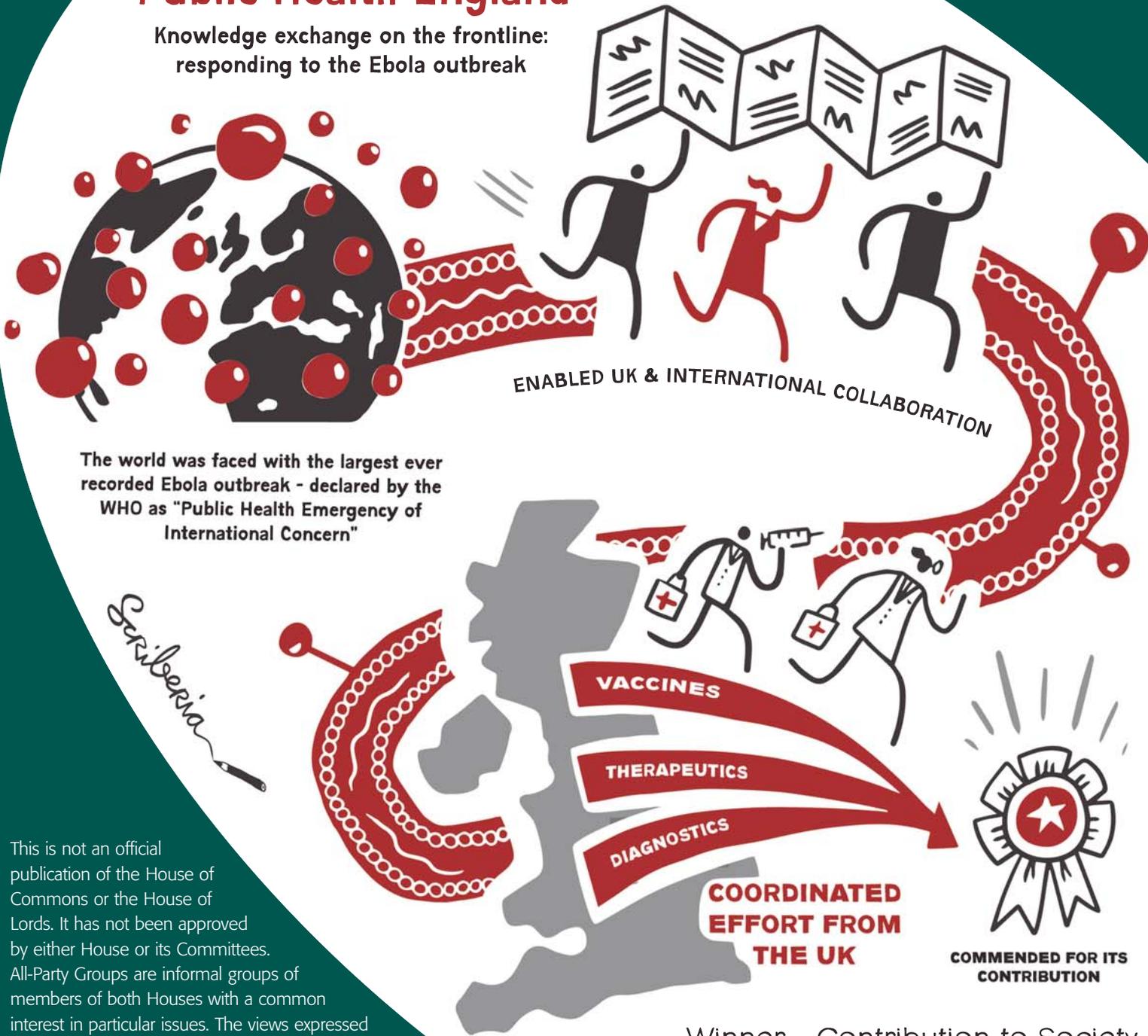


THE **IMPACT AWARDS** FOR KEC PROFESSIONALS

## Public Health England

Knowledge exchange on the frontline:  
responding to the Ebola outbreak



The world was faced with the largest ever recorded Ebola outbreak - declared by the WHO as "Public Health Emergency of International Concern"

This is not an official publication of the House of Commons or the House of Lords. It has not been approved by either House or its Committees. All-Party Groups are informal groups of members of both Houses with a common interest in particular issues. The views expressed in this Journal are those of the Group. This Journal is funded by the members of the Parliamentary and Scientific Committee.

Winner - Contribution to Society

# Clinical pharmacology: Championing patient safety

The British Pharmacological Society leads the way in the research and application of clinical pharmacology around the world. Clinical pharmacology is the only medical speciality focusing on the safe, effective and economic use of medicines. It is a dynamic speciality essential for UK healthcare – and crucial in protecting patient safety and improving outcomes by:

## Detecting & reporting adverse drug reactions (ADRs)

ADRs cause harm to patients - yet 70 per cent are avoidable.

- ADRs account for **6.5 per cent** of hospital admissions and **14.7 per cent** of adult hospital in-patients experience an ADR
- Various studies have estimated that ADRs cost between **£637 million – £770 million** annually in England

## Treating cases of poisoning

Poisoning is one of the most common causes of hospital admission.

- There were over **153,500** admissions to Accident and Emergency departments with suspected poisoning in 2013/14 in England (including legal and illegal)
- In England and Wales in 2013, there were **almost 3,000 deaths** caused by poisoning (including drug misuse)

Yet, as identified in the British Pharmacological Society's report, *A Prescription for the NHS*, there were only 77 Clinical Pharmacology & Therapeutics (CPT) consultants in the UK, which has now dropped to just 72 consultants and is significantly fewer than the 440 recommended by the Royal College of Physicians. Most of the NHS is therefore operating without the skills and expertise that clinical pharmacologists can bring to healthcare.

The British Pharmacological Society believes that enhancing the value of the speciality is a long-term process that will require co-ordination across the entire health system. It therefore calls on the organisations responsible for workforce management in the four UK nations to:

1

Ensure that within the next decade NHS organisations across the UK have equitable access to clinical pharmacology expertise

2

Commit to increase the CPT consultant workforce to 150 whole-time equivalents by 2025, accompanied by an increase in the number of specialist registrar training posts

3

Develop a joint strategy to achieve this increase, including the provision of enhanced undergraduate and postgraduate education and training

4

Provide a clear career route for clinical pharmacologists, with associated career support and development



[www.bps.ac.uk](http://www.bps.ac.uk)  
[info@bps.ac.uk](mailto:info@bps.ac.uk)



Stephen Metcalfe MP,  
Chairman, Parliamentary and  
Scientific Committee

It is great to note that since I last wrote, the UK has won yet another Nobel Prize – our eighth in the last decade. Tomas Lindahl received a share in the Prize for Physiology/Medicine for his work on DNA repair. In all humility we need to remember that Professor Lindahl was born in Sweden and came to the UK as an immigrant in his 20's.

As it happens, another recent UK winner (and now President

of the Royal Society) was also an immigrant in his 20's Sir Venkatraman (Venki) Ramakrishnan (Chemistry, 2009). The (Physics 2010) Nobel prize winners for discovering graphene were Russians by birth who did their work at the University of Manchester.

All these illustrate points tackled at a P&SC meeting in 2013 (report in Science in Parliament, Spring 2014). Science knows no national boundaries, and the UK is a very attractive place in which to pursue scientific research.

We never cease to coax the Home Office to accept these facts, and base immigration policy accordingly. In fact they have just relaxed the regulations on students coming to Britain.

The question of why the UK is so attractive is worth examining. Speaking English obviously helps. Reasonably well funded, thanks to never ending pressure from Learned Bodies and individuals, is also a sine qua non. Perhaps

too our tolerance of challenges to authority and the establishment sets us slightly apart. Look at the reputation of the British sense of humour and satire.

John Gurdon (Nobel Laureate, Physiology 2012) remains proud of his school report which declared that he would never be a success as a scientist because he was always challenging given theories and opinions.

That is one reason why the Haldane Principal, enunciated 100 years ago, was first promulgated. Scientists welcome challenges to established laws and theories. Politicians are usually more content with the status quo.

Governments will of course continue to determine budgets, but they need to let scientists get on with the job of determining scientific priorities.

Perhaps the centenary is an appropriate time to review this relationship?



The Journal of the Parliamentary and Scientific Committee.  
*The Parliamentary and Scientific Committee is an All-Party Parliamentary Group of members of both Houses of Parliament and British members of the European Parliament, representatives of scientific and technical institutions, industrial organisations and universities.*



Science in Parliament has two main objectives:

1. to inform the scientific and industrial communities of activities within Parliament of a scientific nature and of the progress of relevant legislation;
2. to keep Members of Parliament abreast of scientific affairs.

# CONTENTS

<b>MEASUREMENT</b> Dr Peter Thompson	<b>2 ARE WE LOOKING AFTER OUR SOIL?</b> Address to the P&SC by Dr Jacqueline Hannam	<b>20</b>
<b>QUEEN ELIZABETH PRIZE FOR ENGINEERING</b> Presented to Dr Robert Langer	<b>4 100 YEARS OF WOMEN'S MEMBERSHIP AT THE PHYSIOLOGICAL SOCIETY</b>	<b>22</b>
<b>THE UK SHOULD BE PROUD TO BE GREAT AT KEC 6</b> Maxine Ficarra	<b>ASK FOR EVIDENCE</b> Dr Chris Peters	<b>24</b>
<b>BIOLOGY WEEK 2015</b>	<b>8 HOUSE OF COMMONS SELECT COMMITTEES</b>	<b>26</b>
<b>SIN SPOTLIGHT ON MICROBIOME RESEARCH</b> Patricia Gruver	<b>10 PARLIAMENTARY OFFICE OF SCIENCE AND TECHNOLOGY</b>	<b>31</b>
<b>UK &amp; BRAZIL</b> Dr Julia Knights	<b>11 HOUSE OF LORDS SCIENCE AND TECHNOLOGY SELECT COMMITTEE</b>	<b>33</b>
<b>STEMNET AWARDS</b>	<b>12 HOUSE OF COMMONS LIBRARY SCIENCE AND ENVIRONMENT SECTION</b>	<b>34</b>
<b>PATIENT SAFETY</b> Address to the P&SC by Professor Sarah Sharples	<b>15 SCIENCE DIRECTORY</b>	<b>36</b>
<b>ROYAL SOCIETY PAIRING SCHEME</b> Alan Malcolm	<b>17 SCIENCE DIARY</b>	<b>44</b>

The covers of this issue are sponsored by PraxisUnico, the British Pharmacological Society and the Royal Society of Biology.

# MEASUREMENT: the secret to the confidence that underpins our economy



Dr Peter Thompson  
CEO of The National Physical  
Laboratory

At the time of writing I am just over 200 days in post as CEO for the National Physical Laboratory (NPL). In this short time I have already engaged with all the divisions of NPL, the Board, some of our key customers and wider stakeholders, including the international metrology community. Throughout all this I have been overwhelmed at the affection and esteem in which NPL as the UK's National Measurement Institute is held and at the quality of its science and scientists. I did not realise so much world-leading research was happening here, and the impact it was having on industry and society – for example, we are currently supporting an application using ultrasound to screen for breast cancer more effectively.

Perhaps I should not be so surprised when considering the importance of measurement in

making our everyday lives easier, from the alarm clock that brings us into the new day to the transportation that delivers us to and from our place of work. It is not just the little things that make our lives simpler; NPL is also part of a measurement infrastructure across the UK that oversees thousands of measurements daily. This underpins best practice and fair-trading, from posting letters to pulling pints; supports environmental measurements, from climate change to air quality. It maintains accuracy in healthcare, from cancer treatment to drug discovery. Every year, more than £600 billion worth of goods and utilities are sold on the basis of the measurement of their quantity.

Given the impact of measurement it is no surprise that NPL works with customers from a broad range of industries, including the manufacturing, aerospace and oil and gas sectors. Our support helps them improve or validate their

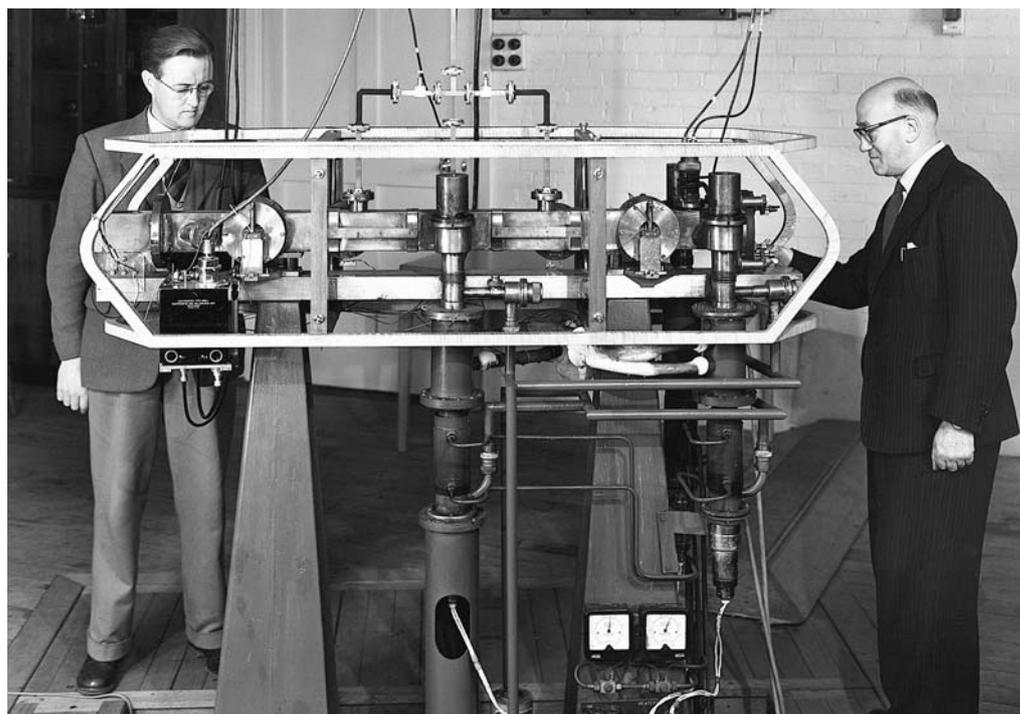
companies working closely with NPL receive direct financial benefits worth £634M a year; and with 63% of users having introduced a new or improved product during the period they worked with NPL. Moreover, NPL is committed to enhancing

## *... using ultrasound to screen for breast cancer ...*

components and processes, and in turn, provide their own customers with confidence in their product or service. This helps to ensure that the UK's engineering and manufacturing sectors remain competitive on the global stage. It also provides tangible benefits for the businesses themselves. A recent customer survey<sup>1</sup> found that

its portfolio of services over the next few years so that it will deliver £1 billion a year in financial benefits to its community of users.

Without accurate measurement, made in the correct units, you cannot have certainty, and that is when mistakes can be made. In a world where supply chains are



Jack Parry and Louis Essen with the world's first caesium atomic clock at NPL

global and parts are sourced from across the globe to deliver critical infrastructure projects it is critical that everything is exact. Some industries work within tolerances of tenths of millimeters.

Whilst errors in measurement can have catastrophic consequences, good measurement practices can transform for the better. To me, measurement's value boils down to one thing: confidence. Confidence is the key, confidence in the data you have, and confidence in the decisions you make with it. Only then can you make a decision to invest or purchase a new product or service. As such, measurement has a significant role to play in economic growth. Before I joined NPL I was sent a pack of documents as a synopsis of the laboratory's work in recent years. Included in this was a set of case studies developed by an independent research company. This assessed the impact of working with NPL for a selection of UK SMEs, with the results highlighting a scale of financial benefit of between 10 and 30 times the public investment (in NPL).

On a broader scale, measurement allows the establishment of standards. Being able to identify the 'gold

*... leading centre for doctoral training and skills ...*

standard' in a particular area and measure performance of specific companies or products against that ultimately leads to a higher quality result for all, and can offer an alternative to regulation and red tape.

In research and development, measurement helps us validate, verify and progress new breakthroughs. 60 years ago

Louis Essen and Jack Parry designed and built the world's first caesium atomic clock at NPL, transforming the way we measure and use time. The caesium fountain atomic clock used at NPL today measures time to an accuracy of one

*... measurement has a significant role to play in economic growth ...*

second in 158 million years. We are now looking to develop miniature atomic clocks for use in space, as part of the recently launched Quantum Metrology



Dr Tania Mathias MP and Dr Peter Thompson NPL CEO at the opening of the QMI. ©NPL

Institute at NPL. The new facility provides verification for quantum technologies; technologies based on abstract science, but that offer incredible applications

and a potential £1 billion market for the UK.

Another time-related project about which I am very excited is NPLTime, a service to pipe precise timing to the city for financial trading. The project will depend on sound measurement to win the confidence of investors and customers, and is already getting a lot of interest

from both the financial sector and other measurement institutes.

However, the continued value that the UK receives from measurement in increasing the productivity and competitiveness of UK manufacturing and

industry, depends on having the right skills to implement it. The UK is consciously addressing the STEM skills shortage and within this there is a shortage of

measurement skills. Automation of processes has led to many knowing how to operate the kit and not about the fundamental measurements that underpin the kit's effectiveness. Educating industry about measurement skills is helping improve productivity and efficiency.

We ensure that the UK has these skills and is doing it through a number of ways. NPL conducts extensive outreach programmes, reaching around 30,000 people a year and educating them about the role of measurement in society. To further inspire the next generation of scientists and engineers we have this year

bolstered our involvement in apprenticeships, by working with government to develop a Trailblazer apprenticeship in metrology, and give young people job-relevant skills.

At a different level, we've also just launched the Postgraduate Institute for Measurement Science, which will bring together 150 researchers co-supervised by NPL staff, in collaboration with over 30 UK universities. The Institute is managed in association with the Universities of Strathclyde and Surrey to enable a postgraduate experience that will place students well for future employability and skills. My aim is for the Institute to be the

*... win the confidence of investors and customers ...*

leading centre for doctoral training and skills development in metrology and its applications in physical, engineering, biological and chemical sciences.

It is clear that NPL's work is intrinsic to the success of UK industry. Its importance will increase with the government's drive to improve UK productivity and international competitiveness. I strive to see NPL giving its all in delivering the best solutions for customers, which help them to succeed. To do this, we need to coherently and consistently communicate the message about the value of measurement by highlighting the amazing science happening at facilities like NPL. It's very simple really; we just need to have the confidence to say it.

**Reference**

- 1 <http://www.npl.co.uk/upload/pdf/customer-survey-2012.pdf>

# QUEEN ELIZABETH PRIZE FOR ENGINEERING

## Presented to Dr Robert Langer

On 26 October 2015 Her Majesty The Queen presented the Queen Elizabeth Prize for Engineering (QEPrize) to a chemical engineer who has made revolutionary advances and leadership in engineering at the interface with chemistry and medicine, Dr Robert Langer.

Dr Langer received the QEPrize trophy in a ceremony at Buckingham Palace. Influential international engineering economies were represented, with Ambassadors and High Commissioners from countries including the United States, China, Japan, Germany, South Korea, South Africa, Singapore and India in attendance. They were joined by senior business leaders from the QEPrize donor companies and young engineers from the QEPrize Engineering Ambassadors Network.

The day also marked the release of the first QEPrize Create the Future Report. The Report revealed the changing nature of engineering perceptions across 10 key markets and provided a fascinating insight with country comparisons alongside expert commentary from the fields of commerce, science, academia and the full breadth of engineering disciplines.

### DR ROBERT LANGER

Robert Langer is one of 11 Institute Professors at the Massachusetts Institute of Technology (MIT) in Cambridge, USA. This is MIT's highest honour. His laboratory at MIT – with over 100 students, postdoctoral students, and visiting scientists at any one time



Photo by David Parry

– is the world's largest academic biomedical engineering laboratory. He has over 1000 issued and pending patents, over 200 major prizes to his name, and is the most cited engineer in history (Science, 2014). His work has helped lay the foundation for long-lasting treatments for brain and prostate cancers, endometriosis, schizophrenia, diabetes and the drug-coated cardiovascular stents that alone have benefited 10 million heart patients.

A chemical engineer by training, Dr Langer was the first person to engineer polymers to control the delivery of large molecular weight drugs for the treatment of diseases such as cancer and mental illness. His unconventional thinking toppled the established view that

controlled-release drug delivery would not work for large molecules like proteins, which are very sensitive to their surroundings.

From the start, Dr Langer's work has been characterised by a truly interdisciplinary approach. He developed his first drug delivery system during the 1970s while working with Dr Judah Folkman, a Harvard

inhibit it. Once he had discovered how to create polymer micro- and nanoparticles that could support and release sensitive protein-based drugs in the body, he used this technique to test possible drugs to control angiogenesis. He and Dr Folkman isolated the first substances that blocked angiogenesis; such substances have been used to treat over 20 million patients.

*... fascinating insight with country comparisons ...*

professor and surgeon at Boston Children's Hospital. Folkman hypothesized that the growth of cancerous tumours could be restricted by stopping angiogenesis, the formation of new blood vessels, and he asked Langer to find a way to

Together with another Harvard surgeon, Dr Joseph Vacanti at Massachusetts General Hospital, Dr Langer helped to pave the way for major innovations in tissue engineering, pioneering synthetic polymers that could deliver cells to form specific

tissue structures. This concept led to the development of a new kind of artificial skin, now approved by the FDA for use on burn victims and patients with diabetic skin ulcers. Many other such systems, including ones for new cartilage formation and spinal cord repair, are now in clinical trials.

Professor Lord Broers FREng FRS HonFMedSci, Chair of Judges for the QEPrize, said: "Robert Langer has made an immense contribution to healthcare and to numerous other fields by applying engineering systems to biochemical problems. Not only has he revolutionised drug delivery, but his open-minded approach to innovation and his ability to think 'outside the box' have led to great advances in the field of tissue engineering. He is a truly inspiring leader who has attracted brilliant people to these relatively new and exciting areas of research and is extremely involved in the commercial development of his group's research."

One of Dr Langer's most recent projects is a microchip-based implant capable of storing and releasing precise doses of a

### ... new and exciting areas of research ...

drug on-demand or at scheduled intervals for up to 16 years. Microchips, the company he co-founded to commercialise the development, announced in December 2014 that it has completed clinical demonstration. Unlike traditional drug delivery platforms, Microchips Biotech's implant can respond to wireless signals, which can activate, deactivate, or modify the frequency or dose of the drug, without being removed from the patient. The company is looking initially at three areas for such an implant: diabetes, female contraception, and osteoporosis, which all require regular, long-term dosage. The contraceptive approach is funded by the Gates

Foundation, as are new ways of providing single-step immunizations for polio and other vaccines, providing long-acting malaria drugs, and providing essential minerals. All of these new techniques are currently being pursued in Dr Langer's lab.

### ... most cited engineer in history ...

#### THE CREATE THE FUTURE REPORT

The inaugural Create the Future Report is an international survey of attitudes towards engineering surveying respondents in global centres for engineering including the US, Germany, Japan, Turkey, India and Brazil.

#### The report reveals that:

- \* Engineering tops the list of professions seen as most vital for economic growth. Other professions include business leader, lawyer, doctor and teacher.

- \* 57% believe engineering is critical in solving the world's problems, particularly in the US, UK and Germany

- \* In Japan engineering is seen as a driver of innovation

- \* Interest in engineering remains higher amongst men (66% vs. 43%) but the gap is closing fast in emerging economies such as India and Brazil

- \* People in the US, Germany and India show the highest numbers rating engineering as a top career opportunity

- \* Interest in engineering still lags behind wider STEM subjects (Science, Technology, Engineering, Mathematics), 55% vs 91%

- \* 71% of people think engineers' contribution to society is undervalued, they deserve much more recognition

The Create the Future Report is supported by insights and opinion from leaders of some of the world's leading companies as well as eminent engineers from medicine, energy, IT and infrastructure.

Lord Browne of Madingley FREng FRS, Chairman of the

Queen Elizabeth Prize for Engineering Foundation, said of the QEPrize Create the Future Report:

"The QEPrize Create the Future report shines a light on a great many positive changes in our industry. As an engineer, I am enormously encouraged to see that the public thinks engineers are capable of solving the world's greatest problems. It is also encouraging to see that people think the priority for engineers should be improving renewable energy and healthcare, not just traditional engineering infrastructure such as bridges and buildings.



Dr Langer at work in his laboratory

"There is a responsibility on governments, industry, academics, teachers, parents and grandparents to encourage young people to share in the excitement of engineering innovations and the endless possibilities of a career in this vital sector."

#### THE QUEEN ELIZABETH PRIZE FOR ENGINEERING

Launched in 2011, the Queen Elizabeth Prize for Engineering is a global £1 million prize that celebrates ground-breaking innovations in engineering. The prize rewards an individual or team of engineers whose work has had a major impact on humanity.

The winners of the first QEPrize in 2013 were the five

pioneers of the internet and the World Wide Web. Robert Kahn, Vinton Cerf and Louis Pouzin made seminal contributions to the protocols that together make up the fundamental architecture of the internet. Sir Tim Berners-Lee created the World Wide Web and vastly extended the use of the internet beyond email and file transfer. Marc Andreessen, while a student and working with colleagues, wrote the Mosaic browser which made the internet available to everyone.

Alongside highlighting such ground-breaking achievements, the QEPrize celebrates engineering as a discipline and career choice, shining light on the excitement and importance of engineering and encouraging young people to get involved in the area.

One avenue open to young engineers is to become a QEPrize Engineering Ambassador. This growing international network brings together practicing early-career engineers who act as evangelists for their profession, speaking to teachers, parents, schoolchildren, politicians and journalists about their jobs.

It is just one of the many ways that the QEPrize celebrates and shares stories of engineering success, raising the international public profile of engineering and inspiring new generations of engineers to take up the challenges of the future.

For further details, please visit [www.qeprize.org](http://www.qeprize.org)

# THE UK SHOULD BE PROUD TO BE GREAT AT KEC



Maxine Ficarra  
Executive Director  
PraxisUnico

and economic impact, and their expertise in overcoming obstacles and finding creative solutions to practical problems delivers significant value to collaborative work between academia and industry.

PraxisUnico is a world-leading national professional association for public sector knowledge exchange and commercialisation practitioners. Nessa Carey, International Director, travels across the world to deliver training to Knowledge Exchange & Commercialisation practitioners, to share the UK's expertise, build links and bring back learning to inform best practice. She describes the importance of knowledge exchange and commercialisation in supporting and developing the new industries of the future, delivering social benefits and helping to drive the growth of the economy and keep a competitive edge in global markets through research and innovation.

"The UK is ranked #2 in the Global Innovation Index, and 3 of the top 10 universities worldwide are based in the UK. As James Wilsdon, professor of

Numerous studies have shown how the transfer of publicly funded research outcomes can improve business productivity, sales, and performance in product, service and process innovation<sup>1</sup>, across sectors as well as across geographies. Knowledge Exchange and Commercialisation (KEC) is an umbrella term which describes a very broad range of activities to support mutually beneficial relationships between universities, businesses and the public sector. KEC professionals play an important role in enabling the realisation of social



The Innovate2015 event shed a global spotlight on UK innovation in November

Science and Democracy in the Science Policy Research Unit (SPRU) at the University of Sussex and chair of the Independent Review of the Role of Metrics in Research Assessment and Management, said recently, *'On any reading of the international data, the UK [research] system is highly efficient and delivers superb results.'*

Central government funding in the UK, and in particular HEIF (the Higher Education Innovation Fund) has delivered a national level of support that allows public sector research

organisations to embed and enable engagement with external partners. As University Alliance note "HEIF funding is given to the universities, but the overall impact is felt across all collaborative partners and beneficiaries<sup>2</sup>", and this was demonstrated clearly in the recent Research Excellence Framework (REF) 2014, where 30% of submissions were deemed to be *'world leading'*<sup>3</sup>.

Further examples of excellence were identified in the recent Impact Awards for KEC professionals, from PraxisUnico and Research Councils UK, highlighting the vital role played by KEC professionals working alongside academic colleagues. The finalists all provided outstanding examples of how KEC teams work to support relationships between businesses and the UK's world-leading publicly funded researchers – on a national and international basis, demonstrating a global reach of impact achieved across all areas of business and society from investment in research.



Amanda Brooks, Director of Innovation at Department for Business, Innovation and Skills, speaking at Innovate2015 about building on UK strengths in commercialising innovation

Public Health England's KEC activity received several awards for its leadership and contribution to the development of vaccines, therapeutics and diagnostics. They won the Impact Award for Contribution to Society for "Knowledge Exchange on the Frontline: responding to the Ebola outbreak", in which KEC professionals enabled UK and international collaboration, co-ordinating work on vaccines, therapeutics and diagnostics and bringing the knowledge community together to develop an effective response.



2 seater electric powered automated vehicle pod equipped with sensor and navigation technology from the University of Oxford - part of the LUTZ Pathfinder project from Coventry based company RDM.

The UK can lead such initiatives because of the strong KEC community. At PraxisUnico we bring together the best people in knowledge exchange and commercialisation (KEC) to enable knowledge sharing



Innovate2015 showcased many technologies which have been developed in collaboration with UK Universities

around the world. We want to create vibrant, highly trained entrepreneurial technology transfer, knowledge exchange and commercialisation ecosystems. We've worked

across the world, in Brazil, China, Japan, Saudi Arabia, Portugal, Columbia, and other regions which are seeking to develop their KEC activity.

Through training, we can help international KEC practitioners to



projects delegates were working on were technologies related to water treatment, and the production of clean drinking water. Water availability is a major issue in China and is a consequence of many factors,

only the UK, but make a real difference in solving global problems."

**References**

1 UK-Innovation Research Centre (2014) The economic significance of the UK science base, a report for the Campaign for Science and Engineering; Department for Business, Innovation and Skills (2014) Estimating the effect of UK direct public support for Innovation; Howells J; Ramlogan R; Cheng S (2012) Universities in an open innovation system: a UK perspective, International Journal of Entrepreneurial Behaviour & Research, Vol. 18 Iss: 4, pp.440-456; Swann, 2009, cited in Schmuckler K; Cook W (2009) Beyond bricks and mortar boards: universities' role in building regional economies, a report for Universities UK and the Institute for Public Policy Research IPPR, 2009

2 <http://www.unialliance.ac.uk/blog/2015/03/17/why-is-it-important-that-universities-and-businesses-collaborate/>

3 <http://www.ref.ac.uk/>

**Fast facts about KEC in the UK**

- 47%: growth in KEC income to universities over ten years to 2013-14
- 6.3 fold economic leverage : Higher Education Innovation Funding (HEIF) leverages at least £6.30 from users for every £1 of public money invested: more if student enterprise and spin-outs are included.
- 2nd: The UK ranks 2nd in the Global Innovation Index (2015) and 4th internationally for university-industry collaboration in R&D
- 150,000: The number of consultancy, contract research, and IP-related transactions handled by university research offices and KEC offices in 2013-14
- £3.6bn: Universities contributed £3.6 billion to the economy in 2013-14 through services to business including research commercialisation, delivery of professional training, and consultancy.



Public Health England Category Winner

solve the challenges they face. While the challenges are unique to each country, skills like landscaping the business environment and identifying the potential customer base for the technologies they are trying to

ranging from the rapid increase in high population densities, to the toxic by-products resulting from the generation of traditional Chinese medicines. Water technologies and expertise are in high demand in

*... KEC teams work to support relationships ...*

commercialise are eminently transferable.

We were recently delivering training in Shanghai, where it was striking that two of the three

China, creating potential opportunities for partnerships with UK organisations.

By working together, we can achieve impacts that benefit not



Public Health England Stand

# BIOLOGY WEEK 2015



At the Wellcome Trust Centre for Human Genetics science researchers and musicians came together for an evening of music and storytelling, entitled 'The Heart and the Head' at the Oxford University Museum of Natural History. It got rave reviews: "I think this was an amazing event because it effectively brought the day-to-day experience of being a scientist to life. I would love to see more events like this" and "Science paired with art, telling stories instead of simply facts... thank you for inspiring us in the right direction".

**Biology Week was launched at a packed Parliamentary Reception in the Palace of Westminster in October as Ministers, MPs, Peers, Society Fellows and representatives from the Society's Member Organisations also celebrated the Society's new Royal title.**

Meanwhile, across the UK thousands of people, from young children to research scientists, enjoyed over 100 events as part of this year's Biology Week. The annual celebration of the biosciences included lectures, debates, science festivals, quizzes, storytelling, nature walks and more.



Nicola Blackwood MP, chair of the Science & Technology Select Committee, took to the stage to say a few words regarding the success of science in the UK saying: "The UK is a science superpower." She stressed the importance of investing in research, and emphasised her wish for the impending spending cuts to not drastically impact on UK science and her determination to not let science fall off the agenda.



Professor Melanie Welham FRSB, Executive Director of science at BBSRC highlighted the importance of Biology Week, detailing the wide variety of events and activities taking place in science centres, universities, schools, museums, lecture theatres, parks and even pubs across the UK and beyond. Professor Welham also stressed the importance of recognising the positive impact of the 'bioeconomy' in the UK.



Finally, Professor Dame Jean Thomas Hon FRSB, President of the Royal Society of Biology, officially announced the Society's new 'Royal' title. She also officially launched the RSB's Three Year Plan 2015-2018, and outlined its three key themes: a unified voice, professional membership and a broad reach.

The Royal Institution hosted over 400 guests of different ages and scientific backgrounds to discuss synthetic biology while at the annual RSB Awards Ceremony, the winners of the Photographer of the Year competition, Book Awards, Science Communication Awards, Animal Essay competition and President's Medal were all announced.

Three 'Big Biology Day' science festivals took place nationwide during the week. People learnt about carnivorous plants and fossils in Cardiff, crafted antibodies out of playdough and explored local nature reserves in Staffordshire, and enjoyed a panel discussion focussing on infectious diseases in Cambridge.

Fun scientific activities were arranged by organisations including the British Society of Immunology, Nutrition Society, Microbiology Society, Babraham Institute, the Linnaean Society, Medimmune and the Biochemical Society.

The Physiology Society's 'Physiology Friday' attracted hundreds of entries to their BioBakes competition, which crowned three 'star bakers' for their biological masterpieces.

The results of the 'election' for the UK's Favourite Insect was announced at the end of the Parliamentary Reception (co-sponsored by the BBSRC) and the clear winner proved to be the Bumblebee (which was also the choice of the nationwide poll announced live on BBC TV's Newsround two days later).



MPs cast their vote in the Ballot Box for their choice of Favourite UK Insect *Left to Right*: Stephen Metcalfe MP, Nicola Blackwood MP and Chi Onwurah MP. In the background is Professor Dame Jean Thomas



Election Agents of the 'Insect Candidates' hear the results from the Acting Returning Officer (Dr Stephen Benn)

# SCIENCE AND INNOVATION NETWORK SPOTLIGHT ON MICROBIOME RESEARCH



Patricia Gruver

Foremost, informatics is an area of critical need for research. Microbiome datasets, often from the same study, reside in different databases, are inaccessible or too vast to access and process. Because there is a large amount of data analysis in this field, there is a need to train microbiologists as informaticians and vice versa. Secondly, a multidisciplinary approach is necessary to further research. Scientists studying the earth's microbiome should be sharing information with researchers focusing on gut health, for example. Most importantly, exploring functionality of the microbiome is critical. Funding bodies are currently biased toward descriptive rather than mechanistic studies which detract from the importance in understanding how microbes function. Solving these issues will benefit the development of therapeutics that will target our most dreaded diseases.

Currently hailed as "the holy grail of health and wellness", the microbiome is the ecosystem that lives in, on and around us. It includes all bacteria, viruses,

## *... address some issues that microbiome researchers face. ...*

and fungi that we carry with us on our skin and throughout our digestive system. In recent years, our microbiome has been linked to many diseases, such as cancer, depression, and Parkinson's. There has been a lot of buzz about our microscopic partners; however, in order to understand the complexity of the relationship between humans and microbes, we must first address some issues that microbiome researchers face.

Many are already addressing these problems. At a UK Science and Innovation Network (SIN) led workshop in Cambridge, researchers from the US and UK discussed the possibility of collaborations between the two countries. The UK is well positioned as a resource based upon its extensive NHS health data which could be leveraged for global collaborations. Sharing data will result in more significant discoveries in this field. The SIN workshop also

informed the Research Councils about the challenges that microbiome researchers currently face, which could stimulate interest in funding more multidisciplinary and mechanistic studies. Discussions like this are valuable to the scientific community due to their influential effect on future work.

work is human nutrition. The UK is taking a lead in this field with its newly announced Centre for Food and Health in Norwich Research Park. This centre will explore the complex interaction between the microbiome and nutrition. As we understand more about our bacterial partners, views on human

## *... importance in understanding how microbes function ...*

Because the microbiome changes from person to person, there is no "one size fits all" solution for the future of treatment in this field. Not only does it differ between people, but it also changes as a person

nutrition will be disrupted. This will catalyse efforts to integrate agricultural policies and practice, food production and distribution with nutrition. For example, infants who are not able to breastfeed could have their

## *... the microbiome changes from person to person ...*

ages, changes their diet or alters their environment. This is where precision medicine could be a "game changer". Doctors could use the microbiome to custom tailor medical treatments to specific ailments. And even before illness creeps in, doctors could check for imbalances in the microbiome to hone in on tricky diagnoses before the patient realises there is a problem. Moreover, scientists are working to engineer

formula supplemented with the microbes from breast milk that are known to shape a healthy infant gut.

The implications for the microbiome are vast. Some researchers believe our microbes are a powerful and effective alternative to antibiotics. This might be the solution to the growing problem of antimicrobial resistance (AMR). There are many other scenarios that could

## *... complex interaction between the microbiome and nutrition ...*

microbes that will combat invading pathogens, diagnose early stages of cancer, correct digestive issues, and regulate mood.

The most obvious application for the future of microbiome

be altered by advances in this field, such as alleviating Parkinson's or treating behavioural disorders. Quite possibly the cure to many dreaded diseases has been residing within us this entire time.

# UK & BRAZIL:

## Science opportunities during Rio 2016



Dr Julia Knights  
Director of Science & Innovation  
Network (SIN) Brazil  
British Embassy Brasilia

**Next year, Rio de Janeiro will play host to the Olympics and Paralympics – the first time the Games will be hosted in South America. Despite some political turbulence in Brazil, the Games offer a raft of commercial and science opportunities in a country which boasts two thirds of Latin America’s scientific output.**

In the laboratories of the Rio botanical gardens, scientists are cataloging the unique collection of Brazilian flora of Kew Gardens, digitized by Brazilian scientists at Kew including specimens collected by Charles Darwin. This part of Brazil’s “Reflora” project, is funded by the UK government’s Newton Fund.

### *... unique collection of Brazilian flora of Kew Gardens ...*

The futuristic “Museum of Tomorrow”, under construction on Rio’s Mauá Pier, is set to take water from Guanabara Bay to cool the building whilst filtering it to preserve marine life. Steel wings on its roof will act as solar panels to create electricity. An

agreement signed this year, facilitated by the British Council, should see London’s Science Museum exhibit some of its touring exhibitions here.

The Oswaldo Cruz Foundation – Brazil’s world class biomedical lab to support Brazil’s public health system – sits in a vast palace in Rio and boasts a US\$ 1 Billion research budget. Lord O’Neill has just persuaded one of its Vice Presidents to participate in his independent global review on antimicrobial resistance.

The Brazilian Doping Control Laboratory of the Federal University of Rio is packed with the latest kit to test illegal drugs for Rio 2016’s athletes, to World Anti-Doping Agency (WADA) standards. This lab has benefited from training links with the official WADA London 2012 Drug Control Centre – a partnership between GSK and Kings College London.

These are just a few of the exciting UK Brazil science collaborations with Rio de Janeiro that the UK’s Science & Innovation Network (SIN) in Brazil and the British Consulate in Rio have been involved in.

### **SCIENCE & COMMERCIAL OPPORTUNITIES DURING RIO 2016**

Construction of the Museum of Tomorrow is part of Porto Maravilha – a raft of mega

urban renewal projects supported by the Federal and Rio State government. They will see the redevelopment of over five million square meters, including a new system of selective rubbish

collection involving employing local communities in the favelas, bike lanes and more efficient street lighting.

Rio’s environmental challenges could be opportunities for UK businesses. In Rio’s Olympics bid, there was a promise to regenerate its waterways through a US \$4 billion investment in sanitation. However, in the last few decades, as Rio’s population has risen dramatically, its sewage problem has spiraled with waste flowing into more than fifty streams that empty into Guanabara Bay – the venue for the Olympic sailing events. To date, just one out of the eight new treatment facilities promised under the Olympic bid has been built. The UK Trade & Investment team of the British Consulate in Rio has been showcasing opportunities on water and waste to UK businesses.

During the Games, SIN Brazil will also hold a series of lectures on climate change, biodiversity of Brazil’s biomes & bioeconomy funded under BIS’s

### *... Brazil’s world class biomedical lab ...*

Global Partnership Fund. Explorer John Hemming and renowned taxonomist and former Director of Kew, Professor Sir Ghilleen Prance are amongst those invited to speak.

## UK GOVERNMENT'S £45 MILLION NEWTON FUND IN BRAZIL

The £45 Million Newton Fund in Brazil over 5 years, of which SIN Brazil has strategic oversight with a Newton team of three, offers an excellent platform for UK based scientists to get involved now, during and beyond the Games.

Timely for Rio's water challenge has been a new £3.5 Million Newton innovation industrial R&D call for research on technology solutions for energy, water and waste launched this September by Innovate UK joint with SENAI (Brazil's non-for-profit National Service for Industrial Training network).

Parts of Brazil suffered severe water shortages this year – especially São Paulo. Next year the UK's Met Office together with Brazil's Ministry of Science and three of its institutes with expertise in climate (INPA, INPE & Cemaden) will launch a new £4 Million Newton Fund research call on climate modeling, carbon modeling and natural disaster forecasting.

*... its sewage problem has spiralled ...*

Improved long-term forecasting could help Brazil predict droughts in advance enabling cities to be better prepared.

ESRC and Brazil's Council of Funding Agencies (CONFAP) have also recently closed a £6 Million Newton research call on

healthy cities and the social science of food, water, energy nexus.

The UK Academies and CONFAP are also offering joint fellowships and mobility grants under the Newton Fund for both UK and Brazilian researchers to spend between two weeks and four years in Brazil to conduct research across all science disciplines.

he offered to share the UK's expertise. We also have funding for a further project on encouraging Brazil to reduce animal testing following an MOU signed by FCO's Chief Scientific Adviser, Prof Robin Grimes and the Minister of Science, Technology & Innovation this August. In November SIN followed this up with a mission for the Home Office's Animals in Science Regulations Unit & the UK's National Centre for the 3R's (Replacement, Reduction & Refinement) to meet with government, industry & researchers.

To contact SIN Brazil or receive their SIN Latam newsletter on R&D & Newton Fund Calls covering Brazil, Chile, Mexico, Peru, Colombia, Costa Rica, Uruguay and Panama, please get in contact at [Julia.knights@fco.gov.uk](mailto:Julia.knights@fco.gov.uk). Also visit [newtonfund.ac.uk](http://newtonfund.ac.uk) for info on UK Brazil current research calls.

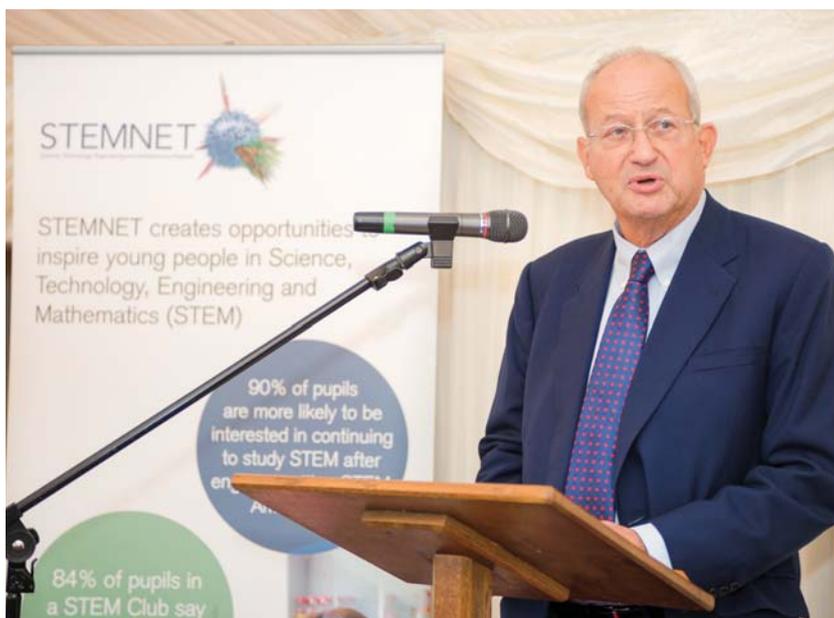
## PROJECTS IN ENERGY STORAGE & REDUCED ANIMAL TESTING

SIN Brazil gained funding this autumn for a new project on energy storage. This follows PM David Cameron's recent bilateral with President Rouseff in which

# STEMNET AWARDS

## Honour those inspiring young people in science, technology, engineering and maths

### Winners to visit CERN facility in exclusive trip



The host of the STEMNET Awards, Lord Sainsbury of Turville, welcomes guests, commends volunteers and talks about how increasingly crucial STEM skills are for the United Kingdom.

The winners of the 10th annual STEMNET awards were announced at a ceremony at the House of Lords on October 6th, honouring the UK's most dedicated and inspirational people motivating young people in Science, Technology, Engineering and Maths.

Hosted by Lord Sainsbury of Turville, the Awards were presented in six categories by BBC Journalist Steph McGovern and STEMNET's CEO Kirsten Bodley.

The winners from across the UK are invited by the Awards Sponsors, the Science and Technology Facilities Council (STFC), on an exclusive visit to CERN. Winners will fly to Geneva in December, where they will see cutting edge science in action, as well as meeting top physicists and engineers from across the facility.

Science, Technology, Engineering and Math (STEM) subjects are major contributors to the UK

economy, and ensuring the future generation is passionate about, and skilled in, science, technology, engineering and maths is a key objective of the UK government. STEMNET is the leading organisation in achieving this goal, partnering with schools and employers throughout the UK to create opportunities for young people in STEM.

**“We believe in the importance of Science, Technology, Engineering and Mathematics as areas that are inherent to success,”** said Kirsten Bodley, Chief Executive at STEMNET, **“We are very proud that our programmes, partners and amazing volunteers are having a real impact. We are now working in 95% of UK secondary schools. It motivates us to build on our achievements and support more teachers and inspire more young people in STEM.”**

*... partnering with schools and employers ...*

Professor John Womersley, particle physicist and STFC CEO said, **“For many young people the key to enthusing them about science, technology, engineering and maths and opening their eyes to the huge range of exciting and fulfilling career opportunities in STEM is very often an inspiring and passionate role model. STFC is proud to be a member of the STEMNET team and to recognise the substantial contribution each of these winners has made in helping to communicate this important message and to inspire the next generation of UK scientists.”**

*... every event this year oversubscribed by pupils ...*



Guests meet the three finalist schools in the STEM Club Award category. The finalist schools were Plashet School in London, the Portslade Aldridge Community Academy from Brighton and Hove and the *Joseph Whitaker School* from Nottinghamshire.

### THE STEMNET AWARDS CATEGORIES AND WINNERS ARE:

- **STEM Ambassador Award:** **Richard Taffs** regularly supports a wide range of activities including working with STEM Clubs, helping at large science events and also providing STEM mentoring for children with special needs. Richard promotes the STEM Ambassadors Programme
- **STEM Apprentice Award:** **Joanne Sharples** is passionate about encouraging more young women into STEM because she is concerned about the gender imbalance in many STEM sectors. Joanne’s efforts have helped increase the number of female Engineering Apprenticeships at BAE by 30%. Joanne did this whilst also pursuing her

*... an inspiring and passionate role model ...*

encouraging numerous colleagues to become STEM Ambassadors. Teachers and pupils consistently give brilliant feedback about how valuable Richard’s unwavering commitment is.

- **STEM Employer Award:** **Cullum Detuners Ltd** take a strategic approach to releasing their staff as STEM Ambassadors to deliver

inspiring activities in local schools. As well as realising benefits for their STEM recruitment they have grasped opportunities to offer development for existing staff through the STEM Ambassadors Programme whilst also recognising wider benefits for the STEM community. In addition to the STEMNET’s programmes, for students they offer paid work experience, apprenticeships and lend a strong focus to inspiring females into STEM.

- **STEM Club Award:** **PACA STEM Club** took part in a huge range of STEM activities but through their STEM Ambassadors they took a particular interest in Astronomy and coding. The Club has also offered

activities for students with widely different interests, including developing a cosmetics business, Green power racing and Dr Who themed science writing.

*... increase the number of female Engineering Apprenticeships ...*

- **The Joan Sjøvoll STEM leadership Award:** Rachel Beddoes has enthused pupils, parents and colleagues. She has found funding for many school STEM initiatives and even for her own position. Her colleagues say she has transformed STEM provision in her school which takes up a large number of local STEM



The winning school was Portslade Aldridge Community Academy from Brighton and Hove.

opportunities – with every event this year oversubscribed by pupils. Rachel has engaged local business, found pupils work

experience and has developed STEM engagement beyond the school and for students in the wider community.

- **STEM Teacher Award:** Helen Higham is a Chemistry teacher who also volunteered to be Kirkcaldy High School's STEM co-



Left to right: BBC Journalist Steph McGovern, STEM Apprentice Award winner Joanne Sharples, host of the STEMNET Awards, Lord Sainsbury of Turville and STEMNET Chief Executive, Kirsten Bodley.



Journalist Steph McGovern and STEMNET Chief Executive, Kirsten Bodley, congratulate Richard Taffs, the winner of the STEM Ambassador Award.

### About STEMNET

STEMNET creates opportunities to inspire young people in Science, Technology, Engineering and Mathematics (STEM) and is an independent educational charity. STEMNET runs three main programmes:

- The **STEM Ambassadors** programme, bringing 30,000 role model volunteers working in STEM sectors into schools to offer real life application and inspiration around STEM subjects
- The **STEM Clubs** programme supports teachers in taking pupils beyond the curriculum is funded.
- The **Schools STEM Advisory Network**, providing schools with the help they need to deliver exciting STEM lessons and enrichment.

STEMNET's work is supported by BIS, DfE, the Gatsby Charitable Foundation and the Scottish Government.

ordinator and runs the school's STEM Club. Helen leads the annual employability event with more than 25 STEM Ambassadors and makes a priority of helping to break down stereotypes and promote positive role models for girls in STEM. Helen's efforts have also supported the school to achieve the highest number of pupils gaining Engineering Scholarships out of all Scottish state schools.

# PATIENT SAFETY

Meeting of the Parliamentary and Scientific Committee on Tuesday 13th October

# HUMAN FACTORS AND PATIENT SAFETY



Professor Sarah Sharples  
President: Chartered Institute of Ergonomics and Human Factors  
Professor of Human Factors, University of Nottingham

In recent years, patient safety has become an increasingly important issue for hospitals, general practitioners and home healthcare. Considerations range from the safety of a particular device to support treatment for a long term condition such as cancer, kidney failure or diabetes, to understanding how we can ensure that operations are conducted as safely and effectively as possible. There is an increased interest and urgency in ensuring that our healthcare professionals, the technologies and equipment they use, the rooms or buildings in which they work and the organisations which employ them are designed in a way that enables them to work to the best of their ability and to provide the highest possible standard of care.

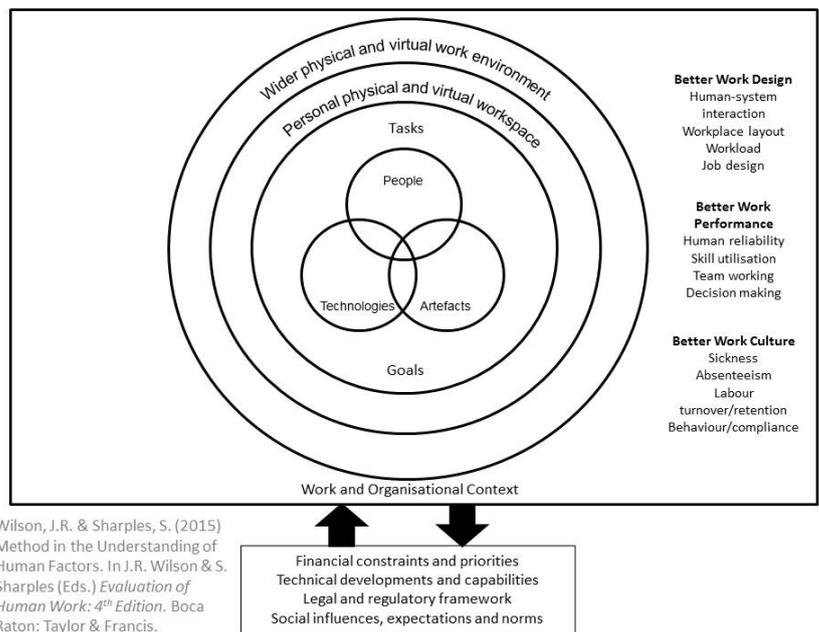
Ergonomics and Human Factors (the two terms can generally be used interchangeably) can be very basically described as the discipline that provides the underpinning scientific understanding that enables us to “fit the task to the person”. What

this means in practice is that ergonomists and human factors professionals develop skills and knowledge to inform the design of technologies and artefacts that are used by people in working contexts. People in these contexts have tasks (for example, a ward nurse may have the task of taking a patient’s blood pressure) alongside goals (the same nurse may have the goal of ensuring that the patient feels cared for and attended to during their stay on the ward), and these tasks are completed in an immediate, or personal workspace, (the individual hospital bed) within a larger work environment (the ward or hospital). All of this happens within a wider organisational context, and is influenced by external financial constraints and priorities, technical developments and capabilities, the relevant legal and regulatory framework and social influences, expectations and norms.

In 2014 the Institute of Ergonomics and Human Factors was awarded the Royal Charter, and members are now entitled to apply for the status of ‘Chartered Ergonomist and

Human Factors Specialist’. A Chartered Ergonomist and Human Factors specialist is required to have a broad set of knowledge about all aspects of the physical, cognitive, social and

our current and future health care systems and technologies. One area that has received much attention is the design of processes to support patient



Wilson, J.R. & Sharples, S. (2015) Method in the Understanding of Human Factors. In J.R. Wilson & S. Sharples (Eds.) *Evaluation of Human Work: 4th Edition*. Boca Raton: Taylor & Francis.

organisational aspects of work, and will take a ‘systems perspective’ to understand the different interactions that happen within this work context. The goal of ergonomics and human factors (E/HF) is to deliver better work design, better work performance and better work culture.

All aspects of E/HF are highly relevant to the challenges of patient safety. Recent years have seen a welcome increase in the focus on human factors within the clinical context, and have seen innovations in process and product design. But there is still much more opportunity to incorporate E/HF expertise in many aspects of healthcare, for

safety in the operating theatre, with a particular focus on communications between theatre team members. This work, in many cases prompted by tragic cases where communication failures have contributed to patient injury or death, informed the development of the surgical safety checklist, pioneered by Dr Atul Gawande (US clinician who also delivered the 2014 Reith Lectures). This approach asks clinical teams to work through a series of prompts to check details and plans of upcoming procedures, and also to facilitate discussion, reflection and communication within the operating team. While this is not

the only approach that can be used to build communication amongst teams, and is only successful if used diligently and with full commitment from all team members, it represents a valuable intervention that raises awareness of human factors in the operating theatre.

But the discipline of ergonomics and human factors covers matters far beyond the behaviour of humans. One of the areas in which E/HF can offer a significant contribution is around the design of medical devices and equipment. Examples where the role of design has been singled out as being an influential factor in a medical incident include the tragic death of Wayne Jowett, who received an injection of a drug that should only ever be delivered intravenously (ie into the bloodstream) into his spinal fluid. Design solutions now exist that should prevent such an error, such as 'lock and key' systems that prevent spinal drugs being attached to delivery devices for the bloodstream, and vice versa. However, these solutions have been noted to be difficult to implement in a complex healthcare system. In addition, some design solutions are not always suitable for all

*... comfort of both the mother and the medical professional was maintained ...*

patients (eg a design solution that prevents errors in administering medicines for adults may not always be transferable to the paediatric setting, due to the smaller volumes of drugs involved (see Newton et al, 2010 , for further explanation). To take an analogy from a non-healthcare context, if we designed the nozzles for diesel to be a different shape to the nozzles for petrol, and it was then impossible to put the wrong type of fuel in a car, thousands of individual drivers would avoid costly repairs each year, but the massive-scale



Two different infusion devices delivering medication to one patient in hospital. These devices are programmed by nurses; they should be designed to maximise patient safety (minimising the likelihood of the user programming the wrong rate or volume of medication) – eg, by having consistent interfaces and intuitive user interaction.

©EPSRC funded CHI+MED project ([www.chi-med.ac.uk](http://www.chi-med.ac.uk)).

infrastructure changes that would be needed to enable this change to be implemented mean that this has not yet happened. Our complex and distributed healthcare settings face the same challenge.

The Chi+Med project, led by University College London, has examined the design of infusion devices, used for drug delivery,

mainly in hospital settings. Their work has highlighted a vast range of designs of infusion devices, as well as the need for specialist training of those using infusion devices, to minimise the likelihood of error. Their work also highlights the complexity of device design in the complex healthcare setting – it is often the case for example that procurement processes and financial constraints mean that several different devices designed by several different manufacturers are all sited in the same hospital setting, perhaps even on the same ward or for the same patient. While each

device might independently stand up to scrutiny when subject to usability testing, if a nurse is required to rapidly switch between two devices, one of which requires a single button to be pressed multiple times to achieve a certain setting for flow rate, but another of which requires a combination of several buttons to be pressed for the same setting, it is not surprising that even the most competent operator will occasionally make an error. There are of course systems in place to minimise the likelihood of this, such as requiring colleagues to check settings, but we know that in settings that are busy, safety-critical and stressful, such as hospitals, human performance is put under great strain, and workload can be consistently high.

Another value of taking an ergonomics/human factors perspective to design is that we naturally consider all actors within a system. A nice example of this has been shown by work led by Professor Sue Hignett of Loughborough Design School, who led a holistic design of a novel birthing pool, taking into account the comfort of the mother, the different positions a mother might take up during birth and while being examined,

comfort of both the mother and the medical professional was maintained.

The nature of healthcare is changing, and the discipline of medicine is advancing rapidly. Dansen (2011) has noted that by 2020 the doubling time of medical knowledge (eg the amount of information that exists related to the medical domain) will be just 73 days. Doctors are already developing ways to manage this safety critical knowledge, by designing tools to ensure that important information about dosing are close to hand, and by embracing mobile devices to support the capture of medical information and enable rapid checking of resources that can help diagnosis and treatment. Technologies are also changing the ways that patients manage and monitor their own health, from using 'apps' to monitor healthy behaviours, to providing peer support networks for patients with similar clinical conditions.

As well as technologies providing opportunities to help manage the volume of information, and to support patients in taking control of their own healthcare, technologies also provide an opportunity for



Ergonomic Birthing Pool

©Professor Sue Hignett

and the needs of the partner and the midwife. This holistic approach ensured that the

us as E/HF practitioners to further our understanding of how the work of clinical

professionals is impacting upon them. Physiological monitoring is now advancing to such an extent that it is becoming possible to monitor how busy different clinical staff are or how they are moving around a hospital. By combining different sets of data about clinical work we can start to support the design of clinical work more effectively, modelling patterns of tasks within different healthcare contexts, designing layouts of healthcare settings to be more supportive of the different types of tasks that take place, and helping managers to plan effective levels of staffing.

### ... support the design of clinical work ...

Ergonomics and Human Factors has much to offer to support the design of healthcare, and contributes to the improvement of patient

safety in all clinical settings. There are a number of things that will help this to happen:

1. To move beyond the emphasis on attribution of 'root cause' and 'human error' to understanding the good practice that contributes to a 'resilient system';

2. To ensure that when incidents occur, investigations are followed up with action, and resources are deployed to enable the lessons learned when, sadly, things do go wrong, to be transferred as widely as possible;

3. To harness the potential provided by the vast sets of data that are now being generated, about patient health state and clinical performance; and

4. To ensure that we always consider the whole system and its stakeholders.

Healthcare is complex – a hospital comprises not only the patients and clinical staff, but also porters, cleaners,

### ... Patient care involves many skilled people ...

procurement specialists, maintenance engineers, data analysts, and managers. Patient care involves many skilled people, and affects not only the patients but also their relatives, friends and carers. And clinical tasks involve multiple devices and artefacts. E/HF has a valuable role to play in supporting the design of the current and future healthcare environment, and is critical if we are to ensure that patient safety remains a priority for the future.

### References

- 1 Newton et al. (2010) Making Existing technology safer in healthcare. *Qual Safe Health Care* 19: i19-i24.
- 2 Densen, P. (2011) Challenges and Opportunities facing medical education. *Trans Am Clinical and Climatological Association*, 122.

*Other speakers at the meeting on 13th October were Jocelyn Cornwell, Chief Executive, The Point of Care Foundation, and Janet Anderson, Senior Lecturer in Adult Nursing, Kings College London. We hope to publish summaries of their talks in a future issue of Science in Parliament. Recordings of their presentations, together with the powerpoint files can be found at [www.scienceinparliament.org.uk](http://www.scienceinparliament.org.uk).*

# ROYAL SOCIETY PAIRING SCHEME

Alan Malcolm

## Once again the Parliamentary and Scientific Committee supported the Royal Society in the launch of its Pairing Scheme on 23rd November.

Each autumn the Royal Society coaxes a few dozen MPs, (as well as some senior civil servants) to be paired with a scientist from their constituency.

The scientist spends four days in Westminster "shadowing" the MP to gain an insight into how Parliament works. The universal reaction from the scientists is to note how incredibly hard MPs



Jo Johnson MP, Minister of State for Universities and Science, Dr Julie Maxton, Executive Director, Royal Society, Nicola Blackwood MP, Chairman, House of Commons Science and Technology Select Committee

work, and how remarkably little time there is for reflexion and meditation.

The quid pro quo is that the MP spends time in the laboratory of their local scientist to see how a laboratory runs. For reasons in the above paragraph, this is not usually as long as four days!

Nonetheless most MPs leave with an understanding of hypothesis, design, errors, controls, and statistics as well as pressing matters such as funding (shortage of) and career progression (haphazard).

Perhaps even more important than this first taste of each other's life style is the friendship which is often established between the two. The MP knows that when (s)he wants a quick answer to a scientific question, there will be a willing respondent at the end of a phone line, or email.

## SCIENTISTS AND THEIR PARLIAMENTARY/CIVIL SERVICE PAIRS

Dr Theo Tryfonas, University of Bristol  
Dr Marta Costa, University of Cambridge  
Professor Tamara Galloway, University of Exeter  
Dr Matthew Levy, University of Oxford  
Dr John McGeehan, University of Portsmouth  
Dr Scott McGrane, University of Surrey  
Dr Rebecca Dewey, University of Nottingham  
Dr Marina Parry, CRUK Manchester Institute  
Dr Simon Clarke, University of Reading  
Dr Isabel Vincent, Glasgow University  
Dr Jonathan Roiser, University College London  
Dr Jessica Ash, University of Oxford  
Professor Michelle Peckham, University of Leeds  
Professor Sian Harding, Imperial Heart and Lung Institute  
Dr Nicholas Levsen, Newcastle University  
Professor Darrin Baines, University of Coventry  
Dr Jason Lotay, University College London  
Dr Joy Farnaby, Imperial College London  
Dr Davide Mattia, University of Bath  
Dr Julius Hafalla, London School of Hygiene and Tropical Medicine  
Professor Peter Styring, University of Sheffield

Mrs Madeleine Moon MP  
Mr Daniel Zeichner MP  
Mr Ben Bradshaw MP  
Ms Nicola Blackwood MP  
Mrs Flick Drummond MP  
Ms Anne Milton MP  
Ms Lilian Greenwood MP  
Ms Liz McInnes MP  
Mr Ed Vaizey MP  
Ms Carol Monaghan MP  
Sir Keir Starmer MP  
Mr George Freeman MP  
Mr Chris Green MP  
Lady Victoria Borwick MP  
Ms Chi Onwurah MP  
Lord David Prior of Brampton  
Dr Tom Salter, the Department for Transport  
Dr Charlotte Woolley, the Ministry of Defence  
Dr James Davey, the Department for Energy and Climate Change  
Ms Eleanor Richman, the Home Office  
Dr Emma Hennessey, the Foreign and Commonwealth Office



Dr Mariam Kiran, University of Bradford

Dr Liz Stephens, University of Reading

Dr Nathalie Pettorelli, Institute of Zoology

Dr Simon Willcock, University of Southampton

Dr Kate Hendry, University of Bristol

Dr Caroline Hattam, Plymouth Marine Laboratory  
Dr James Henstock, University of Keele

Dr Katie Morton, University of Cambridge

Dr Jean-Christophe Nebel, Kingston University

Professor Rachel Williams, University of Liverpool

The following scientists also took part in the first day's events on 23rd November:

Dr Rick Stafford, University of Bournemouth

Professor Albert Ferro, King's College London

Ms Tamsin Bell, University of Cambridge

Mr Gary Spencer, the Department for Business, Innovation and Skills

Mr Colin Armstrong, the Government Office for Science, Department for Business, Innovation and Skills

Mr Tom Leveridge, the House of Commons Environmental Audit Select Committee

Professor Tim Wheeler, the Department for International Development

Dr Julius Piercy, the Department for Food, Environment and Rural Affairs

Mr Tom Reid, the Department for Transport  
Dr Thomas Payne, the Centre for Applied Science and Technology, part of the Home Office

Dr Beverley Bishop, the Health and Safety Executive

Dr Graham Dean, the Centre for Applied Science and Technology, part of the Home Office

Mr Daniel Acheampong, the Centre for Applied Science and Technology, part of the Home Office



Chris Green MP and Professor Michelle Peckham, University of Leeds



Ed Vaizey MP, Minister of State for Digital Industries, and Dr Simon Clarke, University of Reading



Dr Julie Maxton, Executive Director, Royal Society



Nicola Blackwood MP, Chairman, House of Commons Science and Technology Select Committee



Victoria Borwick MP



Carol Monaghan MP and Dr Isabel Vincent, Glasgow University



Jo Johnson MP, Minister of State for Universities and Science



Dr Emma Hennessey, Foreign and Commonwealth Office and Professor Peter Styring, University of Sheffield

## ARE WE LOOKING AFTER OUR SOIL?

Meeting of the Parliamentary and Scientific Committee on Tuesday 3rd November

# SOIL

## 7.3 billion users worldwide



Dr Jacqueline Hannam  
Senior Research Fellow in Soil  
Science at Cranfield University and  
BSSS council member  
@Dirt\_Science

The British Society of Soil Science (BSSS) was founded in 1947 with the aims of advancing the study of soil. It is a charity open to membership from all those with an interest in the study and uses of soil, and it currently publishes two scientific journals; the *European Journal of Soil Science* and *Soil Use and Management*. The Society represents the views of many of the world's leading soil scientists, promotes education through initiatives in schools, colleges and universities and also organises a varied programme of events on a wide range of soil-related issues. Prof Ian Boyd, Chief Scientific Officer at Defra, recently launched the latest BSSS professional competency document under the 'Working with Soil' initiative that provides guidance and training in key soil science skills for professionals. The Society will be hosting the prestigious World Congress of Soil Science in Glasgow in 2022 and will showcase our

internationally recognised soil research institutions and visit our unique soil landscapes.

Soil is fundamental to life on earth. It provides a variety of crucial functions and services to society. The most obvious is supporting the vegetation and crops that underpin our agricultural systems that provide us with around 95% of the food we eat. With the global population predicted to exceed 9 billion by 2050 there is pressure to increase food production on a limited land

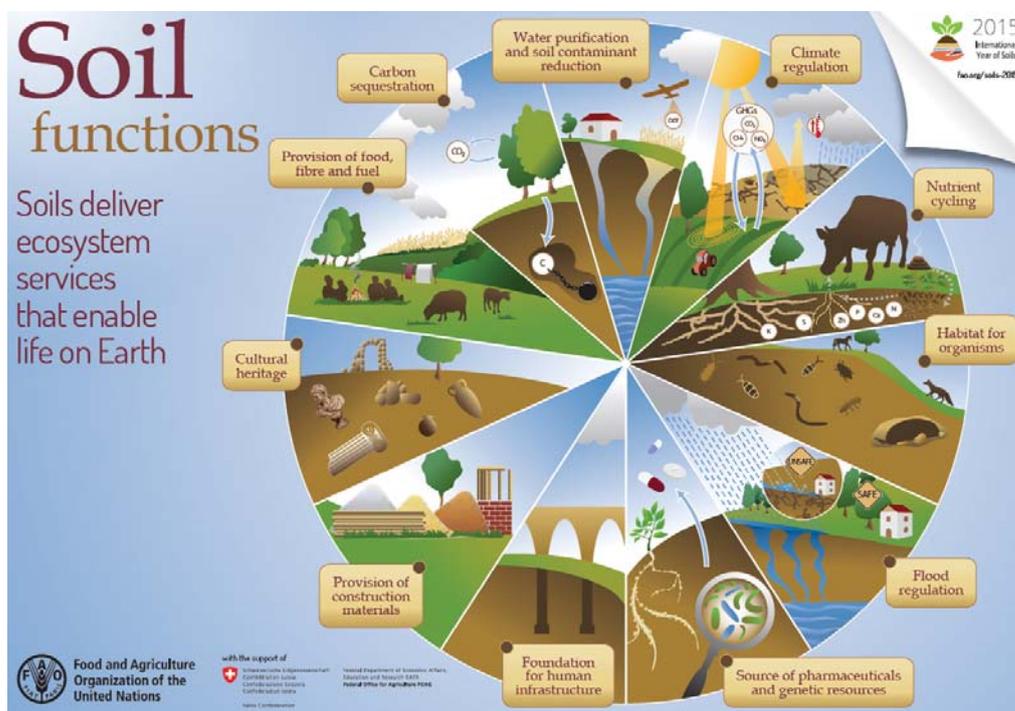
flooding. They support a large and diverse community of soil organisms – there are more microorganisms in a teaspoon of soil than there are people on earth. These organisms help to

*... a reservoir for new antibiotics ...*

cycle the essential nutrients for plant growth and are a reservoir for new antibiotics. Soils provide the foundations for our expanding built environment and also protect our history by preserving and protecting cultural artefacts.

the National Soil map of England and Wales<sup>2</sup>, originally commissioned by MAFF. This provides us with a national baseline of our soil resources and crucially identifies where

they are different, how this impacts on their key functions (ie whether they are good for agriculture) and how they can be effectively managed. Innovation in soil mapping methods have the potential to upscale these original maps



Soil functions (FAO)

area. In addition to supporting agriculture soil also filters and regulates the water that moves through it. This improves our water quality and slows water movement in river catchments that can regulate downstream

There is an incredible diversity of soils in the UK. Over 700 soil types are recognised in England and Wales alone<sup>1</sup>. In the mid 1980s the Soil Survey of England and Wales published

using geostatistical models to predict soil properties in two and three dimensions. Data at the field scale is being acquired in the agricultural sector by deploying remote (eg using satellite imagery or images taken

with drones) and proximal sensing (eg using geophysical mapping). These techniques are used to infer soil properties, and the resulting maps can be used to guide more effective crop and soil management. Agrimetrics<sup>3</sup>, a new scheme launched this year, aims to provide a platform for innovation in data science in the agri-food industry – soil data should be central to this initiative. After all, soil is where food begins.

decreases the spaces between soil particles and reduces the capacity of the soil to receive and transmit water and gasses.

4) Loss to construction, where soil is sealed by man-made surfaces, essentially reducing all functions except providing a foundation for built structures.

Different types of soil will have different responses to these threats. Many impacts can be managed or mitigated by changing soil management

### ... promotes education through initiatives in schools ...

Our soils are under enormous pressure due to demands for increased food production and external pressures such as climate change. The result is a degradation of global soil resources. A recent assessment indicates the majority of the world's soil resources are only in a 'fair', 'poor' or 'very poor' state<sup>4</sup>. Degradation impacts on soil functions and consequently the ability of soil to provide the essential services to society. In England and Wales soil degradation is estimated to have an annual cost of between £0.9 and £1.4 billion<sup>5</sup>. These costs include on-site impacts such as a loss in crop yield and off-site impacts such as the cost for water treatment. The key threats to the functioning of soils in the UK are:

1) Loss of organic matter which means a reduction in fuel for soil biology, diminishing provision of nutrients and a degradation of soil structure.

practices but the response of the soil system is often only apparent after years or decades. This requires continued investment in the national scale monitoring<sup>6</sup> of soil quality indicators. However, significant new investment in soil monitoring at local levels is required particularly where mitigation measures are starting to be implemented. Some of these measures include recommendations in the new Cross Compliance rules for soil protection but specific management practices include:

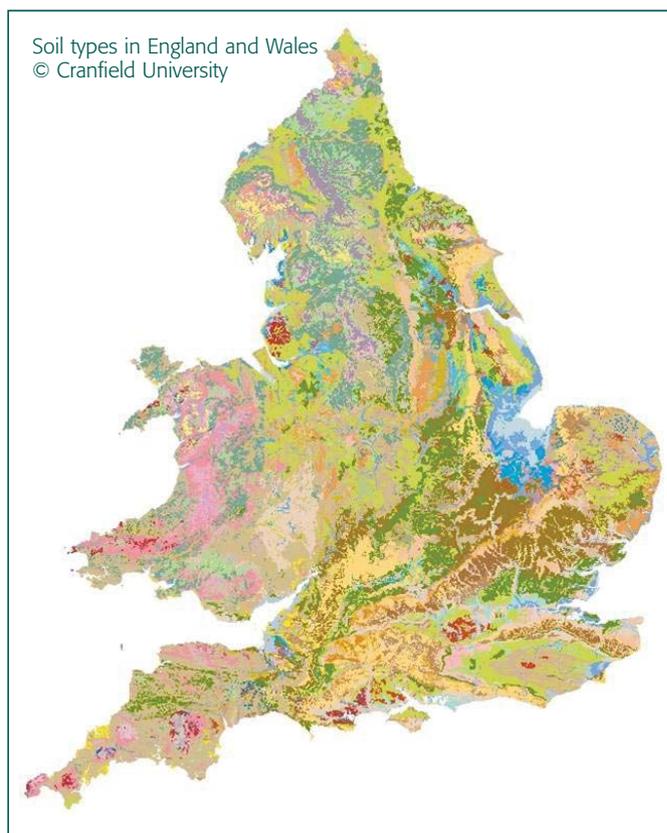
- Conservation tillage (eg minimising ploughing)
- Timing and direction of field operations (eg avoid compacting soil when wet and ploughing down slopes)
- Changes in crop agronomy (eg different rotational crops and introducing cover crops)
- Adding organic matter (eg through application of compost and manures)

### ... demands for increased food production ...

2) Soil erosion is a loss of soil through detachment and movement of soil by water, wind and cultivation.

3) Compaction, from the increasingly large size and weight of farm machinery,

There is no "magic bullet" to solving the impacts of soil degradation, what is needed is a mix of the complimentary measures listed above and a robust mechanism in place to monitor the response and



recovery of soil in the UK. Effective soil protection and the potential remediation of degraded systems requires an understanding of where these measures are most needed and what will be most effective.

5 Graves A. R. et al., 2015. The total costs of soil degradation in England and Wales. *Ecological Economics*. 119. 399-413.  
6 <http://www.ceh.ac.uk/our-science/projects/countryside-survey>

### ... monitor the response and recovery of soil ...

Otherwise we are unable to meet the target set in 2009 in the Soil strategy for England: "By 2030, all of England's soils will be managed sustainably and degradation threats tackled successfully".

For more information please visit: British Society of Soil Science [www.soils.org.uk](http://www.soils.org.uk) or follow us on twitter @Soil\_Science admin@soils.org.uk Cranfield Soil and Agrifood institute <http://www.cranfield.ac.uk/About/Cranfield/Themes/Agrifood> or follow us on twitter @CranfieldAgrifo

Other speakers at the meeting on 3rd November were Helen Browning OBE, Chief Executive, Soil Association, and Chris Collins, Professor of Environmental Chemistry, University of Reading. Recordings of their presentations, together with the powerpoint files can be found at [www.scienceinparliament.org.uk](http://www.scienceinparliament.org.uk). We hope to publish summaries of their talks in a future issue of *Science in Parliament*.

#### References

- 1 [www.landis.org.uk](http://www.landis.org.uk)
- 2 <http://www.landis.org.uk/data/nmsoilscapes.cfm>
- 3 <http://www.agrimetrics.co.uk/>
- 4 FAO 2015 Status of the Worlds Soil Resources FAO Rome.



World Congress of Soil Science comes to Glasgow in 2022 © BSSS

Rule 36: Women shall be eligible for membership of The Society and have the same rights, duties and privileges as men

# CELEBRATING 100 YEARS OF WOMEN'S MEMBERSHIP AT THE PHYSIOLOGICAL SOCIETY

Dr Helga Groll

Media and Communications Officer, The Physiological Society

## THE HISTORY OF PHYSIOLOGY

In the early 19th century, experimental physiology\* was virtually non-existent in Britain, though it flourished in France and Germany. Medical students were largely taught by anatomists, surgeons and physicians. Things slowly started to change in 1836 with the appointment of William Sharpey<sup>1</sup>, a Scottish anatomist and physiologist, often dubbed as 'Father of modern physiology in Britain', to the Chair of General Anatomy and Physiology at University College London.

## THE FOUNDATION OF THE PHYSIOLOGICAL SOCIETY

The burgeoning of practical physiology involving work on living animals was paralleled by the emergence of those opposed to such experiments and in 1875 a Royal Commission of Enquiry into

Vivisection was set up. It included the zoologist TH Huxley and the surgeon JE Erichsen, both supporters of experimental physiology. The Commission recommended that work on living vertebrates should be governed by an Act of Parliament that required experimenters to be licensed by the Home Secretary and special conditions being imposed for certain types of experiments. Experimental physiologists recognised the need to have a say in any proposals that might unjustifiably hinder progress. It was this need that led to the formation of The Physiological Society.

The Physiological Society was founded in 1876 to promote the advancement of physiology as well as to provide networking opportunities between physiologists<sup>2</sup>. The Constitution allowed for the election of 'Men of distinction in science as Honorary Members'; the first two, Charles Darwin and William Sharpey, were elected almost at the birth of The Society.

From the 1880s, scientific meetings formed of communications and demonstrations in conjunction with Society dinners became more frequent and reflected The Society's birth as a "Dining Club".

Members of The Society would discuss business over dinner; indeed one of the rules of The Society stated that 'The meetings of The Society shall commence with dinner at six o'clock punctually'.

Although The Society had never explicitly excluded women, women members were not officially admitted until July 1915. There are records that indicated that women had published in The Society's journals as well as attended meetings. In 1884, Marion Greenwood published a communication, although there is no evidence that she attended the meeting herself. The first record of

a woman at a Society meeting was Florence Buchanan's attendance in 1896, although she did not join the men for dinner.

In 1913, John Scott Haldane, a Scottish physiologist, proposed that women should be admitted as members of The Society and in the following year, a postal

ballot of members showed that of 161 members who voted, 94 supported the motion. Some, however, opposed this motion and argued that The Society was primarily 'a dining society and it would be improper to dine with ladies' smelling of dog, (the men smelling of dog that is).

On 23 January 1915, the admission of women was 'approved by a majority' and the following was added to The Society rules (Fig 1):

'Rule 36. Women shall be eligible for membership of The Society and have the same rights, duties and privileges as men.'

Florence Buchanan, an electrophysiologist at Oxford, was the first woman to be proposed as a member of The Society (Fig 2). There was a generally positive reception towards admitting women, and in July 1915, Florence, together with five other women, Winifred Cullis, Ruth Skelton, Sarah Sowton, Constance Leetham Terry and Enid Tribe, were elected as members (Fig. 3). These six women were active physiologists and had already given communications to The Society, or published in *The Journal of Physiology* and what is known today as *Experimental Physiology* prior to becoming a member.

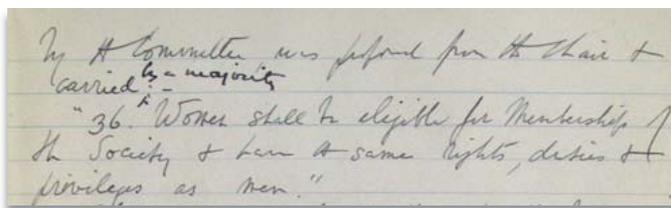


Fig 1 The Minute Book for the meeting of 23 January 1915, showing the adoption of the new rule to admit women.

\*Physiology is the science of life. It is a broad science which aims to understand the mechanisms of living, from the molecular basis of cell function to the integrated behaviour of the whole body. Research in physiology helps us to understand how the body works; it also helps us to realise what goes wrong in disease and to identify new treatments for disease.

All of them went on to work in diverse areas of physiology, such as electrophysiology, muscle physiology or teaching. Florence Buchanan was the first woman author to publish in the *Quarterly Journal of Experimental Physiology*, which became *Experimental Physiology* in 1990. Winifred Cullis became the first woman on the Committee and the first to host a Society meeting; she was also the first woman to become Professor of Physiology and Head of Department at the School of Medicine at The University of London.

Although a lot of the women are less heard of today, many of them were well known in their lifetimes, and their contributions and achievements deserve to be remembered.

Since 1915, women have regularly been elected to membership, and gradually, women followed Winifred Cullis onto The Society's Committee and editorial boards of The Society's journals.

To commemorate 100 years of women's membership, The Physiological Society has published a book highlighting the achievements and contributions of 20th and 21st century women physiologists.

Professor Susan Wray, co-editor of the book commented, 'Women have – and will continue to – make significant contributions to science. This book offers an extensive collection of member portraits, past and present, and will undoubtedly inspire the next generation of women physiologists and other scientists.'

Dr Rachel Tribe, The Physiological Society Diversity Co-Lead and Reader in

Women's Health at the King's College London, added, 'I am absolutely delighted that the centenary of the election of women members to The Physiological Society is being celebrated. The book profiles some wonderful early career and established scientists who are

driving forward the discipline today. Ensuring we develop greater diversity in the scientific workforce will enrich the pool of talent, which is essential for progressing our understanding of human and animal physiology.'

The Physiological Society brings together over 3,500 scientists from over 60 countries. The Society promotes physiology with the public and parliament alike. It supports physiologists by organising world-class conferences and offering grants for research and also publishes the latest developments in the field in its three leading scientific journals, *The Journal of Physiology*, *Experimental Physiology* and *Physiological Reports*. [www.physoc.org](http://www.physoc.org)

#### References

- 1 Taylor, D. W. (1971). The life and teaching of William Sharpey (1802-1880). "Father of modern physiology" in Britain. *Medical History*, 15(3), 241-259.
- 2 Edward Sharpey-Schafer (1927) History of the Physiological Society during its First Fifty Years, 1876-1926 Part 1. *J Physiol*; 64(3 Suppl): 1-76

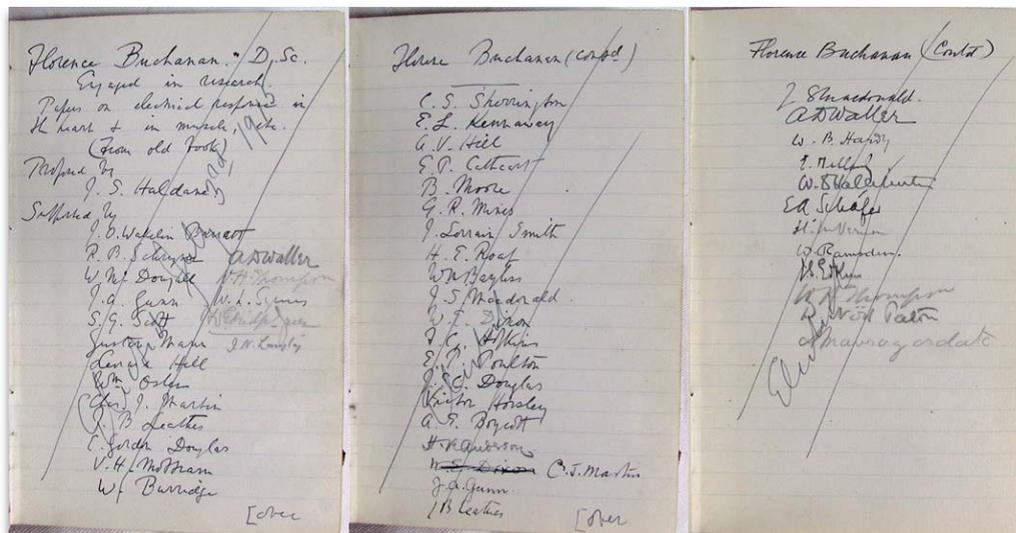


Fig 2 The entry in the Candidates Book for Florence Buchanan. It extended to three pages, and was the first entry in a new book, transferred from the old book where she had first been proposed in 1912.

### THE FIRST SIX WOMEN MEMBERS OF THE PHYSIOLOGICAL SOCIETY

**Florence Buchanan** had originally been proposed in 1912 by her colleague and family friend J S Haldane. She received 50 signatures of support. She had published two papers in *J Physiol* and three in what is today *Exp Physiol*.

**Ruth F Skelton** was proposed by William Bayliss and is described as a demonstrator at Western House, Beaconsfield. She had not published in the journals and received five signatures of support.

**Winifred C Cullis** was proposed by Joseph Barcroft and received 19 signatures of support. She was a lecturer at the Physiological Laboratory of the London (Royal Free Hospital) School of Medicine for Women and had co-authored six papers in *J Physiol*.

**Enid M Tribe** was a lecturer in histology and senior demonstrator in physiology at the London School of Medicine for Women (Royal Free Hospital) and had co-authored a paper in *J Physiol* with Winifred Cullis; she was proposed by Joseph Barcroft and received 13 signatures of support.

**Constance Leetham Terry** was a demonstrator in physiology at the London (Royal Free Hospital) School of Medicine for Women and had authored one paper in *J Physiol*. She was proposed by Joseph Barcroft and only received four signatures of support.

**S C M Sowton** was proposed by A D Waller and received 20 signatures of support. She is described as 'engaged in research' and had co-authored three papers in *J Physiol*, two of them with C S Sherrington.

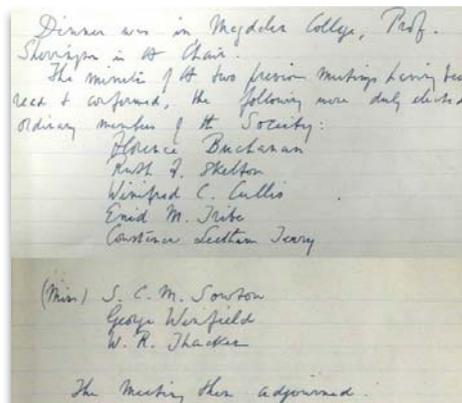


Fig 3 The Minute Book for the meeting of 3 July 1915 recording the election of six women.

# ASK FOR EVIDENCE

**Dr Chris Peters**  
Scientific liaison  
Sense About  
Science

Every day, we hear claims about what is good for our health, bad for the environment, how to improve education, cut crime, and treat disease. Some are based on reliable evidence and scientific rigour. Many are not. Where there is regulation of misleading information, in advertising or trading standards for example, regulators are overworked and overwhelmed removing claims and making corrections. With small tweaks, the same claims crop up again and again and every time one is debunked another pops up – like a game of whack-a-mole.

What are groups like patient support forums supposed to do when people pose as members to promote unproven treatments – police every post made on their forums? That probably wouldn't work, even if we

*... like a game of whack-a-mole ...*

wanted it to. Surely the only way is to immunise people against misleading information.

So how can we make companies, politicians, commentators and official bodies accountable for the claims they make? If they want us to vote for them, believe them, or buy their products,



then we should ask them for evidence, as consumers, patients, voters and citizens. If we don't ask for evidence, people and companies will get away with making misleading claims.

At Sense About Science we know the cost of false claims. Take the husband of a multiple sclerosis sufferer who told us that he wished he'd known the questions to ask a clinic offering unproven stem cell treatments.



He might have spent the thousands of pounds, and the last few months of his wife's life, on a holiday instead of chasing false hope.

We've launched an Ask for Evidence campaign to

It's not just a way of protecting yourself, or your constituents, from misleading claims. It's also an opportunity for organisations to show they are based on the best available evidence, or that they aspire to be. NHS Choices

questions around the original research on which they were basing these pilots – including whether they accounted for suicides that occurred during the daytime when the lights might

engage with the public. This year, people on AskforEvidence.org have made over 1,000 requests for evidence, and it has had over 190,000 visitors. The campaign

### *... accountable for the claims they make ...*

encourage everyone, every consumer, citizen and patient, to ask for evidence on claims they encounter. This is Sense About Science working with the public, to park their tanks on the lawn of those who seek to influence us. And it's starting to work.

quickly updated its advice on washing reusable nappies when it was asked for evidence by the Nappy Science Gang – it turns out there's no evidence that you should only be using non-bio

### *... claims are being withdrawn ...*



The campaign has seen people ask a retail chain for the evidence behind its MRSA resistant pyjamas; ask a juice bar for the evidence behind wheatgrass detox claims; ask the health department about rules for Viagra prescriptions; ask for the studies behind treatments for Crohn's disease, and

detergent. It's brilliant that a group of mums can change the policy of such a huge organisation simply by asking for evidence.

Sometimes evidence isn't clear cut. In fact it's pretty common for there to be some degree of uncertainty. Network Rail was asked for evidence about a pilot

not have been on – the intervention was relatively cheap and based on robust evidence about blue light affecting mood. Network Rail was keen to test whether blue lighting could have any effect on what is a significant problem on our rail network. It was great to see a company happy to have a conversation about what the evidence does and doesn't tell us.

is supported by hundreds of public figures, organisations and thousands of supporters such as Mumsnet, NHS Behind the Headlines and the Royal Statistical Society. The campaign has received core funding from The Esmée Fairbairn Foundation and the website was built thanks to support from the Wellcome Trust.

The more people ask for evidence, the more people

### *... a company happy to have a conversation ...*

hundreds more. As a result, claims are being withdrawn, bodies held to account and those who are championing the good use of evidence are being held up as examples to the rest.

they were planning to launch to see if installing blue lights in stations could reduce suicides. Network Rail was open and honest about the gaps in the evidence. They responded that although there were significant

### *... supported by hundreds of public figures ...*

It has been fascinating to see what issues people care about, from nappies to railways, weight-loss pills to national policies on agriculture. When you start from a position of what people care about, it's a relatively simple step for people to be enthused about discussing evidence and what that does and doesn't look like. AskforEvidence.org has grown into a national platform for people to get help with science and evidence questions, and for scientists and scientific organisations to meaningfully

expect to be asked. And that's a good thing because it's in the public interest to be spending public money in a way that is based on the best available evidence. Or at least taking account of what the evidence says.

**Dr Chris Peters is the scientific liaison at Sense About Science and coordinates the Ask for Evidence campaign which seeks to raise the level of expectation for evidence society.**



# HOUSE OF COMMONS SELECT COMMITTEES 2015

## BUSINESS INNOVATION AND SKILLS COMMITTEE

The Business, Innovation and Skills Committee is appointed by the House of Commons to examine the administration, expenditure and policy of the Department for Business, Innovation and Skills (BIS) and its associated public bodies, including the Office of Fair Trading (OFT).

Mr Iain Wright (Labour, Hartlepool) was elected Chair. Other members of the Committee are: Paul Blomfield (Labour, Sheffield Central); Richard Fuller (Conservative, Bedford); Peter Kyle (Labour, Hove); Amanda Milling (Conservative, Cannock Chase); Amanda Solloway (Conservative, Derby North); Jo Stevens (Labour, Cardiff Central); Michelle Thomson (Scottish National Party, Edinburgh West); Kelly Tolhurst (Conservative, Rochester and Strood); Craig Tracey (Conservative, North Warwickshire); Chris White (Conservative, Warwick and Leamington).

## CURRENT INQUIRIES

### Work of the Department for Business Innovation and Skills

The inquiry was announced on 8 October 2015. A single evidence session was held on 14 October, when the Committee took evidence from Rt Hon Sajid Javid MP, Secretary of State, and Martin Donnelly CMG, Permanent Secretary, Department for Business, Innovation and Skills.

### UK steel industry

The inquiry was announced on 22 October 2015 following the Tata steel redundancies. An Oral evidence session was held on 27 October.

### Exports and the Role of UKTI

The inquiry into Government's export targets and how UKTI activities affect exports was announced on 29 October 2015.

### Productivity Plan

The Committee announced an inquiry into the Government's Productivity Plan on 20 July 2015. Oral evidence sessions were held on 20 October and 3 November.

### Assessing quality in Higher Education

On 17 September 2015 the Committee announced an inquiry looking into proposed changes to quality assessment in universities and the potential impact of introducing a Teaching Excellence Framework. The closing date for the submission of written evidence was 30th October.

## Digital economy

The Committee announced an inquiry looking at Government actions affecting businesses in the digital economy on 21 September. An Oral evidence session was held on 10 November.

For the most recent information on all Inquiries and to view evidence please visit

<http://www.parliament.uk/business/committees/committees-a-z/commons-select/business-innovation-and-skills/>

Contact: Business, Innovation and Skills Committee, House of Commons, London SW1A 0AA. Telephone: 020 7219 5777; Email: [biscom@parliament.uk](mailto:biscom@parliament.uk)

## EDUCATION COMMITTEE

The Education Committee monitors the policy, administration and spending of the Department for Education and its associated arms length bodies, including Ofsted.

Mr Neil Carmichael (Conservative, Stroud) was elected Chair. Other members of the Committee, are: Lucy Allan, (Conservative, Telford); Ian Austin, (Labour, Dudley N); Michelle Donelan (Conservative, Chippenham); Marion Fellows (Scottish National Party, Motherwell and Wishaw); Suella Fernandes (Conservative, Fareham); Lucy Frazer (Conservative, SE Cambridgeshire); Kate Hollern (Labour, Blackburn); Ian Mearns (Labour, Gateshead); Caroline Nokes (Conservative, Romsey and Southampton N); Kate Osamor (Labour Co-op, Edmonton).

## CURRENT INQUIRIES

### Mental health and wellbeing of looked after children

On 18 September 2015 the Education Committee announced an inquiry building on the Health Committee's recent report on children's mental health. The Committee has published written evidence received.

### The Children's Commissioner for England

The inquiry was announced on 17 September 2015; a single evidence session with Anne Longfield, Children's Commissioner for England will be arranged.

### Supply of teachers

The Committee launched an inquiry into recruitment and retention of teachers on 16 October 2015. The closing date for written

evidence was 20 November and it is expected that there will be an oral evidence session with the Secretary of State for Education before the end of the year.

### **Holocaust Education**

The Education Committee announced an inquiry into the teaching of the Holocaust in schools on 21 September. Having received written evidence, it is anticipated that the Committee will hold a single oral evidence session before the end of the year.

### **Regional Schools Commissioners**

On 20 July the Committee announced an inquiry into the role of Regional Schools Commissioners. The Regional Schools Commissioners (RSCs) were appointed in 2014 to work with school leaders to promote and monitor academies and free schools. This inquiry explores the expanding role of RSCs, their resources, impact and accountability. The Committee held oral evidence sessions on 21 October and 4 and 17 November.

### **The work of Ofsted**

On 16 July the Committee announced an inquiry into the work of Ofsted and called for written evidence ahead of a one-off evidence session on the work of Ofsted with Sir Michael Wilshaw, Her Majesty's Chief Inspector, which was held on Wednesday 16 September.

### **Responsibilities of the Secretary of State for Education**

The Education Committee announced the inquiry on 7 September 2015, and held a single evidence session with Rt Hon Nicky Morgan MP, Secretary of State, on the responsibilities of the Secretary of State, on 9 September.

### **The work of Ofqual**

The Committee held a one-off evidence session on 14 October on the work of Ofqual; evidence was given by Glenys Stacey, Chief Regulator and Chief Executive, and Amanda Spielman, Chair, Ofqual.

For the most recent information on all Inquiries and to view evidence please visit

<http://www.parliament.uk/business/committees/committees-a-z/commons-select/education-committee>

Contact: Education Committee, House of Commons, London SW1A 0AA. Telephone: 020 7219 1376; Email: [educom@parliament.uk](mailto:educom@parliament.uk)

---

## **ENERGY AND CLIMATE CHANGE COMMITTEE**

The Committee is appointed by the House of Commons to examine the expenditure, administration and policy of the Department of Energy and Climate Change (DECC) and its associated public bodies.

Angus Brendan MacNeil (Scottish National Party, Na h-Eileanan an Iar) was elected Chair. Other members are: Rushanara Ali (Labour, Bethnal Green and Bow), Tom Blenkinsop (Labour, Middlesbrough South and East Cleveland), Rt Hon Alistair Carmichael (Liberal Democrats, Orkney and Shetland); Glyn Davies (Conservative, Montgomeryshire); James Heappey (Conservative, Wells); Matthew Pennycook (Labour, Greenwich and Woolwich); Dr Poulter (Conservative, Central Suffolk and North Ipswich); Antoinette Sandbach (Conservative, Eddisbury); Julian Sturdy (Conservative, York Outer); Dr Alan Whitehead (Labour, Southampton Test).

## **CURRENT INQUIRIES**

### **Ofgem annual report and accounts 2014-15**

The Energy and Climate Change Committee announced an inquiry into annual report and accounts for Ofgem and held a single oral evidence session on 27 October.

### **Responsibilities of the Oil and Gas Authority**

On 29 October 2015 the Energy and Climate Change Committee announced an inquiry examining how the Oil and Gas Authority plan to fulfil their objectives. An oral evidence session was held on 3 November.

### **DECC Annual Report and Accounts 2014-15**

On 5 November the Committee announced an inquiry into Department of Energy and Climate Change's Annual Report and Accounts for 2014-15; an oral evidence session was held with the Secretary of State and officials from the Department on 10 November.

### **ECC priorities for holding Government to account**

On 16 July the Committee announced an enquiry looking to gather views on which areas of DECC's policies will require particular scrutiny over the years to come to inform the Committee's future work programme and its priorities for holding Government to account. Following a stakeholder forum, held at Westminster on 8 September, the Committee has set up the following three Inquiries:

#### **Investor confidence in the UK energy sector**

The inquiry was announced on 16 September. The Committee wants to investigate the factors that contribute to investor confidence in the energy sector and to build an understanding of how DECC's policy making process might impact on investor decisions. An oral evidence session was held on 20 October with Andrea Leasom MP, Minister of State, and officials from the department. Further oral evidence sessions are expected.

#### **Home energy efficiency and demand reduction**

On 16 September 2015 the Committee announced an inquiry into previous energy efficiency schemes. Oral evidence sessions were held on 3 and 17 November; further sessions are expected.

#### **Low carbon network infrastructure**

On 17 September the Energy and Climate Change Committee announced an inquiry into the UK's electricity infrastructure. The Committee will be investigating what changes are required from today's electricity infrastructure to build a low carbon, flexible and fair network.

#### **Security of supply**

On 12 November the Committee announced an inquiry into the security of the UK's energy supply; a one-off evidence session was held on 24 November.

For the most recent information on all Inquiries and to view evidence please visit

<http://www.parliament.uk/business/committees/committees-a-z/commons-select/energy-and-climate-change-committee>

Contact: Energy and Climate Change Committee, House of Commons, London SW1A 0AA Telephone: 020 7219 2158; Email: [ecc@parliament.uk](mailto:ecc@parliament.uk)

---

## ENVIRONMENT FOOD AND RURAL AFFAIRS COMMITTEE

The Environment, Food and Rural Affairs Committee (EFRA) is appointed by the House of Commons to examine the expenditure, administration and policy of the Department for Environment, Food and Rural Affairs (Defra) and its associated public bodies.

Mr Neil Parish (Conservative, Tiverton and Honiton) was elected Chair. Other members are: Chris Davies (Conservative, Brecon and Radnorshire); Jim Fitzpatrick (Labour, Poplar and Limehouse); Harry Harpham (Labour, Sheffield, Brightside and Hillsborough); Simon Hart (Conservative, Carmarthen West and South Pembrokeshire); Dr Paul Monaghan (Scottish National Party, Caithness, Sutherland and Easter Ross); Rebecca Pow (Conservative, Taunton Deane); Margaret Ritchie (Social Democratic & Labour Party, South Down); David Simpson (Democratic Unionist Party, Upper Bann); Angela Smith (Labour, Penistone and Stocksbridge); Rishi Sunak (Conservative, Richmond).

### CURRENT INQUIRIES

#### Greyhound welfare

Environment, Food and Rural Affairs Committee announced an inquiry into the welfare of greyhounds used for racing on 22 September.

#### Air quality

On 22 October the Committee announced an inquiry into Defra's role at tackling air quality. The Department is currently consulting on how the UK can meet EU Directive requirements for limiting emissions of nitrogen dioxide; it also has a wider role in tackling the harmful levels of many other pollutants emitted by the transport, energy and industrial sectors as well as from households and farming.

#### Defra's performance in 2014-15

This inquiry was announced on 18 September 2015. The Committee held two oral evidence sessions on 14 and 21 October with Ministers and officials from the Department.

#### Common Agricultural Policy

On 10 September the Environment, Food and Rural Affairs Committee announced an inquiry looking at developments in the Common Agricultural Policy. The Committee intends to keep a watching brief over developments in the Common Agricultural Policy throughout the life of this Parliament, with a view towards contributing policy ideas ahead of negotiation for the 2020 CAP reform. The intention is to take evidence and report on individual aspects of the policy as they emerge. The Committee would welcome communications on any aspect of the CAP at any time. The Committee took oral evidence on 16 September from Mark Grimshaw, Chief Executive, Rural Payments Agency.

#### Farmgate prices

On 17 September the Committee announced an inquiry into falling dairy and meat prices. Changing global markets and national conditions have made prices volatile. Policies of EU, UK Government, and individual retailers and processors have a significant impact on prices paid, while consumer choices also shape markets. The Committee wishes to inquire into the impact of these and other factors on farmgate prices, and measures that could be taken to improve prospects for the agriculture industry. Oral evidence sessions were held on 28 October and 4 November.

For the most recent information on all Inquiries and to view evidence please visit

<http://www.parliament.uk/business/committees/committees-a-z/commons-select/environment-food-and-rural-affairs-committee>

Contact: Environment, Food and Rural Affairs Select Committee, House of Commons, London SW1A 0AA. Telephone: 020 7219 5774/3262; Email: [efracom@parliament.uk](mailto:efracom@parliament.uk)

---

## ENVIRONMENTAL AUDIT COMMITTEE

The remit of the Environmental Audit Committee is to consider the extent to which the policies and programmes of government departments and non-departmental public bodies contribute to environmental protection and sustainable development, and to audit their performance against sustainable development and environmental protection targets.

Huw Irranca-Davies (Labour, Ogmore) was elected Chair. The remaining members of the Committee are: Peter Aldous (Conservative, Waveney); Caroline Ansell (Conservative, Eastbourne); Jo Churchill (Conservative, Bury St Edmunds); Mary Creagh (Labour, Wakefield); Geraint Davies (Labour, Swansea West); Zac Goldsmith (Conservative, Richmond Park); Margaret Greenwood (Labour, Wirral West); Luke Hall (Conservative, Thornbury and Yate); Carolyn Harris (Labour, Swansea East); Peter Heaton-Jones (Conservative, North Devon); Mr Peter Lilley (Conservative, Hitchin and Harpenden); Caroline Lucas (Green Party, Brighton Pavilion); John Mc Nally (Scottish National Party, Falkirk); Rebecca Pow (Conservative, Taunton Deane); Rory Stewart (Conservative, Penrith and The Border).

### CURRENT INQUIRIES

#### Diesel emissions and air quality

The Environmental Audit Committee is holding an inquiry (announced on 15 October) into diesel emissions from vehicles and its impact on air quality in the UK. In particular, the Committee will examine the accuracy of diesel vehicle emission data. It will also explore whether new questions about the accuracy of this data will impact the Government's policy on air quality and road transport. Oral evidence sessions were held on 15 and 27 October.

#### Assessment of EU/UK environmental policy

The Environmental Audit Committee is holding an inquiry, announced on 19 October, to assess the extent to which EU environmental objectives and policies have succeeded in tackling environmental issues in the UK. The inquiry will first look at the merits and drawbacks of determining environmental policy at an EU level for the UK and, secondly, look at the implications of such policies on the UK environment.

#### Future of the Green Investment Bank

On 15 October the Environmental Audit Committee announced an inquiry into the Future of the Green Investment Bank, which the Government plans to move into private ownership. This move is welcomed by the Green Investment Bank, which argues that capital from the Government will not be sufficient to sustain its level of future investment, but some green groups and think tanks have been critical of the plan, warning that it will undermine the GIB's ability to meet its goals and that it will damage confidence in low-carbon sector investment more generally. The Committee held an oral evidence session on 28 October.

### The Government's approach to sustainable development

The Environmental Audit Committee launched its inquiry into the Government's approach to sustainable development on 21 July. The Committee will be exploring what impact the new Government's fiscal and legislative agenda will have on sustainable development. It will be looking to establish themes for its work during the Parliament and measures against which the Government's success can be judged. The evidence received for this inquiry will feed into the Committee's work over the course of this Parliament.

### The Airports Commission report: Carbon emissions, air quality and noise

On 23 July the Committee announced an inquiry into the Airports Commission report and the implications for Government commitments on carbon emissions, air quality and noise should the Airport Commission's recommendation of a third runway at Heathrow Airport be adopted. Oral evidence sessions were held on 14 October and 4 November.

For the most recent information on all Inquiries and to view evidence please visit

<http://www.parliament.uk/business/committees/committees-a-z/commons-select/environmental-audit-committee>

Contact: Environmental Audit Committee, House of Commons, London SW1A 0AA. Telephone: 020 7219 6150; Email: [eacom@parliament.uk](mailto:eacom@parliament.uk)

---

## HEALTH COMMITTEE

The Health Committee is appointed by the House of Commons to examine the policy, administration and expenditure of the Department of Health and its associated bodies

Dr Sarah Wollaston was elected Chair. The remaining members of the Committee are: Mr Ben Bradshaw (Labour, Exeter); Julie Cooper (Labour, Burnley); Dr James Davies (Conservative, Vale of Clwyd); Andrea Jenkyns (Conservative, Morley and Outwood); Andrew Percy (Conservative, Brigg and Goole); Emma Reynolds (Labour, Wolverhampton South East); Paula Sherriff (Labour, Dewsbury); Maggie Throup (Conservative, Erewash); Helen Whatley (Conservative, Faversham and Mid Kent); Dr Philippa Whitford (Scottish National Party, Central Ayrshire).

## CURRENT INQUIRIES

### Childhood Obesity

The Health Committee announced a short inquiry on 25 September, building on the previous Committee's work on the impact of diet and physical activity on health. This inquiry specifically considers what the Government's policy priorities should be for addressing childhood obesity. The Committee is not seeking formal written evidence, but has held oral evidence sessions.

### Public health post-2013 – structures, organisation, funding and delivery

The Health Committee announced on 27 October a short overview inquiry on the impact of the Health and Social Care Act reforms of the public health landscape, considering whether they have achieved their aims, and what further improvements may be necessary.

### Work of the Secretary of State for Health

This inquiry is now concluded.

## Current issues in NHS England

On 14 July the Committee announced an inquiry into Current issues in NHS England. It will review the current performance of the NHS and examine how NHS England is planning to implement the vision outlined in the Five Year Forward view. On 21 July the Committee took evidence from NHS England's Chief Executive Simon Stevens, Sir Bruce Keogh, Medical Director and Jane Cummings, the Chief Nursing Officer for England. Further oral evidence sessions are expected.

### Primary care

On 30 July the Committee announced an inquiry into challenges affecting primary care services in England. It will consider whether the Department of Health and its arms' length bodies have the plans and policies in place now to ensure that high quality care is consistently available to patients at the point of need. Oral evidence sessions were held on 5 and 10 November.

For the most recent information on all Inquiries and to view evidence please visit

<http://www.parliament.uk/business/committees/committees-a-z/commons-select/health-committee>

Contact: Health Committee, House of Commons, London SW1A 0AA Telephone: 020 7219 6182; Email: [healthcom@parliament.uk](mailto:healthcom@parliament.uk)

---

## SCIENCE AND TECHNOLOGY COMMITTEE

The Science and Technology Committee exists to ensure that Government policy and decision-making are based on good scientific and engineering advice and evidence. The Science and Technology Committee is unusual amongst departmental select committees in that it scrutinises the Government Office for Science (GO-Science), which is a "semi-autonomous organisation" based within the Department for Business, Innovation and Skills (BIS). GO-Science "supports the Government Chief Scientific Adviser and works to ensure that Government policy and decision-making is underpinned by robust scientific evidence". The committee therefore has a similarly broad remit and can examine the activities of departments where they have implications for, or made use of, science, engineering, technology and research.

Nicola Blackwood (Conservative, Oxford West and Abingdon) was elected as Chair. The other members are: Victoria Borwick (Conservative, Kensington); Stella Creasy (Labour, Walthamstow); Jim Dowd (Labour, Lewisham West and Penge); Chris Green (Conservative, Bolton West); Dr Tania Mathias (Conservative, Twickenham); Carol Monaghan (Scottish National Party, Glasgow North West); Graham Stringer (Labour, Blackley and Broughton); Derek Thomas (Conservative, St Ives); Valerie Vaz (Labour, Walsall South); Matt Warman (Conservative, Boston and Skegness).

## CURRENT INQUIRIES

### The Science Budget

On 10 July the Committee announced an inquiry into the Science Budget, ahead of the Spending Review. On 15 July the Committee took evidence from Jo Johnson MP, Minister of State for Universities and Science, Gareth Davies, Director General, Knowledge and Innovation, and Philippa Lloyd, Director General, People and Strategy, Department for Business, Innovation and Skills; Sir Paul Nurse, President, The Royal Society, Professor Richard Parker, Chair, Research and Secondments Committee, Royal Academy of

Engineering, Lord Stern of Brentford, President, British Academy, and Professor Sir John Tooke, President, Academy of Medical Sciences. The Committee held three further oral evidence sessions on 8 and 15 September and 13 October.

On 9 November the Committee published its report in which it warned that the UK is falling behind its competitors in research and development (R&D) investment and the Government will be putting competitiveness, productivity and jobs at risk if it does not set out a clear roadmap to increase science funding in the Spending Review.

### Science in emergencies

On 20 July the Science and Technology Committee announced an inquiry into science in emergencies after the Ebola outbreak, examining what lessons have been drawn concerning the use of scientific advice in the UK for similar disease outbreak emergencies in future.

The Committee held an oral evidence session on 20 October to examine the UK's preparedness and response to disease emergencies, with a particular focus on the provision of expert advice to Government during a disease outbreak. It will also take evidence on the development of an Ebola vaccine and consider some of the challenges of conducting clinical research during a disease outbreak.

### The Big Data Dilemma

On 24 July the Committee announced an inquiry into opportunities and risks of big data. The committee will look at whether the Government is doing enough to ensure that UK entrepreneurs can benefit from the data revolution, and at data protection and privacy issues. Oral Evidence sessions were held on 27 October and 17 November.

### Investigatory Powers Bill: technology issues

On 4 November 2015 the Science and Technology Committee announced an inquiry into the technology issues of the Investigatory Powers Bill. The Bill is a response to advances in communications, particularly over the internet. Confidence in commerce depends on reliable encryption. The boundaries between content and communications data are becoming blurred. The consequences for privacy, proportionality and data security will be explored by the Committee in the context of the rapidly changing technological landscape – and the need to fight terrorism and crime. An oral evidence session was held on 10 November; a further oral evidence session will be held in December.

For the most recent information on all Inquiries and to view evidence please visit

<http://www.parliament.uk/business/committees/committees-a-z/commons-select/science-and-technology-committee>

Contact: Science and Technology Committee, House of Commons, London SW1A 0AA Telephone: 020 7219 2793; Fax: 020 7219 0896; Email: [scitechcom@parliament.uk](mailto:scitechcom@parliament.uk)

---

## TRANSPORT COMMITTEE

The Transport Committee examines the expenditure, administration and policy of the Department of Transport and its associated public bodies.

Mrs Louise Ellman (Labour, Liverpool, Riverside) was elected Chair; the remaining members of the Committee are: Robert Flello (Labour, Stoke-on-Trent South); Mary Glendon (Labour, North

Tyneside); Karl McCartney (Conservative, Lincoln); Stewart Malcolm McDonald (Scottish National Party, Glasgow South); Mark Menzies (Conservative, Fylde); Huw Merriman (Conservative, Bexhill and Battle); Will Quince (Conservative, Colchester); Iain Stewart (Conservative, Milton Keynes South); Graham Stringer (Labour, Blackley and Broughton); Martin Vickers (Conservative, Cleethorpes).

## CURRENT INQUIRIES

### Road haulage

The Transport Committee announced the inquiry on 11 September 2015. The Committee is investigating what action the Government has taken to address industry concerns about a lack of skilled drivers in the road haulage sector, and assess how effective the Government's response has been.

### Volkswagen Group emissions violations

On 7 October the Transport Committee announced an inquiry into Volkswagen Group emissions violations and held a one-off evidence session on 12 October.

### Vehicle Type Approval

On 16 November the Transport Select Committee launched an inquiry to examine whether the vehicle type approval testing is fit for purpose.

### Operation Stack

On 7 October the Transport Committee announced an inquiry into Operation Stack, and on 14 October held a one-off evidence session to question freight industry representatives about the efficacy of Operation Stack.

### Maritime Policy and Coastguard Modernisation

Following its announcement of the inquiry on 2 September, the Transport Committee held a single evidence session on 7 September, giving members of the committee an opportunity to question Department for Transport ministers and officials about the recommendations of the maritime study group (published on the morning of the evidence session), the future coastguard programme and related maritime issues.

### Road traffic law enforcement

The Transport Committee is conducting an inquiry (announced on 10 September) into road traffic law enforcement. The objective of this inquiry is to scrutinise how effectively the Government's policies to improve road safety – by tackling dangerous or careless driving – are being enforced. An oral evidence session was held on 2 November.

### Surface transport to airports

On 11 September the Transport Committee announced an inquiry into surface transport at airports. The Committee is interested to assess the effectiveness of the Government's approach to planning surface access to airports, as well as understanding whether the Government is making full use of its powers to influence the selection of infrastructure and accompanying modes of transport to and from airports. Oral evidence sessions were held on 26 October, 9 and 16 November.

For full details of all Inquiries and transcripts of evidence sessions please visit <http://www.parliament.uk/business/committees/committees-a-z/commons-select/transport-committee>

Contact: Transport Committee, House of Commons, London SW1A 0AA Telephone: 020 7219 3266; Email: [transcom@parliament.uk](mailto:transcom@parliament.uk); Twitter: @CommonsTrans



# PARLIAMETARY OFFICE OF SCIENCE AND TECHNOLOGY (POST)



## RECENT POST PUBLICATIONS

### Herbicide Resistance

August 2015 POSTnote 501

Increasing resistance to herbicides, coupled with a lack of new types of herbicides, has the potential to reduce crop yields. The UK Government's commitment to increase yields over the next 25 year requires the development of alternative crop protection methods. This POSTnote outlines the challenges of herbicide resistance and reviews possible approaches to long-term weed control strategies.

### Securing UK Soil Health

August 2015 POSTnote 502

2015 is the United Nations International Year of Soils. Soils underpin food production and regulate water, carbon and nitrogen cycles but are subject to pressures from population growth and climate change. In England & Wales, soil degradation costs around £1bn per year. This POSTnote outlines the evidence for measures that sustain soils and existing policies affecting soil health.

### Trends in Energy

September 2015 POSTnote 503

Providing affordable, reliable and sustainable energy is a key issue in UK policy. Energy policy can be informed by current energy sector trends and projections into the future. This briefing outlines key trends in energy, the factors driving these changes and future projections. It also highlights the implications and challenges of these trends.

### The 100,000 Genomes Project

September 2015 POSTnote 504

In 2012, the Prime Minister announced plans to sequence 100,000 genomes. The project aims to establish a genomic medicine service within the NHS and support the Government strategy for UK Life Sciences. This POSTnote provides an introduction to genomic medicine and an overview of the aims, structure and major challenges of the 100,000 Genomes Project.

### Precision Farming

June 2015 POSTnote 505

Precision farming uses technology to improve efficiency. It offers benefits for yields, profits and the environment. However, uptake by farmers has been slow. This POSTnote describes

precision farming methods, adoption and factors influencing it, and future practices.

### Trends in Compulsory Education

September 2015 POSTnote 506

Five trends can be identified in compulsory education across the UK: changes in the attainment gap between different pupil groups, rising pupil numbers, decreasing numbers of people entering initial teacher training, the growing use of technology and changing levels of school autonomy and diversity. Three factors are shaping these trends: population growth, inequality and the changing labour market.

### Trends in Crime and Criminal Justice

September 2015 POSTnote 507

Behaviours are criminalised through legislation or judicial decision, and this is influenced by public attitudes. Crime is widely considered to be falling but the data underpinning this trend are complex. This POSTnote describes crime patterns, and highlights issues with crime measurement and data. It also identifies key developments in the criminal justice system.

### Deep Sea Mining

September 2015 POSTnote 508

In March 2013, the Prime Minister said that deep-sea mining could be worth £40bn to the UK over the next 30 years. This briefing summarises the framework governing activity in international waters. It describes the mineral deposit types being considered and the proposed extraction methods, potential environmental effects and mitigation options.

### Forensic Language Analysis

September 2015 POSTnote 509

Forensic linguistics and phonetics are sciences that examine text and speech. They have applications in criminal, civil and asylum legal proceedings, and in the private sector (for example, in verifying identity). They are also used in counter-terrorism, intelligence and surveillance. This note examines the scientific validity of procedures and their applications, and explores issues surrounding their use.

### Trends in ICT

October 2015 POSTnote 510

This note looks at developments in information and communication technology (ICT) and their relevance for UK policy in the next five years. It

examines the capability, use and economic impact of ICT; technical barriers; and implications for cybersecurity, privacy and internet governance.

### **Automation in Military Operations**

October 2015

POSTnote 511

Automated technology is increasingly used in military activities such as intelligence gathering, navigation and weapons delivery. This POSTnote examines current and future military applications of automation, and considers associated legal, ethical and societal issues.

### **Unintentional Bias in Court**

October 2015

POSTnote 512

When asked to interpret information and draw conclusions, people are prone to a number of well understood, unintentional errors in reasoning. These are known as cognitive biases. This POSTnote examines how these affect reasoning and decision-making, and outlines strategies to minimise their influence in court.

### **Future of Natural Gas**

November 2015

POSTnote 513

UK shale gas exploration and efforts to mitigate climate change have stimulated debate about the future of the natural gas sector. This briefing looks at potential pathways for the sourcing and use of natural gas in the UK. It considers the implications for the economy, energy prices, the reliability of energy supplies and efforts to cut emissions.

## **CURRENT WORK**

*Biological Sciences* – Anti-Ebola Treatments, Intellectual Property and Plants, Pregnancy and Breastfeeding Guidelines, Global Health Inequality, Electronic Health Records

*Environment and Energy* – Managing the UK Plutonium Stockpile, Trends in the Environment, Trends in Agriculture, the Water-Food-Energy Nexus, the Circular Economy, Marine Microplastic Pollution, Adapting Urban Drainage, Natural and Health, Putting a Value on Nature

*Physical sciences and IT* – Digital Forensics, Financial Technologies, Trends in Defence

*Social Sciences* – Preventing extremism, Policing Domestic Abuse

## **CONFERENCES AND SEMINARS**

### **Evidence Roundtable**

The use of evidence in Parliament fulfils many roles and is particularly important to facilitate Parliament's ability to scrutinise the work of government effectively. In this context, 'evidence' in the sense of information presented in support of an assertion and to guide decision making can take a variety of formats, from academic research, written submissions to Select Committee Inquiries, oral evidence, the perspectives of other Members and the media, and for the Commons, information about Members' constituencies and from their constituents. It is important that Parliament contributes to the debate to ensure that the diverse understandings of 'evidence' in Parliament are understood both internally and externally. This roundtable explored the relationship between different types of evidence and information needs, to explore what types of evidence are most appropriate to these different requirements, and to consider how to assess quality and rigour of each evidence type in these contexts. A secondary aim was to contribute to the wider

public debate around the relationship between evidence and policy, to ensure that the particular context of Parliament is taken into account. The roundtable involved 20 experts from a range of disciplines that are able to outline approaches taken in different contexts and to stimulate discussion as well as internal staff from across both Houses.

### **Air Quality**

This briefing provided the opportunity for parliamentarians to discuss with experts the effect of air quality policies on air pollutant exposure and health. The event was chaired by Baroness Manningham-Buller. This was a working breakfast for MPs, Peers and their staff to discuss the science and resulting policy issues relating to new knowledge on the interconnections and pathways between air pollutants and interacting stressors, exposure routes and health effects in humans. The speakers were Professor Paul Wilkinson, Public and Environmental Health Research Unit, London School of Hygiene and Tropical Medicine, member of the Committee on the Medical effects of Air Pollution (COMEAP); Professor Martin Williams, Environmental Research Group, King's College London; Professor Michael Depledge, Chair of Environment and Human Health, University of Exeter, and Chair of the Board of the European Centre for Environment and Human Health; Dr Sotiris Vardoulakis, Air Pollution & Climate Change Group, Public Health England; Professor Ian Boyd, Chief Scientific Adviser, Defra; Andrea Lee, Health and Environment Adviser, Client Earth; Ruth Calderwood, Environmental Policy Officer at City of London.

### **Research and Parliament**

Research is one type of evidence that can strengthen Parliament's important democratic functions – debating the issues of the day, creating and revising laws, and examining and critiquing the actions of government. The purpose of this event was to inform academics about the many ways that they can improve their impact on Parliament. It presented findings from an analysis into the impact case studies submitted as part of the recent HEFCE Research Excellence Framework (REF) to showcase the different ways that academics (from all disciplines) have contributed to Parliamentary processes. It drew out lessons for Parliament on how it is currently engaging with academics, and how it might in the future. This reception gave attendees the opportunity to speak to researchers, Parliamentarians, Parliamentary staff and other relevant stakeholders about their experiences in an informal setting. Speakers included the Rt Hon John Bercow MP, Speaker of the House of Commons; Baroness D'Souza, The Lord Speaker; Professor Jane Elliott, Chief Executive, Economic and Social Research Council; Professor James Wilsdon, Chair of the Campaign for Social Science, Professor of Science & Democracy, University of Sussex; and Penny Young, Librarian and Director General of Information Services, House of Commons. The event was sponsored by Research Councils UK and held in collaboration with the Parliaments and Legislatures Specialist Group of the Political Studies Association.

## **STAFF, FELLOWS AND INTERNS AT POST**

### *Fellows*

Kirsten Miller, Natural History Museum, British Ecological Society  
Charlotte Wood, Institute of Zoology, Natural Environment Research Council

Madeline Burke, Bristol University, Engineering and Physical Sciences Research Council, was placed with the House of Commons Library Science and Environment Section

Louise Wilson, Surrey University, Biotechnology and Biological

Sciences Research Council  
Jenny Crane, Warwick University, Wellcome Medical History and Humanities  
Genevieve Waterhouse, London Southbank University, British Psychology Society  
Kathryn Boast, Oxford University, Science and Technology Facilities Council  
Sarah Smith, Reading University, Institute of Food Science and Technology  
Stephen Barrie, King's College London, Nuffield Bioethics

## INTERNATIONAL ACTIVITIES

### EPTA Directors Meeting, Paris, September 2015

Ran workshop with EPTA directors about POST's project to use Trends Cards to facilitate work on futures. Attended conference on Climate Change and Innovation.

### Mexico, November 2015

Aaron Goater, the energy adviser for POST, spent a week in Mexico to help set up a parliamentary advice service for the Mexican Parliament.



# HOUSE OF LORDS SCIENCE AND TECHNOLOGY SELECT COMMITTEE

The members of the Committee are: Earl of Selborne (Chairman), Lord Cameron of Dillington, Lord Fox, Lord Hennessy of Nympsfield, Lord Hunt of Chesterton, Lord Kakkar, Baroness Manningham-Buller, Lord Maxton, the Duke of Montrose, Baroness Morgan of Huyton, Baroness Neville-Jones, Lord Peston, Viscount Ridley and Lord Vallance of Tummel.

### GM Insects

In July 2015, the Committee launched an inquiry into GM Insects. Written submissions were sought by 18 September and 9 oral evidence sessions were conducted. The Committee will report by the end of the year.

### The Relationship between EU Membership and the effectiveness of Science, Research and Innovation in the UK

In July 2015, the Committee agreed to conduct an inquiry into the relationship between EU Membership and the effectiveness of science, research and innovation in the UK. A Call for Evidence was issued in September. Oral evidence sessions commenced in mid-December and will continue in the first quarter of 2016.

### Government Chief Scientific Adviser

A public, oral evidence session with Sir Mark Walport was held on 17 November 2015.

### The Dowling Review

On 7 July 2015, the Committee held a one-off public, oral evidence session on the Dowling Review, hearing from Professor Dame Ann Dowling DBE FRS FREng, President of the Royal Academy of Engineering and Dr Hayaatun Sillem, Director of Programmes and Fellowship, the Royal Academy of Engineering.

### Nuclear Fusion

On 21 July 2015, the Committee held a public, oral evidence session on the topic of nuclear fusion. The Committee heard from: Professor Steven Cowley FRS FREng, Chief Executive Officer, UK Atomic Energy Authority, Professor of

Physics at Imperial College London and Head of the EURATOM / Culham Centre for Fusion Energy (CCFE) Fusion Association; Dr David Kingham, Chief Executive Officer, Tokamak Energy; and Dr Sharon Ellis, Deputy Director, Research Councils Unit, Department for Business, Innovation and Skills.

### The Resilience of the Electricity System

In July 2014, the Committee launched an inquiry into the resilience of electricity infrastructure. The inquiry focused on the resilience of the UK's electricity infrastructure to peaks in demand and sudden shocks. It was interested in the resilience of the system both in the short term (to 2020) and in the medium term (to 2030) as electricity generation is decarbonised. Oral evidence was taken across the autumn and concluded in late January 2015. The Committee reported on 12 March 2015. A Government response was published in June 2015. A debate in the Chamber on the report and the Government response was held on 3 November 2015.

## FURTHER INFORMATION

The reports, Government responses, written and oral evidence to the Committee's inquiries mentioned above, as well as the Calls for Evidence and other documents can be found on the Committee's website. Further information about the work of the Committee can be obtained from Chris Clarke, Committee Clerk, [clarkechr@parliament.uk](mailto:clarkechr@parliament.uk) or 020 7219 4963. The Committee Office email address is [hscience@parliament.uk](mailto:hscience@parliament.uk).



# HOUSE OF COMMONS LIBRARY SCIENCE AND ENVIRONMENT SECTION



Scientists and other staff in the Science and Environment Section provide confidential, bespoke briefing to Members and their offices on a daily basis. They also provide support to Commons Select Committees, and produce longer notes and research papers which can be accessed on line at <http://www.parliament.uk/topics/topical-issues.htm>

Summaries of recently updated briefings are opposite. For further information contact: Sarah Hartwell-Naguib  
Head of Section  
Tel: 020 7219 1665  
email: [hartwellnaguibs@parliament.uk](mailto:hartwellnaguibs@parliament.uk)

## RECENT PUBLICATIONS

### Nuisance Calls: Unsolicited sales and marketing, and silent calls

2.9.15 | *SN*

Nuisance calls cause widespread harm and inconvenience which have been acknowledged by the previous and current Government and the relevant regulators. For the two types of nuisance calls – silent calls and unwanted marketing calls – the Coalition Government first raised the financial penalty available to Ofcom in enforcing its rules on nuisance calls from £50,000 to £2 million in 2010. And second, in 2015, introduced new regulations lowering the legal threshold before the ICO could take action to issue a civil monetary penalty up to £500,000. This note sets out the key regulations which seek to address nuisance calls and the main sources of assistance and their limitations.

### The Assisted Dying (No 2) Bill 2015

4.9.15 | *CBP-7292*

Rob Marris MP, after being drawn first in the Private Member's Bill ballot in this Parliament, tabled the Assisted Dying Bill (No 2) 2015 which was defeated at its second reading on 11 September 2015. The Bill is intended to enable competent adults who are terminally ill to be allowed assistance with ending their life if they request it. Previous attempts to change the law in this area included the Assisted Dying Bill 2014, tabled by Lord Falconer in the House of Lords. Lord Falconer has also tabled the Assisted Dying Bill 2015 in this Parliament.

The Government has indicated that it considers this issue to be a matter of individual conscience; it has traditionally been the subject of a free vote.

This paper provides a background to the legal cases in this area and the DPP guidance on prosecutions for assisted suicide. It includes an overview of the Assisted Dying (No 2) Bill 2015, and a summary of the 2014 Assisted Dying Bill's progress in the House of Lords in the last Parliament. A discussion of stakeholder views is included.

### Fixed Broadband: Policy, Coverage and Speeds

7.10.15 | *SN06643*

This sets out the current situation with regard to broadband access and coverage and provides an overview of the Government's broadband policy. It focuses on the delivery of broadband targets and funding in England. The devolved administrations have their own delivery programmes.

### Psychoactive Substances Bill

3.11.15 | *CBP-7334*

This briefing paper was prepared for the Second Reading of the Psychoactive Substances Bill on 19 October 2015. It provides background to new psychoactive substances, their use, and the current legislative framework, together with an overview of the Bill and its consideration in the Lords. Some response to the Bill from interest groups is discussed.

New psychoactive substances have been a challenge for existing drugs legislation in the UK; they are developed at such a speed that by the time one substance is controlled, another one with a slight change in chemical structure can take its place in the market. There have been some developments to attempt to improve control of these substances, such as temporary class drug orders which allow the 12-month temporary control of a substance.

In 2014, the Home Office appointed an expert panel to look at legislative options to tackle new psychoactive substances. They looked at international examples and recommended that a blanket ban approach, similar to that in place in the Republic of Ireland, would be best. The Government response to the review said that they would take the recommendations forward. The Conservative manifesto prior to the 2015 election included a commitment to make a ban on all new psychoactive substances.

### Support for Science

3.11.15 | *CBP-7237*

Public funding for research comes from a mix of devolved (eg Higher Education Funding Council for England) and UK (eg Research Councils) institutions. Bodies like Innovate UK have a

specific focus on industrial research. Within these broad frameworks, grants are awarded on a competitive basis.

Successive governments have sought to protect the science budget – both in terms of recurring and capital costs. The latter are increasingly being linked to earmarked projects, a recent one being the Alan Turing Institute based at the British Library. The non-capital science budget, held by the Department for Business, Innovation and Skills and protected by a policy ring-fence, is currently £4.6 billion per annum. The Conservative Party Manifesto 2015 provides an outline of the new Government's general policy commitments in this area. A library standard note, *Research and Development in the UK*, includes, among other things, a regional breakdown of support for science from different sources identified as government, higher education, business and private non-profit organisations (eg charities). On 20 March, the Office for National Statistics (ONS) published a statistical bulletin: *UK Gross Domestic Expenditure on Research and Development, 2013*.

The ONS provides data on R&D expenditure by UK country and region. In this context, the country and region refers to the location where the R&D is performed, not the location of the funder. In 2013, the South East, East of England and London continued to dominate R&D activity in the UK, accounting for 52% of total UK R&D.

### **The Off-patent Drugs Bill**

5.11.15 | *CBP-7365*

The Off-patent Drugs Bill 2015 is a Private Members' Bill tabled by Nick Thomas-Symonds after he came eighth in the ballot this year. It had its first reading on 24 June and it is expected that the Second Reading debate will be resumed on 4 December 2015.

The Bill addresses the situation where a drug that has an expired patent is discovered to be effective for a new indication that is not within the scope of its licence. It would require the Secretary of State to seek licences for off-patent drugs in new indications, and to request the National Institute for Health and Care Excellence to conduct technology appraisals for off-patent drugs in new indications.

### **Shale Gas and Fracking**

5.11.15 | *SN06073*

Shale gas is extracted from solid rock using a process called hydraulic fracturing, or 'fracking'. The Royal Society and Royal Academy of Engineering have reviewed the risks associated with fracking. They concluded that the health, safety and environmental risks can be managed effectively in the UK by implementing and enforcing best operational practice. However, they made several recommendations including calling for more research on the carbon footprint of shale gas extraction.

A report on this was published by DECC in September 2013, in which shale gas emissions were said to be similar to those of conventional gas and lower than those of coal and LNG, leading the Secretary of State to describe shale gas as a 'bridge' to a low-carbon future.

The regulatory regime for fracking in the UK is covered in this note along with comment on environmental concerns. It also covers the

new access provisions and debate on fracking during the Infrastructure Bill's passage through Parliament.

## **ACTIVITIES**

In addition to providing bespoke briefings for MPs, and publishing papers such as those above, the section has prepared debate packs, containing briefing and supporting press and parliamentary material, for debates on: Reform of the Common Fisheries Policy (8/9/15); Superfast Broadband Rollout (7/10/15); E-petition relating to making the production, sale and use of cannabis legal (9/10/15); Fire safety measures in schools (20/10/15); Work of the UK in Tackling Malaria and Neglected Tropical Diseases (26/10/15); Green Investment Bank (28/10/15); Role of the Treasury in Supporting UK Science (03/11/15); and the Dog Meat Trade (3/11/15).

Staff of the Section have participated in a wide range of visits and other engagements with academics and other stakeholders to build contact networks and to find out about developments in research. David Hough, Sara Priestley and Ed White visited the University of Lancaster and heard about the latest developments in research into energy, environment and climate change policies and issues.

Elena Ares arranged for Professor Corinne Le Quéré, Professor Andy Jordan and Dr Rachel Warren to come to Parliament to present to House staff on "Beyond 2 degrees: Dangerous climate change – the implications for policy and government". Louise Smith organised a visit to the renewable energy company RES, at their award winning headquarters at Kings Langley in Hertfordshire.

Other stakeholder engagements have included meetings and events with Imperial College, University of London, the Environment Agency, the National Farmers Union, National Grid, for a full day's briefing on the operation of and outlook for the electricity market, University of Exeter, City University, Cambridge Science and Technology Policy Department.

Staff have also supported members of select committees including: presenting at a seminar convened to provide the new Environment, Food and Rural Affairs Committees members with an introduction to the policy areas that Defra covers; and participating in an Energy and Climate Change Committee seminar for new members which they had helped to facilitate.

## Research Councils UK

Contact: Alexandra Saxon  
Head of RCUK Strategy Unit  
Research Councils UK  
Polaris House  
North Star Avenue  
Swindon SN2 1ET

Tel: 01793 444592  
E-mail: [communications@rcuk.ac.uk](mailto:communications@rcuk.ac.uk)  
Website: [www.rcuk.ac.uk](http://www.rcuk.ac.uk)



Each year the Research Councils invest around £3 billion in research covering the full spectrum of academic disciplines from the medical and biological sciences to astronomy, physics, chemistry and engineering, social sciences, economics, environmental sciences and the arts and humanities.

Research Councils UK is the strategic partnerships of the seven Research Councils. It aims to:

- increase the collective visibility, leadership and influence of the Research Councils for the benefit of the UK;
- lead in shaping the overall portfolio of research funded by the Research Councils to maximise the excellence and impact of UK research, and help to ensure that the UK gets the best value for money from its investment;
- ensure joined-up operations between the Research Councils to achieve its goals and improve services to the communities it sponsors and works with.

## Biotechnology and Biological Sciences Research Council (BBSRC)



Contact: Matt Goode  
Associate Director, Communications & External Relations  
BBSRC, Polaris House, North Star Avenue  
Swindon SN2 1UH. Tel: 01793 413299  
E-mail: [matt.goode@bbsrc.ac.uk](mailto:matt.goode@bbsrc.ac.uk)  
Website: [www.bbsrc.ac.uk](http://www.bbsrc.ac.uk)

BBSRC invests in world-class bioscience research, innovation and training on behalf of the UK public. Our aim is to further scientific knowledge to promote economic growth, wealth and job creation and to improve quality of life in the UK and beyond. BBSRC research is helping society to meet major challenges, including food security, green energy and healthier lifespans and underpins important UK economic sectors, such as farming, food, industrial biotechnology and pharmaceuticals.

## Economic and Social Research Council



Contact: Jacky Clake, Head of Communications, Economic and Social Research Council, Polaris House, North Star Avenue, Swindon SN2 1UJ  
Tel: 01793 413117  
E-mail: [Jacky.Clake@esrc.ac.uk](mailto:Jacky.Clake@esrc.ac.uk)  
Website: [www.esrc.ac.uk](http://www.esrc.ac.uk)

The ESRC is the UK's largest organisation for funding research on economic and social issues and is committed to supporting the very best research with wide-ranging impact. Social science contributes to greater knowledge and understanding of the many challenges our society faces today and by ensuring that ESRC-funded research makes the biggest possible impact, our research shapes public policies and makes business, voluntary bodies and other organisations more effective, as well as shaping wider society. We also develop and train the UK's future social scientists.

## EPSRC

Pioneering research and skills

Contact: Sarah Crew, Parliamentary Relations Manager, EPSRC, Polaris House, North Star Avenue, Swindon SN2 1ET  
Tel: 01793 444570  
E-mail: [sarah.crew@epsrc.ac.uk](mailto:sarah.crew@epsrc.ac.uk)  
Website: [www.epsrc.ac.uk](http://www.epsrc.ac.uk)

EPSRC is the UK's main agency for funding research and training in engineering and physical sciences, investing around £800m a year in research and postgraduate training, to help the nation handle the next generation of technological change.

The areas covered range from information technology to structural engineering, and mathematics to materials science. This research forms the basis for future economic development in the UK and improvements for everyone's health, lifestyle and culture. EPSRC works alongside other Research Councils with responsibility for other areas of research.

## Medical Research Council



Contact: Sophie Broster-James  
Public Affairs Manager  
One Kemble Street, London WC2B 4AN.  
Tel: 020 7395 2275  
E-mail: [sophie.broster-james@headoffice.mrc.ac.uk](mailto:sophie.broster-james@headoffice.mrc.ac.uk)  
Website: [www.mrc.ac.uk](http://www.mrc.ac.uk)

Over the past century, the MRC has been at the forefront of scientific discovery to improve human health. Founded in 1913 to tackle tuberculosis, the MRC now invests taxpayers' money in the highest quality medical research across every area of health. Thirty-one MRC-funded researchers have won Nobel prizes in a wide range of disciplines, and MRC scientists have been behind such diverse discoveries as vitamins, the structure of DNA and the link between smoking and cancer, as well as achievements such as pioneering the use of randomised controlled trials, the invention of MRI scanning, and the development of therapeutic antibodies. We also work closely with the UK's Health Departments, the NHS, medical research charities and industry to ensure our research achieves maximum impact as well as being of excellent scientific quality.

## Natural Environment Research Council



Contact: Andy Jones  
Government and Parliament Communications Manager  
NERC, Polaris House, North Star Avenue, Swindon, SN2 1EU  
Tel: 01793 444238  
Mobile: 07867553053  
Email: [CONSPINQ@nerc.ac.uk](mailto:CONSPINQ@nerc.ac.uk)  
Website: [www.nerc.ac.uk](http://www.nerc.ac.uk)

NERC is the UK's leading public funder of environmental science. We invest £330 million each year in cutting-edge research, postgraduate training and innovation in universities and research centres.

Our scientists study the physical, chemical and biological processes on which our planet and life itself depends – from pole to pole, from the deep Earth and oceans to the atmosphere and space.

We partner with business, government, the public and the wider research community to shape the environmental research and innovation agenda. Our science provides knowledge, skills and technology that deliver sustainable economic growth and public wellbeing.



## Science & Technology Facilities Council

Contact: Natalie Bealing  
Head of Stakeholder Engagement  
STFC Rutherford Appleton Laboratory  
Harwell Campus, Didcot OX11 0QX  
Tel: 01235 445484  
E-mail: [natalie.bealing@stfc.ac.uk](mailto:natalie.bealing@stfc.ac.uk)  
[www.stfc.ac.uk](http://www.stfc.ac.uk)

The Science and Technology Facilities Council is one of Europe's largest multidisciplinary research organisations undertaking and supporting a broad range of research across the physical, life and computational sciences. We operate world class, large-scale research facilities in the UK and Europe and provide strategic advice to the UK Government on their development. We partner in two of the UK's Science and Innovation Campuses. We also manage international research projects in support of a broad cross-section of the UK research community, particularly in the fields of astronomy, nuclear physics and particle physics.



Contact: Dr Matt Norton  
3 Riverside, Granta Park  
Cambridge, CB21 6AD  
Tel: 01223 824575  
E-mail: [policy@alzheimersresearchuk.org](mailto:policy@alzheimersresearchuk.org)  
Website:  
<http://www.alzheimersresearchuk.org/>

Alzheimer's Research UK is the UK's leading dementia research charity. Currently, we support 132 projects worth over £26.4m and have committed over £60m to research since the charity began. As research specialists, we fund pioneering research at leading universities across the UK and the globe with the goal of defeating dementia. Our expertise brings together leading dementia scientists to share ideas and understanding. We work with people with dementia to reflect their concerns and firmly believe that science holds the key to defeating dementia.

## Association of the British Pharmaceutical Industry



Contact: Audrey Yvernault  
Head of Policy and Public Affairs  
7th Floor, Southside, 105 Victoria Street,  
London SW1E 6QT  
Tel: 020 7747 7136  
Email: [AYvernault@abpi.org.uk](mailto:AYvernault@abpi.org.uk)  
Website: [www.abpi.org.uk](http://www.abpi.org.uk)

The Association of the British Pharmaceutical Industry (ABPI) represents innovative research-based biopharmaceutical companies, large, medium and small, leading an exciting new era of biosciences in the UK. Our industry, a major contributor to the economy of the UK, brings life-saving and life-enhancing medicines to patients. Our members are researching and developing over two-thirds of the current medicines pipeline, ensuring that the UK remains at the forefront of helping patients prevent and overcome diseases. Topics we focus on include:

- All aspects of the research and development of medicines including clinical research and licensing
- Stratified medicine
- Vaccines, biosimilars, small and large molecules, cell therapy and regenerative medicine

## AIRTO



Contact: Professor Richard Brook OBE FREng  
AIRTO Ltd: Association of Innovation  
Research & Technology Organisations Limited  
c/o National Physical Laboratory  
Hampton Road, Teddington  
Middlesex TW11 0LW  
Tel: 020 8943 6600  
E-mail: [enquiries@airto.co.uk](mailto:enquiries@airto.co.uk)  
Twitter: @airtoinnovation  
Website: [www.airto.co.uk](http://www.airto.co.uk)

AIRTO – Association of Innovation, Research & Technology Organisations – is the foremost membership body for the UK's innovation, research and technology sector, representing 80% of organisations in the sector.

AIRTO's members deliver vital innovation and knowledge transfer services which include applied and collaborative R&D, (frequently in conjunction with universities), consultancy, technology validation and testing, incubation of commercialisation opportunities and early stage financing. AIRTO members have a combined turnover of over £5.5bn from clients both at home and outside the UK, and employ over 47,000 scientists, technologists and engineers.

## AMPS

AMPS

The Association of Management and Professional Staffs.

Contact:  
Tony Harding  
07895 162 896 for all queries whether for membership or assistance.  
Branch Office Address:  
Merchant Quay,  
Salford Quays, Salford  
M50 3SG.

Website: [www.amps-tradeunion.com](http://www.amps-tradeunion.com)

We are a Trades Union for Management and Professional Staff working in the pharmaceutical, chemical and allied industries.

We have produced a training programme funded by the EU on diversity and helping women managers remain in the workplace after a career break. This training programme is aimed at both men and women and is intended to address the shortfall in qualified personnel in the chemical and allied industries.

We are experts in performance based and field related issues and are affiliated to our counterparts in EU Professional Management Unions.



BIOCHEMICAL SOCIETY

Contact: Gabriele Butkute  
Science Policy Assistant  
Biochemical Society  
Charles Darwin House  
12 Roger Street, London WC1N 2JU  
Tel: +44 (0)20 7685 2401  
Email: [gabriele.butkute@biochemistry.org](mailto:gabriele.butkute@biochemistry.org)  
Website: [www.biochemistry.org](http://www.biochemistry.org)

The Biochemical Society works to support the advancement of the molecular biosciences; facilitating the circulation of knowledge and supporting innovation, raising awareness of the importance of our discipline in addressing societal grand challenges.

We achieve our mission by:

- Supporting the next generation of biochemists
- Bringing together molecular bioscientists; fostering connections and providing a platform for collaboration and networking
- Promoting and sharing knowledge through meetings, publications and public engagement
- Highlighting the role of molecular biosciences in interdisciplinary and translational research, while supporting the fundamental science that underpins applied studies

## The British Ecological Society



Contact: Jackie Caine, Policy Manager  
British Ecological Society  
12 Roger Street, London WC1N 2JU  
Email: [jackie@britishecologicalsociety.org](mailto:jackie@britishecologicalsociety.org)  
Tel: 020 7685 2510  
Website: [www.BritishEcologicalSociety.org](http://www.BritishEcologicalSociety.org)  
Ecology & Policy Blog  
<http://britishecologicalsociety.org/blog/>  
Twitter: @BESPolicy

The British Ecological Society's mission is to generate, communicate and promote ecological solutions. The Society has over 5,000 members worldwide, publishes five internationally renowned scientific journals and organises the largest scientific meeting for ecologists in Europe. Through its grants, the BES supports ecologists in developing countries, public engagement and research. The BES informs and advises Parliament and Government on ecological issues and is committed to ensuring that policy-makers have access to the best available evidence. The BES welcomes requests for assistance from parliamentarians.

## British In Vitro Diagnostics Association (BIVDA)



Contact: Doris-Ann Williams MBE  
Chief Executive  
British In Vitro Diagnostics Association  
Devonshire House  
164 – 168 Westminster Bridge Road  
London SE1 7RW  
Tel: 0845 6188224  
Email: [doris-ann@bivda.co.uk](mailto:doris-ann@bivda.co.uk)  
[www.bivda.co.uk](http://www.bivda.co.uk)

BIVDA is the UK industry association representing companies who manufacture and/or distribute the diagnostics tests and equipment to diagnose, monitor and manage disease largely through the NHS pathology services. Increasingly diagnostics are used outside the laboratory in community settings and also to identify those patients who would benefit from specific drug treatment particularly for cancer.

## British Nutrition Foundation



Contact: Professor Judy Buttriss,  
Director General  
Imperial House 6th Floor  
15-19 Kingsway  
London WC2B 6UN  
Tel: +44(0) 20 7557 7930  
Email: [postbox@nutrition.org.uk](mailto:postbox@nutrition.org.uk)  
Websites: [www.nutrition.org.uk](http://www.nutrition.org.uk)  
[www.foodafactoflife.org.uk](http://www.foodafactoflife.org.uk)

The British Nutrition Foundation (BNF), a registered charity, delivers impartial, authoritative and evidence-based information on food and nutrition. Its core purpose is to make nutrition science accessible to all, working with an extensive network of contacts across academia, education and the food chain, and through BNF work programmes focussing on education in schools and nutrition science communication.



Contact: Jonathan Brüun  
Chief Executive  
British Pharmacological Society  
The Schild Plot, 16 Angel Gate,  
City Road, London EC1V 2PT  
Tel: : 020 7239 0171  
Fax: 020 7417 0114  
Email: [jonathan.bruun@bps.ac.uk](mailto:jonathan.bruun@bps.ac.uk)  
Website: [www.bps.ac.uk](http://www.bps.ac.uk)

The British Pharmacological Society is a charity with a mission to promote and advance the whole spectrum of pharmacology. It is the primary UK learned society concerned with drugs and the way they work, and leads the way in the research and application of pharmacology around the world.

Founded in 1931, the Society champions pharmacology in all its forms, across academia, industry, regulatory agencies and the health service. With over 3,500 members from over 60 countries worldwide, the Society is a friendly and collaborative community. Enquiries about the discovery, development and application of drugs are welcome.

## The British Psychological Society



Contact: Tanja Siggs  
Policy Advisor - Legislation  
The British Psychological Society  
St Andrews House  
48 Princess Road East  
Leicester LE1 7DR  
Tel: 0116 252 9526  
Email: [tanja.siggs@bps.org.uk](mailto:tanja.siggs@bps.org.uk)  
Website: [www.bps.org.uk](http://www.bps.org.uk)

The British Psychological Society is an organisation of 50,000 members governed by Royal Charter. It maintains the Register of Chartered Psychologists, publishes books, 11 primary science Journals and organises conferences. Requests for information about psychology and psychologists from parliamentarians are very welcome.

## British Society of Soil Science



Contact: Ian Brown  
LR8, Vincent Building, Cranfield University,  
Cranfield, Bedfordshire MK43 0AL  
Tel: 01234 752983  
E-mail: [admin@soils.org.uk](mailto:admin@soils.org.uk)  
Website: [www.soils.org.uk](http://www.soils.org.uk)

The British Society of Soil Science (BSSS) or "BS cubed" as it is fondly known was founded in 1947 by a number of eminent British soil scientists. It was formed with the aims: to advance the study of soil; to be open to membership from all those with an interest in the study and uses of soil; and to issue an annual publication.



Contact: Dr Christopher Flower  
Josaron House  
5-7 John Princes Street  
London W1G 0JN  
Tel: 020 7491 8891  
E-mail: [info@ctpa.org.uk](mailto:info@ctpa.org.uk)  
Website: [www.ctpa.org.uk](http://www.ctpa.org.uk) &  
[www.thefactsabout.co.uk](http://www.thefactsabout.co.uk)

CTPA is the UK trade association representing manufacturers of cosmetic products and suppliers to the cosmetic products industry. 'Cosmetic products' are legally defined and subject to stringent EU safety laws. CTPA is the authoritative public voice of a vibrant and responsible UK industry trusted to act for the consumer; ensuring the science behind cosmetics is fully understood.



The British Society for  
Antimicrobial Chemotherapy

Mrs Tracey Guise  
Chief Executive Officer  
British Society for Antimicrobial Chemotherapy  
Griffin House | 53 Regent Place | Birmingham  
B1 3NJ  
[www.bsac.org.uk](http://www.bsac.org.uk) | [www.antibiotic-action.com](http://www.antibiotic-action.com)  
[www.e-opat.com](http://www.e-opat.com) | [www.nas-pps.com](http://www.nas-pps.com)  
[www.appg-on-antibiotics.com](http://www.appg-on-antibiotics.com)  
[www.bsacsurv.org](http://www.bsacsurv.org)

The BSAC is an inter-professional organisation with over forty years of experience and achievement in antibiotic education, research and leadership. The Society has an active international membership and:

- Is dedicated to saving lives through the effective use and development of antibiotics, now and in the future.
- Communicates effectively about antibiotics and antibiotic usage via workshops, professional guidelines and its own high impact international journal, the Journal of Antimicrobial Chemotherapy.
- Is home to the UK-led global initiative Antibiotic Action
- Serves as secretariat to the All Party Parliamentary Group on Antibiotics

## Brunel University London



Contact: Geoff Rodgers  
Brunel University London  
Kingston Lane  
Uxbridge UB8 3PH  
Tel: 01895 265609  
Fax: 01895 269740  
E-mail: [g.j.rodgers@brunel.ac.uk](mailto:g.j.rodgers@brunel.ac.uk)  
Website: [www.brunel.ac.uk](http://www.brunel.ac.uk)

Brunel University London is an international research active university with 3 leading research institutes:

**Institute of Energy Futures:** Led by Professor Savvas Tassou, the main themes of the Institute are *Advanced Engines and Biofuels*, *Energy Efficient and Sustainable Technologies*, *Smart Power Networks*, and *Resource Efficient Future Cities*.

**Institute of Materials and Manufacturing:** The main themes of research are *Design for Sustainable Manufacturing*, *Liquid Metal Engineering*, *Materials Characterisation and Processing*, *Micro-Nano Manufacturing*, and *Structural Integrity*. The Institute is led by Professor Luiz Wrobel.

**Institute of Environment, Health and Societies:** Professor Susan Jobling leads this pioneering research institute whose themes are *Health and Environment*, *Healthy Ageing*, *Health Economics*, *Synthetic Biology*, *Biomedical Engineering and Healthcare Technologies*, and *Social Sciences and Health*.

Brunel University London offers a wide range of expertise and knowledge, and prides itself on having academic excellence at the core of its offer, and was ranked in the recent REF as 33rd in the UK for Research Power (average quality rating by number of submissions) and described by The Times Higher Education as one of the real winners of the REF 2014.

## Clifton Scientific Trust



Contact: Dr Eric Albone MBE  
Clifton Scientific Trust  
49 Northumberland Road, Bristol BS6 7BA  
Tel: 0117 924 7664 Fax: 0117 924 7664  
E-mail: [eric.albone@clifton-scientific.org](mailto:eric.albone@clifton-scientific.org)  
Website: [www.clifton-scientific.org](http://www.clifton-scientific.org)

Science for Citizenship and Employability,  
Science for Life, Science for Real

We build grass-roots partnerships between school and the wider world of professional science and its applications

- for young people of all ages and abilities
- experiencing science as a creative, questioning, human activity
- bringing school science added meaning and motivation, from primary to post-16
- locally, nationally, internationally (currently between Britain and Japan; also the Ukraine)

Clifton Scientific Trust Ltd is registered charity 1086933



Contact: Jo Revill, CEO  
Vintage House  
37 Albert Embankment  
London SE1 7TL  
Tel: 020 3031 9800  
Fax: 020 7582 2882  
E-mail: [bsi@immunology.org](mailto:bsi@immunology.org)  
Website: [www.immunology.org](http://www.immunology.org)

The BSI is one of the oldest, largest and most active immunology societies in the world. We have over 5,000 members who work in all areas of immunology, including research and clinical practice.

The BSI runs major scientific meetings, education programmes and events for all ages. We disseminate top quality scientific research through our journals and meetings and we are committed to bringing the wonders and achievements of immunology to as many audiences as possible.

## Cavendish Laboratory



Contact: Departmental Administrator,  
The Cavendish Laboratory,  
J J Thomson Avenue, Cambridge CB3 0HE, UK.  
E-mail: [glw33@cam.ac.uk](mailto:glw33@cam.ac.uk)  
<http://www.phy.cam.ac.uk>

The Cavendish Laboratory houses the Department of Physics of the University of Cambridge.

The research programme covers the breadth of contemporary physics

**Extreme Universe:** Astrophysics, cosmology and high energy physics

**Quantum Universe:** Cold atoms, condensed matter theory, scientific computing, quantum matter and semiconductor physics

**Materials Universe:** Optoelectronics, nanophotonics, detector physics, thin film magnetism, surface physics and the Winton programme for the physics of sustainability

**Biological Universe:** Physics of medicine, biological systems and soft matter

The Laboratory has world-wide collaborations with other universities and industry

## The Council for the Mathematical Sciences



Contact: Lindsay Walsh  
De Morgan House  
57-58 Russell Square  
London WC1B 4HS  
Tel: 020 7637 3686  
Fax: 020 7323 3655  
Email: [cms@lms.ac.uk](mailto:cms@lms.ac.uk)  
Website: [www.cms.ac.uk](http://www.cms.ac.uk)

The Council for the Mathematical Sciences is an authoritative and objective body that works to develop, influence and respond to UK policy issues affecting mathematical sciences in higher education and research, and therefore the UK economy and society by:

- providing expert advice;
- engaging with government, funding agencies and other decision makers;
- raising public awareness; and
- facilitating communication between the mathematical sciences community and other stakeholders

## Eli Lilly and Company Ltd



Contact: Thom Thorp, Senior Director, Corporate Affairs  
 Tel: 01256 315000  
 Fax: 01256 775858  
 Eli Lilly and Company Ltd, Lilly House  
 Priestley Road, Basingstoke, Hants,  
 RG24 9NL  
 Email: [thorpth@lilly.com](mailto:thorpth@lilly.com)  
 Website: [www.lilly.co.uk](http://www.lilly.co.uk)

Lilly UK is the UK affiliate of a major American pharmaceutical manufacturer, Eli Lilly and Company of Indianapolis. This affiliate is one of the UK's top pharmaceutical companies with significant investment in science and technology including a neuroscience research and development centre and bulk biotechnology manufacturing operations.

Lilly medicines treat schizophrenia, diabetes, cancer, osteoporosis, attention deficit hyperactivity disorder, erectile dysfunction, depression, bipolar disorder, heart disease and many other diseases.

## Energy Institute



Contact: Louise Kingham OBE FEI  
 Chief Executive  
 61 New Cavendish Street  
 London W1G 7AR  
 Tel: 020 7467 7100  
 Email: [info@energyinst.org](mailto:info@energyinst.org)  
 Website: [www.energyinst.org](http://www.energyinst.org)

The Energy Institute (EI) is the chartered professional body for the energy sector, supporting over 22,000 individuals and 200 companies worldwide. The EI provides learning and networking opportunities, professional recognition and technical and scientific knowledge resources on energy in all its forms and applications.

The EI's purpose is to develop and disseminate knowledge, skills and good practice towards a safe, secure and sustainable energy system. It addresses the depth and breadth of the energy sector and informs policy by providing a platform for debate and scientifically-sound information.

A registered charity, the EI serves society with independence, professionalism and a wealth of expertise in all energy matters.

## EngineeringUK

Tamzin Caffrey  
 Head of Communications  
 EngineeringUK  
 5th Floor, Woolgate Exchange  
 25 Basinghall Street, London EC2V 5HA  
 Tel: 020 3206 0444  
 Fax: 020 3206 0401  
 E-mail: [tcaffrey@engineeringuk.com](mailto:tcaffrey@engineeringuk.com)  
 Website: [www.EngineeringUK.com](http://www.EngineeringUK.com)

EngineeringUK is an independent organisation that promotes the vital role of engineers, engineering and technology in our society. EngineeringUK partners business and industry, Government and the wider science and technology community: producing evidence on the state of engineering; sharing knowledge within engineering, and inspiring young people to choose a career in engineering, matching employers' demand for skills.

## Fera



Contact: Director of Science  
 Fera Science Ltd. (Fera)  
 Sand Hutton, York, YO41 1LZ  
 Tel: 01904 462000  
 E-mail: [chiefscientistoffice@fera.co.uk](mailto:chiefscientistoffice@fera.co.uk)  
 Website: [www.fera.co.uk](http://www.fera.co.uk)

Fera provides expert analytical and professional services to governments, agricultural companies, food retailers, manufacturers and farmers to facilitate safety, productivity and quality across the agrifood supply chain in a sustainable and environmentally compatible way.

Fera uses its world leading scientific expertise to provide robust evidence, rigorous analysis and professional advice to governments, international bodies and companies worldwide. Our food integrity, plant health, agri-tech and agri-informatics services ensure that our customers have access to leading edge science, technology and expertise.

## First Group



Contact: Mac Andrade  
 Director Infrastructure  
 First Group  
 4th Floor, Capital House  
 25 Chapel Street  
 London NW1 5DH  
 E-mail: [mac.andrade@firstgroup.com](mailto:mac.andrade@firstgroup.com)  
 Website: [www.firstgroup.com](http://www.firstgroup.com)

FirstGroup is the leading transport operator in the UK and North America.

Our services help create strong, vibrant and sustainable local economies and our opportunity is to be the provider of choice for our customers and communities. During the last year around 2.5 billion people relied on us to get to work, to education, to visit family and friends and much more.

## GAMBICA Association Ltd



Contact: Dr Graeme Philp  
 Broadwall House  
 21 Broadwall  
 London SE1 9PL  
 Tel: 020 7642 8080  
 Fax: 020 7642 8096  
 E-mail: [assoc@gambica.org.uk](mailto:assoc@gambica.org.uk)  
 Website: [www.gambica.org.uk](http://www.gambica.org.uk)

GAMBICA Association is the UK trade association for instrumentation, control, automation and laboratory technology. The association seeks to promote the successful development of the industry and assist its member companies through a broad range of services, including technical policy and standards, commercial issues, market data and export services.

## The Geological Society



Contact: Nic Bilham  
 Director of Policy and Communications  
 Burlington House  
 Piccadilly  
 London W1J 0BG  
 Tel: 020 7434 9944  
 Fax: 020 7439 8975  
 E-mail: [nic.bilham@geolsoc.org.uk](mailto:nic.bilham@geolsoc.org.uk)  
 Website: [www.geolsoc.org.uk](http://www.geolsoc.org.uk)

The Geological Society is the national learned and professional body for Earth sciences, with 12,000 Fellows (members) worldwide. The Fellowship encompasses those working in industry, academia and government, with a wide range of perspectives and views on policy-relevant science, and the Society is a leading communicator of this science to government bodies and other non-technical audiences.

## Glass and Glazing Federation



Contact: James Lee  
 54 Ayres Street  
 London SE1 1EU  
 Tel: 020 7939 9100  
 Fax: 0870 042 4266  
 E-mail: [info@ggf.org.uk](mailto:info@ggf.org.uk)  
 Website: [www.ggf.org.uk](http://www.ggf.org.uk)

The GGF is the main representative organisation for companies involved in all aspects of the manufacture of flat glass and products and services for all types of glazing, in commercial and domestic sectors.

Members include companies that manufacture and install energy efficient windows, in homes and commercial buildings, the performance glass used in every type of building from houses to high-rise tower blocks and the components that are used to manufacture every type of glazing.

## Institute of Food Science + Technology ifst

Contact: Delia Mertoïu  
 5 Cambridge Court  
 210 Shepherds Bush Road  
 London W6 7NJ  
 Tel: 020 7603 6316  
 E-mail: [info@ifst.org](mailto:info@ifst.org)  
 Website: [www.ifst.org](http://www.ifst.org)

IFST is the independent qualifying body for food professionals in Europe. Membership is drawn from all over the world from backgrounds including industry, universities, government, research and development and food law enforcement.

IFST's activities focus on disseminating knowledge relating to food science and technology and promoting its application. Another important element of our work is to promote and uphold standards amongst food professionals.

## Institute of Marine Engineering, Science and Technology (IMarEST)



Contact: Bev Mackenzie  
Institute of Marine Engineering, Science and Technology (IMarEST), Aldgate House, 33 Aldgate High Street, London, EC3N 1EN  
Tel: +44(0) 20 7382 2600  
Fax: +44(0) 20 7382 2667  
E-mail: [technical@imarest.org](mailto:technical@imarest.org)  
Website: [www.imarest.org](http://www.imarest.org)

Established in London in 1889, the IMarEST is a leading international membership body and learned society for marine professionals, with over 15,000 members worldwide. The IMarEST has an extensive marine network of 50 international branches, affiliations with major marine societies around the world, representation on the key marine technical committees and non-governmental status at the International Maritime Organization (IMO) as well as other intergovernmental organisations.

## Institute of Measurement and Control



Contact: Mr Peter Martindale,  
CEO and Secretary  
The Institute of Measurement and Control  
87 Gower Street, London WC1E 6AF  
Tel: +44 (0) 20 73874949  
Fax: +44 (0) 20 73888431  
E-mail: [ceo@instmc.org.uk](mailto:ceo@instmc.org.uk)  
Website: [www.instmc.org.uk](http://www.instmc.org.uk)  
Reg Charity number: 269815

The Institute of Measurement and Control provides a forum for personal contact amongst practitioners, publishes learned papers and is a professional examining and qualifying organisation able to confer the titles Eurlng, CEng, IEng, EngTech; Companies and Universities may apply to become Companions. Headquartered in London, the Institute has a strong regional base with 15 UK, 1 Hong Kong and 1 Malaysia Local Section, a bilateral agreement with the China Instrument Society and other major international links.

## IOP Institute of Physics

Contact: Alex Connor  
76 Portland Place, London W1B 1NT  
Tel: 020 7470 4819  
E-mail: [alex.connor@iop.org](mailto:alex.connor@iop.org)  
Website: [www.iop.org](http://www.iop.org)

The Institute of Physics is a leading scientific society. We are a charitable organisation with a worldwide membership of more than 50,000, working together to advance physics education, research and application.

We engage with policymakers and the general public to develop awareness and understanding of the value of physics and, through IOP Publishing, we are world leaders in professional scientific communications.

In September 2013, we launched our first fundraising campaign. Our campaign, Opportunity Physics, offers you the chance to support the work that we do.

Visit us at [www.iop.org](http://www.iop.org), follow us @physicsnews



## Institute of Physics and Engineering in Medicine

Contact: Rosemary Cook CBE (CEO)  
Fairmount House, 230 Tadcaster Road,  
York, YO24 1ES  
Tel: 01904 610821 Fax: 01904 612279  
E-mail: [rosemary.cook@ipem.ac.uk](mailto:rosemary.cook@ipem.ac.uk)  
Website: [www.ipem.ac.uk](http://www.ipem.ac.uk)

IPEM is a registered, incorporated charity for the advancement, in the public interest, of physics and engineering applied to medicine and biology. Its members are medical physicists, clinical and bio-engineers, and clinical technologists. It organises training and CPD for them, and provides opportunities for the dissemination of knowledge through publications and scientific meetings. IPEM is licensed by the Science Council to award CSci, RSci and RSciTech, and by the Engineering Council to award CEng, IEng and EngTech.



## The Institution of Chemical Engineers

With over 42,000 members in 120 countries, IChemE is the global membership organisation for chemical engineers. A not for profit organisation, we serve the public interest by building and sustaining an active professional community and promoting the development, understanding and application of chemical engineering worldwide.

Alana Collis, Technical policy manager  
+44 (0) 1788 534459  
[acollis@icheme.org](mailto:acollis@icheme.org)  
[www.icheme.org](http://www.icheme.org)

Kuala Lumpur | London | Melbourne | Rugby | Singapore | Wellington

## Institution of Civil Engineers



Contact: Alex Green-Wilkes,  
Public Affairs Manager,  
One Great George Street, Westminster,  
London SW1P 3AA, UK  
Tel: 020 7665 2109  
E-mail: [alex.green-wilkes@ice.org.uk](mailto:alex.green-wilkes@ice.org.uk)  
Website: [www.ice.org.uk](http://www.ice.org.uk)

Established in 1818 and with over 86,000 members in 167 countries worldwide, ICE is a leading source of expertise in infrastructure and engineering policy and is widely seen as the independent voice of infrastructure. ICE provides advice to all political parties and works with industry to ensure that civil engineering and construction remain major contributors to the UK economy.

## Institution of Engineering Designers



Contact: Libby Meyrick  
Courtleigh  
Westbury Leigh  
Westbury  
Wiltshire BA13 3TA  
Tel: 01373 822801  
Fax: 01373 858085  
E-mail: [ied@ied.org.uk](mailto:ied@ied.org.uk)  
Website: [www.ied.org.uk](http://www.ied.org.uk)

The only professional membership body solely for those working in engineering and technological product design. Engineering Council and Chartered Environmentalist registration for suitably qualified members. Membership includes experts on a wide range of engineering and product design disciplines, all of whom practise, manage or educate in design. **New for 2015: Chartership for Product Designers (CTPD).**



Contact: Paul Davies  
IET,  
Michael Faraday House,  
Six Hills Way,  
Stevenage,  
SG1 2AY  
Tel: +44(0) 1438 765687  
Email: [pdavies@theiet.org](mailto:pdavies@theiet.org)  
Web: [www.theiet.org](http://www.theiet.org)

The IET is a world leading professional organisation, sharing and advancing knowledge to promote science, engineering and technology across the world. Dating back to 1871, the IET has over 163,000 members in 127 countries with offices in Europe, North America, and Asia-Pacific.

## Institution of Mechanical Engineers



Contact: Richard Campbell  
1 Birdcage Walk  
London SW1H 9JJ  
Tel: 020 7973 1293  
E-mail: [publicaffairs@imeche.org](mailto:publicaffairs@imeche.org)  
Website: [www.imeche.org](http://www.imeche.org)

The Institution provides politicians and civil servants with information, expertise and advice on a diverse range of subjects, focusing on manufacturing, energy, environment, transport and education policy. We regularly publish policy statements and host political briefings and policy events to establish a working relationship between the engineering profession and parliament.

## LGC



Queens Road, Teddington  
Middlesex, TW11 0LY  
Tel: +44 (0)20 8943 7000  
Fax: +44 (0)20 8943 2767  
E-mail: [info@lgcgroup.com](mailto:info@lgcgroup.com)  
Website: [www.lgcgroup.com](http://www.lgcgroup.com)

LGC is an international science-based company and market leader in the provision of analytical, forensic and diagnostic services and reference standards to customers in the public and private sectors.

Under the Government Chemist function, LGC fulfils specific statutory duties as the referee analyst and provides advice for Government and the wider analytical community on the implications of analytical chemistry for matters of policy, standards and regulation. LGC is also the UK's designated National Measurement Institute for chemical and biochemical analysis.

With headquarters in Teddington, South West London, LGC has 36 laboratories and centres across Europe and at sites in China, Brazil, India, South Africa and the US.



Contact: Dr Elizabeth Rollinson,  
Executive Secretary  
The Linnean Society of London  
Burlington House, Piccadilly,  
London W1J 0BF  
Tel: 020 7434 4479 ext 12  
E-mail: [elizabeth@linnean.org](mailto:elizabeth@linnean.org)  
Website: [www.linnean.org](http://www.linnean.org)

As the world's oldest biological society, the Linnean Society of London is an essential forum and meeting point for those interested in natural history. The Society holds regular public events, publishes three peer-reviewed journals, promotes the study of the natural world with several educational initiatives and is home to a world famous library and collection of natural history specimens. The Society's Fellows have a considerable range of biological expertise that can be harnessed to inform and advise on scientific and public policy issues.

*A Forum for Natural History*

## L'ORÉAL UK AND IRELAND

Contact: Anna Lucuk,  
Director of Corporate Communication,  
L'Oréal UK & Ireland  
255 Hammersmith Road, London W6 8AZ  
Tel: 0208 762 4374  
E-mail: [anna.lucuk@loreal.com](mailto:anna.lucuk@loreal.com)  
Website: [www.loreal.co.uk](http://www.loreal.co.uk)

L'Oréal employs more than 3,800 researchers world-wide and dedicates over €850 million each year to research and innovation in the field of healthy skin and hair. The company supports women in science research through the L'Oréal UNESCO For Women In Science Programme and engages young people with science through the L'Oréal Young Scientist Centre at the Royal Institution. L'Oréal also collaborates with a vast number of institutions in the UK and globally.

## Marine Biological Association



Contact: Dr Matthew Frost  
Marine Biological Association,  
The Laboratory, Citadel Hill, Plymouth, PL1 2PB  
Tel: 07848028388  
Fax: 01752 633102  
E-mail: [matfr@mba.ac.uk](mailto:matfr@mba.ac.uk)  
Website: [mba.ac.uk](http://mba.ac.uk)

Since 1884 the Marine Biological Association has been delivering its mission 'to promote scientific research into all aspects of life in the sea, including the environment on which it depends, and to disseminate to the public the knowledge gained.' The MBA represents its members in providing a clear independent voice to government on behalf of the marine biological community. It also has an extensive research programme and a long history as an expert provider of advice for the benefit of policy makers and wider society.

## Met Office



Contact: Dr Matt Huddleston  
Met Office  
127 Clerkenwell Road  
London EC1R 5LP  
Tel: 020 7204 7469  
E-mail: [matt.huddleston@metoffice.gov.uk](mailto:matt.huddleston@metoffice.gov.uk)  
Website: [www.metoffice.gov.uk](http://www.metoffice.gov.uk)

The Met Office doesn't just forecast the weather on television. Our forecasts and warnings protect UK communities and infrastructure from severe weather and environmental hazards every day – they save lives and money. Our Climate Programme delivers evidence to underpin Government policy through the Met Office Hadley Centre. Our Mobile Meteorological Unit supports the Armed Forces around the world. We build capacity overseas in support of international development. All of this built on world-class environmental science.



Contact: Dariel Burdass  
Deputy Chief Executive  
Microbiology Society  
Charles Darwin House  
12 Roger Street, London  
WC1N 2JU  
E-mail: [d.burdass@microbiologysociety.org](mailto:d.burdass@microbiologysociety.org)  
Website: [www.microbiologysociety.org](http://www.microbiologysociety.org)

The Microbiology Society is the largest learned microbiological society in Europe with a worldwide membership based in universities, industry, hospitals, research institutes and schools. The Society publishes key academic journals, organises international scientific conferences and provides an international forum for communication among microbiologists. The Society promotes the understanding of microbiology to a diverse range of stakeholders, including policy-makers, students, teachers, journalists and the wider public, through a comprehensive framework of communication activities and resources.

## National Physical Laboratory



Contact: Fiona Auty  
National Physical Laboratory  
Hampton Road, Teddington  
Middlesex TW11 0LW  
Tel: 020 8977 3222  
Website: [www.npl.co.uk/contact-us](http://www.npl.co.uk/contact-us)

The National Physical Laboratory (NPL) is the United Kingdom's national measurement institute, an internationally respected and independent centre of excellence in research, development and knowledge transfer in measurement and materials science. For more than a century, NPL has developed and maintained the nation's primary measurement standards - the heart of an infrastructure designed to ensure accuracy, consistency and innovation in physical measurement.

## Natural History Museum



Contact: John Jackson  
Head of Science Policy and Communication  
Natural History Museum  
Cromwell Road, London SW7 5BD  
Tel: +44 (0)20 7942 5257  
E-mail: [j.jackson@nhm.ac.uk](mailto:j.jackson@nhm.ac.uk)  
Website: [www.nhm.ac.uk](http://www.nhm.ac.uk)

We challenge the way people think about the natural world – its past, present and future

We use our unique collection and unrivalled expertise to tackle the biggest challenges facing the world today.

We are leaders in the scientific understanding of the origin of our planet, life on it and can predict the impact of future change.

We study the diversity of life and the delicate balance of ecosystems to ensure the survival of our planet.

We help enable food security, eradicate disease and manage resource scarcity.

We inspire people to engage with science to solve major societal challenges.

## NEF: The Innovation Institute



Contact: Michelle Medhat  
NEF: The Innovation Institute  
29 Harley Street  
London W1G 9QR  
Tel: 0208 786 3677  
E-mail: [info@thenef.org.uk](mailto:info@thenef.org.uk)  
Website: [www.thenef.org.uk](http://www.thenef.org.uk)

The Innovation Institute aims to drive innovation and growth in science, technology and engineering to achieve growth, prosperity and wellbeing in the UK. Our partners, clients and stakeholders include:

- Businesses
- Education providers
- Government bodies

New Engineering Foundation, our charitable arm, focusses on SciTech skills development. NEF work in vocational training and further education is supported by a Panel drawn from key industries.

Our Institute of Innovation and Knowledge Exchange is a professional body and a "do tank", led by the Innovation Council to support the role of innovation in society.



Contact: Nick Allen  
Executive Officer  
Boughton Green Road,  
Northampton, NN2 7AL  
Tel: 01604 735500  
Fax: 01604 716502  
E-mail: [nick.allen@northampton.ac.uk](mailto:nick.allen@northampton.ac.uk)  
Website: [www.northampton.ac.uk](http://www.northampton.ac.uk)

The University of Northampton is an institution committed to science education through initial teacher training, a STEM Ambassador network which works within the community and teaching and research to doctoral level. We are an Ashoka U 'Changemaker Campus' status university recognising our commitment to social innovation and entrepreneurship.



The University of  
**Nottingham**

UNITED KINGDOM · CHINA · MALAYSIA

Contact: Alex Miles  
Deputy Director, External Relations  
(Public Affairs)  
University Park, Nottingham, NG7 2RD  
E-mail: [alex.miles@nottingham.ac.uk](mailto:alex.miles@nottingham.ac.uk)  
Mobile: 07917115197  
Twitter: @AlextoMiles  
[www.nottingham.ac.uk](http://www.nottingham.ac.uk)

With 43,000 students and campuses in Nottingham, China and Malaysia, The University of Nottingham is 'the nearest Britain has to a truly global university'. With more than 97 per cent of research at the University recognised internationally according to the Research Excellence Framework 2014, the University is ranked in the top 1% of the world's universities by the QS World University Rankings.

# PHARMAQ

## PHARMAQ Ltd

Contact: Dr Benjamin P North  
PHARMAQ Ltd  
Unit 15 Sandheath Industrial Estate  
Fordingbridge  
Hants SP6 1PA.  
Tel: 01425 656081  
E-mail: [ben.north@pharmaq.no](mailto:ben.north@pharmaq.no)  
Website: [www.pharmaq.no](http://www.pharmaq.no)

PHARMAQ is the only global pharmaceutical company with a primary focus on aquaculture. Our mission is to provide environmentally sound, safe and efficacious health products to the global aquaculture industry through targeted research and the commitment of dedicated people. We have a product portfolio that includes over 20 fish vaccines along with specialist feed additives, anaesthetics, antibiotics, sea lice treatments and biocide disinfectants. Through our sister company, PHARMAQ Analytiq, we also offer a range of diagnostics services that can be used to help safeguard fish welfare and improve productivity.



Contact: Henry Lovett  
Policy & Public Affairs Officer  
Hodgkin Huxley House  
30 Farringdon Lane  
London EC1R 3AW  
Tel: +44 (0) 20 7269 5722  
E-mail: [hlovett@physoc.org](mailto:hlovett@physoc.org)  
Website: [www.physoc.org](http://www.physoc.org)

Physiology is the science of how molecules, cells and organs work in the body. Representing over 3500 life scientists, The Physiological Society supports scientific research through its grants schemes, conferences and its three open access journals.

The Society also supports the teaching of physiology in schools and universities, and works to promote an understanding of physiology amongst policy-makers and the general public.

## Prospect



Contact: Sue Ferns,  
Director of Communications and Research,  
New Prospect House  
8 Leake St, London SE1 7NN  
Tel: 020 7902 6639 Fax: 020 7902 6637  
E-mail: [sue.ferns@prospect.org.uk](mailto:sue.ferns@prospect.org.uk)  
[www.prospect.org.uk](http://www.prospect.org.uk)

Prospect is an independent, thriving and forward-looking trade union with 117,000 members across the private and public sectors and a diverse range of occupations. We represent scientists, technologists and other professions in the civil service, research councils and private sector.

Prospect's collective voice champions the interests of the engineering and scientific community to key opinion-formers and policy makers. With negotiating rights with over 300 employers, we seek to secure a better life at work by putting members' pay, conditions and careers first.



Contact: Dr Andrew Muir  
c/o STFC Innovations Ltd  
Harwell Campus Oxford OX11 0QX  
Tel: 0121 710 1990  
E-mail: [Andrew.muir@midven.co.uk](mailto:Andrew.muir@midven.co.uk)  
Website: [www.rainbowseedfund.com](http://www.rainbowseedfund.com)

The Rainbow Seed Fund is a £24m, early-stage venture capital fund dedicated to kick-starting promising technology companies emerging from the UK science base. The Fund is backed by ten UK publicly-funded research organisations and the Department of Business, Innovation and Skills and holds investments in some of the UK's most innovative companies in areas as diverse as novel antibiotics, research into Alzheimer's disease, "green" chemicals and airport security. The Fund is managed by Midven, a specialist venture capital company. We are prepared to invest early and help build a proposition to attract additional investment and get to market.



Contact: Helen Wilkinson  
Dallam Court, Dallam Lane  
Warrington, WA2 7LT  
Tel: 01925 41 3984  
E-mail: [helen.wilkinson@risksol.co.uk](mailto:helen.wilkinson@risksol.co.uk)  
Website: [www.risksol.co.uk](http://www.risksol.co.uk)

Risk Solutions helps our clients make better decisions in a complex and uncertain world.

Using traditional qualitative and quantitative methods, combined with cutting-edge participative approaches, we work with clients from across the public and private sectors, their stakeholders and customers, to bring a depth of understanding of the issues and to develop consensus about how to tackle them.

Our small, highly motivated and client focused team delivers:

- policy design, appraisal and decision support
- risk assessment and risk based strategies and plans
- evaluation, assurance and organisational review, and
- training, coaching and guidance.



ROYAL  
ACADEMY OF  
**ENGINEERING**

Contact: Junour Blake  
External Relations Manager  
Royal Academy of Engineering  
3 Carlton House Terrace  
London SW1Y 5DG  
Tel: 020 7766 0600  
E-mail: [juniour.blake@raeng.org.uk](mailto:juniour.blake@raeng.org.uk)  
Website: [www.raeng.org.uk](http://www.raeng.org.uk)

As the UK's national academy for engineering, we bring together the most successful and talented engineers for a shared purpose: to advance and promote excellence in engineering. We have four strategic challenges: drive faster and more balanced economic growth; foster better education and skills; lead the profession; and promote engineering at the heart of society.

## Royal Botanic Gardens, Kew



Contact: Office of the Science Directorate  
Royal Botanic Gardens, Kew  
Richmond, Surrey, TW9 3AB  
Tel: 020 8332 5050/5248  
Email: [scienceadmin@kew.org](mailto:scienceadmin@kew.org)  
Website: [www.kew.org](http://www.kew.org)

RBG Kew is a centre of global scientific expertise in plant and fungal diversity, conservation, and sustainable use, housed in two world-class gardens. Our scientific vision is to document and understand global plant and fungal diversity and its uses, bringing authoritative expertise to bear on the critical challenges facing humanity today.

Kew's strategic priorities for science are:

1. To document and conduct research into global plant and fungal diversity and its uses for humanity.
2. To curate and provide data-rich evidence from Kew's unrivalled collections as a global asset for scientific research.
3. To disseminate our scientific knowledge of plants and fungi, maximising its impact in science, education, conservation policy and management.

These priorities enable us to curate, use, enhance, explore and share Kew's global resource, providing robust data and a strong evidence base for our UK and global stakeholders. Kew is a non-departmental government body with exempt charitable status, partially funded by Defra.



## The Royal Institution Science Lives Here

Contact: Dr Gail Cardew  
Director of Science and Education  
The Royal Institution  
21 Albemarle Street, London W1S 4BS  
Tel: 020 7409 2992 Fax: 020 7670 2920  
E-mail: gcardew@ri.ac.uk  
Websites: [www.rigb.org](http://www.rigb.org),  
[www.richannel.org](http://www.richannel.org)  
Twitter: [ri\\_science](https://twitter.com/ri_science)

The Royal Institution (Ri) has been at the forefront of public engagement with science for over 200 years and our purpose is to encourage people to think further about the wonders of science. We run public events and the famous CHRISTMAS LECTURES®, a national programme of Masterclasses for young people in mathematics, engineering and computer science, educational activities at the L'Oréal Young Scientist Centre and policy discussions with science students. And through the Ri Channel we share the stories behind cutting-edge science with people around the world.

## The Royal Society



Contact: Becky Purvis  
Head of Public Affairs  
The Royal Society, 6-9 Carlton House Terrace  
London SW1Y 5AG.  
Tel: 020 7451 2261  
Email: [becky.purvis@royalsociety.org](mailto:becky.purvis@royalsociety.org)  
Website: [www.royalsociety.org](http://www.royalsociety.org)

The Royal Society is the UK academy of science comprising 1400 outstanding individuals representing the sciences, engineering and medicine. It has had a hand in some of the most innovative and life-changing discoveries in scientific history. Through its Fellowship and permanent staff, it seeks to ensure that its contribution to shaping the future of science in the UK and beyond has a deep and enduring impact.

## Royal Society of Biology



Contact: Dr Stephen Benn  
Director of Parliamentary Affairs  
Royal Society of Biology  
Charles Darwin House  
12 Roger Street  
London WC1N 2JU  
Tel: 020 7685 2550  
E-mail: [stephen.benn@rsb.org.uk](mailto:stephen.benn@rsb.org.uk)  
Website: [www.rsb.org.uk](http://www.rsb.org.uk)

The Royal Society of Biology is a single unified voice, representing a diverse membership of individuals, learned societies and other organisations. We are committed to ensuring that we provide Government and other policy makers – including funders of biological education and research – with a distinct point of access to authoritative, independent, and evidence-based opinion, representative of the widest range of bioscience disciplines. Our vision is of a world that understands the true value of biology and how it can contribute to improving life for all.



Contact: Clare Viney  
Executive Director, Communications,  
Policy and Campaigns  
Royal Society of Chemistry, Thomas Graham  
House (290), Science Park, Milton Road,  
Cambridge, CB4 0WF  
Tel 020 7440 2267  
Email [vineyc@rsc.org](mailto:vineyc@rsc.org)  
Website: [www.rsc.org](http://www.rsc.org)

The Royal Society of Chemistry is the world's leading chemistry community, advancing excellence in the chemical sciences. With over 50,000 members and a knowledge business that spans the globe, we are the UK's professional body for chemical scientists; a not-for-profit organisation with 170 years of history and an international vision of the future. We promote, support and celebrate chemistry. We work to shape the future of the chemical sciences – for the benefit of science and humanity.

## Society for Applied Microbiology



Contact: Lucy Harper  
Society for Applied Microbiology  
Bedford Heights, Brickhill Drive  
Bedford MK41 7PH  
Tel: 01234 326661  
Fax: 01234 326678  
E-mail: [lucy@sfam.org.uk](mailto:lucy@sfam.org.uk)  
Website: [www.sfam.org.uk](http://www.sfam.org.uk)

SfAM is a UK organization, serving microbiologists internationally. It works to advance, for the benefit of the public, the science of microbiology in its application to the environment, human and animal health, agriculture, and industry. With Wiley-Blackwell, SfAM publishes five internationally acclaimed journals. Value for money and a modern, innovative and progressive outlook are its core principles. A friendly society, SfAM values integrity, honesty, and respect, and seeks to promote excellence and professionalism and to inspire young microbiologists.

## Society for Underwater Technology



Society for Underwater Technology  
Contact: David Liddle, Business  
Development Executive  
1 Fetter Lane, London EC4A 1 BR  
Tel: 020 3440 5535  
Fax: 020 3440 5980  
E-mail: [info@sut.org](mailto:info@sut.org)  
Website: [www.sut.org](http://www.sut.org)

The SUT is a multidisciplinary learned society that brings together individuals and organisations with a common interest in underwater technology, ocean science, and offshore/subsea engineering. The society was founded in 1966 and has members from over 40 countries, including engineers, scientists, other professionals and students working in these areas.

## Science Chemistry Innovation



Contact: Reshna Radiven  
SCI  
14-15 Belgrave Square  
London SW1X 8PS  
Tel: 020 7598 1500  
E-mail: [reshna.radiven@soci.org](mailto:reshna.radiven@soci.org)  
Website: [www.soci.org](http://www.soci.org)

The Society of Chemical Industry (SCI) is a unique multi-science and multi-disciplinary forum that connects Scientists and Business people. Established in 1881, as a hub for innovation, by leading scientists, inventors, entrepreneurs and investors, SCI continues to work in this way. Many current SCI members include leaders and innovators representing many different areas of industry and academia.

SCI's community promotes applied science through more than 100 conferences and events each year, 7 leading scientific journals and Chemistry and Industry magazine. We also support and celebrate science through bursaries and awards for a spectrum of scientific areas.

## Society of Cosmetic Scientists



Contact: Gem Bektas,  
Secretary General  
Society of Cosmetic Scientists  
Suite 109 Christchurch House  
40 Upper George Street  
Luton Bedfordshire LU1 2RS  
Tel: 01582 726661  
Fax: 01582 405217  
E-mail: [secretariat@scs.org.uk](mailto:secretariat@scs.org.uk)  
Website: [www.scs.org.uk](http://www.scs.org.uk)

Advancing the science of cosmetics is the primary objective of the SCS. Cosmetic science covers a wide range of disciplines from organic and physical chemistry to biology and photo-biology, dermatology, microbiology, physical sciences and psychology.

Members are scientists and the SCS helps them progress their careers and the science of cosmetics ethically and responsibly. Services include publications, educational courses and scientific meetings.

## Society of Maritime Industries



Contact: John Murray  
Society of Maritime Industries  
28-29 Threadneedle Street,  
London EC2R 8AY  
Tel: 020 7628 2555 Fax: 020 7638 4376  
E-mail: [info@maritimeindustries.org](mailto:info@maritimeindustries.org)  
Website: [www.maritimeindustries.org](http://www.maritimeindustries.org)

The Society of Maritime Industries is the voice of the UK's maritime engineering and business sector promoting and supporting companies which design, build, refit and modernise ships, and supply equipment and services for all types of commercial and naval ships, ports and terminals infrastructure, offshore oil & gas, maritime security & safety, marine science and technology and marine renewable energy.

## STEMNET



Contact: Kirsten Bodley, Chief Executive  
5th Floor, Woolgate Exchange  
25 Basinghall Street  
London EC2V 5HA  
Tel: 020 3206 0450  
E-mail: [info@stemnet.org.uk](mailto:info@stemnet.org.uk)  
Website: [www.stemnet.org.uk](http://www.stemnet.org.uk)

STEMNET is an independent charity which enables young people to meet inspiring role models, understand real world applications of STEM and experience practical activities that bring learning and career opportunities to life. We do this through three core programmes:

- STEM Ambassadors - We run the UK network of STEM Ambassadors: over 30,000 inspiring volunteers
- STEM Clubs Programme - We provide free, expert advice and support to all schools which have set up or plan to develop a STEM Club
- Schools' STEM Advisory Network (SSAN) - We deliver free impartial advice to teachers and use our business links and partnerships to enhance the STEM curriculum in secondary schools in the UK

## Universities Federation for Animal Welfare



Contact: Dr Robert Hubrecht  
Chief Executive and Scientific Director  
The Old School, Brewhouse Hill  
Wheathampstead, Herts. AL4 8AN.  
Tel: 01582 831818. Fax: 01582 831414.  
Email: [ufaw@ufaw.org.uk](mailto:ufaw@ufaw.org.uk)  
Website: [www.ufaw.org.uk](http://www.ufaw.org.uk)  
Registered in England Charity No: 207996

UFAW, the international animal welfare science society, is an independent scientific and educational charity. It works to improve animal lives by:

- supporting animal welfare research
- educating and raising awareness of welfare issues in the UK and overseas
- producing the quarterly scientific journal Animal Welfare and other high-quality publications on animal care and welfare
- providing advice to government departments and other concerned bodies.



Contact: Chris Eady  
The Welding Institute, Granta Park, Great Abington, Cambridge, CB21 6AL

Tel: 01223 899614  
Fax: 01223 894219  
E-mail: [chris.eady@twi.co.uk](mailto:chris.eady@twi.co.uk)  
Website: [www.twi-global.com](http://www.twi-global.com)

The Welding Institute is the leading institution providing engineering solutions and knowledge transfer in all aspects of manufacturing, fabrication and whole-life integrity management.

Industrial membership provides access to innovative problem-solving from one of the world's foremost independent research and technology organisations.

Non-Corporate services include membership and registration, education, training and certification for internationally recognised professional development and personnel competence assurance.

TWI provides Members and stakeholders with authoritative and impartial expert advice, knowhow and safety assurance through engineering, materials and joining technologies.

# SCIENCE DIARY

## THE PARLIAMENTARY AND SCIENTIFIC COMMITTEE

Tel: 020 7222 7085  
[office@scienceinparliament.org.uk](mailto:office@scienceinparliament.org.uk)

Tuesday 19 January 17.30  
**Discussion Meeting**

Tuesday 26 February 17.30  
**Discussion Meeting**

Subjects and speakers to be confirmed.  
For further information please visit the website: [www.scienceinparliament.org.uk](http://www.scienceinparliament.org.uk)

## BRITISH SCIENCE WEEK 2016

11-20 March 2016  
Details can be found at  
<http://www.britishtscienceassociation.org/news/bsw2016-news>

## THE ROYAL SOCIETY

Details of all events can be found at  
[www.royalsociety.org/events](http://www.royalsociety.org/events)

## THE ROYAL INSTITUTION

Details of future events can be found at  
[www.rigb.org](http://www.rigb.org)  
Booking is essential. For more information and to book visit [www.rigb.org](http://www.rigb.org)  
There is a charge for tickets. Members go free.

## PARLIAMENTARY OFFICE OF SCIENCE AND TECHNOLOGY

For details of events organised by POST visit  
<http://www.parliament.uk/mps-lords-and-offices/offices/bicameral/post/post-events/>

## THE INSTITUTION OF MECHANICAL ENGINEERS

For details of events visit:  
[www.imeche.org/events](http://www.imeche.org/events)

## THE LINNEAN SOCIETY OF LONDON

For details visit: [www.linnean.org](http://www.linnean.org)

More information on P&SC members' events can be found at:  
[www.scienceinparliament.org.uk/members-news](http://www.scienceinparliament.org.uk/members-news)



## OFFICERS OF THE PARLIAMENTARY & SCIENTIFIC COMMITTEE

President: The Lord Oxburgh KBE FRS  
Chairman: Mr Stephen Metcalfe MP  
Deputy Chairman: Mr Tom Blenkinsop MP  
Hon Treasurer: The Lord Willis of Knaresborough  
Secretary: Carol Monaghan MP  
Vice-Presidents: Mr Paul Ridout  
Mr Philip Greenish CBE  
Dr Stephen Benn  
Mr Atti Emecz  
Professor Ian Haines

Advisory Panel: Dr Guy Hembury  
Professor Colin Seabrook MBE  
Ms Doris-Ann Williams MBE  
Professor Francesca Medda  
Mr David Youdan  
Dr David Dent  
Rebecca Purvis  
Secretariat: Professor Alan Malcolm  
Mrs Karen Smith



3 Birdcage Walk  
London SW1H 9JJ  
T: 020 7222 7085  
F: 020 7222 7189

[www.scienceinparliament.org.uk](http://www.scienceinparliament.org.uk)  
Editor: Professor Alan Malcolm  
Editorial Assistant: Annabel Lloyd



# SET for BRITAIN

Presentations by Britain's Early-Stage Researchers  
In Science, Engineering, Technology and Mathematical  
Sciences at the House of Commons

**Monday, 7th March 2016**

12 noon – 2.15 pm  
**Physical Sciences Exhibition  
(Chemistry and Physics)**

3.00 pm – 5.30 pm  
**Engineering and Mathematical Sciences Exhibitions**

6.15 pm – 8.30 pm  
**Biological and Biomedical Sciences Exhibition**

8.30 pm  
**Presentation of Westminster Medal**

Further information from [www.setforbritain.org.uk](http://www.setforbritain.org.uk)



**IOP** Institute of Physics



Royal Society of  
**Biology**



The  
Physiological  
Society





Nicola Blackwood MP and Stephen Metcalfe MP

Carol Monaghan MP and Chi Onwurah MP

together with the Royal Society of Biology and the science and engineering community wish you a

# Happy New Year

