

University of Science and Technology (POSTECH), the latter up from fourth. Fourth position is now occupied by the resurgent Samsung, which has one of the highest ratios of corrected count to published articles of any institute in the Asia-Pacific, followed by Korea University located in northern Seoul, which maintained its position as the fifth-ranked institution in Korea.

The composition of the next five is a little more interesting, and variable from year to year. Four technological research institutes have moved out from last year's rankings to be replaced by universities. This leaves a top ten with one public research body, KAIST, one corporation, Samsung, and eight universities, perhaps reflecting a transition in Korea from essential, practical technological research to broader endeavours.

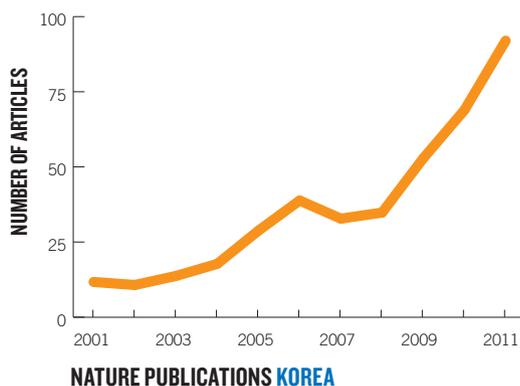
Three newcomers enter the lower five, and they are a diverse group. Sixth-placed Ewha Womans University is the largest female educational institution in the world and, among its alumnae, numbers many of the most influential women in the country. Most

of its eight articles published in Nature-branded primary research journals in 2011 are in the life sciences, but they also included chemical biology and physics. The university itself incorporates a relatively new, but large College of Engineering. Yonsei University, the third of Korea's prestigious SKY (Seoul National, Korea and Yonsei) universities has moved into ninth place, up from 11 in 2010, but still not as high as its seventh place in 2009.

The last of the newcomers at number ten (up from 14) is Ajou University, which was established as an engineering school in the early 70s with the help of the French, and developed into a broader university with a significant endowment from the CEO of the Daewoo conglomerate.

First entering the top ten in 2010, Hanyang University has moved down a place to seventh position in 2011, and

Sungkyunkwan University — down to eighth place from number three last year — is the only institute to have tumbled out of the top five. ■



SINGAPORE

CORRECTED COUNT: 13.43

ARTICLES: 53

COUNTRY PROFILE	
POPULATION	5.1 million
RESEARCHERS	27,841
GDP (PPP)	\$309,000 million
GDP PER CAPITA	\$59,582
R&D EXPENDITURE (%GDP)	2.61%

SOURCE: MEXT, IMF, UN

With core research strengths in biomedical science, IT and engineering, Singapore maintains its position as a top-five-ranked country in the Asia-Pacific rankings of the Nature Publishing Index. The widening gap between Singapore and fourth-ranked Korea and the notable rise of Taiwan and India in 2011 however, means that the island nation faces challenges from above and below.

Despite a small population of just over 5 million and a small number of institutions publishing in Nature-branded primary research journals, Singapore ranks fifth in the Asia-Pacific region in 2011. Its three top institutions, the Agency for

Science, Technology and Research (A*STAR), the National University of Singapore (NUS) and Nanyang Technological University (NTU) are all ranked in the top 50 in the Asia-Pacific in terms of three-year averages — at 15th, 18th and 35th, respectively.

But the gap between Singapore and the top four countries — Japan, China, Australia and Korea — is significant and widening. In 2011, Singapore lost ground on fourth-ranked Korea, and it is now facing a challenge from sixth-ranked Taiwan which increased its publication to 26 articles, but whose less stable record means that it is in eighth place on the basis of three-year averages. With a big increase in 2011 publications, India is not far behind in seventh spot.

For the numbers of articles published, Singapore's corrected count is relatively low — an indication of the multinational, collaborative nature of research in Singapore, which is now home to more than 100 global biomedical companies. Given its size, Singapore is undoubtedly a success story. Its top-ranked institution, NUS, ranks 16th in the

NATURE PUBLISHING INDEX SINGAPORE

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	National University of Singapore (NUS)	6.28	32	16	2	3.76	23	2	2.46	9	2	12.50	64
2	Agency for Science, Technology and Research (A*STAR)	3.24	21	32	1	5.04	24	1	5.56	17	1	13.84	62
3	Nanyang Technological University (NTU)	3.03	10	33	3	1.64	5	3	1.40	5	3	6.07	20
4	DSO National Laboratories	0.38	2	156	–	–	–	–	–	–	5	0.38	2
5	Singapore Eye Research Institute	0.15	5	277	–	–	–	–	–	–	6	0.15	5
6	Laboratory of NF-κB Signaling	0.13	1	309	–	–	–	–	–	–	7	0.13	1
7	National Cancer Centre Singapore	0.10	2	343	8	0.01	1	–	–	–	9	0.11	3
8	Waseda Bioscience Research Institute in Singapore (WABIOS)	0.07	1	418	6	0.06	1	–	–	–	8	0.12	2
9	Singapore-MIT Alliance (SMA)	0.04	1	476	–	–	–	–	–	–	11	0.04	1
10	Merck Research Laboratories	0.02	1	543	–	–	–	–	–	–	12	0.03	1

Asia-Pacific region in 2011 and, at 110, just misses out on the Nature Publishing Index Global Top 100. The country has a vibrant knowledge-based economy, characterized by high levels of collaboration between government agencies and private research institutes, and also between disciplines. This multidisciplinary collaboration is actively encouraged in Singapore's R&D strategy, facilitated by the creation of research hubs in biomedical science (Biopolis) and, nearby, in physical sciences, IT and engineering (Fusionopolis). These hubs involve A*STAR institutes and research and development labs of international companies such as GlaxoSmithKline, Novartis and Merck.

Investment in science and technology is high and increasing — the Singapore government intends to spend 3.5% of GDP on research and development by 2015 and is already committed to outlaying US\$16.1 billion for the period 2011–2015. With 53 articles in the Nature Publishing Index, Singaporean scientists have the distinction of being the most productive of the top five Asia-Pacific countries in terms of both articles per capita, and articles per research scientist. Singapore has by far the highest GDP per capita of the top five countries as well as the highest per capita expenditure on R&D.

CHANGES AT THE TOP

This year marks a change in the rankings of Singapore institutions, with NUS taking over the top spot from A*STAR. The NUS, continuing its rise over the past few years, contributed to 32 articles published in Nature-branded primary research journals in 2011, up from 23 in 2010, while A*STAR dropped from 24 articles in 2010 to 21 in 2011.

The NUS, Singapore's largest university, is strongest in the life sciences, but also published three papers with high corrected counts in *Nature Photonics*, where it is the fourth-ranked institution in the region. It is home to Research Centres of Excellence (RCE) in quantum technologies, cancer science, and mechanobiology, as well as being a

partner with Nanyang Technological University in an RCE in environmental life sciences engineering.

A*STAR has dropped from top-ten status in the Asia-Pacific over the past two years to 32nd in 2011. It is now only one rank in the Asia-Pacific listing above Singapore's third-ranked NTU. The majority of A*STAR's articles were published by the Genome Institute of Singapore, and the agency now ranks fourth in the Asia-Pacific region for *Nature Genetics*. In addition to its strength in life sciences, A*STAR institutes contributed to articles in high-performance computing, nanotechnology, optical physics and materials in Nature-branded primary research journals.

Nanyang Technological University (NTU), established in 1991 but already enrolling more than 33,000 students, is a founding member of the Global Alliance of Technological Universities — seven of the world's top technological universities that seek to develop scientific and technological solutions to global problems. The university has doubled its research staff in the past five years as it transforms from primarily a teaching role to a research-based institution. From 2010 to 2011, NTU doubled its paper count from five to ten, publishing articles in a range of fields including materials science, molecular and structural biology, photonics and geoscience.

Another significant facet of Singapore's success overall is the increase in the number of institutions contributing each year. Up from only the big three in 2009, ten institutions published in Nature-branded primary research journals in 2011. All except one of these other institutions ranked in the top 200 of the region in 2011. At present, they are publishing small numbers of articles with low corrected counts, but both the number of institutions included in the Index and the size of their contribution are expected to grow in coming years as Singapore's considerable investment in research and development bears fruit. ■

