Toppling the ivory towers - why university science is central to all our lives

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Can you imagine a world without penicillin, the world's most widely used antibiotic? If it were not for British universities, we may still be trying to get along without the drug that has saved millions of lives.

It was in a laboratory at St Mary's Hospital Medical School, now part of Imperial College London, that the brilliant but notoriously chaotic researcher Sir Alexander Fleming spotted signs of anti-bacterial activity in mould-covered culture dishes. His discovery was later developed by a team at Oxford University under Sir Howard Florey and Sir Ernst Chain and mass produced in the USA just in time to save many lives during World War II. Penicillin, in its various forms, continues to be vital to the treatment of life-threatening conditions such as meningitis, pneumonia and septicaemia.

Penicillin's serendipitous discovery is one of the celebrated stories of science, but it also highlights the fundamental role that universities play in pushing forward the breakthroughs that save and improve countless lives. The strength of university science is that we can carry out the speculative, blue-skies research that underpins the inventions and innovations that the world relies on.

Now more than ever, the UK needs its universities. Economically and technologically, global competition grows increasingly fierce. Asia and China are investing with mounting determination in their science base, and the USA continues to make it an urgent priority.

Universities have always been the knowledge-base of the UK, the powerhouses of its economy. My own institution, Imperial College London, was founded one hundred years ago for precisely that role - to carry out the research and educate the students critical to maintaining British industry's world standing. Our Centenary celebrations have been characterised by a buoyant sense of optimism that the impressive achievements of the past will be matched and exceeded over the next one hundred years.

The twenty-first century will confront the world with some of its greatest ever tests, which scientists, engineers and medics will be critical to overcoming. Tackling climate change and mitigating its consequences, sourcing sustainable energies, and containing potential pandemics – these are issues that affect us all. It is notable that what these major challenges have in common is that they cannot be solved by scientists of a single discipline alone. It will take an array of tools and techniques to tackle them – and that is where the unique capability of our universities lies.

Business and industry simply cannot build up the kind of intensive research hub that is comparable to a top university. Imperial has at its fingertips world class authorities in a wide range of disciplines, all working side by side. Engineers, computer scientists and clinicians collaborate to create the technology that allows us to see deep into our bodies and observe why they go wrong; scientists of many expertises join together to develop new low-polluting fuels and find innovative responses to growing concerns such as national security.

Amongst our academics there is a great and growing passion for entrepreneurship, to see their exciting ideas and developments move out of the lab and into society where they can make a concrete difference. It is here that the backing of our industrial collaborators is vital. Universities are packed with experimenters and thinkers, but we do not have, for example, the vast experience of taking new therapies on the long and difficult journey to licence that a pharmaceutical company has. Imperial is fortunate to receive a great deal of support from its commercial partners, and this approach has paid dividends for us, for them and for the country as a whole.

An illustration of what can be achieved when universities, industry and government work together is the £50 million Clinical Imaging Centre recently opened at Imperial's Hammersmith Hospital campus. The product of a partnership between Imperial, GlaxoSmithKline and the Medical Research Council, the Centre uses state of the art technology to observe how diseases such as cancer develop and how the body responds to the drugs provided to target them. It will undoubtedly lead to better and earlier therapies, offering the prospect of significantly improved outcomes to

many patients. The diagnostic tools Hugh Laurie calls on the TV series *House* may look impressive, but they are lagging far behind what we will be able to do here. None of the partners could have accomplished this alone and it represents an ideal model for future collaborations.

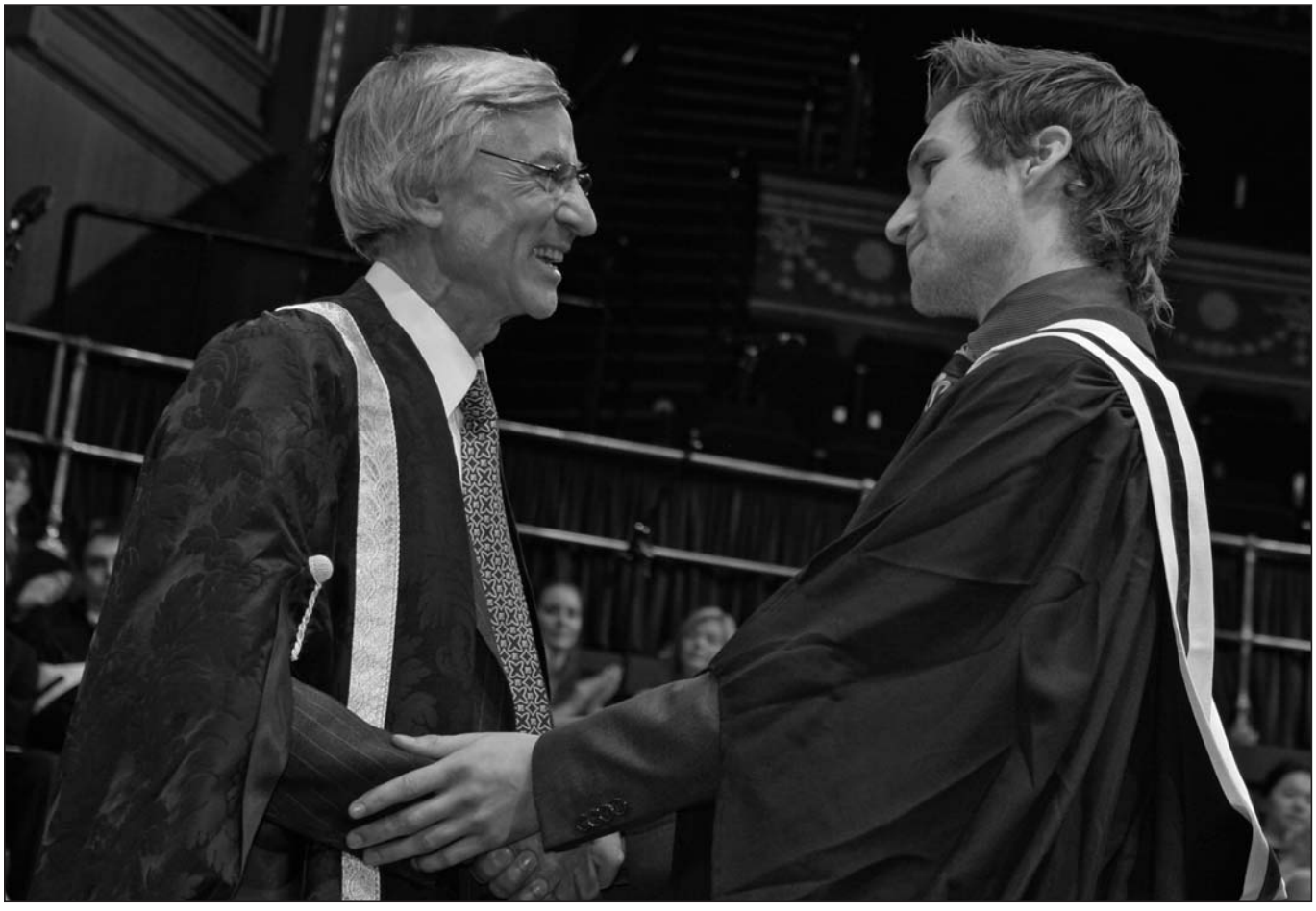
Vital, too, is the generosity of the new philanthropists – active donors who, like our Victorian founders, wish to see their wealth do good. Pre-eminent amongst these are Jeremy and Hannelore Grantham, who earlier this year provided £12 million for the establishment of an Institute for Climate Change at Imperial. Personal wealth and a sense of global responsibility do not always go hand in hand, but when they do the difference it can make is enormous.

So in many ways the future for UK science is bright. International competition is tough, but while the importance of research is recognised at the highest levels of politics and industry, we will maintain our edge. The UK Government's attitude and actions over the last decade have created a very supportive environment for research. Today's scientists can be confident that their vital work will continue to make a difference in the world.

But what about the scientists of tomorrow? The world grows ever more reliant on technology, and we will fall behind quickly if we do not nurture the scientific interests and abilities of the next generation. It is here that my optimism begins to falter.

The Government is clearly aware that the diminishing number of young people studying science post 16 poses a problem that must be urgently addressed. However one of the proposed solutions – a new GCSE offering bite-sized chunks of topical science rather than a good understanding of the different disciplines – introduces more difficulties than it overcomes. Degree level science demands a thorough grounding in the fundamentals, and it would be reckless of universities to admit students without this onto their courses. I do not believe that the new 'twenty first century science' GCSE will stop the number of young people abandoning science as soon as they have the opportunity.

So at the beginning of its second century, Imperial faces some difficult choices. It is a UK university, established to support British technology and industry, and it remains true to that founding mission. But it is also an academic institution dedicated to providing a top quality education for those who will truly benefit from it, the world's brightest and best young people, regardless of background or nationality. Increasingly, those with a drive for science and the education to back it up are coming from outside the UK – over 40 per cent of the students Imperial now teaches are not UK citizens. Some will stay here, but many more will return to their home countries, which will be immeasurably enriched by the abilities that a UK education has nurtured. If we do not replicate this dedication to science amongst young people here, we will waste talents and squander opportunities, and the result will be a poorer society for all.



Graduation day success for Imperial students, but where will the UK's future scientists be found?