Summer 2004

SCIENCE IN PARLIAMENT

REACHing for the Right Solution?

Science Investment

Research Assessment

Animal Research

Concrete Developments

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

Gordon Brown's canny science investment helps UK Ltd's innovative industries retain world class status and attract school leavers considering science and technology.

Lord May condemns bureaucracy in the retrospective Research Assessment Exercise and promotes stable financial support for innovative research scientists.

Tom Blundell (RCEP) and John Selborne (ACHS & CSF) debate Registration, Evaluation and Authorisation of Chemicals (REACH) and respond pragmatically to cumbersome proposals from Brussels reliant on excessive animal testing.

Ian Gibson and Bob Combes present details of scientific benefits arising from animal research and the UK's stringent animal welfare controls designed to minimise the use of animals in research.

Simon Campbell opts for risk-based approaches to chemical hazards, criticises the European Chemicals Agency and offers help with EU legislation on REACH.

Tony McWalter investigates British-built innovative and miniaturised technology onboard Beagle 2 and applications to onsite analysis of drugs, explosives, people, racehorses and bedside monitoring of diabetes, linked by mobile to a hospital supervisor.

John Beddington and Michael Park compare fisheries research with a fisherman's meagre catch.

Britain's best-kept IT secret wins the MacRobert Award. The fate of Physics and Chemistry in our universities is in the balance, and this is discussed by Brian Iddon and Peter Main. Ed Metcalfe promotes the Southeast Region with a GDP of £145bn and 50,000 high tech companies spending £4 billion yearly on R&D. "Concrete is best for Sustainable Development" and much more.

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

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Summer 2004 Volume 61 Number 3

ISSN 0263-6271

The Rt Hon Gordon Brown MP

Chancellor of the Exchequer

The future of the British economy depends on the future of British science. In today's competitive global economy, the nations that will thrive will be those that attract and retain the highest-skilled people and the most innovative companies. And I believe that at this moment of opportunity with the world economy starting to grow again, Britain's great traditions of scientific inventiveness make us well equipped to be one of the great success stories of the global age. It is important therefore to make the right long term decisions to invest in science and skills.

We are not only faced with the challenge from America, Japan and the Euro area, but with the rise of India and China as technological powers. Already China has 750,000 researchers, China and India each have around 2 million graduates a year, and research and development spending in Singapore is growing at 15 per cent a year. So Britain cannot afford not to invest. Indeed a government that fails to invest in science and skills is a government failing to equip Britain for the new economy.

So alongside the Budget we published a consultation document inviting views on the Government's aspirations for science and innovation over the next 10 years:

- World class excellence from our best centres of science and technology, driven by competition for funding and talent;
- A dynamic research base that meets the needs of both public and private funders and is managed effectively to achieve financial sustainability;
- Greater collaboration between universities and business to provide a sharper focus for research and an impetus to innovation and productivity growth;
- Better application of leading edge technologies in business and the public sector;
- Development, from investing in the education supply, of the science and technology skills that our businesses and public services will need over the next decade, underpinned by excellent teaching in schools to engage the next generation of workers in the knowledge economy;
- And a society that is confident about the use of science and technology.

We are delighted that over 200 organisations have contributed to our consultation, including: universities; science, research and knowledge transfer organisations; businesses; non governmental organisations; charities; and Regional Development Agencies. And they have come to us with one consistent message – that in today's world investment in science is not only desirable – it is a necessity.

While it would be easier to take the short term route – and fail to continue to make the necessary investments for the future – we propose to take the longer term view, to choose science and technology above many other spending priorities.

So the Secretaries of State for Industry and Education and I have now published, alongside the spending review, a ten year framework for building British leadership in science and innovation to prepare Britain for the challenges of the global economy.

This framework sets out a new and stretching long term target to increase UK investment in private and public sector research and development from 1.9 per cent of national income – amongst the lowest of our competitors – to 2.5 per cent in ten years' time – among the best of our competitors.

To support this ambition – building on the significant increases in science investment in the last two spending reviews – total government funding for science will rise from £3.9 billion this year to £5 billion by 2008 in this spending review: one billion extra for science by 2008 – a 5.8 per cent average annual real terms rise. And we are delighted that as a result of our investment, the Wellcome Trust has announced a partnership with the UK Government to invest in UK research – committing to invest at least £1.5 billion over five years.

With this funding increase – the largest sustained increase in science spending for a generation – we will continue to make good past under-investment in Britain's scientists, engineers and technologists and the infrastructure that supports them. And we will do more to turn our excellent science base to greater economic advantage, building on the culture change under way in our universities, promoting far more widespread collaboration between businesses and the science base, and promoting innovation in companies directly.

Our long term target is ambitious and will only be achieved with continued commitment and investment from all research funders. So the challenge I am putting to the scientific community, business and charities today is to work with us over the next decade to make Britain the best and most attractive location in the world for science and innovation.

The Future for Chemistry

Dr Brian Iddon MP

The Government's ten-year strategy for science and innovation is very welcome. We all know that the future prosperity of the United Kingdom depends on a strong and expanding science and engineering base.

The UK must maintain its capacity to carry out world-class research with top rate infrastructure and the best trained people.

The chemical sciences underpin the core expertise needed for most scientific and technological developments and they continue to make enormous contributions to social, cultural, economic and intellectual advances.

Key industrial sectors depend on chemistry

Key industrial sectors depend on them – whether chemicals, pharmaceuticals or biotechnology – and they make significant contributions to our national prosperity, trade balance, and our quality of life.

It's not hard to see why.

Chemicals and pharmaceuticals are one of the UK's largest manufacturing industries. In 2000 they had 235,000 direct employees, a turnover of £50b, a £5b trade surplus, sales of £33b, and capital expenditure of £3b.

And let's not forget the tax and national insurance contribution which amounts to nearly £5b a year to national and local Government.

Moreover UK biotechnology is second only to the US, and creative chemical sciences have been a key driver for the foundation of many start-up companies. The output of the chemical sciences is a vital component of downstream businesses both large and small including food, consumer products, energy and mining, high technology, and the environment.

Innovations in chemical science underlie most aspects of everyday life, from new medicines to materials to foodstuffs to fuels, and are essential to sustain the world.

We should also remember the crucial role of chemistry in the human genome which has now been sequenced using techniques developed by chemists. Frankly we are only now beginning to realise that genomic information – controlled by subtle and complex molecular processes – is stored, expressed and utilised in ways that are barely understood.

What we do know is that we're going to rely on advances in understanding how molecular processes control fundamental complex cellular pathways to lead us to new medicines to treat and cure many diseases.

Advanced materials and new insights into molecular processes will stimulate commercial exploitation of new technologies like nanotechnology – saving energy, conserving precious natural resources and helping to generate new energy sources. The reason why the chemical sciences will be at the heart of multidisciplinary initiatives in the 21st century is simple. Understanding events at the molecular level will be the key to future invention and innovation.

A rosy future? Or trouble ahead?

Amidst all this you might be forgiven for thinking that the future is rosy and that the 10-Year strategy will reach its potential.

But it isn't. And it might not.

The Government's strategy assumes that current levels of science activity will continue. But, unless we take urgent action soon, this will not happen. In the core sciences of chemistry and physics there is a risk of contraction.

Immediate action is needed because we have an immediate problem.

If the 10-Year Strategy is to work as intended we are going to need to make sure that we don't continue to close down the chemistry provision in our universities.

Closing chemistry departments is not the way to deliver a 10-Year strategy. Nor is it the way to stimulate research in areas where the UK is not yet internationally competitive.

So what should we do instead?

I agree with the Royal Society of Chemistry's analysis that significant short-term additional investment is needed between 2005 and 2007 to secure the sustainability that underpins the long-term vision of the 10-Year Strategy.

The RSC claim £2.6b is needed. If so what should be done with the money? I think there are three priorities:

1. We need to secure the future of the chemical sciences in higher education institutions. Total funding of £300m is needed for physical science and engineering between 2005 and 2007 in universities, with £90m of those funds required for chemistry. This should provide the necessary financial breathing space needed by Vice-Chancellors to draw up long-term plans which integrate across institutions and thus prevent further disastrous closures of physical science departments, particularly chemistry.

2. We need to provide the best facilities to train and inspire scientists of the future. A capital allocation of around £1.9b is required to provide at least good science laboratory facilities in all schools and £70m per annum (£210m between 2005 and 2007) for equipment.

3. We need to provide the best chemical sciences education in schools. Additional funding of £70m pa (£210m in 2005/07) is needed to meet the longer term need for trained personnel through more effective recruitment and retention of science teachers.

It is critical we sustain and reinforce the core chemical sciences. The 10-Year Strategy deserves no less.

The Future of Physics

Professor Peter Main, Director, Science & Education,
The Institute of Physics

UK Physics is Flourishing but University Departments Continue to Close, Does it Matter?

Since 1992, the number of physics departments in UK universities has fallen by more than 30%. There are now fewer than 50 universities that offer physics degrees. The fall is not due to any lack of attractiveness of physics graduates to potential employers. Quite the contrary, physicists have never been in higher demand. The closures are a consequence of changes in levels in government funding and of a relative lack of demand for physics courses (static vs. growth in other subject areas) from students entering higher education. The closures could have major consequences for the supply of well-trained scientists to support the ever more technical industrial sector.

In many ways, physics has never been in a healthier state. Physics-based industry dominates the manufacturing sector and continues to grow. Many recent advances have enormous technical possibilities while the discovery of dark energy has revolutionised our understanding of the Universe. Physicists have also been increasingly involved in interdisciplinary activity; in 2003, as well as the Physics Nobel Prize, physicists also won Prizes in Medicine and Physiology, and in Economics. And yet university physics departments have been closing.

Why?

Falling student numbers have been the most important factor in the closure of individual departments. The larger, more prestigious departments have grown at the expense of the smaller ones. The funding per student has fallen over a long period so that, in order to maintain a viable number of staff, they have increased their student intake. With a constant level of applications, this has been disastrous for a number of the smaller departments. It is worth mentioning that many of the departments that closed had reputations for excellent teaching and research.

The closures are nothing to do with a lack of demand for physics graduates. Universities report that their physicists are highly sought after by employers for their attractive combination of skills and competence – not least to supply some of the drastic shortfall in well qualified physics teachers which is undoubtedly contributing to the lack of student enthusiasm for the subject. Despite this buoyant market, the number of physics graduates has hardly changed over the last ten years, although the number of graduates in all subjects has increased by around 50%. Over the same period the number of candidates for A-level physics has fallen by 20%. Undoubtedly, one of the reasons for this decline is the poor quality of careers advice given to students aged 16. The majority of pupils are just not aware that A-levels in physics and mathematics are among the most flexible and lead to the highest average salaries. Market signals are clearly not working in this regard, and physics departments have done well to maintain the supply of graduates in these circumstances.

There is no sign that the reduction in the number of physics departments is stopping. There are several more already some distance along the road to closure. A recent, informal survey showed that the vast majority of physics departments had been running at a deficit for many years within their university financial models. Although the majority of vice-chancellors and principals have elected to keep hold of their physics departments the situation is clearly unstable.

In addition, the constant strain of running at a deficit has had a deleterious effect on the morale of academic physicists and on the general infrastructure.

So does it matter?

While fewer university departments do not necessarily result in fewer graduates, it certainly does not help the situation. Already, there are physics deserts appearing around the country. For example, a prospective physics student in Norwich, of good but not outstanding A-levels, would have to travel at least 100 miles from home to find a suitable course. With the Government's expectation that increasing numbers of students will stay at home to study, such deserts could reduce further the potential pool of applicants. This is one of the motives for the Institute of Physics' Undergraduate Bursary Scheme, to be introduced in 2006, which will offer support to physics students from poorer backgrounds. Physics deserts are also likely to be deserts of physics-based industry.

Perhaps just as important is the impact of physics deserts on the quality of UK science overall. Physics is not an isolated subject – it forms a fundamental building block of much of modern interdisciplinary science and technology research which could suffer from a knock-on effect, stifling the quality of UK scientific research and innovation as a whole.

If allowed to run unchecked the "market" in Higher Education could allow economies of scale to drive consolidation too far to the detriment of physics, science and UK industry as a whole.

THE EU CHEMICALS DIRECTIVE AND ITS IMPLICATIONS FOR EXPERIMENTS ON ANIMALS

MEETING OF THE PARLIAMENTARY AND SCIENTIFIC COMMITTEE ON MONDAY, 26TH APRIL 2004

Relatively uncontrolled utilisation of the use of a very wide range of chemicals in commercial products over the last 100 years, some of them potentially hazardous, has transformed the environment. The EU response contained in the REACH proposals would require a very large expansion in routine testing using animals.

Tom Blundell discusses the role of the Royal Commission in developing a more humane and pragmatic approach based on state of the art methods currently used in commercially-based environmental research and John Selborne describes how such a policy is being developed in the UK and is achieving consensus on risk assessment and management among stakeholders, ranging from the chemicals industry to NGOs, with a minimum of formal regulation.

Chemicals in Products - safeguarding the environment and human health

Sir Tom Blundell, Chair,
Royal Commission on Environmental Pollution

Last year the Royal Commission on Environmental Pollution published its Report on Chemicals in Products – safeguarding the environment and human health. In this presentation I will explain how the Royal Commission's recommendations relate to the EU REACH proposals (Registration, Evaluation, Authorisation and Registrations of Chemicals), and what the implications of our proposals and those of REACH are for animal testing.

I would like firstly to take the opportunity to say a few words about the Royal Commission on Environmental Pollution, which I chair. The Commission is an independent environmental advisory body charged with advising the UK Government on matters both national and international, concerning the pollution of the environment, on the adequacy of research in this field; and the future possibilities of danger to the environment. The Commission was established by Royal Warrant in 1970 and comprises 12 part-time Commission members, supported by a full-time secretariat. To date, the Royal Commission has produced 24 major Reports and we will be launching our 25th Report Environmental Effects of Marine Fisheries in October. Urban Environments is our next major study and this is in progress.

Turning to our Report on Chemicals in Products – the Royal Commission first became involved with chemicals when it recommended in its 2nd report in 1972 that new chemical products should be tested, and that a database should be set up of chemicals and their characteristics. Mandatory provision of information about chemicals with biologically active ingredients – notably pesticides – had by then been established, and the Royal Commission's proposals were to extend this sort of testing regime to new chemicals. The Royal Commission's recent return to the subject after 30 years was long overdue. Our Twenty-Fourth Report on Chemicals in Products, published last June, was a comprehensive review of the science, legislation and public policy relating to the manufacture and use of chemicals.

The current European legislative system for chemicals has been largely unable to identify the risks posed by many chemicals and is slow to act where risks have been established. The legislation distinguishes between so-called "existing" and "new" chemicals using 1981 as a cut-off date; "new" chemicals are those that have been introduced since. New chemicals have to be notified and tested in production volumes from 10 Kg, whilst there is no such provision for existing chemicals. This has encouraged the continued use of "existing chemicals". It has been up to the Member States to determine whether any of the "existing chemicals" need to be examined, and if so, to do it. The procedures have been lengthy and cumbersome. For example, since 1993, 140 high-volume chemicals have been singled out for risk assessment. Only a very limited number has completed the process so far. In October last year the European Commission presented proposals for a new EU regulatory

framework for chemicals, REACH. Under these proposals manufacturers and importers who handle more than 1 tonne of a chemical substance a year would be required to register it in a central database

The problems that have to be addressed are the huge backlog of untested chemicals, and the cumbersome testing methodologies that have led to what the Commission has termed "paralysis by analysis". The Commission is very concerned about the huge numbers of animals that are required under current legislation for the testing process, and does not believe that enough has been made of the testing methods used in other areas of chemicals screening or the enormous amount of information that is available from environmental monitoring.

No matter how sophisticated the testing and assessment regime, considerable uncertainty will remain in any environmental assessment of chemicals. This arises because of:

- uncertainty in the test methods;
- the complexity of environmental processes; and
- incomplete understanding of the way in which chemicals interact with living organisms.

And it means that almost no matter how much testing or monitoring is carried out, we still will not be completely confident that any particular chemical is not causing a problem that we have not yet recognised. To address these deficiencies, the Commission has recommended a four stage process. It must be smarter and faster than existing methods, and must exploit modern technology. The four stages are listing, sorting, evaluation and approval.

The Royal Commission, whilst acknowledging that the REACH proposals were steps in the right direction, expressed a number of concerns. We thought that the procedures emerging for assessing chemicals were over complex, and would provide the more recalcitrant elements of the chemicals industry with an excuse to procrastinate, which is more or less what had happened in the case of the existing substances regulation ten years earlier.

The Royal Commission's proposals differ from those in REACH in many respects: REACH would require detailed information and data sharing for registration and further data following evaluation. Our scheme would save time and reduce costs by making more of existing data and computational techniques and genomics towards an enhanced understanding of fate and effects of chemicals in organisms and on the environment. These techniques reduce the burden of animal testing, with the RCEP calling for all practicable steps to be taken to avoid the use of higher animals as test organisms during substance evaluation.

REACH would merge the operation of the new and existing substances schemes. RCEP want the two schemes to be separate. For existing chemicals those of concern would be identified using existing data and computational techniques; others would be available for use but monitoring would be increased. New chemicals under the RCEP scheme would come into the scheme as chemicals of concern. All chemicals of concern would be rigorously tested.

The RCEP scheme does not evaluate exposure in terms of tonnage production as does REACH. A chemical that has been selected by the sorting process should be subject to further investigation regardless of the volume of the market. But the uses to which the chemical is put, and therefore its sources and pathways into the environment, must be integral to the investigation.

The REACH proposals do not allow a fast track for risk management whereas the RCEP proposals seek to remove from the market immediately synthetic chemicals found in elevated concentrations in biological fluids and tissues of humans, marine mammals or top predators. We propose that no substances are ever considered completely safe – the situation is always kept under review.

Our approach makes much greater use of environmental monitoring, notably in triggering the re-assessment of substances previously considered as being of no concern. The Commission's approach links information and assessment to instruments that drive substitution. Substitution can involve a number of approaches. For example hazardous chemicals can be replaced with less hazardous alternatives. Another approach could be to modify processes so that hazardous chemicals are no longer required. A third possibility could be to change working practices. To drive substitution the Royal Commission has recommended the introduction of a banded charge for the use of hazardous chemicals.

REACH will not start to come into effect this decade. We propose steps that will make an impact within just a few years.

What are the implications of our proposals and those of REACH for animal testing?

The UK's Institute for Environment and Health has estimated the number of animals likely to be required as a result of the REACH process. The lowest likely estimate for animal usage for completing testing under REACH for the approximately 30,000 chemicals produced at up to 100 tpa [tonnes per annum] is about 2.5 million animals. Inclusion of the testing to be undertaken at Level 1 and 2 (approximately 4.27 million animals) brings the overall total to at least 6.7 million vertebrate animals (excluding offspring from reproductive studies and any additional studies that may be warranted, eg toxicokinetics, mechanistic investigations, endocrine disruption, avian toxicity studies).

The Royal Commission's proposals would result in far fewer animals being used. Only chemicals of concern would be tested on animals, and even then, only after all other avenues had been explored, including considering the question of whether the value of the chemical to society justifies animal testing. We think that it could be less than 1% of the number estimated for REACH.

In summary I believe that the recommendations in our Report Chemicals in Products – safeguarding the environment and human health, present a far smarter and faster mechanism than the REACH proposals for dealing with the massive backlog of chemicals that are currently on the market and for which there are little or no data with which to assess their risk. And the Royal Commission's proposals would result in far fewer animals being used by avoiding unnecessary in-vivo testing.

UK Chemicals Stakeholder Forum

The Earl of Selborne KBE FRS

Manufactured chemicals play a key role in the provision of goods and services on which modern society depends and the chemical industry is Europe's third largest, employing 1.7 million people directly and with up to 3 million jobs dependent on it. However some chemicals have the potential for causing serious damage to the environment and human health.

The UK Government proclaimed in its 1999 Chemical Strategy that it was "very concerned that we do not have even a basic assessment of the possible risks of most chemicals released into the environment in large quantities". The European Commission White Paper of February 2001 stated that "the lack of knowledge about the impact of many chemicals on human health and the environment is a cause for concern".

While the UK Government recognised at the time that a new EU Chemicals Regime was the preferred option, it considered that a national initiative was needed in the interim to address these concerns about industrially produced and used chemicals harming the environment and (through environmental exposure) human health.

The United Kingdom strategy had three goals:

1) To make full information publicly available about the environmental risks of chemicals.
2) To promote the reduction of risks presented by chemicals to the environment and human health while maintaining the competitiveness of industry.
3) To phase out early those chemicals identified as representing an unacceptable risk to the environment and human health.

The Strategy document announced the establishment of a new UK Chemicals Stakeholder Forum to promote a better understanding between Stakeholders of the concerns which people have about chemicals and the environment. The Strategy envisaged that the Forum would, by providing advice to the UK Government and the devolved administrations, ensure that these concerns were fully reflected in the development of UK policy on chemicals and the environment. The Advisory Committee on Hazardous Substances (ACHS) was reconstituted as a expert body to advise the Forum on the technical and scientific data.

The UK Government's impatience in 1999 with the progress of the EU chemicals policy was justified. Since 1981 the EU regime had required the notification and evaluation of new (post 1981) chemicals. This had worked well and there was a useful body of data on approximately 3,000 chemicals marketed since 1981. However the EU Existing Substances Regulation of 1994 for the evaluation of chemicals introduced before 1981 had proved far less satisfactory. Approximately 30,000 such chemicals were marketed in quantities of more than 1 tonne, but little had been achieved in identifying those most likely to present a potential environmental risk, and even less in managing such risks.

By 2002 140 chemicals had been identified as requiring immediate attention. Only a handful of risk assessment and risk reduction strategies had been published by the Commission, and only two proposals had been made for banning the use of particular chemicals. This very slow progress suggested that there was a fundamental flaw in the regulation.

The Chemicals Stakeholder Forum was established in 2000 with its membership drawn from organisations representing chemical producers, industries that use chemicals, scientists, trade unions and those concerned about the use of animals in the testing of chemicals. All meetings are open to the public and all papers and minutes are published on the Internet.

The Forum was required by its second meeting to give the minister, Michael Meacher, an agreed criteria for drawing up a list of chemicals of concern. With the assistance of the Advisory Committee on Hazardous Substances the Forum defined criteria for identifying chemicals that have intrinsic properties which give cause for concern about their potential to damage the environment or human health through the environment. These criteria are based on persistence, bioaccumulation and toxicity, as well as persistence and bioaccumulation without known toxicity. These criteria were modelled closely on the EU guidelines of the time. Once these criteria had been agreed the Forum then looked at a number of specific chemicals which appeared to meet these criteria of concern and it engaged in a dialogue with the manufacturers

and distributors on what risk management might be appropriate. The Forum's consideration of medium chain-length chlorinated paraffins (MCCPs) is an example of this dialogue. The main use of these substances is in the manufacture of polyvinyl chloride (PVC). They also have significant uses in other plastic and rubber products as flame retardants, in sealants, paints, metal cutting and working fluids and carbonless copy paper. We were advised that MCCPs were likely to be found in human breast milk and cows' milk. Although MCCPs were being considered under the Existing Substances Regulation we took the view that there was already sufficient evidence to justify immediate action. In response to the Forum's concerns the UK manufacturer of MCCPs and a group of industrial users formed the MCCP User Forum to develop a targeted risk reduction plan in which they committed to a 25% reduction in emissions. The first report of the User Forum was presented in December 2003 to the Chemicals Stakeholder Forum and further plans for risk reduction will be expected.

Our list of chemicals of concern was published on our web site and this acted as a spur to manufacturers and distributors to look at their record of transparency and responsiveness to public concerns. I have always believed that there is much data on persistence, bioaccumulation and toxicity held by industry which is described as commercially sensitive. As this data relates to potential impacts on the environment, it should be put in the public arena. Any organisation or proposed regime which encourages the sharing of data and a pragmatic approach to risk assessment and management is greatly to be encouraged. If a chemical is not volatile, there is no need to assess for inhalation. This means one less animal test is required.

As the REACH proposals have emerged we have looked at the implications and logistics of testing an estimated 30,000 chemicals currently in use in the EU and not covered by a positive approval regime. We have concluded that we have grave concerns about the potential numbers of animal tests that would be required by REACH and we wrote to the Government to urge that a different approach be adopted. Testing should only be required where it is needed to provide essential evidence, and not to fill gaps in the data. Animals should only be used when opportunities for data sharing have been exhausted, when there is no acceptable non-animal alternative test available and when all opportunities for minimisation and refinement of testing methods have been exhausted. The House of Lords Select Committee on the European Union, in its report on the European Commission's White Paper Strategy for a future Chemicals Policy, stated:

"The White paper provides a rare opportunity to generate the political will in the EU to promote non-animal testing. The United Kingdom Government must take a lead in this and should make it clear in the Council that it cannot accept a new chemical strategy that leads to significantly increased animal testing. This would be unacceptable to the public and could well cause the strategy to fail. The EU chemicals strategy must therefore be linked to an EU strategy for minimising animal testing."

This recommendation was strongly supported by the Forum.

If REACH could embrace the concept of one substance, one registration package, then the speed of evaluation would be greatly enhanced but commercial interests mitigate against this. Where larger companies have their own testing facilities they are reluctant to share ownership of the tests with competitors. A scheme which made mandatory the sharing of core data, but excluding product information, would be highly desirable. I cannot see any justification for data on hazardous properties being withheld on grounds of commercial confidentiality.

REACH needs also to encourage countries outside the EU to share data relevant to high tonnage chemicals. Much of this required information already exists elsewhere. If this could be accessed by the new European agency it could then concentrate its activities on the specialist chemicals, which are likely to prove harder to assess. OECD has worked in the chemicals field since 1971 and much EU chemicals legislation has drawn on OECD work. The OECD has produced guidelines for mutual acceptance of data for new and existing chemicals and there is already an OECD initiative to avoid duplication of testing for High Production Volume (HPV) chemicals. There is an urgent need to agree on a common approach within OECD for non-HPV chemicals as well. Unless this is achieved REACH will prove not just impractical to implement but also a serious obstacle to Europe's competitive position in the global chemicals market.

In discussion the following points were made:

Will REACH impact more on the UK Chemicals Industry than on imports and will similar standards apply to both? These proposals risk pricing the EU Chemicals Industry out of business as US industry is in a post-REACH phase. The EU should adopt OECD standards where economic criteria form part of the evaluation. Methods require standardisation and basing on those used in drug development, rather than on REACH which requires more animal testing and ignores relative risk arising from 30,000 chemicals. The UK should put onus on manufacturers and distributors to place information in the public domain on chemicals and products containing chemicals, based on Proportionality. Since 1986 there has been a legal requirement for animal testing, which will be necessary to meet Defra reqirements for REACH, but the activities of anti-vivisection groups make it impossible to hold stakeholders' meetings in the UK. Many environmental testing standards for REACH are not fit for purpose. There is scope for development of relevant testing, involving computer-based methods, to provide rapid screening and risk assessment of 30,000 chemicals. The need for REACH has arisen due to lack of response to prior invitations to disclose risk associated with historical chemicals and products, without blame implied or attached. A new Agency will be required in Europe for chemicals in the environment.

The EU REACH Scheme for Chemicals Testing - a Challenge and an Opportunity for Alternatives to Laboratory Animals

Professor Robert D Combes (FRAME)

In February 2001, the European Commission (EC) issued a White Paper entitled *Strategy for a Future Chemicals Policy*.[1] This proposed the establishment of a new system called REACH (**R**egistration, **E**valuation and **A**uthorisation of **CH**emicals) to harmonise the safety assessment of both existing and new chemical substances. In May 2003, the EC issued a further set of proposals on REACH,[2] and officially approved the legislation on October 29 2003, while issuing the final draft of the legislation, in six volumes[3].

While a unified testing system for chemicals is sensible, the underlying policy is ill-conceived because it: a) is based on the unrealistic concept of a risk-free environment; and b) fails to define how non-animal approaches should be implemented, while generally promoting their usage. REACH is based on a top-down approach, in which the information required is dictated by production volume (tonnage). This assumes erroneously that the higher the level of production of a substance, the greater the level of human exposure.

Implications for using laboratory animals

Many laboratory animals could be required if REACH is based on check-list toxicity testing, and dictated by a tonnage-trigger system, rather than by more-pertinent measures of likely exposure, such as bioavailability. This would cause substantial ethical, scientific and logistical problems, especially for industry[4], that would be incompatible with the time-schedule envisaged for testing. The legislation includes several suggestions for minimising animal testing, but the text of the policy is ambiguous in places[5]. Moreover, the EC has included the OECD Health Effects Test Guidelines (TGs) in one of the Annexes to REACH. This merely reproduces TGs mostly for animal tests ignoring several approved alternative methods, implying that the original guidelines are intended to be used. FRAME has found much scope for improving these TGs for their application to REACH.

To speed up testing and to avoid duplication, it would be preferable for data to be shared and published as part of the new policy. This is advocated by the EC, but is not a legal obligation, and raises important confidentiality issues.

Strategies for using non-animal approaches in REACH

Of the testing schemes that have been proposed[5], some are very general, eg the European Centre for the Ecotoxicology and Toxicology of Chemicals (ECETOC) and the Royal Commission on Environmental Pollution (RCEP) schemes. Only proposals produced by the BUAV and FRAME[6] directly address how non-animal approaches could be integrated into a testing strategy. An EC scientific committee[7] has, however, indicated its lack of support for the BUAV suggestions, reaffirming its commitment to animal testing.

The FRAME tiered scheme[6] (fig 1) is intended to facilitate efficient evaluation of chemicals for human and environmental hazard, while minimising the use of laboratory animals. It starts with preliminary risk assessment (involving available information), followed by testing, based on physicochemical properties and (Q)SAR approaches. The latter are used with expert system and biokinetic modelling, and information on metabolism, to identify key metabolites and bioavailability. These data, with production levels and patterns of use, are used to assess potential exposure. Further testing should be dictated strictly by a need to fill essential information gaps, and should rely on non-animal methods, as far as possible. The scheme includes a feedback loop, so that new data are used to improve the predictivity of prediction systems.

Discussion

Our strategy is based on the principles that: a) testing should only be initiated when useful human exposure information is available; b) exposure should be determined by bioavailability, then patterns of use and production levels; and c) after preliminary risk assessment, any further testing should avoid duplication, should include any pre-existing data, should be driven by a justifiable need for data, and should be flexible. Thus, animal testing will only need to be a last resort.

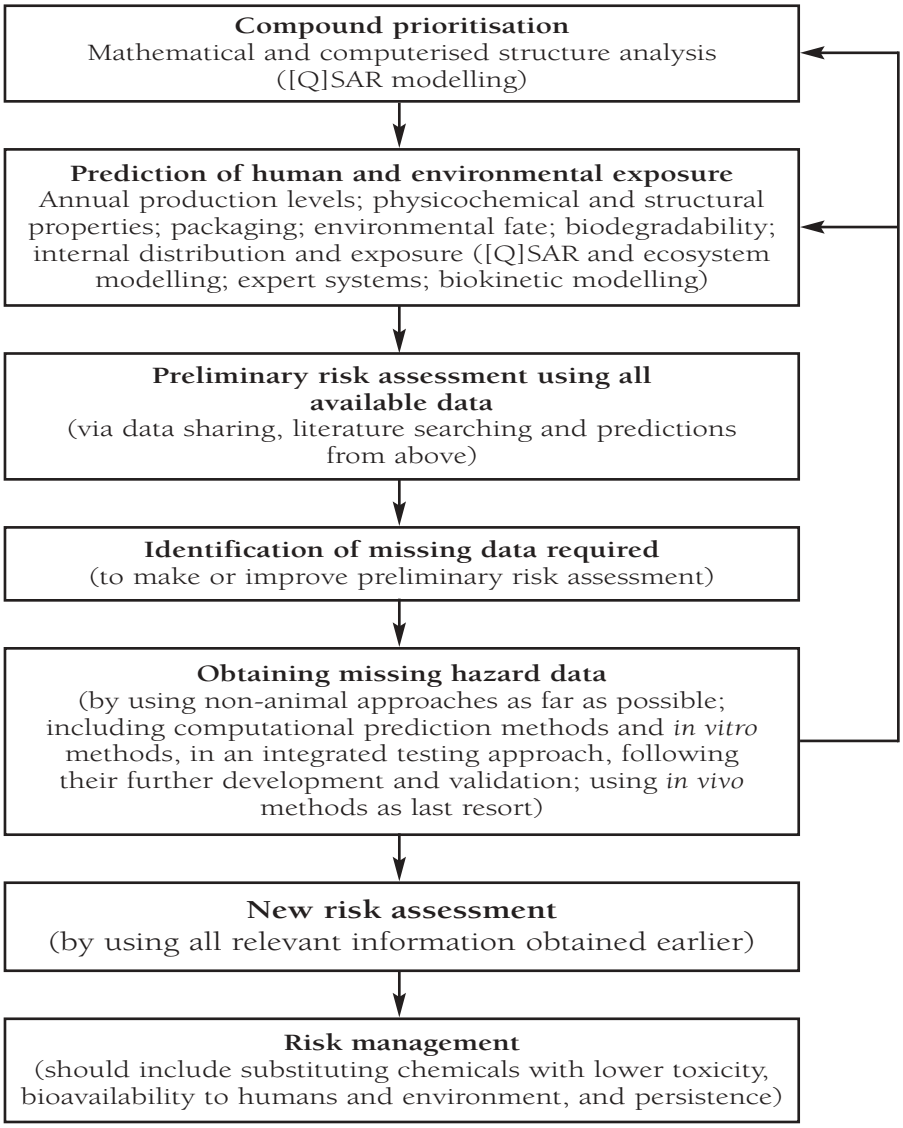
There are similarities between our proposals and those made by the RCEP,[6] especially the call for increased usage of computational prediction methods. However, FRAME recognises that it is not a simple matter of adopting practices in the

pharmaceutical industry. Thus, for (Q)SAR models to be used not only for screening but also to generate definitive hazard data for risk assessment, they need to be formally validated for reliability and relevance.

Conclusions

FRAME makes the following recommendations: a) the EU should only require testing of chemicals where there is adequate evidence of exposure to humans or wildlife; b) the EU should maximise the application of *Directive 86/609EEC* (requiring the use of alternatives whenever possible), by waiving requirements for animal tests at the registration stage, in favour of validated *in vitro* test methods, as soon as they become available; and c) new initiatives for developing and validating non-animal approaches for safety assessment should be established.

A fresh approach to assessing the risk of exposures to chemicals is desperately needed. The advent of the REACH policy, while being a huge challenge for the development of alternatives, is also an ideal opportunity to reassess our reliance on hazard data based on outdated, and often imprecise, animal testing and inadequate information on exposure. It is time to consider how best to use data from more modern non-animal methods that can permit extrapolation from effects on (human) cell cultures to whole organisms and populations. It is hoped that there is time to improve REACH by further consultation.[8]



Incorporating ideas from the Royal Commission on Environmental Pollution report and modified from (6), the scheme includes a feedback loop for hazard data to be used to improve computational prediction methods.

***(Q)SAR** = (quantitative) structure-activity relationship.*

***REACH** = Registration, Evaluation and Authorisation of Chemicals.*

Figure 1: The FRAME decision-tree testing scheme for REACH

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ADDRESS TO THE ANNUAL GENERAL MEETING OF THE PARLIAMENTARY AND SCIENTIFIC COMMITTEE HELD ON MONDAY 17TH MAY 2004

The Role of Science in a Changing World

The Lord May of Oxford OM AC PRS
President of The Royal Society

The UK must overcome enormous challenges in the next 10 years if it is to maintain its world class standing in science, engineering and technology. Despite our longstanding strength and sustained successes in science, we must continue to seek better ways of harnessing the creative potential of a nation that has produced truly groundbreaking contributions, from Isaac Newton's theory of gravitation to Tim Berners-Lee's world wide web.

In meeting these challenges, the scientific community can be reassured by the Government's plans to introduce a ten-year investment framework for science and innovation, to be published this summer alongside the results of the Spending Review. It shows that this administration recognises that the challenges that UK science faces lie beyond immediate political imperatives.

One, if not the most, important aim of such a framework must be to ensure that we continue to produce successive generations of highly skilled, innovative and creative individuals to drive forward the cutting edge of science. The UK has an enviable track record for producing world class scientists. For instance, in the past 15 years, 11 British scientists have been recognised by the award of Nobel prizes in the sciences, with many others receiving equally prestigious international awards.

Yet there are worrying signs that the supply of talented individuals may be faltering, and the declining popularity of the physical sciences, engineering and technology among school pupils and university students threatens the prosperity and quality of life of the whole nation and its progress during the twenty-first century. The huge falls in A-level entrants for physics, chemistry and mathematics are particularly alarming. Between 1991 and 2003 there were decreases in the number of A-level entries in Chemistry by 19%, in Physics by 30%, and in Mathematics by 25%.

The Government must respond to these disturbing trends by implementing the recommendations of two important reviews, one by Sir Gareth Roberts into the supply of scientists and engineers, published in April 2002, and the other by Adrian Smith into school mathematics, published in February this year. Both of these documents outline important ways of engaging more young people with science and mathematics, and to continue studying the subjects beyond the age of 16.

Both reports point out that there needs to be an improvement in the number and diversity of science graduates recruited into teaching, and who must have access and entitlement to high quality continuing professional development and well-equipped, modern laboratories. Their knowledge and enthusiasm for science, and hence that of their students, cannot flourish without opportunities to stay engaged with the ideas and excitement of genuine scientific endeavour.

The curriculum also must reflect the unique place of science and mathematics in today's society and must relate closely to the daily lives and experiences of pupils, as well as developing the creative potential of those who choose to study these subjects. I hope these imperatives will feature strongly in Mike Tomlinson's report on the future of 14-19 education when it appears later this year.

But it is not only at school level that we need to pay more attention to the development of creative talent in science. According to the most recent figures from the Higher Education Statistics Agency, between 1995-6 and 2001-2 there were falls in the number of first-year undergraduates in Engineering and Technology by 8% and in the Physical Sciences by 20%. We need to make sure that the higher relative cost of running many science and engineering undergraduate courses is not passed on through variable tuition fees, creating financial disincentives for students that would worsen present trends.

Of particular concern is how we persuade the best undergraduates of today to carry on their training to become the highly skilled research scientists of tomorrow. In the UK it is often assumed that this can only be achieved if undergraduates are directly exposed within their institutions to those who have already established research careers. However, in the United States for instance, a large number of the highest quality entrants to graduate programmes have emerged from teaching-only institutions. Whilst the model from the United States cannot be directly applied here, it is perhaps time that we considered whether our present set-up, with all departments within all universities pursuing the same mission of both

teaching students and conducting research, is the best way of developing creative undergraduate talent.

I strongly believe that the best way of managing talented individuals, once they have moved into postgraduate and postdoctoral training, is by exposing them to institutional cultures in which they are free to express their creativity and set their own agendas, not being entrained in hierarchies of deference to their seniors, no matter how distinguished they may be. This is one of the guiding principles behind the Royal Society's University Research Fellowships, initially established in the 1980s primarily in response to a perceived lack of job opportunities in the UK. But the successful formula of providing the best individuals with the funds to study what they want, where they want, for up to 10 years without the burden of huge amounts of administrative work, means that this scheme is still a flagship success in the scientific community today, providing a solid career base for 300 of our brightest post-doctoral researchers.

Creative talent can only flourish if the systems of accounting for the money invested in our universities does not introduce either perverse incentives or unduly onerous administrative burdens. Researchers should be encouraged to collaborate across both disciplines and institutions without worrying about whether they will fit into a neat box on a research assessment form. They also need to be encouraged to share their creative talents with business, to exchange ideas and pursue innovations, without the fear that this will adversely affect their research rating and therefore the prospect of securing future funding. All of these are problems with the UK's present Research Assessment Exercise. Whilst the refinements devised by Gareth Roberts will no doubt improve the next Exercise, we should be thinking in the long-term how we might best account for public investment in research without stifling creative talent.

In particular, we need to stimulate more interaction between the creative talent in our universities and businesses. A series of reviews in the past few years have identified the UK's weakness in the expenditure by business on research and development. The UK, in common with many other Member States of the European Union, is lagging far behind the United States in this respect. In response, the European Union has set a target for expenditure on research and development to reach the equivalent of 3% of Gross Domestic Product by 2010. The recommendations contained in the Lambert Review outline many ways in which businesses might be encouraged to spend more with universities. But we must be sure that in trying to address these problems we do not damage either the fundamental research carried out in the Science Base, or the many successes in innovation that the UK currently has.

Finally, whilst over the next ten years we should rightly focus on developing the talent of UK scientists, we should not ignore the importance of assisting the development of science in other countries. Much has been made of claims of a brain drain from this country, primarily to the United States. But what is often ignored is just how much brain gain we have enjoyed, with very talented individuals from other countries bringing their skills and knowledge to the UK. For example, 17% of Royal Society University Research Fellowships are held in the UK by young postdoctoral researchers from 13 other countries. Not only does the UK continue to benefit from welcoming scientists whose strengths have been developed in other countries, but our scientific community gains from the knowledge created elsewhere.

For this reason, we must recognise that the UK benefits both directly and indirectly from a strong and healthy international scientific community across the world. The more diverse the community, the more fertile is the base from which groundbreaking ideas can spring. So, in the next 10 years, the UK should invest in international science and particularly in building the scientific capacity of developing countries that look to us for leadership and inspiration. In this respect, the UK scientific community and Government should embrace the contents of the report on scientific capacity building published earlier this year by the InterAcademy Council.

The next ten years will be an exciting time for international science, and a challenging one for UK science. We must continue to invest in the education and training of future generations of scientists, both here and abroad, nurturing their creative talent and providing them with the environment, tools and incentives to make the advances that improve the prosperity and quality of our lives.

In discussion the following points were made:

The reconciliation of effective accountability with a requirement for the minimum bureaucracy varies around the world to enable funding on a long-term basis. The procedures in the USA may take up to three times as long as those based on the UK-Scandinavian model where people get together, put up a proposal for peer review and a record is made of those involved and what they want to do and decisions are made, taking into account an assessment of the intrinsic qualities of the applicants. The backward-looking Research Assessment Exercise (RAE) in the UK, on the other hand, is much more bureaucratic, resulting in a large increase in the number of civil servants now required for self-serving and self-justifying administration and does not take adequate account of the personal qualities of those under review and it is to be hoped that 2007 will be the last one of that type.

The new Treasury funding for Science and Technology is based on the classical concept of capital plus labour combining to produce growth. However, new knowledge forms an integral part of this process and this is the quintessential activity that defines us as humans. We need to find young people, develop the science base and encourage innovation using the resources of the OST, the Treasury and members of both Houses of Parliament.

Although students tend to specialise at a younger age in the UK than in the US there is no evidence that US students are better informed. A lifestyle was described based on history and english at 12 years old that was transformed at the age of fifteen to one based on physics, chemistry, maths and engineering. There were no artificial barriers to this change in direction with the result that, at the age of 20, realistic science-based projects were being tackled; the whole educational process was streamed in every

subject to ensure removal of all artificial restrictions to rapid progress. In the UK the only students who can still access such a traditional and effective system for promoting excellence and relevance to current needs for both students and society are those prepared to pay for private education. As elsewhere in the UK this infrastructure has unfortunately been dismembered.

For some people new information is never welcome, they know and like what they grew up with, but information is now more accessible than at any time hitherto and we are much more aware of problems that could arise in future. The demonisation of technology is one such case. If GM had been publicly funded and more focused on the needs of developing countries and more open to a better debate on the kinds of uses to which it could be applied, the outcomes could have been very different.

The Lord Soulsby of Swaffham Prior

New President of the Parliamentary and Scientific Committee

I feel very honoured indeed that you have elected me as your President in succession to my esteemed predecessor, the Rt Hon Lord Waldegrave of North Hill, who has served our Committee so well for four very active years when the important role and influence of scientists in Parliament has probably never been more important than it is today. In his farewell address Lord Waldegrave indicated that he hoped you would select a scientist or technologist to succeeed him as it is a number of years since the office was held by a practitioner, in the very distinguished person of Lord Flowers. I am therefore doubly honoured in following in the illustrious footsteps of one who has done so much to put science right at the centre of government in this country.

I look forward to serving the Committee as we confront a broad range of scientific and technical issues that are of vital interest to our country. We live in exciting times when the opportunities for scientific and technical achievements are powerful drivers for change that can have major and irrevocable impacts on our lifestyle and wellbeing. It often takes time for an appropriate balance to be reached between positive and negative aspects of an apparently desirable and benign development. Scientists and technologists who advise government agencies and others therefore have ever-increasing responsibilities in this respect; they need to ensure that the risks arising from irreversible changes to all aspects of our lifestyle are fully assessed before key decisions are made. Life is not risk free however and we need scientists to explain what risk is and to be more open and able to offer constructive advice to help solve or mitigate some of the genuine concerns and sometimes life-threatening problems that afflict humanity. I hope to be of help in guiding our committee towards this goal during my term in office.

Election of Office-holders
The following were elected at the AGM on 17th May:

President: The Lord Soulsby of Swaffham Prior
Vice-Presidents: Dr Richard Worswick, Ms Sandra Gidley MP, Mr Stephen Cox CVO, Mr Peter Raymond MBE
Advisory Panel: Professor Peter Saunders

New Members
We are pleased to welcome FIRSTFARADAY Partnership (Professor Christopher Knowles) and the Nuffield Council on Bioethics (Dr Sandy Thomas) as members of the Committee.

Science for Survival: "Scientific Research and Public Interest"

By Dr Peter Cotgreave
British Library Publishing Division ISBN: 0712308911 £14.95

"Science Should be on Tap, not on Top"

With these words, Michael Meacher MP, until recently a Minister in the present Government, ended a Times article headed "Public health warning: our leaders' seduction by science is dangerous". In fact (as Meacher acknowledges) the words at the top of this article were coined by none other than Winston Churchill – not a man who one would expect to be approvingly quoted by a conspicuously left-wing politician.

Yet, both Meacher and Churchill are, in their different ways, voicing a populist view of the place of scientists in our body politic: scientists are dangerous people, not to be trusted, and must be kept under control. Peter Cotgreave's book "Science for Survival: Scientific Research and the Public Interest" is not a bad starting point for anyone tempted to think like this and who wants to see the other side of the case.

His central argument is that, in today's world, any country that aspires to economic advance must nurture scientific research and technological development, for it is there that progress lies. Of course, mistakes are made (he cites BSE and a number of other recent scandals) but he argues that unless risks are taken, including the risk of failure, worthwhile advances in knowledge are unlikely. What is essential is that science must earn the trust of the public – here he firmly endorses the main thrust of the case made in "Science and Society", the influential Report of the Lords' S & T Select Committee. Concentrating on the public understanding of science is not the right way to achieve trust. What is needed is public engagement and for that to be effective there needs to be a wider public appreciation of the scientific process, greater willingness of the science community to listen, and a recognition by researchers of the justified public concerns about the ethical, environmental and social implications of their work.

It is quite wrong for politicians like Meacher to argue that because there have been mistakes, therefore science is not to be trusted. Cotgreave's book was written before the recent demarche by Greenpeace, but I am sure that he would scornfully reject the notion that the only worthwhile evidence of public engagement would be if scientific researchers abandoned work which offended certain activists.

Cotgreave has a lot of other bees in his bonnet, many of them well worth restating. He is very critical of what I may call the "Frankenstein food" style of journalism, blaming the media for stirring up scares. He doubts the ability, or even the willingness of many scientists to "open up" to the public for fear of damaging their reputation for serious research, or attracting the attention of the animal terrorists (my words!). He wants to see much more investment in research-based companies and quotes interesting figures to show that this pays off, even though it is inevitable that some of those companies will fail. He rightly argues that school curricula must both aim to train the next generation of scientists and "seek to give the majority a basic grounding in scientific ideas and processes, so that we can all take part as active citizens in a democracy". He will, I am sure, approve of the new "Science for the 21st Century" syllabus for the 13 to 16-year olds currently being piloted in a number of schools across the country, because it is aimed at doing both these vital tasks.

Peter Cotgreave, as many of those in politics will be well aware, is the tireless Director of that vigorous campaigning organisation known as "the Save British Science Society". It will therefore come as no surprise to find that "Science for Survival" is peppered with lots of familiar arguments and bêtes noirs, but it is none the worse for that. It will be apparent that this book is more of a layman's pot-pourri than a closely argued case for scientists to study. I suspect that most of the readers of "Science in Parliament" who are interested and involved in science policy are not trained scientists and it is primarily to them that this book will be of value.

Though the Government is now a "Meacher-free zone", I feel sure that Ministers, too, (and their Shadows) would gain by spending an hour or two perusing the book, and asking themselves and their advisors if there are lessons to be learned about the proper use and value of science in our country.

I enjoyed reading it!

The Rt Hon Lord Jenkin of Roding

Lord Jenkin chaired the sub-committee of the House of Lords Science and Technology Select Committee which conducted the enquiry culminating in the report "Science and Society".

REACHing for the Right Solution

Dr Simon Campbell
President of the Royal Society of Chemistry

There are strong voices on all sides of the debate which has been triggered by the European Commission's White Paper Strategy for a Future Chemicals Policy and in particular on REACH.

REACH (Registration, Evaluation, and Authorisation of Chemicals) is arguably the most significant proposed development in European legislation on controlling chemicals and it will have far-reaching implications for the science and practice of chemistry within the European Union.

As an independent professional scientific society we have a duty under our Royal Charter to serve the public interest and it is in that spirit that we examined these proposals carefully and identified some key points which we think should be taken into consideration.

In principle the Royal Society of Chemistry would welcome a single harmonised regime for assessing and controlling the possible effects of chemicals on health and the environment.

REACH has some very laudable objectives. One of its key aims is to introduce laws that will provide a faster, more efficient approach to managing chemicals of high concern. The most recent version of REACH is more balanced and more pragmatic than earlier versions.

However, in common with the UK Government and many other interested parties, including the House of Commons Science & Technology Committee whose excellent report was published in May, the Society believes that more information and guidance is required if REACH is to achieve its intended objectives. Until then we have some significant concerns about the sheer workability of aspects of the proposals. Our reservations can be summarised as follows:

REACH should be based on Risk and not Hazard

We believe that substances should generally not be classified on the basis of their intrinsic hazard alone but on the risk that the hazard will cause actual harm. Intrinsic hazard is not a good measure of the actual threat that a substance poses to humans or the environment. Risk is a better measure because it is based on the likelihood that an intrinsic hazard associated with a substance will cause actual harm. The Society suggests prioritisation (to identify and deal with substances of high concern) on the basis of risk to be built in at the Registration stage. Exposure scenarios required for registration will differ on the basis of use and this will have a key impact on the risk that a chemical (substance) poses.

Volume Alone is Not Enough

There is a danger in concentrating solely on the volume of a chemical produced or imported. For example a high volume low toxicity substance like sodium chloride (common table salt) is of less concern than a small volume high toxicity substance. Using tonnage to trigger the REACH process is not ideal although it offers a pragmatic solution for new substances.

REACH and International Compatibility

We think REACH should be compatible with existing and proposed international initiatives on the control of chemicals. For example, implementing REACH should have regard to the Intergovernmental Forum on Chemical Safety [IFCS], the UNEP strategic approach to chemicals management, the OECD co-operative programme for testing and assessing High Production Volume (HPV) chemicals, and the Rotterdam Convention on Persistent Organic Pollutants (POPs). REACH should also be compatible with the proposed

Global Harmonised System for classification and labelling of substances.

Transparency and Commercial Confidentiality

Transparency is vital to enhance public confidence in chemistry and in REACH. The challenge is to create a balance between transparency and commercial confidentiality. It's not easy to do but we're not sure the balance is right yet.

All aspects of the REACH process need to be transparent so that interested parties can see how decisions are made and we wish to promote dialogue between the chemical industry and other stakeholders on this key issue. However this transparency should not extend to providing detailed commercially sensitive information which would impact on competitiveness (eg on the intermediates used in pharmaceutical syntheses or details of formulations that would allow competitors to copy mixtures or finished products) without providing any useful benefit.

REACH and Real Data

REACH should only require data that have real and proven value. Production and importation levels of chemicals are not realistic indicators of potential harm or exposure. Testing threshholds should reflect this and take account of estimated actual exposure and potential impact. There should be greater acceptance of scientifically reliable historical data and data in dossiers produced to meet the requirements of other chemical evaluation programmes. We need European Chemicals Agency guidance on using read-across toxicity data and advice on what level of information is required at the Registration stage to avoid a "tick-box" approach.

Minimise the Testing on Animals

It would be unethical to require animal testing simply to complete a bureaucratic "box-ticking" exercise. On the other hand legislators and regulatory agencies must minimise any unnecessary delay in accepting results from alternative test methods. We have a concern that if dossiers will only be checked for completeness, prior to being placed on the database, that this will encourage registrants to generate comprehensive datasets and thus the use of experimental animals for toxicity testing is likely to increase unnecessarily. Testing on animals should be minimised.

Unnecessary Bureaucracy and Cost?

The Society is concerned about the practicality of registering 30,000 substances and over 40,000 intermediates (or whatever the figures turn out to be) within the 12 years of REACH coming to force. Ideally we can see the case for one registration per chemical compound – otherwise we face the prospect of the bureaucratic nightmare of multiple registrations, but how practical this is remains to be seen.

It is difficult to quantify the cost of compliance with REACH. Current cost estimates by the EU Commission are 2.8 billion euros – mostly on testing and registration.

The biggest costs will probably be incurred "downstream in the supply chain" due to mixture and product reformulation. This in turn will depend on the number of substances that will be taken off the market. Whatever the figures turn out to be it is already clear that implementing REACH will place significant costs on industry and we share the fears that this could be a factor that affects whether the industry remains in the EU.

What Kind of European Chemicals Agency?

The Society has serious concerns about the resources and expertise within the European Chemicals Agency [ECA] and other key bodies involved in REACH. Will the ECA have the necessary skills and experience to make sure that Registration isn't downgraded to a "box-ticking" exercise? Will the ECA check the validity of data dossiers and enforce a proper sampling regime to ensure that harmful substances classified into categories not intended for rapid evaluation do not slip through because the data is not properly scrutinised? Will the ECA provide proper guidance to ensure consistency and a level playing field between Member States?

Unintended Side Effects?

Any chemicals that are withdrawn should be those that are least desirable for health, safety or environmental reasons. But REACH could lead to useful chemicals ceasing to be available due to the high cost of testing. The "best" or "safest" substances should not be withdrawn simply because economic sense dictates that the producer/importer drop that substance rather than pay for the tests. The Commission estimates that only 1-2% of substances currently on the market will be lost. But the Society and others believe that this may be a significant underestimation.

REACH mustn't inhibit Innovation

The Society welcomes the exemptions on Registration for the purposes of research and development to facilitate the introduction of new substances aimed at promoting innovation. The Commission's approach to innovation is primarily focused on substitution. Although substitution can lead to environmental benefits it is unlikely to lead to the true innovation needed to underpin sustainable development.

The Society is aware that the process of developing the proposals into legislation has only just begun and we hope that further improvements will be made to ensure the effectiveness and workability of the eventual legislation.

The new MEPs elected in June now have the task of discussing and debating these important proposals when the European Parliament gets seriously under way in the autumn.

Our Society will be ready to offer them our advice and help.

Concrete is the Best Bet for Sustainable Development

Concrete can help more than most to achieve real sustainable development. With over 100 million tonnes of concrete being used annually in the UK, the potential contribution of cement and concrete towards sustainable development is considerable reports Anna Scothern, Head of Concrete Performance at The Concrete Centre.

Under the Kyoto Protocol, the UK is committed to reducing greenhouse gas emissions by 12.5 per cent (from 1990 to 2012). In addition to this the Government has set its own target of a 60 per cent reduction during the period 1990 to 2050. In order to achieve these reductions, Government has called on industry sectors to develop their own sustainable development strategies. The cement and concrete sector has risen to the challenge. The Concrete Centre and British Cement Association are facilitating a Sustainability Team comprising of representatives from end user practices, manufacturing companies and trade associations to develop and implement a strategy where concrete can contribute positively towards sustainable development.

The cement and concrete sector has been addressing how sustainable thinking can be applied to its manufacturing processes and to concrete construction for some time. Progress has been made in using alternatives to fossil fuels for cement manufacture. For example, some 28 million used tyres are dumped in landfill every year. These provide an ideal cement kiln fuel, burning without fumes or flames. Other waste products that can be safely and environmentally recycled for fuel in cement fuels include sewage sludge, paper and plastics and even recycled solvents. Cement also uses waste by-products from other industries as part of its constituents. For many years waste ash from power stations, pulverised-fuel ash (pfa), has been used as a component of Portland pfa cement. By altering the chemical balance cement

Crushed concrete and segregated steel is recycled for new steel reinforcement and concrete construction.

kilns can also reuse their own main solid waste, cement kiln dust which was formerly land filled. As a result, in the UK over 100,000 tonnes less virgin material is quarried each year and some 120,000 tonnes of material is recycled instead of being sent to landfill.

Similarly, the by-product from blast furnaces is ground to produce a cement replacement called "ggbs". Furthermore, the gypsum that is a by-product of the de-sulphurisation processes installed at coal-fired power stations as part of the acid-rain reduction programme can be substituted for mined virgin gypsum used in cement making.

Concrete structures are durable with low maintenance requirements. But when a structure is at the end of its life concrete can be crushed and re-used as aggregate. The use of recycled and secondary aggregates for construction has increased by over 50 per cent from 1989 to 2002. Increasingly, buildings that are being demolished are crushed for re-use as aggregate. For some concrete buildings up to 95 per cent of the structure is recycled. This means less use of natural aggregate resources and reduced waste going to landfill.

The other main area where concrete contributes to sustainable development is by helping to reduce the energy used by buildings. Around 90 per cent of the total energy used in buildings is used for heating, cooling and lighting. Utilising the inherent thermal mass of concrete offers the opportunity to reduce the energy requirements of buildings.

The thermal mass of exposed concrete enables it to absorb, store and later radiate heat. In offices where heat is generated by people, computers, lighting and solar gain, the daytime temperatures can be reduced by as much as 5^0C. Night time natural ventilation cools the concrete ready for the next day. The use of exposed concrete and natural ventilation reduces the dependence on air conditioning and can reduce the level of CO_2 emissions by up to 50 per cent. Exposure of the concrete ceiling also means that suspended ceilings systems are not required. Plus concrete's inherent fire resistance means that, unlike other structural materials, it does not require additional expenditure on expensive protective coatings or preservatives.

The fact that materials used for cement and concrete are sourced within the UK provides further environmental credentials. Other construction products raw materials are often shipped in from abroad, as in the case of iron ore for structural steel manufacture. Iron ore is quarried from as far afield as Brazil and then shipped across to the UK. This raises significant questions about the environmental impact of such global transportation. Concrete manufacture uses locally sourced raw material, provides local communities with employment and provides significant benefits to the UK.

The Concrete Centre is working with the British Cement Association, The Concrete Society, British Precast, Quarry Products Association and British Ready Mixed Concrete Association as well as major industry stakeholders to develop and implement medium-to-long-term strategies to increase and realise the sustainability potential of concrete. A programme of seminars will explain the role that concrete can play in creating a more sustainable built environment. In addition, further research is being carried out into the best environmental options for the recycling of waste and concrete aggregates and into the use of concrete for a sustainable built environment.

Exposed concrete significantly increases a builing's thermal efficiency.

The Concrete Centre is the new central market development organisation for the £5 billion UK concrete sector. The Centre works in the interests of all those involved in concrete design and construction. It focuses on design and construction methods, education and training, research, new product and process development and the performance of concrete in practice. It works closely with other well-established cement and concrete bodies in the UK. For more information see: www.concretecentre.com

Britain's best-kept IT secret wins the MacRobert Award

British engineers at global IT giant IBM have won the 2004 Royal Academy of Engineering MacRobert Award for an innovation that most people have never come across. WebSphere MQ software has helped businesses save billions of dollars by providing a failsafe means of exchanging business-critical information between computer systems, irrespective of their location and regardless of which hardware, programming language, operating system or communication protocol they use.

WebSphere's development team, from IBM's Hursley Laboratory near Winchester, received the MacRobert Gold Medal and £50,000 prize in London last month from HRH Prince Philip, Duke of Edinburgh, at the Academy's Awards Dinner, beating off stiff competition from Pilkington's self-cleaning windows, Sharp's 3D displays and Delphi Diesel's emission-busting injection systems.

"Without WebSphere MQ we might never have enjoyed the full benefits of the e-commerce revolution," says Dr Robin Paul FREng, Chairman of the MacRobert Award Judging Panel. "When you realise how many IT systems have to talk to each other when, for example, you check your balance and transfer funds online you really start to appreciate the value of this innovation. By enabling seamless communications between computers, the engineers at Hursley have effectively created the oil that now keeps the world's e-commerce machine running."

WebSphere MQ was conceived at a time when organisations realised they were becoming totally dependent on a proliferation of incompatible, non-communicating information systems. Whilst the IT suppliers promoted replacement, upgrade or integration, Dr Tony Storey FREng and Tim Holloway came up with the simple – but heretical – idea that the right solution was to connect existing systems.

Launched in 1994, WebSphere MQ integrates servers, back office systems and databases, reliably handling hundreds of millions of messages every day. But like all simple ideas, WebSphere MQ was not easy to implement and the development team faced huge challenges along the way. These included having to support 40 different computing platforms, filing over 120 patents as well as having to transfer the original system to the Internet. But they did this successfully – and continue to improve it – such that WebSphere MQ is now an essential part of the mainstream infrastructure for over 10,000 customers, including more than 80 per cent of companies in the Fortune 100.

"We are delighted that the IBM WebSphere software family has been honoured with this prestigious award by the Royal Academy of Engineering," says Graham Spittle, Hursley Laboratory Director and IBM's Vice President, Business Integration Development. "WebSphere MQ is one of the most important and successful distributed system technologies in the industry today, and we are proud that this achievement was initiated by a UK team. This award recognises the importance of software as an engineering discipline in its own right, as much as it recognises the success of IBM WebSphere MQ. The MacRobert Award is an indication of the maturity of the industry and recognition of the significance of the role IT plays in the modern world."

The IBM team who have won the 2004 MacRobert Award are (left to right):
Peter Lambros, Senior Technical Staff Member, Graham Spittle, IBM Vice President and Director of the Hursley Laboratory, Dr Tony Storey FREng, IBM Fellow, Peter Niblett, Senior Technical Staff Member and (not pictured) Tim Holloway, IBM Distinguished Engineer.

Three fine finalists

In another year, according to the judges, any of the four finalists could have won. Coming a very close second were:

Delphi Diesel Systems for the E3 electronic unit injector advanced fuel system. The E3 will enable diesel engines to meet not only the next European and American emissions standards but also the stringent future emission controls Euro V and US07. Precise control of fuel injection means reductions in harmful exhaust gases, nitrous oxides and soot plus lower fuel consumption. Delphi's advances have been made using a two-valve injection system instead of the conventional single valve and it is half the weight of competing products. They sold 50,000 units in 2003, mostly to Volvo, and are planning to produce 100,000 systems this year as new customers come on board in the US, Europe and Asia.

Team members: Barrie Barker, Robert Cross, Andrew Male, David Jewell and Simon Backhouse, all based at Delphi Diesel in Stonehouse.

Pilkington plc for Pilkington Activ™, the world's first self-cleaning glass. Window-cleaners worldwide will lament the development of this low-maintenance glass but it has the huge environmental benefit of slashing detergent use. A special coating of microcrystalline titanium dioxide catalyses the breakdown of organic material in sunlight. The same coating also makes water sheet out all over the surface, so rainwater can just wash away the dirt. Pilkington has developed a reliable process to apply the coating very precisely when the glass is still at over 650°C. The coating must be only 15nm thick and accurate to within 1nm to avoid distortions in the glass.

Team members: Dr Kevin Sanderson, Simon Hurst, Tim McKittrick, David Rimmer and Dr Liang Ye, all based at the Pilkington European Technical Centre in Lathom, Ormskirk.

Sharp Laboratories of Europe for Look no glasses!, their electrically switchable 2D-3D displays, can be used in the front line of the 'War on Terror'. Airport security staff can now see the realistic 3D images from their X-ray equipment without wearing uncomfortable glasses. Sharp's technology gave us affordable 3D for the first time last year in the NTT DoCoMo mobile phone – it sold more units in a week than all previous 3D displays combined. To date, more than 3 million 2D-3D phones have been sold. The display achieves 3D using the Parallax Barrier effect to direct discrete images on an LCD screen towards each eye. The user's brain recombines these images as a 3D picture. Uniquely, the Parallax Barrier can be switched off leaving a conventional 2D display.

Team members: Dr Grant Bourhill, Adrian Jacobs, Dr Graham Jones, Jonathan Mather and Robert Winlow, all based at Sharp Laboratories on the Oxford Science Park.

Down to Earth - Spin off from the Beagle 2 Project

Tony McWalter MP
Member, Science and Technology Select Committee

A question frequently asked of space scientists is: "Wouldn't the money spent on satellites be better employed on medical care, social problems, education, the environment, crime prevention, and so on?"

The most famous UK involvement in space in recent times was the Beagle 2 Mars lander. A unique feature of that project was its mass spectrometer designed to look for life. This tiny instrument was built with the help of funding by the Wellcome Trust in the expectation that, after the Mars programme, the technology could be transferred into clinical/medical fields of more general interest to the Trust. It was also recognised that in other areas on planet Earth miniature instruments which are operated remotely, and which have the capacity to survive the hazards and rigours of space travel, might be of great use.

The project team have recognised quite a number of possible activities including measurement of stable isotopes and combined gas chromatography-mass spectrometry. They wish to broaden their perspective and welcome contact with anyone whose science could benefit from the availability of small mass spectrometer systems.

On 27th May I was very pleased to be able to extend a welcome to a room full of scientists and engineers supported by my fellow members of the Science and Technology Select Committee, Dr Ian Gibson MP, Dr Brian Iddon MP and Sandra Gidley MP.

In complete contrast with the fiasco surrounding the secret report prepared at the behest of the UK Government and the European Space Agency on the failure of Europe's Mars rover, Beagle 2, this meeting had all the smell of success as project after project involving the onboard science package was rolled out before us for our critical inspection.

Professor Colin Pillinger had brought along a mass spectrometer, built and paid for by PPARC, and supported by Wellcome Trust funding to help keep the Open University team together during the period of down stream spin-off development. He explained that the miniature machine on the table right in front of us, the sibling of the machine on board Beagle 2, was itself a spin-off development from Ptolemy, an evolved gas analyser (GCMS) on board Philae, a cometary lander attached to Rosetta, Europe's comet chaser.

Colin emphasised that the technology on show would be internationally competitive until 2007 when he hopes, Aurora permitting, Beagle will fly again, hopefully in tandem. His science team comprising Dr Ian Wright and Dr Geraint 'Taff' Morgan, then brought on a select group of invited speakers to demonstrate the actual and potential applications for the miniature mass spectrometer.

Mr Jason Hall of Roke Manor Research described the role of mass-spectrometry in border security, especially detection of human trafficking by roadside scanning of soft-sided vehicles and onboard cargo characterisation. Currently testing, whether for drugs, explosives or people, requires transmission of samples to a laboratory. What he envisaged was gas analysis with a hand-held instrument. This view was supported strongly by Professor Dick Lacey of the Police Scientific Development Branch, who emphasised the utility of such an instrument for dealing with terrorism. Mr John Wicks of Tricho-Tech Ltd foresaw the opportunity provided by a portable machine to improve the onsite analysis of hair samples for drugs. The current procedure for analysis of hair is laborious, lengthy, expensive and time-consuming.

Dr Ben Fairman of LGC Limited, the recently privatised Laboratory of the Government Chemist, also retains the responsibility of the National Measurement Institute (NMI) for high accuracy chemical analysis. Ben described the full range of mass spectrometer (MS) based techniques used in the laboratory. It became clear there would be multitudinous new analytical opportunities afforded by robust portability, including field applications such as scrapie genotyping on sheep, and police applications such as the use of urine analysis for drugs.

On the medical front, Dr Sergei Kharitonov of the National Heart and Lung Institute is interested in the prospects for a home-based machine for monitoring diabetes patients, with a small MS linked to a mobile phone technology connecting remotely to a hospital supervisor.

It was left to the last two presenters to catch the mood of the meeting with fanciful insights into the future. Dr Ed Houghton of HFL Newmarket, the first laboratory in the world to bring the full resources of the modern chemical laboratory to the racetrack, saw opportunities for extending the current chip technology by putting a lab on a chip especially for drug detection and for continuous health checks.
Dr Cathy Wise from Glasgow University Veterinary School also welcomed the opportunity provided

for non-invasive breath analysis of animals and detection of chronic disease in racehorses. Perhaps ultimately there will be a tiny spectrometer on the nose of every racehorse!

How can we stem the defection of our young people from science and engineering? The Open University has a vision that every school science classroom will have a mini-portable MS to allow its students a powerful insight into the natural world. Human breath has, we are told, two hundred components, and sometimes an analysis can identify sickness without the need for invasive investigation. I cannot but think that students would enjoy using such a powerful instrument. Thanks to Beagle and the Open University team, we are currently world leaders in this technology. We must ensure that for once we do not lose the benefits of discovery; and that needs the OU team to get the funding needed to stay together. Wellcome has done a terrific job, but one suspects that other funding agencies are needed if a team of this calibre is to be allowed to develop its full potential.

In conclusion, I should note that our meeting lasted two and a half hours, that it brought together in a common purpose a host of innovative scientists and considerable number of stars of industry. I feel that this sort of in-depth seminar is the very best way to handle science in a Parliament which is too often disinclined to see things from a scientific or a technological point of view.

LETTER TO THE EDITOR

Sir,

The response by the authors[1] of *Understanding, Preventing and Overcoming Osteoporosis* to our evaluation of their book[2] questions the integrity of all scientists who undertake industry-funded research and that of Learned Societies who pursue disease pathogenesis through dependable, scientifically-researched, knowledge, albeit sponsored by industry on occasion. We entirely refute Plant and Tidey's inference that our views have been influenced by any potential conflicts of interest, which we have always disclosed, consistent with good scientific practice.

Plant and Tidey present a highly selective argument in their dismissal of any beneficial role for milk or calcium in relation to osteoporosis, not mentioning any of the key randomised controlled trials (RCT) which show a positive benefit of supplementation with Ca/milk/dairy products on indices of bone health in a variety of population groups. They also fail to acknowledge that not one RCT study has shown an adverse effect of Ca/milk/dairy products on the skeleton[3].

Whilst the association between dietary acid and hip fracture risk is of obvious interest[4], evidence supporting a causal link requires RCTs, too few of which have been published to allow complete confidence in their assertion that a high alkaline intake can prevent osteoporosis. Our caution is repeated: *fruit and vegetables cannot be claimed to be proven therapies for osteoporosis prevention.*

The use of cod liver oil as a source of vitamin D has not been "conveniently ignored" but considered in the light of judgements made from available literature. A recent RCT trial using cod liver oil for the prevention of hip fracture in an ageing population showed no effect[5]. The statement that John Lee's book concerning natural progesterone is based on "peer-reviewed JAMA papers" is strongly disputed. The only RCT of natural progesterone showed no effect on bone density[6]. The advice in their "ten golden guidelines" concerning consumption of wholesome nutritional ingredients, alcohol intake, exercise strategies is consistent with current recommendations.

In their response, the authors maintain their aim *"to empower people by translating mainstream scientific literature to make it accessible and to do so with a healthy scepticism of science funded by any vested interest groups"*. We accept that providing proven research results is clearly differentiated from well-meaning supposition and industry-funded exploration are not immediately deemed suspect, the statement is satisfactory. If, however, positive results are assumed invalid just because funds which enabled them to be obtained came from industry then there is a risk of ignoring the scientific truth. We remain resolute in our review conclusions that claims of *"proven" dietary therapies made by Plant and Tidey for osteoporosis prevention should be treated with extreme caution.*

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"Why Is Animal Research Still Necessary?"

Dr Ian Gibson MP

On the 18th May, Andrew Lansley MP, Patsy Calton MP and I hosted a Parliamentary reception in the Strangers Dining Room of the House of Commons for the recently established Coalition for Medical Progress (CMP). The Coalition is an alliance of organisations that share a common aim to ensure the UK continues to lead advances in human and animal medicine. The role of the CMP is to explain the case for medical progress and the benefits due to animal research. The reception included charitable, academic and commercial research organisations concerned with research on how the body works and how disorders can be overcome. These studies range from basic research on DNA at the cellular level up to large scale clinical trials in people.

Research on animals takes place in Britain when there is no alternative and after the Home Office has assessed costs and benefits. Laboratories, scientists and research programmes are all licensed before animal work is undertaken. Hence there are incentives to minimise suffering, for ethical, legal and scientific reasons and to use the minimum number of animals consistent with obtaining statistically significant results as they are far more expensive than methods that do not use animals.

Nevertheless, in spite of all these precautions, there are few issues that generate as much correspondence for MPs and Peers as animal welfare. Indeed, the British people have an almost unique aversion for animal suffering and this is probably why our country has such stringent controls on the use of animals in biomedical research. There is a good case for suggesting that if research on animals is here to stay, as an essential but hopefully an ultimately reducible component of international research on living organisms, is it not better for the animals involved that the work be carried out in Britain where this is best managed? By displaying negative and emotive reactions which could drive the work offshore, where we may have far less influence and control, the outcome could lead to overall increases rather than reductions in animal suffering.

Partners in the Coalition present on the day were represented by stands clearly displaying the names of their host organisation and presenting keynote research with which they are associated. They were staffed by well qualified representatives who were able to debate and discuss openly and frankly the important role that research on animals has for the work they undertake to improve the health and welfare of both people and animals themselves. The list of organisations involved has a familiar ring, as we naturally associate some of their names with downstream benefits that research brings to society through the doctor's surgery and the drug dispensary, rather than the upstream research on which this is based.

To give a few concise examples and illustrate the broad scope of the work involved, we should emphasise the benefits to animals worldwide from the work of the Animal Health Trust on vaccines against highly infectious Horse Flu, a global problem that causes immense disruption to British Racing.

AstraZeneca, one of the top five pharmaceutical companies in the world, is offering a new treatment for advanced lung cancer for patients with otherwise limited options.

The Biotechnology and Biological Sciences Research Council is working on Stem cell research for Parkinson's and Alzheimer's diseases, diabetes and cancer, and development of anti-inflammatory drugs for arthritis.

The British Heart Foundation is investigating recurrent narrowing of arteries following angioplasty and the use of snake venom in treating cardiovascular disease.

Cancer Research UK, sponsored almost entirely by public donations, is concerned with chemotherapy for childhood leukaemia and experimenting with drugs that stop the blood supply to tumours without which they cannot grow. They conduct research on the human p53 gene that monitors cell damage and if this is detected, issues "don't grow or die" instructions when functioning normally. Defective or missing p53 genes can result in damaged cells becoming cancerous.

GlaxoSmithKline invested over £2.8bn in research and development in 2003 with £1bn spent in the UK. They conduct research on respiratory diseases, especially Asthma, and have developed, with the help of human volunteers, an electronic lung for testing novel drugs through an inhaler.

Other British based world class organisations in this show included Huntingdon Life Sciences, Lilly, the Medical Research Council, the National Institute for Biological Standards and Control (NIBSC), Pfizer, and The Wellcome Trust Sanger Institute. Further information of the work of other members not represented on the day are readily available on the website www.medicalprogress.org . This provides a unique and valuable resource to help you to make up your own mind about the need for and benefits of animal research.

A Fisherman's Tale

Michael Park, Chairman,
The Scottish White Fish Producers Association Ltd

I first entered into the fray of fisheries politics as a youthful, cynic-free soul of thirty-four, some ten years ago now, and although it doesn't exactly feel like a decade has passed since my starry-eyed inception into the murky world of politics I'm afraid the well worn battle scars which are usually synonymous with defeat would none the less belay the reality. It would be fair to say that the law of averages would promote a belief that through that decade I should have witnessed some good, fairly good and of course some downright awful times. However, in reality I've witnessed some bad, worse and extremely grim times but at no time have I ever witnessed a Council of Ministers settlement or indeed any other settlement which has been heralded by the Scottish Fleet as a success.

For the last twenty years the system and the players in the system have engaged in a world of make-believe, conspiring together to camouflage the shortfalls in the science by constructing a plan of creative inertia. It beggars belief, although not surprisingly to the industry, that throughout these turbulent years we haven't even succeeded in creating a time series of actual stock abundance calculations, a series which would actually give some hope to the industry. Creating such a series and moving away from calculating trends onto actual abundances would allow the industry to believe that, just like any other form of science, fisheries science is evolving.

The area IV Anglerfish stock on the west coast of Scotland is a prime example to show the reasons behind the loss of credibility of the fisheries scientific community. For the last four years the Total Allowable Catch (TAC) has been reduced by 60% from 8,000 tons to a figure agreed in December of 2003 for this year of 3,180 tons. The demographics of this stock clearly makes it a by-catch fishery for most if not all of the fleet at some time, and the physical characteristics of the fish clearly dictate that facilitating its escape while fishing is almost impossible, they have a large head and small tail which leaves technical adjustments to gear futile.

The quota management system, which is run by the producers' organisations, sets monthly catch figures for individual vessels and while some vessels do hold private entitlement to quota which they can utilise at will, the majority of the fleet lives to a pre-defined catch level each month. As a result of the stock abundance, coupled with the restrictive quotas, our fleets have been forced to discard substantial amounts of Anglerfish back to the sea, a practice that makes a mockery of the quota system but also makes a mockery of the scientific community. Here we are, catching a species, which can't be avoided, and which on the admission of the scientists is in relative abundance, yet the system is incapable of delivering a remedy. Having said that, the Minister, Ben Bradshaw, did manage to deliver an in-year increase in the same stock for the fishermen in the south west last year, However, that would imply that politics can achieve solutions which the scientists as yet have been unable to, and I'm not entirely convinced that the assumption would be fair.

In the Faeroe Islands and other successful world fisheries, partnerships have been created between fishermen and the scientists in the pursuit of credible fisheries data. Trawl surveys using research vessels and commercial vessels working in tandem help not only to build trust but also allow for a degree of day-to-day self-audit. We must move away from this insane preoccupation that the models and systems that were created by our scientific forefathers hold some form of iconic status and deserve to be in place for perpetuity as a testimony to their greatness.

Fishermen are more responsible now; we realise that we are dealing with a fragile resource, a resource that if treated with respect will nourish our communities for generations. As responsible adults we deserve to be dealt in on the hand with regards to fisheries science and the correlation of data, but until that time arises the preoccupation by fishermen that the scientists remain firmly in the pocket of those that pay their wages will remain.

I'm convinced that some of the main players in the Fisheries Research Services both north and south of the border accept that the structures and systems in place are outdated and require change. If change does happen then the ability of the scientific community to involve fishermen in its renewed construction, but more importantly to allow for the provision of peer review by the worldly and wise, would be the real indicator of change.

Science and Fisheries

Professor J R Beddington CMG FRS
Professor of Applied Population Biology and Head of Department of Environmental Science and Technology, Imperial College

It is well recognised that fisheries are in a bad state, the FAO and others have documented on a global scale the high and increasing proportion of stocks that are overfished. Locally, the white fish stocks around the UK are in some cases at the lowest levels ever observed. The fishing industry in parallel is in a poor state with large operating losses and a level of overcapacity that at a global level is breathtaking (some $50 billion of subsidies are believed to be operating). This is mirrored locally, a recent Cabinet Office Strategy Unit Study estimated that some £40-50 million of decommissioning would be required to reduce the white fish fleet to levels appropriate to the productivity of the stocks.

Is this a failure of fisheries science, governance or political will? In this article I will briefly look at some of the issues that can go towards answering this question.

From a scientific perspective, fisheries science is a subset of population biology, scientists aim at understanding the population dynamics of harvested species and how they respond to exploitation.

Traditionally, fisheries science has posed questions about what levels of catch are sustainable, or have investigated by manipulating the size at which fish can first be caught and the level of fishing, how yields can be maximised.

The dynamics of fish stocks are driven by the same demographic processes of birth, growth and death that govern all populations, but in most fish species the key to their dynamics is the recruitment of young fish spawned by the adult stock. This recruitment is variable, often highly variable and largely unpredictable as it is driven by a plethora of environmental factors as well as the size of the adult stock. This natural variability has implications for the industry as the higher the level of exploitation the more the fishery is dependent on the recruitment of young fish. In a relatively lightly exploited population the cohorts of older fish are available for exploitation, in a heavily fished population they are not. This means that the variability of the stock size and catches increase with the level of exploitation. Hence, over-exploitation leads not just to lower catch levels, but to highly variable ones as well.

Central to the practical application of such theories, is the estimation of the abundance of targeted fish stocks, either by direct methods such as research surveys and tagging experiments, or statistical procedures which use the catch information from commercial vessels.

It is in this last practical application of the science that some of the major problems for fish stock assessment arise. The methods are dependant on good and reliable data and when this is not available, then major problems occur. This is not just another example of the garbage in garbage out criticism of modelling procedures, but is more subtle and involves a key problem of fisheries management, that of compliance. Many fisheries, including the most important around the UK, are regulated by catch quotas (ie vessels are limited to a fixed level of catch), but the absence of effective control means there is an incentive to catch more than is reported.

The problem is that some of the key methods of estimating fish stock abundance depend on observing how the stock responds to the catch. If the stock appears to be significantly affected by a moderate catch, then the methods infer that the stock abundance is low. If reported catch levels are lower than the true ones, then the methods will predict the stock is lower than its true size. The fishing industry will thus view the scientific assessment as overly pessimistic and mistrust of the science prevails.

These and other more complicated problems of fisheries management have been the subject of study in more recent years. Pioneered ironically by the International Whaling Commission (not an example of historic sustainable management) techniques have been developed which model the whole process of fishery management. They include methods of data collection, the estimation of population models and parameters, the level of exploitation and methods of regulation including the level of compliance. All these procedures are explored by computer simulation to investigate how different management procedures perform in achieving the goals of sustainable stock levels and sustainable fisheries.

A variety of lessons can be learnt from such analysis, some obvious, others less so. For example, it is obvious that effort control (regulating the number of vessels or the time at sea) is more efficient than regulating by catch quantities where monitoring is inefficient and expensive. However, more subtly, effort control has a natural feedback in the face of stock variation: if stock levels are lower than expected, catch levels under effort

control will also be lower (catch rates vary with stock size) and sustainability is enhanced.

These methods have the potential to significantly improve fisheries management, but only in situations where the capacity of the fleet is broadly in line with the potential of the stocks to sustain catches. Where excess capacity is present, the industry will operate for sound economic reasons in unpredictable ways which can influence the fisheries management process. The capacity problem is one of governance, not one amenable to scientific study except that science can clearly demonstrate the degree of overcapacity.

If the problems of compliance and capacity could be successfully addressed there would be a major improvement in fisheries management, but some scientific issues would still remain.

The population dynamics of individual stocks are determined by the ecosystem in which they operate, which itself is driven by environmental factors. Hence it is important to know how exploitation will affect not only the target species, but other species in the ecosystem. Similarly, the implications of changing environmental conditions on the components of the ecosystem need to be explored. Such results will not come quickly as even simple analysis will depend on extensive spatial and time series data.

In the face of such uncertainties, other management measures of a precautionary nature have been explored. One that has much support is the closure of areas to all fishing, the creation of reserves. Such methods face formidable problems of compliance and cannot be universally applied, but the exploration of similar ideas clearly has merit.

Perhaps the most important need for the future is the development of a community of interest between the industry and the scientific and management communities. That this is recognised, and attempts are being made to develop this in various parts of the world, give some limited optimism that the future of fisheries may be better than its past.

Science in the South East

Ed Metcalfe
Science Lead for the South East England Development Agency

With the decline in traditional manufacturing and the advent of a knowledge economy based on continuous technological change, a premium has been placed on achieving a strong Science, Engineering and Technology (SET) base.

In the South East of England the South East England Development Agency (SEEDA), with the lead role amongst the other eight Regional Development Agencies (RDAs) for science and innovation, has a key role to play in developing and maintaining a healthy, dynamic and sustainable economy.

By any conventional economic measure, the South East is one of the UK's most successful regions, with a GDP of £145bn contributing over 45 per cent of net revenue to the Treasury.

There are about 50,000 high technology companies based in the South East which currently spend some £4 billion per annum on Research & Development (R&D) and employ over 35 per cent of all UK employees in R&D based activities. Latest forecasts suggest a continued growth in SET-related industries with an expected increase of 28 per cent by 2012. Expenditure on R&D is also expected to increase by a further 17 per cent over the same period.

Fundamental research is at the heart of the competitiveness of the UK economy. For example, the Diamond Synchrotron light source near Oxford is the largest scientific facility to be built in the UK for nearly 30 years. The Synchrotron will produce highly focused light beams that will enable scientists and engineers to probe deep into the basic structure of matter and materials, answering fundamental questions about everything from the building blocks of life to the origin of our planet. Researchers from the UK and abroad will have access to these cutting-edge analytical techniques and services for the next 20 years or more.

The region excels in government-funded animal health research, with several world reference laboratories in viral and bacterial infectious diseases. Further laboratories are planned for development over the next few years. Another area of particular strength is the region's defence sector, which has seen its R&D transformed by the reorganisation of the former Defence Evaluation and Research Agency into QinetiQ plc and the Ministry of Defence-owned Defence Science and Technology Laboratory.

The performance of the South East regional economy bears comparison with the world's best. Benchmarking* against other knowledge-based economies puts the region in the top 10 regions internationally for information technology and computer manufacturing and for biotechnology. The challenge for the region is to convert this tremendous intellectual capital into greater productivity, where the region only currently ranks 34th internationally. To further improve the region's productivity and competitiveness, SEEDA is working with the advice of its Science and Industry Council to enable a step increase in the level of collaboration between industry/private sector and the science base in the region. The recently published Lambert Review recognised this challenge and identified the need for greater incentives for the business sector to work more closely with the science base in UK universities. RDAs such as SEEDA have a vital brokering role to play in articulating the needs of business demand for R&D and increasing the coherence of the provision from the universities.

Our approach has three strands. Firstly responsive knowledge transfer driven by the needs of the economy. We need to nurture the potential giants of the future. 3M started in 1902 making sandpaper, Pfizer started its UK operation in Sandwich 50 years ago this year and Vodafone was only formed as recently as 1984. The one thing we cannot predict is which companies will become the next giants but we can increase their chances of success through the support and nurturing for which RDAs such as SEEDA have a growing reputation.

In its five years since inception, SEEDA has now completed the development of 20 Enterprise Hubs. These are business incubation establishments in key locations around the region providing hatcheries, workspace and support for start-up high technology companies. In just two years (2002-04) SEEDA's Hubs created 573 jobs and 288 businesses, with 824 businesses located in or using the facilities of incubators. 106 businesses have already graduated from these incubators.

SEEDA is also funding a pilot scheme with three universities (Brighton, Kent and Surrey) called Great Ideas in Science and Technology (GRIST). GRIST will allow would-be graduate

entrepreneurs to transform innovative ideas into successful businesses.

Our second objective is closer engagement of business with the SET base and better commercialisation of leading edge technologies. SEEDA and the London Development Agency have co-funded the business planning of West Focus, a consortium of six Higher Education Institutes to the west of London, to provide a more coherent interface to meet business needs.

The House of Lords Inquiry into Science and the Regions recommended greater coherence in SET exploitation. SEEDA is coordinating, through its lead role, national-regional and inter-regional partnership working, particularly to ensure that business demand is clearly articulated and met in support of the UK economy. Key partners include the RDAs and Devolved Administrations, the Research Councils, DTI, the Office of Science and Technology (OST) and the Higher Education Funding Council for England (HEFCE).

Finally we need to ensure a supply of the right skills. Through partnership working in the Regional Skills Alliances we are developing mechanisms to identify and address imbalances in the supply of and demand for skills. For example we are developing, with employers, through the sector skills agency e-Skills UK and universities in several regions, a new type of business-led degree to meet the employers' needs for management in information technologies. We need to support the universities' response to employer demand, through targeted student growth on such employer-led degree courses.

We have also begun to tackle, with e-Skills UK, a significant market failure in that only 20 per cent of the IT workforce is female. This is an issue that SEEDA is addressing by working at an early stage with schools on a unique pilot initiative, Computer Clubs for Girls (CC4G), designed to encourage the participation of girls aged 10-13 in learning about computers. These voluntary school-run clubs have enabled girls to discover the fun side of IT, helping to change their perceptions of the value and capabilities of computers. Last year more than 3,600 girls benefited from the programme in 109 schools, and it is intended to extend the scheme nationally, with encouragement from Secretary of State for Education and Skills, Charles Clarke.

Other priorities for SEEDA are to encourage the supply of people with SET skills, upgrade technical skills in the workplace and promote management and leadership skills, especially where these are needed to nurture innovation.

Our aim in SEEDA is to build on the region's great SET strengths to increase the international competitiveness of the South East economy and to benefit wealth creation across the whole of the UK.

*Global Index of Knowledge Economies: Benchmarking South East England – Robert Huggins Associates, November 2001

House of Commons Library Science and Environment Section
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The Nuclear Decommissioning Authority

Research Paper 04/37

Part 2 of the *Energy Bill* [HL], Bill 93 2003-04, seeks to establish the Nuclear Decommission Authority charged with managing public sector civil nuclear waste; and would also create a new Civil Nuclear Police Authority to oversee a reconstituted nuclear constabulary.

Most of Part 2 extends to the whole of the UK.

The Patents Bill

Research Paper 04/41

The Patents Bill was introduced to the House of Lords on 15 January 2004. It would amend the *Patents Act 1977* and implement, in UK law, changes to the 1973 European Patent Convention agreed in 2000.

The Bill would also make other changes to the *Patents Act 1977* that have been indicated as necessary or recommended through consultation by the Patent Office. The Bill has been considered in the House of Lords. It was passed to the House of Commons on 6 April 2004 and received its Second Reading on 7 June 2004.

The provisions of the Bill would have the same extent as the *Patents Act 1977*, that is, the United Kingdom (including the Isle of Man). It would apply to acts done in an area designated by order under section 1(7)of the *Continental Shelf Act 1964* or specified by order under section 10(8) of the Petroleum Act 1998.

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 is Dr Ian Gibson (Lab, Norwich North). Other members of the Committee are 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 (Con, 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 12 May. The Committee will continue to host such sessions at regular intervals.

Director General of the Research Councils: Introductory Hearing

The Committee took evidence from Professor Sir Keith O'Nions, Director General of the Research Councils, on Wednesday 12 May.

Current Inquiries

Human Reproductive Technologies and the Law

The Committee announced its terms of reference 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 is looking into how human reproductive technologies are regulated in the UK. Terms of reference include 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 Committee started taking evidence on 14 June. A Report is expected in the Winter.

The Use of Science in UK International Development Policy

The Committee announced its inquiry in July 2003. It is examining the extent to which research, technology and innovation is informing Government international development policy and practice and what the impact of Government policy has been in building a relevant science base in developing countries. It is also looking at whether expertise in the UK science base is being utilised effectively in the implementation of this policy. The Committee finished taking oral evidence in July 2004. A Report is expected in the early Autumn.

Scientific Publications

The Committee announced its inquiry in December 2003. It is examining access to journals within the scientific community, with particular reference to price and availability. The inquiry is also looking at the impact that the current trend towards epublishing may have on the integrity of journals and the scientific process. The Committee finished taking evidence in May 2004. A Report is expected in the Summer.

Research Assessment Exercise

The Committee announced its inquiry in February 2004 in response to the unveiling of proposals from the Higher Education Funding Councils. The inquiry follows up the Committee's Report on the Research Assessment Exercise (RAE) published in April 2002. The Committee concluded in this Report that the RAE needed to be reformed to make it fairer, avoid perverse incentives and impose fewer costs on institutions. It felt the RAE should continue, but only as a part of a broader higher education research funding strategy in which its side effects and disadvantages were offset by other mechanisms. The inquiry is looking at whether the new scheme will provide a robust and reliable system of research assessment, the burden and cost it places on higher education institutions and the implications for higher education more generally. The Committee finished taking evidence in May 2004.

Beagle 2

The Committee announced its inquiry in May 2004. It will follow up the recommendations from the Commission of Inquiry on Beagle 2 relating to the funding and management of the mission. In particular, the Committee will look at the role of the Department of Trade and Industry, the Office of Science and Technology, the European Space Agency, the British National Space Centre, the Particle Physics and Astronomy Research Council and others in providing support to the project. It will not focus upon the technical reasons for the lander's failure. Oral evidence will be taken in July.

Reports

EU Chemicals Legislation

The Committee published its Sixth Report of Session 2003-04, Within REACH: the EU's new chemical strategy (HC 172-I) on 12 May 2004.

The Report concluded that Government has played an important part in the development of the new EU chemicals legislation. It concluded that its stance is, for the most part, sensible and that it has made a welcome attempt to make the debate in the UK an inclusive and constructive one.

Director General for Higher Education: Introductory Hearing

The Committee published its Seventh Report of Session 2003-04, Director General for Higher Education: Introductory Hearing (HC 461), on 21 June 2004.

The Work of the Council for the Central Laboratory of the Research Councils

The Committee published its Eighth Report of Session 2003-04, The Work of the Council for the Central Laboratory of the Research Councils (HC 462) on 22 June 2004.

The Report examined the work, strategy and expenditure plans of CCLRC, as part of the Committee's ongoing programme of scrutiny of the Reseach Councils. The Report called for the strategic advisory role of CCLRC to be taken over by RCUK.

Further Information

Further information about the work of the Committee or its current inquires can be obtained from the Clerk of the Committee, Mr Chris Shaw, the Second Clerk, Mrs Emily Commander, or from the Committee Assistant, Ms Ana Ferreira on 020 7219 2792/2794; 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.

Anyone wishing to submit evidence to the Committee is strongly recommended to obtain a copy of the guidance note first. Guidance on the submission of evidence can be found at *http://www.parliament.uk/commons/selcom/witguide.htm.*

All recent publications (from May 1997 onwards), terms of reference for all inquiries and press notices are available on the internet at *http://www.parliament.uk/parliamentary_committees/science_and_technology_com.cfm*

House of Lords Science and Technology Select Committee

The members of the Committee (appointed 3 December 2003) are Baroness Finlay of Llandaff, Lord Lewis of Newnham, Lord Mitchell, Lord Oxburgh (Chairman), Lord Paul, Baroness Perry of Southwark, Baroness Platt of Writtle, Baroness Sharp of Guildford, Lord Soulsby of Swaffham Prior, Lord Sutherland of Houndwood, Lord Turnberg, Baroness Walmsley, 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.

Science and International Agreements

The recently published report 'Science and Treaties' examines the processes by which scientific advice and other scientific input are incorporated into international agreements. The inquiry, chaired by Lord Mitchell, took evidence from the Government, the European Commission, United Nations agencies, industry, NGOs and several bodies involved in international agreements which draw on scientific advice.

The report emphasises how important it is that Government departments have sufficient in-house scientific expertise, and that departments co-ordinate effectively, so that negotiations are based on the best available scientific evidence. The inquiry found some areas where the provision was inadequate, although the Sub-Committee heard much testimony praising the role the UK plays in this context.

The proper application of the precautionary principle – where there is uncertainty in the scientific evidence, and a risk of irreversible damage to the environment – is encouraged. The guidelines laid down by the Interdepartmental Liaison Group on Risk Assessment in 2002 are commended.

The report calls on the Government to take further steps to persuade those governments which have not yet done so, and in particular the United States and Russia, to ratify the Kyoto Protocol so that it can come into force, and to reduce emissions of greenhouse gases.

The value of the work done by British scientists in Antarctica, which underpins a number of treaties, is also recognised.

The Practicalities of Developing Renewable Energy

The inquiry investigating the practical issues arising if renewable energy sources are to be introduced at the rate proposed in the Government's recent Energy White Paper has also recently reported. In the course of the inquiry, the Sub-Committee heard from the renewables industry, leading academics, financiers, NGOs and the Government;

Members also saw at first hand how renewables contribute to Danish energy requirements, and how Woking Borough Council is promoting a sustainable energy policy at a local level.

The report concludes that the Government's target of 10% of the UK's electricity being supplied from renewable sources by 2010 is unlikely to be met. From the evidence taken, the Sub-Committee, chaired by Lord Oxburgh, identifies policy areas which are preventing the uptake of renewables.

The report calls for

- a more stable and predictable system of subsidies for renewables to encourage investment;
- urgent attention to be given to electricity transmission and distribution systems to take account of distributed and intermittent generation;
- the development of a more strategic approach to planning, including processes to achieve local acceptance of renewables projects;
- greater Government commitment to energy research and development.

New inquiry – The science of ageing

Sub-Committee I, chaired by Lord Sutherland of Houndwood, will investigate the ageing process and how science and technology can help mitigate 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 focus will be on how healthy life expectancy can be increased, and independence for the elderly retained for longer.

The Call for Evidence is expected to be published in July. Michael Collon (collonm@parliament.uk) will be the Clerk of the Sub-Committee.

New inquiry – Energy efficiency

Baroness Perry of Southwark will chair Sub-Committee II investigating the Government's targets for increased energy efficiency, following on from the renewable energy inquiry. The Government has recently published an energy efficiency "Plan for Action" which details ambitious reductions in energy use.

The Government aims to reduce carbon emissions per unit of GDP ("carbon intensity") by 4% a year until 2050. Half of the additional carbon savings required to meet this target are to come from energy savings. The inquiry will look at how science and technology can be used to meet these goals, and if policies are likely to be effective. The domestic sector accounts for one-third of projected savings, by improving insulation, and the efficiency of boilers, lighting and appliances. Business and industry are expected to deliver two-thirds of savings. A further important aspect to be studied will be the reaction of the public to energy saving measures.

The Call for Evidence is expected to be published in July. Christopher Johnson (johnsonc@parliament.uk) will be the Clerk of the Sub-Committee.

Radioactive waste

The Select Committee is following-up previous investigations on the handling of radioactive waste. This short inquiry will concentrate on the Government's new body, the Committee on Radioactive Waste Management (CoRWM) set up in 2003, which has been tasked with finding a long-term solution for managing high and intermediate level waste.

The Select Committee will visit an open meeting of CoRWM in September, and take evidence later in the Autumn. Contact the Committee's Specialist Assistant, Jonathan Radcliffe (radcliffej@parliament.uk), for information regarding this inquiry.

Select Committee visits

In April the Select Committee visited the UK Atomic Energy Authority site at Culham in Oxfordshire, where Europe's nuclear fusion research is carried out. The Committee was impressed by presentations from staff, including the Director of Culham, Chris Llewellyn Smith, and enjoyed a fascinating tour, coming away with a stronger belief that large scale energy generation from fusion might be a reality in 20–30 years. The next stage in the development of fusion is the building of a prototype reactor called Iter – the International Thermonuclear Experimental Reactor. However, talks are currently in deadlock over the siting of Iter, with France and Japan both competing to host the $5 billion project.

Further Information

Further information about the work of the Select Committee can be obtained from 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

Teenage Sexual Health

April 2004 ***POSTnote 217***

Recent reports have drawn attention to the increasing prevalence of sexually transmitted infections (STIs) in the UK. This has been most apparent in young people aged 16-19. STIs are associated with several potentially serious health outcomes, including infertility and cervical cancer. This briefing describes trends in the sexual health of 16-19 year olds, discusses potential contributing factors and analyses two major Government initiatives in this area.

Speed Cameras

May 2004 ***POSTnote 218***

Speed cameras are a key part of the government's strategy for reducing road casualties. There are over 6,000 speed camera sites in the UK. Their use generates widespread debate, with 55 questions posed in Parliament in 2004 alone. This briefing provides an overview of UK speed enforcement policy, focusing on speed cameras. It discusses evidence of their effectiveness and related factors such as causes of road crashes, problems in identifying offenders, and public attitudes to camera use.

Current studies

Areas in which POST is currently working include: climate change and public health in the UK, Strategic Environmental Assessment, classification of radioactive wastes, UK gas reserves, biomass energy, energy efficiency, sustainable home-building, the EU chemicals directive, organ transplants, neglected diseases, drug tests, dyslexia and dyscalculia, the genetics white paper, converging digital communications, mobile phones, RFID tagging, the European Research Area and undergraduate science education.

Work with Committees

Dr Theresa-Jane Squire has been working with the House of Commons Culture Media and Sport Committee on Digital convergence and the BBC Charter.

Staff, Fellows and Interns at POST

POST is pleased to announce that it has appointed Dr Kate Trumper, currently Environment Specialist with the Environment, Food and Rural Affairs Committee of the House of Commons, to the position of Energy and Environment Adviser. Kate will join POST in mid-September.

The following fellows and interns have been working at POST during the period since the last issue:

Katherine Byrne (European Research Area), Bimal Chaudhari (Regulating Stem Cell Therapies), Stefan Heimann (Energy efficiency), Franziska Matthies (Climate change and public health in the UK), Dr Angharad Thomas (RFID tags), Helen Wells (Speed cameras), Masahiro Uemura (Biomass energy); Rob Frost (Genetics White Paper); Kristelle Haslam (Radioactive waste classification); Ivan Scrase (Strategic environmental assessment), Sarah Bunn (Drug Tests); Jenny Steere (EU Chemicals directive); Polly Dalton (Dyslexia and Dyscalculia); Will Marshall (Undergraduate science education).

International Activities

POST hosted a fact-finding visit from Tore Tennøe, Director of Norsk Teknologirådet (the Norwegian Board of Technology) POST's sister organisation in Norway.

Drs Theresa Jane Squire and Jofey Craig represented POST at the biennial workshop series for non-directorial staff members of EPTA – the European Parliamentary Technology Assessment network. This was hosted by viWTA – the Vlaams Instituut voor Wetenschappelijk en Technologisch Aspectenonderzoek (the Flemish Institute for Science and Technology Assessment) POST's sister organisation in Flanders. POST has been invited to host the 2006 workshop.

POST, as a member of a consortium of four other members of EPTA, headed by TAB, the Büro für Technikfolgen-Abschätzung beim Deutschen Bundestag, (the Office of Technology Assessment at the German Parliament) has been invited to assist in providing a technology assessment service to STOA, the Science and Technology Options Assessment service at the European Parliament. This will begin to operate in January 2005.

Additional information can be obtained from POST, House of Commons, 7 Millbank, London SW1P 3JA (020 7219 2840).

Also available on the internet at http://www.parliament.uk/post/home/htm

Members of either House can obtain free copies of all published material. Others may purchase copies from the Parliamentary Bookshop (020 7219 3890). There is also a subscription service: details from POST.

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 19th April to 27th May 2004 from both Houses of Parliament appears on pages 37 to 43.

Genetically Modified Crops

Debate in the House of Commons on Wednesday 5 May

The Minister for the Environment (Mr Elliott Morley) pointed out that the GM foods issue is contentious, complicated and difficult. The "GM Nation?" debate was not a referendum on GM foods. Food safety and environmental impacts are paramount in the Government's approach. The extreme positions are that those involved in the development and marketing of GM foods see no need for traceability and labelling, believe the EU is acting illegally and believe GM foods should have open and unfettered access to our markets. At the other extreme there are those who will never accept the principle of GM foods whatever the evidence. And the Government has to find a way through those conflicting positions.

Joan Ruddock, (Lewisham, Deptford) who had been comprehensively briefed by Friends of the Earth, Five Year Freeze, the Soil Association, GeneWatch UK and the Consumers Association, raised several important scientific and technical issues. Commercialisation of GM crops is a reckless experiment with our natural environment and human health. It is conducted by a handful of companies that have consistently made false claims for their products, evaded public scrutiny and resisted every attempt to regulate their behaviour. GM technology was not introduced to deal with problems in this country or the developing world. It was developed by companies seeking to control agricultural practices that would boost their profits.

The constructs that create genetically modified organisms are designed to cross species barriers. They introduce foreign DNA, parts of bacteria and viruses, and often carry antibiotic resistance markers. They are inherently unstable, and are expressed in every part of the plant without the control mechanisms that affect the plant's natural genome.

She also wanted to know what the Food Standards Agency is up to because she was not convinced that it has carried out its public duty to protect public health after the single study at Newcastle University – in which human volunteers ate GM – showed that GM material entered the gut bacteria of at least three people after only one meal.

Lessons for the UK from experience of GM use in North America and Argentina are clear. GM crops do not fulfil the promise of less chemical use or of consistently higher yields, and contamination of non-GM and organic crops and seeds is the norm. For example, with GM cotton there was an initial reduction in chemicals used then year-on-year increases.

The challenge for the Government is to guarantee that the seed stocks for organic farming will be protected and the industry expanded. Who will be liable when non-GM or organic products are contaminated with GM? The biotech companies have said they will not pay, and the insurance companies have said they will not insure. GM can be detected at the 0.1 per cent level, however the EU has proposed 0.3-0.5 per cent for seed purity which would put in jeopardy all future attempts to adopt the 0.1 per cent level as a standard.

Mr Michael Meacher (Oldham, West and Royton) declared an interest in an organic retail firm. 85% of people do not want GM crops, the supermarkets don't want it as there is no market in it, and even the biotech companies are pulling out even from trials which have slumped from 140 two years ago to just one this year. Farmers' initial enthusiasm has begun to wane in the light of a need for increased pesticide use, super-weeds and increasing resistance from new strains of weeds. GM conflicts with Government's wider policies including sustainable agriculture and a major extension of organic crops. Evidence for impacts on human health are accumulating. GM food should not be allowed into the human food chain on the precautionary principle, which is written into EU food law. DNA recombination technology is inherently unstable. The doctrine of substantial equivalence, used as a device to circumvent direct trials of the effects of GM foods on human health, is a scam. In the few cases involving human or animal tests in which the results were disturbing, the research was closed down and no further action taken.

Alan Simpson (Nottingham, South) had recently chaired a seminar in Westminster Hall that sought to address the question of whether GM crops are safe for the environment or for animal or human consumption. The reality is that the GM issue has never been about feeding the world, but about who owns the food chain. The companies that are pushing GM through are down to their last card: contaminate or bust – and we will see unscrupulous efforts to contaminate the food chain. We can still say no and the Government can give a lead in defining a new base for establishing the science of good scrutiny.

The Minister for Rural Affairs and Local Environmental Quality (Alun Michael): The approach of the Government on GM crops is precautionary, evidence-based and sensitive to public concerns. Safety is a priority and commercial cultivation of a GM crop will be permitted only if we are

satisfied it is safe. Labelling rules will ensure that consumers can choose between GM and non-GM products.

GM Crop Trials

Question and Written Answer on Wednesday 19 May

Andrew George (St Ives): To ask the Secretary of State for Environment, Food and Rural Affairs how many (a)acres and (b)hectares of land have been used for GM crop trials in each of the last five years for which records are available (i) as part of the Government's farm scale evaluation, (ii) for other experimental purposes and (iii) for other purposes.

Mr Morley: The available information is as follows.

(a) Farm-scale evaluations—approximate areas

	Area (acres)	Area (hectares)
2000 and 2001	2,433	985
2002	1,171	474
2003	249	101
Total	3,853	1,560

(b) Research and development trials

Accurate information is not available on the areas of research and development trials. Under the legislation the notifier is only required to give the size of the release site which is usually larger than the area used for growing GM crops. However, most of these releases are very small, in the region of 0.1–0.2 ha.

(c) National List trials—each site on average less than 0.1 ha

	Area (acres)	Area (hectares)
1999	3.7	1.5
2000	4.0	1.6
2001	1.2	0.5
2002	1.5	0.6
2003	<0.1	<0.1
Total	10.4	4.2

Sustainable Development

Question and Written Answer on Friday 21 May

Norman Baker (Lewes): To ask the Secretary of State for Environment, Food and Rural Affairs what definition of sustainable development has been agreed for application across Government; and what mechanism is in place to ensure that the term is applied and claimed appropriately.

Mr Morley: The UK Government's current sustainable development strategy "A better quality of life", launched May 1999, describes sustainable development as "ensuring a better quality of life for everyone, now and for generations to come". It also refers to a widely used international definition, from the Brundtland Report of the 1987 World Commission on Environment and Development, of "development which meets the need of the present without compromising the ability of future generations to meet their own needs".

Government publications usually refer to the "better quality of life" description as given in our 1999 Strategy. Examples would include the departmental sustainable development strategies for the Department of Health, the Department for Trade and Industry and the Department for Culture, Media and Sport, and HM Treasury's 2002 Spending Review Report.

We are currently consulting, in partnership with the Scottish Executive, the Welsh Assembly Government and Northern Ireland, to develop new sustainable strategy for the UK. As part of this we are reviewing our explanation of what sustainable development means.

Badger TB

Question and Written Answer on Wednesday 26 May

Mr Cameron (Witney): To ask the Secretary of State for Environment, Food and Rural Affairs when the Government will set a timetable for coming to a conclusion about the issue of TB in badgers; and if she will make a statement.

Mr Bradshaw: The question of what to do about a wildlife reservoir of bovine tuberculosis is a complex one. The Government are determined to base its future TB policy on sound scientific evidence. The Randomised Badger Culling Trial (RBCT), due to be completed in 2006, should help decide whether culling badgers can form part of a cost-effective, sustainable and practical TB control policy. On 9 February, Defra launched a consultation on the key principles on which a new long-term strategy for tackling bovine TB will be developed. This consultation asks questions on a wide-range of issues, including how the Government can establish targets, balance costs, benefits and risks, work in partnership with all the key interest groups and how policy can be developed in the light of emerging scientific evidence. That will include evidence from the ongoing RBCT and elsewhere (including the Four Areas badger culling trial in the Republic of Ireland, when published).

On 6 April, Defra announced the publication of a report from an independent scientific panel chaired by Professor Charles Godfray FRS. The report reviewed the progress of the RBCT and associated Defra research, as part of a wider review of Defra's science. The Government are giving careful consideration to the complex recommendations of the report, and the review's conclusions will inform Defra's wider review of TB strategy. Defra has extended the deadline for the public consultation on the TB Strategy review until 4 June, to allow sufficient time for this report to be assimilated and commented on.

Nuclear Power

Debate in the House of Lords on Thursday 6 May

Lord Tombs rose to ask what practical measures are required to keep the nuclear option open, in accordance with declared Government policy to help us to meet our commitments on climate change. The imprudent reliance on imported gas may have the effect of closing this option. The country has benefited for almost 50 years from civil nuclear power, with an impeccable safety record, that has generated almost 2,000 terrawatt hours of electricity, thus avoiding emission of about 2 billion tons of CO_2 that would have been generated by coal burning and that is about four times our annual emissions of CO_2. British Energy is saddled with local rates higher than any other

form of electric power generation, high reprocessing costs, the climate change levy designed to tax the CO_2 it does not emit and a 40% reduction in wholesale electricity prices due to NETA as introduced by the DTI and Ofgem. This resulted in the industry being declared uneconomic, although no other form of power generation could operate profitably under these conditions imposed by Government.

Fragmentation of the industry following privatisation of electricity supply resulted in a dysfunctional strategy split five ways between advisory committees in Ofgem with its devotion to short-term pricing, DTI, Defra, ODPM and the Treasury. Secure energy supply, particularly electricity, lies at the heart of the country's economic life and requires a better informed and more purposeful approach.

The first need is for investment in generating plant to be market driven. Wind power is currently the only beneficiary where complex subsidies enable investment which would not occur otherwise, resulting in estimated increased electricity costs of £30 billion by 2020. This is twice the construction costs of 10 gigawatts of modern nuclear power stations to replace the ageing stock of existing stations and provide secure uninterrupted electricity supply. The short-term tariff structure should be based on a strategy designed to encourage investment. However, the reality is the opposite as the industry is managed discontinuously through inter-departmental committees lacking technical knowledge staffed by transient Ministers and civil servants leading to a decision vacuum. Perhaps the Government could revert with advantage to an energy department, restoring a strategy with accountability.

Nuclear waste disposal has suffered from procrastination by the Government for more than five years since a Select Committee inquiry that he chaired had reported. The problems are well understood and soluble, the only thing lacking is government action. As new build would only add marginally to the waste volume requiring disposal, this provides no grounds for inactivity on decision making about new nuclear capacity.

The Nuclear Installations Inspectorate is now suffering from shortages of skilled and experienced manpower which must be rectified as this deficiency would delay implementation of a new build programme.

The United States Department of Energy has enabled development of consortia responsible for design and safety of presently competing modern reactors, such as the Westinghouse APR 1000, the General Electric simplified boiling water reactor and the Canadian Advanced CANDU, which resembles the UK's SGHWR reactor from the 1970s. The UK through BNFL and its acquisition of Westinghouse plays a vital role in this activity.

The Government must establish competence and show leadership in energy matters if a steadily weakening nuclear option is to be maintained. If this is not forthcoming the outcome would be disastrous to which the Government seem indifferent and which the nation cannot afford.

Lord Oxburgh had no conflicts of interest to report, but saw no chance of the nuclear option staying open or of the UK even remaining an intelligent customer of technology developed by others, since nuclear engineering as an academic discipline in this country is virtually dead. The only reason it is not totally dead is due to support given by BNFL to particular university departments. Expenditure on research relevant to the nuclear industry in this country is a minute fraction of one per cent of that spent in other countries that run nuclear reactors. A minimum contribution of £10 million from public funds added to similar existing expenditure could help keep the nuclear option open.

Lord Sainsbury of Turville responded by attributing the lack of plans for new build to the generators' inability to provide cheap nuclear energy. The necessary pool of skills and expertise would be generated by measures to secure nuclear skills for the future. This pool would ensure new build and make the commissioning process easier. The Cogent Sector Skills Council, licensed on 2 March 2004, will take a strategic view of the nuclear sector to ensure that the education and training base can meet the nuclear employers' current and future needs. Cogent will operate through a mix of the Sector Skills Development Agency and industry funding.

The Nuclear Skills Group report and prospect of the Nuclear Decommissioning Authority, for example, have already prompted the North West Development Agency to fund a project designed to attract the NDA to the north-west. Several other marginal activities were also described in some detail. £5 million spent over four years is to be invested in Research Council work on the "Towards a Sustainable Energy Economy" initiative. He admitted the miniscule nature of this commitment but indicated that it is just a starting point. The work undertaken by the Research Councils on this initiative involved negotiations with a group of nine Government departments, agencies and private companies and considers three themes: maintenance of current generation capacity; fission as part of a sustainable energy economy; and future fission power. This must be seen in the context of the new UK Energy Research Centre currently being established.

The UK also keeps in touch with developments such as the Pebble Bed Modular Reactor as well as EURATOM, IAEA, and the Generation IV International Forum to develop a framework for collaborative R&D on reactor systems that could be deployed from 2030. The UK, although uncommitted to new build, has nevertheless played an active role in these developments.

Lord Sainsbury saw no problem with the organisation of Government, placing clear responsibility on the DTI. He reiterated Government confidence in the ambitious plans for renewables and energy efficiency but admitted inability to predict the future, especially for security of supply, cost and the environment and reaffirmed a commitment to consider new build as one of the options for the future.

Science Funding

Question and Written Answer on Tuesday 18 May

Mr Stephen O'Brien (Eddisbury): To ask the Secretary of State for Trade and Industry if she will break down by budget heading the expenditure of the departmental science programmes in (a) 2002–03 and (b) 2003–04.

Ms Hewitt: The information is as follows.

(a) Actual expenditure for 2002–03 from the Science Budget was as follows:

£000

	2002–03 Resource	Capital	Total
MRC[1]	340,867	19,589	360,456
BBSRC[2]	249,953	2,676	252,629
NERC[3]	224,006	17,907	241,913
EPSRC[4]	507,019	3,407	510,426
PPARC[5]	246,231	2,755	248,986
ESRC[6]	77,736	182	77,918
CCLRC[7]	23,168	19,414	42,582
Research Councils Pension Scheme	28,450	—	28,450
Royal Society	28,783	—	28,783
Royal Academy of Engineering	4,770	—	4,770
SRIF[8]	190,402	—	190,402
Diamond Synchrotron	489	14,366	14,855
Higher Education Innovation Fund	22,791	—	22,791
PSRE Fund[9]	4,977	—	4,977
CMI	10,705	—	10,705
Other[10]	34,455	—	34,455
Total	1,994,802	80,296	2,075,098

Notes:

1. Expenditure includes funding brought forward from previous years, under "End-year Flexibility" arrangements. In addition, some Research Councils were given transfers from central budgets.

2. Abbreviations used are as follows.

(1) Medical Research Council

(2) Biotechnology and Biological Sciences Research Council

(3) Natural Environmental Research Council

(4) Engineering and Physical Sciences Research Council

(5) Particle Physics and Astronomy Research Council

(6) Economic and Social Science Research Council

(7) Council for the Central Laboratory of the Research Councils

(8) Science Research Investment Fund

(9) Public Sector Research Establishment

(10) Includes expenditure on nuclear fusion and residual expenditure on closed schemes.

(b) The actual expenditure figures for 2003–04 are yet to be finalised and audited.

Chemicals Industry

Question and Written Answer on Wednesday 28 April

Mr Bellingham (NW Norfolk): To ask the Secretary of State for Trade and Industry what discussions she has had with her US counterparts concerning European regulations on the chemicals industry; and if she will make a statement.

Jacqui Smith: My officials have participated in discussions with US counterparts about EU regulations on the chemicals industry. This has included proposals for new regulations controlling the manufacture, use or import of chemicals into the EU, known as the REACH system (Registration, Evaluation and Authorisation of Chemicals). The Government consider it essential that the new system be compatible with member state and EU commitments under the World Trade Organisation (WTO), relevant multilateral environment agreements such as the Stockholm and Rotterdam Conventions, the Globally Harmonised System of classification and labelling and with other existing complementary legislation. The Government are committed to continuing dialogue with our trade partners on this issue.

Mathematics and Science Teachers

Debate in Westminster Hall on Tuesday 20 April

Dr Vincent Cable (Twickenham) reminded Members that this is the first opportunity they have had to comment upon Professor Adrian Smith's report, "Making Mathematics Count". The report is of major importance for educationalists, schools and the wider economy.

Professor Smith's comments on specialist maths teaching, "Everyone I have spoken to says the position… is a disaster… There is a dire, catastrophic crisis level shortage of specialists," are hard hitting. Analysis reveals a vicious circle in which a succession of problems feed on each other and are brought to a head at GCSE level, from which too few students emerge with mathematical skills suitable for modern apprenticeships.

Too few study the top tier of mathematics that enables them to go on to AS-level. Too many students fail AS-levels and too many do A-levels. Far too few study further maths, which is increasingly the preserve of the private sector, and far too few study maths, physics and chemistry at university. The number of physics and chemistry students is declining steadily, with far too few graduates as a consequence. Far too few of these go into teaching or teaching teachers, with one inadequacy feeding off another.

Professor Smith indicates there is a shortage of 3,400 maths teachers and serious shortages of science and IT teachers. In order to fill the shortage it would be necessary to recruit 40 per cent of all maths graduates into teaching, which is unachievable. Thirty per cent of maths teachers are over 50 – a higher percentage than any other subject – and only 15 per cent are under 30 which is one of the smallest percentages. There are similar patterns in science and even worse in teacher training.

There are also qualitative problems: 26 per cent of all school maths teachers are not qualified beyond A-level. The Ofsted analysis of key stage 3 teaching found that a third of all classes were seriously deficient; a third of entrants into science teaching have a third-class honours degree or lower; and many physics and chemistry teachers have not done maths beyond GCSE level, so the problem spreads to other subjects.

Comparison with other OECD countries shows that 23 per

cent of British schools suffer from a deficiency in the quantity or quality of maths teachers compared with 12 per cent in the rest of the OECD, and 29 per cent of British schools are affected by shortages of maths teachers compared with 12 per cent in the rest of the OECD.

Smith said that the three-tier GCSE is "disastrous", and that we had completely lost the plot on GCSE. The curriculum 2000 is described as a disaster because of its effects on maths, since in the first year there were large numbers of failures which meant that in the following two years much smaller numbers took the course which will feed through to universities and teacher recruitment for years to come.

The number of students taking maths and science at A-level shows that since 1997-98 there have been drops in A-level students of 20 per cent in maths, 17 per cent in chemistry and 11 per cent in physics. Maths was the only subject to show any recovery last year. Mathematics and science teaching require much greater use of market forces than the golden hellos and teaching bursaries which only apply to new entrants. Professor Smith pointed out that if market forces operated in this area maths teachers could be paid £10,000 more than their colleagues.

Mr Robert Key (Salisbury) responded to the last point that having spent 16 years at the chalkface he knew that differential pay rates gave rise to all sorts of petty jealousy in the staff room.

Mrs Annette L Brooke (Mid-Dorset and North Poole) also responded to the same point by suggesting that if higher salaries are to be paid they should be for all teachers. She knew from experience that having different salaries for the same job in a school leads to a lot of unhappiness.

The Parliamentary Under-Secretary of State for Education and Skills (Mr Stephen Twigg) responded by pointing out that he was the only non-mathematician, non-economist and non-accountant in the debate and confessed to giving up his maths A-level after one year when he was persuaded to apply for entry to Oxford to read philosophy, politics and economics rather than doing his fourth A-level in mathematics.

He agreed with everything that had been said about the scale of the challenge that we face with science and mathematics in our schools. He noted the discussion about Professor Smith's recommendation that market forces should be applied to recruitment and retention of maths teachers. But his only comment was that we live in interesting times.

He went on to give the good news in contrast to all the foregoing comments in the debate, that there had been a small improvement at key stage 3 last year with 71 per cent of pupils achieving level 5 or better and 48 per cent of pupils achieved grades A* to C. Although these figures are not good enough they represent progress in the number of 15 and 16-year olds achieving the level that we would all expect them to reach in mathematics. The position in teacher vacancies in science and mathematics is improving. There has been a large increase in those going into initial teacher training and specialising in maths with a more modest improvement in science places.

Financial incentives in addition to those mentioned in the debate also include looking at ways to assist student debt for graduates who go into teacher shortage subjects such as maths and science. The undergraduate ambassador scheme which enables students to get degree credit for their classroom activities aims to recruit about 1,000 maths and physics students by 2005-06. There has been progress although there is some way to go to get it completely right.

Thimerosal

Question and Written Answer on Wednesday 5 May

Dr Tonge (Richmond Park): To ask the Secretary of State for Health (1) what vaccines used in the UK contain Thimerosal; (2) when the use of Thimerosal as a preservative in vaccines was discontinued in the UK.

Miss Melanie Johnson: Thiomersal (also known as thimerosal) is present in the following childhood vaccines: the combined diptheria-tetanus-wholecell pertussis and Haemophilus Influenzae vaccine for primary immunisation and the combined diptheria/tetanus vaccine used for boosting teenagers. Details of the vaccines used in the childhood immunisation programme can be found in the national health service Factsheet, Thiomersal and vaccines.

Other vaccines that contain thiomersal are: Anthrax vaccine, some hepatitis A vaccines, some hepatitis B vaccines, some influenza vaccines and the diptheria-tetanus-wholecell pertussis vaccine.

The use of thiomersal in vaccines has not been discontinued in the United Kingdom. The European Agency for the Evaluation of Medicinal Products (EMEA) recommended in 1999 that vaccine manufacturers phase out use of thiomersal wherever possible. This was a purely precautionary recommendation aimed at limiting avoidable exposure to mercury compounds. EMEA acknowledged that there was no evidence of harm caused by thiomersal in vaccines. The Committee on Safety of Medicines (CSM) endorsed this recommendation in 1999 and the Joint Committee on Vaccination and Immunisation also supports the EMEA statement. There is strong evidence that thiomersal in vaccines does not cause neurological damage to children and the CSM continues to advise that the balance of benefits and risks of thiomersal-containing vaccines is overwhelmingly positive.

In line with the EMEA recommendation, manufacturers are actively developing research programmes to eliminate, substitute or reduce thiomersal in vaccines. This may take time because manufacturers are required to ensure that the replacement or elimination of thiomersal does not affect the safety or efficacy of the final vaccine.

Human Embryos

Question and Written Answer on Tuesday 11 May

Jim Dobbin (Heywood and Middleton): To ask the Secretary of State for Health whether an application for a licence to create human embryos by cell nuclear replacement has been submitted to the Human Fertilisation and Embryology Authority.

Miss Melanie Johnson: From 7 May 2004, the Human Fertilisation and Embryology Authority (HFEA) will publish the titles and lay summaries of research licence applications on its website.

The HFEA has received one application for a licence to create human embryos by cell nuclear replacement. The title and lay summary are as follows:

Title – Derivation of human embryonic stem cell lines using nuclear transfer and parthenogenically activated oocytes.

Centre – Newcastle Fertility Centre at Life.

Lay summary – It is recognised that human embryonic stem cells offer a great potential for therapies for many diseases such as diabetes. These stem cells are derived from embryos which are created for in-vitro fertilisation treatment, but which are not suitable for treatment. If stem cell treatments are to reach their full potential we need to derive stem cell lines which are genetically similar to the recipient so they will not be rejected. This may require the application of techniques such as nuclear transfer and parthenogenic activation. Nuclear transfer involves the transfer of genetic material from adult skin cells to eggs which have had the cell's nucleus removed. Parthenogenic activation involves an egg being artificially stimulated by chemical or electronic means in order to make the egg start embryo development. The present application is to undertake some of the initial studies that are needed to understand methods that will develop this technology.

Progress of Legislation before Parliament

Government Bills

Energy Bill: HoL Committee 15, 20, 22 & 27 Jan, 3, 4, 10, 12, 24 & 26 Feb, 2 & 3 March; Report 18, 22, 23, 29 & 30 March; 3R 20 Apr. HoC 2R 10 May; Committee stage completed 22 June; Report stage 13 July.

Health Protection Agency Bill: HoL 2R 5 Jan; Committee 3 March; Report 6 Apr; 3R 29 Apr. HoC 2R 21 June; Committee Stage started 29 June.

Human Tissue Bill: HoC 2R 15 Jan; Committee 27 Jan-5 Feb; Report 28 June. HoL 2R 22 July.

Patents Bill: HoL 2R 26 Jan; Committee 8, 10 &11 Mar; Report 23 Mar; 3R 6 Apr. HoC 2R 7 June; Committee stage 15 June; Report 14 July.

Private Members' Bills

Air Traffic Emissions Reduction Bill: completed all stages HoL.

Dophins and Other Cetaceans Protection Bill: introduced 31.3.04 under the ten-minute rule by Adrian Sanders MP – not printed.

Food Labelling Bill: introduced 22.3.04 under the ten-minute rule by Richard Bacon MP; provisional date for 2R 16 July.

Genetically Modified Organisms Bill: introduced under the Ballot by Gregory Barker MP – not printed.

Marine Wildlife Conservation Bill: introduced under the 10-minute rule by John Randall MP on 16 June; provisional date for 2R 16 July.

Regulation of Hormone Disrupting Chemicals: introduced under the 10-minute rule by Geraint Davies MP on 25 May; provisional date for 2R 16 July.

Rural Broadband Facilitation Bill: introduced 28.4.04 under the ten-minute rule by Ian Liddle-Grainger MP; provisional date for 2R 15 October.

Sustainable and Secure Buildings Bill: introduced 7.1.04 under the Ballot by Andrew Stunell MP; 2R 30.1; SC C 3 & 9.3.04; completed HoC stages 30.4.04; 2R HoL 25 June.

UK Parliament - Digest of Parliamentary Debates, Questions and Answers

19th April - 27th May 2004

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 32 to 37.*

Agriculture

Agriculture (Environmental Damage) – 23.4.04 HoC 671W
Farming (NI) – 12.5.04 HoC 389W
Fruit Farming – 20.5.04 HoC 1101W
Orchards – 25.5.04 HoC 1494W
Organic Crops: Presence of Heavy Metals – 19.5.04 HoL WA87
Potato Ring Rot – 18.5.04 HoC 831W
UK Produce – 25.5.04 HoC 1500W

Animal Experiments

Animal Experiments – 27.4.04 HoC 930W, 30.4.04 HoC 1359W & 21.5.04 HoC 69WS
Intimidation – 6.5.04 HoC 1692W
Animal Research – 14.5.04 HoC 603W & 20.5.04 HoC 1128W
Animal Rights Activists – 18.5.04 HoC 893W
Animal Rights Protesters – 20.5.04 HoC 1128W
Animal Testing – household products – 19.4.04 HoC 84W

Animal Welfare – 13.5.04 HoC 575W
Household products – 19.4.04 HoC 320W
Public attitude – 20.4.04 HoC 416W
Animals (Scientific Procedures) Act 1986 – 25.5.04 HoL WA122
Non-human Primates – 26.5.04 HoC 1694W
Use of Animals in Scientific Procedures – 21.5.04 HoL WS45

Animal Health and Welfare

Anderson Inquiry – 5.5.04 HoC 1491W
Animal Health Acts 1981 and 2002 – 20.4.04 HoL WA33
Animal Transport – 4.5.04 HoC 1381W
Animal Welfare – 18.5.04 HoC 825W
Apiculture – 24.5.04 HoC 1287W
Avian Flu – 18.5.04 HoC 825W & 20.5.04 HoC 1102W
Beak Trimming – 24.5.04 HoC 1289W
Blue Tongue Virus – 30.4.04 HoC 1343W
British Wildlife – 13.5.04 HoC 471W
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Channel Tunnel – 6.5.04 HoL WA136
Farm Medicine – 19.5.04 HoC 977W
Food Industry Waste – 27.4.04 HoC 861W
Government Funding (Animals) – 20.5.04 HoC 1109W
Growth Promoters (Animal Feeds) – 30.4.04 HoC 1347W
Illegal Food Imports: Testing – 27.5.04 HoL WA164
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CBRN Decontamination Guidance – 14.5.04 HoC 29WS
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Royal Society Decontamination Report – 26.5.04 HoC 1666W
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Biotechnology

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* Trials – 19.5.04 HoC 977W
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Euro-News

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

Research is part of the European Identity

"Twenty five years ago the Union's research budget was €120m a year, now it stands at €4b a year", said Dr Linkohr MEP for Germany who stepped down before the 10 June elections. "Research is no longer simply a technical means of solving problems, it has become part of the European identity" he argued. At the beginning national attitudes were dominant, but now a European network has been created. The European Research Area (ERA) concept proves that we are much more European in our approach than before.

One of his most high profile campaigns has been directed towards increasing the EU spend on research, calling for a 70% increase in the Framework Programme budget and the establishment of a European Research Council (ERC) to increase financial support for basic research. The third pillar comprises a European innovation area, or council, with a focus on improving the research and innovation capacity of small and medium enterprises (SMEs) in Europe. "SMEs are our real weakness in Europe" he argues.

"Ethical assessment of research on biotechnology, nuclear energy and stem cells have exposed sensitivities. If we want a genuine ERA, then we have to seek compromise at a European level" believes Dr Linkohr. "I will never stop working to promote science and technology in Europe" he concluded.

http://www.linkohr.de/

EU prepared to take risks

The issue facing participants at the Congress was how to promote scientific research in Europe in the context of the EU's Lisbon objectives of becoming the world's most competitive economy by 2010.

Mr Prodi urged Europe's policy makers to be brave enough to take the necessary decisions and to take risks "if we take no risks, we guarantee mediocrity" he said. One of the great strengths of the US is that it has learned to be "big enough to

fail", whereas the EU often spent too long in discussion and avoided taking any risky decisions, he added.

He argued that Europe needs a continent-wide system of research, with research centres and universities forming centres of excellence within an integrated research area. Further integration is also needed to encourage researcher mobility. "Today, if a researcher goes abroad they do it at their own risk, as careers are often still linked to national systems. We shouldn't penalise researchers for expanding their horizons." The movement of researchers between the public and private sectors is also necessary to stimulate industrial investment in science.

http://www.europarl.eu.int/conferences/2004_science/default_en.htm

Europe needs more Scientists

Members of a European High level Group (HLG) on Human Resources for Science and Technology called for "a little less conversation and a little more action" at a conference in Brussels on 2 April. It is unlikely that Europe will achieve its target of recruiting an additional 500,000 more researchers by 2010 if no action is taken. Over the past few years, growth in research jobs has surpassed overall employment. However the EU is still lagging behind the US and Japan in terms of science, engineering and technology (SET) employment. According to Jean-Patrick Connerade President of Eurosciences, "It is a simple case of governments making rather empty promises about what they are going to do." Young people are not attracted to science for two main reasons: careers in this field are perceived as unglamorous and badly paid and the jobs are simply not there. Even though it is the private sector that is the greatest employer of scientific personnel, European governments are not adequately supporting the public sector, which is not as well funded as in the US and suffers from inadequate resources, salaries and career prospects.

http://europa.eu.int/comm/research/conferences/2004/sciprof/index_en.html

Innovation: policy and practice

EU Research Commissioner Philippe Busquin refused either to condone or reject a proposal by German MEP Rolf Linkohr on the need for a European Innovation Area when speaking in Brussels on 5 April.

An innovation area or council would focus on improving the innovation capacity of small and medium sized enterprises (SMEs), according to Dr Linkohr, and would form one of the three pillars of European research, along with the Framework Programmes and a European Research Council.

He gave four principal reasons for his reluctance to give the initiative his absolute support.

- There is no innovation without research and that requires a solid research base
- Innovation is the responsibility of enterprise and is difficult to fund with public money
- The need to avoid duplication
- Reluctance to distract national policy-makers from the current priority of increasing research investment

Research is on the political agenda and we need to keep the momentum. Mr Busquin proposed other suggestions aimed at boosting innovation in Europe. Structural Funds are useful. He supported a SME helpdesk, tax incentives at national level that are coherent across the EU, and closer links with the European Investment Bank (EIB) for funding innovation where he expects more money to become available by 2010.

Europeans don't trust junk food

The EU "trust in food" project, funded under the Sixth Framework Programme (FP6), has published the results of a study showing that Europeans' trust in processed food, meat and "junk food" is low, with only one in five consumers trusting the quality of burgers from fast food outlets and meals from restaurants. On the other hand, the six-nation survey showed that consumers tend to trust fruit and vegetables. Levels in trust varied with the British being the most trusting consumers largely as a positive response to measures taken in the wake of the Bovine Spongiform Encephalopathy epidemic. Italy and Portugal represent the low-trust regions, up to 80% of whom believe that prices, taste and quality have worsened over the last 20 years.

In all countries, a low percentage of consumers were found to trust either the food-processing industry, supermarket chains or farmers to tell the truth about a food scare. The highest levels of trust were placed in consumer organisations, food experts and governmental bodies.

The next phase of the project will be to analyse the development of food and consumer policy in the EU, focusing especially on consumer interest in European food regulation.

http://www.trustinfood.org

Improved management of mining waste

Report on the proposal for a European Parliament and Council directive on the management of waste from the extractive industries. Waste from the extractive industries represents a very large waste stream, one of the biggest in the EU. Major accidents in recent years involving collapsing mine dams in Spain and Romania show that mismanagement of waste can have a disastrous environmental impact. Throughout the EU, there is a large number of landfill sites full of mining waste discharging significant quantities of pollutants into water and soil. The proposal covers the management of waste from the extractive industries, resulting from extraction, treatment and storage of mineral resources and the working of quarries.

Environmental Liability
Polluters clean up or pay up

New EU rules on responsibility for cleaning up the environment came a step closer when Parliament adopted the conciliation agreement on the Environmental liability directive. EU governments will in future have to ensure either that environmental damage is prevented or that the mess is soon cleaned up again. In a clear shift towards the "polluter pays" principle, the cost of cleaning up will be borne by the company or other operator that caused the damage. If this is not possible, the relevant authorities may, as a last resort, take the necessary measures themselves to repair the damage.

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).

Agriculture

Council Reglations on:

the production and marketing of apiculture products – OJ L125(p1)28.4.04

genetic resources in agriculture – OJ L162(p18)30.4.04

Community plant variety rights – OJ L162(p38)30.4.04

Commission Decision on seed mixtures for use as fodder plants – OJ L116(p39)22.4.04

Animals and Veterinary matters

Council Directive on importation into and transit through the Community of certain live ungulate animals – OJ L139(p321)30.4.04

Council Regulation on compliance with feed and food law, animal health and welfare rules – OJ L165(p1)30.4.04

Commission Regulation on imports of products of animal origin for personal consumption – OJ L122(p1)26.4.04

Commission Decisions on:

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animal health conditions and veterinary certification for products transiting or being temporarily stored in the Community – OJ L118(p45)23.4.04

animal health conditions and veterinary certification for rabbit meat, wild and farmed game, animal casings and farmed ratite meat – OJ L151(p54,62&70)30.4.04

Aviation

Council Regulations on:

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common rules in the field of civil aviation security – OJ L157(p1)30.4.04

Opinions of the Economic and Social Committee on civil aviation – OJ C108(p55&57)30.4.04

Chemicals

Council Directive on the limitation of emissions of volatile organic compounds due to the use of organic solvents in paints etc – OJ L143(p87)30.4.04

Council Regulation on detergents – OJ L104(p1)8.4.04

Commission Regulation on the export and import of dangerous chemicals – OJ L123(p27)27.4.04

Commission Decision on the import of certain chemicals – OJ L144(p11)30.4.04

Commission Recommendation on results of risk reduction strategies on various named chemicals – OJ L144(p72)30.4.04

Dangerous Goods

Commission Directive on classification, packaging and labelling of dangerous substances – OJ L152(p1)30.4.04

Education and Training

Calls for proposals:

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E-Learning Programme – OJ C113(p39)30.4.04

Energy and Nuclear Industries

Opinion of the Economic and Social Committee on promoting renewable energy – OJ C108(p45)30.4.04

Environment

Council Directives on:

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environmental liability with regard to the prevention and remedying of environmental damage – OJ L143(p56)30.4.04

Council Regulation on persistent organic pollutants – OJ L158(p7)30.4.04

Opinions of the Economic and Social Committee on:

certain chemicals in the air – OJ C110(p16)30.4.04

emission of gaseous and particulate pollutants from engines – OJ C108(p32)30.4.04

certain fluorinated greenhouses gases – OJ C108(p62)30.4.04

Opinion of the Committee of the Regions on the proposal on the protection of groundwater from pollution – OJ C109(p29)30.4.04

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Council Regulations on:

the management of fishing fleets – OJ L102(p9)7.4.04

multilaterial co-operation in the north-east Atlantic fisheries – OJ L123(p4)27.4.04

European Community observer scheme for Community fishing vessels operating in the NAFO area – OJ L161(p1)30.4.04

fishing opportunites for certain fish stocks in Community waters – OJ L161(p144)30.4.04

control measures for certain stocks of highly migratory fish – OJ L162(p8)30.4.04

measures for the recovery of the Northern hake stock – OJ L150(p1)30.4.04 and Corrigendum OJ L185(p1)24.5.04

Incidental catches of cetaceans – OJ L150(p12)30.4.04 and Corrigendum OJ L185(p4)24.5.04

certain conservation measures relating to waters round Malta – OJ L150(p32)30.4.04

Commission Regulation on TACs and quotas – OJ L120(p8)24.4.04

Commission Decisions on:

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diseases in aquaculture animals – OJ L156(p5)30.4.04

health conditions and certification requirements for imports of live fish etc intended for farming – OJ L156(p29)30.4.04

Foodstuffs

Council Directive on products of animal origin intended for human consumption – OJ L157(p33)30.4.04

Council Regulations on:

the hygiene of foodstuffs – OJ L139(p1&55)30.4.04

controls on products of animal origin intended for human consumption – OJ L139(p206)30.4.04

Commission Directives on:

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labelling certain foods – OJ L162(p76)30.4.04

Commission Regulations on:

foods for infants and dioxins – OJ L104(p48)8.4.04 & OJ L106(p3 & p6)15.4.04

additives in feedingstuffs – OJ L162 (p65&68)30.4.04

Commission Decisions on:

the register of flavouring substances – OJ L113(p28)20.4.04

bacteriological tests in certain meat establishments – OJ L144(p1)30.4.04

Opinion of the Economic and Social Committee on nutrition and health claims made on foods – OJ C110(p18)30.4.04

Genetically Modified Organisms

Commission Regulation on the application for the authorisation of new genetically modified food and feed – OJ L102(p14)7.4.04

Intellectual Property and Patents

Council Directive on the enforcement of intellectual property rights – OJ L157(p45)30.4.04

IT and Telecommunications

Opinion of the Economic and Social Committee on adapting e-Business policies to a changing environment – OJ C108(p23)30.4.04

Maritime and Marine

Council Regulations on Maritime Safety Agency and ship and port security – OJ L129(p1&6)29.4.04

Opinion of the Economic and Social Committee on proposed regulation to establish a European Martime Safety Agency – OJ C108(p52)30.4.04

Call for proposals in the field of Community co-operation against marine pollution – OJ C93(p33)17.4.04

Plants and their Protection Products

Commission Directives on substances and pesticide residues – OJ L120(p26,30&39)24.4.04 & OJ L125(p38)28.4.04

Commission Regulation on transitional measures for plant protection products following accession of new Member States – OJ L123(p7)27.4.04

Public Health and Pharmaceuticals

Council Regulation establishing a European Centre for disease prevention and control – OJ L142(p1)30.4.04

Commission Decision on surgical implants – OJ L120(p48)24.4.04

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Commission Regulations on:

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Commission Decision on bodies whose researchers may access confidential data for scientific purposes – OJ L156(p1)30.4.04

Opinions of the Economic and Social Committee on:

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Europe and Basic Research – OJ C110(p98)30.4.04

Call for proposals for indirect RTD actions under the specific programme for research, technological development and demonstration – OJ C113(p16)30.4.04

Transport

Council Directives on:

safety of the Community's railways – OJ L164(p44)30.4.04

the interoperability of the trans-European rail system – OJ L164(p114)30.4.04

safety requirements for tunnels in the Trans-European Road Network – OJ L167(p39)30.4.04

Council Decision on the development of the trans-European transport network – OJ L167(p1)30.4.04

Commission Decision on technical specifications for interoperability – OJ L155(p1)30.4.04

Opinion of the Economic and Social Committee on:

the approval of motor vehicles and their trailers – OJ C108(p29)30.4.04

sustainable mobility – OJ C108(p35)30.4.04

Opinon of the Committee of the Regions on the European Road Safety Action Programme – OJ C109(p7)30.4.04

Wildlife and Conservation

Commission Regulations on:

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The Academy of Medical Sciences is an independent interdisciplinary body representing the medical science community and those involved in healthcare. Its 700 Fellows include clinical academics, non-clinical scientists, veterinary scientists, dentists, nurses and the professions allied to medicine. The Academy's prime purpose is to promote the translation of medical science into clinical practice for patient benefit. It provides authoritative advice and comments on a multitude of public policy issues that involve the biomedical disciplines.

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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.

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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 2002/2003 their combined expenditure on biomedical research in the UK was £660 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.

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Aston is a leading technological university with excellence in teaching and research in its chosen fields. All of its research is of direct relevance to industry and commerce and it has a strong record of research collaboration. The latest research assessment exercise shows that more than 85% of Aston's academics are rated as undertaking research of national and international standing.

Biotechnology and Biological Sciences Research Council

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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

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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

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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.

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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

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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

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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

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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

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BRE is the UK's leading centre of expertise on buildings and construction, and the prevention and control of fire and other risks. BRE is owned by the Foundation for the Built Environment, an independent charitable organisation with a mission to champion excellence and innovation in the built environment.

Expertise includes:

- Design standards
- Construction
- Material properties
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- Testing and Certification
- Energy usage
- Environment
- Fire
- Security
- Natural hazards
- Expert witness

CABI Bioscience

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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

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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

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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. 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

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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

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

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- seeing science as creative, questioning, human
- bringing school science added meaning and motivation
- locally, nationally, internationally (currently between Britain and Japan)

Clifton Scientific Trust Ltd is registered charity 1086933

Council for the Central Laboratory of the Research Councils

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CCLRC is the UK's strategic agency for scientific research facilities. It supports leading-edge science and technology by providing world-class, large-scale facilities, which are used annually by more than 12,000 researchers worldwide. These advanced technologial capabilities, backed by a pool of expertise and skills across a broad range of disciplines, are exploited by universities and industry alike. The annual budget of CCLRC is some £130 million

University of East Anglia

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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

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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

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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

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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

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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

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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

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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.

Institute of Biology

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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

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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

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The Institute of Physics is an international learned society, publisher and professional body. It represents the physics community to government, legislators and policy-makers. Key activities include:
Scientific publishing and electronic dissemination of physics
Setting professional standards, awarding professional qualifications, validating higher education courses
Promotion of physics through conferences, education, policy advice and public debate
Support for physics in schools, colleges and universities

Institute of Physics and Engineering in Medicine

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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.

Institution of Civil Engineers

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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.

King's College London

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King's is a multifaculty university with excellence in education, humanities and law, a diversity of provision in health and life sciences and a distinguished tradition in natural sciences and engineering. The College encompasses the international standing of the Institute of Psychiatry and brings together three world famous names - Guy's, King's and St Thomas' - in the UK's largest medical and dental schools.

LGC

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Setting standards in analytical science

LGC is the UK'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

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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

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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 research successes include a WRAP sponsored programme to develop new commercial applications for recycled PET.

University of Manchester Institute of Science and Technology

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Manchester's UMIST is the 6th top research university in the UK. Winner of 3 Queen's Prizes for Higher Education, 2 Queen's Awards for Export Achievement and 2 Prince of Wales' Awards for Innovation, UMIST has an international reputation. Centres of excellence include Environment, Life Sciences, IT, Telecommunications, Management, Manufacturing, Materials and Energy. UMIST VENTURES Ltd is the commercial arm of UMIST.

Marks & Spencer Plc

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Main Business Activities

Retailer - Clothing, Food, Financial Services and Home.
544 stores in 29 countries worldwide.
Employing 67,133 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

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The Medical Research Council (MRC) is funded by the people of the UK through taxes. 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 user needs as well as high scientific quality. The MRC has funded the work which led to some of the most significant discoveries and achievements in medicine in the UK.

Merck Sharp & Dohme Research Laboratories

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Drug discovery for brain diseases.

National Physical Laboratory

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E-mail: enquiry@npl.co.uk
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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.

National Radiological Protection Board

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To advance by research the acquisition of knowledge about the protection of mankind from radiation hazards.
To provide advice to the government on the acceptability to the UK of standards recommended or proposed by international bodies, and on their application.
To provide information and advice to those with responsibilities in the UK in relation to the protection from radiation hazards, either of the community as a whole, or particular groups.

Working in partnership with the Health Protection Agency

Natural Environment Research Council

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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

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The University of Newcastle is a member of the Russell Group of research-intensive Universities. The University has undergone a major restructuring and expansion since 2002, with increases in undergraduate, postgraduate and international student numbers, as well as sustained growth in 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 very significant levels of EU activity. In 2002 it was identified in a national survey as one of the top Universities in the UK for technology transfer.

OSIL

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OSIL specialises in the provision of high quality products and services for the marine, freshwater and meteorological measurement community. These include supply of laboratory/field instruments, service and calibration, sampling equipment, seawater calibration standards, oceanographic survey, data collection and interpretation. Our expertise ranges from inshore and coastal waters to full ocean depths. OSIL maintains close links with academic scientific centres.

Particle Physics and Astronomy Research Council

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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

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Prospect is an independent, thriving and forward-looking trade union with more than 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

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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

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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

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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.

Royal Astronomical Society

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The Royal Astronomical Society is a learned society founded in 1820. It exists to encourage and promote astronomy and geophysics. Expertise of members covers most aspects of astronomy, astrophysics, space science, solar physics, studies of the upper atmosphere, planetary science and geophysics.

Royal Botanic Gardens, Kew

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ALL LIFE DEPENDS ON PLANTS

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 eductional organisation devoted to increasing knowledge and public understanding of plant and fungai 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.

Royal College of Veterinary Surgeons

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"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

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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

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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

The Royal Society of Chemistry

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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

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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

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The Science Council has a membership of over 20 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. There are specialist groups for policy issues relevant to science in education, environment, health and society. In 2003 the Science Council was granted a Royal Charter and launched the Chartered Scientist (CSci) designation in 2004.

SEMTA

Technology Skills For Productivity & Performance

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SEMTA (Science, Engineering and Manufacturing Technologies Alliance) is the Sector Skills Council for the science, engineering and manufacturing technology sectors. We have become one of the first fully-licensed SSCs.

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

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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

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University of Surrey

UniS
University of Surrey

Contact: Pauline Elliott
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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
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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.

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Published four times a year. The 2004 subscription rate is £60.00. Single numbers £15. ISSN 0263-6271

All enquiries to the Parliamentary and Scientific Committee, 3 Birdcage Walk, Westminster, London SW1H 9JJ. Tel: 020 7222 7085

Members wishing to take the front or back covers, advertise in the journal or appear in the directory listing should contact Mrs Annabel Lloyd, Tel: 020 7222 7085.

Published by The Parliamentary and Scientific Committee, 3 Birdcage Walk, Westminster, London SW1H 9JJ.

Typeset and printed by APR Print and Design Ltd.

Science Diary

The Parliamentary and Scientific Committee

Contact: Annabel Lloyd 020 7222 7085

www.pandsctte.demon.co.uk

Meetings held in Boothroyd Room, Portcullis House

Dates for Autumn meetings:

Monday 25 October 17.30

Monday 15 November 17.30

Monday 13 December 17.30

Subjects and 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)

Tuesday 14 September 18.30
Could Breast Cancer be Caused by a Virus?
Caroline Ford
Tickets £5

Monday 20 September 19.00
The Ingredients of Language
Prof Steven Pinker

Thursday 23 September 19.00
From Chemistry to Catwalk

Saturday 25 September 10.00-16.30
Fabulous Fish
Rick Stein and John Stein
Ticket price tba

Wednesday 29 September 19.00
Space for the Terrified!!!
Dr Sarah Dunkin

Monday 4 October 19.00
The Science of Chocolate

Wednesday 6 October 19.00
Science Graduate of the Year
Tickets £5

Thursday 7 October 19.00
DNA Missiles: The Natural and Unnatural History of Sperm
Prof Tim Birkhead, Dr Allan Pacey and Dr Juliet Tizzard

Tuesday 12 October 18.30
Science Meets Politics

Thursday 14 October 19.00
The Big Bang
Dr Simon Singh

Wednesday 20 October 19.00
Pain Management

Tuesday 26 October 19.00
The Future of Sound

The Royal Society

6-9 Carlton House Terrace, London SW1Y 5AG

Events held at the Royal Society unless otherwise stated

Contact Froniga Lambert: 020 7451 2574

froniga.lambert@royalsoc.ac.uk

http://www.royalsoc.ac.uk/events

Pre-registration is essential for Discussion Meetings

Monday 27 and Tuesday 28 September (all day)
Discussion meeting
Chromosome segregation
Organised by Professor Kim Nasmyth FRS and Professor Mitsuhiro Yanagida

Wednesday 13 October 18.00
Clifford Paterson Prize Lecture
What is quantum non-locality?
Professor Sandu Popescu

Monday 18 and Tuesday 19 October (all day)
Discussion meeting
The nature of mathematical proof
Organised by Professor Alan Bundy, Professor Donald MacKenzie, Sir Michael Atiyah FRS and Professor Angus MacIntyre FRS

Royal Society of Chemistry

Contact: Dr Stephen Benn
0207 437 8656

BENNS@RSC.ORG

Monday 19 – Wednesday 21 July
Self Organising Polymers
Faraday Discussion 128
The University of Leeds

Friday 23 – Tuesday 27 July
22nd International Carbohydrate Symposium
University of Glasgow

Wednesday 1 – Friday 3 September
Dynamics and Structure of the Liquid-Liquid Interface
Faraday Discussion 129
University of Cambridge

Wednesday 8 – Friday 10 September
The Chemical Biology of Cancer
University of London

Wedmeday 8 – Friday 10 September
New Trends in Crystal Engineering
University of Nottingham

Monday 13 – Wednesday 15 September
From Molecules to Materials
University of London

Wednesday 15 – Friday 17 September
Transition Metals in Organic Synthesis
University of Glasgow

Thursday 16 – Friday 17 September
Non-Covalent Interactions in Chemistry and Biology
University of Cambridge

The Royal Society of Edinburgh

22-26 George Street, Edinburgh EH2 2PQ

Tel. 0131 240 5000, Fax: 0131 240 5024

events@royalsoced.org.uk

Apply on-line for tickets
www.royalsoced.org.uk

All events are free, require tickets, and take place at the RSE unless otherwise stated.

Monday 6 September 17.30
The Bruce Preller Prize Lecture
The Threat of Terrorism: The Place of Science
Professor Sir Keith O'Nions FRS, Director General of Research Councils, Office of Science and Technology

Thursday 30 September 2004 (full day)
Scotland's Land Conference
A Conference fee will apply

Thursday 14 - Friday 15 October 2004 (full day)
Caledonian Research Foundation Conference
Reproductive Health

The BA (British Association for the Advancement of Science)

Saturday 4 – Saturday 11 September
BA Festival of Science
Exeter

Further information: *www.the-ba.net/festivalofscience*

SCI

14/15 Belgrave Square,
London SW1X 8PS

Contact: conferences@soci.org or 020 7598 1562

Sunday 5 – Wednesday 8 September
A Celebration of Organic Chemistry
University of Warwick

Sunday 12 – Wednesday 15 September
Contaminated Land - Achievements and Aspirations
University of Loughborough

Sunday 12 – Wednesday 15 September
Electrochem 2004
University of Leicester

Thursday 21 October
Roads from Vienna
SCI, Belgrave Square, London

Tuesday 26 October
Making Pesticides Easier and More Effective to Use
SCI, Belgrave Square, London

Wednesday 27 October
Introduction to ADMET: Solving Problems Chemically
SCI, Belgrave Square, London

Royal Pharmaceutical Society of GB

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

Monday 6 September
Can herbs improve your health?
University of Exeter
A half-day session at the BA Festival of Science

Monday 27 to Wednesday 29 September
Medicines: from cell to society
The British Pharmaceutical Conference
Manchester

Institution of Mechanical Engineers

Wednesday 8 September
Nuclear Waste Options
Lecture presented by Bertrand Barré of AREVA, France
Lecture organised by the Energy, Environment and Sustainability Group
Contact Irene Gibbs 020 7973 1309
Email i_gibbs@imeche.org.uk
One Birdcage Walk, London

Wednesday 15 September
Analytical Methods & Tools in Transmission Systems
Seminar organised by the Aerospace Industries Division
Contact Georgina Shaw 020 7973 1291
Email georginas@imeche.org.uk
TRW, Birmingham

Tuesday 5 – Wednesday 6 October
Symposium Alternative Fuels
Symposium organised by the Combustion Engines and Fuels Group
Contact Stephanie Love 020 7973 1317
Email s_love@imeche.org.uk
One Birdcage Walk, London

Friday 8 October
Human Error in the Workplace
Seminar organised by the Safety & Reliability Group
Contact Georgina Shaw 020 7973 1291
Email georginas@imeche.org.uk
One Birdcage Walk, London

Tuesday 12 October
Risk-Based Inspection
Seminar organised by the Pressure Systems Group
Contact Gilda Ereira 020 7973 1317
Email g_ereira@imeche.org.uk
The Centre, Birchwood Park, Warrington

Science in Parliament

3 Birdcage Walk, London SW1H 9JJ
Tel: 020 7222 7085 Fax: 020 7222 7189

Editor:	Professor Peter Simpson
Editorial Assistant:	Mrs Annabel Lloyd

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