

# Science, Technology, Education and Health News from China

## Number 106 – April 2013

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### Introduction

Annual budgets of Chinese government bodies have confirmed another year of budget increase for science and education. Chinese scientists reported the first experimental observation of the quantum anomalous hall effect. Chinese Academy of Sciences ranked top on Asia-Pacific Nature Ranking. Chinese scientists have come up with a new method of weighing microscopic particles such as single atoms or protons, as well as cancer DNA, which could lead to early diagnoses of the disease. In education, a student at Fudan University was murdered by his fellow flat-mate with poison, triggering discussion on education system. Bizzar questions in independent tests ahead of college entrance examination raised questions on evaluation system. In health, Chinese government’s reaction on H7N9 won positive feedback.

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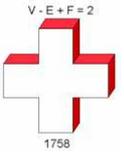
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 We also invite you to follow Swissnex China on Weibo <http://e.weibo.com/swissnexchina>  
 and on <http://www.swissnexchina.org/>*

<sup>1</sup> Please click on the blue texts to activate the hyperlinks to either email addresses or related websites.



## Story of the Month

### Another Leap Year for China's 2013 Science, Technology and Education Budget

Ministries in China released their 2013 budget in April. As major science powers such as the United States and Japan are cutting their research budget, 2013 marks another year for the consistent budget increase for research and education in China.

Ministry of Education's budget increased from RMB 185.6 billion to **RMB 211.2 billion**, up by an astonishing 12%. The budget covers not only the operations of the ministry but also the 75 universities directly affiliated to the Ministry and 35 affiliated government organizations.

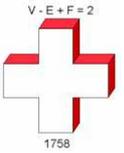
Higher education receives a total budget of RMB 187 billion, taking up the lion's share of the budget. Visible growth are found in the area of **vocational education** (RMB 30 million investment in vocational college to develop new curriculum), **study abroad program** (RMB 2.25 billion investment to support the national outstanding graduate students' overseas study program launched in 2012), **study in China program** (scholarship fund has increased by 16.13% to RMB 1.8 billion).

The Ministry of Education is also increasing spending on **research**, which is in line with the recent campaign for coordinative innovation. Research fund for high technology research, industrial technology research and development, key science and technology project and general research project all go up, respectively by 11.87%, 2.44%, 23.07% and 35.79%, showcasing the growing importance of universities in research and innovation sector.

Ministry of Science and Technology has a budget of **RMB 29.7 billion** for 2013, a minor increase up from RMB 28.5 billion in 2012 budget (+4%). Basic research, applied research and high-tech research received a funding of respectively RMB 4.3 billion (+2.38% from actual spending in 2012), RMB 9.97 billion (-0.48%) and RMB 8.57 billion (+1.41%). Science and technology cooperation budget experienced a cut by 19.78% to RMB 1.91 billion, mainly because of less spending planned for ITER project during 2013.

Noted expenditures include a new demonstration project to support the popularization of new energy vehicles (RMB 2.2 million) and RMB 372 million investments as venture capital to support high-technology start-ups, an increase of 15.4% compared to the actual spending in 2012.

Chinese Academy of Sciences, the flagship research institute of China, presented its annual budget of **RMB 46 billion**, covering headquarter and its 132 affiliated research institutes and organizations. The budget increased by 9.5% compared to the 2012 budget, and the increase is mainly in the science and technology research expenses (+ RMB 3 billion) and education expenses (+ RMB 114 million), which refers to the budget of the Chinese Academy of Sciences University (bachelor programs in Hefei, Anhui Province and graduate school in Beijing). Research fund for CAS institutes reached RMB 43.7 billion. Basic research, applied research and technology development received respectively RMB 18.6 billion, RMB 19 billion and RMB 700 million. Competitive fund/external mandate accounts for respectively 52%, 46% and 30% of the total research fund. RMB 10 million is put aside for international cooperation, in which 7.75 million is expected to be spent on cooperation projects.



## News

### 1. **A Decade after SARS, China's Flu Response Wins Cautious Praise**

(Science, 12-04-2013)

Coming at the 10-year anniversary of the SARS outbreak, the Chinese government's announcement that a new influenza virus is killing people elicited suspicion from many Chinese. Why, some asked, did it take nearly 6 weeks after the first patient fell ill for the government to identify the H7N9 virus? And was there a connection to the thousands of dead pigs floating in Shanghai's Huangpu River?

But many scientists say that, while there are plenty of questions surrounding the new virus, China has actually come a long way when it comes to monitoring health and has been forthcoming with the international health community—a sharp contrast with the SARS episode, when it was unable to identify the new pathogen and tried to sweep a deadly epidemic under the rug.

Reporting of the virus's initial discovery, and subsequent cases, appears to have been timely, says virologist Malik Peiris of the University of Hong Kong. "One should not underestimate the work and challenge" in identifying, confirming, and double-checking a new influenza strain, Peiris says. "The Chinese are getting out information as fast they can," adds virologist Robert Webster of St. Jude Children's Research Hospital in Memphis, Tennessee.

SARS was a turning point, says Yanzhong Huang, a global health fellow at the Council on Foreign Relations in New York City. "In the post-SARS era, the central health authorities have become more transparent in sharing disease-related information with the international community," Huang says. China has also boosted public health funding, set up a comprehensive disease prevention and control system, established a task force to combat avian influenza, and set up hundreds of monitoring stations for animal disease.

But China's Ministry of Agriculture—which will be critical in tracing H7N9's animal origins—remains a weak link. In 2006, the ministry was slow to share virus samples from poultry with the international community after researchers found a new strain of H5N1 in birds in six provinces. Now, there is again concern that the ministry "might not be very enthusiastic" to share with foreign labs, Huang says. Current regulations require Chinese scientists to get the ministry's permission to collect and study avian flu samples, effectively limiting research to three labs.

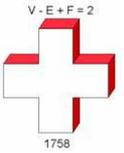
There are other reasons for concern. Many health labs are still not adequately equipped, Huang says: "Hospitals at the grassroots level probably are still unable to tell the difference among cold, annual flu, and avian influenza." The government has censored posts on Weibo, China's most popular microblog, about links to the dead pigs and alleged hidden cases. And in another sign that not everything has changed, some local disease centers have touted the traditional Chinese medicine banlangen as treatment for H7N9—the same unproven product that was trotted out 10 years ago as a remedy for SARS.

<http://www.sciencemag.org/content/340/6129/130.full>

### 2. **Chinese Scientists Report the First Experimental Observation of the Quantum Anomalous Hall Effect**

(Tsinghua University, 15-03-2013)

The research team led by Professor Qikun Xue from Tsinghua University, in collaboration with researchers from the Institute of Physics of Chinese Academy of Sciences and Stanford University, made a breakthrough in the field of condensed matter physics. They reported the first experimental observation of the quantum anomalous Hall effect, which represents a very important new phenomenon discovered first by Chinese physicists. These results were published on March 15th Beijing Time (March 14th US Eastern Time) in the Science magazine as a Science Express paper. Tsinghua graduate students Cuizu Chang, Jinsong Zhang, Xiao Feng and Institute of Physics graduate student Jie Shen made equal contributions to this work. The other members of the joint research team include Yayu Wang, Xi Chen



and Jinfeng Jia from Tsinghua, Xucun Ma, Ke He, Lili Wang, Li Lu, Zhong Fang and Xi Dai from the Institute of Physics, and Shoucheng Zhang from Stanford.

The dissipationless edge states of the quantum Hall effect can be used for making new generation of low energy consumption transistors and electronic devices, which can help reduce the heating and energy cost of computers. However, the realization of conventional quantum Hall effect needs a very strong magnetic field (more than 10,000 times larger than the earth magnetic field), making the application very challenging. The most fascinating property of the quantum anomalous Hall effect is that it occurs in zero magnetic field, which significantly facilitates the practical applications of the quantum Hall effect for low energy consumption electronics.

The research team used molecular beam epitaxy to grow atomically flat thin films of magnetically doped (Bi,Sb)<sub>2</sub>Te<sub>3</sub> topological insulators. They fabricated the films into transport devices and measured the anomalous Hall effect at extremely low temperatures. They found that within a certain range of gate voltages, the zero magnetic field anomalous Hall resistance of this system reaches the quantized value  $h/e^2 \sim 25800 \Omega$ , which is the hallmark of quantum Hall effect. They submitted the paper to the Science magazine and it was quickly accepted.

The research is supported by the National Natural Science Foundation of China, the Ministry of Science and Technology of China, the Ministry of Education of China, Tsinghua University, and the Chinese Academy of Sciences.

[http://www.tsinghua.edu.cn/publish/newsen/6054/2013/20130315101609802411919/20130315101609802411919\\_.html](http://www.tsinghua.edu.cn/publish/newsen/6054/2013/20130315101609802411919/20130315101609802411919_.html)

### 3. Chinese Academy of Sciences on Track for Top Asia-Pacific Rank

(Nature Index China, 21-03-2013)

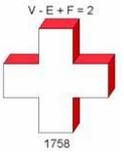
The Chinese Academy of Sciences (CAS) just failed to overtake The University of Tokyo as Asia-Pacific's top research institution in 2012. But it will almost certainly achieve top rank in 2013. Indeed, on a rolling 12-month window to mid-March, the CAS has a substantial lead, and its rise is typical of China's impressive research output growth.

These are the lead conclusions of the 2012 Nature Publishing Index (NPI) 2012 Asia-Pacific, published today in Nature. The NPI shows that China ranks second in the Asia-Pacific region behind Japan, but China's research output is growing at a faster rate. China has 51 institutions in the Asia-Pacific top 200, and most of them improved their ranking from last year, reflecting China's strong economy and increasing science investment.

CAS is the country's outstanding research leader. Its size is a factor, encompassing over 100 research institutions. CAS leads all other Asia-Pacific institutions in publications in Nature and three of the 17 other Nature research journals.

The top ten institutions in China are:

- Chinese Academy of Sciences (CAS)
- The University of Science and Technology of China, which has retained second place
- Tsinghua University in third place, up from fourth
- Peking University in fourth, having swapped places with Tsinghua University
- Shanghai Jiao Tong University and BGI in fifth and sixth places, respectively; these two institutions have showed the biggest proportional growth since 2008
- Zhejiang University, which rose from 11th last year to seventh
- Huazhong University of Science and Technology, which jumped from 20th spot last year to eighth
- Fudan University, which rose to ninth place with strong contributions in life and physical sciences
- The University of Hong Kong, which dropped from eighth, last year to tenth — the only one of this year's top 10 whose publication output decreased.



The Nature Publishing Index 2012 Asia-Pacific has been released as a supplement to Nature today. It measures the output of research articles from nations and institutes published in the 18 Nature-branded primary research journals over the calendar year to provide a snapshot of research in the Asia-Pacific in 2012.

([http://www.nature.com/nchina/press\\_releases/20130409\\_npi\\_asia\\_pacific\\_eng.pdf](http://www.nature.com/nchina/press_releases/20130409_npi_asia_pacific_eng.pdf))

#### 4. **Defending China's Imitators as "Bandit" Innovators**

(Wall street Journal, 04-04-2013)

Here's a spin on the issue of Chinese companies that copy western technology: They aren't just imitators. They're "bandit innovators" who are good for the world — and even for the companies they are copying. So says Li Daokui, economist at Beijing's Tsinghua University. A member of two Chinese government consultative bodies, the Harvard-educated former academic advisor to the People's Bank of China was speaking Thursday at the Institute for New Economic Thinking's annual conference taking place in Hong Kong.

Mr. Li, who has been outspoken on intellectual property issues in the past, cited a certain type of high-tech diesel engine, which he says a German company is the leader in, but that a Chinese company he knows is trying to copy.

"I tell my German friends, 'Don't worry too much about Chinese companies imitating you, they are creating value for you down the road,'" he said. "This type of imitation can't replace fundamental research...they don't have the accumulation of knowledge, the know-how to continuously grow," he said. "What it does do is create an ecosystem in which innovations will eventually build off of each other and help industry and the economy overall. It creates social value. It lowers the monopolized rents...and this innovation is not threatening the leading edge of the leaders."

"We criticize and attach value judgments...we have to understand the mechanism of these kind of innovations," he added, noting that economists haven't quantified the benefits of bandit innovation, as he calls it.

The issue strikes at the heart of the whole point of the modern patent system, which is to give innovators a time-limited monopoly to enjoy the fruits of their invention. Some economists, however, say patents take away the incentive by other companies to innovate. It also touches on the ultimate putdown of China's economic boom of the past three decades: That very little it had to do with innovation and much of it was thanks to copying Western technology.

There's a hot debate over exactly how much innovation goes on in China. Some say there's more than the country's reputation suggests, and that it's starting to be a big advantage to Chinese based manufacturers. Others note there are virtually no global Chinese brands that can rest their names on indigenous Chinese technology.

As to whether China can eventually be the leaders on the frontier of invention, not just the bandits, Mr. Li is sure it will happen.

"I totally disagree with the very popular view that China culturally is not positioned to innovate...There's no single Chinese culture. There is a large array of subcultures," he said, pointing to the entrepreneurial engineering culture in southern China. "I have faith that time will enable China to innovate in the Western fashion."

Another speaker at the forum, economist and Warburg Pincus venture capitalist William Janeway, questioned whether China can move beyond this stage of bandit innovation. "It's not yet clear whether economic powerhouses of Asia will succeed in making the change from innovation follower to frontier," he said.

(<http://blogs.wsj.com/chinarealtime/2013/04/04/defending-chinas-imitators-as-bandit-innovators/>)



## 5. **Cancer Cells Could be Weighed in Future**

(Xinhua, 19-04-2013)

Chinese scientists have come up with a new method of weighing microscopic particles such as single atoms or protons, as well as cancer DNA, which could lead to early diagnoses of the disease.

A research team led by Zhu Kadi, a professor with the Shanghai Jiaotong University, proposed the optical mass sensing technique to measure the masses of tiny objects, a method which could be several times more sensitive than previous techniques.

An article about the research was published earlier this month in *Physics Reports*, an authoritative international journal. "The technique is still theoretical. We are looking for partners to carry out experiments," said Zhu. Traditional measurement method can only weigh a bunch of atoms, and then estimate the mass of a single atom.

"We propose a system consisting of a nanoscale vibrating bar containing an embedded quantum dot and a metal nanoparticle sphere. When a tiny object, such as an atom or a strand of DNA, is placed onto the bar, the extra mass of the tiny object will change the bar's vibration frequency, which could be measured with lasers," Zhu said. "There is no new physical theory being applied. But nobody has thought about the measurement in this way," according to the professor.

In recent years, many researchers have been exploring nanotechnologies to create more sensitive measuring instruments, but they have all relied on electrical circuitry to communicate with the sample. "Those techniques cannot be used to measure uncharged particles. For example, the DNA molecules will be destroyed if they are charged," Zhu said.

Besides, he explained, electric wires can soak up energy by heating up, and they don't work well at the highest frequencies, where measurements often have the best sensitivity to small changes. "Using lasers, rather than wires, is the key of the new technique," said Zhu.

There are many possible applications of the technology, while its use in the early detection of cancer cells could be the most exciting to ordinary people. "The mass of cancer DNA molecules should be different from that of normal ones. So the technology could be used to find these cells," Zhu predicted.

([http://usa.chinadaily.com.cn/china/2013-04/19/content\\_16423789.htm](http://usa.chinadaily.com.cn/china/2013-04/19/content_16423789.htm))

## 6. **Campus Crime Arouse Higher Education Rethink**

(Xinhua, 19-04-2013)

The poisoning to death of a postgraduate student at Fudan University in Shanghai has aroused debate among experts and the public, some of whom are questioning China's education system as they recall similar cases involving promising youth on campus.

Huang Yang, 28, a third-year grad student at Fudan University, was pronounced dead due to multiple organ failure on April 16. Shanghai police have detained Huang's roommate, surnamed Lin, on suspicion of poisoning Huang with N-Nitrosodimethylamine, a highly toxic chemical compound.

Fang Ming, a spokesman for Fudan University, said there was no academic competition between Huang and Lin. Though both medical students, they did not have the same major and worked as interns at different hospitals, he said. Police are continuing investigation into the case. He also said that Fudan University has strengthened psychological counseling and control on experimental drugs.

The controversial incident has been widely discussed on China's Twitter-like microblog Sina Weibo. A subsequent pair of violent campus crimes has even added fuel to the flames. And the intrigue has been spurred by similar shocking cases in the recent past.



In 1994, Tsinghua University student Zhu Ling, chemistry major, suffered severe brain damage after being poisoned with thallium. There was speculation that Zhu's roommate was responsible, but charges were never pressed and the case remains unsolved. In 1997, two students of Peking University survived being poisoned by their classmate with thallium. The aggressor was sentenced to 10 years in prison. In 2007, three students of the Xuzhou-based China University of Mining and Technology also survived being poisoned by their friend, who was never tried after it was revealed he suffered a psychological disorder.

Huang Hongji, director of the Shanghai Youth Research Institute, characterized Huang Yang's killing as an extremely particular case. According to official statistics, cases of theft accounted for 80 percent of crimes in Shanghai from January 2012 to April 2013, with murder and intentional injury taking up just five percent.

"But it is time to rethink our higher education system," according to Huang Hongji. The typical college student of this era, born after the 80s and early 90s, is an only child, inclined to be spoiled and selfish, he said. On the other hand, a dearth of care from school or instructors amid expanding enrollments into universities has proved to be another problem, Huang Hongji added.

Xiong Bingqi, deputy director of the 21st Century Education Research Institute, echoed his opinions, saying Chinese have come to value "success" more than moral education. Xiong told a Xinhua reporter that though the education system isn't wholly to blame for the poisonings, it needs to be improved. "Our education focuses too much on professional education and ignores moral education. If a student lacks an understanding of their duties to society, he or she might use extreme methods to solve some difficulties in life," Xiong said.

He also suggested strengthening the psychological and moral education of students would help them to solve difficulties in communications.

[http://news.xinhuanet.com/english/indepth/2013-04/19/c\\_132323526.htm](http://news.xinhuanet.com/english/indepth/2013-04/19/c_132323526.htm)

## 7. Bizzar Tests Challenge Chinese Students

(Xinhua, 18-04-2013)

Chinese high school students taking college entrance exams have been puzzled and confused by the strange questions appearing on the tests.

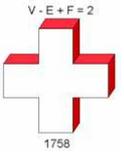
"How many monsters does the novel 'Journey to the West' depict?" is a question on the entrance exam for Shanghai's Fudan University. "Which city is hazier: Beijing or Shanghai?" Students must answer this question when taking an entrance exam for Sun Yat-sen University.

Since 2003, students who wish to enter top universities have been taking independent admission exams organized by the colleges each spring before taking the annual national college entrance exams.

The independent exams are part of education reforms intended to make the selection of candidates more comprehensive. Complaints about the rigid nature of unified college entrance exams are widespread.

But many students have doubts about the independent exams, particularly in light of the strange questions they must answer. The unorthodox nature of the questions does not match with conventional Chinese education, which values giving the "right" answer over giving a creative one. Many students have no idea how to even begin to answer the questions. However, open questions can prompt students to think independently and creatively, an ability that will be required in their future career and life.

After a decade of trials, independent admission exams held separately by some universities have demonstrated progress in China's education reform. They are flexible and innovative, helping to prompt secondary education institutions to improve accordingly in order to foster independent thinking and analysis.



Students cannot prepare for the exams merely by cramming beforehand, but must become more creative and imaginative in order to stand out from their peers. Creativity and imagination should be stressed more than a good memory. Acquiring knowledge is only one part of a quality education. Learning to find ways to apply that knowledge are just as important, if not more so.

Chinese educators should reconsider the way they evaluate students, as the country will need innovative minds to realize the dream of national rejuvenation.

([http://news.xinhuanet.com/english/china/2013-04/18/c\\_132320979.htm](http://news.xinhuanet.com/english/china/2013-04/18/c_132320979.htm))

## Events (May – June 2013)

### Science, Technology and Education-related Events in China

#### **The 16<sup>th</sup> China Beijing International Hi-tech Expo**

Date: May 21<sup>st</sup> to 26<sup>th</sup>

Place: Beijing

Contact: <http://www.chitec.cn>

Contact: <http://ChinaBioLLC.com>

#### **The 20<sup>th</sup> China International Industry Fair**

Date: June 5<sup>th</sup>

Place: Chongqing

Contact: Chinese Mechanical Engineering Society

#### **2013 Beijing Science and Technology Week**

Date: May 18<sup>th</sup> to 24<sup>th</sup>

Place: Beijing

Contact: <http://www.bast.net.cn>

#### **The 13<sup>th</sup> China International Environmental Protection Exhibition and Conference**

Date: June 9<sup>th</sup>

Place: Beijing

Contact: China Association of Environmental Protection Industry

#### **2013 China Bio Partnering Forum**

Date: May 29<sup>th</sup> to 30<sup>th</sup>

Place: Beijing

### Swiss-related S&T, Education and Health Events and Announcements

#### **Celebration of 5<sup>th</sup> Anniversary of Basel-Shanghai City Partnership**

Date: May 14<sup>th</sup>

Contact: Swissnex China

Contact: Embassy of Switzerland in China

#### **IMD MBA Introduction Event**

Date: May 24<sup>th</sup>

Contact: Embassy of Switzerland in China

#### **Swiss Week**

Date: May 30<sup>th</sup> to June 2<sup>nd</sup>

Contact: Swissnex China

#### **Visit of University Basel and University Hospital Basel to China**

Date: May 14<sup>th</sup> to 17<sup>th</sup>

Contact: Swissnex China

#### **EPFL EMBA Study Trip in China**

Date: June

Place: Shanghai and Beijing

Contact: Swissnex China and Embassy of Switzerland in China

#### **University of Basel visit**

Date: May 13<sup>th</sup>