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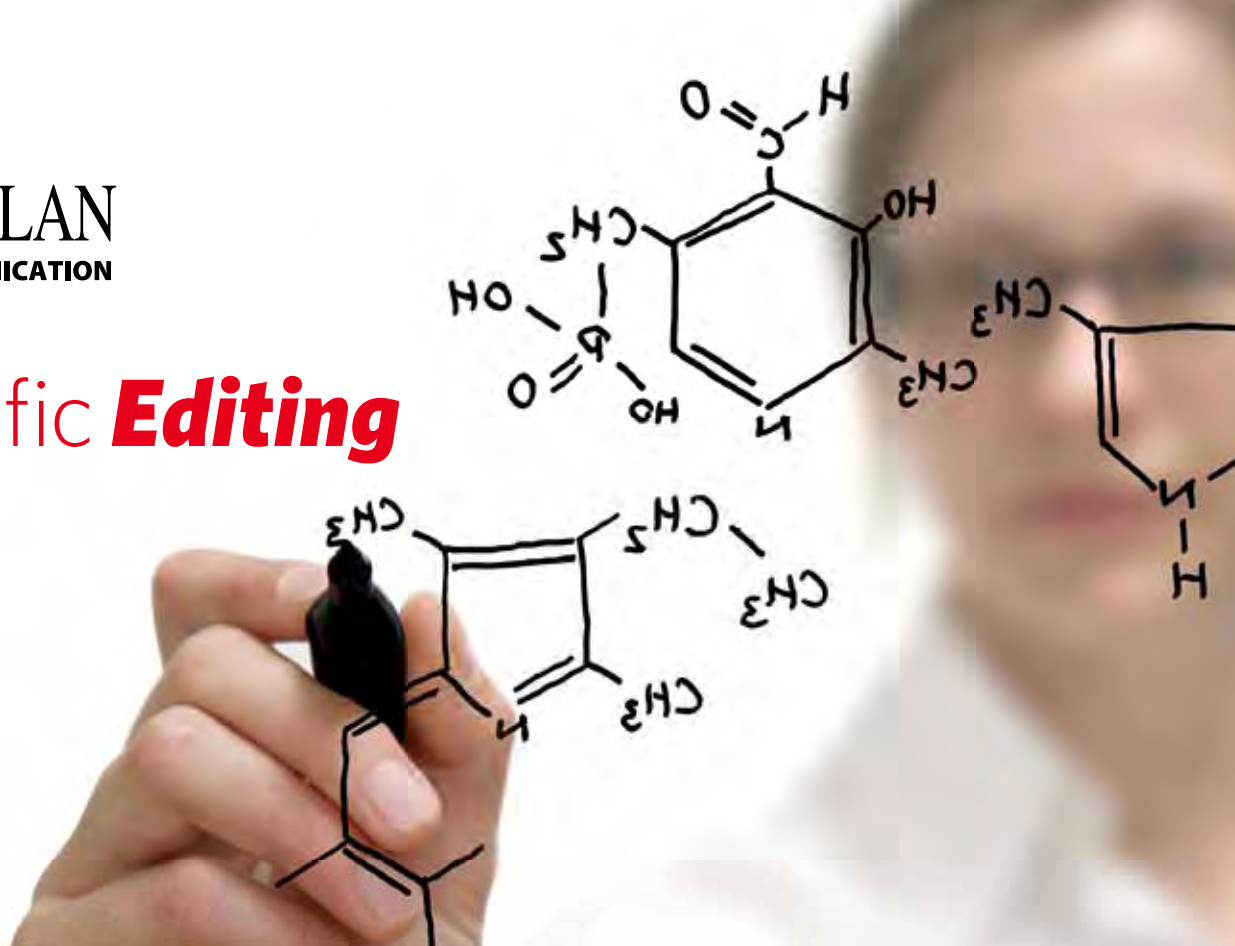
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NATURE PUBLISHING INDEX 2011 – CHINA

THE RISE OF CHINA CONTINUES UNABATED

David Swinbanks, Regional Managing Director, Nature Publishing Group

We at Nature Publishing Group (NPG) are delighted to present here the 2011 rankings of Chinese research institutions and cities based on their output of scientific research articles in Nature-branded primary research journals. The rankings are based on the number of papers published in 2011 with data for 2010 and 2009 also presented for comparison. China's performance is also placed in a regional context in the Asia-Pacific (see Asia-Pacific rankings on p. 24) and in a global context in the Global Top 100 rankings (see www.natureasia.com/en/publishing-index/global/).

China continues its phenomenal rise in output of scientific papers increasing from 126,299 papers in Thomson Reuters (formerly ISI) Web of Knowledge in 2010 to 147,564 in 2011. China's rise in output of papers in Nature-branded primary research journals is also remarkable, jumping from 152 papers in 2010 to 225 in 2011. *Nature Communications* — NPG's new online-only journal which offers authors the option to publish open access with their paper freely available to the world online — is proving particularly popular with Chinese scientists. In 2011, there were 48 papers with a corrected count of 26.38 published in *Nature Communications* with authors from China exceeding the number in the mother journal *Nature*. This reflects the growing popularity of open access publishing in China.

China has three institutions, namely, the Chinese Academy of Sciences, the University of Science and Technology of China, and Peking University, ranked in the Global Top 100 institutions worldwide at positions 23, 76 and 94 (see table on p. 8), respectively, with the Chinese Academy of Sciences rising nine places from 32 in 2010. This reflects the growing global strength of China's scientific research.

The Nature Publishing Index 2011 China takes the raw data of numbers of papers published and breaks them down by institution and city in China, assigning a corrected count to each paper according to the percentage of authors from that institution or city. Institutions and cities are then ranked on the basis of this corrected count. On the index website (www.natureasia.com/publishing-index/china) it is possible to drill down to the abstracts of the papers that make up the counts for each institution.

The index offers a unique insight into some of the highest quality basic research emerging from China. The rankings in this supplement provide snapshots for 2011, 2010 and 2009. To see the very latest results for China, visit the index website at www.natureasia.com/publishing-index/china. The index is updated every week with a moving window of 12 months of data.

There are many ways to assess the output and quality of research from

institutions, cities and countries, and Nature Publishing Index is just one. There are several caveats that must be applied in interpreting the index. Nature-branded primary research journals, although covering a broad spectrum of basic research in the life, physical, chemical and geosciences, provide relatively limited coverage of applied sciences, engineering and clinical medicine. The index should therefore be viewed primarily as an index of high-quality basic and not applied research. Having made that note, however, there are of course exceptions, such as the journals *Nature Photonics*, *Nature Materials*, *Nature Nanotechnology* and *Nature Biotechnology*, which cover both domains.

The output of an institution or city or country obviously depends on its size. In this regard, the Chinese Academy of Sciences, which has

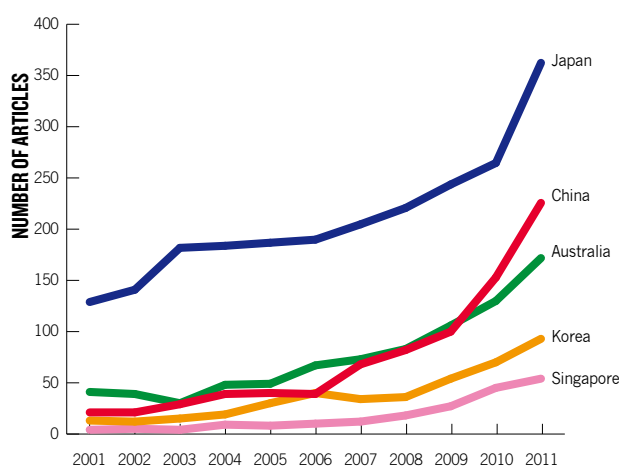
over 100 institutions and over 40,000 staff and nearly 50,000 students, is much better placed to generate large numbers of papers than say a university, and so this should be borne in mind when making comparisons with other institutions in China. In this supplement, we provide statistics on the numbers of researchers, students and faculty at each institution so readers can more easily take this into account. On the website, we also provide a breakdown of article counts for the individual institutes within the Chinese Academy of Sciences so users of the website can assess the contributions of individual academy institutes.

It must also be borne in mind that NPG launched new Nature-branded titles almost every year, such as *Nature Communications* launched in April 2010 and *Nature Climate Change* launched in April 2011 and this

naturally drives up the numbers of papers from institutions and countries worldwide. But the increase in number of papers in Nature-branded primary research journals, which amounts to a 29% increase from 2,597 papers in 2009 to 3,343 papers in 2011, is far outstripped by the 227% increase in numbers of papers from China in this same period.

With these caveats, we believe the index provides an extremely powerful tool to assess and find some of the best basic research coming out of China, and, because all the raw data and abstracts to the research articles behind the index are freely available on the index website, institutions and science policy makers are free to make their own interpretations and analysis of the index data, provided they cite the index as the source.

This print publication is only intended to be a guide to the Nature Publishing Index website and how it can be used to draw results and information from China. Our interpretations and presentations of rankings should not be viewed as definitive or final. This publication is just the starting point of many different ways to interpret and mine the data on China in the index. We warmly welcome feedback (by email to feedback@natureasia.com), and we hope that the index will become a dynamic entity that responds to input and feedback from users.



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EDITORIAL

ENTER A NEW ERA

Felix Cheung, Editor, Nature China

The United States' recession in the late 2000s and the ongoing sovereign debt crisis of the European Union have had a severe impact on the scientific community. Countries that were once the world's scientific superpowers are limiting, if not reducing, their spending on research and development in response to the economic downturn. Researchers of the West are now seeking opportunities in emerging countries, particularly those in Asia, and the result is a reshuffling of rankings that is fuelling a new scientific era. In the midst of this great disruption, many people are asking the question — which country will survive and become the next scientific superpower of the new world? The most common answer from people, it seems, is China.

We recently performed an analysis of research articles published in English-language science, technical and medical journals in the period from 1990 to 2011. We found three striking facts that can paint a clearer picture of current international trends. Firstly, China has increased its number of research articles over the last ten years, from 29,687 in 2001 to 147,564 in 2011, and is now ranked second behind the United States, having surpassed the United Kingdom in 2005, and Germany and Japan in 2006. If the trends continue, China will surpass the United States by 2022.

Secondly, the percentage of highly cited research articles (those within the top 1% by citation) that are authored by researchers based in China has increased over the last ten years, from 1.85% in 2001 to 11.3% in 2011, and is now ranked fourth behind the United States (50.7%), Germany (14.5%), and the United Kingdom (14.3%). Although the United States is still the leading producer of highly cited research articles, our data show that China is fast closing the gap and will overtake Germany and the United Kingdom by 2014.

Thirdly, the United States is slowly losing its dominance in the sciences, and the percentage of highly cited research articles that are authored by researchers based in the United States has decreased over the last ten years, from 64.3% in 2001 to 50.7% in 2011.

So what is the key take-home message? The key take-home message here is that there has been real and substantive growth in both the quantity and quality of China's scientific research. This conclusion

is backed up by a report from the UNESCO Institute for Statistics in 2010, which estimates that China now has roughly the same number of researchers as the United States. Furthermore, an announcement from the National Natural Sciences Foundation of China on 28 March 2012 has revealed that China will increase its annual budget for research and development by 25% over last year's figure to RMB 15 billion (USD 2.4 billion). Given that the two most important elements for pushing scientific research forward — namely people and money — are aplenty in China, it can be anticipated that China's rapid growth in scientific output will continue.

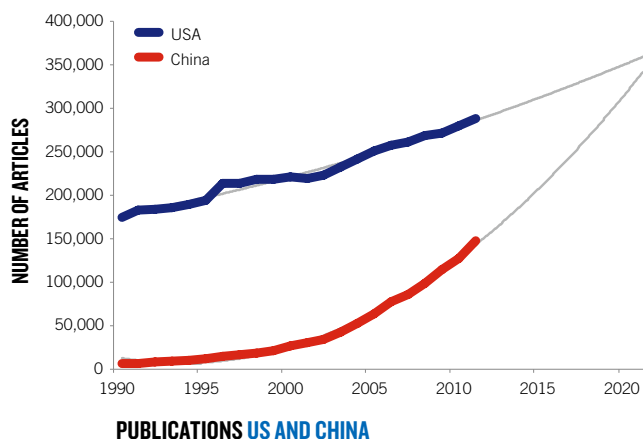
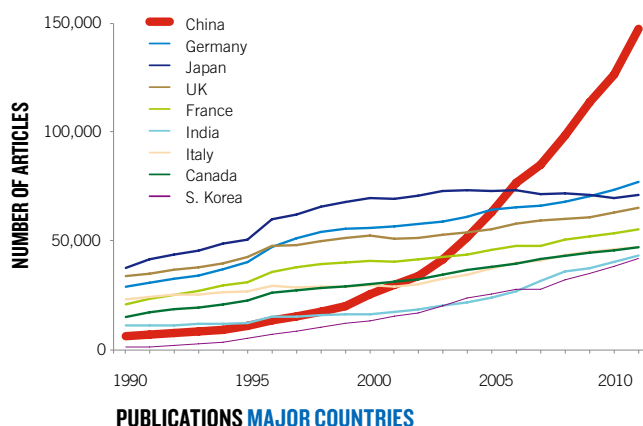
Another important lesson is that China has largely transformed itself from a country that focuses on quantity to one that focuses on quality of scientific research. Previous reports have criticized China for its lack of innovation, but our latest analysis shows that the country has come a long way in this aspect, and that it is now a major producer of highly influential research articles.

However, China must also be aware of factors that might limit its innovation. For example, although there is an understanding at the highest levels of the Chinese government of the importance of protecting intellectual property rights (IPR), in practice protection of IPR is still a lot weaker than in the West. In this regard, China is still behind the United States, which has long nurtured innovation through strong protection of IPR to achieve its success today.

If we look at the past, present and future of China's scientific research, we would come to realise that we are now at a midpoint of a revolution in scientific history.

The economic recession has created both risks and opportunities. How other countries can benefit from the growth and changes in China will be a key topic for many in the next ten years.

The Nature Publishing Index offers a unique way to assess the high quality research output of an institution or a city in China. We have analysed the index data and assessed the various strengths of each institution and city. We hope the information will give our readers some guidance on which institutions and places in China are at the forefront of scientific research today.



TOP TEN INSTITUTIONS

The first decade of the 21st century was a period of scientific awakening for China. The country saw the introduction of education reforms, the consolidation of research institutions, the rise of domestic talents and the growth of research and development. The Ministry of Science and Technology has increased the number of state-of-the-art national laboratories in the country from five to 19 and realigned much of the universities' national key disciplines in response to economic and social needs. All these changes have had a cumulative effect in reshaping the research landscape of China.

Scientific research in China has come a long way in the last ten years. Like a giant factory, the country was mass-producing an enormous quantity of research articles in the world's scientific literature. The research strengths of the country have traditionally been biased towards the applied end of the research spectrum. However, China realises the importance of moving up the 'food chain' and in recent years has placed more emphasis on quality rather than quantity. The country has also devoted much of its effort to basic research, particularly in the fields of chemistry, materials and physics.

The energy crisis and other national security problems, for example, have prompted China to focus research on dye-sensitized solar cells, rechargeable batteries and high-temperature superconductors. With the need to stay at the forefront in information technology and communications, the country has also devoted much of its resources to the development of lasers, optics and quantum information.

China is the third-largest country in the world by area. It is one of the world's major carbon emitters, but also acts as one of the world's largest terrestrial carbon sinks. It has the Tibetan Plateau and Himalayas in the west, the Gobi desert in the north, and the East and South China Seas in the east. Mirroring this diversity, China has much to offer in terms of research on climate change, soil erosion, sand storms, tectonics, earthquakes and ocean currents.

In addition, the aging population and emerging public health threats have prompted China to make significant progress in the life sciences, particularly in the fields of genetics, clinical medicine and structural biology. The country has the largest population and the largest hospital network in the world, presenting obvious advantages

over other nations in conducting genome-wide association studies, collecting clinical data and running epidemiological surveys. As a result, China now plays an increasingly important role in studies of drug safety and efficacy, hereditary diseases, cardiovascular diseases and diabetes.

According to the latest figures from the Ministry of Education, the number of research institutions in China currently stands at 797, of which 481 are universities and 316 are non-university establishments. These research institutions share the common goals of advancing sciences and contributing knowledge, but at the same time compete fiercely with each other for students, faculty and research grants. As the country now places more emphasis on the quality of research output rather than the quantity, understanding the differences and primary strengths of each of these institutions has become an important topic of discussion.

The Nature Publishing Index offers us a unique way to assess the research output of an institution. Our analysis based on the 2011 rankings shows that the top ten Chinese institutions for high-quality scientific research, in descending order, are the Chinese Academy of Sciences (CAS), the University of Science and Technology of China (USTC), Peking University, Tsinghua University, the Hong Kong University of Science and Technology, Xiamen University, Shanghai Jiao Tong University (SJTU), the

University of Hong Kong, Nanjing University and BGI Shenzhen. The majority of these institutions have now established their own areas of expertise. The USTC, Tsinghua University, Xiamen University and Nanjing University, for example, have respectively become leaders in physics, structural biology, chemistry and materials.

Apart from the 2011 rankings, we have also included the 2010 and 2009 rankings for the sake of comparison. The performance of a research institution can vary greatly between calendar years. To smooth out any temporal fluctuations that might occur from time to time, we have included a ranking based on the number of publications in Nature-branded primary research journals over a three-year (2009–2011) period for the very first time.

Interestingly, the three-year rankings have revealed a hierarchy of scientific power in China. At the top of this hierarchy, we have the



NATURE PUBLISHING INDEX 2011 CHINA — INSTITUTIONS

2011					2010			2009			Total 2009-2011		
RANK	INSTITUTION	CORRECTED COUNT	ARTICLES	ASIA-PACIFIC RANK	RANK	CORRECTED COUNT	ARTICLES	RANK	CORRECTED COUNT	ARTICLES	RANK	CORRECTED COUNT	ARTICLES
1	Chinese Academy of Sciences (CAS)	22.52	62	3	1	14.27	41	1	12.01	31	1	48.80	134
2	University of Science and Technology of China	8.58	17	11	3	3.83	8	4	2.67	8	3	15.08	33
3	Peking University	7.24	21	13	5	3.46	17	3	2.82	9	4	13.51	47
4	Tsinghua University	6.36	16	15	2	6.15	16	2	3.32	9	2	15.83	41
5	The Hong Kong University of Science and Technology (HKUST)	3.86	5	23	9	1.86	3	–	–	–	10	5.72	8
6	Xiamen University	3.77	6	25	10	1.83	3	11	1.00	1	8	6.59	10
7	Shanghai Jiao Tong University (SJTU)	3.73	21	28	19	0.99	4	5	1.76	10	9	6.48	35
8	The University of Hong Kong	3.58	12	29	7	2.17	8	8	1.36	5	6	7.10	25
9	Nanjing University	3.01	11	35	6	3.16	8	7	1.41	5	5	7.58	24
10	BGI Shenzhen	2.97	11	36	4	3.59	9	19	0.52	1	7	7.08	21

CAS — a scientific superpower (in a China context) that is responsible for producing approximately 22% of China's research articles in Nature-branded primary research journals. The supremacy of the CAS is evident from its size, its dominance in a wide range of research fields, and its ability to influence major decision-making in China's research and development.

Beneath this giant are three top-tier universities, namely the USTC, Peking University and Tsinghua University, each of which contributes approximately 6–7% of China's research articles to Nature-branded primary research journals. These top-tier institutions are becoming world renowned establishments which not only have the ability to exert influence on a global scale, but also possess research strengths that could lead China into a new era and may cause lesser institutions to change their course.

Then immediately below this upper tier is a mid-tier of elite universities and research institutions each of which contributes approximately 2–3% of China's research articles to Nature-branded primary research journals. They tend to focus their efforts on excelling in particular research areas, whether it might be material physics as in the case of Nanjing University or medical genetics at SJTU, and they carve out a niche for themselves by pursuing a narrower

range or particular types of research. These mid-tier institutions come in a variety of shapes and sizes, and, alongside the top-tier institutions, can be a driving force of scientific creativity and a supportive backbone behind the regional economy, such as in the case of BGI Shenzhen which has created a whole new economy based on genetic sequencing and SJTU which provides support to local pharmaceutical companies through its investigations of the medical genetics of various diseases.

We would like to point out that although the Nature Publishing Index rates the CAS as China's top research institution, the number of researchers working at the CAS is three to five times that of most universities in the country. It is therefore important to keep in mind that when making comparisons between the different Chinese institutions, one must take into account the number of researchers working at the institution, data for which we have provided with each description of the top ten institutions.

We would also like to close by stressing that the Nature Publishing Index provides just one way of looking at and ranking the output of high quality research from institutions in China, and in order to achieve an overall assessment of China's research institutions a variety of approaches should be adopted. ■

HOW TO READ THE NATURE PUBLISHING INDEX CHINA

The Nature Publishing Index China is a ranking based on the number of primary research articles published in the Nature family of journals by institutions and cities in mainland China and Hong Kong. The ranking is based on a corrected count that takes into account the fractional contribution of an institution or a city (by author affiliation) to each published article. The fractional counts are then tallied for the designated period. Only articles printed in the ranking period are included in the calculation of the index (advance online publications are not included until assigned an issue number and sent to press). The Nature Publishing Index 2011 China is based on frozen data for the calendar year 2011: January 1 to December 31.

The Nature Publishing Index China is based on affiliation data drawn from Nature journal articles published on nature.com. There is great variability in the way authors present their affiliations. Every effort is made to count affiliations in a consistent way making reasonable assumptions to determine corrected counts and these assumptions are explained on the website. As such, corrected counts are approximations based on these assumptions and no counts are definitive.

THE CHINESE ACADEMY OF SCIENCES (CAS)

THE GIANT MARCHES ON

CORRECTED COUNT: 22.52 ARTICLES: 62

The Chinese Academy of Sciences (CAS) maintains its number one position at the top of the China rankings. In the Asia-Pacific region, CAS has overtaken the Japan-based institution RIKEN — the runner-up of 2010 — for the very first time, is ranked third behind the University of Tokyo and Kyoto University, and based on current trends is fast closing the gap with Kyoto University. The CAS is ranked 23rd in the world immediately behind the Johns Hopkins University, USA — but ahead of the Swiss Federal Institute of Technology Zurich, Switzerland; the University of Toronto, Canada; the University of London and University College London, UK; and the Rockefeller University, USA. It is one of three Chinese research institutions present in the 2011 Nature Publishing Index Global Top 100 (see table on p. 8).

Founded in 1949 and headquartered in Beijing, the CAS is China's premier research institution dedicated to the advancement of natural sciences. It is also one of the world's largest agglomerations of scientific workers, with close to 100,000 professionals, including principal investigators, technicians and students, conducting research in all facets of science.

The CAS has branch offices in 11 cities — Shanghai, Changchun, Chengdu, Guangzhou, Kunming, Lanzhou, Nanjing, Shenyang, Wuhan, Xi'an and Xinjiang — and more than 100 affiliated institutes dotted throughout the country. In addition, the CAS has two affiliated universities, namely the University of Science and Technology of China (ranked separately in this publication) and the Graduate University of Chinese Academy of Sciences.

The CAS has contributed 62 articles with a corrected count (CC) of 22.52 to Nature-branded primary research journals, including 16 (CC 4.51) articles to the flagship title *Nature*. The published work spans all disciplines of science, but overall, there are 36 (CC 15.35) articles in the life sciences and 26 (CC 7.17) in the physical sciences.

The primary research strengths of the CAS have always been in the areas of chemistry, physics, structural biology, genetics and palaeontology, but this year it has also upped the number of articles in the areas of immunology and plant biology. In the three years of the China Index (2009–2011), the CAS is the largest contributor in China to *Nature*, *Nature Chemical Biology*, *Nature Climate Change*, *Nature Communications*, *Nature Medicine*, *Nature Neuroscience*, *Nature Physics* and *Nature Structural & Molecular Biology*, as well as the second largest contributor to *Nature Chemistry*, *Nature Genetics*, *Nature Geoscience*, *Nature Immunology* and *Nature Materials* (see Top Institutions by Nature Journal on p. 22).

The CAS has more than 100 affiliated institutes, but only 32 have made their names onto the pages of Nature-branded primary research journals: 15 in Beijing, six in Shanghai, two in Qingdao, and one each in Dalian, Fuzhou, Guiyang, Kunming, Lanzhou, Nanjing, Shenyang and Yantai. The top five contributors are Shanghai Institutes for Biological Sciences, the Institute of Physics, the Institute of Botany, the Institute of Biophysics, and the Institute of Vertebrate Paleontology and Paleoanthropology.

The two affiliated institutes that see the biggest improvement from last year are SIBS and the Institute of Botany: the former has increased its number of research articles in Nature-branded primary research journals from six (CC 1.11) articles to 15 (CC 3.74), while the latter has increased from one article (CC 0.20) to five (CC 2.44). Lixin Zhang, in particular, has contributed two wholly authored articles (articles with a CC of 1) on chloroplast signalling to *Nature Communications*.

CHINESE ACADEMY OF SCIENCES	
	LOCATION: BEIJING, SHANGHAI, CHANGCHUN, CHENGDU, DALIAN, FUZHOU, GUANGZHOU, GUIYANG, KUNMING, LANZHOU, NANJING, NINGBO, SHENYANG, SHENZHEN, SUZHOU, TAIYUAN, URUMQI, WUHAN, XI'AN, XIAMEN, XINJIANG, XINING, XISHUANGBANNA AND YANTAI
	ESTABLISHED: 1949 STAFF: 45,400 STUDENTS PHD: 20,919 MASTERS: 27,142

The CAS is responsible for more than one-fifth of China's annual contribution, by CC, to Nature-branded primary research journals. Between 2009 and 2011, the CAS has accumulated more articles and a higher CC in Nature-branded primary research journals than the sum of Tsinghua University, Peking University and the University of Science and Technology. Given its sheer size and volume of people, we anticipate that the CAS will maintain its domination in China for some time to come.

NATURE PUBLISHING INDEX GLOBAL TOP 100

RANK	INSTITUTION	COUNTRY	CORRECTED COUNT	ARTICLES
1	Harvard University	USA	129.92	289
2	Stanford University	USA	67.48	140
3	Max Planck Institutes	Germany	63.87	159
4	National Institutes of Health (NIH)	USA	58.11	153
5	The University of Tokyo	Japan	42.88	109
6	French National Centre for Scientific Research (CNRS)	France	42.51	203
7	University of California Berkeley	USA	37.60	91
8	Yale University	USA	36.92	84
9	University of California San Diego (UCSD)	USA	34.27	103
10	University of California San Francisco (UCSF)	USA	34.15	91
20	Kyoto University	Japan	23.98	56
23	Chinese Academy of Sciences (CAS)	China	22.52	62
76	University of Science and Technology of China	China	8.58	17
94	Peking University	China	7.24	21

The data for the Global Top 100 is drawn from the beta website of the Nature Publishing Index Global Top 100 (www.natureasia.com/publishing-index/global). We welcome feedback from readers on the website and the way results are presented.

Results for organizations that include numerous sub-entities (e.g. the Max Planck Institutes) are presented as aggregates of all contributing entities in the beta index. An exception to this rule is the University of California System, for which each of the ten universities of the system are presented individually. On aggregate count, the University of California System has a corrected count in excess of 142 and would be ranked number one.

UNIVERSITY OF SCIENCE AND TECHNOLOGY OF CHINA

THE QUANTUM LEAP

CORRECTED COUNT: 8.58 ARTICLES: 17

Founded in 1958 and located in Hefei, Anhui Province, the University of Science and Technology of China (USTC) is the youngest member of the C9 league – an elite alliance comprising nine Chinese universities, China's equivalent of the Ivy League. It is one of only two universities that are under the administration of the CAS (most universities in China are under the administration of the Ministry of Education), and the only university in China with two national laboratories (there are only 19 of these state-of-the-art facilities in the country).

Coming in at second place in the 2011 China rankings, the USTC has defied all expectations and contributed 17 (CC 8.58) articles to Nature-branded primary research journals. With a 124% increase in CC, the USTC has successfully progressed from third place to second and, as a result, pushed Peking and Tsinghua University – widely regarded as the two top universities in China – down to the third and fourth position respectively. It is one of three Chinese research institutions present in the 2011 Nature Publishing Index Global Top 100 (see table on p. 8).

The USTC publishes articles mainly in the physical sciences. Overall, there are 15 (CC 8.08) articles in the physical sciences and two (CC 0.5) in the life sciences. The primary research strengths of the USTC are in the areas of quantum physics and condensed matter physics. Guangcan Guo, Jianwei Pan and Xianhui Chen, in particular, are responsible for a large slice of USTC's publications in Nature-branded primary research journals: Guo and Pan

UNIVERSITY OF SCIENCE AND TECHNOLOGY OF CHINA	
LOCATION:	HEFEI
ESTABLISHED:	1958
ACADEMIC STAFF:	1,448
STUDENTS	
PHD:	1,900
MASTERS:	6,200
UNDERGRADUATES:	7,400

both study quantum systems, and Chen studies high-temperature superconductors.

Within the Asia-Pacific, the USTC has moved up five places to 11th, ahead of the University of Queensland, Australia. In the three years of the China Index (2009–2011), the USTC is the largest contributor to *Nature Photonics* and the second largest contributor to *Nature Communications* and *Nature Physics* (see Top Institutions by Nature Journal on p. 22).

Although the USTC has yet to earn the same level of fame as Peking and Tsinghua University, we have substantiating evidence that all three institutions are actually in the same league when it comes to publishing high-quality research. Between 2009 and 2011, the USTC has accumulated a CC of 15.08, on par with Tsinghua University's CC of 15.83 and ahead of Peking University's CC of 13.51. If the USTC continues to perform strongly in Nature-branded primary research journals, we are confident that its role as a leading research institution will eventually receive recognition. ■

PEKING UNIVERSITY

MAINTAINING DIVERSITY

CORRECTED COUNT: 7.24 ARTICLES: 21

This year Peking University has excelled in the China rankings by contributing 21 (CC 7.24) articles to Nature-branded primary research journals, including four (CC 0.24) articles to *Nature*, placing it at third place in the rankings ahead of Tsinghua University. Peking University's published work covers a wide range of disciplines, but overall, there are 13 (CC 2.78) articles in the life sciences and eight (CC 4.46) in the physical sciences.

Founded in 1898, Peking University is a leading comprehensive university that offers education and research in all disciplines, ranging from science and engineering to arts, humanities and social sciences. It has 81 national key disciplines – disciplines that are strategically important to the nation and therefore are financially supported by the Ministry of Education (MOE) – and boasts one national laboratory, 49 state key laboratories and ten MOE key laboratories. Thanks to all these facilities, Peking University has become one of the most diverse and best-equipped universities in China.

Peking University is one of three Chinese research institutions present in the 2011 Nature Publishing Index Global Top 100 (see table on p. 8). As a leading comprehensive university, Peking University places its research focus not on one single discipline but on a wide range of disciplines. Because of this, Peking University has achieved a solid performance in multiple areas, including biotechnology, cell biology, chemistry and materials.

Interestingly, the majority of the articles published by Peking

PEKING UNIVERSITY	
LOCATION:	BEIJING
ESTABLISHED:	1898
ACADEMIC STAFF:	1,597
STUDENTS	
PHD:	5,088
MASTERS:	10,031
UNDERGRADUATES:	14,465

University have a low share of authorship; only five articles have a CC greater than 0.5. These numbers suggest that Peking University is conducting high-quality research and publishing in top-ranked journals by collaborating with strategic partners that have complementary interests – a clever approach to increase its competitiveness amidst globalization.

Within the Asia-Pacific, Peking University has moved up six places to 13th, ahead of the Australian National University. In the three years of the China Index (2009–2011), Peking University is the largest contributor to *Nature Cell Biology* and the second largest contributor to *Nature Chemical Biology* and *Nature Photonics* (see Top Institutions by Nature Journal on p. 22).

The breadth of disciplines strongly reflects the diversity and balance of top scientists working at Peking University. Although Peking University does suffer a lack of 'identity' – a discipline that it excels in – we believe that this unique quality is what sets it apart from other universities in China. ■

TSINGHUA UNIVERSITY

THE RISE OF MATERIAL PHYSICS

CORRECTED COUNT: 6.36 ARTICLES: 16

Founded in 1911, Tsinghua University is an institution that places much its focus on education and research in science and engineering. The present Tsinghua University originates from Tsinghua College, an establishment set up by the United States when it remitted a portion of the Boxer indemnity (compensation forced on the Chinese government for the loss of property and life as a result of the 1898–1901 Boxer Rebellion) to China. Because of this, western cultures have had a deep influence on Tsinghua University's early development, especially on its ideology of academic freedom and independence.

In fourth place in the 2011 China rankings, Tsinghua University has contributed 16 (CC 6.36) articles to Nature-branded primary research journals, including five (CC 3.37) articles to *Nature*. It has tied with its own record of last year by contributing the same number of articles — 16 — to Nature-branded primary research journals. Despite a slight increase in the CC, Tsinghua University has dropped two places to fourth in the China rankings as its close competitors — the USTC and Peking University — overtake.

The primary research strength of Tsinghua University has always been in structural biology, and this year it has published seven (CC 3.76) articles in this area. Jiawei Wang, in particular, has contributed five articles on various protein structures to Nature-branded primary

TSINGHUA UNIVERSITY	
LOCATION:	BEIJING
ESTABLISHED:	1911
FACULTY:	3,133
STUDENTS	
PHD:	8,436
MASTERS:	15,984
UNDERGRADUATES:	15,050

research journals: three in *Nature* and two in *Nature Communications*.

Apart from structural biology, the number of articles in material physics has also gone up. Overall, Tsinghua University has published five (CC 2.31) articles in this area. Xiaozhong Zhang, in particular, has contributed an article titled 'Geometrical enhancement of low-field magnetoresistance in silicon' to *Nature*, which has recently been named 'China's top ten scientific and technological progresses in 2011' by the Ministry of Science and Technology. Based on these observations, we have reasons to believe that Tsinghua University is gearing up to become a leader in material physics.

Within the Asia-Pacific, Tsinghua University is ranked 15th ahead of National University of Singapore. In the three years of the China Index (2009–2011), Tsinghua University is the second largest contributor to *Nature* and *Nature Structural & Molecular Biology* (see Top Institutions by Nature Journal on p. 22).

THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

AIMING FOR QUALITY OVER QUANTITY

CORRECTED COUNT: 3.86 ARTICLES: 5

This year the Nature Publishing Index 2011 China ranks the Hong Kong University of Science and Technology (HKUST) as the fifth leading research institution in China and the leading research institution in Hong Kong. Although the HKUST has only contributed five (CC 3.86) articles to Nature-branded primary research journals — the least among the top ten — it finishes high in the rankings by having a high share of authorship for each of its articles.

Founded in 1991, the HKUST is a public university that specialises in science, technology, engineering, management and business. It is the youngest of eight universities in Hong Kong and widely regarded as one of the 'top three' — the other two being the University of Hong Kong and the Chinese University of Hong Kong. Today, the HKUST plays an important role in transforming Hong Kong into a knowledge-based society and driving the local economy through scientific discoveries and technological innovations.

The primary research strengths of the HKUST have always been in the areas of neuroscience, theoretical physics and structural biology, but this year the numbers are high in only neuroscience and theoretical physics. Nancy Ip and Che Ting Chan, in particular, have each contributed two articles to Nature-branded primary research journals: the former in *Nature Neuroscience* and *Nature Cell Biology* and the latter in *Nature Materials* and *Nature Photonics*.

THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY	
LOCATION:	HONG KONG
ESTABLISHED:	1991
FACULTY:	439
STUDENTS	
POSTGRADUATE:	3,709
UNDERGRADUATES:	6,172

Within the Asia-Pacific, the HKUST has catapulted itself from 34th place to 23rd, ahead of Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia. In the three years of the China Index (2009–2011), HKUST is the largest contributor to *Nature Materials* and the second largest contributor to *Nature Neuroscience* (see Top Institutions by Nature Journal on p. 22).

This year the HKUST manages to finish three places ahead of the University of Hong Kong. It is an amazing feat considering that the number of faculties at the HKUST is less than half of that at the University of Hong Kong. However, between 2009 and 2011, the University of Hong Kong accumulated more articles and a higher CC in Nature-branded primary research journals than that of the HKUST. It remains to be seen if the HKUST can maintain its title as the leading research university in Hong Kong in the years to follow.

XIAMEN UNIVERSITY

A CASE OF GOOD CHEMISTRY

CORRECTED COUNT: 3.77 ARTICLES: 6

Founded in 1921, Xiamen University is an institution located in the coastal city of Xiamen — approximately an hour by plane from either Shanghai or Hong Kong. It is the one and only university in China that is located inside a special economic zone.

Xiamen University has gained further ground this year in the China rankings by contributing six (CC 3.77) articles to Nature-branded primary research journals, including its first article in *Nature Nanotechnology* and *Nature Geosciences*. It now represents the sixth leading research institution in China, and is well ahead of many traditional elite universities. Within the Asia-Pacific, Xiamen University has leapt from 39th place to 25th, ahead of the Korea Advanced Institute of Science and Technology (KAIST).

One of the most remarkable things about Xiamen University is the rapid rise in its research quality over recent years. It was only in 2008 that Xiamen University published its first article in *Nature Chemical Biology* and *Nature Materials*. Since then, Xiamen University has been a regular contributor to Nature-branded primary research journals.

Chemistry and cell biology continually feature as Xiamen University's key research strengths, but this year the number of articles is particularly high for chemistry. Overall, Xiamen University has

XIAMEN UNIVERSITY	
LOCATION:	XIAMEN
ESTABLISHED:	1921
ACADEMIC STAFF:	2,536
STUDENTS	
PHD:	2,797
MASTERS:	16,546
UNDERGRADUATES:	20,454

contributed four (CC 3.17) articles in the area of chemistry, including one wholly authored article to *Nature Nanotechnology* and two wholly authored articles to *Nature Communications*.

As we mentioned in last year's China index, an interesting characteristic about Xiamen University is that the majority of its articles in Nature-branded primary research journals are wholly authored articles. In fact, since its debut in 2008, Xiamen University has been publishing at least one wholly authored article every year. This '100% made in Xiamen' characteristic reflects the university's relative isolation from other major research institutions — but at the same time underscores the university's ability to do everything in-house. ■

SHANGHAI JIAO TONG UNIVERSITY

ENTER THE GWAS

CORRECTED COUNT: 3.73 ARTICLES: 21

This year Shanghai Jiao Tong University (SJTU) has made a huge improvement in productivity by contributing 21 (CC 3.73) articles to Nature-branded primary research journals, including three (CC 0.20) articles to *Nature*. With a 280% increase in CC, SJTU has skyrocketed from 19th place to seventh in the China rankings and is now trailing behind Xiamen University by 0.04 of a CC. Despite a large increase in the number of articles — second only to the CAS — SJTU has finished in the bottom half of the top ten because the majority of its articles have a low share of authorship; only three articles have a CC higher than 0.5.

Founded in 1896, SJTU is the oldest university among our top ten this year. Student exchange programs and international research collaborations have always been a core part of SJTU's development. In 1978, SJTU sent its first delegation of Chinese scientists to the US. Since then, it has established links with more than over 100 universities in more than 20 countries.

Publishing primarily in the life sciences, this year the SJTU has published 18 (CC 3.50) articles in the life sciences and four (CC 0.23) in the physical sciences. The primary research strength of SJTU is in the area of medical genetics. In fact, out of the 18 articles in the life sciences, 14 are on genome-wide association studies (GWAS) of medical conditions including gastric cancer, lung cancer, endometrial cancer, leukaemia, Graves' disease, schizophrenia, nephropathy, polycystic ovary

SHANGHAI JIAO TONG UNIVERSITY	
LOCATION:	SHANGHAI
ESTABLISHED:	1896
ACADEMIC STAFF:	3,094
STUDENTS	
POSTGRADUATE:	24,017
UNDERGRADUATES:	17,766

syndrome, atopic dermatitis, hypertension and metabolic disorders.

The SJTU owes much of its success to two of its affiliated institutions, Ruijin Hospital and the Bio-X Center. This year Ruijin Hospital has contributed five articles to *Nature Genetics* on behalf of SJTU, while the Bio-X Center has contributed four articles to *Nature Genetics* and one article to *Nature Nanotechnology*.

Within the Asia-Pacific, SJTU ranks in the 28th spot, one place behind Korea's Pohang University of Science and Technology (POSTECH), having made a huge climb from last year's 68th spot. In the three years of the China Index (2009–2011), SJTU is the second largest contributor to *Nature Cell Biology* (see Top Institutions by Nature Journal on p. 22). ■