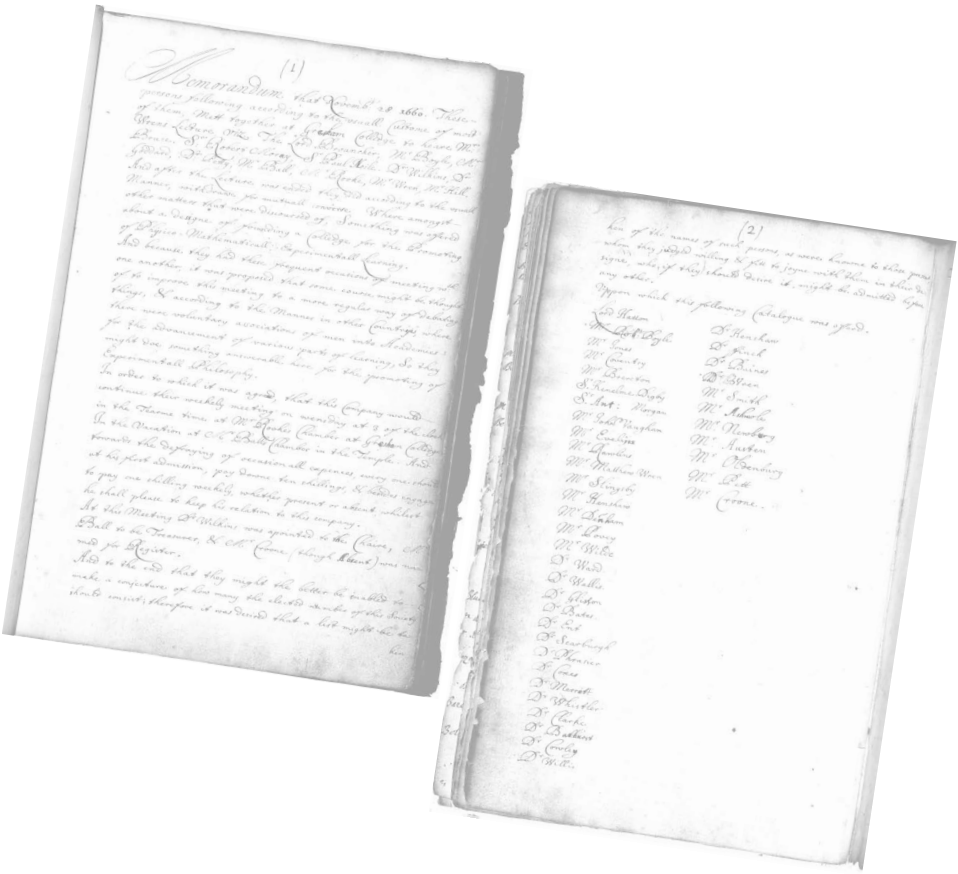

Anniversary Address 2009

Lord Rees of Ludlow OM Kt PRS

CELEBRATE 350 YEARS

THE ROYAL SOCIETY

Congratulations to all those who have received awards this afternoon.

As the risk of being invidious, I'd like specially to acclaim Professor C.N.R. Rao, who has travelled from Bangalore to be here today. His Royal Medal recognises more than 50 years of distinguished research. But, over and above that, he's been a crucial catalyst for scientific excellence in India through his unflagging commitment and leadership - and an inspiration throughout the developing world.

And it's appropriate also to congratulate our three Fellows who gained Nobel Prizes this year - Elizabeth Blackburn, Charles Kao and Venki Ramakrishnan - and the many who have won other major international awards.

This afternoon I want to comment first on some global issues. I'll then focus in to the here and now.

Events in the last year have highlighted the interconnectedness and vulnerability of today's world. The fall-out from the banking fiasco was worldwide. And there have been rising concerns about infectious diseases: thankfully, no catastrophic pandemic has yet hit us, but it's clear that in this context, as in finance, preventative measures require global monitoring and cooperation. There has also been stronger focus on crises that are less immediate but deeply disquieting: the pressures on energy and resources cause by a larger and more empowered population. This is the first century when one species, ours, risks irreversibly degrading the entire planet's environment.

To reduce such risks we shall more than ever need the fruits of science: vaccines against pandemics, better food supplies, 'clean' energy, more robust networks, and equitable policies to preserve ecosystems and climate. All these are rightly high on the agenda of any scientific academy, and they've featured strongly in our activities this year.

Food, climate and energy

The Society published last month a study entitled *Reaping the Benefits: science and the sustainable intensification of global agriculture*. It was chaired by one of the world's most distinguished plant scientists, Sir David Baulcombe.

The global population has risen six-fold since Thomas Malthus offered his famously pessimistic prediction that human populations would outrun the growth in food supplies. But, despite devastating regional famines (generally caused by wars, distribution problems or economic inequality), food production has more than kept pace. We have however become unduly dependent on farming techniques that cause long-term environmental damage. Productivity must be further enhanced - but without degrading the soil or despoiling the ecology. The report's main message is that the 'sustainable intensification' of agriculture requires a multi-pronged approach. Improvements in farming practices, pest control and crop management are essential, but modern genetics and other biological advances must be deployed as well.

There is a big gap between sophisticated UK laboratories and the reality of subsistence farming. To eliminate malnourishment in Africa - and indeed to ensure food security in Europe - requires an adequate economic and political infrastructure as well.

Water shortages are, in many areas, a major constraint on food production. These will be aggravated by climate change - a topic that naturally remains high on our agenda in the lead-up to the Copenhagen conference next month.

The Society has of course been in the forefront of climate research, and UK scientists have had leading roles in the IPPC. It's sometimes asserted that the IPPC reports are accepted without enough critical scrutiny by scientists. That's absolutely not so - as would have been plain to any who attended the lively discussion meetings on climate change at the Royal Society. These meetings are open to all, and it's sad that those who disparage the science didn't attend them.

The 4th IPCC assessment came out in 2007. Subsequent work has strengthened the concern about dangerous, long-term and potentially irreversible climate change. Sea level rise could speed up; CO_2

concentrations are rising at the higher end of projections; methane concentrations have also started to rise.

Everyone quotes a 'headline figure' of predicted global temperature rise: 2, 3 or 5 degrees Centigrade. But the rise won't be uniform. Recent models from the Hadley Centre show that a 4 degree global rise could lead to a warming of up to 10 degrees in western and southern Africa. Moreover, if our dependence on fossil fuels were not reduced, this could happen by 2070.

The models offer enough spatial resolution to address questions like: Where will droughts be worst? Where will storms increase? What will happen to the monsoons?

The key – and uncontroversial - fact is that the atmospheric CO_2 concentration is already higher than it's been for at least a million years, and is rising in an unprecedented fashion, primarily because of fossil fuels. The main downsides lie decades in the future. However, it seems that anthropogenic global warming has already begun. The last decade has been warmer, on average, than any other decade in the last 150 years. But there isn't a steady rise, because the 'forcing' by CO_2 is superposed on all the other climate changes: El Nino, La Nina, etc.

It's the consensus view that to ensure a better than evens chance of avoiding a potentially dangerous 'tipping point', the mean temperature rise must be held below 2 degrees. To achieve this, global CO_2 emissions must, by 2050, be brought down to half the 1990 level. This 2050 target corresponds to two tons of CO_2 per year from each person on the planet. For comparison, the current US level is 20, the European figure is about 10, and the Chinese level is already 5.5 and the Indian is 1.5.

The scientific evidence that underpins calls for action at Copenhagen is very strong. Without co-ordinated international action on greenhouse gas emissions, the impacts on climate and civilisation could be severe. Because the key determinant of climate change is the cumulative anthropogenic build-up of CO_2, this action mist be urgent. That's why the signal sent by the outcome of Copenhagen will be so crucial. The aim must be to turn around the annual rise in global emissions by the 2020s.

Reaching this target would be a momentous achievement - one where all nations acted together, in the interests of a future beyond the normal

political horizon. Unless politicians are spurred to achieve real progress in Copenhagen, the outlook will be bleaker. Ironically, the political response to the financial crisis offers encouragement. Who would have thought two years ago that the world's financial system would have been so transformed that banks were nationalised, and so forth? Likewise, we need coordinated 'outside the box' action to cope with the looming climate crisis.

There is surely a moral imperative for developed countries to take the lead in cutting their carbon emissions and to share their wealth and skills so that developing countries can adapt to climate change and build their economies sustainably.

It's sometimes said fatalistically that the UK's stance is of marginal import, because our emissions constitute only 1 or 2 per cent of the problem. But we have leverage in two respects.

First, politically: we have earned political influence because of the UK government's international leadership ever since the Gleneagles Summit, and because we've already enshrined into law a commitment to cut our own emissions by 80 per cent over the next forty years.

Second, through our science and engineering: we not only have a high profile in climate science, but we have the expertise to spearhead the technologies needed for a transition to a low-carbon economy - and it's in our national interest to take a lead. We need to keep our lights on - to ensure energy security for ourselves. But, beyond that imperative, we should seize the chance to pioneer 'clean' and sustainable energy to meet the entire world's growing needs.

Our energy R and D is still, despite some welcome government initiatives, on the same scale as it was in the pre-privatisation era of the 1980s - minuscule compared to the scale of the challenge. But in the US, energy took a big share of the stimulus package. Indeed, President Obama declared that energy R and D should have the same national priority that the Apollo programme had in the 1960s.

What are the 'clean energy' options - for this country in particular?

There's nuclear power. Many of us favour the UK having at least a replacement generation of power stations, and substantial R and D

worldwide into 'fourth generation' reactors, 'fission-fusion hybrids' and the like. But the non-proliferation regime is fragile, and before being relaxed about world-wide expansion of nuclear power, one would surely require the kind of fuel bank and leasing arrangement that has been proposed by the IAEA. (In this context, our study of how to cope safely with separated plutonium, led by Professor Geoffrey Boulton, has been well received in government)

There's wind - onshore and offshore. The technology is well-tried, but government policy displays a lack of realism in the speed with which thousands of offshore turbines can be built and deployed.

There's wave and tidal energy. Here, the UK could lead. We have the geography - a large tidal range, and capes round our coast with fast-flowing tidal streams - and we have marine technology from the North Sea oil and gas.

And biofuels. There's rightly been ambivalence about first generation biofuels - there is a tradeoff with land use for food production and forestation. A well-received Royal Society report last year set out the pros and cons. But in the longer run genetic technology may have a lot to offer.

Another need is for improved energy storage - lithium batteries and super-capacitors - for transport, to smooth over peaks and troughs in demand, and to complement unsteady power sources such as sun and wind.

And nuclear fusion (including of course the ITER project) remains an important area of research that could have long-term potential.

But a widely favoured long-term bet for Europe is solar energy - huge collectors in the Sahara generating power that's distributed via a pan-European smart grid. Achieving this will require vision, commitment and public-private investment on the European Level.

If mitigation efforts are ineffectual, CO_2 will inexorably reach a concentration where there's serious risk of a 'tipping point'. Some therefore argue that the international community should, as a fallback, contemplate a 'plan B' : geoengineering the climate to combat the effects of fossil fuels.

In September the Society published a comprehensive assessment of geoengineering, chaired by Professor John Shepherd. The most widely discussed concepts entail countering the warming effects of rising CO_2 concentration by (for instance), changing the albedo of clouds, putting aerosols in the upper atmosphere, or even deploying vast sunshades in space. The committee put a firm damper on all such options - this cautionary message is timely, as the possibility of a 'techno-fix' has an undoubted allure. The continuing build-up of CO_2 would store up problems for our descendents - as well as having other deleterious effects, such as ocean acidification.

An alternative geoengineering strategy is direct extraction of CO_2 from the atmosphere. This might be more politically acceptable, though it's not clear whether it would be feasible on the necessary scale.

The overall message is that geoengineering merits some long-term research, but it is not a substitute for the high-priority pursuit of mitigation. Moreover, it is in everyone's interest that any moves towards geoengineering 'field trials', let alone full implementation, enjoy the legitimacy that comes from robust frameworks of governance, accountability and public engagement.

Demography

No-one could have been unaware that 2009 was Darwin's year. All scientists should be grateful to the wide community that was involved in the many high-profile commemorative activities, which undoubtedly raised public understanding of Darwin's life and ideas.

Darwin's work has practical relevance to the behaviour of viruses and suchlike: indeed there was a Royal Society discussion just last month on that theme. But let's not forget that conceptual leaps have a cultural value that is worthwhile in itself. The impact of *The Origin of Species* on intellectual life was immediate and profound - and of course resonates even more today, 150 years after its publication.

Darwin's anniversary year will now segue into the Year of Biodiversity – a topic that will be addressed at a conference here next January. This important meeting will be held under the auspices of the Inter-Academy Panel (IAP), a federation of 103 academies of science from all over the world who will be our guests for their triennial general assembly.

The IAP owes its origin to an *ad hoc* meeting of the world's academies that took place in New Delhi in 1993. A key impetus for this first meeting came from Anne Maclaren, then the Society's Foreign Secretary. Its theme was global population.

The population has risen by more than a billion in the 16 years since the New Delhi meeting. It is now 6.8 billion. Barring catastrophe, it will reach around 9 billion by 2050 - most people alive today are under 25. The forthcoming IAP meeting offers a good opportunity to revisit the impact of population growth. And the Society hopes during 2010 to carry out its own assessment of the Earth's 'carrying capacity' and related issues.

The good news is that in half of the world, fertility has fallen below replacement level - empowerment of women being a key factor. If the same fall happened everywhere, then the global population could start a gradual decline after 2050 - a development that would surely be benign.

But in Africa the prognosis is bleak. Ethiopia's population 100 years ago was 5 million. It's now 75 million, and it will almost double by 2050. Sudan and Uganda will more than double. In 1950, Europe had three times the population of Africa. In 2050, Africa will have three times Europe's.

The rich world has the resources, if the will is there, to enhance the life-chances of the world's billion poorest people - relieving the most extreme poverty, providing clean water, primary education and other basics. This is a precondition for achieving in Africa the demographic transition that has occurred elsewhere. It would surely be shameful, as well as against even our narrow self-interests, if the UN Millennium Goals set for 2015 were not met.

Another issue that will surely concern the IAP - especially the African Academies with whom our Society has forged special links - is migration. The combined effects of globalisation, liberalised labour markets and ease of travel have led to international mobility on an unprecedented scale. Almost one in ten people living in developed parts of the world are migrants. There's one big difference from earlier centuries. Those who voyaged from Europe to North America or Australia in the 19th century made an almost irreversible lifetime decision - breaking links with their roots and their families. Today, migrants can stay in contact with their homeland: travel is far easier, and communications are always open.

Governments are increasingly competing to attract highly-skilled migrants. The US, in particular, has benefited hugely by draining top talent from the rest of the world. This transfer need not always be a net loss to the 'donor' country - there's evidence of a growing two way traffic. Some now use the term 'brain circulation' to describe what's happening in China, India, Taiwan and Ireland.

Nonetheless, the poorest countries face enormous challenges in retaining their all-too-few highly-trained people, and even more in attracting them back. Africa's predicament is the worst. It shoulders a quarter of the global health burden, but only 1 in 60 of the world's health workers. And of those, a 2005 survey said that around half wanted to leave. Their loss can be ill afforded - it's doubly tragic if, having come to a developed country, they find they're not accredited - and doctors become cab drivers.

These issues warrant innovative international approaches to help developing countries engage with their diaspora communities. Maybe wealthy countries should reimburse enough funds to train two people for each one who is drained away to Europe or North America. We need programmes that encourage expatriate experts to go back to their home countries, even if just for short stays, to foster new collaborations for research and aid institutional growth.

To stimulate and inform policies in this important area, the Society is preparing a report on Global Science.

The UK scene

Let me focus now on some UK issues.

More and more aspects of public policy have a scientific dimension, but science tends to be trumped on the political agenda by seemingly more urgent though less important matters. Nor is the best scientific advice always taken adequately into account. In that context we welcome the survival of the House of Commons Select Committee on Science and Technology, under Phil Willis's effective chairmanship. It is disquieting to note how few MPs in any political party have any serious scientific interests or engagement - indeed the Conservatives have not taken up their quota of slots on the Select Committee. Several MPs who have

been its stalwarts will be leaving Parliament at the next election - one can only hope for some worthy replacements among the new intake.

In the last 'reshuffle', DIUS was disbanded after only two years' existence; science and tertiary education were shifted into an expanded BIS. Few tears will have been shed for DIUS as such. But it is disquieting that reorganisations are imposed at short notice, and with an economy of forethought - the ensuing disruption distracts attention from a demanding agenda. It is reassuring that John Beddington and Adrian Smith continue in their key roles, and that Paul Drayson retains at least a part-time science brief.

We should welcome the appointment of Chief Scientific Advisers in further departments (including the Foreign Office) - though there still isn't one in the Treasury. (And, incidentally, it's welcome and important that there will be a new post of Chief Scientist for the EU - poor coordination all too often prevents Europe from punching at its full weight.)

When President Obama named the scientists who would join his administration he said that their advice should be heeded "even when it is inconvenient - indeed especially when it is inconvenient". And his scientific advisors are indeed a 'dream team'. We've been pleased to welcome Harold Varmus, Steve Chu and John Holdren to the Society for discussions during the year.

Professional bodies and learned societies all have a role in ensuring that the best evidence and advice is available to policymakers. But the Royal Society's coverage of all science and technology gives it a special status, and ensures that our advice (whether sought or not) deserves to have impact. But to ensure that it actually does, we need to engage with Whitehall, with the media, and with all political parties - especially in this pre-election atmosphere.

Our 'core competence' as a Society is science: that is the only area where we should aim to articulate a consensus. In other aspects of their lives - in their politics, nationality and religion - scientists span a diverse range of allegiances and opinions. But it would be good if more of them- including our Fellows and URFs -were to engage, from their individual perspectives, in wider political and policy activities.

Today we are formally launching our expanded Science Policy Centre. Its remit is a broad one: to address all areas of policy where scientific assessment plays a role. And in this address I've already mentioned to several science-linked issues that are being addressed.

But I believe that the scientific community, and especially our Fellows, would expect the Society to have a special focus on 'policy for science' - to spearhead efforts to ensure that UK science continues to flourish and is optimally applied to the nation's benefit. The autonomy of other bodies (Research Councils, for instance) is being eroded. In consequence, our obligation to articulate this case gets ever stronger.

To this end, we plan to publish, probably in March 2010, a report that will review UK science and innovation policy and chart its future direction. It will cover (and update), in a UK context, the range of issues that the US National Academy of Sciences addressed in their influential report, *Rising above the Gathering Storm*, in 2005. The advisory group for our report is a strong one: Sir Martin Taylor chairs it, and its members include two widely-respected former science ministers and two Nobel prize-winners, along with a range of others (from within and beyond the Fellowship) who can offer distinctive perspectives.

The UK is a global leader in research, with a deserved reputation as a valuable hub in international innovation. Our strong research base is a complex and vulnerable ecosystem, and without protecting it, we will lose this global advantage.

Our universities are vulnerable in many ways. The Far East is striving to achieve competitive excellence. Institutions on mainland Europe are competing for graduate students by offering instruction in English. Several countries (e.g. Australia, Germany, South Korea and Canada) have boosted their spend on science and innovation as part of a 'stimulus package'.

More importantly still, the Obama administration has given America's already world-leading scientific community a massive boost - in morale and in substance. The allure of the US is now much stronger than in the Bush era. Our success in attracting and retaining mobile talent will be at risk unless we respond. Even to retain our international competitiveness, we must raise our game

The present government, from the Prime Minister downwards, deserves credit for its sustained commitment to science, in rhetoric and substantially in substance - a doubling in the science vote over the last decade. It would be tragic not to build on this momentum - once the tap has been turned off, it can't readily be turned on again.

It was thus a disappointment to us that, despite Lord Drayson's efforts, the UK didn't match other nations in offering a substantial 'stimulus package'. Examples from previous economic downturns suggest that investing in the science base can be a driver towards prosperity.

All those whom we honoured at today's Anniversary Meeting (and who win major prizes) tend to be individualists - they certainly don't fit into a single mould. But there are three things that I'd guess they'd agree on. Their achievements were long-term; their outcome was unpredictable; and they needed a supportive environment.

It is crucial to support the creative individuals on whom scientific advance depends. In the words of a former Royal Society President, Aaron Klug, "The major insights in science come from people who have the patience to develop an intimate understanding of a problem, who have the space and the freedom to take professional risks and who know how to make creative use of the surprises that they encounter when they do so. These are the people who make the enduring difference. These are the people whom we must nurture wherever we find them".

When academics argue for 'free wheeling' research, they risk being accused of an ivory tower attitude that disregards their obligations to the public. But I'd strongly contest that accusation - it's only by supporting such research that we can sustain high-quality universities, which are themselves of immense economic and social value to the nation. Much of economic growth that benefits all citizens can be traced back to research that starts in universities - generally a decade or two earlier. They are sources of expertise spanning the public and private sector, and a magnet for talent from around the world.

To ensure that our universities stay internationally competitive, they must attract world-class faculty. To do this, it's crucial that they offer faculty members the prospect, without undue hassle, of gaining 'responsive mode' funding for the research to which they're prepared to dedicate

their lives. That's a fair expectation if you're at Harvard, Stanford or Berkeley; it must be so here if we're to compete for mobile talent at the highest academic level.

I emphasise this point because there's a risk that current efforts to prioritise and 'audit' academic research will backfire, by erode the strength of our universities and thereby weakening the UK's competitiveness as a high-tech nation.

The impacts of science are often felt far away from the time and place of the original research. A recent report from the MRC, Wellcome Trust and Academy of Medical Sciences concluded that, even in medicine where research is often highly-targeted, the lag between scientific research and health benefit can be anywhere from 10 to 25 years.

Indeed, there is increasing evidence that academic research has high financial returns. Where economists have sought to reduce rates of return on public investment to a single number, they have arrived at figures of 20 per cent or more. Patents now cite publicly-funded science more than ever.

We can't confidently predict how, when or whether a specific research project will 'pay off'. The social or economic benefit should not be credited solely to the most immediately relevant project, any more than a win at football is due solely to the team members who actually score the goals. The lineage of a 'spin-off' can be traced back to a surprisingly diverse range of influences. The overall impact of the UK's science and technology depends on ensuring that enough top rate intellects enter the profession - and choose to work in this country.

But we should downplay the distinction between applied and 'not yet applied' science. Whether our motive is curiosity, or whether there is a practical goal in sight, 'problem solving' is the activity that motivates us all. The mindset is the same, whether one is an engineer facing a novel design challenge, or an astronomer mapping the remote cosmos. There is as much intellectual challenge in the applications as in the science itself - a point neatly made by an old New Yorker cartoon showing two beavers looking up at a huge hydroelectric dam. One beaver says 'I didn't actually build it, but it's based on my idea'. In that connection I welcome our closer interactions with the Royal Academy of Engineering, now fully

installed in 3-4 Carlton House Terrace. (Almost next door - only the Turf Club comes between us.)

It's in the UK's interests to support real academic excellence right across the board - and indeed it's affordable even in these straitened times. This support, directed to those with the highest international standing or the greatest promise, should come from within the 'ringfenced' science budget - a policy that served us well in earlier decades. It would be ironic if a government that has been traditionally unwilling to 'pick winners' in industrial policy were to aspire to make such judgments 'upstream', at the less predictable research level. But - just to be clear – obvious funding outside the 'ring fence' , for development, translational research and commercial start-ups, must plainly be selective, and channelled according to priorities broader than the science itself. (This latter funding includes of course other government departments, and Public Sector Research Establishments, with a turnover of 2.9 billion - and of course the R and D effort in the private sector.)

A Royal Society report entitled *Hidden Wealth*, prepared under the chairmanship of Professor David Rhind, highlighted the importance of science, maths and computing outside the manufacturing sector - not just in finance, where the benefits of over-sophistication have been ambivalent, but throughout the service sector. We now have a better understanding of the UK's relative strengths in 'hidden' but high-value areas of science and innovation, which don't always show up in international comparisons.

I make no apology for reiterating a point I made last year - the need to inject more (and more diversely sourced) resources into *physical* sciences. These sciences are the basis for information technology, electronics, 'clean energy' (and indeed a substantial part of medical research). But whereas biomedical sciences can draw on the Wellcome Trust, the medical charities, and the pharmaceutical industry to supplement government funding, there are no real counterparts of these private sources for the physical sciences to draw on.

It's crucial that enough scientists enter research and university teaching. Their supply depends on the quality of graduate education, currently the subject of a keenly-awaited review by Adrian Smith The last RAE uncovered 'islands of excellence' in many departments across our entire

university system. This is good news because, ideally, *all* undergraduates should be taught by faculty members whose expertise extends well beyond the standard curriculum, and whose teaching is nourished by research, scholarship and reflective enquiry - that's what distinguishes a university from an institution for further education. But it doesn't follow that every university should be free to offer PhDs in every subject. A student aspiring to a PhD needs more than just a good supervisor. He or she needs to be in a graduate school that is large enough, and well enough resourced, to offer courses over a wider range. Without this second component, newly-minted British PhDs won't necessarily have the flexibility and range needed for their later career - whether or not that's in academia. So PhD-level education needs to be concentrated in fewer centres than research excellence is.

In this context one should surely welcome the formation of groupings and clusters of universities which can coordinate PhD-level graduate education. But that should not reduce the opportunities for an academic any university - even an individual in a small 'island of excellence' - to do good research. This is one of the potential strengths of our 'dual support' system

The expansion of higher education has been welcome, but it has inevitably spread public funding thinner. There has not been sufficient acceptance that we need to foster as much institutional diversity as in the US- rather than a uniform pattern measured by a single league table. There is concordance, not conflict, between sustaining excellence and widening access. But we should not typecast whole universities. An 'island of excellence' could grow to be a major research group. Indeed the strongest departments around the country weren't all planned for: many stem from exceptional individuals who were able to build up strong groups. It's important for the country that these opportunities aren't choked off. Recruitment of staff into less favoured universities would be unduly handicapped if it were perceived that, however enterprising they were, they had no chance of emulating the careers of those who built up biomedicine in Dundee, space research in Leicester, building research in Bradford, and so on.

Society affairs

Turning now to more 'parochial' matters affecting the society itself, I'd like first, as always, to pay tribute to Stephen Cox, who we're fortunate to have as Executive Secretary. His speech has summarised the key developments and initiatives whereby we will use the opportunity of our 350th anniversary not only to 'promote' the Society itself, but to raise the profile of science generally.

Although they may be not always be apparent to Fellows, our international activities are wider and more diverse. We have extended our longstanding links with the US National Academy of Sciences, thanks to the generosity of Raymond and Beverly Sackler. The first Sackler Forum, on global food supplies, will take place here in two week's time - a follow-on from the report by David Baulcombe's group that I have already mentioned. And we have been developing our links with Africa - the IAP meeting in January will be a major event. And we have regular gatherings with other academies, as well as fostering bilateral links and exchanges. I'd like to thank our Foreign Secretary, Lorna Casselton, for her indefatigable travels on our behalf.

Indeed, I want to express immense gratitude not just to her but to the other officers as well - the Treasurer, and the Physical and Biological Secretaries. These are honorary positions, with a heavy load, which officers undertake as a supplement to their often-demanding 'day jobs'. Each serves for five years, and one leaves office every year. This year it is our Physical Secretary, Martin Taylor whose term expires. He is a mathematician. There are some common misperceptions of mathematicians - that they are solemn people of few words. But Martin is the utter obverse of that caricature. He's contributed hugely. He's been specially involved in educational issues. He has also, within the Fellowship, laboured hard to enhance the participation of applied scientists and engineers in the Society. And, as a final comfort to all Fellows, he's improved the obituaries in *Biographical Memoirs*. Martin remains 'in harness' as chairman of the *Fruits of Curiosity* report, but we wish him well in coping with the culture shock of his impending move from Manchester to Oxford.

Our new physical secretary, John Pethica, is a distinguished physicist with experience spanning the academic and commercial sectors. We welcome him.

I'd like also to thank the staff, who keep the place humming, and sustain the quality that we strive for in everything we do- our publications, our meetings, our media and 'outreach' work, and our interactions with Fellows, URFs and grantholders. It's fitting also to acknowledge the extra efforts involved in the planning for our Anniversary Year, which has been led by Dominic Reid, guided by a committee chaired by Melvyn Bragg.

Among all that we owe to Stephen Cox and Ian Cooper, I'd like to highlight their superb professionalism in overseeing the purchase and conversion of Chicheley Hall - the site of the new Kavli International Centre, which will open next Summer as a major enhancement of our facilities and activities.

And I'd like specially to thank Michael Murphy. He has proved an excellent leader of the development team. Guided by a committee chaired by David Sainsbury, the appeal is very close to its £100m target. This achievement owes a huge amount to Michael's efforts. We shall miss him, and wish him well in his new fundraising challenge at Kew Gardens. We welcome Alison Pemberton as our new Development Director. We still have much work to do, and I hope you will all consider giving Alison a good start by further support to the Society - relevant information is on our (now much-improved) website.

Epilogue

Finally, as we begin our anniversary year, let us glance backwards to our founders.

Back in the 1660s, they met regularly to discuss scientific ideas and perform experiments - experiments with air-pumps, trials of different poisons on animals, improvements to gunpowder and to pendulum clocks. And sometimes rather gruesome experiments in which the blood from one dog was transfused into another.

(Indeed there was a blood transfusion into a human – who, amazingly, survived. Samuel Pepys - one of the early FRSs - conversed with him after the operation and found him to be 'cracked a little in his head, though he speaks very reasonably and very well'.)

Discussion and publication - the core of the Society's activities right from its beginnings - have become the accepted procedures whereby scientific ideas are criticised, refined, and codified into 'public knowledge' Over the centuries our journals have published Isaac Newton's researches on light, Benjamin Franklin's experiments on lightening, reports of Captain Cook's expeditions, Volta's first battery, Talbot's pioneering photographs - and of course, more recently, many of the triumphs of 20th century science. Sixty fascinatingly varied highlights from our publications, with commentary and background, appear today on our new *Trailblazing* website.

Last year we invited our Fellows to suggest what would be the highlights of the coming decades. We have used the 'top ten' to guide our choice of topics for Discussion Meetings in 2010. So we will be discussing some big themes: biodiversity, ageing, web science, global health, climate, brain science - and the search for extraterrestrial life.

The 'ingenious and curious gentlemen' who established the Royal Society enjoyed speculation and sought enlightenment: they were, in Francis Bacon's phrase, 'merchants of light'. But they were also intensely engaged with the problems of their era: the rebuilding of London after the Great Fire, improvements to timekeeping and navigation; the maintenance of forests; and the exploration of the New World.

Science has been utterly transformed during the last 350 years - and the world has been transformed by science. Nonetheless, some values endure.

Our ambition for the next 50 years must be to sustain the curiosity and enthusiasm of our founders. To aspire, like them, to 'see further' into nature and nature's laws, but also to emulating their broad engagement with society and public affairs - no longer just in one city or one nation, but on global scales.

The Royal Society

The Royal Society is a Fellowship of more than 1400 outstanding individuals from all areas of science, mathematics, engineering and medicine, who form a global scientific network of the highest calibre. The Fellowship is supported by over 130 permanent staff with responsibility for the day-to-day management of the Society and its activities.

In our 350th anniversary year and beyond we are working to achieve five strategic priorities:

- **Invest** in future scientific leaders and in innovation
- **Influence** policymaking with the best scientific advice
- **Invigorate** science and mathematics education
- **Increase** access to the best science internationally
- **Inspire** an interest in the joy, wonder and excitement of scientific discovery

For further information

The Royal Society
6–9 Carlton House Terrace
London SW1Y 5AG

T +44 (0)20 7451 2500
F +44 (0)20 7930 2170
E info@royalsociety.org
W royalsociety.org

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