



The future history of how science is organised in the UK

Comments at the Future Histories of Science
meeting, Cambridge Science Festival on 23 March 2005

The other speakers tonight get to speak about the exciting developments that are likely to happen in science and technology over the next few decades – people living on Mars, massive medical advance and so on.

I have been asked to talk about changes in how science will be organised and funded over the same period.

All I can do is look at existing trends and try to extrapolate, and try to guess what the consequences might be

Big Science

I want to start by observing the rise of Big Science. Most of the great scientists you can name – people like Einstein, Newton or Mendel worked more or less alone. Some – like Watson and Crick – are known for working in pairs. A few relied on a substantial international infrastructure, although in general it was incidental to their work. Darwin, for example, tagged along on a global maritime expedition, but his scientific work was conducted largely as individual.

Over the past fifty years or so, we have moved into an era in which Big Science is more prevalent. In some cases, projects are so big that hardly any single country can afford to fund them alone. CERN, the hole in the ground in Switzerland where they do particle physics, is a good example, and was one of the first.

Big collaborations are now becoming the norm in many subjects. A well-known recent example was the Human Genome Project, and there are many others.

There are good reasons for this trend, which I will not go into now, but there are consequences that have not, in my opinion, been properly thought through. What is going to happen to smaller projects, as Big Science sucks up more and more of the cash? What will happen to lone maverick with an idea that does not fit into the paradigm of the Big Science agenda.

We have already seen problems. The House of Commons has criticised the Medical Research Council for putting so much money into its Biobank project (an admirable scheme in its own right) that it had little or none left for individuals with outstanding new ideas.

Unconventional thinkers who do not fit into the existing framework of research are important. It is not a coincidence that many of the great names of science were to some extent loners. In many fields of life, I bet you can name great men and great women, but you would have trouble naming great committees.

Many of the great scientists of the past had access to some source of funds. Darwin was independently wealthy, Mendel was supported by the church. Such money is rare now, and we rely on state funding for the levels of investment needed to do excellent fundamental science.

Will the rise of Big Science change the nature of the scientific questions that are asked? Undoubtedly. Will that be entirely positive? Not if we do not also preserve funding for lone mavericks.

Internationalisation

A former Chief Scientific Adviser coined a great phrase a few years ago. He said: 'Science was globalised before globalised was even a word'. He was right. Science does not appreciate national borders. Even during the Napoleonic Wars, the Royal Society in London and the French Academy in Paris were working together.

Mobility has increased, and promoted even more international exchange. So now, if you look at the names of the authors of papers coming out of British Universities, you will see people from many countries working in the British science base, and there are many Brits doing the same abroad.

Traditionally, many scientists have moved countries and stayed in their adopted country more or less indefinitely. This is particularly true in the USA, where the universities are full of professors who came originally from many places all over the world, but have spent their entire careers in America.

Will this continue to be true? There are many brilliant Indian scholars in the UK at the moment. The Indian government is investing heavily in science, and its infrastructure is rapidly increasing. I think it is entirely possible that the many exciting opportunities that this will open up will prove very attractive to many of the Indian researchers currently in the UK. I suspect we will not be able to come back in 40 years and point to hundreds of Cambridge professors who came to the UK from India in 2005 and stayed. They will have an excellent time, do some brilliant science, make some firm friends, and go back to share in India's sense of national economic rejuvenation.

And that will not be the only change in the internationalism of science. One of the previous speakers, predicting what will happen in space science, talked about NASA and the European Space Agency. But by the middle of this century, the USA and Europe will not be the only countries doing space science at that level. The Chinese are active in this area, and they have the scientific and economic muscle to make a big impact.

How will that kind of science change when the cosy club of Europe and America see their virtual monopoly broken? I have no idea, but I am looking forward to finding out.

Quantity of information

When the British Museum was founded in the eighteenth century, its library had what was perceived as a realistic ambition of collecting just about every book – every piece of knowledge that existed.

Well, that has long disappeared as a sensible idea, with the total quantum of research outputs in the world currently doubling every few years. It is impossible to keep pace even in your own field, let alone with all the cross-disciplinary research we are always told is so important.

What will the consequences be? There are two that spring immediately to mind. First, there will be an increased amount of duplication in science, as people carry out experiments they believe to be novel, but which have already been done elsewhere. Apart from leading to silly disputes about who thought of something first, this may lead to an interesting phenomenon, if anyone can put in the time and effort required. By trawling through what is out there, it will become possible to add to our certainty about results, or make interesting comparisons of similar studies, from which we may be able to make useful extrapolations.

The other consequence of trying to keep up with the massive quantity of information that is available is that many people are becoming more and more specialised – they know more and more about less and less. Without inventing some new way of doing it, it will be increasingly difficult to make links between different subjects.

Politicisation of funding

As public science budgets increase, and as more and more politicians take an interest in science, science funding is becoming more politicised. At a meeting in Westminster earlier this month, the Science Minister, Lord Sainsbury, gave the most political speech I have ever heard him give, and his Shadow, Robert Key MP, was equally ebullient from a Conservative standpoint.

Even more obvious was the rivalry between the Prime Minister and his Chancellor over who would announce the recent allocation of the science

budget. Gordon Brown was all set to it, when Tony Blair popped up at a major university, donned a white coat and made the announcement.

This sort of stuff interests the Westminster Village, but what are the real effects? Well, in recent years, the Science Vote (the technical name for the budgets of the Research Councils and the Office of Science & Technology) has started coming with ring-fenced pots for particular subjects. That never used to happen – decisions were supposed to be made at arm's length.

In 1997, only 2% of the Science Vote was administered centrally; the rest went straight to the Research Councils. That figure was risen by a factor of more than 10. More than 20% of the Science Vote is now controlled centrally by Ministers and Civil Servants.

This increasing political interference will affect the science gets done, almost certainly for the worse. We need to find some way of recovering the freedom that made the UK's science base so brilliant in the first place.

Conclusions

So, I cannot really pretend that I can see with any clarity into the future of science, but I do believe that some of the trends that are now occurring will require other changes to offset any negative effects.

That way, our science base can be a jewel in the British Crown for the next fifty years as it has been for the last half century.

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