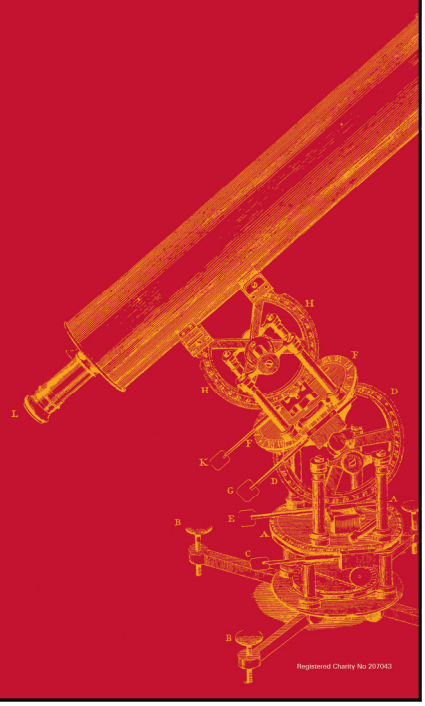
UK-China Research Partnerships

Tony Cheetham
Treasurer and Vice-President



THE ROYAL SOCIETY

Royal Society's Global Reach

- An academy for the Commonwealth, not just the UK
- About 40% of the Fellowship reside overseas, including:
  - ~15% of the regular Fellows are from the Commonwealth
  - ~10% of the British Fellows work overseas
  - ~15% of the Fellowship are Foreign Members
- We have ~35 MOUs with international organisations, including academies and funding agencies

RS International Strategy 2012-17

1. Stronger engagement with the world's leading scientific nations
2. Building closer ties with other European nations
3. **Developing stronger links with the emerging economic powers, especially China, India, and Brazil**
4. Celebrating the Society's long-standing links with the Commonwealth
5. Building scientific capacity in developing countries, especially within the Commonwealth e.g. Sub-Saharan Africa and the Caribbean

Prof. Tony Cheetham

- University of Oxford 1974-91
- University of California, Santa Barbara 1991-2007
- University of Cambridge 2007-pres.

- ~15 visits to China since 1984
- Chaired 1st US-China Workshop on Advanced Materials, 2005
- Member, International Review Committee NSFC, 2010-11

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Main contacts in Mainland China:

Chinese Academy of Sciences
NSFC
Peking University
Tsinghua University
Fudan University
Suzhou Inst. of Nano-Tech.

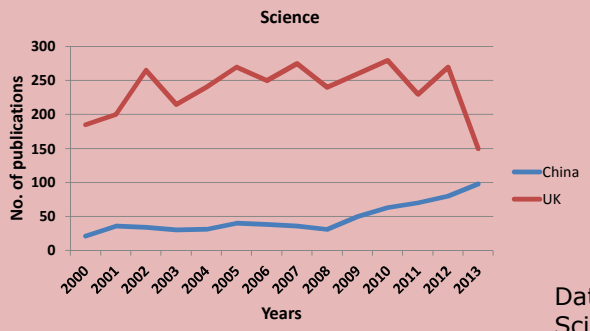
☆ Places visited

Conceptions and Misconceptions about Science in China

1. Chinese scientists excel at execution but are weaker at discovery and innovation
2. Intellectual property is not well protected in China and Chinese scientists might steal our ideas
3. Navigating compliance and ethics is challenging
4. Plagiarism and duplication are widespread in China
5. Chinese universities are not comparable with British ones

Is discovery science weak in China?

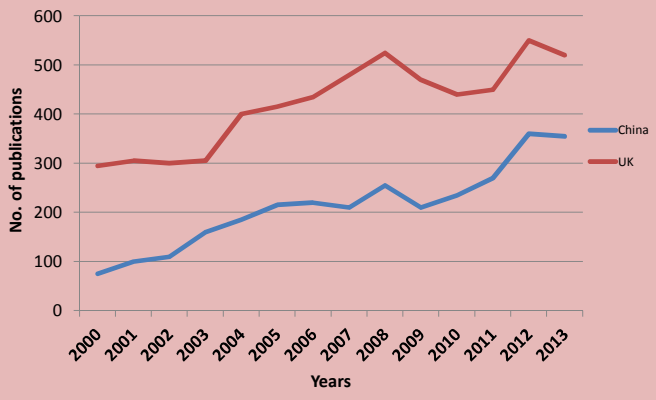
1. The volume of scientific publications from China is now second only to the USA
2. But what about the quality and how does it compare with the UK? Below we plot the number of papers in *Science* for UK (red) versus China (blue)



Data from Web of Science, June 2014

How do we compare with China in the world's leading physics journal?

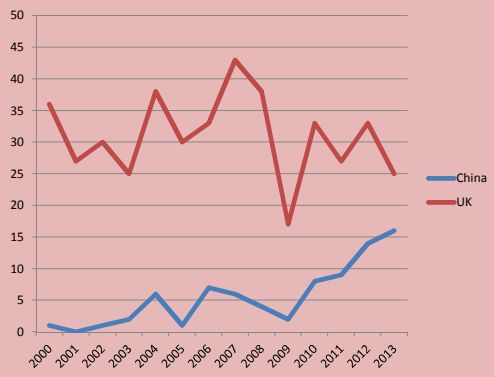
Here are the data for *Physical Review Letters*:



Data from Web of Science, June 2014

Results for a Major Biotechnology Journal:

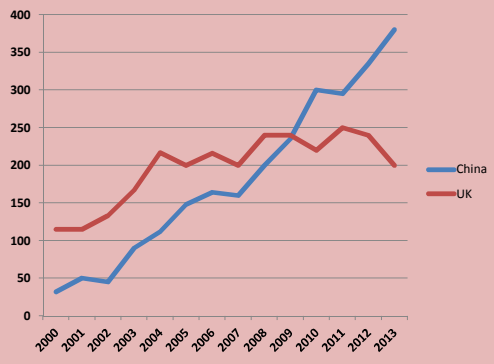
Here are the data for *Nature Biotechnology*:



Data from Web of Science, June 2014

Publications in the World's Leading Chemistry Journal

The publication data for *Journal of the American Chemical Society*:

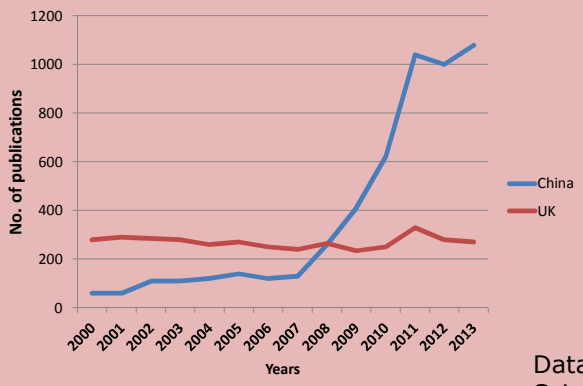


Data from Web of Science, June 2014

There is evidence that China is stronger in Chemistry than Physics and Life Sciences

And what about Britain's Leading Chemistry Journal?

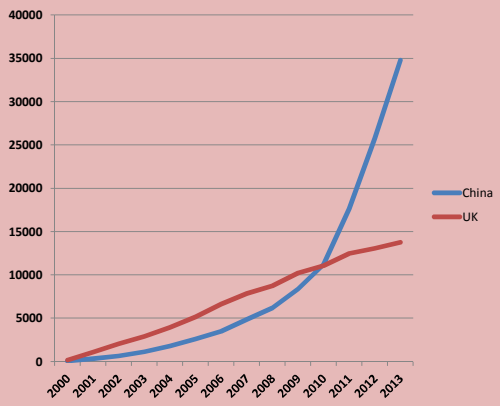
Here are the publication data for *Chemical Communications* (Royal Society of Chemistry):



Data from Web of Science, June 2014

Does the Chinese work have any impact?

The citation data for *Chemical Communications* (Royal Society of Chemistry):



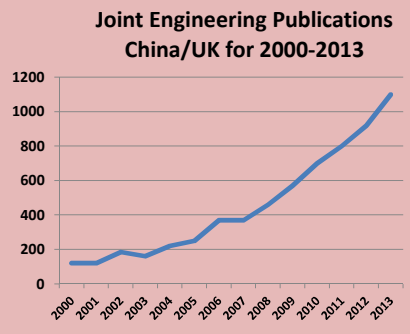
Data from Web of Science, June 2014

What conclusions can be drawn from the publication data?

1. Chinese science is now having a much greater impact in the world's leading scientific journals
2. The impact is higher in some fields than others (e.g. Chemistry is very strong)
3. Chinese science is now in the "Premier League" and the future trend is clear
4. We should celebrate the contributions that China is making to the scientific literature, recognizing that this is good for the global scientific endeavour
5. Britain cannot be complacent if it wishes to continue to be a major scientific nation

International Collaboration with China

Collaboration with:	Joint publications 2000-2013
USA	160,611
UK*	47,204
Japan	43,112
Germany	29,277
Australia	28,899
Canada	27,493
France	17,785



***Funding agencies for UK/China**:

NSFC	7,380
CAS	1,410
STFC	939
Roy Soc	803
EPSRC	680
Wellcome	409

Joint Publications by Field:

Engineering>Physics>Chemistry >Material Sc.>Computer Sc.> Biochemistry/Mol. Biol.

The Intellectual Property Issue:

1. There is certainly an issue about intellectual property and many companies are concerned about how they can operate in China without having their IPR compromised (Merck, Eli Lilly, Monsanto, etc)
2. At the academic level this is not really a concern, any more than it would be when dealing with scientists in other countries
3. Plagiarism in scientific publishing is probably more of a problem in China, perhaps because of the manner in which the system rewards scientists for publishing in high impact journals
4. The Royal Society has signed the San Francisco Declaration relating to the use of impact factors in assessing the scientific achievements of individuals

What about the Quality of Research in Chinese Universities?

1. A large proportion of the best science in China is carried out in the Institutes of the Chinese Academy of Sciences (~100 in all), which have no counterparts in Britain (much as the Max Planck Society dominates research in Germany)
2. A small number of the universities are strong at research, such as Peking Univ., Tsinghua Univ., Fudan Univ. and the CAS Univ. Science & Technology.
3. Many British universities have exchange programmes with these institutions. Britain is a preferred partner because of our strong science base and language

Leiden Ranking of University Research?

http://www.leidenranking.com/ranking/2014

This is a ranking based upon citations per paper, weighted for different fields

1. The top ranked Chinese university in Physical Sciences in 2014 was Fudan Univ., at #96. It was slightly ahead of Edinburgh and Durham at #107 and #108, respectively. Tsinghua Univ. was #142, just behind Sheffield (#139) and Bath (#140). The top Indian university was IISc Bangalore (#288)
2. In Life Sciences, China was weaker with the top university (Tsinghua) in 208th place
3. As with the journals data, there is evidence that China is much stronger in some fields than others.

Is Britain well placed to respond to the growth of Chinese science?

1. There is a huge mismatch between Chinese studying in Britain and Brits studying in China
2. Approximately 46,000 Chinese students arrived in Britain in 2012, while ~4000 British students went to study in China that year. Britain is not in the top 15 countries sending students to China, and is well behind France (8400) and Germany (6300).
3. The mismatch is even greater at the post-doctoral level (ad UK visa issues are problematic)
4. Britain needs to educate a workforce that is well informed about the strengths and weaknesses of China and familiar with Chinese culture

Final Comments

1. Academic collaboration with China is highly desirable because China has developed into one of the leading scientific nations in the world
2. There is already a great deal of scientific collaboration between the UK and China, most of it supported by the NSFC
3. The greatest need is providing more young British scientists with the opportunity to experience China
4. In addition to producing good research, the soft power of scientific engagement should not be overlooked
5. Face-to-face interactions are extremely important when dealing with China

Thank you!

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