Whit Issue 2005

SCIENCE IN PARLIAMENT

UK - Best Place For Innovation

Women In Science

Crime Technology

Bovine Tuberculosis

Society for General Microbiology
Fighting Infection

SCIENCE IN PARLIAMENT

The Journal of the Parliamentary and Scientific Committee.

The Committee is an Associate 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:
a) to inform the scientific and industrial communities of activities within Parliament of a scientific nature and of the progress of relevant legislation;
b) to keep Members of Parliament abreast of scientific affairs.

The Parliamentary and Scientific Committee

In this issue Lawson Soulsby especially welcomes MPs elected to the 2005 Parliament and points them to the Committee's new website. John Krebs leaves the Food Standards Agency with clear responsibilities for safety, but an uncertain role for nutrition. Lindsay Sharp's National Museum of Science and Industry is committed to new scientific dialogue making sense of science and technology. HRH The Princess Royal, our Guest of Honour at the Annual Lunch, provides encouragement to women in science and engineering thus also helping to provide more science and maths teachers. William Hughes wants serious organised crime put out of business, Gloria Laycock needs a new scientific agency promoting crime prevention. Gary Pugh's forensic databases are the best in the world and paramount in the investigation and reduction of crime. Keith O'Nions distributes the Chancellor's £10 billion for science and innovation at the Science Week Seminar, Catherine Beech's early stage companies need business to help them pull through. Patrick McDonald joins up government departments to make them a more demanding customer for technology. Ian Diamond's knowledge networks and partnerships underpin commercial applications. Janet Hurst's microbes will inherit the earth, but in the mean time require constant vigilance. Colin Grant's chemical engineers help solve practical problems. John Bourne finds that 60% of post FMD TB is due to cattle movement, not badgers. Tam Dalyell finally says goodbye after 43 years as a "Committee Regular" – and he will be very much missed.

Dr Douglas Naysmith MP
Chairman, Editorial Board,
Science in Parliament

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Front cover picture: Colour TEM of MRSA: resistant Staphylococcus bacteria (Credit: Dr Kari Lounatmaa/Science Photo Library)

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A Welcome from the President

The Lord Soulsby of Swaffham Prior

It is with very great pleasure that I take this opportunity to welcome back existing members of the Parliamentary and Scientific Committee to the new Parliament of 2005, and on this special occasion I particularly wish to welcome newly elected Parliamentarians, who may be taking their seats in Parliament for the very first time. This Committee has been serving the needs of Parliamentarians and our many vitally important and internationally recognised member organisations for over 65 years. We are still going strong by adapting to the ever changing needs of our membership, while encouraging informed debate on matters of scientific importance that affect the whole nation. We also consider that it is particularly important to help facilitate cross-party discussion on matters of common scientific interest. These may be very complex issues that involve Parliamentarians working with our member organisations in the national, European or international interest.

We live in exciting times when the opportunities for scientific and technical achievements are powerful drivers for change that can have major impacts on our lifestyle and wellbeing, both now and for the foreseeable future. Parliamentarians therefore play a vital and ever-increasing role in deciding on science-based policy issues today that may have impacts far beyond the life of the current Parliament. An important example of this is Climate Change for which a much better understanding of the very complex interactions of science and technology is needed by all concerned if a satisfactory long term outcome is to be obtained. Indeed the future existence of mankind on this planet in a state that we could regard as civilised is the fundamental issue at stake here.

The Officers and Staff of the Committee have planned an excellent programme of meetings in Parliament and site visits with the climax being our Annual Lunch each year at the Savoy. Please take a look at our new website where you will find this and much more information about the Committee, including online access to the four preceding issues of Science in Parliament. Please contact Mrs Annabel Lloyd, our Administrative Secretary, if you should require any help in obtaining the current password that is essential in order to obtain access to all the resources available to you on this site.

Launch of the Committee's New Website on Monday 23 May 2005 http://www.scienceinparliament.org.uk

The Council have approved the launch of a new website designed primarily for the benefit of members but also to inform non-members about meetings and publications of the Committee. The name of the new website has been chosen to reflect the interest in and importance of our journal, Science in Parliament, both to the membership and to non-members. The previous website has also been modified to divert readers directly to the new site. It is intended to help facilitate much better access to and a wider readership of our journal, especially by non-members who can now purchase publications through the website. In addition, all our subscribers will continue to receive hard copy issues of Science in Parliament as before.

Full access to all the facilities on the site is accessible only to Members and to all Parliamentarians, who will need to contact Mrs Annabel Lloyd in the office to obtain a password, if they have not already received one. Further news about the Committee's new website is available on page 35.

Five years of the Food Standards Agency

Sir John Krebs FRS

The Food Standards Agency (FSA) was set up as a "force for change" in the White Paper that created it five years ago. The "old climate of secrecy and suspicion" was replaced by "modern, open arrangements, which will help to command confidence." At the end of my period as Chairman of this new UK wide, non-ministerial government department, what progress had the Agency made?

It is notoriously difficult to measure trust and confidence, but several recent surveys suggest that the Agency has, as a result of both its actions and its way of doing business, begun to build confidence. For instance, a 2003 Norwegian study found public confidence in food safety to be the highest of six EU member states (Figure 1) and the Agency's own annual surveys of consumer attitudes shows that trust in the FSA has increased (Figure 2).

Trust is fragile and the Agency still has a long way to travel on its journey. To assess progress after five years, and learn from this for the future, the FSA Board recently commissioned a thorough and independent review, carried out by Baroness Dean of Thornton-le-Fylde. 125 organisations and individuals commented on the Agency's performance to date. The majority thought that the FSA has lived up to its promises. Expectations are now high, and the second five years will be even more challenging than the first. The Dean review also made 22 recommendations, all of which the Board has accepted, of ways to improve in the future.

One key promise was to be completely open about decision-making. Since the start, every board meeting at which food policy has been discussed and decided has been held in public. Typically, between 50 and 100 observers attend in person, and at my last meeting as Chairman, held in Edinburgh in March, a further 1,800 watched us on the live web-cast.

Another promise was that we would be open and honest about risk and uncertainty. I have always said "life is not risk free" and, in this regard, food is no different from crossing the road or getting out of bed.

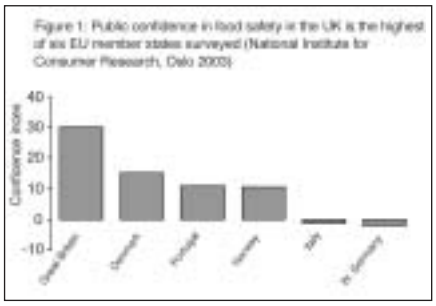
In risk assessment, top quality science (including social sciences) is essential, and the Agency gets much of its expert advice from nine independent scientific advisory committees populated by leading experts from the UK and elsewhere. This rigorous, impartial, scientific approach is the crucial underpinning of the Agency's independence from particular interest groups, including politicians. It also, on occasions, brought us into conflict with those whose views are based on assertion and belief rather than evidence.

But, unlike the textbook science taught at school, the reality is often messy, with uncertainties or gaps in knowledge. In dealing with uncertainty, such as the possibility of BSE having infected sheep, the Agency is always honest about the limitations of the science.

By discussing the risks and uncertainties with a broad range of individuals and organisations with different perspectives, the FSA has improved its understanding of acceptable risk and therefore of ways of managing uncertainty. Experience has shown that this open and inclusive way of making decisions works better than the older approach of "decide, announce and defend".

While most people see a clear role for government and for regulators in the area of food safety, there is much less agreement about who – individuals, parents, the authorities – should take responsibility for tackling the risks from poor diet. Nutrition is part of the Agency's remit, but to what extent should it be involved in determining the choices on offer to people, and the information that goes with them?

As in all its work, the Agency has started by garnering the evidence. A report from the Scientific Advisory Committee on Nutrition (SACN) is the basis for the Agency's



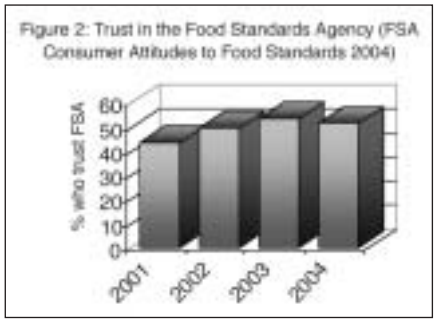
work, along with the Department of Health, on cutting people's salt consumption. The SACN report reaffirmed the link between eating too much salt, high blood pressure and hence heart disease. On average we eat 50 per cent more salt than we should, and much of this salt is added for us in food manufacturing.

From what was more or less a standing start two years ago, action by the food industry has started to reduce salt in certain processed foods, and long term plans for further reductions are now being put forward. These commitments should, over five years, meet the Agency's target of reducing average salt intake from about 9.5 grams to the recommended 6.0 grams per person per day. As the President of the Food and Drink Federation, said in his recent annual address, this is an excellent example of the Food Standards Agency and the food industry working together to achieve benefits for public health.

At the same time, the Agency launched a public education initiative, built around a character called "Sid the Slug," to raise public awareness of the risks of too much salt, so that consumer "pull" and industry "push" work together.

The Agency is also basing its other nutrition work on evidence, including promotion and marketing of food to children, nutrient profiling, and the development of simple front-of-pack signposting for nutrition labelling. The Agency is involving the food industry, as well as consumer organisations, in this work as it progresses.

The FSA's role is public protection, and one of the tools it can use is regulation. However, rather than always creating new rules for the food industry, the Agency's preference, taking into account the level of risk, is to achieve its aim of consumer protection by a combination of support and recognition for businesses, voluntary action by the food industry and public awareness. The success of the FSA's approach is acknowledged in Philip Hampton's recent review of independent regulators.



In terms of choice and safety, the food lives of most people in the UK are probably better today than ever before. But at the same time, our food supply is complex and global, and many of the foods people eat are highly processed. The challenges for the food industry of managing risk and standards were shown clearly by the recent incident in which an illegal adulterant, the red dye Sudan 1, found its way into more than 550 different products. The industry is responsible for the standards and safety of the food it makes and sells, but both industry and the public benefit from the oversight of an independent and transparent Food Standards Agency that puts consumers' interests first.

OPINION

National Museum of Science & Industry: The C21 Museum In Action

Lindsay Sharp, Director, National Museum of Science & Industry

Modern economies are built upon strong scientific and technical foundations. Success, in terms of prosperity and quality of life, can only be achieved by countries that wholeheartedly embrace good science. An informed public, from which come new generations of scientists, technologists and innovators, is vital to the survival of such "scientific nations".

However, we are witnessing a decline in various science and technology specialisms. This trend has been exacerbated by the unwillingness or inability of lay publics to understand new developments and their implications. The result, often influenced in part by media, is increasing cynicism and a steady erosion of future scientifically and technologically driven prosperity.

All countries need an informed and aware public. And the public, in turn, needs somewhere to turn for independent and unbiased perspectives. NMSI meets this requirement perfectly: it has a deep understanding of how we arrived at our present condition, derived from its collections of science, technology and human ingenuity. Today, NMSI resources are accessed by over 12 million people each year. Four million of them are visitors to the group's national museums, located in London, Yorkshire, Co. Durham and Wiltshire, and a further eight million are individual visitors to NMSI's award winning websites.

The NMSI museums have over 500,000 objects in their collections, across five sites – Science Museum, London; National Railway Museum, York; National Museum of Photography, Film & Television, Bradford; Locomotion: NRM at Shildon, Co. Durham; and NMSI in Wroughton – and in store.

The group is also custodian to collections of a further 5 million two-dimensional items. These were recently further enriched by the acquisition of the Royal Photographic Society (RPS) collection, arguably the world's greatest, now housed at NMPFT. We are also stewards, through the Science Museum, to one of the greatest international collections of the history of medicine, The Henry Wellcome Collection.

Using its unrivalled collections, NMSI can take a sceptical, balanced and questioning approach to all developments in science and technology. We may not have all the answers but, vitally, NMSI puts individuals in a position where they can make up their own minds from the unbiased information that we provide. As a result, every year, it is the trusted reference point for millions.

One of those reference points is the Science Museum's new Energy Gallery. Opened in July 2004 and targeted at children aged seven to fourteen years, their teachers and families, this curriculum-linked gallery encourages visitors to explore the vital role energy plays in our society and question how we'll meet future demands when deposits of fossil fuels run out. A further example is the new Nanotechnology exhibition opened at the Science Museum in March 2005. Sponsored by the Department of Trade & Industry and opened by Lord Sainsbury, this exhibition looks at issues surrounding this controversial new technology. It presents the facts in an informed and balanced way and asks visitors to consider and express a view on how Nanotechnology might impact on their lives in the future.

NMSI engages with individuals through exposition, experiment and dialogue. Both the Science Museum and NRM, for example, hold regular "Sleepovers" which provide an enjoyable educational experience and fun for children and accompanying adults. Events consist of an evening of planned hands-on activities rounded off by camping in the Museum overnight.

But it is not just children that NMSI is engaging in a new kind of scientific dialogue. The Science Museum's Dana Centre, opened in November 2003, is a state of the art venue for adults to take part in exciting, informative and innovative debates about contemporary science, technology and culture. These, along with entertainments, demonstrations, international link-ups and a range of formats, take place with maximum informality to tackle, head on, subjects that are important to everyday lives – getting to the real science behind the headlines. Events to date have included a live projection of a heart operation performed by surgeons in the US, demonstrations of the most advanced humanoid robots and debates on key issues such as identity cards, MRSA and Nanotechnology. Forthcoming events include a debate asking "what is the greatest threat to society in the future – climate change, pandemics such as Avian Flu, or terrorism?"

As well as stimulating scientific debate and dialogue among its audiences, NMSI also complements learning organisations in their quest to make sense of science and technology and to better achieve their aims. Its outreach and learning departments are among the best in the world, reaching over 400,000 young people every year through specific outreach and curriculum-linked learning schemes.

Initiatives like the Department for Culture, Media & Sport/ Department for Education & Skills sponsored "Anim8ed" project stimulate individual creativity and fresh thinking in a fun and friendly environment. The project run by NMPFT, in conjunction with two regional museums, explores the potential of animation as a learning tool for supporting a variety of subjects across the National Curriculum, using the museums' collections to inspire young people to create their own animations.

With four national museums spread across the country and a range of cutting edge online and emerging broadcast initiatives, NMSI's engagement with its publics is broad and multifaceted. Both on its own and in partnership with other like-minded organisations, the opportunity now exists on an unprecedented scale to give meaning to science and its application through human ingenuity, to inspire new generations, and to empower individuals and communities around the globe. NMSI is committed to this goal.

The Annual Lunch was held on Wednesday 9th February 2005

Lord Soulsby of Swaffham Prior, the President of the Committee, introduced the guests including Bob May, President of the Royal Society; Alec Broers, President of the Royal Academy of Engineering; Roy Anderson, Chief Scientific Adviser, MoD; Howard Dalton, Chief Scientific Adviser, DEFRA; Paul Wiles, Chief Scientific Adviser, Home Office; Julia Higgins, Chairman, EPSRC; and Graeme Davies, Chairman, CCLRC. He then paid tribute to last year's Guest of Honour, Chris Patten, who offered us his unequivocal support for the "top-up" scheme which will be introduced in the autumn of 2006, and who recently hit out at Ministers who criticised Oxford for its admissions procedures and the disproportionately high intake from private schools, pledging that Oxford will "scour every part of Britain for talent", but will not apologise for taking the best applicants even if educated in the independent sector.

The Government regards UK science as a national asset which produces some of the best science and the best scientists in the world. We undertake 5% of the world's science, produce 9% of the world's scientific papers, receive 12% of the citations of scientific papers, including 13% of the world's most cited papers, with only 1% of the world's population.

In 1997/98 the Government's science budget was only £1.3 billion, rising by 2007/8 to £3.3 billion enabling Research Councils to increase the research they support and to start rebuilding the scientific infrastructure. The closure of University Science Departments is considered a major failure of the system for funding Higher Education. How is Britain going to manage when mathematics, chemistry and physics are under such dire threat? We can all celebrate the recent announcement that existing UK legislation is to be extended to protect both scientists and the general public from extremist Animal Rights Campaigners.

Mr Richard Page MP, Lord Soulsby and Lord Waldegrave

Turning to the Guest of Honour, Lord Soulsby introduced HRH The Princess Royal who responded by indicating how pleased she was to see so many ladies present and gave thanks for the warm welcome from the Parliamentary and Scientific Committee, which the Duke of Edinburgh had also addressed six years previously. Although a Past Master and co-member with Lord Soulsby of the Worshipful Company of Farriers, she stated that this was hardly a qualification, but having no others for anything except an A-level in Geography, confessed that "this is about as scientific as I get. I have probably come under the heading of an honorary man in most of the things that I have done and been asked to do, so I am not the ideal person to lead the discussion on women in science, engineering and technology, except that I was prevailed upon by a very distinguished role model for women in engineering, Baroness Platt of Writtle, to become Patron of WISE, which encourages everyone to think about the issues and to consider careers in science and engineering for women. There are many women's organisations which do not fulfil the role for which they were originally set up, but this one really does.

The Parliamentary and Scientific Committee has a broad brief, membership and range of expertise and knowledge and it would be a mistake to suggest that I know much about any of them. But my short version of this speech says that I did A-level Geography. I would also like to have done Physics and Biology, but because I could not do Chemistry, this was not permitted. When I left school I wanted to go to the local polytechnic to do engineering, but I was not brave enough. If I could ask what would have made the difference about decisions on the subjects I was prepared to take or the place I went to study, I suspect

HRH The Princess Royal talks to guests. *Credit: Mervyn L de Calcina-Goff*

that it would be a single person that I would have met at the right time at the right place – and there is no system which can ensure that this will happen. One can only raise the awareness of the issues which prevent young women from choosing certain subjects, such as the teaching profession, and then introduce those individuals to each other and give them the support to make decisions, which maybe their family, their circumstances or their schools, would not have considered appropriate subjects for them to take up. And then I would leave it to you. That is the short version.

The longer version is a bit longer. Gender issues are also very much more difficult. Here are a couple of anecdotes, which I hope you have not heard previously.

WH Smith's 2002 Christmas catalogue included in the Gifts for Boys section the Science Kit, the WHS Science Gift Pack and Inventor's Handbook on Flying Machines and Robots, and in the Gifts for Girls section, there were Ballet Bag, Barbie and Rapunzel, Cool Texting Gift Pack and WHS Felicity Wishes Gift Packs. Everybody, especially children, are rather conditioned by those sort of assumptions that exist in wider society, so maybe girls' alienation from science begins at that very early age.

There is no evidence at all that scientific ability is genetically determined. However, there is evidence that women's and men's brains are subtly different. I am pleased because it is quite important that there is a difference and that they are interested in different aspects of their environment.

Do these differences reflect aptitude or interest? Some intriguing data suggest it is the latter. On the empathy quotient there is one which asks a range of questions about how interested you are in people and their emotional lives and how involved you become in other people's feelings – women as a group score higher than men. On the systemising quotient which asks you how interested you are in systems of different kinds you won't be surprised to hear that men as a group score higher than women. And this has given rise to the idea that in a typical female brain interest in empathy is stronger than interest in systems. Of course, a proportion of both sexes are equally interested in emotions and systems.

A research group at Cambridge University has recently analysed the proportion of each gender with each of these profiles, and the results are striking. For every ten men, six will have a male brain, two will have a balanced brain and two will have a female brain. In contrast, for every ten women, four will have a female brain, four will have a balanced brain and two will have a male brain, which inclines us to certain conclusions. Firstly, the sexes do differ; secondly, women seem to have specialised more as a group to be better at empathy and men seem to have specialised more to become better systemisers; and thirdly, more women seem balanced.

I'm absolutely certain that this arises from selective evolutionary pressure, and the suggestion that you might be able to eradicate these influences in a couple of hundred years is probably a little far-fetched. We can also conclude that you cannot tell what kind of brain a person has from their gender – which is possibly the most important result of that study. Teachers will have to ensure that they are appealing to all types of learning needs and John Head (1996) suggested that four generalisations can be made:

1) Females tend to imbed information in its context, males tend to extract it from its context

2) Females are more reflective, males more impulsive

3) When something goes wrong females are more likely to blame themselves, males put the blame elsewhere

4) Females are more likely to co-operate and males to compete.

Are these true and how do you deal with exceptions? How should schools respond, as by the time children enter school they already have definite views on what is men's or women's work. Science is still perceived as a male domain and as an objective and dispassionate world of facts and figures, without creative influence. The physical sciences appear unrelated to life, impersonal and

Lord Soulsby and Baroness Platt of Writtle. *Credit: Mervyn L de Calcina-Goff*

concerned only with demonstrating scientific truth.

Pupils asked to draw a scientist produced one who in nearly every case is white, male, with facial hair, in a white labcoat working alone in a laboratory. It would be funny if it wasn't a stereotype that alienates girls, contributes to attainment gaps, especially between white and Afro-Caribbean pupils and between family homes where the parents may be unskilled manual workers rather than managerial or professional.

In Britain we have a shortage of science and maths teachers which means that not enough pupils receive an education in science sufficiently inspiring to take it up as a career, and they are not progressing to higher education or teacher training, hence the current shortage of good teachers will become even more acute. However, with Government and Wellcome Trust funding, new science learning centres are being established to re-invigorate science teaching. The Science Learning Centre, London, was opened at the University of London's Institute of Education in 2004 with an objective to make science relevant, interesting and inclusive for all pupils by study of properties of metals relating to jewellery design, different types of fabric and transport, for example.

In England and Wales 50% of chemistry students are female, and 75% of the advanced level physics students are male. In Scotland preferences for particular topics have remained stubbornly gender-related, with females preferring topics such as living things and the processes of life whereas energy, earth and space are preferred by boys. Females are less likely to choose physics at advanced level, but still do as well as the males. The gender balance for veterinary medicine was 80% men and 20% women, whereas currently 20% are men and 80% are women. The Basic Skills Agency works with both primary and secondary schools which also provides a platform to help move people on into sciences.

Lord Flowers, Professor Peter Saunders, Dr Ian Gibson MP, Professor Dame Julia Higgins and Professor Peter Jost

There are some excellent role models for women, such as Baroness Platt. She has made a successful career in science and is an inspiration for many, especially through her position in WISE, which rewards young women who have not only done well themselves, but have gone back to their schools, clubs, and universities and inspired other younger women to follow them.

Last week I attended the celebration of the Scottish Women's Hospitals opened in France in 1914 under the French Red Cross, at the Abbaye de Royaumont, led by Dr Elsie Inglis, although she had previously been rejected by the British Government on the basis that France was not a nice place for women to be.

To some, Ellen MacArthur is just a sailor, but you only have to listen to her and see the inside of the boat that withstood the strain of averaging 16 knots around the world, to realise the understanding of science and engineering that she thoroughly mastered, coupled with her skill and determination to complete the circumnavigation in record time. She also has remarkable parents who gave her their full support.

Your mother is the most important role model. Some universities are now organising public lectures and science events for such people who have some influence on the youngest generation and show them how science fits into their lives and pass on that enthusiasm. There are opportunities for those becoming interested in a science career after leaving school, such as the new foundation degree course at Birkbeck and in the School of Pharmacy, for laboratory technicians working in the NHS.

The internet and the wordwideweb are important tools and should be used to raise awareness of what is available. It should provide women with the opportunity to investigate types of careers, things they need to do, things they need to understand before they actually have to appear for interview.

In a press release launching the Women@CL website in December 2004, the Project Director, Professor Ursula Martin of Queen Mary College, described their aim as "to shatter the frosted glass ceiling – it is not that it is unbreakable, it is just that we have had difficulty in seeing through it."

You are a very important organisation for influencing a wide range of bodies, and I am sure that you have all done a lot to encourage women into your various sectors, institutions and professions. We need to do more for women and for science and engineering, but if we focus that effort on women, then there is a very good chance we may solve the whole of the problem.

Thank you for your invitation. Maybe your next debate will enlarge what I have mentioned today. It is an issue in which I am interested. There are a lot of very useful women out there who would like to do more. Thank you."

FROM THE SCENE OF CRIME TO THE COURTHOUSE

MEETING OF THE PARLIAMENTARY AND SCIENTIFIC COMMITTEE ON MONDAY, 28TH FEBRUARY 2005

Crime is big business, it causes untold harm on our streets, damage to our communities and nets billions of pounds each year for those responsible. It blights vulnerable communities, ruining lives and instilling fear. As criminals become more sophisticated, so we must raise our game to fight it. We must make better use of science and technology to stay ahead to reduce the harm it does to the UK and its citizens.

Bill Hughes describes how he directs the SOCA and collaborates with international partners where he uses all the means at his disposal to attack and disrupt the often very complex and multifaceted worlds of serious and organised crime. Gloria Laycock presents scientific methods used in crime management and policing with the primary aim of preventing or reducing crime. Gary Pugh discusses his work on the scene of crime and new approaches in the interpretation and presentation of forensic evidence, designed to support the Metropolitan Police Service as a world leader in the use of forensic science.

Tackling Organised Crime

William Hughes, Director General Designate, Serious Organised Crime Agency

The new Serious Organised Crime Agency (SOCA) will, from April 2006, bring together four key law enforcement agencies (National Crime Squad, National Criminal Intelligence Service, the investigative and intelligence work of Her Majesty's Customs and Excise on serious drug trafficking and the recovery of related criminal assets, and the Immigration Service's responsibilities for organised immigration crime). But SOCA is no mere amalgamation of existing agencies. It will be bigger and more effective than the sum of its parts.

SOCA will target serious organised crime that impacts on the UK. It will work to a clear system for prioritising operational targets, and its approach will capitalise upon the experience of the law enforcement community nationally and internationally founded on robust and evidence-based techniques, within a framework of clear legal guidance and high professional standards.

SOCA will be intelligence-led and will use tactics from conventional evidence gathering to private sector initiatives and interaction with professional bodies to undermine organised crime.

It will take a radical and innovative approach to act decisively and swiftly to destabilise organised criminal enterprises and will focus on disruption and dismantling and other interventions as well as arresting and prosecuting. It will send out a clear strong message to those who think they can promote serious organised crime in the UK.

What do we mean by "Harm" reduction?

This is a new departure for us in the UK – to move away from the old "bean-counting" approach of the past. The Home Office and others are seeking to measure harm caused to the UK – not simply economic harm, but real lasting damage to the fabric of our society. This is what will make SOCA unique. It will seek to make the UK the most hostile environment in which serious organised crime can operate.

We currently believe that the harm caused by serious organised crime is valued at a minimum of £20 billion, and possibly up to £40 billion. But what price can be put upon wrecked lives or wrecked businesses?

However, before SOCA can start measuring harm reduction, we need to first understand the business methodologies of crime.

From source to street

If the UK really hopes to undermine serious organised crime in the UK, we have to be radical. We must not rely upon law enforcement alone, or even the old tried and tested methods. We have to deal with the causes of serious organised crime and not keep addressing the symptoms. At the moment, every time we bust a major OCE, another steps in because the rewards are high and the risks, by comparison, are low.

We have to reverse this scenario so that the risks become much greater than the reward, and the rewards become disproportionate to the risks. The UK has to be perceived as a hostile place to do business. This means a sea-change in our approach to the threat.

Therefore when we remove an organised crime group, we must review and understand how their business was constructed and why they were successful so that we can destroy the facilitation support

structure. This will allow us to provide evidence to government and to professional institutions and regulatory bodies, so that, instead of relying upon anecdote, we can give factual detail on how these businesses work and how they are able to take advantage of the criminal justice system.

In the business world, hostile takeovers are commonplace. Predators will conduct a detailed analysis on the target company's business. The individual analysis for areas such as outlet sites, management and workforce structures, profits and losses, and productivity rates will contribute to a composite from which the predator will identify the vulnerabilities, both at individual sites and as a collective whole. It will inform and formulate its take-over strategy, which will be tailor-made with specific tactics to attack individual sites.

Such principles can be applied to the drugs market. In knowing the composite structure of the heroin or cocaine market from strategic assessments, we can apply a simultaneous strategy of enforcement and intervention using all our resources, to weaken and disrupt serious organised crime and thus destabilise the market. The alternative is to carry on attacking individual silos. If so, then whilst we might impact significantly on them, we are probably not doing much to fragment the drugs market in the UK.

The private sector has long recognised that scientific managed processes are a vehicle to deliver and SOCA's Forensic Service will play a significant part in exploiting those methods to develop that understanding around the business methodologies adopted by criminals. Whilst prosecutions are central to the disruption and dismantling of organised criminal enterprises more emphasis is being put on forensic science to support that process than ever before. However, forensic resources are finite and are operating in a changing operational environment that is subject to external market forces. As such we must maximise the use and benefits of this expensive area through the pro-active use of forensics.

"Every contact leaves a trace" – it's not just about fingerprints and DNA that can be recovered from crime scenes. The commodity itself will be analysed not only to profile and check against other seizures but to develop understanding on the manufacture process. For example, Class A drugs that find their way to the UK are all similar in appearance at the point of entry. These are pressed, packaged and branded to a very high "industrial" standard; it is forensic science that will provide the investigation teams with knowledge of process and the materials involved in production and distribution.

SOCA Forensics will therefore provide a holistic approach to the whole investigation process, facilitating total forensic ownership from conception to conclusion in court and not start from when a crime scene is identified, as has traditionally been the case. This approach will engage specialist and sensitive operational techniques uniquely tailored to support the investigation of organised crime. In addition it will support law enforcement by providing guidance and specialist operational capabilities when appropriate.

SOCA forensic scene examiners will be investigators rather than just evidence gatherers, and will be highly trained and vetted specialists able to work and manage the dynamic and complex surveillance environment. They will support lawfully intrusive aspects to operations, providing assistance with planning and evidence gathering. In particular, specialist teams able to operate covertly anywhere in the world recovering samples for analysis and using the latest technologies can send electronic exhibits back to the forensic unit in the UK with results within hours rather than days.

Partnerships

Multi-agency working is not a new concept and there are many examples of effective partnership initiatives at all levels of law enforcement.

For example, new digital technologies are entering the market place and are being constantly updated at a rapid rate. There is a need to stay ahead of the criminals and this requires project-managed research and development to ensure "first mover" advantages so that the organisation remains at the cutting edge. Slow development equals the loss of technical and forensic environmental leadership and the criminal will only need to keep up with the market to stay ahead of law enforcement.

UK law enforcement therefore has not only to educate our non-law enforcement partners in the handling of intelligence but then to trust them to do so. The role of regulatory bodies or professional institutions will be vital in this regard. We cannot approach the private or public sector in the semblance of partnership without living up to the spirit of it. We need to share what we know with them. Equally, they need to value the trust we have placed in them. SOCA will provide the opportunity to harvest the forensic output, maximise operational effectiveness and direct research and development through joint agency collaboration. This will involve the exploitation of national and international forensic databases for the evaluation and aggregation of forensic product and will support decision-making through the tasking and co-ordinating process.

So how will we know that we are having an impact?

If we successfully understand the serious organised crime business, then we should also know when the commodity supply is altered, or the organised crime enterprises change their methods of operation.

If we understand the business from source to street, we should know when street prices or purity levels have changed, when supply is difficult; and when distribution centres have altered or disappeared. The intelligence does not stop when we put the operation in place to attack. As law enforcement officers, we need to see the benefits of continuing intelligence gathering and analysis as the operation occurs. At the moment our fixation is on the arrests, seizures of drugs and the subsequent prosecutions, and not upon the harm caused. We need to quickly attain a better overall picture of the problem. If we are not preventing the business of drugs getting to the street, then no matter how many arrests we make and however many kilogrammes of drugs we seize, we will fail in our mission.

So where does all this take us?

Law enforcement has to review its role and tasks. It is about focusing

on the entire business of serious organised crime, and ensuring we have the intelligence support that properly tells us what is happening and how it works.

We must develop multi-agency approaches and strategic alliances across the world. This is more than simply liaison and attending conferences together. This is real co-operation and joint working, and sometimes it is difficult. Egos and status can sometimes intrude on good working relationships.

Sometimes, we will be constrained by the market-place, political and legal factors. They are there to make life more interesting and challenging, and we will seek to understand them, and wherever possible, seek to change them, properly and with well reasoned arguments, supported by evidence. That evidence will be based upon high quality, timely and accurate intelligence.

We will operate jointly and effectively to disrupt, disable and defeat serious organised crime. We want serious organised crime to fear us and our methods. We will, properly and ethically, turn their own lieutenants against them, whether to give evidence at their trials, or, even more importantly, to tell us how they operate and succeed, so that our intelligence picture is complete.

Our successes will be common successes for us all. Serious organised crime is a business. Our business is to put their business out of business.

FROM THE SCENE OF CRIME TO THE COURTHOUSE

Policing and Crime Prevention

Gloria Laycock
Professor of Crime Science, University College London

When John Kennedy became President of the USA he made two promises to the American people. The first was to get a man on the moon and the second was to eliminate poverty. He only delivered on one of those promises and it was the one where he listened to the scientists. If we are serious about bringing crime under control and being able to say how we did it, then we, also, need to start listening to scientists.

Reflecting this idea the Jill Dando Institute of Crime Science (JDI) was established at University College London in 2001. The Institute was founded with support from the Jill Dando Fund of over £1million – money raised by the Trustees – much of it from the general public who were appalled at the murder of Jill Dando, a popular TV presenter, on her own doorstep. Our aim at the JDI is to change the way in which people think about crime and respond to it.

Science can help this task in at least four ways. First, the police and their partners need to think scientifically. They need to use data, logic, evidence and rationality; they need to test hypotheses and establish knowledge. Secondly, the techniques of the scientist need to be brought to bear on our understanding of crime and its causes. We need to get away from the emotional rhetoric so beloved of politicians and take a cold hard look at what is going on. Thirdly, as we begin to understand crime better we see that science can help in preventing crimes from happening, and finally, recognising that the probability of capture is more significant than what for many is the remote possibility of punishment, science can help in catching offenders more quickly and bringing them to justice. In this brief paper I will concentrate on the first three ways in which we feel science to be relevant to crime reduction.

To anyone with a scientific background these ideas might seem totally obvious – what else would you do? But a surprising number of people take exception to the idea that science can contribute to a set of socially defined problems like crime and disorder. It is, for example, quite revolutionary for some of our public policy colleagues to hear that experimentation might be a good idea. The Government regularly launches "pilot schemes" but well before anyone has had the chance to say whether or not they work, we hear that the prize new idea is to be launched across the country with a fanfare of trumpets. That is not the way of a true scientist.

Another attribute of crime science, which is how we characterise this approach, is that it is multi-disciplinary. An epidemiologist, for example, or an electrical engineer can have a significant contribution to make to the reduction of crime. The closest analogy is perhaps with

medical science where we are used to the idea that to keep us well, or make us better, a whole range of sciences contribute. The same is true for crime science.

What do we know about crime and its prevention?

We know that conventional policing, which relies for its effect upon general and specific deterrence and incapacitation, has limits. Offenders fairly quickly learn that they will probably not get caught – so the deterrent effect of sentencing is reduced.

We know that crime is common: 33% of males will have a conviction by the age of 46; half will be convicted only once, just over half will have a criminal career of less than a year and nearly half will be convicted of theft for handling stolen goods. So although a lot of people commit crime they do not do it for long and it is arguably not very serious. They do it because it is easy. And they are distinct from the "proper" or "professional" offenders who are not so easily deterred and of whom there are far fewer. They are the ones who really do need to be caught.

We know that the immediate situation within which we find ourselves is a powerful determinant of what we do. And it is easier to change situations than it is to change people. The crime patterns that we see are a reflection of the criminal opportunities that the situation offers.

Crime patterns are constantly changing in reflection of this. For example the Internet has opened up opportunities for new crimes but also new ways of committing old ones. It also offers stealth and anonymity to those with the necessary skills. E-crime can easily open up multiple opportunities for crime in one event. For a burglary, there is one opportunity per event, but if a hacker opens up a bank's files this offers the opportunity to steal from many different bank accounts in one operation.

We have also learned that crime-prone goods have certain characteristics. They can be characterised as fitting the acronym CRAVED. They are concealable, removable, available, valuable, enjoyable and disposable. Anything fitting this acronym needs extra protection. The most obvious example is cash, but TVs, videos and of course the mobile phone, are also vulnerable. That is where the electronic engineer comes in, by designing goods so that they do not work if stolen.

As with any science the starting point is the collection and analysis of data. The discovery that victims are repeatedly victimised has been described as one of the most significant findings of the 1990s. We know from the British Crime Survey that about 4% of victims suffer 44% of crime. It concentrates. Looking just at property crime, 3% of victims account for 51% of crime. Prior victimisation, for a vast range of offences, is the best predictor of future risk. Furthermore repeat crimes occur quickly after the original offence, which offers the opportunity for immediate targeting. One of the reasons that high crime areas have high crime rates is simply because there are more repeat victims in those areas.

Work carried out by Shane Johnson and Kate Bowers at the JDI, using techniques from epidemiology (their backgrounds are mathematics and computer science), has shown that domestic burglary not only clusters in space – ie homes are vulnerable to repeat burglary, but it also clusters in time – you get what might be called a "spate" of offending, which then moves. In high crime disadvantaged areas it is the original victim that is at risk but in more affluent areas it is their immediate neighbours. This increased vulnerability lasts for a number of weeks, but is greatest in the first few days. These results are opening up all sorts of crime prevention and detection possibilities which, with Home Office funding, we are now testing in a police force area.

Future plans

We are hugely optimistic that this approach is right. It rings true with practitioners who are keenly interested, for once, in academic research! There are, inevitably, ways in which the approach could be improved, and its implementation speeded up. The data, for example, which is the life blood of any science, is often poorly recorded in police data systems and we have to go through hoops for months at a time to get access to the kind of detail on offending that we need in order to carry out our research. If anyone tells you that the Data Protection Act is not a problem for researchers then please refer them to me!

We would like to persuade the Government to apply Section 17 of the Crime and Disorder Act (which says that local authorities need to take account of the crime consequences of their policies) to all statutory agencies. This would make a major difference to policy development and ultimately to crime control.

There are also, as with any developments in science, the frustrations of raising money for pet ideas. We know that our ideas have practical implications – they are not pie in the sky – the country needs them! Persuading fund holders of this is a wholly different matter. I find myself saying "just trust me" – whilst being painfully aware that that is so unscientific.

As a blunt summary:

- Please don't underestimate how radical our agenda is.
- As we move into the next election all the political parties will be competing to put more officers on the street – this misses the point entirely!
- We need an agency independent of Government to press the crime prevention/design agenda.
- The Data Protection Act protects data not people. Access to point data for researchers needs to be mandated.
- Scientists really can reduce crime but at present politics gets in the way!

Delivery and Development of Forensic Services in the Metropolitan Police Service (MPS)

Gary Pugh, Director of Forensic Services, Metropolitan Police Service

The MPS Directorate of Forensic Services is playing an increasing role in making London safer by identifying the perpetrators of crime, providing evidence to eliminate or associate those suspected of committing crime and contributing to an understanding of criminality in London. The major expansion in the use of forensic services is driven by the success of forensic databases of fingerprints and DNA. The increased contribution is delivered in the MPS through the provision of in-house services, such as crime scene and fingerprint examination, and the integration and use of external forensic science services. A rapid and responsive service is required from all those involved in the forensic business with the emphasis on accuracy, speed and informing decision making at all stages of the investigative and criminal justice processes.

The increased use of forensic services is shaped by four strategic drivers:

- an increased level of intervention in all crime,
- a need to achieve a step reduction in the time taken for all forensic examinations,
- the use of forensic intelligence to link crimes and inform an understanding of criminality, and
- future developments in the digital and microchip technology that will allow for rapid identification of offenders, streamline processes and enable more effective interpretation of forensic evidence.

The establishment of forensic databases of fingerprints and DNA profiles in the last ten years has resulted in a significant and strategic shift in the focus of forensic services from being about the courts and evidence to being one of the primary means of identifying potential perpetrators in all types of crime.

The UK national fingerprint database consists of over 5 million fingerprint records with over eight hundred thousand unmatched latent finger marks from crime scenes. By contrast the national DNA database contains over 2.5 million DNA profiles and has over two hundred thousand unmatched DNA profiles from crime scenes. Even allowing for a high proportion of the finger marks and DNA profiles recovered from crime scenes that are not the perpetrator's the volume of unmatched fingerprint and DNA records represents a significant opportunity to solve crime.

The power of the forensic databases is derived from the features of forensic information contained in fingerprints and DNA in that they have the potential to uniquely characterise an individual, they do not change over time and can be recovered from crime scenes and victims. This is illustrated in a recent terrorist case where one of the key individuals involved was identified through the recovery of a finger mark on the packaging of a mobile phone recovered from a safe house and used to communicate the bomb warning. The individual was not known to anti-terrorist branch and had been entered onto the national fingerprint databases many years earlier for a relatively minor offence.

The collection of fingerprints or DNA is determined by statute and following the implementation of the most recent Criminal Justice Act, which allows for fingerprints and DNA to be taken from individuals arrested for recordable offences, sampling levels have increased in the MPS by 50%. Fingerprint examination and DNA profiling are complementary in their application. Fingerprint examination which is still the primary method of forensically tackling crime provides the only rapid means of confirming the identity of individuals through the ability in custody suites to "scan and search" the fingerprints of those arrested. On the other hand DNA profiling with its genetic origins allows for identity to be established through familial testing and there

are an increasing range of DNA tests that can be used in crime investigation; mitochondrial DNA that allows for the analysis of bones and hair, Y chromosome testing that has applications in sexually motivated crime where it is important to isolate the male component of a forensic sample and single nucleotide polymorphisms (SNP's) allow for analysis of degraded or old DNA samples. All of this technology can be brought to bear in the identification of victims of mass disasters. MPS Forensic Services has deployed teams to Thailand to assist in the identification of those tragically killed by the Tsunami.

The increased power of forensic databases has encouraged greater use of forensic services. For example, the number of crime scenes examined by MPS forensic staff has increased to over 11,000 a month, mainly from burglary and volume crime. The intervention rate or the proportion of crime scenes examined in MPS is currently running at 90% of residential burglaries, 9% of street robberies and 10% of vehicle crimes. This has resulted in increases in the volume of forensic material recovered and most importantly the number of suspects identified.

Traditionally, forensic services contribute to serious crime investigation such as homicide and this is very much still the case with new technology allowing for the recovery of smaller and more challenging finger marks and DNA. The modern day Sherlock Holmes is normally attired in a white over suit, facemask and overshoes and uses a vast array of physical and chemical methods to recover forensic evidence. This technology includes specialised light sources and photography combined with a range of chemical treatments that allow for invisible latent finger marks and traces of body fluids to be revealed through imaging and photo luminescent techniques. The more thorough and detailed capture of the crime scene provides an opportunity to understand the sequences of events and to test the account of witnesses or suspects. The use of computer presentation also allows technology to have other applications such as minimising the distress to the families of homicide victims by removing the body from the crime scene.

The response from Forensic Services is required in hours and days rather than weeks and months to minimise further offending. forensic services is now very much a 24/7 business at the front line of policing. The adoption of intelligence-led approaches by police forces and national agencies through the UK National Intelligence Model opens up an opportunity for Forensic Services to contribute to a wider intelligence picture. This could be through using fingerprints and DNA to track and identify those involved in criminal activity at national and international level. The MPS provides the support to national agencies involved in counter terrorism activity and since the dramatic events of 9/11 we have made extensive use of national and international databases to reveal identities and movements of individuals that have been key sources of intelligence. Using forensic databases of fingerprints and DNA and looking to other forensic information about criminal commodities such as firearms or drugs provides the opportunity to contribute to tackle criminal networks and reduce harm from serious and organised crime.

Future technology will challenge current models for delivery of forensic services with the potential to carry out DNA or Class A drug testing in the custody suite. We will be able to identify offenders while in custody and streamline processes to deal with offenders so that action can be taken quickly to minimise the risk of further offending and rehabilitate or deter offenders. There is also a wider agenda with respect to not only the use of technology but the roles of forensic staff in the police service. As well as using more sophisticated technology to locate, recover, analyse and interpret forensic material, forensic staff have an important role in dealing with the victims of crime and providing reassurance. Whether photographing a victim of an assault, dealing with someone who has been burgled or seeking to preserve a homicide scene at the family home of the victim, forensic staff require an awareness of the distress caused by crime. As part of the modernisation agenda the forensic staff will become the sole response to burglary in the MPS area negating the need for a police officer to attend. This approach is not only more efficient with a target to deal with burglary scenes within four hours but maximises forensic recovery and minimises the distress to victims allowing them quickly to return to a normal life.

Overarching all of this is the absolute need to maintain public confidence in the use of forensic services in general and the forensic databases in particular. In the UK we have the most well developed use of forensic databases in the world and the effective governance and operation of these databases is paramount to their continued use in the investigation and reduction of crime.

In discussion the following points were made:

Anyone arrested or detained for questioning can have their DNA collected for storage on the DNA national database without any prior need for permission. The use of part of the DNA molecule to predict human characteristics for criminal profiling is an area for research, but is not currently applied to crime prevention. Criminals deliberately contaminate DNA left at crime scenes. Smart water that sprays a burglar is a useful technique in linking criminals to a crime scene. Studies of repeat victimisation are under way. SOCA deals with organised crime related to Class A drugs, people trafficking (including people smuggling), firearms and money laundering. It has no primary responsibility for counter-terrorism, although abuse of red diesel, linked to the IRA and organised crime, forms part of SOCA's wider remit to break into and disrupt and destroy organised crime. To defeat crime in the future much better use must be made of science and not just the traditional reaction of putting more bobbies on the beat.

THE SCIENCE WEEK SEMINAR – THURSDAY 17TH MARCH 2005

THE UK – BEST PLACE IN THE WORLD FOR INNOVATION

The annual Science Week Seminar was held in the Attlee Room at Portcullis House and focused on the need to develop stronger links between scientific innovation and commercial development to realise full economic potential. The joint chairmen were Mr Richard Page MP, Chairman of the Parliamentary and Scientific Committee, and Sir David King FRS, Government Chief Scientific Advisor. The subjects addressed by the speakers are the Ten Year Plan; The technology strategy as a basis for future economic success; Technology strategy and collaborative policy in Government; Knowledge transfer within the Research Councils; and Science and Technology centres of excellence. The seminar was jointly organised by the Parliamentary and Scientific Committee, the Parliamentary Office of Science and Technology and the DTI and attracted a capacity audience who took an active part in a well-organised and successful meeting.
Report by Robert Freer

Mr Richard Page, Chairman, Parliamentary and Scientific Committee

Mr Page welcomed the delegates, and in opening the first half of the meeting, pointed out that the title "The UK - Best place in the world for innovation" should be read as a statement of intent. He also drew attention to the growing importance of the Parliamentary and Scientific Committee. A hundred years ago it was theoretically possible for an MP to understand the whole of science. Today that is impossible. As scientists climb up their individual silos they also find it increasingly difficult to communicate with each other let alone with the general public. An MP is a jack of all trades, often lacking sufficient scientific knowledge to understand the right way forward when science-based legislation looms. This is where the PSC's role is of growing importance as a bridge between the scientific world and Parliament, helping both sides to understand the needs and pressures of the other.

The Ten Year Plan

Sir Keith O'Nions, FRS, Director General UK Research Councils

I want to give you an overview of the 10-year Framework for Science and Innovation and of the role of the recent Science Budget allocation of £10 billion announced by Patricia Hewitt.

The headline aspects of government science policy both in the UK and USA have changed little over the past 60 years. US policy after the war in 1946 was to focus on the war on disease, on public welfare, national security, the international exchange of information (at a time when most basic science was being done in Europe) and the creation of jobs to provide economic growth. In the 1960's the Wilson Government set up the influential Robins committee which also placed great emphasis on economic growth. The difference today is that there is a much stronger focus on delivery and a commitment to maintaining long-term support for research activities.

The 10-year Framework is the clearest annunciation yet of Government policy. It has been well received by academics, and viewed with interest and envy from overseas. It aims to make Britain the most attractive location in the world for scientific innovation.

The UK has a strong base in science and technology but we must aim to be internationally competitive across the board. In much of science the quality and input of our research is second only to the US but in engineering research and the physical sciences we are more like third and fourth in the world and we need to address these areas.

The 10-year Framework strives for a research base that is responsive to the needs of the economy and public services (such as national security and the environment). Significant investment will be aimed at encouraging economic exploitation. Our aspiration, over the ten-year period, is for business R&D to rise from 1.2% of GDP last year to 1.9% and overall investment including the Government contribution to rise to 2.5%.

The 10-year plan seeks to address the supply of engineers and technologists. There has been a big increase in PhDs in the bio-medical and life sciences but in the physical sciences and in engineering we have not necessarily got the right people in the right places at the right time.

The largest part of new investment will be targeted at the sustainability of our universities and public research laboratories, filling the

black hole left by many years of under-investment. Finally, the Framework gives priority to improving public confidence in emerging technologies such as nanotechnology.

The allocation of the £10 billion through the Research Councils, the Royal Society, the Royal Academy of Engineering and the British Academy lays the foundations for this 10-year vision. It covers the whole range of research activity from particle physics to the humanities.

To improve the sustainability of our infrastructure, £200m per year by 2007/8 has been allocated to cover a greater contribution of the full economic cost of undertaking research. Most of this will go to the universities on the back of existing grants. Ongoing investment in university infrastructure is being maintained at £500m per year over the next three years. Taking into account capital streams, our aim is for 100% of full economic costs to be met by the end of the next spending review. Capital funding for large facilities and Research Council Institutes will also be increased to £250m by 2007/8.

The importance of knowledge transfer has been well articulated over the last few years. In the Higher Education Innovation Fund there has been an increase in the money given to universities specifically to support linkage activities with business and for developing knowledge transfer capabilities. We need to support these activities both nationally and regionally and not just assume that they will happen naturally. A sum of £110m per year will be allocated for this purpose by the end of the review. An equivalent fund of £20m has been allocated to knowledge transfer in public sector research establishments, and £15m will be allocated later this year targeted specifically at taking forward the results of research funded through Research Council grants.

In allocating the total fund of £10bn, the Research Councils identified their own priorities and OST sought to balance investment across these priorities. We have made available an extra £40m to engineering (with particular focus on the life sciences interface), mathematics and the social sciences. An additional £30m has been allocated to support blue skies research in systems biology and big environmental projects, and £25m to clinical research to improve the translation of basic medical research to the bedside. Finally, EPSRC has been allocated an additional £25m to invest in energy research to produce a coherent programme of work to support future energy options from nuclear fusion to photovoltaics.

To summarise, the 10-year Framework identifies huge challenges and opportunities for our research base. The UK has a world-class science base, and the Government understands that its long-term sustainability is a prerequisite to successful exploitation.

The Technology Strategy as the Basis for Future Economic Success

Catherine Beech, Cambridge Gateway Fund

Catherine Beech introduced herself as the founder of the Cambridge Gateway Fund, a small venture capital fund based in Cambridge which invests in companies in the UK. She is also a member of the DTI Technology Strategy Board which offers an insight into the working of the DTI on technology transfer.

The UK has a strong base in science and technology and in fundamental academic research. Our scientists are innovative and publish more scientific papers per capita than any other country in the world but we are less good at commercialising the results. For example, MRI scanners were invented in this country but it was the Americans who made them a commercial product. We need to improve the commercial take-up of our new technologies. We need not only to find things out for the pleasure of doing so but also find the right market to sell them in.

Our spending on basic research is spread fairly evenly across the country but is less overall than in other countries For comparison, Germany, France and the US have all increased their spending on R&D, as a percentage of GDP, since 1981 but we have not. Where we are strong in research, such as pharmaceuticals, we are holding our own but in research on oil, gas and utilities other countries are spending more.

For an academic access to grants for basic research is not difficult and it is easy to find someone who can help you. But funding for early stage companies is more difficult to find. University challenge funds have been successful and are well used by academics who understand how they work but have not yet

reached the stage where they are making an actual return.

In order to forecast what technologies will be needed in the future, we first need to consider what will be the cultural, social and demographic changes and what we should be looking for technology to provide. The DTI did some useful work last year on the underlying themes which address culture and society changes to help define where technologies should be focused. The public wants many things to be smaller, better and cheaper, and more personal mobility creates a demand for better communications. Large companies are very interested in early stage companies who can offer technologies which help them do better in their present programmes, and there is a particular need for better engineering in the life sciences.

There are a number of factors which are critical for success and to support a spirit of entrepreneurship in an early stage company. The opportunity to get advice and share information with someone who has successfully done what you are trying to do is particularly helpful. In Cambridge there are clusters of entrepreneurs where such help is available. Human capital is important as is the physical infrastructure, long planning delays to get new buildings can frustrate the development of small companies. Managers with global management and marketing skills can help to identify a current market need for a less than perfect product. By the time the perfect product is produced the market may have moved on. Government support for these managers would be helpful.

Access to money is always a problem. Academic grants are available for basic research, and university challenge funds are helping companies to develop their ideas. There are some Angel groups, including a strong group in Cambridge, but otherwise there are few funds available for early stage companies, and fewer funders prepared to take risks. Also, funders like to have a hands-on connection with the company. Venture capital is difficult. Private equity capital from London tends to go into management buyouts rather than to support early stage companies, and funders expect a return in five years, and we need to change our fear of failure.

There is now more emphasis on the business pull rather than the innovative technologies. This is an important step forward. Under the technology programme £250m has been made available; it is not enough but it is a start. The Government is making a real effort to help business to set priorities and to fund them. People are using the facilities and the competitions which have been set up which is a positive step. The objective in technology is to stick to what you know and do best and continue doing it. Technology platforms are important for venture capitalists as multiple products can be spun off with opportunities for repeated shots at goal, whereas with only one technology and product, nothing remains after failure. Some early stage technology companies would find it impossible to survive without the early stage tax credit. Of five small early start companies in a competition in Cambridge, two have contracts with the US, but none with the UK. There is therefore a need for improved procurement in the UK.

The Technology Strategy and Collaborative Policy in Government

Patrick McDonald, DTI Technology Strategy Board

Our programme provides two mechanisms to support business, collaborative development and knowledge transfer networks. The funding for this programme will rise to £180m by 2007-2008. This compares with £50m in 2003. In April 2004 we launched a competition for £60m of funding which attracted 400 projects of which 17 were funded at the end of the selection process. We also appointed an independent Technology Strategy Board which met formally for the first time on 1st November. On 29th November 2004 we launched another competition which attracted over 900 applications for £80m. Lord Sainsbury announced the next competition for £100m which will open on 26th April 2005.

The objective for Government support is to help businesses increase investment in R&D, promoted by market pull rather than science push. This analysis is also focused on the capability of firms to deliver market needs following an assessment of the potential for technology "stretch" which is a measure of market maturity. The funds allocated are

sufficient for the needs of a project and are not spread thinly across a broad spectrum of activities just to reduce complaints. Judgement is needed in allocating funding for technology-specific small companies compared with the £20m-£30m required for validation of complex systems, such as demonstrators or technology test beds, that will be met by a new pilot programme in future.

The DTI is extending the technology strategy to other government departments since an EU survey in 2003 showed that the UK takes about twice as long as our major competitors to bring a product to market. Can the Government help by becoming a more demanding customer? The Government spends about £1bn annually on fostering technology transfer companies, and about £10bn on its own research with an overall procurement budget of £120bn, a powerful financial lever to motivate business innovation.

The work of joining up government departments is proceeding well, having received £50m from Defra to be channelled through the technology programme, which benefits the work on sustainability where we have a common interest. The latest competition includes a £20m challenge to demonstrate aspects of the zero emission enterprise, such as waste reduction. A workshop is planned with Defra, other departments and the Research Councils, to help find areas of common interest.

The nine Regional Development Agencies and the three Devolved Administrations are at different stages with their regional technology strategies, and the Technology Strategy Board has an important intercommunication role with them. The relationship works best when discussing specific opportunities for regional collaboration such as micro-nanotechnology where the DTI can assume leadership and set a national agenda.

The DTI is developing a strategic approach for technology support but there is a long way to go with research teams needing longer term funding and businesses with better facilities in the run-up to the spending review in 2006.

Knowledge Transfer within the Research Councils

Professor Ian Diamond, Chief Executive, ESRC

Knowledge transfer within the 10-year Framework is the topic of this address, presented as chair of the executive group for the seven research councils, that cover the entire science base from social economics to particle physics and environmental medicine. The Government spending review reflects the national commitment, ranging from basic research to the use of knowledge generated from the science base for the general benefit of UK society.

The fundamental starting point is that no one can take public money for research if it is not communicated properly for the benefit of the population. This principle extends not only to business and industry but also to public policy and interactions with the Government. All Councils have their own policy to support knowledge transfer and they work together with the UK Research Councils (UKRC) to identify the added value. In ESRC we adapt our strategy to fit the research undertaken, supported by a range of policies, so that for each research topic an appropriate strategy is available.

The need for a strategy for small business research was recognised by the ESRC in the late 80s and a small business service has now been in operation since 2004. The application of research is not a linear process, it is necessary to interact with the user and time is necessary for the development of new ideas. The priorities for the Research Councils centre on collaboration, on supporting research workers and on the commercialisation of the results. Collaboration with education and training supports post-graduate training and ensures we have world class scientists coming on stream. Additional funding is available for PhD training with entrepreneurial skills.

The need for interaction between business and academics is recognised, and also the potential benefit that accrues for those PhD students who are supervised by both academics and by specialists from industry. This will produce a new generation of scientists who understand business, and those who go into industry will be better trained in understanding business. A third benefit will be development

of a new network between the supervisors.

People are essential to successful knowledge transfer and we need to encourage networking to enable people to move between research, industry and Government. In the ESRC we also have the Connect Club which provides opportunities for industrialists to meet researchers, and we have 24 Faraday partnerships and other ways to support long-term research.

For instance, Rolls Royce are supporting aero engine development with a number of universities, and the University of Dundee is working with the MRC on pharmaceutical developments to understand how cells transmit molecular messages and how this information can be used to help develop drugs for a variety of diseases. As a result of these commercial activities over the last three years, 187 licences have been issued, 351 patents have been generated with more than £50m income from 30 spin out companies.

The research councils are also working with academics and other partners to take this forward. For example, ERSC is working with the Nottingham University Institute of Enterprise and Innovation and MRC to help the commercialisation of the work of over 180 bioscientists per year. Small groups are set up to prepare a business plan. These entrepreneurial activities are not picked up in five minutes but if you want to inspire PhD students with a small amount of money they will work hard. This work is people-intensive and takes time. We are committed to help scientists to understand business and all the research councils are increasingly aware of the issues to understand and develop business, financial and legal skills and to assist the next generation of scientists. For those councils for which it is appropriate researchers can apply for a further grant to develop the commercial opportunities of their work. For 24 such projects £1.4m has been allocated; it takes only a small amount of money to support this work.

The commercial application of research is not a linear process. It requires partnerships and needs interaction with industry. This takes time. We need to set up networks including Government and industry at a high level to deal with this, but it requires positive commitment from all those involved. UKRC is totally committed to knowledge transfer and we look forward to encouraging the commercial development of basic research.

Science and Technology Centres of Excellence

Sir Richard Sykes, Rector, Imperial College, London

Our Centres of Excellence in higher education carry out work of high quality and have a potentially significant impact on our lives and it is vital to maintain them. Our science base has been neglected in the past, particularly during the 1980s and 1990s, and we need to increase our investment if we are to keep up with the USA. This is now starting to happen and the science budget has risen from £1.45bn in 1997-98 to £2.4bn now, and will be £3.4bn by 2008. This is a welcome improvement and is better than in Europe generally but is still below the US level.

Government thinking supports the endeavours of leading universities in extending the frontiers of science, engineering and technology. But fine aspirations need to be focused and converted into actions and we need to avoid wasting the money by spreading it too thinly and regulating too strongly.

The solutions to the important needs of the world are never simple and are going to require not only a widely disparate knowledge base but we also need to align political practicalities with scientific possibilities if we are to achieve realistic solutions. Even within the scientific community we need to bring together different disciplines.

At Imperial College we believe in the value of interdisciplinary working and we have a powerful mix of disciplines covering the sciences, engineering and business management and we work hard to ensure these disciplines collaborate and interface with each other. A typical example is constrained robot surgery which requires the contributions of mechanical engineers, computer scientists and surgeons. In the past this collaboration rarely happened but today it is the usual practice. In advanced imaging techniques, our work is probably better than elsewhere in the world and for this we need good engineers, mathematicians and clinicians.

We encourage new entrepreneur companies. This has been a complete change compared with ten years ago. Since 1997 60 new companies have been founded on

research work undertaken at Imperial College, 40% of them in biotechnology and health care, and we are adding 4 to 8 companies per year. £20m equity goes back into IC as well as licence income.

For these companies to prosper good science is not enough. We need to build national and global networks to provide not only the critical mass but also the insight, the vision and leadership these partnerships need. As an example of the operations by Imperial College in the field of international health care the Gates Foundation came to IC to seek help in running a complex health programme in Africa, together with Harvard and the local governments. Another programme funded by the Gates Foundation is for a £15m programme on HIV/AIDS. In a third programme the Wellcome trust is working with IC, Oxford and local governments on HIV/AIDS

In the medical sciences we have special advantages. The NHS is one of the finest systems in the world to deal with patient care and we have the finest practitioners in medical science and technology so we are seeking to bring them together. The multi-disciplinary approach in which clinical medicine is integrated with science and technology is the key to improved clinical care and can be applied to real health problems. One example is the new information network at the Hammersmith cancer centre which will co-ordinate clinical care at all the NHS hospitals. The network contributes clinical information to a data warehouse being built with the support of the Wellcome Trust, Imperial College and GlaxoSmithKline. The information collected can be fed back into the pharmaceutical industry to help the development of new cancer treatments.

Universities have a role in creating ideas and technologies and transferring them into industry and commerce. Industry develops ideas and practical products and the NHS uses the new products and services. And they all contribute to adding new skills to the pool of knowledge workers. Our medical regulatory environment in UK is good and achieves the right balance between protecting the individual and stimulating exploration. This has helped UK scientists to lead the world in stem cell research and in tissue engineering. We must be prepared to pay for the adoption of new technologies. We have the potential but if we don't also show we have the market for our creativity, our scientists and technologists will drift away to the USA. Another example is our work to understand and solve the issues around global climate change.

These examples of major problems in health and the environment can be addressed only by big science, by bringing people together in multi-disciplinary teams to create a critical mass. We need long-term contracts to provide stability and to ensure delivery and then we can compete on the global stage. In this country we have all the ingredients for success but we have to work together and recognise that it is a difficult game.

Sir David King FRS, Government Chief Scientific Advisor

Sir David summed up the meeting and thanked all the speakers and indicated that the topic was well chosen and very timely. The opportunities emerging from one of the strongest science bases in the world are immense for all of us.

In July 2004 he published a paper in Nature that listed the scientific strength of different countries by the number of citations per £ invested in the science base. The UK headed the list with 60% more than the next nearest competitor nation. Industry investing in the UK gets more bang for its buck. In this country we have strong science with a legacy going back 250 years or more, despite the brain drain to the USA which is now reversing.

We have now established hi-tech clusters which are the follow-through from the science base and which we had previously been missing for decades. The next phase is to develop the pull-through from the hi-tech clusters to industry. Within 3 miles of Cambridge there are now 1600 hi-tech companies employing about 40,000 people. These clusters, which are unique in Europe, are the opportunity for the future but we need a continuation of the change in culture which has happened in the universities. It is still to happen in some industries and in the City..

In discussion the following points were made:

The role of the Regional Development Agencies; need for long term investment; neglect of materials funding; method of measuring added value; links with humanities research boards; demise of SMART programme; intellectual property rights; costs of collaborative research; collaboration between NHS and academics; NHS priorities for research and patient care; SMEs and global collaboration; economic and social dimension to research; role of charities in funding research; criteria for the infrastructure; costs of research for SMEs; the regulatory system; training new engineers for new nuclear power stations; teaching science and engineering in schools; market opportunities for new companies; role of Technology Strategy Board; communication between science and the City.

Fighting Infection

Janet Hurst and Faye Jones
External Relations Office, Society for General Microbiology

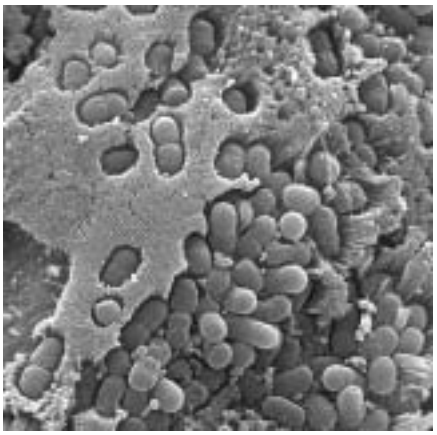
Micro-organisms – bacteria, fungi, protozoa, algae, viruses and prions – affect every aspect of our lives. The science of microbiology is important to each and every one of us. Politicians and opinion-formers are faced every day with making decisions about microbiological issues that are key to human, animal and plant health.

Since 1970 previously unknown pathogenic micro-organisms have emerged as a significant threat to human and animal health at an average rate of about one a year. SARS, BSE, vCJD, Ebola, HIV, Lyme Disease, Legionnaire's Disease, *E.coli* O157:H7 and West Nile virus have all been hitting the headlines. Many of these infectious agents have been passed to humans from animals. Now that the "golden age" of antibiotics is ending, even diseases once thought to be conquered, such as TB, are making a comeback. The scale of global travel means that infections can rapidly spread around the whole world.

Infections not only make humans ill and decimate livestock and wildlife, but they can wreak economic havoc, as demonstrated in the 2001 UK foot-and-mouth disease outbreak.

Because they are so numerous and reproduce so rapidly, micro-organisms can constantly evolve and adapt to changes in their environment. This makes it difficult for scientists to keep ahead. For example, antibiotic resistance is not a new problem. Within a very short time of the commercial development of penicillin in World War II, some bacteria were showing signs of resistance to the drug.

The fight against microbes combines the incessant struggle to gain an upper hand over known pathogens and the never-ending vigilance required to overcome anticipated and unexpected outbreaks of new or evolved species.



Cultured human small intestinal mucosa infected with enteropathogenic* E. coli *(Credit: Stuart Knutton, University of Birmingham).

MRSA

MRSA is a prime example of a continuing struggle against microbes. MRSA are *Staphylococcus aureus* bacteria that have evolved resistance to the methicillin class of antibiotics. These bacteria live harmlessly in the noses of many people, but in the very old and young and in patients that are already unwell they can cause disease. Infections caused by MRSA are treated with the last remaining reliable antibiotic class, vancomycin. This drug is expensive, has side-effects and has to be administered in hospital. Even with treatment, 25% of patients with MRSA bacteraemia will die. This equates to approximately 5,000 people each year in the UK.

The UK has one of the highest rates of MRSA infection in Europe. About 40% of *Staphylococcus aureus* infections in UK hospitals are due to these strains. So how do we fight it? MRSA is already established in our hospitals. It is found on equipment, beds, floors, furnishings, sinks, etc, and simple cleaning is often not enough to get rid of it. MRSA is also found in the noses and on the hands of patients, visitors and healthcare workers. In the UK, we do not routinely screen all patients and staff for carriage of MRSA.

There are no simple solutions to stopping the spread of *Staphylococcus aureus* or MRSA. Reductions in infection rates can be achieved through greater awareness, more hand-washing resources, screening and infection control, and isolation of patients and staff carrying the bacteria. The recent introduction of MRSA bacteraemia reporting is starting to have an effect.

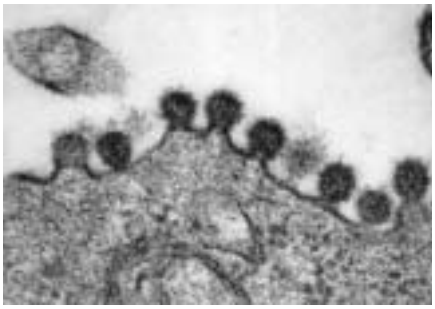
But these measures alone will not eradicate MRSA. Since 2002, three cases of fully vancomycin resistant *Staphylococcus aureus* (VRSA) have been reported in the USA. It would be irresponsible not to expect cases in the UK and we must prevent VRSA from getting established in our hospitals. VRSA may be untreatable and no one will want to go to hospital if they have a chance of catching this potentially fatal infection.

Many large pharmaceutical companies have closed their research programmes for developing new antibiotics. Lack of potential profits and tough regulations mean that companies will not invest time and money in this. A small number of companies are developing vaccines, but none so far have been found to be effective against MRSA. With no new drugs or vaccines available, ring-fenced funding for research is essential.

MRSA experts believe that we cannot control infection without greater understanding and more tools. UK Government investment is needed to develop new rapid diagnostic tests, better treatment for patients, improved surveillance and above all fundamental research into all aspects of this terrible infection and how it spreads.

Avian 'flu

Avian influenza, a virus infection commonly called bird 'flu, is an illustration of a microbiological problem requiring international



Transmission electron micrograph of budding influenza virus (x 200,000 magnification).

contingency planning. This economically important disease for poultry farmers is mainly found in the Far East. It can spread to humans who come into contact with infected birds. Luckily this is rare and involves only some strains of the virus, but cases over the past nine years have raised concern that the world may be on the brink of an influenza pandemic. H5N1, the causative strain, is primarily found in poultry and although the number of people infected is relatively few, in them it causes severe disease and the death rate is above 70%. Unfortunately, because the virus is very similar to human influenza virus there is a risk of the two types combining into a form that both causes severe disease in humans and spreads as easily from person to person as human 'flu. The effects of this could be devastating.

In the face of this danger, governments are stockpiling antiviral drugs and work is under way to develop a suitable strain of H5N1 that could be used to make new vaccines. The National Institute for Biological Standards and Control has already solved the first significant problem to emerge. H5N1 is too dangerous to use for vaccine development and so scientists at NIBSC have manipulated the virus and removed the features responsible for causing disease. This strain is now being used by vaccine manufacturers in their research.

The second problem is how to stimulate proper protection in people. Information so far suggests that for any potential pandemic, vaccination tactics will need to be different from those in current use. Further research is urgently needed to design immunisation strategies for the new vaccines.

Only microbiologists can make a difference

Without the unceasing work of microbiologists in hospitals, health protection laboratories, industry, universities and research institutes into the causes, diagnosis, prevention and treatment of infectious diseases, millions of people and animals would die each year. In the face of so many new challenges from microbes, the expertise of microbiologists has never been more needed.

The development of improved services to control and prevent infection was flagged as a priority for the Government in the House of Lords Science & Technology Committee 2003 report Fighting Infection. Recommendations include the facilitation of greater collaboration between experts and the recruitment of more specialists. Reports into animal health which resulted from the 2001 foot-and-mouth outbreak made similar proposals. Yet despite these recommendations, there is a shortage of clinical microbiologists in our hospitals and many research institutes working on animal and human infectious diseases are facing cuts in funding and thus in staff.

Microbiologist at work.

Microbes will inhabit Earth long after the human race is extinct. The need for skilled microbiologists and funding for microbiology will exist as long as human life itself. Governments around the world cannot ignore the fact that the fight against infection will never end, but that if they invest in microbiologists some of the battles can be won.

Further reading:
Enright, M. (2005). *Microbiology Today* 32, 48.
Health Protection Agency *Staphylococcus aureus* website (http://www.hpa.org.uk/infections/topics_az/staphylo/menu.htm).
Health Protection Agency avian influenza website (http://www.hpa.org.uk/infections/topics_az/avianinfluenza/menu.htm).

society for general Microbiology

The Society for General Microbiology (SGM) Microbiology Awareness Campaign aims to alert parliamentarians and government departments to the important issues relating to infectious disease and the need for adequate funding of surveillance and research. It has recently been acknowledged as a source of advice on exotic infectious diseases imported into the UK within the contingency plans of the Department for Environment, Food and Rural Affairs (DEFRA).

The SGM was founded in 1945 to bring together scientists involved in all areas of microbiology and, with a current membership of over 5,500, can offer impartial and expert information to politicians and civil servants on all microbiological topics. The Society responds to relevant government consultation documents, produces occasional briefing papers on microbiological themes and offers a free subscription to its magazine *Microbiology Today* to all Parliamentarians.

As well as promoting microbiology through its grants, prize lectures, education and public understanding of science activities and its high profile role in UK and international biological organizations, the SGM holds international scientific meetings and publishes cutting edge research findings in its four prestigious journals.

For further information contact:
The External Relations Office, Society for General Microbiology, Marlborough House, Basingstoke Road
Spencers Wood, Reading RG7 1AG. Tel 0118 988 1843 www.sgm.ac.uk Email

Chemical engineering on the menu

Professor Colin Grant, Strathclyde University

Imagine for a moment if you can, receiving an invitation to a dinner party where the other guests included a Nobel Prize Winner, MIT's youngest ever full professor, the Managing Director of one of the world's biggest oil companies, a leading cardiovascular physiologist, the President of Trinidad and Tobago and a latter day crystal ball gazer who has been publicly described as "weird, wonky, wonderful and very, very useful…" An intriguing guest-list I hope you'd agree and perhaps even more so when you learn that the after-dinner conversation will focus on the future of chemical and process engineering and its potential impact on the way we might be living our lives over the next twenty years.

Professors Jean-Marie Lehn, Jackie Ying, Denis Noble, His Excellency George Maxwell Richards, Shell's Malcolm Brinded and futurologist Oliver Sparrow are the special guest speakers at the UK's biggest ever gathering of chemical and process engineers, which opens at Glasgow's Scottish Exhibition and Conference Centre (SECC) on Sunday 10th July 2005. They will be joined by 20 keynote contributors and more than 2000 visitors from 70 countries for four days of networking and discussion that will touch upon some of the biggest challenges facing mankind in the 21st Century.

Wrestling with the issues

Okay I'll come clean, it's a technical conference rather than a dinner party. But even if it had been, I'd hazard a guess that the prospect of breaking bread with a crowd of chemical engineers might not have proved an immediate attraction – even with haggis on the menu. And yet a closer look reveals that chemical engineers are wrestling with many of the issues that preoccupy, politicians, policymakers and voters in the UK and beyond. The congress programme will feature hot topics such as meeting future global energy needs, the commercialisation of nanotechnology, waste management, technological possibilities arising from the Human Genome Project, education and training and the future existence of the chemical and process industries in developed economies.

Relevant skill set

Chemical engineering is more than a hundred years old. Many people contend that the discipline came of age in 1960's and some will argue that it is now in its sunset years. IChemE hotly contests this proposition, arguing that the core chemical engineering skill set is as relevant today as it has ever been. The fundamental understanding of process design, process control and the modelling of complex systems coupled with a commitment to sustainable development finds application in many different sectors including food and drink, pharmaceuticals, energy, and biotech as well as the traditional areas of petrochemicals and oil and gas processing. Chemical engineers can also be found at work in the financial sector, the media and even in politics where Ashok Kumar, Labour MP for Middlesbrough South and East Cleveland and IChemE Fellow has been known to fly the flag for the discipline from the benches of the House of Commons.

And yet chemical engineering is something of a Cinderella amongst the engineering disciplines. Civil engineers build bridges and roads, mechanical engineers bring us cars and trains, electrical engineers keep the lights on; but what do chemical engineers do exactly? A typical dictionary definition might be as follows, "the activity of applying chemistry to the solution of practical problems". Not entirely helpful you might think, although the last five words are worth hanging on to – solving "practical problems"; we have quite a few of those around, maybe chemical engineers can help.

Innovation and achievement

The heart of the process community, IChemE was founded in 1922 and it is true to say that the 7th World Congress of Chemical Engineering is quite simply the largest project ever undertaken by the Institution in it's 83-year history. The bidding process started back in 1999, and whilst not quite on the scale of an Olympic bid, the competition was extremely strong and the UK saw off rival pitches from Spain, Italy and France to win the right to host the event. The attractions of Glasgow outshone Barcelona, Rome and

Toulouse clearly proving irresistible to the judges and I would hardly disagree. IChemE was handed a golden opportunity to highlight innovation and achievement in the discipline and, crucially, to showcase the leading role that British chemical engineers are playing in the advancement of process technology. Over the last two years 3000 abstracts have been subjected to rigorous peer review. The process yielded almost 2000 manuscripts and at the time of writing 1400 delegates have registered to attend the congress, a third of them coming from industry, dispelling the myth that events such as this are exclusively attended by academics.

Few in the science community would dispute the fact that traditional boundaries between disciplines are crashing down. As such, the congress will not be the sole preserve of chemical engineers. Other disciplines are well represented in Glasgow with major contributions from chemists, mathematicians, environmental scientists and even accountants. Her Royal Highness The Princess Royal will attend and speak in her role as official patron and the Deputy First Minister, Jim Wallace MSP, will represent the Scottish Executive. Substantial industrial backing has been secured from more than 20 leading companies with process sector interests including ABB, BASF, BOC, BNFL, BP, Foster Wheeler, GSK and Shell.

Novel agenda

In an attempt to present the diverse spectrum of chemical engineering research in a new and more publicly accessible manner, IChemE choose to steer clear of the usual practice of pigeon holing different specialists in different parts of the programme. A commuter on the "clockwork orange", as our underground railway system is sometimes known, might glaze over at the prospect of a room full of process engineers discussing multi-phase flow or particle technology. Alternatively, tell them that the SECC is full of people thinking about ways of turning "molecules into money" or looking at "engineering for life" and you might be in with a chance of a productive conversation before they leap out at Buchanan Street.

IChemE Chief Executive, Dr. Trevor Evans, reports that the international community responded well to the challenges set out in the unusual congress themes. "The congress agenda reflects the way in which we, as chemical engineers, strive to advance fundamental understanding and translate science into viable engineering applications. Around the world we are managing complex systems and turning molecules into money without overlooking the fact that we must deploy our skills to enhance the quality of life and to deliver sustainable processes for future generations. To date we have assembled almost 1000 world-class contributions that are meeting this challenge and I am proud of the fact that UK contributors account for almost a quarter of the programme."

EPSRC Chairman, Professor Dame Julia Higgins, agrees. Writing in the congress guide she says, "The novel programme has prompted chemical engineers to think outside the box and confront the challenges presented by multidisciplinary working."

Public outreach

Away from the main programme, the congress will also feature a lively series of public outreach events including an international Chem-E-Car challenge staged in conjunction with the Glasgow Science Centre. The competition will see undergraduate teams from all over the world put their skills to the test in designing a car powered and controlled by a chemical reaction. The science centre will also be staging a series of public lectures and demonstrations to coincide with the congress. Shell are sending Michael Schumacher's F1 Ferrari for a pit-stop tyre change challenge whilst at the other end of the speed table BOC will unveil their latest record breaking fuel cell powered car.

Practical and political problems

And so the scene is set for an exciting week in Glasgow during which many of the UK's brightest engineers will rub shoulders with their international peers. The event will prove invaluable for industrialist and academics, whilst arousing more than a passing interest amongst the wider public. A dinner party it certainly won't be, although I am sure that the conference fringe will feature a prawn cocktail or two. And who knows, the answers to one or two of our more pressing practical, and dare I say political problems, may just get a first airing.

Colin Grant is the Roche Professor of Chemical Engineering and Head of Department at Glasgow's Strathclyde University. A Fellow of the Institution of Chemical Engineers, Grant will chair the 7th World Congress of Chemical Engineering, which runs from 10-14 July 2004.

For more information see www.chemengcongress2005.com

IChemE will be producing a short bullet point briefing outlining significant developments reported at the congress with implications for UK policymakers during the autumn. To request a copy please contact Suzi Mewes **smewes@icheme.org.uk**

Eating with the P and S

Tam Dalyell

Douglas Naysmith has asked me to reminisce, as Father of the House of Commons and as a Parliamentary and Scientific Committee "Regular" for over 43 years.

The first meeting I attended was one day after I took my seat! Encouraged by the Chairman, Austin Albu, MP for Edmonton, an engineer himself, I went along to listen to H J B Harding and J P Pain make a presentation on "Technical considerations relating to the Channel Tunnel and Channel Bridge". You may laugh now, but some of us concluded that a whole bridge or a half bridge-half tunnel was more feasible than a tunnel!

The two following meetings that first summer have stuck in my memory. Drs H G Sanders, T A Lloyd Davies and Donald Hunter came to us on the subject of the diseases arising out of the use of new materials and processes in industry and agriculture. This was of considerable constituency use to me, as the information gleaned meant that I was taken far more seriously than most politicians by the managers of firms employing my constituents, BP Chemicals in Grangemouth, the Atlas Steel Foundry in Armadale, and a host of others. Among those most interested in the subject – I had made copious notes – was Bill Hewlett, then setting up Hewlett-Packard in Queensferry in my constituency. As a member of PSAC – the President's Science Advisory Council – he invited me to see him in Washington, which I did, and meet the American Scientific Establishment of the day, Glenn Seaborg, George Kwistiakowsky, Dan Hornig, Ed Wenk and others. Directly and indirectly the Parliamentary and Scientific Committee has opened many doors to me.

The second and seminal meeting of that summer was when, just before the recess, the distinguished engineer, S A Ghalib, friend of Lord Gregson (President 1986-89), Sir William Cook, and Colonel G W Raby came on the issue of "Atomic energy: recent developments and future prospects". Seminal not only for me, but for the distinguished electrical engineer, Arthur Palmer (Chairman 1965-67), who decided as the Founder-Chairman of the Select Committee on Science and Technology, to embark as our first task on the inquiry into Nuclear Power. The Labour Members of the Select Committee were Palmer, David Ginsburg (Dewsbury), who became Chairman of the P and S (1968-1970), Dr Nick Davies (Stretford), Lecturer in Physics at the Langworthy Laboratory in the University of Manchester, Bryan Parkyn (Bedford), Chemical Engineer and businessman, Dr David Owen (Plymouth) and I. The Conservatives had Sir Harry Legge-Bourke, later long-term Chairman of the 1922 Committee, Sir David Price, Chairman of the P and S 1979-81, and Airey Neave (Abingdon), later to be tragically murdered. The Liberal was Eric Lubbock (Orpington), engineer, now Lord Avebury.

In those days, Commander Christopher Powell, secretary of the Committee, and lobbyist, would be disappointed if at least 20 MPs and a phalanx of Peers, led by the ever-kindly Earl of Halsbury FRS (President 1963-65) did not turn up.

So much for my first 6 months as an MP!

In the following year, I remember hearing Sir Frederick Brundrett and Sir Owen Wansbrough-Jones outline the role of Science and Government; Abdus Salam FRS, of Imperial College, later to win a Nobel Prize, on the application of science and technology in less developed areas; Dr E G Cox FRS, on Science and Agriculture, who invited us a fortnight later to go to East Malling Research Centre, where a lovely lunch and unparalleled fresh cherries off the tree made an impression, etched on our minds; and Dick Stone, Fellow of King's Cambridge, on "The use of computers in economic investigation".

The Science Minister of the day was the Lord President of the Council, Quintin Hogg. His Parliamentary Secretary, Denzil Freeth, in our eyes a possible future Prime Minister. Science was important before the White Heat of the Technological Revolution!

A feature of the Parliamentary and Scientific Committee has been the 7.30-9.30 "working dinner" after the formal evening seminar, usually held in the Astor Suite at 1 Parliament Street. Not only have they been congenial, but highly educative as far as I am concerned.

I am told that I have had more Oral Questions answered over 43 years than anyone in the history of Parliament. Many of them originated either from the discussion with guests over dinner – visiting speakers sang for their supper – or in conversations with a neighbour at the meal. For example, I was first told of the importance of Aldabra Atoll, an ecological jewel in the Indian Ocean, by Sir Ashley Miles FRS (Biological Secretary and Vice-President of The Royal Society 1963-68), whom I had the good fortune to sit next to in 1967. Had it not been for that chance encounter at the Parliamentary and Scientific Committee, I would never have asked 70 Parliamentary Questions, and sent them to eight leading Americans, including Vice-President Hubert Humphrey whom I had met in Washington when I was a guest of the Bureau of the Budget. He went to Robert MacNamara, Secretary of Defense, who in turn went to Lyndon Johnson, as did Dillon Ripley, who exercised his right as Secretary of the Smithsonian to go direct to Lyndon Johnson. Lyndon Johnson asked Harold Wilson what Aldabra was all about. The idea of a British runway died an instant death. Had it not been for the Parliamentary and Scientific Committee dinner the home of the pink-footed booby, the flightless rail and the giant tortoise in the Indian Ocean would have been destroyed for ever.

I have a huge debt to the Committee for bringing me together with scientists and industrialists, whom I would never otherwise have had the chance of meeting, and who greatly enriched my knowledge and understanding.

Bovine Tuberculosis - Towards a Science Based Control Strategy

J. Bourne – Chairman, Independent Scientific Group:
C.A. Donnelly, D.R. Cox, G. Gettinby, J.P. McInerney, W.I. Morrison, R. Woodroffe.

In order that future TB control policies can be science based, Defra on ISG advice has put in place a comprehensive programme of research to better understand the epidemiology of TB in both cattle and badgers.[1,2,3] This research is now providing a flow of valuable data on a range of topics, extending beyond the trial on culling badgers that was originally proposed in the Krebs report.[4] Emerging data, as yet incomplete, will allow secure scientific conclusions to be drawn.[5]

The Randomised Badger Culling Trial (RBCT)

The RBCT design which has been described in detail[1-3] involves three experimental regimes – proactive culling, localised reactive culling and no badger culling, the latter providing a survey only control. The objective of proactive culling is to reduce badger densities to low levels across entire areas, and this is maintained by further regular culls. Reactive culling, by contrast, initiated in response to confirmed cattle TB breakdowns, focused on home ranges of badgers as a one off operation. Both culling methods were subject to badger welfare concerns.[5,7,8] The principal question addressed by the RBCT is "what contribution can proactive culling and reactive culling make to controlling cattle TB".

The trial was designed to provide reliable estimates of the effects of culling on TB breakdowns by the time 50 triplet years have been accumulated and, in addition, a range of epidemiological and other data to provide a better understanding of the disease in both cattle and badgers. Analysis of herd breakdown data, the measure of the impact of badger culling on the disease in cattle, is carried out by two members of the ISG, audited by an Independent external statistical auditor, at six monthly intervals.

Thus far the results from the proactive treatment remain inconclusive, the results of reactive culling, however, based on data up to August 2003, and a further analysis to August 2004, provided convincing evidence that reactive culling of badgers does not offer a beneficial effect large enough to make it useful as a potential policy option and that there is substantial, but not overwhelming, evidence of an adverse effect of the reactive strategy[6]. This component of the trial has been stopped.

The proactive treatment continues and 50 triplet years, which marks the predicted end of the trial, will be reached in early 2006.

Badger Welfare

Since the inception of the trial, the ISG has been committed to testing the effectiveness of badger culling policies that would constitute practicable policy options if they were found to be effective. It was considered that if culling strategies

had very serious impacts on conservation and animal welfare they would not be sustainable in the long term – not least because they would be rejected by the public, including landowners in trial areas. Two aspects of badger culling had major implications for badger welfare, the method of catching badgers – cage trapping, and the timing of culling in relation to badger breeding season and the avoidance of the starvation and death underground of dependant cubs whose dams had been killed.

A detailed analysis of cage trapping data evaluating the injuries sustained by badgers captured in cage traps and the effectiveness of a closed season on avoiding the death of badger cubs from starvation have been recently published.[7,8]

In summary while cage trapping may have consequences for badger welfare other than physical injuries (particularly stress) trial data demonstrate that most badgers (88%) confined to traps have no detectable injuries as a result of being confined in the trap and of those injured 74% record only minor skin abrasions. A minority (1.7%) experienced tooth damage likely to have involved serious (albeit short term) suffering. Modification to cage traps – smooth coating of wire mesh, and modified door mechanisms – have reduced abrasion and other injuries further.

In order to minimise leaving unweaned cubs to starve when their mothers are culled a closed season for culling was instituted during February, March and April based on the best available data on the timing of badger reproduction to cover the lactating period. In contrast to predictions from welfare groups that large numbers of cubs (upward of 2000) would die underground as a result of trial operations, data suggests that the number is less than 20 cubs per annum. Thus although the adoption of a closed season has some practical disadvantages, by limiting the time for badger culling and lengthening the response time for a reactive cull, it shows clear welfare benefits.

Risk Factors - TB99 Epidemiological Survey

Many risk factors in relation to environment and cattle husbandry practices have anecdotally been suggested as predisposing farms to TB breakdowns. Because of the large number of factors[3] these are not easily amenable to experimental investigation but useful information can be gained from the TB99 epidemiological case-control study which compares data from breakdown farms to non-breakdown farms in trial areas. This approach allows investigation into the wide range of factors such as herd size, land cover, soil type, grazing systems, housing, movement of cattle etc which are potentially associated with an increased, or a decreased, risk of TB in cattle.

An initial analysis of trial data from a clearly defined data set up to 2001 has been carried out and recently published.[9] Of the large number of factors screened for association with a herd TB breakdown those factors associated with an increased risk were found to be moving cattle on to farms from markets or farm sales, operating the farm over several premises, use of covered yard housing and the use of other undefined housing types. In contrast those factors found to be associated with a decreased risk of a herd breakdown were spreading of artificial fertilisers and farmyard manure.

In view of the approach, and the limited data analysis undertaken, the risk factors identified are cautiously regarded as being associated with TB herd breakdowns, and not proof of causation. The results have provided a focus and helped to inform farm practice. Further case-control analyses of post FMD TB99 data are ongoing, and in the light of the experience and findings from TB99 the modified, shorter Case Control Study form (CCS2005) has been designed for the further evaluation of herd breakdown risk factors. This new form was implemented in January 2005 and is being used to collect more information not only within the RBCT trial areas but elsewhere in England and Wales.

Other Trial Related Research

In addition to addressing the effects of two culling approaches on the incidence of cattle TB herd breakdowns, the RBCT provides valuable baseline epidemiological data. This includes the prevalence of TB in badgers, its relationship to social group size and structure and, importantly, the spatial relationship between TB infected badgers and cattle herd breakdowns. These data are currently being analysed and along with other trial related research on matters such as the impact of badger removal on other wildlife and badger density estimations will ultimately contribute to a cost-benefit analysis that will be considered by Defra when determining future policy options.

Disease Diagnosis

A critical requirement of a disease control programme is accurate and sensitive diagnosis. The tuberculin skin test coupled to restrictions of movement of animals from breakdown farms have contributed to the successful control of TB in many countries, and in parts of GB. However the use of these control procedures have not prevented the spread of the disease across wide areas of GB in the past two decades.

The tuberculin skin test was developed as a herd test, and in

initial TB control programmes it worked successfully to identify and eliminate infected herds or groups of animals within a herd. This type of herd application is now relatively rare and the test is used almost exclusively to identify individual infected animals. This application has exposed the limitations of the test, whose reported sensitivity for identifying individual infected animals is variable, and may be as low as 65% to 70%.[2,3,5,10]

These recognised shortcomings have encouraged the development of alternative in-vitro tests and in particular the IFN test. This is a laboratory-based test which involves the culture of whole blood with *M. bovis* antigen and measurement of interferon (IFN) production by responding T-lymphocytes.[11,12] This test has been used strategically in a number of international TB control programmes to complement the tuberculin test to identify a higher proportion of TB infected cattle in a herd.[11]

Refinements to the IFN test have been made,[13,14] further research is ongoing, and the point has been reached when the IFN test must be considered as an important component of a TB control strategy. This necessitates that the test be properly validated in the field in GB to determine its strategic value in a range of potential future control policy options.[5]

Cattle Tracing and Molecular Epidemiology

A significant recent research development has been provided by the opportunity to link cattle movement and molecular epidemiological data. Strains of *M. bovis* with a distinct genotype can now be identified and linked to specific geographical areas of the country.[15] In the wake of FMD following the destocking of affected farms, both within and outside trial areas, an opportunity was taken to undertake a detailed epidemiological study on all of these restocked farms in trial areas and those farms outside trial areas that subsequently suffered a TB herd breakdown. This study, although still in its early stages has demonstrated new breakdowns occurring in previously relatively TB free regions of the country, which can be linked by genotyping back to specific *M. bovis* strains in other distant regions of the country. Their demonstration in new regions is consistent with the movement of undiagnosed but TB infected cattle. The past belief, that the source of infection for these new breakdowns is diseased badgers moving over long distances, is highly unlikely since both behavioural and genetic evidence indicate that badgers tend not to make long range movements.

It is particularly worrying that Defra report that 60% of herd breakdowns in Cumbria, post FMD, are ascribed to cattle movement.[5] Initial analyses of cattle tracing data is also demonstrating the extremely large number of local cattle movements in high cattle density and high TB disease risk areas which further highlights the danger posed by the movement of infected undiagnosed cattle.[16]

Vaccines

Vaccines have the potential for disease management and might be seen to offer the ultimate approach to disease control. However, this potential element of a TB control policy can only be regarded as a long-term, uncertain option, and would need to be complemented by other control measures.

A recently published vaccine scoping study[17] has reported on the feasibility for pursuing a TB vaccination strategy. This study advised that there was currently no suitable vaccine available that could be considered for use in cattle although the potential for neonatal vaccination should be explored experimentally using the human vaccine, BCG (Bacillus Calmette and Guerin).

BCG might also be considered for use in badgers although there is only limited experimental information on its protective efficacy in badgers and further detailed consideration needs to be given to the design and scale of a field trial to demonstrate its impact on the target species, cattle. Such a trial would have to be on the scale and time frame of the RBCT, and would necessitate the development of a non-parenteral vaccine, possibly an oral vaccine. It would also need to be guided by the outcome of the RBCT, since wide scale culling of badgers could be expected to have a greater impact on cattle TB than vaccination of badgers. The suggestion of an initial "small scale" trial to demonstrate the impact of parenterally vaccinating badgers with BCG, on the disease level in badgers would necessarily involve the capture and culling of a large number of badgers and would need to surmount considerable logistical difficulties if reliable data are to be gained.[5]

The ROI Four Areas Trial

The recent publication of the Republic of Ireland Four Areas badger removal trial[18] has given rise to considerable interest and raised questions on its value to policy development in this country. The ISG commentary to Ministers on this study recognised the strong evidence provided that badgers have a role in propagating TB in cattle, confirming earlier field assessments made in GB.[4] However the most that could be concluded from the ROI data was that virtual elimination of badgers over a substantial area, and maintained over time, is likely to have a beneficial effect on the incidence of TB in cattle. Quantitative assessment of the benefit accruing in the ROI study is made difficult in that the impact of culling varies in the four counties studied and the impact of, albeit limited, culling in the reference areas is unclear. However the qualitative assessment of the range of reduced incidence of cattle TB that is claimed to have been achieved (50% to 75%), by virtual badger elimination, is likely.

The ROI study usefully adds to the data-base on badger culling and may ultimately help interpret findings of the RBCT. However because of almost complete co-operation with culling from

landowners, seemingly low badger density, different capture methods and reduced welfare constraints, and cattle movement practices and testing procedures in Ireland, it makes it difficult to predict the impact of the same policy, even if exactly implemented in GB.

The results from the ROI study we believe provide no information relevant to the explanation of (or evaluation of) the lack of benefits (and potential risks) of reactive badger culling and have little value for predicting the conclusions to be expected from the proactive versus survey-only comparison in the RBCT or on policy options up to now considered feasible in GB.

Preliminary Interpretation of Research findings

Research findings support the view that TB in cattle and badgers is interlinked involving cross species and within species transmission of infection. The quantitative significance of the various components of this interplay to disease development and its maintenance in either species is unknown. However the disease in each species appears to have its own dynamic. The relevance of this is that a trial of any badger culling strategy (short of complete and sustained elimination) can only provide a measure of the impact of that particular culling strategy on the incidence of TB in cattle and not the quantitative contribution of infected badgers to cattle TB. A further practical relevance is that if the disease was eliminated from badgers, by the elimination of badgers or the use of a highly effective vaccine, a residual disease problem in cattle would remain to be addressed.

The recognised limitations of the tuberculin test to identify all infected animals in a herd, the movement of diseased cattle between herds and the seemingly limited on-farm application of accepted precautions for infectious disease control, clearly highlight the necessary focus for an improved cattle based control of this disease.

The vexed question "what to do about wildlife?" in GB remains unanswered. A number of precautionary husbandry measures have been proposed to reduce cattle/ badger contact, although these have no strong scientific basis, they can be conceived to be sensible precautions that can be applied in many instances. Culling badgers may be seen as an option but data from historical localised badger removal operations and from the reactive component of the RBCT, indicate that localised culling of badgers will have no substantive impact on the disease in cattle. Conversely virtual elimination of badgers over a large area can be expected to do so. Whether more limited sustainable culling over a large area, as conducted in the proactive component of the RBCT, will have an impact on the disease in cattle that is considered to be useful remains to be seen.

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House of Commons Select Committee on Science and Technology

Under the Standing Orders, the Committee's terms of reference are to examine "the expenditure, policy and administration of the Office of Science and Technology and its associated public bodies". The Committee was nominated on 12 November 2001. The Chairman was Dr Ian Gibson (Lab, Norwich North). Other members of the Committee were Paul Farrelly (Lab, Newcastle-under-Lyme), Dr Evan Harris (Lib Dem, Oxford West and Abingdon), Kate Hoey (Lab, Vauxhall), Dr Brian Iddon (Lab, Bolton South East), Mr Robert Key (Salisbury), Mr Tony McWalter (Lab/Co-op, Hemel Hempstead), Dr Andrew Murrison (Con, Westbury), Geraldine Smith (Lab, Morecambe and Lunesdale), Bob Spink (Con, Castle Point), and Dr Desmond Turner (Lab, Brighton Kemptown).

Oral Evidence

The uncorrected transcripts of these evidence sessions are available on the Committee's website.

Science Question Time

The Committee hosted a "Science Question Time" with Lord Sainsbury of Turville on Wednesday 2 March.

Chief Scientific Adviser, Department for International Development: Introductory Hearing

The Committee conducted an introductory hearing with Professor Gordon Conway, who took up his position as Chief Scientific Adviser in the Department for International Development, on 11 January 2005. The oral evidence session considered the new role and its functions along with Professor Conway's views on how to take forward the science and research agenda within the Department for International Development and in international development more generally.

Reports

Annual Report

The Committee published its Second Report of Session 2004-05, *Annual Report 2004* (HC 199) on 17 January 2005. The Report looked at the work of the Committee in 2004.

Office of Science and Technology: Scrutiny Report 2004

The Committee published its Third Report of Session 2004–05, *Office of Science and Technology: Scrutiny Report 2004* (HC 8) on 31 January 2005.

The Committee concluded that the Government's Science and Innovation Investment Strategy 2004-2014 and the Spending Review that it accompanied were welcome news for the UK scientific community. These developments gave science the emphasis that it deserved on the political agenda. The Office of Science and Technology (OST) had taken several positive steps to address many of the issues raised in the Committee's 2003 Report on its work. The Committee found that the Government had set itself several ambitious science policy targets, most notably to dramatically increase investment in R&D as a proportion of GDP. If this target is to be met, the Government would have to look at taking action close to home, as well as asking the private sector to make improvements. The Committee also recommended that OST should look carefully at some of the unintended consequences of otherwise very positive new science policies.

The Medical Research Council's Review of the National Institute for Medical Research

The Committee published its Fourth Report of Session 2004–05, *The Medical Research Council's Review of the National Institute for Medical Research* (HC 6) on 8 February 2005.

The Committee undertook this inquiry as part of its scrutiny of the Research Councils and in response to concerns raised about the way in which the Medical Research Council (MRC) had handled the review of the future of the National Institute for Medical Research (NIMR). It concluded that MRC was right to establish a Task Force to consider the future of NIMR. However, the appointment as Chairman of the MRC Chief Executive, rather than a more independent figure, was naïve. The Task Force adopted sensible working methods; its meetings were chaired with objectivity and competence; and by publishing much material on the MRC website, it was more transparent than many similar bodies. However, the Committee found that the Task Force was unable to give proper consideration to all the cost implications of the proposed move to one of two university hospital sites in central London.

Human Reproductive Technologies and the Law

The Committee published its Fifth Report of Session 2004-05, *Human Reproductive Technologies and the Law* (HC 7) on 24 March 2005.

The Committee also published its Eighth Special Report of Session 2004-05, *Inquiry into Human Reproductive Technologies and the Law* (HC 491) on 24 March 2005.

The Committee launched its inquiry into human reproductive technologies and the law in March 2004. The terms of reference were informed by a public e-consultation on some of the major issues involved in the inquiry, which ran from January to March 2004 at www.tellparliament.net. The inquiry looked into how human reproductive technologies are regulated in the UK. Terms of reference included the balance between legislation, regulation and reproductive freedom; the role of Parliament in the area of human reproductive technologies; the ethical framework for legislation on reproductive technologies; the Human Fertilisation and Embryology Act 1990; and the work of the Human Fertilisation and Embryology Authority.

The Work of Research Councils UK

The Committee published its Sixth Report of Session 2004-05, *The Work of Research Councils UK* (HC 219) on 23 March 2005.

Forensic Science on Trial

The Committee published its Seventh Report of Session 2004–05, *Forensic Science on Trial* (HC 96) on 29 March 2005.

The Committee welcomed the fact that, during the course of this inquiry, the Home Office stated its intention to fully test the GovCo model for the Forensic Science Service (FSS), rather than automatically progressing to a Public Private Partnership. However, it regretted the confusing way in which the Home Office announced this decision. It also identified a need for the Government to implement measures to ensure that the criminal justice system had uninterrupted access to the full range of forensic services of the required quality standards and at affordable prices. The Committee recommended that a Forensic Science Advisory Council be established to act as a regulator of the forensic services market, and to provide a much needed overview of the process by which forensic science is used in the criminal justice system.

Although the Committee accepted that flaws in expert evidence in court are unlikely to have led, in isolation, to a significant number of miscarriages of justice, it concluded that it was impossible to determine the number of cases which had been adversely affected by the conduct of an expert, or the handling of expert evidence in court. The Committee recommended various measures to improve the handling of expert evidence in court, in particular, the establishment of a Science and the Law Forum and a Scientific Review Committee within the Criminal Cases Review Commission, to promote communication between the scientific and legal professions and to provide for ongoing scientific scrutiny of expert evidence.

Strategic Science Provision in English Universities

The Committee published its Eighth Report of Session 2004–05, *Strategic Science Provision in English Universities* (HC 220) on 7 April 2005.

The Committee concluded that, through its funding regime, the Government was passively pursuing a policy of research concentration that would call the financial viability of some university departments into question. Universities' financial difficulties were greatly increased by a steady decline in the number of students wanting to study science subjects. The Committee found that the two important roles of teaching and knowledge transfer were frequently overlooked in the competition for research funds. It recommended that universities diversified to allow each institution to concentrate on its strengths and reduce the strain on resources. It called this the "hub and spokes" model. Through collaboration on a regional basis, universities could ensure that all their staff and students had access to research, teaching and knowledge transfer, whatever their own focus. The Committee concluded that there was a risk that, if many more STEM departments closed, the university system would not be able to produce enough STEM graduates to meet the Government's economic goals.

Government Responses

Second Special Report

The Committee published its Second Special Report of Session 2004-05, *The Use of Science in UK International Development Policy: Government Response to the Committee's Thirteenth Report of Session 2003-04* (HC 235) on 24 January 2005.

Third Special Report

The Committee published its Third Special Report of Session 2004-05, *Responses to the Committee's Tenth Report, Session 2003-04, Scientific Publications: Free for all? Responses to the Committee's 14th Report of Session 2003-04* (HC 249) on 1 February 2005.

Fourth Special Report

The Committee published its Fourth Special Report of Session 2004–05, *Government support for Beagle 2: Responses to the Committee's Twelfth Report of Session 2003-04* (HC 301) on 9 February 2005.

Fifth Special Report

The Committee published its Fifth Special Report of Session 2004–05, *The Work of the Economic and Social Research Council: Government Response to the Committee's First Report of Session 2004-05* (HC 401) on 7 March 2005.

Sixth Special Report

The Committee published its Sixth Special Report of Session 2004-05, *Office of Science and Technology: Scrutiny Report 2004: Government Response to the Committee's Third Report of Session 2004-05* (HC 453) on 22 March 2005.

Seventh Special Report

The Committee published its Seventh Special Report of Session 2004-05, *The Medical Research Council's Review of the Future of the National Institute for Medical Research: Responses to the Committee's Fourth Report of Session 2004-05* (HC 454) on 22 March 2005.

Further Information

Further information about the work of the Committee or its current inquires can be obtained from the Clerk of the Committee, Chris Shaw, the Second Clerk, Emily Commander, or from the Committee Assistant, Ana Ferreira on 020 7219 2792/0859/2794; or by writing to: The Clerk of the Committee, Science and Technology Committee, House of Commons, 7 Millbank, London SW1P 3JA. Inquiries can also be emailed to scitechcom@parliament.uk. Anyone wishing to be included on the Committee's mailing list should contact the staff of the Committee.

The Committee has a new website address: www.parliament.uk/s&tcom. All recent publications (from May 1997 onwards), terms of reference for all inquiries and press notices are available at this address.

House of Lords Science and Technology Select Committee

The members of the Committee (appointed 1 December 2004) are Lord Broers (Chairman), Baroness Finlay of Llandaff, Lord Mitchell, Lord Patel, Lord Paul, Baroness Perry of Southwark, Baroness Platt of Writtle, Baroness Sharp of Guildford, Lord Soulsby of Swaffham Prior, Lord Sutherland of Houndwood, Lord Taverne, Lord Turnberg, Lord Winston and Lord Young of Graffham

The Reports and Calls for Evidence for the inquiries mentioned below can be found at the Committee's web site www.parliament.uk/hlscience.

Scientific aspects of ageing

Sub-Committee I, chaired by Lord Sutherland of Houndwood, has finished hearing oral evidence for its inquiry into the scientific aspects of ageing. Members are investigating the ageing process, and how science and technology can help postpone and mitigate the effects of illnesses or disabilities associated with growing old, and assist the elderly in adapting to the challenges of, for example, restricted mobility and deteriorating senses.

The Sub-Committee has heard very interesting evidence about the research that is being carried out in the UK, in areas such as the importance of nutrition in the ageing process, heart and circulatory diseases, and musculoskeletal disorders such as arthritis. In January, the Sub-Committee visited Washington DC, in particular to hear about the work of the National Institute on Aging (NIA). The NIA receives funding of $1 billion a year, 10% of which is spent on its own research centre, and the rest used to finance research elsewhere in the US. Members heard about the latest advances in understanding processes and diseases of ageing, and how such research was co-ordinated in the United States.

Ministers from the Departments of Health and Transport, and the Office of Science and Technology appeared before the Sub-Committee on 22 March, rounding off the public sessions. The report is expected to be published in early July. Michael Collon (collonm@parliament.uk) is the Clerk of Sub-Committee I.

Energy efficiency

Baroness Perry of Southwark is chairing Sub-Committee II's investigation of the Government's targets for increased energy efficiency. In particular, the Committee is examining the Government's recently published energy efficiency "Plan for Action" which details ambitious reductions in energy use.

The Defra Minister, Lord Whitty, gave evidence on April 6, marking the completion of oral evidence. Evidence has been heard from a wide range of representatives, including from the Carbon Trust and Energy Saving Trust, and the UK Energy Research Centre. Evidence was also heard from sectors including the building and energy industries, consumer electronics and air conditioning.

The Sub-Committee visited Germany and Sweden in January. In Sweden, Members were particularly impressed by the high standards required for buildings and the district heating system in Gothenburg, which collects waste heat from industrial processes and sewage treatment, and distributes it around the city via a 700km network of pipes. In Germany, there was much interest in a public-private partnership scheme in Berlin in which savings from reduced energy use were split between a private company, which made the investment in energy efficient measures, and the local authority.

Further trips have also been made to a renovated Georgian terrace house in Knightsbridge which has substantially reduced its energy demand; Leicester, which has had a strong commitment to managing its energy resources since the 1970s; and Durham University, which has implemented energy efficient measures in a dispersed and historic setting.

The report is expected to be published in early July. Christopher Johnson (johnsonc@parliament.uk) is the Clerk of Sub-Committee II.

Radioactive waste management

Following the Select Committee's critical report on radioactive waste management in December, the Government response was published in a report on 5 April. Members of the Select Committee took the opportunity to comment briefly on the response.

In general, the Select Committee was satisfied with the response – while differences clearly remained between respective positions, the Government had addressed the conclusions in a thorough and thoughtful fashion. The increased involvement of Defra's Chief Scientific Advisor was welcomed, as was the commitment to start planning for the next stage of radioactive waste management strategy this summer.

There was concern, however, that one member of CoRWM had been suspended, and another had suspended himself voluntarily. Both members possessed highly relevant technical expertise, which the Select Committee had already found to be lacking on CoRWM. Additionally, the Select Committee called on CoRWM to follow the Government's Code of Practice for Scientific Advisory Committees

Further Information

Further information about the work of the Select Committee can be obtained from the Clerk, Christopher Johnson (johnsonc@parliament.uk). A free weekly notice of business of all House of Lords Select Committees is available from Geoff Newsome, 020 7219 6678. The Committee's email address is hlscience@parliament.uk

Parliamentary Office of Science and Technology

Recent POST publications

Data protection and medical research

January 2005 ***POSTnote 235***

Introduction of the NHS National Programme for IT in England and Wales will potentially allow researchers greater access to medical data. Increased use of electronic patient records raises concerns about consent, confidentiality and security. This note outlines the types of patient data that are stored, explains their research uses, examines the current regulatory system and analyses issues such as anonymisation, confidentiality and consent.

The bushmeat trade

February 2005 ***POSTnote 236***

There is increasing concern about the commercial trade in "bushmeat" (the meat of wild animals) originating in West and Central Africa. Unsustainable levels of bushmeat hunting could threaten both wildlife populations and the people who depend on bushmeat for food or income. Of particular relevance to the UK are the implications of the trade for human and animal health through possible disease transmission. This note summarises the causes and effects of the bushmeat trade, UK policy and remaining challenges.

Managing the UK plutonium stockpile

February 2005 ***POSTnote 237***

As a result of both civilian and military activities in the UK, a stockpile of plutonium has accumulated for which there is currently no long term management strategy. Proposed options include treating it as a waste or using it in nuclear fuel to generate electricity. Discussions have recently been initiated by the Committee on Radioactive Waste Management (CoRWM) on the implications of managing plutonium as waste; currently none is classified as such. This note provides background information on the UK's stockpile and examines safety and proliferation issues. It outlines why a management strategy is required and summarises commentary on long-term options.

Carbon capture and storage (CCS)

March 2005 ***POSTnote 238***

As part of the Government's global strategy to address climate change, the 2003 Energy White Paper sets the target of a 60% reduction in UK emissions of the greenhouse gas carbon dioxide (CO_2) by 2050, to about 240 million tonnes (Mt) a year from 550Mt in 2000. Increased energy efficiency and use of renewable energy are the key mechanisms proposed to achieve this. However the White Paper suggests the continuing importance of fossil fuels to ensure security of electricity supplies. Using fossil fuels in a low-carbon economy requires their CO_2 emissions be reduced. This note discusses the potential of carbon capture and storage (CCS), a method of carbon 'sequestration', to reduce UK and global emissions, and also the costs, environmental impacts and public perceptions of CCS.

Current work

Biological Sciences and Health

POSTnotes in preparation on Drugs for neglected diseases, the role of Research Ethics Committees, the Changing role of pharmacies, Alcohol and public health and Gene therapy.

Environment and Energy

POSTnotes in preparation on Early warnings for natural disasters, Materials in housing construction, Recycling household waste, Rapid climate change and Sustainable UK fisheries.

Physical Sciences and IT

POSTnotes in preparation on Nanotechnology – risk and opportunity, e-science and the GRID, Mobile phones, The militarisation of space, Criminal justice system ICT ("joined-up justice") and Open source software.

Science policy

POSTnotes in preparation on Undergraduate science education and The 24 hour society.

Staff changes

In February, Ms Clare Armstrong joined POST as a secretary, after a long period during which the Office had to rely on temporary staff.

In April, Dr Jofey Craig went on maternity leave and was replaced by Dr Bella Starling, who comes to POST on secondment from the Wellcome Trust.

Seminars

In February and March, POST collaborated with OFCOM to organise two parliamentary seminars. The first concentrated on the implementation of digital television switchover, while the second, on new communications technologies, included hands-on demonstrations of various forms of new technologies, such as high definition TV and new mobile phone designs.

Fellows and Interns at POST

Since the start of 2005, POST has welcomed its first EPSRC fellow, Oliver Tearne, and also Joanne Baker (Oxford University), Jawad Masood (Cambridge University), Karina Drif and Nicola Patmore (ESRC fellows).

In January, POST was pleased to host a two-week visit from Dr Kathleen Logan, Policy Officer of the Royal Society of New Zealand, who examined our working methods.

International Activities

The director and Dr Kate Trumper participated in the 2005 Directors' meeting of the European Parliamentary Technology Assessment network, held in Bruges, in March. Dr Trumper also represented POST at a European Commission conference on "Science in Society" in Brussels.

House of Commons Library Science and Environment Section
Research Papers

The following is a summary of papers produced for Members of Parliament.
Information and copies of papers can be obtained from Michael Crawford at the House of Commons Library on 020 7219 6788 or through www.parliament.uk/parliamentary_publications_and_archives/research_papers.cfm

The Clean Neighbourhoods and Environment Bill

Research Paper 05/01
The Clean Neighbourhoods and Environment Bill was published on 7 December 2004 and had its Second Reading on 10 January 2005. The Bill presents a number of Government proposals that are designed to take forward its policy on creating Cleaner, Safer and Greener Communities. The Bill extends to England and Wales. It received Royal Assent on 7th April.

The Drugs Bill

Research Paper 05/07
The Drugs Bill was introduced in the House of Commons on 16 December 2004. The Bill had its Second Reading on 18 January 2005.

The Bill introduces new measures to deal with the problems caused by the misuse of controlled drugs. It concentrates on measures designed to break the link between drug use and crime. It seeks to introduce harsher sentences for dealers who target children or who attempt to evade arrest by swallowing the evidence.

The Bill would introduce further powers for police to test those suspected of misusing drugs on arrest, and require those who test positive to attend an assessment. There are also provisions to supplement anti-social behaviour orders in cases where behaviour is affected by drug misuse.

The Bill extends mainly to England and Wales but has some provisions for Northern Ireland. It received Royal Assent on 7th April.

Research Papers were also produced on the following Private Members' Bills:

The Drugs (Sentencing and Commission of Inquiry) Bill: Research Paper 05/16
The Health and Safety (Directors' Duties) Bill: Research Paper 05/18
The Smoking in Public Places (Wales)Bill: Research Paper 05/22
The above Bills did not progress through all their parliamentary stages before the dissolution of Parliament.

LETTER TO THE EDITOR

Sir,

Assessment Fatigue Syndrome

Over the last decade there has been an exponential increase of performance measurement in Higher Education, designed to increase the quality and quantity of output. We are beset by a proliferation of accreditations, validations, benchmarking, teaching audits and research assessments. Whilst accountabilities and transparency of research governance are to be welcomed, I submit that the veritable legion of education evaluators and ethical scutineers are in danger of inhibiting intellectual health instead of curing the problems they were designed to mitigate.

Different agencies "own" these evaluative ventures and rarely seem to talk to each other despite the overlap in their spheres of interest. Preparation absorbs countless hours of discussion and endless amounts of labour writing the appropriate documentation. This erodes time for creative conversations about ideas and actually undertaking the research, which ironically will be the target of the next round of the research assessment exercise.

A further frustration is the increasingly stringent requirements of ethics committees who provide favourable opinions for research to proceed. There is confusion between pedagogic activity whereby we work with students, teaching them how to do research and research governance which evaluates the scientific merit of investigative endeavours. The hurdles that are being set are so daunting, that students (and professional researchers) feel it has become a defensive exercise that is inimitable to creative and imaginative research.

Contributory factors to the present obsession to measure rather than do are: the development of a litigation mentality creating a cycle in which liability has become individualised, accidents blameworthy and the public compensation seeking; consumer rights which confer a sense of entitlement for the lay public to have sway in scientific endeavours, at its most radical with the activities of the politically extreme; a loss of public confidence in the scientific community to regulate itself as exemplified by the Alder Hay scandal.

As a solution, we need some rationalising of the various assessment exercises whereby common domains of assessment can be signed off and accepted by relevant bodies and thus avoid duplication of effort; and for the pendulum of ethical scrutiny to swing back to a manageable norm.

Professor Jennifer Brown
Department of Psychology
University of Surrey.

Science and the General Election

On Tuesday 1 March 2005 Dr Stephen Benn, the Parliamentary Affairs Officer of The Royal Society of Chemistry co-ordinated a special event hosted by Dr Brian Iddon MP and Dr Andrew Murrison MP at very short notice in the Attlee Suite, Portcullis House, to which all the major parties represented at Westminster had been invited to send a spokesperson to present their party's policies on science. The Society hoped that this meeting would provide a welcome opportunity for science and engineering issues to be discussed in advance of a General Election. The event was very widely supported by, among others, the Royal Society, The Royal Academy of Engineering, the Science Council, the Institute of Physics, the Biosciences Federation and Save British Science. The Attlee Suite was filled to capacity with some 220 participants.

The President of the Royal Society, Lord May, and the President of the Royal Academy of Engineering, Lord Broers, co-chaired the day's proceedings. Those who spoke on behalf of their political parties were: the Labour Party, The Lord Sainsbury of Turville, Minister for Science and Innovation; the Conservative Party, Mr Robert Key MP, Shadow Science Minister; the Liberal Democrats, Dr Evan Harris MP, Member of the House of Commons Science & Technology Select Committee; Plaid Cymru, Simon Thomas MP, Chief Whip & Frontbench Spokesperson; the Scottish National Party had been invited but did not send a spokesperson.

Following presentations by the political parties, the co-chairmen presided over the main feature of the event – Question Time. The meeting has already been comprehensively reported elsewhere in The Times with the title – The difference between politicians and scientists? One just can't say 'n' – and published in the Science Notebook of 7 March by Anjana Ahuja (see www.timesonline.co.uk) who has been a feature writer for nine years, reporting and commenting on science, medicine and social affairs. She sits on the Science in Society Committee at the Royal Society, and the editorial committee of the BA magazine. She has previously written for Science in Parliament and holds a PhD in physics from Imperial College. The 'n' in her title refers of course to "nuclear".

UK National Science Week 2005

On Monday 14th March Dr Brian Iddon MP sponsored the annual exhibition of presentations by Britain's top Younger Scientists, Engineers and Technologists in the Churchill Room at the House of Commons.

The participants were welcomed by Eric Wharton on behalf of SET for BRITAIN to the 8th Annual Reception for Britain's top younger researchers at the House of Commons held in the UK's National Science Week. He thanked Dr Brian Iddon MP for his sponsorship of the event and went on to point out that Brian is one of a number of Champions at Westminster for UK science, engineering, medicine and technology, being also a member of the Commons Select Committee for Science and Technology and a senior member of the Parliamentary and Scientific Committee. These events are highly regarded and very important opportunities for bringing parliamentarians directly into contact with outstanding young researchers and selected aspects of their research. About 540 applications to display posters were received this year and of these about 270 were selected, 170 for the Lunchtime Reception and 100 for the Evening Reception requiring a two-shift system for posters at each reception. Biosciences were the theme for the evening Reception and it is hoped that this might become an annual freestanding event in Westminster in future. Some fifty-seven MPs had also given prior notice of their intention of visiting the Receptions.

SET for Britain does not take any part in judging. That is the role of the Poster Judges; eighteen Judges assisted with assessment of the Lunchtime Reception (all SET), and ten Judges with the Evening Reception (Biosciences). Awards are based on excellence of the work presented and the personal involvement and understanding of the work by the presenter. Judging is not an easy task in view of the excellence of both the posters and their presenters. General objectives of the event include fostering greater interaction and networking both between younger researchers and with Parliamentarians and providing opportunities for competition and experience in presenting their work to others. The generous donations made in support of the two Receptions and Awards by GlaxoSmithKline, ABPI, BBSRC, MRC, BIA, Biosciences Federation and The Biochemical Society were gratefully acknowledged. Awards were presented by Dr Malcolm Skingle, Director of Academic Liaison, GSK, at the Lunchtime Reception and by Lord Sainsbury, Minister for Science and Innovation, at the Evening Reception.

Parliamentary & Scientific Committee News

A New Website for the P&S Committee

http://www.scienceinparliament.org.uk

The Committee's new website has been designed to meet a range of current and future needs following critical review by the Council of the initial proposals.

Firstly and most importantly it will provide Members with the full details of the future programme of activities planned for the Committee, accessible by means of a password that is only available to Members of the Committee. This will include the titles of subjects planned for discussion and debate at meetings in the Houses of Parliament and the locations and topics planned for site visits. This information is complementary to second class mail or e-mail which will remain the primary methods of communication with the membership. The website will be particularly important, for example, in providing details of the meeting room allocated on the day of a meeting, especially as these are subject to change following the advertisement of a meeting. In addition, Members can now also take advantage of a new facility on this site to communicate directly with the P&SC office should they need to do so. Non-members will have restricted access to the meetings timetable, and will only be able to view the dates of meetings, but not the topic under discussion.

The new site is also designed to provide Members of the Committee with the additional convenience of online access to the current and three previous issues of Science in Parliament, also under password protection. In order to inform the wider public of our work it also provides non-members with the opportunity to learn about many aspects of the Committee's work and to purchase and download selected articles and complete issues of Science in Parliament. The site has been designed from the outset with future developments in mind and is sufficiently flexible to enable it to be upgraded to take account of new functions and applications requested by the membership.

The site is maintained by a webmaster who also built the site, Dr Stephen Henley CEng FIMMM, a mathematical geoscientist who is internationally recognised for his part in development of the G-Exec system for managing earth science data in the days when the NERC only had one computer, a mainframe based in Swindon, and as developer of the Datamine mining industry software. He now specialises in research on database and modelling applications in the geosciences.

Debates and Selected Parliamentary Questions & Answers

Following is a selection of Debates and Questions and Answers from the House of Commons and House of Lords.

A full digest of all Debates, Questions and Answers on topics of scientific interest from 10th January to 7th April 2005 from both Houses of Parliament appears on pages 39 to 47.

Science Policy

Science and Treaties (S&T Report)

Debate in the House of Lords on Thursday 3 February

Lord Mitchell introduced the report of the Science and Technology Committee on Science and Treaties (3rd Report, Session 2003-04, HL Paper 110). Turning to the subject of science attachés at missions overseas, the committee's specific concern was whether the network was adequate in China and India. In China there are at present scientific attachés in three posts: Beijing, Shanghai and Chongqing. In April a fourth post, Guangzhou, will join them. In India there are precisely two such posts, in New Delhi and Bangalore. Four posts in China and two in India are simply not enough. Regarding interdepartmental co-ordination, the designation of a lead department is recommended. Silo mentalities in departments were also highlighted.

Another issue was the role of Parliament in the treaty-making process. At present Parliament has no say in the negotiating process or in the final wording. The European constitutional treaty is an almost unique exception to that. Twenty-five years ago scientists at the British Antarctic Survey first alerted the world to the depletion of the ozone layer. In a short time the Montreal Protocol was adopted and today its depletion has been arrested. The most important aspect of the report concerns Kyoto and global warming. Only ratification of the protocol by the US will send the necessary signal to the rest of the world that that country takes the matter seriously. Global warming is now the number one threat to planet Earth.

Baroness Symons of Vernham Dean responded by pointing out that the Foreign Office has made a substantial increase in the number of science officers in recent years

and has given priority to science resources in important emerging economies which include China and India. In 2000 there were 34 people in 11 missions in 10 countries and territories undertaking science and innovation work. There are now 97 people in 45 missions in 26 countries and territories taking forward the science agenda. The network has almost tripled since 2000. There is a growing momentum in the US at state, city and business levels on climate change and work is under way to persuade the US that it is possible to reduce emissions while maintaining strong economic growth. The appointment of Gordon Conway of the Rockefeller Foundation as Scientific advisor to DfID is a cause for celebration by all concerned. The present arrangements for treaty scrutiny already provide considerable scope for parliamentary involvement. The UK's support of the British Antarctic Survey reinforces the UK's influence and status at Antarctic treaty negotiations.

Apprenticeships

Question and Oral Answer on Thursday 3 March

Mrs Claire Curtis-Thomas (Crosby): To ask the Minister for Women what opportunities are available for women to undertake apprenticeships in science, engineering and technology-related subjects.

The Deputy Minister for Women and Equality (**Jacqui Smith**): Apprenticeship opportunities are open to all candidates, regardless of gender or ethnicity. However, the Government recognise that women and girls have traditionally not taken up apprenticeships in those subjects in significant numbers. We are working across Government to tackle the barriers that hinder female participation in science, engineering and technology, including through apprenticeships. For example, through our work in the manufacturing forum, we have established a sub-group on the image of manufacturing to look at promoting the sector to key audiences, including women.

Stem Cell Research

Debate in the House of Commons on Monday 7 March

Dr Ian Gibson (Norwich, North) noted that Sir John Chisholm, chief executive of QinetiQ believes that the Government's record of support for science-based industry is falling short. For example, liquid crystal display constitutes a £10 billion industry with little of it exploited in the UK. How do we make science and innovation reap economic benefits? A key issue is to create new medicines to treat disease by exploiting adult stem cells or manufactured immortalised stem cells, although little or no funds have been allocated to translational steps since this tends not to generate peer-reviewed publications, thus putting university departments at risk in research assessment exercises. The money allocated to the MRC for stem cells is focused on hypothesis-driven research.

Applied research and development projects are conducted and judged in a very different way from hypothesis-driven research. The best solution is offered by the stem cell foundation set up by Sir Christopher Evans who has the ability and desire to pick winners and back them all the way through to the therapies offered to patients. We must act swiftly if we are to capture the fruits of British research for the UK as we are being overhauled by countries such as China and Korea, and the US brain drain is also increasing.

The Parliamentary Under-Secretary of State for Health (**Miss Melanie Johnson**) pointed out that a widely respected regulatory system to license specific research activities involving embryos is now in place. That has enabled scientists in the UK to derive new embryonic stem cell lines using spare embryos that are not suitable for use in IVF treatment. New regulations were passed in 2000 to permit the use of cell nuclear replacement (cloning) to develop embryonic stem cells. In the UK this research is under the control of the Human Fertilization and Embryology Authority (HFEA). In May 2004 the Government created the world's first stem cell bank. HFEA granted its first licence for therapeutic cloning last year and a second for motor neurone disease this year. Sir Chris Evans of Merlin Biosciences is the principal backer of the East of England stem cell network which is supported financially by the East of England Development Agency with the objective to promote translation of stem cell preclinical research into clinical trials and possible treatments.

Generation IV Nuclear Reactors

Question and Written Answer on Monday 14 March

Llew Smith (Blaenau Gwent): To ask the Secretary of State for Trade and Industry what funding she plans to allocate to the multilateral collaboration with France, Japan, Canada and the United States on research and development for Generation IV Nuclear Reactors; what mechanisms will apply to the administration of the funds; and whether the Nuclear Decommissioning Authority will have a role in this research.

Mr Mike O'Brien: DTI expects to provide funding of up to £5 million per annum for UK participation in international research collaborations on advanced nuclear reactor systems. The mechanisms for administering these funds are under development. The Nuclear Decommissioning Authority (NDA) does not have an interest in Generation IV research, except where that research relates to decommissioning plants in the future.

International Development Policy (Science)

Debate in Westminster Hall on Thursday 17 March

Dr Ian Gibson (Norwich, North) indicated that he was seeking brief but pungent points when introducing the report on the use of science in United Kingdom international development policy to the House. This is the first time that the Science and Technology Committee had addressed the work of DFID, which received about £3.8 billion of the aid budget in 2004-5. One hundred submissions of evidence were received and seven sessions held, involving DFID officials and representatives of organisations involved in capacity building, agriculture, forestry, environment, engineering, health research and development. The Government's Chief scientific Adviser, officials from the Foreign and Commonwealth Office, UK Trade and Investment, the British Council and the Secretary of State for International Development, were all spoken to. Visits were made to the Overseas Development Institute and to Malawi to meet the President, Members of Parliament, senior officials and to see agriculture and health projects.

This is a high-flying report that took wide-ranging

evidence. When the inquiry was announced in 2003, the DFID had a reputation that it did not do science. The Committee therefore decided to take a good hard look at DFID, as international development is far too important to be left to economists and social workers. The presence of Professor Gordon Conway – a real, *bona fide*, hard scientist unlike the soft social scientists, and the increase in the research budget from £80 to £136 million per annum, shows the value of Select Committees, as a response had been obtained before the report was published. The report calls for increased capacity building for science, technology and engineering in developing countries, including establishment of a development sciences research board with an initial budget of £100 million.

Dr Brian Iddon (Bolton, South East) emphasised that it is important that the pursuit of the eight millenium development goals does not take resources away from existing programmes for the supply of clean water, safe sanitation, health care, infrastructure development and sustainable energy. Malawi is in need of a geological survey to guide the search for underground water and to avoid the needless accidental destruction of vital aquifers by uncontrolled drilling.

Mr Tony McWalter (Hemel Hempstead) indicated that the Government's response to the previous point that, "activity is maintained in those areas, often with international finance institutions or EU funding," is an appallingly laid-back approach to this huge and important problem.

Dr Brian Iddon went on to outline several important issues, for example, in Tanzania specialists told the local population what to do without asking what the problems were or what help was needed. We can now train people much better with the advent of long-distance learning. The British Council science sector has a budget of £8 million with science programmes in 62 countries, but only in 12 developing countries. DFID should help organise the Commission for Africa. The Committee did not receive a clear answer from the head of the central research department at DFID on the impact on SET projects of a shift to direct budgetary support.

The Parliamentary Under-Secretary of State for International Development (**Mr Gareth Thomas**) responded as the only non-hard scientist present, having just had a tutorial in science. He conceded that there was a perception that science was not done well enough. The need for a chief scientific adviser was one of the strongest messages delivered by the Committee. Following the appointment of Professor Gordon Conway FRS in January his first job will be to prepare a science and innovation strategy. The Department has agreed with ESRC that both will contribute to a new three-year £13 million programme for research that proposes ideas that have positive impact on world poverty. Additional funding proposed for the 2006 spending review, and an assessment of a development science research board will depend on the outcome of a working group chaired by Sir David King.

The Commission for Africa recommended $3 billion be invested over 10 years to develop centres of excellence in SET in African Universities and was discussed by Professor Conway in South Africa with the New Partnership for Africa's Development. Health spending will increase by £20 million. There is a £100 million programme of assistance to Malawi focused on the health service that is overwhelmed by HIV/AIDS.

Health

Sunlight Exposure

Question and Written Answer on Thursday 3 March

Dr Gibson (Norwich N): To ask the Secretary of State for Health (1) what recent research he has examined concerning (a) the effects of lifetime exposure to sunlight on the risk of melanoma and (b) the effect of sun exposure on survival rates for melanoma; (2) what recent research he has examined concerning the effect of exposure to UV light on the risk of lymphoma; (3) what recent research he has examined concerning the effect of exposure to vitamin D from sunlight in the months immediately after birth on the risk of developing multiple sclerosis.

Miss Melanie Johnson: The most recent review of the research evidence about the health effects of UV radiation was published in 2002 by the National Radiological Protection Board's (NRPB) independent advisory group on non-ionising radiation (AGNIR).

The review gives clear evidence that exposure to ultra-violet radiation (UVR) is a risk factor for developing melanoma and other skin cancers. There is less certainty about the relative roles of cumulative (lifetime) exposure or burning episodes in the genesis of the different types of skin cancer. Chronic exposure to solar radiation also causes photo-ageing of the skin. The risk of developing melanoma has increased substantially in white populations in the United Kingdom and Europe for several decades. The review did not consider clinical issues such as the effect of sun exposure on survival rates for melanoma.

The review noted that the possibility has been raised that the immunosuppressive effects of UVR might be involved in causing lymphoma. The review concluded that overall the results are not consistent with a major role for solar UVR in the aetiology of non-Hodgkins lymphoma (NHL), but they leave open the possibility of a minor role, or an aetiological relation for a particular subtype of NHL.

The review also contains a chapter on vitamin D, which considers the amount of vitamin D needed from UV exposure or the diet to sustain adequate vitamin D levels. It considers the role of vicarious sun exposure in vitamin D synthesis. It notes that infant formula milks are fortified with vitamin D. There is no information in the review on vitamin D and multiple sclerosis, or on any relationship between vitamin D levels in early childhood and illness in adulthood.

The European skin cancer society, Euroskin, is hosting an international meeting to look at the whole issue of UV exposure, vitamin D levels and health later this year. This meeting will include consideration of hypotheses of a wider role for vitamin D in long-term health.

Climate Change

Global Warming and Climate Change

Debate in Westminster Hall on Tuesday 18 January

Mr Alan Meale (Mansfield) introduced global warming, climate change and the Kyoto protocol as the subject to be debated, although some people such as the Dane, Bjorn Lomborg, argues in his book "The Sceptical Environmentalist" that it is not happening and that global warming is a conspiracy devised as an academic concept to gain research funding. Leading American scientists have recently established that concentrations of CO_2 gas have now risen to 375ppm from 280ppm at the time of the industrial revolution. The role of gases in trapping heat was first recognised in 1827 by Jean Baptiste Fourier and proved by John Tyndall in 1861 by quantitative spectroscopy. Sven Arrhenius, the Swedish Chemist, in 1896 promoted the idea that coal combustion could enhance the greenhouse effect and lead to global warming, supported in 1949 by G.S. Callendar in the UK. More recently chlorofluorocarbons, methane and nitrous oxide were also identified as greenhouse gases.

In 1988 the intergovernmental panel on climate change calculated that a 60 per cent reduction in CO_2 emissions could halt global warming leading ultimately to the Kyoto protocol that will come into force legally in February 2005 in signatory countries. American industry will research cleaner technologies, especially hydrogen and fuel cells over the next 25 years. However the United Nations reported that between the mid-1990s and 2000 almost 300 sq km of land were desertified each year and by 2025 two thirds of arable land in Africa, one third in Asia and one fifth in South America will have disappeared. This will result in 135 million people being put at risk of displacement, particularly from the edges of existing deserts. The proportion of people living in countries suffering water stress will double by 2025.

A recent report prepared for the Arctic Council reported a 10 per cent loss of ice in the last ten years that could ultimately lead to thawing of the Siberian Tundra releasing vast amounts of methane and warming the planet even faster. Other impacts include loss of krill, the staple diet of mammals in the southern ocean, the loss of forests and rising sea level of about 7m due to loss of glaciers and ice sheets that would put major coastal conurbations under water and small islands could disappear entirely.

The view that there are no solutions must not be expressed. However many different energy options must be reconsidered including solar energy, radiant energy from thermonuclear reaction, mechanical energy from machines, potential energy from water, chemical energy from molecular reaction, incineration, electrical energy from charged atoms, nuclear energy from splitting atoms and thermal energy from heated matter. Mankind's problem is the maintenance of such energy supplies safely, efficiently and in sufficient quantity.

Mr Robert Key (Salisbury) pointed out that in the 1997 Labour election manifesto the Prime Minister promised a 20 per cent reduction in CO_2 emissions by 2010, with a further goal of a 60 per cent reduction by 2050. In December 2004 the Government admitted that current policies are likely to lead to a reduction of only around 14 per cent by 2010. The Government is also failing to deliver the renewable energy target of 10 per cent for overall energy use by 2010, which now stands at only 3 per cent.

The Minister for the Environment and Agriculture (**Mr Elliott Morley**) stated that global warming is a reality. The scientific evidence is overwhelming. We must have a balance of energy sources. The UK receives a third of its power from coal and there is a role for clean coal technology. The Kyoto process is just the first step. Saudi Arabia is well placed to adapt to the changes needed for a low carbon economy as there will still be enormous demand for oil therefore the opposition from oil-producing states led by Saudi Arabia was a complete and utter disgrace. The UK has reduced greenhouse gases by 14 per cent with a 35 per cent economic growth.

Climate Change (EUC Report)

Debate in House of Lords on Wednesday 23 February

Lord Renton of Mount Harry rose to move that this House takes note of the report of the European Union Committee on the EU and Climate Change (30th Report, Session 2003-04, HL Paper 179). Climate change is happening, it is very largely man-made and is a substantial problem. The EU Emissions Trading Scheme (ETS) is a central element in the EU's programme and currently applies to carbon dioxide only, but other gases may be included from 2008. The scheme covers the largest point source CO_2 emitters which account for about 46 per cent of EU emissions. Companies and not member states are responsible for reductions. It is a bold scheme – the first multinational scheme of its type – covering 23 of the 28 countries that Kyoto caps. It must be extended globally to include other major developing countries.

It is based on national allocation plans. The recent resubmission by Defra of the UK allocation with a 3 per cent increase has been badly received by both the Commission and other countries. Transport contributes about 25 per cent of the UK CO_2 emissions and road transport about 85 per cent of that, indicating that more should be done to develop low emission vehicles. Aviation accounts for about 11 per cent of the UK's total climate impact which rise sharply as it is the fastest growing source of emissions. The impact of aviation emissions is 2.7 times that of carbon dioxide alone and emissions from intra-EU flights should be brought into the EU ETS as soon as possible.

The question of building new nuclear reactors will have to be revisited as it will be very difficult to meet UK targets for CO_2 reduction without doing so. For example, 75 to 80 per cent of French electricity is already nuclear in origin.

Lord Whitty responded that many people have complimented the Government for making climate change a central priority for the UK presidency of the EU which provides a focus on what happens beyond Kyoto. The big omission from this is the United States where the underlying American position is that technology will solve all the problems. If the UK Government were to consider the future of and recognise a need for nuclear power, then continuing investment in research and development would be needed. In addition, large scale generation of electricity on a low carbon basis through tidal and wind power is absolutely essential. The Government think that aviation should join the Emissions Trading Scheme in 2008. Buildings create about 50% of UK carbon emissions and much more needs to be done to improve their energy efficiency.

UK Parliament - Digest of Parliamentary Debates, Questions and Answers

10th January – 7th April 2005

The references are to Hansard, giving first the date of publication, either HoC (House of Commons) or HoL (House of Lords), and finally the column number in Hansard.

**Denotes selected Debates and Questions and Answers of particular interest which are reproduced on pages 35 to 38.*

Agriculture

Agriculture: Pest Bird Control – 21.3.05 HoL WA11
Apiculture – 19.1.05 HoC 933W, 31.1.05 HoC 574W & 28.2.05 HoC 924W
Beekeeping – 13.1.05 HoC 644W & 21.3.05 HoC 535W
Bees – 24.3.05 HoC 924W
Bird Control – 21.3.05 HoC 536W
Environmentally Friendly Farms – 4.4.05 HoC 1082W
EU: Fruit Plant Directive – 1.3.05 HoL WA20
Food Production: UK Self-sufficiency – 22.2.05 HoL 1096
Fruit Farming – 17.3.05 HoC 389
Honey Production – 17.1.05 HoC 725W
Indigenous Food: Self-sufficiency – 8.2.05 HoL WA110
National Bee Unit – 19.1.05 HoC 944W, 24.1.05 HoC 12W & 9.3.05 HoC 1814W
Rural Strategy 2004: Integrated Agency – 23.3.05 HoL WS40
Strawberries – 21.2.05 HoC 63W
Sustainable Farming and Food – 9.2.05 HoL 791 & 21.2.05 HoC 64W

Animal Health and Welfare

Animal Health – 17.3.05 HoC 392
Animal Welfare Bill – 24.1.05 HoC 4W
Animals and Animal Products (Import & Export) (No 2) Regulations – 1.3.05 HoL WA20
Antibiotics (Farms) – 22.3.05 HoC 739W
Avian Flu – 3.3.05 HoC 1271W, 8.3.05 HoC 1667W, 18.3.05 HoC 488W, 23.3.05 HoL 240, 23.3.05 HoC 837W, 4.4.05 HoC 1082W & 5.4.05 HoC 1351W
  Importation of Bird Feathers – 21.3.05 HoL WA15 & 5.4.05 HoL WA104
Bee Disease – 10.1.05 HoC 161W
Bird Control – 10.3.05 HoC 1939W
Chicken Welfare – 25.1.05 HoC 208W
Commission Veterinary Experts – 1.2.05 HoC 769W
Exercise Hornbeam – 13.1.05 HoC 650W
Farm Animal Welfare Council – 23.3.05 HoC 837W
Food Safety (Imports) – 10.3.05 HoC 1931W
Foodstuff Importation – 10.3.05 HoC 1933W
Foot and Mouth – 21.2.05 HoC 56W, 3.3.05 HoC 1296W & 16.3.05 HoC 255W
Growth Antibiotics – 26.1.05 HoC 339W & 27.1.05 HoC 454W
Illegal Meat Imports – 17.3.05 HoC 401
Imported Meat – 13.1.05 HoC 651W
Institute for Animal Health – 4.3.05 HoC 1437W
Meat Imports (China) – 21.3.05 HoC 542W
Pheasants – 26.1.05 HoC 341W
Seal Pups – 24.1.05 HoC 151W
State Veterinary Service – 10.1.05 HoC 179W, 3.3.05 HoL WA49, 18.3.05 HoC 497W & 23.3.05 HoC 72WS
Veterinary Medicines – 18.1.05 HoC 889W & 20.1.05 HoC 1047W
Veterinary Support – 10.1.05 HoC 61W
Veterinary Surgeons Act – 7.2.05 HoC 1216W

Animal Experiments

Animal Experimentation – 4.3.05 HoC 1473W, 15.3.05 HoC 190W & 16. 3.05 HoC 310W
  Adjournment debate – 23.2.05 HoC 448
Animal Experiments – 26.1.05 HoC 370W, 4.2.05 HoC 1120W, 7.2.05 HoC 1260W & 21.2.05 HoC 243W
  Testing – 10.1.05 HoC 267W
Animal Research Organisations – 1.2.05 HoL WS10
Animal Rights Extremism – 20.1.05 HoC 950
Animals (Scientific Procedure Licences) – 23.2.05 HoC 55WS & HoL WS85
Botox – 20.1.05 HoC 1081W & 26.1.05 HoC 377W
Economic Damage (Animal Research) – 1.2.05 HoC 53WS
Xenotransplantation – 24.1.05 HoC 135W & 14.3.05 HoC 65W

Aviation

Aircraft Pollution – 14.3.05 HoC 1W
Aviation Emissions Tax – 10.2.05 HoC 1699W
European Aviation Safety Agency – 1.3.05 HoC 1024W
Jet Lag – 24.1.05 HoL WA142

Biodiversity and Conservation

Avian Biodiversity – 10.2.05 HoC 1652W
Badgers – 11.1.05 HoL WA56 & 5.4.05 HoL WA105
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Bovine Tuberculosis

BSE and CJD

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Climate Change

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Crime and Crime Prevention

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* International Development Policy (Science) – adjournment debate – 17.3.05 HoC 143WH
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Nuclear and Radioactive Substances

Atomic Waste – 4.3.05 HoC 1431W
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Committee on Radioactive Waste Management – 3.3.05 HoC 1275W
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* Science and Treaties – debate – 3.2.05 HoL 450
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Beagle 2 Inquiry – 3.2.05 HoL WS18
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    Sustainability Index – 19.1.05 HoC 941W
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    Health – 25.2.05 HoC 887W
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Police Equipment (Tetra) – 27.1.05 HoC 477W
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    And Resources Action Programme – 16.3.05 HoC 259W
    Disposal – 7.4.05 HOC 1687W
    Electrical and Electronic Equipment Directive – 2.2.05 HoC 931W & 8.2.05 HoC 1374W
    Incineration Directive – 9.3.05 HoC 1817W
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    Performance Reward Grant – 19.1.05 HoC 946W
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Water

Drinking Water – 31.1.05 HoC 576W
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Water Fluoridation (Consultation) (England) Regulations 2005 – 8.3.05 HoL 704
Water Shortage – 8.2.05 HoC 1397W

Euro-News

Commentary on science and technology within the European Parliament and the Commission

REACH Proposals

Under REACH, companies that manufacture or import more than one tonne of a chemical substance each year would have to register it in a central database. The companies concerned would also have to research the risks arising from use of the chemical and take steps to mitigate them. One proposal put forward by the United Kingdom is the "one substance, one registration" or OSOR system. This would allow companies to form a consortium in order to to share the costs of registration. OSOR would be particularly welcome among SMEs. Of primary concern is the potential for increases in testing using animals. The Commission has previously emphasised that alternatives to animal tests must be found and this needs to be a catalyst for further research. The European Parliament will vote on the REACH proposals in the early autumn.

Huygens Probe

The European Space Agency (ESA) is celebrating one of the greatest successes in its history, following the Huygens probe's safe touchdown on the surface of Titan, Saturn's largest moon, on 14 January. Colour images reveal that the surface of Titan is bright orange, with a tangerine sky and appear to show a coastline and a river bed where liquid had once flowed and what could be a bank of methane fog covering the landscape. The intention was to discover clues to the chemical conditions that preceded life on earth. The Cassini-Huygens mission is the result of co-operation between the ESA, NASA and the Italian Space Agency.

European Research Council

The Commission is confident about the creation of a European Research Council. If the Commission convinces the Council to make research a major objective of the EU, this will enable the doubling of the research budget, leading to a better balance between current and new activities, basic and applied research and human resources and infrastructures. The Commission prefers the formation of an executive agency. The Commission has decided to create the nucleus of a science council without waiting for the structure to be decided.

Tsunami Warning System

In the wake of the 26 December earthquake and resulting tsunamis in the Indian Ocean, Germany has announced that it will lead international efforts in setting up an early warning system for tsunamis. This will be co-ordinated by the Geophysical Research Centre (GFZ) in Potsdam which specialises in earthquake and tsunami research and is much further advanced in this type of research than any other centre, according to Klaus Scharioth, Germany's Deputy Foreign Minister.

CUTE fuel cell buses

Fuel cell buses developed within the CUTE project, funded under the EU's fifth framework programme (FP5), have been operating for over a year in 10 European cities, as well as in Perth, Australia. In London, the fleet of three buses travelled over 37,000km and were on the road for 3,400 hours during their first year of operation. They also excelled in reliability according to Transport for London. These trials are a positive indication that hydrogen fuel cells could offer an alternative to diesel in the future. The high cost of the vehicles is the major barrier at the moment.

Methane in the sea floor

A project called Metrol (Methane fluxes in ocean margin sediments: microbiological and geochemical control) funded by FP5 and co-ordinated by the Max Planck Institute for Marine Microbiology, Bremen, is designed to help predict the possible future impact of seafloor methane on global climate change. Vast amounts of methane are formed in European margin sediments by natural mechanisms that are insufficiently understood. Metrol will be completing its work in October 2005 followed by a public symposium designed to present the results to the scientific community.

European Institute of Technology

A cross-party group of MEPs, the Campaign for Parliamentary Reform (CPR) comprising over 130 MEPs has called for the proposed European Institute of Technology (EIT), a European equivalent to the USA's Massachusetts Institute of Technology (MIT), to be housed in the current European Parliament buildings in Strasbourg. The intention of EIT is to help stem the brain drain and attract outside talent and investment into the EU. One of the other main objectives of CPR is to achieve a single seat for the European Parliament in Brussels, abolishing the wasteful monthly sessions in Strasbourg.

EU-Western Balkan Science & Technology

The EU's recently appointed Science and Research Commissioner, Janez Potocnik said that scientific co-operation within the framework programmes is a means of consolidating lasting peace and prosperity in the western Balkan countries. Specific calls for proposals under FP6 have already been launched to address challenges in the region and could receive more financing in the future. The Commission has decided to support the most promising scientific institutes in the area, with the aim of assisting in the establishment of regional networks.

Parkinson's disease

There are 700,000 Parkinson's sufferers in the European Union and that number is expected to rise as the population ages. The PARREHA (Parkinson's rehabilitation) project was established with a €1.68 million grant from the Information Society Technologies programme of FP5 to take advantage of a little understood phenomenon known as kinesia paradoxa, to develop a headset that looks like a normal pair of glasses, that enables a certain group of Parkinson's sufferers to move freely and safely in their normal environment.

European Union - Digest

The references are to the Official Journal of the European Communities (OJ), Adopted Legislation from the L Series (OJL) and Proposals and Opinions from the C Series (OJC).

Animals and Veterinary Matters

Council Directive 2005/24/EC on ova, embryos and semen from bovine species – OJL78(p43)24.3.05

Council Regulations:

183/2005 laying down requirements for feed hygiene – OJL35(p1)8.2.05

396/2005 on residue levels of pesticides in food or feed – OJL70(p1)16.3.05

Commission Directives:

2005/7/EC on dioxins and dioxin-like PCBs in feedingstuffs – OJL27(p41)29.1.05

2005/8/EC on undesirable substances in animal feed – OJL27(p44)29.1.05

Commission Regulations:

75/2005 on maximum residue limits of veterinary medicines in foodstuffs of animal origin – OJL15(p3)19.1.05

255/2005 on additives in feedingstuffs – OJL45(p3)16.2.05

358/2005 on additives in feedingstuffs – OJL57(p3)3.3.05

359/2005 on animal diseases – OJL55(p12)1.3.05

416/2005 on importation from Japan of animal by-products – OJL66(p10)12.3.05

Commission Decisions on:

financial contributions for foot and mouth disease in the UK – OJL45(p13) 16.2.05

financial contributions for laboratories in the veterinary public health field – OJL45(p15)16.2.05

protection measures against avian flu – OJL68(p43)15.3.05

transit through the UK of live bovine animals – OJL61(p28)8.3.05

cattle diseases in Slovenia and Slovakia – OJL61(p37)8.3.05

swine fever – OJL71(p69,70&72)17.3.05

protection measures against avian flu – OJL63(p25)10.3.05

foot and mouth disease virus antigens – OJL68(p42)15.3.05

domestic movements of animals – OJL69(p39)16.3.05

imports of bovine embryos – OJL69(p41)16.3.05

Commission Recommendation on animal nutrition – OJL62(p22)9.3.05

Judgment of the Court on importation of animal feedingstuffs legally manufactured in another Member State – OJC57(p3)5.3.05

Reports of the Court of Auditors on:

system for identification and registration of bovine animals – OJC29(p1)4.2.05

measures to control foot and mouth disease – OJC54(p1)3.3.05

Aviation

Commission Regulation 381/2005 on airworthiness and environmental certification of aircraft – OJL61(p3)8.3.05

Dangerous Goods

Commission Decision regarding the transport of dangerous goods by rail – OJL61(p41)8.3.05

Energy and Nuclear Industries

Commission Regulation 302/2005 on application of Euratom safeguards – OJL54(p1)28.2.05

Council Decisions on:

radioactive waste management – OJL30(p10)3.2.05

UK exemption from climate change levy for low-value solid fuel – OJL51(p17)24.2.05

Commission Opinions on disposal of radioactive waste – OJC26(p3)2.2.05; OJC30(p5&6)5.2.05; OJC36(p3)11.2.05

Notice of UK 23rd Offshore Oil and Gas Licensing Round – OJC60(p7)10.3.05

Environment

Council Directive 2004/107/EC relating to pollutants in the air – OJL23(p3)26.1.05

Commission Directive 2005/13/EC on emissions from tractors – OJL55(p35)1.3.05

Commission Regulation 252/2005 on specimens of wild fauna and flora – OJL43(p3)15.2.05

Report of the Court of Auditors on Forestry Measures within the Rural Development Policy – OJC67(p1)18.3.05

Fish

Council Regulations:

27/2005 fixing for 2005 the fishing opportunities and associated conditions for certain fish stocks – OJL12(p1)14.1.05

172/2005 on fishing off the Comoros – OJL29(p1)2.2.05

289/2005 on trawling ban in Polish waters – OJL49(p1)22.2.05

Commission Regulations:

206/2005 on imports of farmed salmon – OJL33(p8)5.2.05

448/2005 on catches in the north-east Atlantic – OJL74(p5)19.3.05

Council Decision regarding fish stocks in the Pacific Ocean – OJL32(p1)4.2.05

Food

Commission Directives:

2005/4/EC on methods of analysis for the control of levels of metals in foodstuffs – OJL19(p50)21.1.05

2005/5/EC regarding ochratoxin A – OJL27(p38)29.1.05

2005/10/EC on sampling methods –OJL34(p15)9.2.05

2005/26/EC on food ingredients – OJL75(p33)22.3.05

C**ommission Regulations:**

37/2005 on the monitoring of temperature of quick-frozen foodstuffs – OJL10(p18)13.1.05

123/2005 regarding ochratoxin A – OJL25(p3)28.1.05

208/2005 on contaminants in foodstuffs – OJL34(p3)8.2.05

IT, Telecommunications and Broadcasting

Council Resolution: Looking into the Future of Information Communication Technologies – OJC62(p1)12.3.05

Opinion of the Committee of the Regions on National Broadband Strategies – OJC71(p55)22.3.05

Maritime and Marine

Commission Directives:

2005/12/EC on stability requirements for ro-ro passenger ships – OJL48(p19)19.2.05

2005/23/EC on training of seafarers – OJL62(p14)9.3.05

Plants and their Protection Products

Council Directives:

2004/117/EC on examinations and equivalence of seed produced in third countries – OJL14(p18)18.1.05

2005/15/EC on organisms harmful to plants – OJL56(p12)2.3.05

Commission Directives:

2005/16/EC on organisms harmful to plants – OJL57(p19)3.3.05

2005/17/EC on plant passports – OJL57(p23)3.3.05

2005/18/EC on plant health risks – OJL57(p25)3.3.05

Commission Regulation 80/2005 on hop varieties – OJL16(p51)20.1.05

Commission Recommendation on pesticide residues – OJL61(p31)8.3.05

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Association of the British Pharmaceutical Industry

Contact: Dr Philip Wright
12 Whitehall, London SW1A 2DY
Tel: 020 7747 1408
Fax: 020 7747 1417
E-mail: pwright@abpi.org.uk
Website: www.abpi.org.uk

The Association for the British Pharmaceutical Industry members brings together companies in Britain producing prescription medicines both through manufacture and supply as well as research and development (R&D).

The ABPI's mission is to represent the pharmaceutical industry operating in the UK in a way that:

- assures patient access to the best available medicine;
- creates a favourable political and economic environment;
- encourages innovative research and development;
- avoids unfair commercial returns

Association of Marine Scientific Industries

Contact: John Southerden
Society of Maritime Industries
4th Floor, 30 Great Guildford Street
London SE1 0HS
Tel: 020 7928 9199
Fax: 020 7928 6599
E-mail: amsi@maritimeindustries.org
Website:www.maritimeindustries.org/about/amsi.jsp

The Association of Marine Scientific Industries (AMSI) is a constituent association of the Society of Maritime Industries (SMI). As a market orientated trade association, it services companies in the marine science and technology sector. AMSI provides a co-ordinated voice for the industry sector on national, European and international issues.

Academy of Medical Sciences

Contact: Mrs Mary Manning, Executive Director
Academy of Medical Sciences
10 Carlton House Terrace
London SW1Y 5AH
Tel: 020 7969 5288
Fax: 020 7969 5298
E-mail: apollo@acmedsci.ac.uk
Website: www.acmedsci.ac.uk

The Academy of Medical Sciences promotes advances in medical science and campaigns to ensure these are converted as quickly as possible into healthcare benefits for society. The Academy's eight hundred Fellows are the United Kingdom's leading medical scientists from hospitals, academia, industry and the public service. The Academy provides independent, authoritative advice on public policy issues in medical science and healthcare.

AIRTO

Contact: Professor Richard Brook
AIRTO : Association of Independent Research & Technology Organisations
c/o CCFRA, Station Road, Chipping Campden, Gloucestershire GL55 6LD.
Tel: 01386 842247
Fax: 01386 842010
E-mail: airto@campden.co.uk
Website: www.airto.co.uk

AIRTO represents the UK's independent research and technology sector - member organisations employ a combined staff of over 20,000 scientists and engineers with a turnover in the region of £2 billion. Work carried out by members includes research, consultancy, training and global information monitoring. AIRTO promotes their work by building closer links between members and industry, academia, UK government agencies and the European Union.

Association of Medical Research Charities

Contact: Diana Garnham, Chief Executive
Association of Medical Research Charities
61 Gray's Inn Road, London WC1X 8TL.
Tel: 020 7269 8820 Fax: 020 7269 8821
E-mail: ceoffice@amrc.org.uk
Website: www.amrc.org.uk

The Association of Medical Research Charities (AMRC) works to advance medical research in the UK and, in particular, aims to improve the effectiveness of the charitable sector in medical research. There are over 100 member charities within the Association: in 2003/2004 their combined expenditure on biomedical research in the UK was £634 million. AMRC provides information, guidance and advice to medical research charities and information and data on the activities of the charity sector in medical research to government, the media and decision-formers.

Biotechnology and Biological Sciences Research Council

Contact: Dr Monica Winstanley,
Head of External Relations
BBSRC, Polaris House, North Star Avenue
Swindon SN2 1UH. Tel: 01793 413204
E-mail: Public.Affairs@bbsrc.ac.uk
Website: www.bbsrc.ac.uk

The BBSRC is the UK's leading funding agency for academic research in the non-medical life sciences and is funded principally through the Science Budget of the Office of Science and Technology. It supports staff in universities and research institutes throughout the UK, and funds basic and strategic science in: agri-food, animal sciences, biomolecular sciences, biochemistry and cell biology, engineering and biological systems, genes and developmental biology, and plant and microbial sciences.

British Association for the Advancement of Science - the BA

Contact: Sir Roland Jackson Bt, Chief Executive
The BA, Wellcome Wolfson Building,
165 Queen's Gate, London SW7 5HE.
E-mail: Roland.Jackson@the-BA.net
Website: www.the-BA.net

The BA is the UK's nationwide, open membership organisation dedicated to connecting people with science, so that science and its applications become accessible to all. The BA aims to promote openness about science in society and to engage and inspire people directly with science and technology and their implications.

Established in 1831, the BA organises major initiatives across the UK, including the annual BA Festival of Science, National Science Week, programmes of regional and local events, and an extensive programme for young people in schools and colleges.

British Ecological Society

Contact: Nick Dusic, Science Policy Manager
British Ecological Society
26 Blades Court, Deodar Road, Putney,
London, SW15 2NU
Tel: 020 8871 9797 Fax : 020 8871 9779
E-mail: nick@BritishEcologicalSociety.org
Website: www.BritishEcologicalSociety.org

The BES is an active, successful and independent scientific society. It aims to promote the science of ecology worldwide. It supports the ecological research and education communities to ensure that they remain vibrant and productive, thus generating new knowledge, skilled people and a greater appreciation of the science of ecology in the wider community. The Society publishes internationally renowned journals, organises Europe's biggest annual meeting of ecologists, provides advice to policy-makers and opinion formers, has an active programme of educational initiatives and provides grants.

British Pharmacological Society

Advancing molecules into medicines.

Contact: Sarah-Jane Stagg
British Pharmacological Society
16 Angel Gate, City Road,
London EC1V 2SG.
Tel: 020 7417 0113
Fax: 020 7417 0114
E-mail: sjs@bps.ac.uk
Website: www.bps.ac.uk

The British Pharmacological Society's 2,500 members are trained to study drug action from the laboratory bench to the patient's bed-side. Our members come from academia, industry, hospitals and regulatory authorities and government bodies. Our aim is to improve the quality of life by developing new medicines to treat and prevent the diseases and conditions which affect millions of people and animals. Inquiries about drugs and how they work are welcome.

The British Psychological Society

Contact: Dr Ana Padilla
Parliamentary Officer
The British Psychological Society
33 John Street
London WC1N 2AT
Tel: 020 7692 3412
Fax: 020 7419 6922
Email: anapad@bps.org.uk
Website: www.bps.org.uk

The British Psychological Society is an organisation of over 34,000 members governed by Royal Charter. It maintains the Register of Chartered Psychologists, publishes books, 10 primary science Journals and organises conferences. Requests for information about psychology and psychologists from parliamentarians are welcome.

British Society for Antimicrobial Chemotherapy

Contact: Tracey Guest, Executive Officer

British Society for Antimicrobial Chemotherapy
11 The Wharf, 16 Bridge Street,
Birmingham B1 2JS.
Tel: 0121 633 0410
Fax: 0121 643 9497
E-mail: tguest@bsac.org.uk
Website: www.bsac.org.uk

Founded in 1971, and with 800 members worldwide, the Society exists to facilitate the acquisition and dissemination of knowledge in the field of antimicrobial chemotherapy. The BSAC publishes the *Journal of Antimicrobial Chemotherapy* (JAC), internationally renowned for its scientific excellence, undertakes a range of educational activities, awards grants for research and has active relationships with its peer groups and government.

British Veterinary Association

Contact:Chrissie Nicholls
7 Mansfield Street, London W1G 9NQ
Tel: 020 7636 6541
Fax: 020 7637 4769
E-mail:chrissien@bva.co.uk
www.bva.co.uk

BVA's chief interests are:

* Standards of animal health
* Veterinary surgeons' working practices
* Professional standards and quality of service
* Relationships with external bodies, particulary government

BVA carries out three main functions which are:

* Policy development in areas affecting the profession
* Protecting and promoting the profession in matters propounded by government and other external bodies
* Provision of services to members

CABI Bioscience

Contact: Dr David Dent, Managing Director

CABI Bioscience, Bakeham Lane, Egham, Surrey TW20 9TY.

Tel: 01491 829080 Fax: 01491 829100

E-mail: bioscience.egham@cabi.org
Website: www.cabi-bioscience.org

CABI *Bioscience* is a new breed of international organisation specialising in sustainable agriculture, the conservation of biodiversity, invasive species management and industrial and environmental bioremediation. Globally the work of CABI *Bioscience* focuses on the farmer and his need to adapt and respond to the changes and challenges of the markets - these may be for organic produce, a route to transgenic production, or dealing with the effects of climate change or alien invasive species in a safe and sustainable way.

CABI *Bioscience* UK is one of a network of 6 global CABI *Bioscience* centres and a division of CAB International, a 42 member strong UN treaty-level organisation. Its sister enterprise is CABI *Publishing*, a leading international life science publisher.

Campden & Chorleywood Food Research Association

Contact: Prof Colin Dennis, Director-General
CCFRA, Chipping Campden,
Gloucestershire GL55 6LD.
Tel: 01386 842000 Fax: 01386 842100
E-mail: info@campden.co.uk
Website: www.campden.co.uk

A independent, membership-based industrial research association providing substantial R&D, processing, analytical hygiene, best practice, training, auditing and HACCP services for the food chain worldwide.
Members include growers, processors, retailers, caterers, distributors, machinery manufacturers, government departments and enforcement authorities. Employs over 300; serves over 2,000 member sites; and has a subsidiary company in Hungary. Activities focus on safety, quality, efficiency and innovation. Participates in DTI's Faraday Partnerships and collaborates with universities on LINK projects and studentships, transferring practical knowledge between industry and academia.

Cavendish Laboratory

The Administrative Secretary, The Cavendish Laboratory, Madingley Road, Cambridge CB3 0HE, UK.
E-mail: dhp24@phy.cam.ac.uk
http://www.phy.cam.ac.uk

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

Its world-class research is focused in a number of experimental and theoretical diverse fields.

Astrophysics: Millimetre astronomy, optical interferometry observations & instrumentation. Astrophysics, geometric algebra, maximum entropy, neutral networks.

High Energy Physics: LEP, SPS & future LHC experiments. Detector development. Particle physics theory.

Condensed Matter Physics: Semiconductor physics, quantum effect devices, nanolithography. Superconductivity, magnetic thin films. Optoelectronics, conducting polymers. Biological Soft Systems. Polymers and Colloids. Surface physics, fracture, wear & erosion. Amorphous solids. Electron microscopy. Electronic structure theory & computation. Structural phase transitions, fractals, quantum Monte Carlo calculations Biological Physics.

Chartered Institute of Patent Agents

Contact: Michael Ralph -
Secretary & Registrar
The Chartered Institute of Patent Agents
95 Chancery Lane, London WC2A 1DT
Tel: 020 7405 9450
Fax: 020 7430 0471
E-mail: michael.ralph@cipa.org.uk
Website: www.cipa.org.uk

CIPA's members practise in intellectual property, especially patents, trade marks, designs, and copyright, either in private partnerships or industrial companies. CIPA maintains the statutory Register. It advises government and international circles on policy issues and provides information services, promoting the benefits to UK industry of obtaining IP protection, and to overseas industry of using British agents to obtain international protection.

Clifton Scientific Trust

Contact: Dr Eric Albone
Clifton Scientific Trust
49 Northumberland Road, Bristol BS6 7BA
Tel: 0117 924 7664 Fax: 0117 924 7664
E-mail: eric.albone@clifton-scientific.org
Website: 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

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Council for the Central Laboratory of the Research Councils

Contact: Natalie Bealing
CCLRC Rutherford Appleton Laboratory
Chilton, Oxfordshire, OX11 0QX
CCLRC Daresbury Laboratory
Daresbury, Cheshire, WA4 4AD
Tel: 01235 445484 Fax: 01235 446665
E-mail: enquiries@cclrc.ac.uk
Website: www.cclrc.ac.uk

The CCLRC is the UK's strategic agency for scientific research facilities. It also supports leading-edge science and technology by providing world-class, large-scale experimental facilities. These advanced technological capabilities, backed by a pool of expertise and skills across a broad range of disciplines, are exploited by more than 1100 government, academic, industrial and other research organisations around the world each year. The annual budget of the CCLRC is c. £150 million.

University of East Anglia

Contact: Science Communication Officer
University of East Anglia
Norwich NR4 7TJ

Tel: 01603 593007
Fax: 01603 259883
E-mail: press@uea.ac.uk
Website: www.uea.ac.uk

From award-winning technology translating speech into sign language, to internationally-renowned climate research, and from the intricacies of diseases such as cancer to the large-scale hazards of earthquakes and volcanoes, UEA scientists are carrying out world-class research and teaching. A strongly interdisciplinary science cluster: Biological Sciences, Chemical Sciences and Pharmacy, Environmental Sciences, Computing Sciences and Mathematics.

Economic and Social Research Council

Contact: Lesley Lilley,
Senior PR and Parliamentary Officer
Economic and Social Research Council,
Polaris House, North Star Avenue,
Swindon SN2 1UJ
Tel: 01793 413119 Fax 01793 413130
exrel@esrc.ac.uk
http://www.esrc.ac.uk

The ESRC is the UK's leading research and training agency addressing economic and social concerns. We pursue excellence in social science research; work to increase the impact of our research policy and practice; and provide trained social scientists who meet the needs of users and beneficiaries, thereby contrbuting to the economic competitiveness of the United Kingdom, the effectiveness of public services and policy, and quality of life. The ESRC is independent, established by Royal Charter in 1965, and funded mainly by government.

Engineering and Physical Sciences Research Council

Contact: Lucy Brady,
Head of Marketing and Communications,
EPSRC, Polaris House,
North Star Avenue, Swindon SN2 1ET
Tel: 01793 444147 Fax: 01793 444005
E-mail: lucy.brady@epsrc.ac.uk
Website:www.epsrc.ac.uk

EPSRC invests more than £500 million a year in research and postgraduate training in the physical sciences and engineering, to help the nation handle the next generation of technological change. The areas covered range from mathematics to materials science, and information technology to structural engineering.
We also actively promote public engagement with science and engineering, and we collaborate with a wide range of organisations in this area.

English Nature

Contact: Dr Keith Duff,
Chief Scientist
English Nature
Northminster House, Peterborough,
PE1 1UA
Tel: 01733-455208
Fax: 01733-568834
E-mail: keith.duff@english-nature.org.uk
Website address: www.english-nature.org.uk

English Nature is the Government's wildlife agency working throughout England. With our partners and others we promote the conservation of wildlife and natural places.

We commission research and publish scientific papers which underpin the development of policies and programmes to maintain and enhance biodiversity

Environment Agency

Contact: Prof Michael Depledge,
Head of Science
Rio House, Waterside Drive, Aztec West,
Almondsbury, Bristol BS32 4UD
Tel: 01454 284433
Fax: 01454 284301
E-mail: michael.depledge@environment-agency.gov.uk
Website: www.environment-agency.gov.uk

The Environment Agency is responsible for protecting and enhancing the environment in England and Wales. We contribute to sustainable development through the integrated management of air, land and water. We commission research to support our functions through our Science Programme that is based on a 5 year plan developed through consultation.

Freshwater Biological Association

Contact: Dr Roger Sweeting,
Chief Executive.
The Freshwater Biological Association, The Ferry House, Far Sawrey, Ambleside,
Cumbria LA22 0LP.
Tel: 015394 42468 Fax: 015394 46914
E-mail: info@fba.org.uk
Website: www.fba.org.uk

The Freshwater Biological Association is an independent organisation and a registered Charity, founded in 1929. It aims to promote freshwater science through an innovative research programme, an active membership organisation and by providing sound independent opinion. It publishes a variety of specialist volumes and houses one of the finest freshwater libraries in the world.

Fund for the Replacement of Animals in Medical Experiments

Contact: Professor Robert Combes,
Scientific Director
FRAME, Russell & Burch House
96-98 North Sherwood Street
Nottingham NG1 4EE
Tel: 0115 958 4740 Fax: 0115 950 3570
E-mail: bob@frame.org.uk
Website: www.frame.org.uk
Registered Charity No.: 259464

FRAME considers that the current scale of live animal experimentation is unacceptable, but recognises that the immediate total abolition of all animal experimentation is not possible. FRAME advocates the Three Rs approach, with the long-term aim of eliminating the need for live-animal experiments altogether, through the proper development, validation and acceptance of replacement alternative methods.

Health Protection Agency

Radiation Protection Division (formerly NRPB)

Contact: Dr Michael Clark
Radiation Protection Division Scientific Spokesperson
Chilton, Didcot, Oxon OX11 0RQ
Tel:01235 822737 Fax: 01235 822746
Email: pressoffice@hpa-rp.org.uk
Website: www.hpa.org.uk/radiation

The Radiation Protection Division was formed on 1 April 2005 when the National Radiological Protection Board merged with the Health Protection Agency, under the provisions of the Health Protection Agency Act 2004.

As part of the Centre for Radiation, Chemical and Environmental Hazards, the Division carries out the Agency's work on ionising and non-ionising radiations. It undertakes research to advance knowledge about protection of people from the risks of these radiations; provides laboratory and technical services; runs training courses; provides expertinformation and has a significant advisory role in the UK.

Human Fertilisation and Embryology Authority

Contact: Tim Whitaker
21 Bloomsbury St
London WC1B 3HF
Tel: 020 7291 8216
Fax: 020 7291 8201
Email: tim.whitaker@hfea.gov.uk
Website: www.hfea.gov.uk

The HFEA is a non-departmental Government body that regulates and inspects all UK clinics providing IVF, donor insemination or the storage of eggs, sperm or embryos. The HFEA also licenses and monitors all human embryo research being conducted in the UK.

Institute of Biology

Contact: Prof Alan Malcolm, Chief Executive
20 Queensberry Place, London SW7 2DZ
Tel: 020 7581 8333
Fax: 020 7823 9409
E-mail: a.malcolm@iob.org
Website: www.iob.org

The biological sciences have truly come of age with the new millennium and the Institute of Biology is the professional body to represent biology and biologists to all. A source of independent advice to Government, a supporter of education, a measure of excellence and a disseminator of information - the Institute of Biology is the Voice of British Biology.

The Institute of Mathematics and its Applications

Contact: Lisa Wright, Personal Assistant to Executive Director
Institute of Mathematics and its Applications
Catherine Richards House, 16 Nelson Street
Southend-on-Sea, Essex SS1 1EF
Tel: 01702 354020
Fax: 01702 354111
E-mail: post@ima.org.uk
Website: www.ima.org.uk

The IMA is a professional and learned society for qualified and practising mathematicians. Its mission is to promote mathematics in industry, business, the public sector, education and research.
Forty percent of members are employed in education (schools through to universities), and the other 60% work in commercial and governmental organisations.
The Institute is incorporated by Royal Charter and has the right to award Chartered Mathematician status.

Institute *of* Physics

einstein year

Contact: Public Relations Department
76 Portland Place, London W1B 1NT
Tel: 020 7470 4800
E-mail: public.relations@iop.org
Websites: www.iop.org
www.einsteinyear.org

2005 is Einstein Year, part of an international celebration of physics to mark the centenary of the publication of Einstein's most famous theories. The Institute of Physics (IOP), the learned society and professional body which represents physics and physicists, is co-ordinating a range of activities designed to show the diversity and importance of modern physics today and to enthuse and inspire young people to study physics.
The IOP supports physics in schools, colleges and universities and provides policy advice and opportunities for public debate.

Institute of Physics and Engineering in Medicine

Contact: Robert Neilson, General Secretary
Fairmount House, 230 Tadcaster Road,
York, YO24 1ES
Tel: 01904 610821 Fax: 01904 612279
E-mail: r.w.neilson@ipem.org.uk
Website: www.ipem.org.uk

IPEM is a registered, incorporated charity for the advancement, in the public interest, of physics and engineering applied to medicine and biology. It accredits medical physicists, clinical engineers and clinical technologists through its membership register, 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 and by the Engineering Council (UK) to award CEng, IEng and EngTech.

IChemE

IChemE is the qualifying and professional body representing chemical and process engineers in the UK. In 2002, we published *Energy at the Crossroads* in response to the UK government consultation on energy policy; a report that seeks to improve the engineering and scientific input to policymaking. IChemE has also published a set of sustainable development indicators for the chemical & process industries. *The Sustainability Metrics* provide a valuable tool for the measurement of progress towards sustainability.

Contact: **Andrew Furlong**
Head of External Relations
t: +44 (0) 1788 534484
f: +44 (0) 1788 560833
e: afurlong@icheme.org.uk

www.icheme.org

heart of the process

Institution of Civil Engineers

ice

Contact: Neal Weston,
External Relations Manager
One Great George Street, Westminster,
London SW1P 3AA, UK
Tel: 020 7665 2151
Fax: 020 7222 0973
E-mail: Neal.Weston@ice.org.uk
Website: www.ice.org.uk

ICE aims to be a leader in shaping the engineering profession. With over 70,000 members, ICE acts as a knowledge exchange for all aspects of civil engineering. As a Learned Society, the Institution provides expertise, in the form of reports and comment, on a wide range of subjects from energy generation and supply, to sustainability and the environment.

LGC

Queens Road, Teddington
Middlesex, TW11 0LY
Tel: +44 (0)20 8943 7000
Fax: +44 (0)20 8943 2767
E-mail: info@lgc.co.uk
Website: www.lgc.co.uk

Setting standards in analytical science

LGC is Europe's leading independent analytical laboratory providing chemical and DNA-based analysis, diagnostic services, reference standards, R&D, method development, consultancy and training to both the public and private sectors. LGC operates in a diverse range of markets including foods, pharmaceuticals, biotechnology, environment, chemicals and petroleum.

Under arrangements for the office and function of Government Chemist, LGC fulfils specific statutory duties 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 based in Teddington, Middlesex, with other UK operations in Runcorn and Edinburgh, and facilities in France, Germany, Italy, Poland, Spain, Sweden and India.

University of Leeds

Contact: Dr W E Lewis,
Director of Research Support Unit
Research Support Unit, 3 Cavendish Road,
Leeds LS2 9JT
Tel: 0113 3436028
Fax: 0113 3434058
E-mail: w.e.lewis@adm.leeds.ac.uk
Website: http://www.leeds.ac.uk/rsu

The University of Leeds is among the largest research universities in Europe. We have some 3000 researchers, including postgraduates, and an annual research income of more than £70m. Research activity extends across nine faculties representing most core disciplines and often crosses traditional subject boundaries. In the last Research Assessment Exercise, we had 35 schools rated internationally or nationally 'excellent'.

London Metropolitan Polymer Centre

Contact: Alison Green,
London Metropolitan University
166-220 Holloway Road, London N7 8DB
Tel: 020 7133 2189
Fax: 020 7133 2184
E-mail: alison@polymers.org.uk
Website: www.polymers.org.uk

The London Metropolitan Polymer Centre provides training, consultancy and applied research to the UK polymer (plastics & rubber) industry. The training courses are delivered through a programme of industrial short courses and customised courses and these, together with distance learning and other flexible delivery methods, lead to qualifications ranging from technician to Masters level. Recent successes include a WRAP sponsored programme to develop new commercial applications for recycled PET and several technology transfer projects with companies.

Marks & Spencer Plc

Contact:
David S Gregory
Waterside House
35 North Wharf Road
London
W2 1NW.

Tel: 020 8718 8247
E-mail: david.gregory@marks-and-spencer.com

Main Business Activities

Retailer - Clothing, Food, Financial Services and Home.
Over 400 stores in 29 countries worldwide. Employing 66,000 people.

We offer our customers quality, value, service and trust in our brand by applying science and technology to develop innovative products and services.

Medical Research Council

Contact: Elizabeth Mitchell
20 Park Crescent, London W1B 1AL.

Tel: 020 7636 5422 Fax: 020 7436 2665
E-mail:
elizabeth.mitchell@headoffice.mrc.ac.uk
Website: www.mrc.ac.uk

The Medical Research Council (MRC) is funded by the UK taxpayer. We are independent of Government, but work closely with the Health Departments, the National Health Service and industry to ensure that the research we support takes account of the public's needs as well as being of excellent scientific quality. As a result, MRC-funded research has led to some of the most significant discoveries in medical science and benefited millions of people, both in the UK and worldwide.

Merck Sharp & Dohme Research Laboratories

Contact: Dr Ruth M McKernan

Neuroscience Research Centre
Terlings Park
Eastwick Road
Harlow
Essex CM20 2QR

Tel: 01279 440426
Fax: 01279 440178

E-mail: ruth_mckernan@merck.com

www.msd-nrc.co.uk

Drug discovery for brain diseases.

The National Endowment for Science, Technology and the Arts

Contact: Nicky Edwards
Policy & Public Affairs Manager
Fishmongers' Chambers
110 Upper Thames Street, London EC4R 3TW
Tel: 020 7645 9500
Fax: 020 7645 9501
Email: nicky.edwards@nesta.org.uk
Website: www.nesta.org.uk

NESTA (the National Endowment for Science, Technology and the Arts) is all about innovation. Through a range of pioneering programmes, we invest in talented people and ground-breaking ideas. On a wider scale we work to improve the climate for change in this country, acting as a catalyst for change and helping the UK to fulfil its potential.

National Physical Laboratory

National Physical Laboratory
Hampton Road, Teddington
Middlesex TW11 0LW
Tel: 020 8943 6880 Fax: 020 8943 6458
E-mail: enquiry@npl.co.uk
Website: www.npl.co.uk

The National Physical Laboratory (NPL) is the United Kingdom's national standards laboratory, 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 Environment Research Council

Contact: Sheila Anderson,
Head of Communications
Polaris House, North Star Avenue
Swindon SN2 1EU
Tel: 01793 411646 Fax: 01793 411510
E-mail: requests@nerc.ac.uk
Website: www.nerc.ac.uk

The UK's Natural Environment Research Council funds and carries out impartial scientific research in the sciences of the environment. NERC trains the next generation of independent environmental scientists.

NERC funds research in universities and in a network of its own centres, which include:

British Antarctic Survey, British Geological Survey, Centre for Ecology and Hydrology, Southampton Oceanography Centre and Proudman Oceanographic Laboratory

University of Newcastle upon Tyne

Contact: Dr Douglas Robertson
Newcastle upon Tyne NE1 7RU
Tel: 0191 222 5347 Fax: 0191 222 5219
E-mail: business@ncl.ac.uk
Website: www.ncl.ac.uk

The University of Newcastle is a member of the Russell Group of research-intensive Universities and is enjoying substantial growth in student numbers and research income. The University has a well balanced portfolio of research funding across all sponsor groups and has one of the highest levels of research projects funded by UK Government Departments and EU activity. It was recently identified in a national survey as one of the top Universities in the UK for technology transfer.

Particle Physics and Astronomy Research Council

Contact: Dr Catherine Ewart,
Head of Corporate Affairs
Particle Physics and Astronomy Research Council
Polaris House, North Star Avenue
Swindon, Wiltshire SN2 1SZ
Tel: 01793 442115 Fax: 01793 442125
E-mail: catherine.ewart @pparc.ac.uk
Website: www.pparc.ac.uk

The PPARC is the UK's strategic science investment agency that directs and funds research in national and international programmes in fundamental physics.

It is this research into fundamental physics that lies behind some of the major technological advances of the 20th Century, and delivers world leading science, technologies and people for the UK.

Prospect

Contact: Sue Ferns,
Prospect Head of Research and Specialist Services, Prospect House
75 – 79 York Rd, London SE1 7AQ
Tel: 020 7902 6639 Fax: 020 7902 6637
E-mail: sue.ferns@prospect.org.uk
www.prospect.org.uk

Prospect is an independent, thriving and forward-looking trade union with 105,000 members. 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 and, with negotiating rights with over 300 employers, we seek to secure a better life at work by putting members' pay, conditions and careers first.

Queen Mary, University of London

Contact: Caroline Quest,
Innovation and Enterprise
Queens' Building, Mile End Road
London E1 4NS
Tel: 020 7882 7458 Fax: 020 7882 5128
Email: c.quest@qmul.ac.uk

Queen Mary, University of London, incorporates the St Bartholomew's and Royal London School of Medicine and Dentistry. Queen Mary's outstanding research strengths cover the spectrum from Electronic Engineering to Preventive Healthcare. It is home to world-renowned specialist centres including the Centre for Commercial Law Studies, the Interdisciplinary Research Centre in Biomedical Materials and the William Harvey Research Institute.

RIO TINTO

Contact: Terry Friese-Greene
Technology Group Consultant
Rio Tinto plc
6 St James's Square, London SW1Y 4LD
Tel: 020 7753 2467
E-mail: terry.friese-greene@riotinto.com
Website: www.riotinto.com

Rio Tinto is a leading international mining company which focuses on exploration for first class ore-bodies and the development of large, efficient long-life mines capable of sustaining competitive advantage. Principal products (aluminium, borates, coal, copper, gold, iron ore, titanium dioxide, uranium, nickel, talc, salt, diamonds and silver) provide the materials necessary for economic progress and prosperity in the developed and developing world.

The Royal Academy of Engineering

Contact: Tom McLaughlan,
Director of Communications
29 Great Peter Street
Westminster, London SW1P 3LW
Tel: 020 7227 0500 Fax: 020 7233 0054
E-mail: mclaughlant@raeng.co.uk
Website: www.raeng.co.uk

Founded in 1976, the Royal Academy of Engineering promotes the engineering and technological welfare of the country by facilitating the application of science. As a national academy, we offer independent and impartial advice to Government; work to secure the next generation of engineers; pursue excellence; and provide a voice for Britain's engineering community. Our Fellowship - comprising the UK's most eminent engineers - provides the leadership and expertise for our activities, which focus on the importance of engineering and technology to wealth creation and the quality of life.

Kew
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ROYAL BOTANIC GARDENS KEW
WORLD HERITAGE SITE

KEW GARDENS

The mission of Kew is to enable better management of the Earth's environment by increasing knowledge and understanding of the plant and fungal kingdoms – the basis of life on Earth. Kew is fundamentally a scientific, amenity and educational organisation devoted to increasing knowledge and public understanding of plant and fungal diversity – how it came to be, what its current status is, how it can be conserved for future generations, and how it can be used in sustainable ways for human benefit.

Contact: Prof. Simon J. Owens
Tel: 020 8332 5212
Fax: 020 8332 5278
Email: s.owens@kew.org
Website: www.kew.org

SAVING THE WORLD'S PLANTS FOR LIFE

Royal College of Veterinary Surgeons

RCVS
Royal College of Veterinary Surgeons

Contact: Jeff Gill, Policy Officer,
External Affairs Department
Royal College of Veterinary Surgeons (RCVS)
Belgravia House, 62-64 Horseferry Road
London SW1P 2AF.
Tel: +44 (0)20 7202 0735 (Direct)
+44 (0)20 7222 2001
Fax: +44 (0)20 7202 0740
E-mail: j.gill@rcvs.org.uk
Website: www.rcvs.org.uk

"Promoting and sustaining public confidence in veterinary medicine". The Royal College of Veterinary Surgeons (RCVS) is the regulatory body for veterinary surgeons in the UK and is responsible for the registration of veterinary surgeons, for monitoring standards of veterinary education and for professional conduct. The Government regularly consults the RCVS on a range of legislative issues including animal welfare, control of animal disease and veterinary certification.

The Royal Institution

Ri The Royal Institution of Great Britain

Contact: Dr Gail Cardew
Head of Programmes
The Royal Institution
21 Albemarle Street, London W1S 4BS
Tel: 020 7409 2992 Fax: 020 7670 2920
E-mail: ri@ri.ac.uk Website: www.rigb.org

The Royal Institution has a reputation established over 200 years for its high calibre events that break down the barriers between science and society. It acts as a unique forum for informing people about how science affects their daily lives, and prides itself on its reputation of engaging the public in scientific debate. The Royal Institution has a range of activities all under one roof, from programmes for schools and a forum for the general public, through to a heritage programme, an arts–science initiative, a media centre and state-of-the-art chemistry labs.

The Royal Society

THE ROYAL SOCIETY

Contact: Dr David Stewart Boak,
Director Communications
The Royal Society, 6-9 Carlton House Terrace,
London, SW1Y 5AG.
Tel: 020 7451 2510 Fax: 020 7451 2615
Email: david.boak@royalsoc.ac.uk
Website: www.royalsoc.ac.uk

Founded in 1660, the Royal Society is an independent academy promoting the natural and applied sciences. It aims to:

- strengthen UK science by providing support to excellent individuals
- fund excellent research to push back the frontiers of knowledge
- attract and retain the best scientists
- ensure the UK engages with the best science around the world
- support science communication and education; and communicate and encourage dialogue with the public
- provide the best independent advice nationally and internationally
- promote scholarship and encourage research into the history of science

Royal Society for the encouragement of Arts, manufactures and commerce

RSA

Contact: Susie Harries
8 John Adam Street
London WC2N 6EZ
Tel: 020 7451 6879
Fax: 020 7839 5805
E-mail: susie.harries@rsa.org.uk
Website: www.theRSA.org

The RSA's Forum for Technology, Citizens and the Market – a group of science-based companies and their principal stakeholders – aims to promote the flow of new technologies into society by enabling companies to sharpen their understanding of public concerns around new science and engage with these concerns early on as part of their routine product development process.

The Royal Society of Chemistry

RS•C
ROYAL SOCIETY OF CHEMISTRY

Contact: Dr Stephen Benn
Parliamentary Affairs
The Royal Society of Chemistry
Burlington House, Piccadilly, London W1J 0BA
Tel: 020 7437 8656 Fax: 020 7734 1227
E-Mail: benns@rsc.org
Website: http://www.rsc.org
http://www.chemsoc.org

The Royal Society of Chemistry is a learned, professional and scientific body of over 46,000 members with a duty under its Royal Charter "to serve the public interest". It is active in the areas of education and qualifications, science policy, publishing, Europe, information and internet services, media relations, public understanding of science, advice and assistance to Parliament and Government.

The Royal Statistical Society

Contact: Mr Andy Tope
External Relations Officer
The Royal Statistical Society
12 Errol Sreet, London EC1Y 8LX.
Tel: +44 20 7614 3920
Fax: +44 20 7614 3905
E-mail: a.tope@rss.org.uk
Website: www.rss.org.uk

The RSS is much more than just a learned society. We lead the way as an independent source of advice on statistical issues, and through our links with government, academia and the corporate and voluntary sectors, play a crucial role in raising the profile of statistics. We have a powerful voice at Royal Commissions, Parliamentary Select Committees, and at public consultations, offering our own unique view on just about anything, from freedom of information to sustainable development.

The Science Council

Contact: Dr Sarah Ball,
Chief Executive Officer
The Science Council
210 Euston Road, London NW1 2BE
Tel 020 7611 8754 Fax 020 7611 8743
E-mail: enquiries@sciencecouncil.org
Website: www.sciencecouncil.org

The Science Council has a membership of over 25 professional institutions and learned societies covering the breadth of science and mathematics. Its purpose is to provide an independent collective voice for science and scientists and to maintain standards across all scientific disciplines. We are active in science policy issues including science in education, health, society and sustainability. In 2003 the Science Council was granted its Royal Charter and in 2004 it launched the Chartered Scientist (CSci) designation as a measure of high standards in the practice, application, advancement and teaching of science. We now have over 10,000 Chartered Scientists.

SEMTA

Technology Skills For Productivity & Performance

Contact: Nicolas Heslop
Public Affairs Manager
SEMTA, 22 Old Queen Street,
London SW1H 9HP
Tel: 020 7222 0464 Fax: 020 7222 3004
E-Mail: nheslop@semta.org.uk
Website: www.semta.org.uk

SEMTA (Science, Engineering and Manufacturing Technologies Alliance) is the Sector Skills Council for the science, engineering and manufacturing technology sectors.

Our **Mission** is 'to ensure that our sector has the knowledge and skills required to meet the challenges faced by the workforce of the future.'

Our sectors account for a significant proportion of the UK economy. There are about two million people employed in about 100,000 establishments in the core Science, Engineering and Technology sectors, currently contributes over £74 billion per annum – about ten per cent – of total UK GDP.

Society for general Microbiology

Contact: Dr Faye Jones,
Public Affairs Administrator
Marlborough House, Basingstoke Road,
Spencers Wood, Reading RG7 1AG.
Tel: 0118 988 1843 Fax: 0118 988 5656
E-mail: pa@sgm.ac.uk
Website: http//www.sgm.ac.uk

SGM is the largest microbiological society in Europe. The Society publishes four journals of international standing, and organises regular scientific meetings.

SGM also promotes education and careers in microbiology, and it is committed to represent microbiology to government, the media and the public.

An information service on microbiological issues concerning aspects of medicine, agriculture, food safety, biotechnology and the environment is available on request.

Society of Chemical Industry

SCI

where science meets business

Contact: Mr Richard Denyer,
General Secretary and Chief Executive
SCI, International Headquarters
14-15 Belgrave Square, London SW1X 8PS
Tel: 020 7598 1500 Fax: 020 7598 1545
E-mail: secretariat@soci.org
Website: www.soci.org

SCI is an interdisciplinary network for science, commerce and industry. SCI attracts forward-looking people in process and materials technologies and in the biotechnology, energy, water, agriculture, food, pharmaceuticals, construction, and environmental protection sectors worldwide. Members exchange ideas and gain new perspectives on markets, technologies, strategies and people, through electronic and physical specialist conferences and debates, and publish journals, books and the respected magazine *Chemistry & Industry*.

University of Surrey

UniS
University of Surrey

Contact: Pauline Elliott
University of Surrey, Guildford,
Surrey, GU2 7XH
Tel: 01483 689905
Fax: 01483 683948
E-mail: information@surrey.ac.uk
Website: http://www.surrey.ac.uk/

The University of Surrey is one of the UK's leading professional, scientific and technological universities with a world class research profile and a reputation for excellence in teaching and learning. Ground-breaking research at the University is bringing direct benefit to all spheres of life - helping industry to maintain its competitive edge and creating improvements in the areas of health, medicine, space science, the environment, communications, ion beam and optoelectronics technology, visual multi media, defence and social policy.

Universities Federation for Animal Welfare

UFAW
Established 1926

Contact: Dr James Kirkwood,
Scientific Director
The Old School, Brewhouse Hill
Wheathampstead, Herts. AL4 8AN.
Tel: 01582 831818. Fax: 01582 831414.
Email: ufaw@ufaw.org.uk
Website: www.ufaw.org.uk
Registered Charity No: 207996

UFAW is an internationally-recognized independent scientific and educational animal welfare 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 leading journal Animal Welfare and other high-quality publications on animal care and welfare.
- providing expert advice to government departments and other concerned bodies.

Science Diary

The Parliamentary and Scientific Committee

Contact: Annabel Lloyd
020 7222 7085
www.scienceinparliament.org.uk

Monday 23 May 17.30
Election of Officers and AGM
Putting off the Evil Day - Mitigating Consequences of Ageing
Speakers: Professor Tom Kirkwood, Head of the Institute of Ageing, Newcastle University; Professor John Lever, Head of the Department of Bioengineering, Imperial College; Dr Reynold Greenlaw, Oxford Computer Consultants

Monday 13 June 17.30
The Nuclear Energy Option -Will we still need it and, if so, When?
Speakers: Lord Broers, Royal Academy of Engineering; Sir Donald Miller, Past Chairman, Scottish Power; Ann McCall, Head of Safety, Nirex; Godfrey Boyle, Director, Energy and Environment Research Unit, Open University

Wednesday 22 June 10.00-13.30
Visit to London IDEAS Genetics Knowledge Park

Monday 11 July 17.30
Plastic Waste – Toxic Rubbish or Strategic Resource?
Speakers to be confirmed

The Royal Institution

21 Albemarle Street, London W1S 4BS
For further information visit www.rigb.org or telephone 020 7409 2992
Events held at the Royal Institution
Unless otherwise stated tickets cost £8 (£5 concessions)

Wednesday 1 June 19.00
Surviving Armageddon
Prof Bill McGuire

Tuesday 7 June 19.00
The promise of stem cells
Baroness Susan Greenfield, Prof Christopher Higgins and Prof Yair Reisner

Wednesday 15 June 19.00
Headline debate
Sheena McDonald, Robert Key MP and Robin McKie

Thursday 23 June 19.00
The future of our memories
Prof Neil Burgess, Prof Wendy Hall and Dr Andy Miah

Monday 27 June 19.00
Transplants for tomorrow: raising hopes, saving lives
Dr Evan Harris, Keith Rigg and Dr Paul Shiels

Tuesday 28 June 19.00
Technology, society and the senses
Kevin Carey, Ian Pearson and Prof Brian Wynne

Wednesday 29 June 19.00
Dealing with diabetes
Prof Stephanie Amiel and Prof Andrew Hattersley

Friday 22 July 09.30–17.00
Mild cognitive impairment
For programme and confirmed speakers, please visit www.rigb.org nearer the date.
Tickets (including lunch and refreshments) £35, £25 for Ri Members and concessions.

The Royal Society

6-9 Carlton House Terrace
London SW1Y 5AG
Events held at the Royal Society unless otherwise stated.
For further information visit www.royalsoc.ac.uk/events; email events@royalsoc.ac.uk or call 020 7451 2575.

Thursday 2 June 18.30
New views on human origins
By Professor Chris Stringer FRS

Monday 6 and Tuesday 7 June (all day)
Discussion Meeting
Laser-driven plasma accelerators: new sources of energetic particles and radiation

Saturday 11 June 12.00
Heavenly music: the sounds of the Universe
By Professor Andy Fabian FRS and Dr Carolin Crawford
Public lecture as part of the Cheltenham Festival of Science.
For tickets contact Cheltenham Box Office 01242 227979

Monday 4 to Thursday 7 July
Mon 18.00-21.00; Tues-Thurs 10.00-16.30
The annual Summer Science Exhibition

Royal Society of Chemistry

Contact: Dr Stephen Benn
0207 437 8656, BENNS@RSC.ORG

Friday 24 June
Understanding Creativity
London

Monday-Thursday 4-7 July
Formula IV: Frontiers in Formulation Science
University of London

Tuesday-Friday 5-8 July
MC7: Functional Materials for the 21st C
University of Edinburgh

Monday-Wednesday 18-20 July
Analytical Research Forum
University of Plymouth

Monday-Thursdsay 18-21 July
19th International Symposium: Synthesis in Organic Chemistry
University of Oxford

Royal Statistical Society

12 Errol Street, London EC1Y 8LX

Monday 18 – Thursday 21 July
Statistics in Healthcare
Joint conference of the Royal Statistical Society and Statisticians in the Pharmaceutical Industry (PSI)
City Hall, Cardiff
Full details available from www.rss.org.uk/rsspsi2005

The Royal Society of Edinburgh

22-26 George Street
Edinburgh EH2 2PQ.
Tel: 0131 240 5000
Fax: 0131 240 5024
events@royalsoced.org.uk
www.royalsoced.org.uk
All events require registration and take place at the RSE.

Monday 13 June 17.30
How Safe are Vaccinations?
Professor Harry Burns

Monday 11 July 17.30
Climate Change: Apocalyptic, Much ado about Nothing or Cause for Concern
Professor John Mitchell OBE FRS

SCI

14/15 Belgrave Square
London SW1X 8PS
Contact: conferences@soci.org or 020 7598 1562
Unless otherwise stated events are at SCI

Wednesday 8 – Thursday 9 June
In silico ADMET: Design of Bioactive Compounds

Tuesday 19 July
Farming and the Environment
Askham Bryan College, York

Royal Pharmaceutical Society

Contact: Judith Callanan
020 7572 2261
science@rpsgb.org

Monday 27 - Tuesday 28 June
PAT 2005
Process understanding and manufacturing science: translating the philosophy into reality
RPSGB, London

Tuesday 12 July
Use of antibiotics
Joint symposium with SACAR and the National Prescribing Centre
RPSGB, London

Wednesday 6 – Friday 8 July
International analytical validation and regulatory issues for the pharmaceuticals industry
2 day course
Hilton, York.

SCIENCE IN PARLIAMENT

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Science in Parliament
3 Birdcage Walk, London SW1H 9JJ
Tel: 020 7222 7085 Fax: 020 7222 7189
www.scienceinparliament.org.uk

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