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China's Emergence as a Science and Technology Power and the Politics of Chinese-Japanese Cooperation

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BEIJING--With more than two decades of market reforms under its belt, China has transformed into a trading powerhouse and the world's "factory." It is also making its presence felt in the worlds of science and technology.

China's expenditure, in terms of purchasing power parity, along with its army of researchers, has already surpassed Japan's.

In some fields, China is now the leading authority. And that has caused some concern in Europe and the United States.

As part of its industrialization, China has been pouring money and human resources into basic scientific research for technological advancement.

Japan, meantime, continues to grapple with how to define its new relationship with the increasingly technology-savvy country.

In late March, a workshop to analyze the genetic information of organisms using information technology was held at Shanghai Jiaotong University.

The "bioinfomatics" workshop, which was sponsored by, among others, the National Institute of Genetics (NIG) of Japan, was the first of its kind in China.

Japan, the United States and Europe, traditionally the world's leading forces in bio-research, currently operate public databanks to archive genetic information.

Researchers choose one of the databanks and register their achievements in gene decoding in a manner similar to that of obtaining a patent.

About 73 percent of the decoded gene information is registered within the U.S. databank. The EU and Japanese databanks hold about 14 percent and 12 percent of such information, respectively. Those percentage figures are regarded as a measure of the standard of research within those countries or, in the EU's case, within that area.

The "three-pole system" has continued for more than 20 years. But things could change as China's global influence grows.

In February 2006, China created a science and technology plan which listed eight fields in which China deemed it possible to achieve its own technological innovations. Of the eight, bio-research ranked No. 1.

In May 2006, China set up its own databank in Shanghai in cooperation with a British company.

The environment in China for bio-research is particularly favorable right now due to the increasing number of Chinese researchers who have earned doctorates in Europe, the United States and Japan.

Rice is the first grass species to be sequenced

Currently, the amount of genetic information decoded in China accounts for less than 2 percent of all such worldwide activity. But participants at international conferences have already started talking about China's potential.

"Thanks to China's soaring economy, we are awash in funds for research and development. We will be able to catch up with Japan in terms of facilities in several years," said Li Yixue, director of the Shanghai Center for Bioinformation Technology.

The Shanghai Center for Bioinformation Technology: “a corporate center with strong academic ties”

Meanwhile, the databank of NIG of Japan, set up to accept research results from Asian nations, has faced difficulties in obtaining registrations from foreign researchers. In 2000 and 2001, about 80 percent of applications for registration from China came to the Japanese databank. Since 2002, however, most of the Chinese researchers have applied for registration in the United States.

Some Chinese researchers say they applied to the United States because they were not involved in joint research with Japan. Others said the U.S. databank was easier to use than Japan's.

But some Japanese researchers have suggested the drop in the number of Chinese researchers using the Japanese databank may be in reaction to former Prime Minister Koizumi Junichiro 's repeated visits to war-related Yasukuni Shrine.

"Not only in economy but also in science, China has become a country which we cannot ignore any more," said Gojobori Takashi, professor of Japan's NIG.

"In order to maintain the status Japan has built up (in the field of science), we need to cooperate with China and South Korea," he said.

The Growing Chinese Presence in Bioresearch

But it's not just Japan that is feeling the heat.

In January this year, Britain's *Financial Times* carried a commentary entitled, "China is threatening America's lead in technology."

Late last year, the Organization for Economic Cooperation and Development (OECD) said China's expenditures for research and development, in terms of purchasing power parity, would surpass that of Japan in 2006 for the first time, placing it second in the world behind the United States.

The number of researchers in China has already exceeded that of Japan.

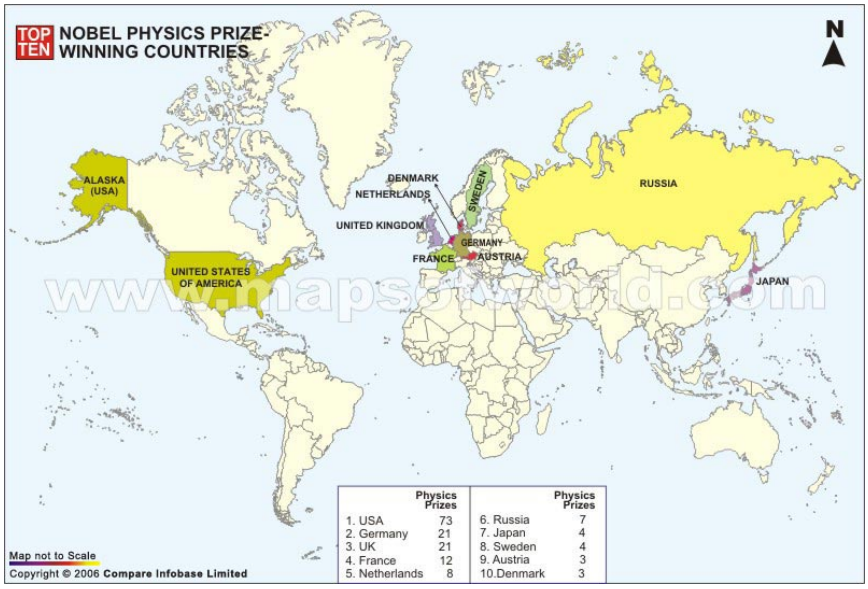
According to the Ministry of Science and Technology in Beijing, China's expenditure for research and development stood at 294.3 billion yuan (about 4.5 trillion yen) in 2006, 1.4 percent of the country's gross domestic product (GDP).

The corresponding figure for Japan for the fiscal year ending March 2006 was 17.8 trillion yen, or 3.5 percent of GDP. However, China's expenditure outlays are rising by about 20 percent annually while Japan's have only grown slightly.

Cherry blossoms of Japan's National Institute of Genetics

But Chinese experts remain modest about the rapid growth.

"Some of the research conducted in China has been the best in the world. But the amount of that research remains small. I hope that a Chinese scientist wins the Nobel Prize by 2020. But it will be difficult," said Mu Rongping, director of the Institute of Policy and Management at the Chinese Academy of Sciences.



	Physics Prizes		Physics Prizes
1. USA	73	6. Russia	7
2. Germany	21	7. Japan	4
3. UK	21	8. Sweden	4
4. France	12	9. Austria	3
5. Netherlands	8	10.Denmark	3

A former high-ranking Chinese government official, who had long been engaged in drawing up policies for science and technology, also remained modest about China's growth.

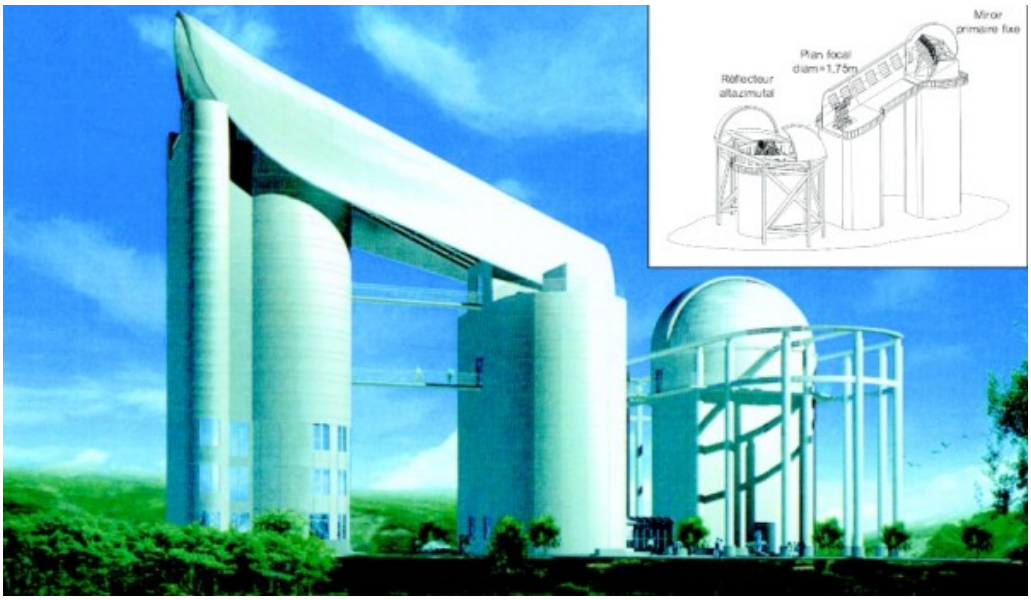
"Judging from the expenditure and the number of researchers, China has become a 'science power.' But its competitive power is not as strong as the United States, the EU or Japan. China is still in a position to learn (from them)," he said.

Meanwhile, Teraoka Nobuaki, an official of RIKEN, a research institute affiliated with the Japanese government, said: "Some excellent research institutes have already appeared in China. They have hired young researchers who had returned from their studies in the United States. Although the research (in the fields of science and technology in China) has not spread as widely as that in Japan, China is making progress steadily."

Teraoka is now serving as the head of a task force to set up RIKEN's office in Beijing.

Hasegawa Shuji, associate professor of physics at the University of Tokyo, said: "The highest-level research in China is equal to that of Japan. Recently, China has purchased expensive German-made measuring instruments. Its research equipment is becoming better than that of Japan."

In Hebei province, a project to construct a large astronomical telescope is under way. The facility, named Large Sky Area Multi-Object Fiber Spectroscopic Telescope (LAMOST), will be used to create the world's best three-dimensional space map by taking over an international project now conducted by Japan, the United States and other countries.



The Large Sky Area Multi-Object Fiber Spectorscopic Telescope in Hebei province

The Chinese staffers are hoping that they will join the world's best.

China growth no threat to Japan

Sunami Atsushi, associate professor of science and technology policy at the National Graduate Institute for Policy Studies in Tokyo, made the following comment on China's growing power in the fields of science and technology.

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It is true that China is becoming more and more competitive in some research areas. While the number of those areas will increase, we should not regard this as a threat to Japan. We should consider it an opportunity.

We can utilize Chinese researchers in areas where we have a serious shortage of Japanese researchers. Japanese scientists can also engage in research in China.

So far, Japan has used the United States and Europe to train young Japanese researchers. From now on, however, we can also use Asia. It will be advantageous to secure a variety of researchers and strengthen Japan's competitiveness.

We are rather concerned about whether the next generation of Japanese researchers are being trained sufficiently so that they can contribute to the Asian region.

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