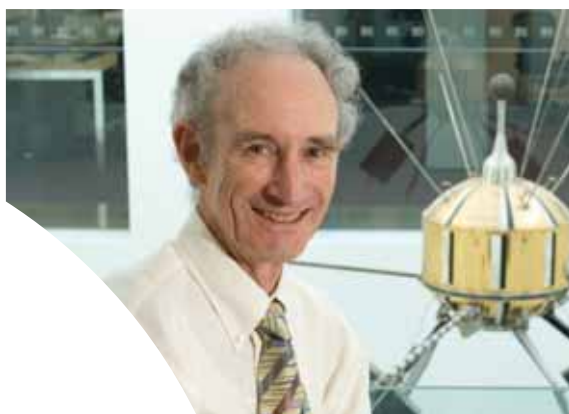


Review of the Year 2005
progressing science in partnership

President's foreword



Progressing science in partnership with national academies has been a key focus for the Society during this ground-breaking year.

Since its founding in 1660, the Royal Society has sought to promote an exchange of knowledge and ideas between scientists in different countries and to strengthen scientific alliances between nations. Its motives have always been clear, to bring the highest level of intellectual endeavour to bear, whether in addressing global issues or in generating new knowledge, and to help build sustainable networks which transcend the political pressures of the day. In recent years, the Society has placed even greater emphasis on working with other national science academies to influence the deliberations of policymakers. The past 12-month period has been no exception, and has seen particular successes.

In late 2004, the UK Government indicated it would be focusing on development in Africa and climate change during its presidency of the G8 group of nations. To underline the important contribution scientists have to make to policies on both these major issues, the Society initiated the preparation of two joint statements by the national academies of the G8, to inform discussions leading up to and at the Gleneagles summit of July 2005. Despite the challenging nature of such statements, it was remarkable how little negotiation was required in finalising them. Clearly,

national science academies around the world are becoming more confident in formulating science advice on a collective basis and engaging with global policymakers. In response, governments increasingly recognise the authority of these academies when they take a united stance on scientific issues. This was evidenced by the G8 nations' acceptance of the statements' key premises, namely that climate change is a reality, and that science and technology are fundamental for development in Africa, as reflected in the Gleneagles summit communiqués.

Of course, this is not the first time that the Society has worked with other academies on significant policy issues. During the course of my five-year presidency, the Society has also signed an important statement on human cloning with more than 60 other signatories, and an earlier statement on climate change with 16 other academies.

The Society's activities on the international stage are not restricted to ad-hoc statements. It is an active member of the InterAcademy Panel, a founding member of the InterAcademy Council, and provides the secretariat for the European Academies Science Advisory Council, all of which provide international arenas for national science academies to engage with each other and with other pan-national organisations. The Society also retains a strong presence in the International Council for Science, or ICSU, which was the first truly global umbrella body for national science bodies.

As my presidency concludes, I am confident the Society will continue to foster valuable partnerships to promote a collective approach to global issues in science.

Lord May of Oxford

Executive Secretary's report



The Society is more active than ever, and by working with many partners we are able to undertake an extensive range of activities.

With our newly refurbished premises working well, and our new website providing greatly increased access to our work, we devoted attention this year to restructuring our staffing arrangements to maximise effectiveness. Two manifestations of this are a streamlined grants administration process and an expanded and more focused international policy operation. In terms of financial resources, we were pleased at the favourable outcome of the last Spending Review, which will increase our activity in the period 2006–08. The extra funds will be devoted to innovation and to science in society activities while enabling us to maintain the volume of our other programmes.

2005 has seen the fruitful development of existing partnerships and the start of new alliances. A prominent example of the former is the Advisory Committee on Mathematics Education (ACME), hosted by the Society and bringing together key players in the field. ACME has had substantial impact in the past year, most notably in influencing plans for the National Centre for Excellence in the Teaching of Mathematics (first proposed by ACME).

Production of influential policy reports took high priority once again in our programme of activities. Reports on personalised medicines, ocean acidification and misuse

of biological research exemplify our partnership approach in being produced by groups of individuals from different backgrounds and organisations. During the year, we funded more than 2300 scientists in the UK and abroad across a range of schemes, and in doing so supported more than 600 collaborations.

2005 has marked the final phases of the five-year Kohn Foundation funded Science in Society programme. This pioneering programme has increased our impact through incorporating public dialogue into our policy work and has promoted change within the Society.

The Society celebrates its 350th anniversary in 2010 and we have laid detailed plans to mount a major new fundraising campaign to allow us to extend our work.

This year marks the end of Lord May of Oxford's very successful period of office as President, and we look forward to welcoming Lord Rees of Ludlow as new President on 1 December.

Stephen Cox

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Influencing science policy, globally

The Royal Society influences science policy at a global level by working with a range of partners, and ensures that science policy is informed by the best scientific advice available. This advice takes account of the views and values of non-scientists.

The G8 deliberations under the British presidency provided a major focus for our science policy work in 2005, with the Society leading the production of **joint statements on climate change and scientific capacity building in Africa** to inform and influence the discussions at the summit in Gleneagles in July.

The academies of the G8, along with those of Brazil, China and India, signed a climate change statement which highlighted the fact that evidence of climate change is sufficiently clear to justify nations acting promptly to address it. The statement called for an international study, informed by science, to determine the levels of emissions that nations can produce while avoiding unacceptable impacts of climate change. It also called on world leaders to work with developing nations to enable them to develop innovative solutions to mitigate and adapt to the adverse effects of climate change, while explicitly recognising their legitimate development rights.

The statement on capacity building was produced by the Society in partnership with the academies of the G8 and the Network of African Science Academies. It stressed the important role of science, technology and innovation in tackling the wide range of problems facing Africa and other developing regions. It also emphasised the need for African countries to be able

to adapt and exploit scientific and technological solutions appropriate to their specific needs, or run the risk of losing their autonomy through becoming ever more dependent on advice and assistance from the developed world.

The statements had a substantial impact on the G8, with the summit's communiqués acknowledging the need for action now on climate change and the fundamental importance of technology for development in Africa. Disappointingly, no concrete actions were agreed with regard to reducing greenhouse gas emissions, and the Society is therefore continuing to press for this issue to be tackled at a global level. The statement on climate change received significant exposure, notably through references in debates in the UK Houses of Parliament and the US Senate prior to the G8 summit.

Both statements are available at www.royalsoc.ac.uk/policy

As a follow up initiative, the Society held **a two-day meeting with representatives from the participating academies** in early September. The meeting provided a valuable opportunity to reflect on the impact of the statements and the ways in which academies might cooperate on key scientific issues in the future. Looking forward, they agreed to strive to inform discussions at future G8 meetings, noting that Russia had identified energy, infectious diseases and education as key issues to be addressed during its presidency of the G8 in 2006.

The Society influenced the G8's deliberations through two further initiatives. The first was a report on **Food crops in a changing climate**, resulting from a discussion meeting held in April, and was also timed to feed into the development of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. The second was the launch of the

Representatives of the science academies of the G8, Brazil and India





Society's report *Ocean acidification due to increasing atmospheric carbon dioxide* at the end of June, which concluded that ocean acidification is a powerful reason, in addition to climate change, for reducing emissions of anthropogenic carbon dioxide to the atmosphere.

The Society's approach to conducting policy studies exemplifies effective collaboration between expert individuals across a range of disciplines and from different backgrounds. The **year-long study into pharmacogenetics**, the field which looks at the potential for tailoring drug treatments to a person's genetic profile, was undertaken by a working group which included not only science researchers but also a general practitioner and a representative from a major pharmaceutical company.

The study found that while pharmacogenetics will help improve the safety and effectiveness of medicines, its widespread use in drug provision is another 15–20 years away, due to the many gaps in our understanding of how genetics relates to the causes of disease. Further research funded by both public and private sources is needed, along with large-scale clinical trials to assess the cost-effectiveness of developing and using pharmacogenetic therapies. Healthcare professionals will require training and education, as few currently have a clear understanding of the field and the benefits it could bring to patients. Questions must also be addressed about whether the healthcare systems in the UK have the resources to implement such technologies. The report on the study, titled *Personalised medicines: hopes and realities*, was published in September, and is available at

 www.royalsoc.ac.uk/personalisedmedicines

In October 2004, the Society held a joint workshop with the Wellcome Trust entitled *Do no harm: reducing the potential for the misuse of life science research*, bringing together life scientists, policy makers, funders and other interested parties. A report of the meeting was disseminated to interested parties and informed the development of the Society's own policy on the issues covered. The timing of the report was such that it helped the Society prepare its position ahead of the

Public dialogue on pharmacogenetics

The pharmacogenetics study was informed by evidence received from a range of stakeholder groups, and included a public dialogue exercise that was devised and conducted by the Society. This explored social and ethical issues raised by developments in pharmacogenetics, and placed a specific focus on the views of ethnic minority communities. Most participants saw the potential development of pharmacogenetic testing as beneficial for helping people to make informed choices. However, there were major concerns, including issues of consent and confidentiality in the handling of biological samples, and whether the Government and the healthcare system could successfully deliver genetic technology in the future. A report on the dialogue can be found at

 www.royalsoc.ac.uk/scienceinsociety



Meeting of Experts of the States Parties of the Biological Weapons Convention in Brussels in June. Chaired by Sir David King FRS, Government Chief Scientific Advisor, the meeting focused on the role of codes of conduct in preventing the development and use of biological weapons.

This year the Society continued to host the secretariat for the **European Academies Science Advisory Council (EASAC)**, a unique body which provides a means for the national academies of Europe to work together to inject high-quality scientific advice into EU policy-making. Two policy reports were published during the year. *A user's guide to biodiversity indicators*, commissioned by the European Parliament (EP) and published in March, sparked a series of follow-up meetings with representatives of the EP, European Commission and the European Council. *Infectious diseases - importance of coordinated activity in Europe*, was initiated by EASAC and presented in June at a meeting of MEPs and officials from the EP and European Commission.

www.royalsoc.ac.uk/easac

a real-time exercise to test plans for responding to an outbreak of foot and mouth disease, staged in June 2004. This report provided a valuable analysis of the exercise and drew a number of parallels with the Society's review, including acknowledgement of the need for Defra to work extensively on vaccination policy.



In February, the Government issued its response to the joint Royal Society/Royal Academy of Engineering report ***Nanoscience and nanotechnologies: opportunities and uncertainties***, published in July 2004. The response accepted the majority of the study's recommendations, and was welcomed by the two academies. However, they expressed concern that the response did not announce any new funding for the essential research required to support the development of robust regulations. The report had highlighted the importance of Government consulting with relevant stakeholders including industry and non-governmental organisations to develop a strategic public dialogue programme, and the academies were pleased that the Government appeared to have heeded this advice in the outline programme that it published in August.

www.royalsoc.ac.uk/policy

Follow-up is an important part of the Society's policy work, enabling it to establish the extent to which its policy recommendations have been heeded by Government and other stakeholders.

In December, the Society published its **follow-up review into the *Infectious Diseases in Livestock (IDL) Inquiry***, the report of which had been published in July 2002. The review expressed disappointment that the UK could not yet effectively tackle foot and mouth disease using emergency vaccination in the face of a major outbreak. It also raised concerns regarding the lack of clarity about the process for deciding whether to deploy emergency vaccination or culling in the event that extensive pre-emptive action was required to stop an outbreak turning into an epidemic. Shortly after the review was completed, the Department for Food, Environment and Rural Affairs (Defra) published a report on Exercise Hornbeam,

The Society encourages and facilitates collaborative arrangements with partners from other countries. Here we focus on India, Africa and China.

The Society's **interactions with India** this year began in January with a visit by Foreign Secretary Julia Higgins FRS, to Bangalore where she attended an Indo-UK *Frontiers of Science* meeting and discussed the Society's initiatives in India. She then visited Delhi to deliver the Blackett Memorial Lecture on the theme *The responsibility of being a scientist* at the Indian National Science Academy. This visit led to the Society and the UK's High Commission in Delhi coordinating an Indo-UK Stem Cells workshop in Bangalore in April, which involved 40 British and Indian stem cell researchers. More than 200 students attended the workshop, which was funded by the Society in conjunction with the British High Commission, the Indian Department of Science and Technology and the National Centre for Biological Sciences in Bangalore. A follow-up meeting was held at the Royal Society in July, and as a result the Department of Biotechnology in India (DBT) is examining the possibility of establishing an equivalent to the UK Stem Cell Bank. The DBT also plans to examine Human Fertilisation and Embryology Authority regulations to assess the value of introducing legislation in India.



Focusing on Africa, the Society consulted widely this year with partner organisations and scientists in Africa on three key initiatives: providing input to the Commission for Africa instigated by the Prime Minister; inputting to the Department for International Development's consultation exercise on its science, technology and innovation policy; and developing the Society's extended programme of work in sub-saharan Africa in future years.

This year marked the ninth anniversary of the Royal Society/National Research Foundation of South Africa Joint Collaborative Programme of scientific exchanges. In August, the Society hosted the annual meeting of UK project leaders which highlighted the major new projects introduced this year in the areas of crop development and parasitic diseases.

The Society continued to **strengthen its links with China** by supporting the UK Government's year-long *UK-China: Partners in Science* campaign, which aimed to showcase the excellence of British science in China, and to stimulate interactions between eminent UK and Chinese scientists. In June, the Society organised a workshop on hydrogen/clean coal, held in Dalian and Beijing, followed in October by a second workshop in Wuhan and Kunming on plant conservation. The Society has become a partner in Co-Reach, a network of European science and technology funding organisations involved in promoting research cooperation with China.

This year also saw the Society's continued administration of fellowships with China supported by private funding from the Sino-British Fellowship Trust, the KC Wong Education Foundation and BP plc, the latter focusing on UK-based research projects covering energy and the environment.

 www.royalsoc.ac.uk/international

Supporting excellent people in science

Through its research fellowships and funding programmes, the Society works in partnership with universities and industry, both within the UK and internationally, to support excellent scientists and invest in the future of UK science.

The Society's **University Research Fellowships** provide young postdoctoral researchers, considered to be potential leaders in their field, with up to ten years of funding. Launched 22 years ago, the fellowships recognise the excellent scientists of tomorrow, enabling them to pursue and develop their research without constraints from the funding body. The Society received 513 applications for this scheme this year, and appointed 43 postholders.

Dorothy Hodgkin Fellowships provide up to four years of funding to researchers for whom career flexibility is essential, for example people with children, carers and people in ill health, in the first few years after their PhDs. This year 183 applications were received, and 16 fellowships were awarded.

Two rounds of the Society's new **UK Relocation Fellowships** were awarded during the year. Created to encourage career mobility in science, engineering and technology within the UK, these fellowships enable postdoctoral researchers to follow a partner who has changed workplace and moved a significant distance, regardless of whether that partner is a research scientist. Twelve applications were received, and six fellowships awarded during the year.

The Society's **International Fellowship programmes** foster science and technology links between the UK and various countries throughout the world. These fellowships offer between six months and three years of funding for outstanding UK-based postdoctoral scientists to conduct cutting-edge research with their overseas counterparts. This year, 54 fellowships were awarded to incoming scientists from China, India, South East Asia and North America.

The **Joint Project Grants programme** provides up to three years of funding for bilateral visits between UK and overseas researchers who are working together on



Dr Simon Fisher

Dr Simon Fisher is a Royal Society University Research Fellow and molecular geneticist at the University of Oxford. His research builds on his previous discovery of FOXP2, a gene whose disruption can render normal speech and acquisition of language skills impossible in some people. This discovery was a vital step in understanding how genes influence vocal communication, and may lead to better diagnosis and therapies for people suffering from developmental disorders involving impaired speech and language. It may also help answer more fundamental questions regarding the evolution of this distinctive human trait.

Dr Fisher leads a research team which regularly collaborates with scientists across a range of different disciplines, including linguists, neurophysiologists and evolutionary anthropologists. His work has sparked much media attention, and he was shortlisted for the 'Young Researcher of the Year' category of the Times Higher Awards 2005.

a single project. This year the programme funded collaborations between the UK and other European countries, countries in the former Soviet Union, China, Korea, Japan, Hong Kong, Taiwan, and, for the first time, India and some countries in South America. One hundred new awards were made this year.



Dr Christiane Nörenberg

Dr Christiane Nörenberg was a Royal Society Dorothy Hodgkin Fellow at the University of Oxford from October 2001 to September 2005 when she part-transferred her fellowship to the University of Wales, Swansea.

Dr Nörenberg is working to find ways systematically to control the size and shape of nanostructures known as 'semiconductor quantum dots' so they can be grown for viable use in future quantum devices such as quantum dot lasers, single electron transistors, and optical computing quantum units.

'The Dorothy Hodgkin Research Fellowship gave me the flexibility to have two children and still pursue my research career. I have benefited hugely from the scheme, and am truly grateful for the opportunities it still gives me,' says Dr Nörenberg.

As part of its ongoing commitment to fostering innovation through building bridges between scientists and industry, the Society hosted **From labs to riches: the first steps** in November 2004. The event featured keynote presentations by Sir Robin Saxby, Chairman of ARM Holdings plc, and Dr Chris Yapp, Head of Public Sector Innovation at Microsoft Ltd, and a series of workshops which aimed to provide attendees with the necessary insights and contacts to facilitate technology transfer and commercialisation of scientific research.

The winners of the **Brian Mercer Senior Award for Innovation**, Professor Lynne Macaskie of the University of Birmingham and Dr Hazel Prichard of the University of Cardiff, received £250,000 to pursue a project whose goal is to convert urban waste into new materials for future clean energy. Professor Jeremy Baumberg won the **Mullard Award** – which recognises younger scientists, engineers and technologists whose work is currently making a contribution to national prosperity in the UK – for his work on the properties of meso and-nano scale physics and technology carried out through Mesophotonics Ltd, a company founded in 2001 by a team of scientists working together at the University of Southampton to study photonic crystal circuits and devices.

The Society's **electronic Grant Application and Processing (e-GAP)** system introduced in 2003 continued to deliver efficiency gains and enhanced service delivery for applicants.

 www.royalsoc.ac.uk/funding

Championing science education and diversity

Working in partnership with a range of organisations and individuals, the Society strives to ensure all young people have a relevant and challenging experience in science and mathematics, and to support teachers, technicians and other school and college staff who share this ethos.

In a year largely dominated by debate over the future education of 14–19 year olds, **the Society continued to champion the place of science in education reform**. Through a concerted media strategy and meetings with the then Education Secretary, Charles Clarke, and key officials, the Society voiced its concerns about the sidelining of science in the Tomlinson proposals and the reform of GCSEs. The result was acknowledgement in the Department for Education and Skills (DfES) White Paper on 14–19 Education of the importance of curricular reform in enabling the goals of the ten year science investment and innovation framework to be met, an undertaking to legislate for an entitlement for all 14–16 year olds to study two science GCSEs, and a commitment to encourage more young people to take up science post-16.

The planned introduction in Autumn 2006 of a new suite of science GCSE courses prompted the Society to take the lead in helping to ensure that teachers and other stakeholders are fully informed about, and confident of, the changes ahead. In April, the Society hosted a seminar and workshop with the Association for Science Education involving 60 teachers and educationalists. This was followed up in June with an action meeting of key players including the Qualifications and Curriculum Authority, Sector Skills Council for Science Engineering and Manufacturing Technologies, National Science Learning Centre, Office for Standards in Education, National Secondary Strategy, GlaxoSmithKline, and Nuffield Curriculum Centre.

To ensure a high level of awareness about the changes to GCSE science, the Society again advocated the need for better science education for 14–19 year olds as the August exam results were announced. In several press releases the Society stated the need for the new courses to reflect the true dynamism of science - essential if more young people are to be



motivated and equipped to pursue science beyond 16. The Society has warned that unless post-16 uptake of science subjects is increased, there is a risk that the Government's aspirations set out in its ten year investment framework for science and innovation might not be met. This message was also made clear to MPs through a submission to the House of Commons Science and Technology Committee's inquiry *Strategic science provision in English universities*.

The Society welcomed confirmed funding of £150,000 from the DfES for its flagship **Partnership Grants Scheme** during 2005–06. The scheme enables scientists, engineers and teachers to work together to bring science to life in the classroom, and is now in its fifth year. In response to demand, the Society has increased the maximum grant available to a school to £3000, and has extended the scheme to post-16 students.

www.royalsoc.ac.uk/education

Mathematics education has been a particularly successful area of endeavour in 2005. The **Advisory Committee on Mathematics Education (ACME)**, based at and managed by the Society, has made great progress in furthering the interests of the maths education community. It is credited with transforming maths education in a short period, unifying disparate voices with highly focused advice.

The National Centre for Excellence in the Teaching of Mathematics (NCETM), proposed by ACME in December 2002, received a pledge of £15 million from the DfES in December 2004. It is expected to open for business in mid-2006. ACME published two major reports in January and July respectively, which were well received. The first made recommendations on assessment in 14–19 mathematics, and the second outlined an infrastructure model for the provision of high-quality, localised continuing professional development for teachers of mathematics.

ACME received a commitment of three further years of core funding from the Gatsby Charitable Foundation, and enhanced funding from the DfES to help implement the Post-14 Mathematics Inquiry recommendations.

 www.royalsoc.ac.uk/acme

The Society continued to work closely with key partners during the year to pursue equality and diversity in science, engineering and technology (SET) education and employment.

In June, the report *Science, Engineering and Technology and the UK's Ethnic Minority Populations*, was published, showing that black Caribbean and Bangladeshi populations are the most under-represented in SET in terms of occupations held and education beyond GCSE. It also found that the numbers of white students studying a SET subject are lower than would be expected, although areas of white and often male domination remain, particularly with regard to high achievement in academic science. Warwick University Institute of Employment Research produced the report for the Royal Society, with support coming from the National Endowment for Science, Technology and the Arts (NESTA) and funding from the DfES. The report addressed gaps that had been evident in earlier reports, and complemented a separate Society project on role models, also supported by NESTA and funded by the DfES. The latter investigated ways in which role models can best be used to challenge stereotypes and encourage

young people to consider careers in science. In mid-January, the Society published a survey, the findings of which suggested that the decline in numbers of science students might be stemmed if more practising scientists and engineers were to become involved with activities that allowed young people to meet and be inspired by them. Acting on these findings, the Society published *Taking a leading role*, a good practice guide for all those involved in role model schemes.

The Society continued to host the **Athena Project**, which aims to advance the cause of women in SET in higher education and research. In December 2004, the report *Good Practice in University Chemistry Departments* was published, which identified key performance indicators that science departments should strive to put in place if they wish to become employers of choice. In March, Professor Virginia Zakian delivered the second Royal Society Athena lecture *All's well that ends well: telomeres, politics and family*.



Through its **Rosalind Franklin Award** and **Dorothy Hodgkin Fellowships** (see page 7), the Society continued to raise the profile of women in SET, and in the case of the Fellowships, provide career flexibility to scientists seeking to balance their careers with family and other commitments.

 www.royalsoc.ac.uk/diversity

Making science accessible and responsive

The Society is committed to making science accessible and responsive to non-scientists, and equipping scientists with skills and opportunities to communicate their science more widely and openly.

Activity in the area of science in society is increasing markedly as evidenced by levels of expenditure and numbers of people engaged. National policy commitments, undertakings by individual organisations and interactions between the science and social science communities are all fuelling this increase in activity. This worldwide phenomenon attracts a great deal of earnest endeavour, but limited strategic thinking.

In 2005, **shaping science in society thinking and practice in the UK** was high on the Society's agenda. Activities focused on engaging with the Higher Education Funding Council for England over ways to embed public engagement in its new strategic plan, participating in ongoing dialogue with the Office for Science and Technology and the Council for Science and Technology concerning the development of science in society advice and policy, and jointly organising the British Association for the Advancement of Science/Royal Society conference (see below). The Society's views also fed into deliberations of the Biotechnology and Biological Sciences Research Council, the Natural Environment Research Council and the Engineering and Physical Sciences Research Council, as well as the strategy and funding panels of Sciencewise, the major government grants programme for public engagement and dialogue activities. Much strategic level discussion also took place with the Economic and Social Research Council and other groups representing social sciences. In September, the Society coordinated and hosted a meeting initiated by the Food Standards Agency in which chairs of advisory committees discussed risk assessment with social scientists. The positive outcome signifies real progress in generating greater understanding of science in society principles and practices.

The Society hosted the third annual BA/Royal Society Communication conference which explored strategic



Inaugural Kohn Award

The inaugural Royal Society Kohn Award for Excellence in Engaging the Public with Science was awarded to Dr Colin Pulham of the University of Edinburgh in May at the 2005 Science Communication Conference. Dr Pulham was recognised for his work in communicating and promoting debate on science through demonstrations, and hands-on activities with local communities during the last ten years. Dr Pulham undertook to spend a large proportion of his grant in ways which would encourage other researchers to participate in dialogue with the public, having already influenced colleagues in his own department.

The award was created by the Society with generous support from the Kohn Foundation. It rewards UK-based practising scientists or science communicators for their engagement with society in matters of science and its societal dimension.

partnerships to develop effective science communication. The conference was attended by 270 influencers and practitioners in the field, an impressive 44 per cent increase on 2004. Key themes to emerge from discussions,

which built on the 2004 recommendations, were working with funding bodies to promote science communication and engagement with industry. The Society is pursuing these themes in collaboration with the BA and others in the science and science communication communities.

In September, the Society launched ***Factors affecting science communication: a survey of scientists***, a study which will provide evidence for a workable system to reward scientists in their efforts to engage with the public. The study is being funded by the Society with the support of Research Councils UK and the Wellcome Trust, and involves an online survey of approximately 1500 UK science researchers together with structured interviews. The report is due for publication in 2006.

The Society continued to offer communication skills and media training courses as a means of equipping scientists with the skills they need to engage with non-specialist audiences. More than 100 post-doctoral scientists participated in these courses in 2005, including 31 Royal Society Research Fellows and 60 nominees of Research Councils.

 www.royalsoc.ac.uk/scienceinsociety

which attracted much media interest. Lord Oxburgh FRS, former Chairman of Shell, delivered *The right climate for business*.

 www.royalsoc.ac.uk/live

Extending the Society's reach

The Society's revamped website, launched in November 2004, is attracting more than double the number of annual visitors by broadening the Society's reach to global audiences. The website received industry recognition through being shortlisted for a 2005 New Media Age (NMA) Effectiveness Award (Public Sector Category).

During the year the Society has broadcast 21 events live from its website, reaching more than 5000 people in more than 30 countries. New technology available through the website has also enabled the Society to streamline the electronic registration process for its scientific discussion meetings.

The revamped website is central to the Society's communications effort, and we will take maximum advantage of the opportunities it affords in the lead up to our 350th anniversary and beyond.

The Society's programme of public events seeks to stimulate the wider community's interest in science. Audiences were greatly extended in 2005 through the use of webcasting.

Almost all public lectures are now broadcast on the web in either live or recorded format, and are available for on-demand viewing. In the face of global concerns about climate change and the future of mankind, three public lectures were especially topical this year. Professor Jared Diamond delivered *Collapse: how societies choose to fail or survive*. Tim Palmer FRS, Science Chair of the UN project on Climate Variability and Predictability, and Dr Tim Wheeler of the University of Reading delivered a two-part lecture titled *Global warming in a chaotic climate - can we be sure?* and *Growing crops in a changing climate*



Einstein's legacy in the 21st century

Astronomer Royal Sir Martin Rees won the 2004 Royal Society Michael Faraday Prize for excellence in communicating science to UK audiences, and delivered his prize lecture, *Einstein's legacy as a scientist and icon*, at the Society in January 2005.

'The future of our planet will depend on collective human actions, and how we choose to apply our scientific knowledge. We need to adopt the perspective that Einstein espoused - global, humanistic and long-term. If we choose wisely, Einstein's legacy will resonate through this century and indeed far beyond.'

Sir Martin Rees

Sir Martin, later to become Lord Rees of Ludlow, is Professor of Cosmology and Astrophysics and Master of Trinity College, University of Cambridge. He was awarded the 2005 Crafoord Prize in Astronomy, considered the equivalent of the Nobel Prize in fields such as cosmology, which fall outside the Nobel Prize categories. Lord Rees was elected President of the Royal Society on 15 July, and takes over from Lord May of Oxford on 1 December.



Prize lectures delivered during the year included the Michael Faraday lecture, given by Sir Martin Rees FRS, the Leeuwenhoek lecture, given by Professor Keith Chater FRS and repeated in Norwich and Aberdeen, and the Rosalind Franklin lecture given by Professor Carol Robinson FRS.

www.royalsoc.ac.uk/events

The Society continued its partnership with the Aventis Foundation, a German charitable trust established by a predecessor of sanofi-aventis, in managing the **Aventis Prizes for Science Books**.

Members of the Junior Prize judging panel



The awards ceremony for the 17th year of the Prizes was hosted by broadcaster and clinical psychologist Dr Tanya Byron, who also chaired the judging panel that prepared the Junior Prize shortlist. Over 800 children in junior judging panels at schools, youth groups and libraries reviewed the shortlisted books, and awarded the Junior Prize to Robert Winston for his book *What Makes Me, Me?* The General Prize, selected from a shortlist compiled by a panel chaired by last year's winner Bill Bryson, was awarded to Philip Ball for his book *Critical Mass: How one thing leads to another*. Profiles of all shortlisted books and their authors are available at

www.royalsoc.ac.uk/aventis

The Society once again teamed up with the best scientists in the UK, and the universities and industries that support them, to showcase cutting-edge research at the **Summer Science Exhibition** in July. Although visitor numbers were affected by the tragic events that occurred in London in the same week, the exhibition was still a great success with more than 100 scientists from academic and industrial laboratories in both the public and private sectors on hand to communicate their work to visitors through 24 fascinating exhibits. Among the most popular exhibits was *The oldest American? Footprints from the past*, by a team from Bournemouth and Liverpool John Moores Universities. The exhibit featured footprints discovered in Mexico that the researchers believed to be 30,000 years old, and some 18,500 years older than previous human finds from this region. Also popular was Imperial College's *Surgical Robots: The future is here* exhibit, which displayed Imperial's work in developing and assessing the provision of 'an intelligent, interactive, robotically enhanced delivery of health care.' *Don't panic!*, an exhibit by a team from the Universities of Sussex, Nottingham and St Andrews featured computer simulations of underground station evacuations that proved regrettably relevant in the wake of the London bombings.

For the first time this year the Society produced a 'virtual' version of the Summer Science Exhibition, giving those who were unable to attend an opportunity to experience the event in an easy-to-access and lively online format.

 www.royalsoc.ac.uk/sse



Sharing scientific knowledge and history

In publishing its seven scientific journals, the Society cooperates and collaborates with many different partners and stakeholders including authors, referees and librarians.

The Society's journals have enjoyed a positive year, both financially and editorially. **Citation rates** are particularly important in determining a journal's success. Measured by a tool known as the Impact Factor, these rates are increasingly used by authors when deciding where to publish, and can also have a bearing on purchasing decisions. This year has heralded increased Impact Factors for all of the Society's journals. Particularly impressive was a 73 per cent increase in the Impact Factor for *Notes and Records of the Royal Society*. *Philosophical Transactions of the Royal Society B: Biological Sciences* exceeded an Impact Factor of 4 for the first time.

Journal of the Royal Society Interface, the Society's interdisciplinary journal, celebrated a successful first year in May. It was highly commended in this year's prestigious Association of Learned and Professional Society Publishers/Charlesworth Best New Journal Awards, earning recognition for its excellent editorial content, effective launch campaign and attractive design. *Interface* has been widely acclaimed by the scientific community, and submissions have far exceeded expectations. As a result, the journal will increase frequency from five to six issues per year in 2006.

Each year an impressive amount of cutting-edge science is published in all the Society's journals. The August issue of *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* published some of the latest research in grid computing, a field which is attracting immense global interest. Many of the papers in the issue relate to research undertaken as part of the UK e-Science Programme, a coordinated initiative involving all Research Councils and the Department of Trade and Industry. The June issue of *Philosophical Transactions of the Royal Society B: Biological*

Sciences published the text of nine specially selected Royal Society Prize Lectures from recent years, none of which had been published elsewhere. It also offered a unique opportunity to read Francis Crick's final paper on the theme of consciousness, which was completed after his death by Christoph Koch.

www.pubs.royalsoc.ac.uk

Discussing cutting-edge science

The Society's scientific discussion meetings provide a forum for the world's leading researchers to confer on some of the most rapidly developing areas of inter-disciplinary research. Leading experts from the UK and overseas are invited to present papers which are usually published subsequently in *Philosophical Transactions of the Royal Society (A or B)* along with notes of the meeting. (A full list of this year's meetings is given on pages 21 and 22.)

One of this year's most popular meetings was *Bioinformatics: from molecules to systems*, which focused on current challenges in bioinformatics including the interpretation of genome sequences and the analysis and prediction of protein structure and function. It attracted 297 attendees and was also the first meeting of the year to be webcast in its entirety.

www.royalsoc.ac.uk/bioinformatics



With collections on the history of science dating back more than 350 years, the Society's Library and Archive are unique and invaluable resources used by researchers, scientists and members of the public alike.

During the year, the Library provided increased access to its collections, notably through the ongoing **archive cataloguing programme**. Generous support from the Andrew W Mellon Foundation has allowed the Society's team to populate the web-based archive catalogue with much useful data for researchers, and 91,000 records have been added to this resource.

Among the key personal collections which can now be explored online include the papers of physicist Sir Francis Simon FRS (1893-1956) and penicillin pioneer and Royal Society President Lord Florey FRS (1898-1968). Older collections vary from material in the Society's administrative archives, notably the Classified Papers which contain manuscripts by Robert Hooke, Sir Christopher Wren and others, to 18th and 19th century sets of personal papers such as letters of the physician Sir Charles Blagden FRS (1748-1820), a close associate of Henry Cavendish and Sir Joseph Banks.

The cataloguing exercise has highlighted many items of great interest, ranging from the amusing to the internationally important. The Miscellaneous Manuscripts series contains a remarkable letter by T H Huxley in which he records, complete with illustrations, a Laurel-and-Hardy-style mix-up of hats with Sir George Stokes. A partnership between Royal Society archivists and researchers of the Newton Project at Imperial College proved a more sure-handed combination when it came to identifying the now-famous Newton alchemical notes within the same set of records.

As in the case of the Mellon project, other successes of the year have been enabled by relationships between the Library and its donors. Key historical books, including *Physico-mechanical experiments* (1719) by Royal Society curator Francis Hauksbee, were purchased at Sotheby's Macclesfield sale thanks to contributions to the Library Reserve Fund. Similar



Rediscovery of lost Newton manuscript

A collection of alchemical notes by Sir Isaac Newton, thought by experts to have been lost following their sale for £15 at an auction in Sotheby's in July 1936, was discovered during cataloguing of the Royal Society's Miscellaneous Manuscripts. With the help of Imperial College's Newton Project, they were identified as being the papers which had disappeared nearly 70 years before.

Much of the text consists of Newton's notes on the work of another alchemist of the 17th century, Frenchman Pierre Jean Fabre, although one page, which is written almost entirely in English in Newton's own hand, may offer his own thoughts on alchemy.

acquisitions of archives, watercolours and oil paintings have often been accompanied by financial contributions to allow the Library to catalogue, conserve and promote the scientific and historical value of these materials. A notable example was the acquisition of the personal papers of the astronomer Thomas Gold FRS (1920-2004) which was accompanied by a contribution of £18,000.

 www.royalsoc.ac.uk/library

Summarised accounts



The financial information given here is a summary extracted from the Society's audited financial statement for the year ended 31 March 2005, which was approved by its Council on 14 July 2005.

The Auditor's report was unqualified. A copy of the financial statements will be submitted to the Charity Commission.

On behalf of the Trustees
Sir David Wallace, Treasurer

The summarised financial information may not contain sufficient detail to allow for a full understanding of the Society's financial affairs. For further information, the full annual financial statements, the Auditor's report on those financial statements and the Trustees' Report should be consulted. Copies of these can be obtained from the Society at 6-9 Carlton House Terrace, London, SW1Y 5AG.

Auditor's statement to the Royal Society

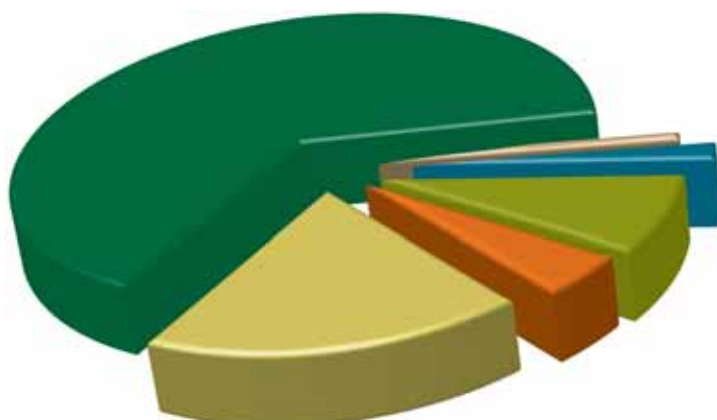
We have examined the summary financial statements set out on page 18. The summary financial statements are the responsibility of the Society's Council. Our responsibility is to report to you our opinion on its preparation and consistency with the full report and financial statements. We conducted our work in accordance with the Bulletin 1999/6, the Auditor's statement on the Summary Financial Statements, issued by the Auditing Practices Board.

Our report has been prepared pursuant to the requirements of the Charities Act 1993 and for no other purpose. No person is entitled to rely upon this report by virtue of and for the purpose of the Charities Act 1993 or has been expressly authorised to do so by our prior written consent. Save as above, we do not accept responsibility for this report to any person or for any other purpose and we hereby expressly disclaim any and all such liability.

In our opinion, the summary financial statements are consistent with the full report and the financial statements of the Royal Society for the year ended 31 March 2005 and comply with the requirements of the Statement of Recommended Practice, Accounting and Reporting for Charities, and regulations made there under, applicable to summary financial statements.

BDO Stoy Hayward LLP

Chartered Accountants and Registered Auditors
21 October 2005



Balance sheet

As at 31 March 2005, the net assets of the Society were £130817k.

Income

	£k
Donations and legacies	31
Fellows' contributions	169
Publications and services	4163
Investment income	2251
Other grants and contributions	9587
Parliamentary Grant-in-Aid	31698
Total	47899

Expenditure

	£k
Fundraising	120
Financing research	22102
Research support	6848
International science and networking with academies	5748
Communicating science	1694
Informing scientific policy	427
Library and history of science	256
Fellowship	123
Publications and services	3265
Staff and other costs directly in support of activities	3239
Management and administration	1996
Total	45818

Fundraising and support



how it can best adapt to a changing world. In so doing, the Society remains acutely conscious of its reliance on the generosity of the members of Fellowship and their families and other individuals, corporations and charitable trusts to have the capacity, flexibility and independence to be at its most effective. Each funding partner listed on these pages is owed a debt of gratitude for supporting the Society in its efforts to make a real difference for science both now and in the future.

www.royalsoc.ac.uk/fundraising

The Royal Society's generous funding partners provide crucial support for its efforts in pushing back the frontiers of knowledge, ensuring that the best scientific evidence is widely available and in communicating science.

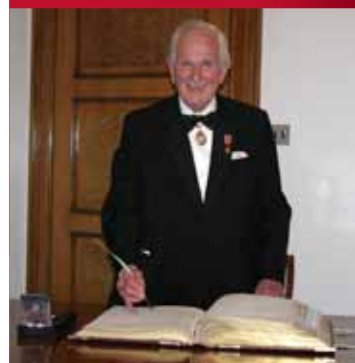
The past year saw a mixture of celebration and thoughtful reflection on the Society's future. Ten years since the campaign was first conceived, the Society marked the **formal closure of Project Science** which raised over £40 million in new funds for science. Donations from the supporters of Project Science have enabled the Society to preserve and strengthen its independence, expand its ability to be flexible and innovative across its full range of programmes and activities, and transform Carlton House Terrace into a truly fitting home for UK science. An event to celebrate the campaign's closure was held in February, attended by the President, Officers and many of the Society's most dedicated supporters. The event also saw the launch of the Royal Society Darwin Trust of Edinburgh Research Professorship which was endowed by the campaign. The Darwin Trust of Edinburgh was set up through the generosity of Sir Kenneth Murray FRS and Professor Noreen Murray CBE FRS. Professor Jean Beggs FRS of the University of Edinburgh is the first holder of the post.

Having celebrated the past, the Society began looking towards the future, focusing on its **350th anniversary in 2010**. The anniversary is prompting the Society to reflect on the challenges the future will bring, and

Wolfson Foundation's 50th Anniversary

In June, the Society hosted a celebration of the Wolfson Foundation's 50th anniversary, giving a chance for the whole of the UK science community to recognise the Foundation's outstanding contribution to infrastructure and scientific excellence in the UK over many years.

The celebration also marked Lord Wolfson of Marylebone's admittance to the Society as an Honorary Fellow.





The President's Circle

The Society gratefully acknowledges the generosity of major benefactors who have made a significant and lasting impact on its work.

EP Abraham Cephalosporin Fund
Aventis Foundation
BP plc
Cambridge Crystallographic Data Centre
The Darwin Trust of Edinburgh
The Garfield Weston Foundation
GlaxoSmithKline plc
The Kohn Foundation
The Leverhulme Trust
Brian Mercer Charitable Trust
The Mercers' Company
Raymond and Beverly Sackler Foundation
Sino-British Fellowship Trust
The Wellcome Trust
The Wolfson Foundation
KC Wong Education Foundation

Benefactors

The Society gratefully acknowledges generous support from the following organisations during the past year.

Armourers & Brasiers' Company
AstraZeneca plc
The Daiwa Anglo-Japanese Foundation
The Gatsby Charitable Foundation
Andrew W Mellon Foundation
National Grid Transco plc
Rolls-Royce plc
The Salters' Company
John Templeton Foundation

Supporters

The Society gratefully acknowledges the generosity of individuals whose gifts during the past year have made a significant impact on its work.

Sir Alan Battersby FRS
Sir Ewen Fergusson GCMG GCVO
and Lady Fergusson
Robert A Hefner III
Sir David Hopwood FRS
Professor Patricia Jacobs OBE FRS
Professor Yuet Wai Kan FRS
Damon de Laszlo
Professor Charles Rees CBE FRS
Sir Martin Wood OBE HonFREng FRS

The Society also wishes to acknowledge all donations that have been made anonymously.

Bequests and memorial gifts

The Society gratefully acknowledges the generosity of those who have made bequests and memorial gifts during the past year.

Mrs Kathleen Denbigh in memory of
Professor Kenneth Denbigh FRS
Professor Gordon Fogg CBE
Professor Alfred Gaydon FRS

Events of the year

September 2004 to August 2005



September

Schools event

- ▶ *Surf's up: science at sea*, a schools' lecture and activities session by Dr Jason Hall-Spencer and Dr Richard Kirby, organised as part of the BA Festival of Science in Exeter

Public events

- ① *Beauty in science and literature*, a panel discussion chaired by Dr Daniel Glaser and featuring Professor Nancy Rothwell FRS and Ben Okri FRSL, organised in partnership with the Royal Society of Literature
- ① *Exploring nanotechnologies*, a panel discussion chaired by Nick Ross and featuring Professor Ann Dowling CBE FRS FREng, Dame Deidre Hutton, Dr Doug Parr and Ian Pearson, organised in partnership with the Royal Academy of Engineering

Scientific meeting

- ▶ *Chromosome segregation*

October

Public events

- ① *Wild reckonings*, an evening of poetry from *Wild Reckoning* - an anthology of poems inspired by Rachel Carson's *Silent Spring*. Readers included Professor Richard Dawkins FRS

Clifford Paterson lecture

- ① *What is quantum non-locality?*, a public lecture by Professor Sandu Popescu
- ① *Not just about numbers*, a public lecture by Professor John Barrow FRS
- ① *A new Eden*, a public lecture by Tim Smit

Scientific meeting

- ① *The nature of mathematical proof*

November

Ferrier lecture

- ① *Magnetic brain stimulation: what can it tell us about brain function?*, by Professor Alan Cowey FRS

Rosalind Franklin lecture

- ① *Finding the right balance: from rare gases to ribosomes*, by Professor Carol Robinson FRS

Francis Crick lecture

- ① *Genes, worms and the new genetics*, by Dr Julie Ahringer

Scientific meeting

- ▶ *Engineered foams and porous materials*

Anniversary Day

- ▶ Anniversary of the founding meeting of the Royal Society, including the presentation of the Society's medals, awards and prize lectures, the President's Anniversary Address and an evening reception



December

Public event

- ① *Science, complexity and the nature of existence*, a public lecture by Professor George Ellis, supported by the John Templeton Foundation

Sir Jagdish Chandra Bose Memorial lecture

- ▶ *Journey to the moon. Space science in India: two recent initiatives*, by Dr Krishnaswamy Kasturirangan

Published reports

- ▶ *Royal Society Infectious Diseases in Livestock Inquiry follow-up review*
- ▶ *Do no harm: reducing the potential for the misuse of life science research*

January

Scientific meeting

- ▶ *Genetic variation and human health*

Public event

- ① *Collapse: how societies choose to fail or survive*, a public lecture by Professor Jared Diamond

Michael Faraday lecture

- ▶ *Einstein's legacy as a scientist and icon*, by Sir Martin Rees FRS

February

Scientific meeting

- ▶ *The fundamental constants of physics, precision measurements and SI base units*

Public event

- ▶ *The Scarecrow's brain - images of the scientist in film*, a public lecture by Sir Christopher Frayling

Bakerian lecture

- ▶ *Negative refraction, the perfect lens and metamaterials*, by Sir John Pendry FRS



March

Public events

- 🕒 *A short history of nearly everything*, a public lecture by Bill Bryson
- ▶ *Do scientists need to think more deeply?*, a public lecture by Dr Colin Tudge
- ▶ *Stem cells in the spotlight*, a public lecture by Dr Patricia Murray, organised as part of the Wrexham Science Festival

Royal Society Athena lecture

- ▶ *All's well that ends well: telomeres, politics and family*, by Professor Virginia Zakian

Scientific meeting

- ▶ *MHD waves and oscillations in the solar plasma*

Published reports

- ▶ *Response to the House of Commons Science and Technology Committee inquiry into strategic science provision in English universities*
- ▶ *EASAC: A user's guide to biodiversity indicators*

April

Scientific meetings

- 🕒 *Bioinformatics: from molecules to systems*
- ▶ *Food crops in a changing climate*

Leeuwenhoek lecture

- ▶ *Streptomyces inside out: a new perspective on the bacteria that provide us with antibiotics*, by Professor Keith Chater FRS

Public event

- ▶ *Global warming in a chaotic climate - can we be sure?*, and *Growing crops in a changing climate*, a two-part public lecture by Dr Tim Palmer FRS and Dr Tim Wheeler

May

Public event

- 🕒 *Why we cooperate*, a public lecture by Professor Martin Nowak, supported by the John Templeton Foundation

Scientific meeting

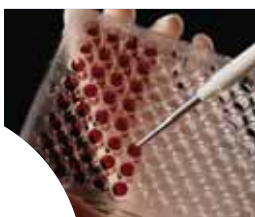
- ▶ *Sexual conflict: a new paradigm?*

Croonian lecture

- 🕒 *Adventures in vascular biology*, by Professor Salvador Moncada FRS

Conference

- ▶ *The Science Communication Conference*, organised by the British Association and the Royal Society



June

Public events

- 🕒 *New views on human origins*, a public lecture by Professor Chris Stringer FRS
- ▶ *Robert Boyle and the early Royal Society: A reciprocal exchange in the making of baconian science*, a public lecture by Professor Michael Hunter
- ▶ *Heavenly music: the sounds of the universe*, a public lecture by Professor Andy Fabian FRS and Dr Carolin Crawford, organised as part of the Cheltenham Festival of Science
- 🕒 *The right climate for business*, a public lecture by Lord Oxburgh of Liverpool FRS

Scientific meeting

- ▶ *Laser-driven plasma accelerators: new sources of energetic particles and radiation*

Published report

- ▶ *Ocean acidification due to increasing atmospheric carbon dioxide*
- ▶ *EASAC*: Infectious diseases – importance of coordinated activity in Europe*

Joint academies' statements

- ▶ *Global response to climate change*
- ▶ *Science and technology for African development*

July

Public event

- 🕒 *2005 Summer Science Exhibition*

New Fellows Seminar

- ▶ *A presentation by new Fellows of their work*

Admission Day

- ▶ *The formal admission of the 2005 class of Fellows to the Fellowship*

*European Academies Science Advisory Council. Provides independent scientific advice to those who make or influence policy for the European Union. The Royal Society hosts the secretariat of this body.

- 🕒 Webcast available at www.royalsoc.ac.uk/webcasts

- 🕒 Available to view online at www.royalsoc.ac.uk/sse

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The Royal Society has three roles: as the UK academy of science, as a learned society and as a funding agency. It responds to individual demand with selection by merit, not by field.

The objectives of the Royal Society are 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.



Issued: November 2005

Founded in 1660, the Royal Society is the independent scientific academy of the UK, dedicated to promoting excellence in science

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