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nature PUBLISHING INDEX 2012

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We are delighted to present the first global overview of high quality research output from the world's many countries and institutions based on the Nature Publishing Index (NPI), which tracks the number and affiliations of primary research articles published in 18 Nature-branded journals.

Created in 2009 to focus on the Asia-Pacific region, the NPI now covers the entire world. Using the Index, we are able to track output by institution and country. The NPI is a unique resource that spans all types of research institutions —not only universities but government research institutes and private sector companies.

What are the most noteworthy messages from this supplement? Unsurprisingly, the United States dominates the rankings, being home to five of the top ten research institutions in the NPI. What is more striking is the rapid rise of China, which has nine institutions in The Top 200 — up from just three a year earlier. China is now clipping the heels of France in the country rankings. The Chinese Academy of Sciences has, as of January 2013, surpassed the University of Tokyo as the top institution in the Asia-Pacific. Despite its dire economic circumstances, Ireland is emerging as a rising star — jumping from 30th to 20th in the NPI between 2008 and 2012. Similarly, Brazil has moved up seven places to 27th. Saudi Arabia and Kenya also stand out as newly emerging players in the Index.

Our interpretations and presentations of the NPI data are not definitive. Users are free to access the NPI online, read the abstracts of the papers on which it is based, and derive their own interpretations of the data (provided they acknowledge the NPI as the source). To that end, we strive to make the Index and the methodology behind it as transparent as possible: the underlying data for the past year can be viewed on the NPI website at nature.asia/publishing-index-global. We hope the analysis presented here will stimulate further use of the NPI by institutions and individuals, and we welcome your feedback.

David Swinbanks
Managing Director, Regional Markets and Science & Medical Communications, Nature Publishing Group. Managing Director, Australia and New Zealand, Macmillan Science and Education

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NATURE PUBLISHING INDEX 2012 ASIA-PACIFIC
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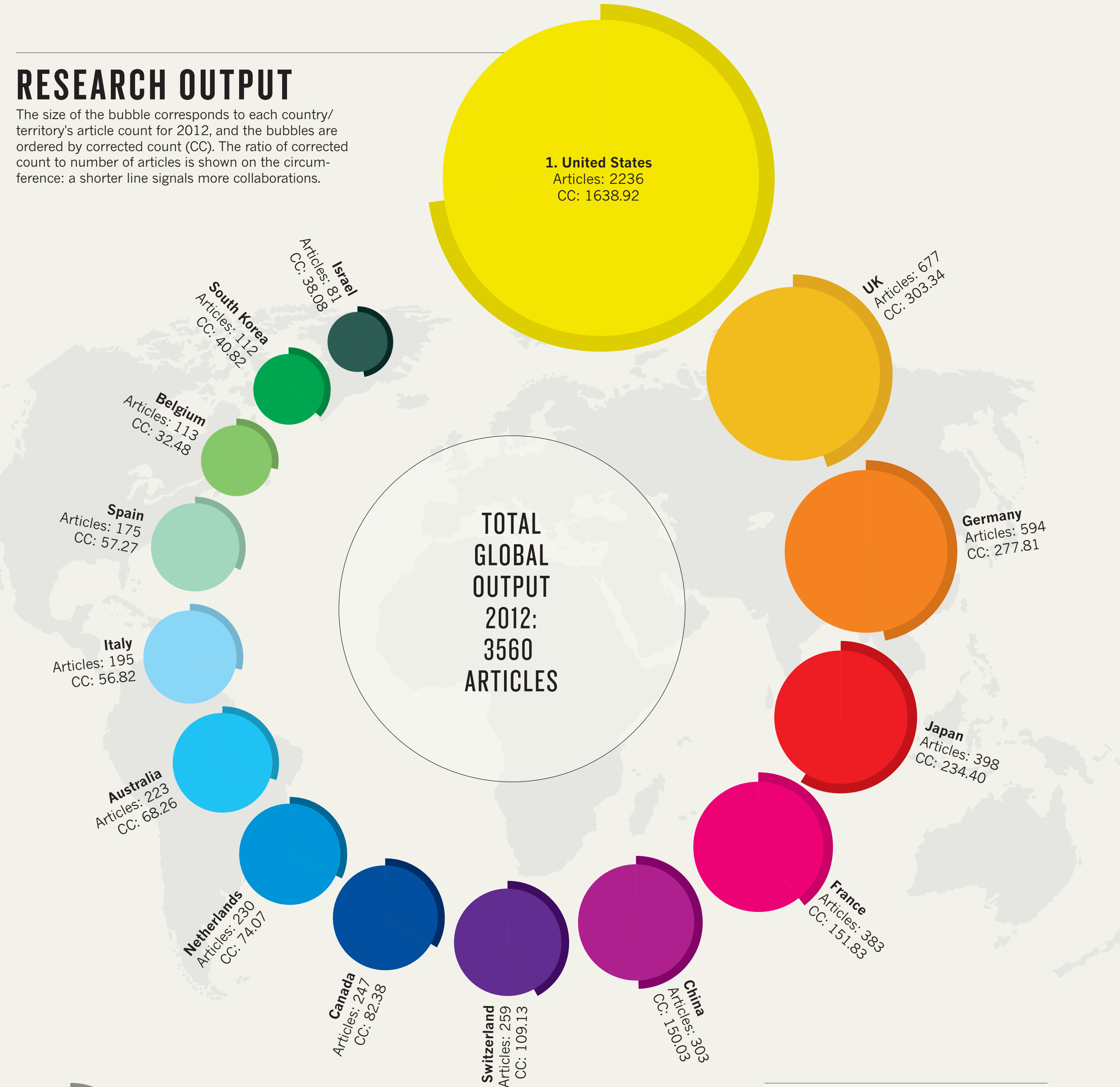
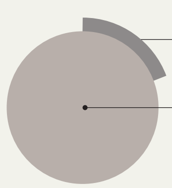
THE WORLD OF SCIENCE

Global scientific enterprise as measured by the NPI is dominated by the United States, which leads in contribution to overall publications and within each major field.

RESEARCH OUTPUT

The size of the bubble corresponds to each country/territory's article count for 2012, and the bubbles are ordered by corrected count (CC). The ratio of corrected count to number of articles is shown on the circumference: a shorter line signals more collaborations.





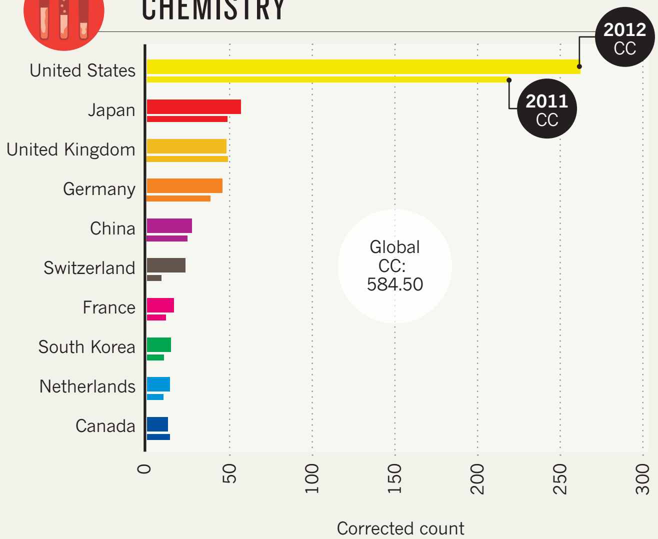
GO ONLINE

For an interactive graphic comparing countries' performance in the NPI:
go.nature.com/FmKFwL

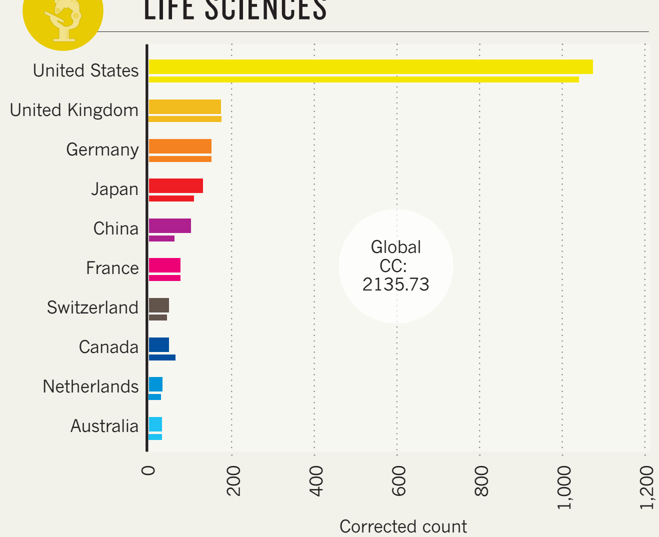
TOP 10 COUNTRIES BY RESEARCH AREA

The UK, Japan and Germany vie for second place.

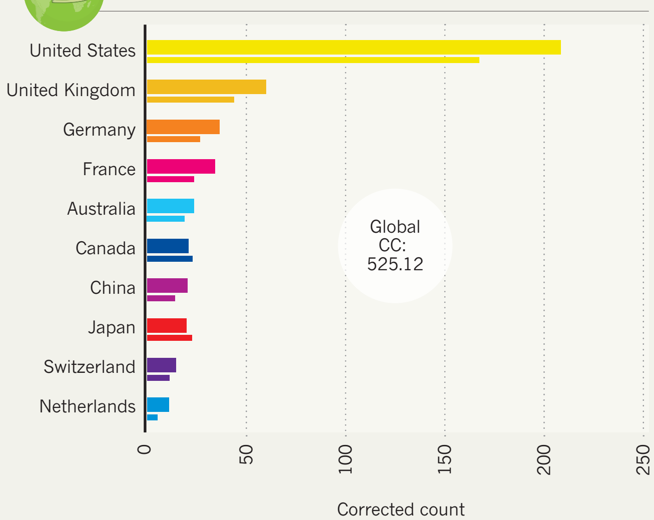
CHEMISTRY



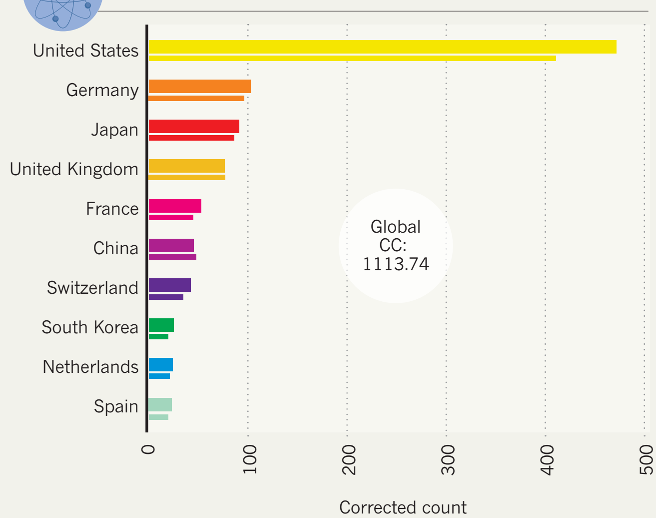
LIFE SCIENCES



EARTH & ENVIRONMENTAL SCIENCES

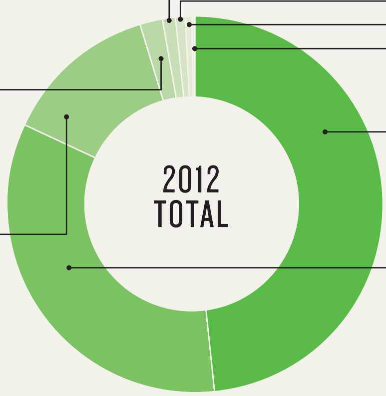


PHYSICS



REGIONAL COMPARISON

North America and Western Europe together account for 82% of the 2012 CC.



Middle East & North Africa CC: 41.12
Eastern Europe CC: 25.76
South & Central America CC: 17.33
Africa (Sub-Saharan) CC: 8.37

Oceania CC: 72.98
Australia CC: 68.26 / AC: 223
New Zealand CC: 4.64 / AC: 24
Cook Islands CC: 0.08 / AC: 1

Asia-Pacific CC: 469.43
Japan CC: 234.40 / AC: 398
China CC: 150.03 / AC: 303
South Korea CC: 40.82 / AC: 112
Singapore CC: 21.19 / AC: 71
Taiwan CC: 11.68 / AC: 38

North America CC: 1721.36
United States CC: 1638.92 / AC: 2236
Canada CC: 82.38 / AC: 247
Bermuda CC: 0.07 / AC: 1

Western Europe CC: 1195.68
United Kingdom CC: 303.34 / AC: 677
Germany CC: 277.81 / AC: 594
France CC: 151.83 / AC: 383
Switzerland CC: 109.13 / AC: 259
Netherlands CC: 74.07 / AC: 230

ARTICLES: 2236

CORRECTED COUNT: 1638.92

United States

Still the superpower of science and the home of five of the top ten research institutions, the United States dominates the Nature Publishing Index. But as US federal support for research falters, other nations are making ground.

There is no question about which country dominates the world's scientific scene. Half of the six researchers who shared the 2012 Nobel prizes in chemistry, medicine and physics are based at US institutions. The US corrected count (CC) in 2012 is up 8.5% from 2011, and exceeds the collective CC of the subsequent 12 countries in the Nature Publishing Index (NPI).

Overall, the US government funded US$63.4 billion in basic and applied research in the 2012 fiscal year (the fiscal 2013 year total is lower but not yet finalized). For fiscal 2014, which begins on 1 October 2013, President Barack Obama has called for $68.1 billion, a 7.5% rise from 2012, plus initiatives such as $3.1 billion for science, technology, engineering and mathematics education. However, most Congressional observers don't expect these totals to be passed.

US researchers warn that the country's research momentum will stutter as federal funding falls. The most significant reduction came under the automatic 'sequestration' cuts in April 2013 that slashed 5% from most non-defence budgets. This climate of cuts is in marked contrast with other countries, most notably China. Since 2009, China's total spending on research and development (R&D) has been second only to the United States, and it plans to increase the proportion it spends to at least 2.5% of its gross domestic product (almost approaching the US rate) by 2020 .

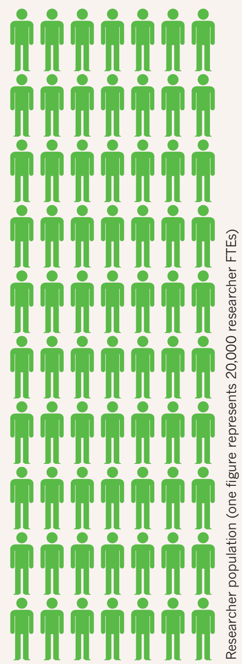
Funding reductions are part of a diminishing Congressional commitment to basic research. "We still need curiosity-driven and discipline-driven research," says Marc Kastner, dean of the Massachusetts Institute of Technology (MIT)'s school of science. "But the faith in doing that is really deteriorating."

Scientific leaders are particularly worried about how reduced budgets will affect the next generation of research. "Funding cuts are turning young people away from careers in science, and this will have a tremendous impact on our ability to innovate in the future," said Marc Tessier-Lavigne, president of Rockefeller University in New York, at a recent Rally for Medical Research in Washington, DC. Budget cuts also harm the US's reputation

UNITED STATES TOP TEN

United States has 81 institutions in the global top 200.

Global rank 2012	Institution	2012 National rank	2012 Corrected count	2012 Articles	2011 National rank	2011 Corrected count	2011 Articles	2008–12 National rank	2008–12 Corrected count	2008–12 Articles
1	Harvard University	1	150.24	368	1	135.35	307	1	658.39	1497
3	Stanford University	2	76.33	161	2	67.47	140	2	288.08	582
4	Massachusetts Institute of Technology (MIT)	3	60.39	199	4	44.03	142	4	235.63	724
6	National Institutes of Health (NIH)	4	43.82	143	3	58.21	154	3	247.22	668
7	University of Washington	5	40.97	102	9	29.38	85	9	147.82	399
11	University of California, Berkeley	6	38.23	98	5	37.57	90	5	167.06	408
13	University of California, San Diego (UCSD)	7	37.44	95	7	34.26	103	7	156.97	390
15	Columbia University in the City of New York	8	34.75	89	9	28.36	79	10	152.46	345
16	Yale University	9	34.46	82	6	37.06	84	6	154.71	345
17	University of California, San Francisco (UCSF)	10	33.74	95	8	34.15	91	8	178.29	426



UNITED STATES 2012

POPULATION: 317 M

RESEARCHERS: 1.4 M

GERD AS % OF GDP: 2.7%

Gross domestic expenditure on R&D (GERD)

SOURCE: UNESCO

and its ability to attract promising foreign students and researchers. Public US universities depend on both the federal and state governments for support and there have also been recent cuts in state funding.

Despite the financial outlook, the United States continues to plan major research programmes, among them the BRAIN (Brain Research through Advancing Innovative Neurotechnologies) initiative to discover ways to prevent, treat and cure brain disorders; BRAIN will launch in the 2014 fiscal year with about $100 million in federal funding. It has been jointly funded by the Allen Institute, the Howard Hughes Medical Institute, the Kavli Foundation and the Salk Institute for Biological Studies.

The proposed federal budget supports many other important agendas such as $2.5 billion for global climate change research (including $379 million for transformational energy R&D), $942 million for innovative space technologies and $658 million for the James Webb Space Telescope. In contrast, the National Institutes of Health (NIH), which currently funds less than one-fifth of grant applications, would be nearly flat-funded at $31.3 billion if Congress agrees. As has been generally true for the past decade, the small increase would not keep up with the rate of inflation.

The United States is especially dominant in life science. It had a CC of 1,074 in 2012 — well ahead of the United Kingdom's 177. Many significant contributions to Nature publications were made entirely by US-based teams. One paper detailed several mechanisms by which the mammalian target of rapamycin (mTOR) kinase, a master regulator of protein synthesis, drives cancer invasion and metastasis. Another article demonstrated that yeast prion proteins can be found in wild strains of yeast, where they create diverse phenotypes and thus act as epigenetic elements of inheritance. A third report described the creation of freely swimming "jellyfish"— assembled from chemically dissociated rat tissue and silicone polymer, and providing a proof of concept for strategies to reverse-engineer muscular organs.

In the other science categories, the United States' advantage is not quite as marked. The closest any other country comes is in earth & environmental sciences, where its CC of 208 is followed by the UK with 60.

HARVARD LEADS INSTITUTIONS

Among US research institutions, Harvard University in Cambridge, Massachusetts, is the clear leader. In fact, Harvard — which comprises the university and affiliations with a sprawling complex of teaching hospitals — is the world's top institution in 2012, with a CC of 150 (up from 135 in 2011) equal to the whole of China. The university is the leading institution in the NPI for life sciences, physical sciences and chemistry. Its weakest area is earth & environmental sciences, where it comes in fourth, trailing the French National Centre for Scientific Research (CNRS), Germany's Max Planck Society and the Chinese Academy of Sciences (CAS).

Stanford University in California is ranked second in the world, with a CC of 76 in 2012, up from 67 the previous year. Among its 2012 efforts, Stanford launched a Center for Computational, Evolutionary and Human Genomics and released a study boasting that its alumni have created companies generating annual world revenues of $2.7 trillion.

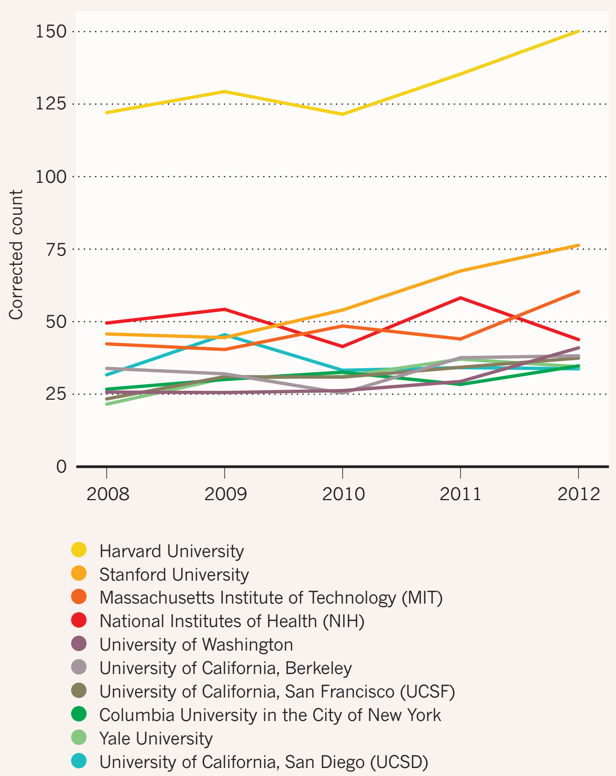
With a CC of 60, MIT is ranked third in the US (and fourth in the world) improving on its fourth-place US showing (CC 44) in 2011.

The University of Washington made a large jump into fifth place nationally with a CC of 41, up from 29. Two campuses of the massive University of California system followed — UC Berkeley and UC San Diego nearly tied with CCs of 38 and 37. The top ten was rounded out by Columbia University (CC 35), Yale University (CC 34) and the University of California San Francisco, which focuses exclusively on health, with 33.

Many of the year's most important papers were based on international collaborations in which US groups played a major role. An example is the Encyclopedia of DNA Elements (ENCODE) project, which mapped regions of transcription, transcription factor association, chromatin structure and histone modification in the human genome — taking a giant step in understanding of how information is expressed within a cell. The ENCODE consortium included more than 30 institutions globally, and US researchers represented 75% of the 400-plus authors on the main paper, published in *Nature* (along with five related papers) in September 2012. ■

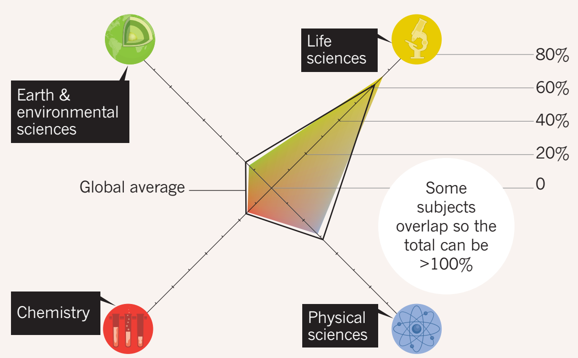
INSTITUTIONAL PUBLISHING TRENDS

Charting the changes in output from the top 10 institutions since 2008.

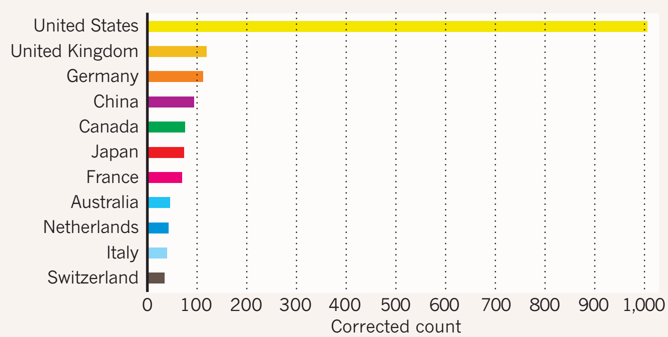


RESEARCH STRENGTHS

The subject areas in which the United States achieved its corrected count.



The countries with which the United States collaborates most. Its corrected count achieved without collaboration is shown for comparison.



ARTICLES: 677

CORRECTED COUNT: 303.34

United Kingdom

A tough economic year saw science funding stagnate, but the country maintained its historic tradition of excellence. The UK is second in the Global NPI. Cambridge and Oxford universities climbed the ranks and life sciences remained a key strength.

The UK has always punched above its weight in science, producing high-quality academic research despite a small population and less research funding (as a share of the economy) than other major research countries. It solidly occupies the second position in the NPI with a CC of 303 (behind the United States), and with 51 institutions in the global top 500 in 2012 — up from 43 in 2008.

For all this success, there is concern in the UK over curtailed spending. While regional competitors like France and Germany are increasing their research expenditure, the UK's science budget has shrunk in the past three years as the nation wheezes its way out of recession. Policy is moving away from funding for blue-sky research towards initiatives that the government hopes will provide an economic return. Researchers are anxiously wondering whether they will be asked to do more with less, and grant application forms have been altered to get scientists to be more explicit about the impact of their research.

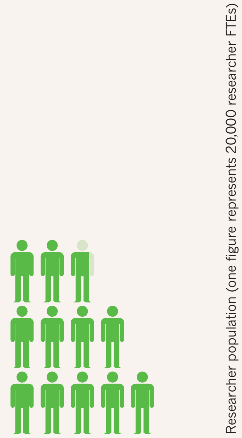
In the NPI, two UK institutions tower over the others: the universities of Oxford and Cambridge, which are both inside the global top 20 with corrected counts that have been rising since 2008. Cambridge improved its rank from 13 to 8, and Oxford from 21 to 14 in that time. They are pulling away from a strong but changeable pack. The UK's second tier consists of University College London and the Medical Research Council (MRC)'s institutes. Other leading UK institutions include Imperial College London, the universities of Edinburgh, Bristol and Manchester, the Wellcome Trust's Sanger Institute (which specializes in genome research), and Cancer Research UK (CRUK)'s centres. All of these institutions ranked either inside or very close to the global top 100 in 2012 and for the previous four years, though none has consistently improved its position over this period.

The UK is particularly strong in the life sciences, ranking behind only the US on the global list. The country boasts several world-class biomedical facilities and benefits from extensive private, philanthropic funding from CRUK and the Wellcome Trust that supplements the

UNITED KINGDOM TOP TEN

The United Kingdom has 19 institutions in the Global top 200.

Global rank 2012	INSTITUTION	2012 National rank	2012 Corrected count	2012 Articles	2011 National rank	2011 Corrected count	2011 Articles	2008–12 National rank	2008–12 Corrected count	2008–12 Articles
8	University of Cambridge	1	39.80	137	1	33.28	116	1	152.71	510
14	University of Oxford	2	36.83	130	2	30.62	118	2	136.22	480
38	University College London	3	16.21	79	3	21.96	71	3	83.86	292
40	Medical Research Council (MRC)	4	16.12	38	5	16.17	30	4	72.28	154
52	University of Bristol	5	12.30	41	8	10.94	35	7	46.43	161
54	University of Edinburgh	6	11.95	52	6	12.18	54	6	50.57	219
69	Imperial College London	7	9.96	64	4	18.02	60	5	62.73	272
99	University of Manchester	8	7.76	34	9	7.44	27	10	32.85	131
101	University of Sheffield	9	7.62	24	–	–	–	13	22.55	87
110	Cancer Research UK	10	6.92	19	15	4.49	18	9	36.45	89



UNITED KINGDOM 2012

POPULATION:	63 M
RESEARCHERS:	235,373
GERD AS % OF GDP:	1.76%

Gross domestic expenditure on R&D (GERD)

SOURCE: UNESCO

MRC's government support. UK scientists played a major part in groundbreaking biological research in 2012, including ENCODE (the encyclopaedia of DNA elements), and work in cancer genetics and stem cells (where John Gurdon jointly won the 2012 Nobel Prize in Physiology or Medicine for work he did at Oxford 50 years ago on reprogramming mature cells). A UK£600 million (US$ 934 million) biomedical science complex, the Francis Crick Institute, is scheduled to open in London in 2015. The country also hosts the headquarters of major pharmaceutical firms including GSK and AstraZeneca.

In Earth and environmental sciences, the UK is again 2nd only to the US. It is in this field that the UK finds its strongest representation in the Global Top 100, with 14 institutions. Among the famous non-university centres in these fields are the Met Office Hadley Centre (which along with the University of East Anglia's Climatic Research Unit, is one of three groups producing datasets on how the Earth's temperature has changed over land and water), the British Antarctic Survey and the National Oceanography Centre. But the future of the latter two centres is unclear: in 2012 its government funding body, the National Environment Research Council, proposed a contentious merger to cut costs. It shelved the idea after protests from politician and scientists, but job cuts are expected.

The UK fares slightly worse in chemistry and physics — ranking third and fourth, respectively, in those fields. Still, the country is indisputably in the elite echelons in physical science research. A highlight of 2012 was the invention of a room-temperature microwave laser, from researchers at the National Physical Laboratory, reported in *Nature* in August 2012; while the country's Diamond Light Source synchrotron (with 22 beamlines) and the Joint European Torus fusion experiment (the world's largest tokamak), both in Oxfordshire, are leading facilities. A recently expanded area is space research: the European Space Agency opened its first UK centre in 2012, and the country is hoping that satellite making will prove an economic boon.

Another potential strength is graphene, the flat-carbon material that physicists at Manchester University first isolated in 2004 (for which Andre Geim and Konstantin Novoselov won a Nobel prize in 2010); a £61 million National Graphene Institute is planned for the city and is scheduled to open in 2015, although many of the patents in the area are owned by South Korea and the United States.

Maintaining these strengths needs sustained investment in basic research. Gross domestic expenditure on research and development (GERD) as a proportion of GDP has been declining for 30 years, and since 2008 has been at about 1.8% — a figure far lower than all major competitors and even below the European Union's 2011 average of 2.0%.

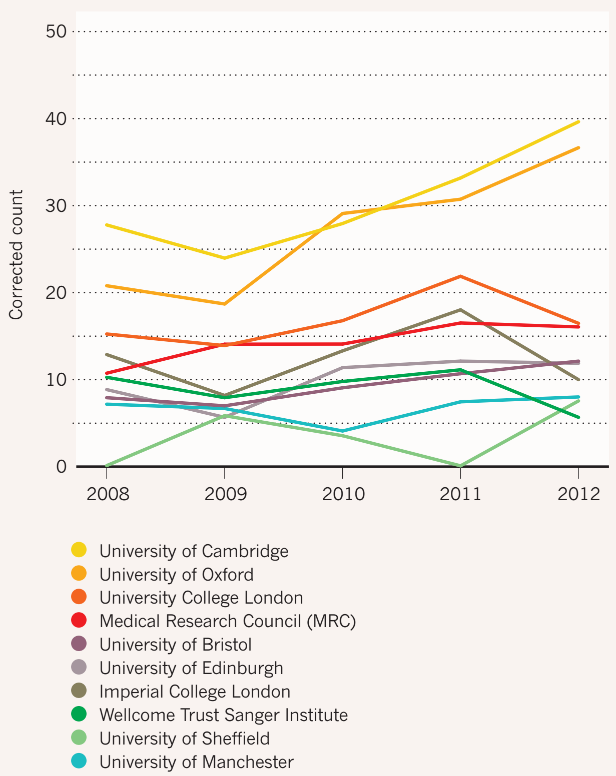
A governmental spending plan to 2014/15, announced in 2010, saw flat funding for research grants (a decrease in real terms), and sharp cuts to research infrastructure support. Much of the diverted money was returned to science in the years after 2010, allotted to specific areas such as graphene, synthetic biology, energy storage and advanced materials. Yet planned spending for grants and infrastructure in 2014/15 is still 7% lower than in 2010–11 — even without adjusting for inflation. Researchers are awaiting the next large spending review, to be announced on 26 June; a cash freeze for government science spending is expected, according to the 'Science is Vital' campaign, a grass-roots movement of researchers led by the cell biologist, Jennifer Rohn, at University College London, which is calling for a guaranteed budget increase.

Besides research funding, universities are also worried about the current government's tough stance on cutting immigration, which may limit the UK's highly mobile research population and attractiveness to overseas students.

In 2012, the UK's graphene Nobel laureate, Geim, was among researchers to criticize the changes, saying he would have been denied entry from Russia if the current rules had been in place. ■

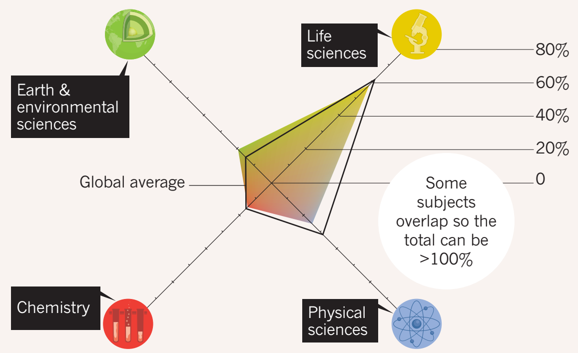
INSTITUTIONAL PUBLISHING TRENDS

Charting the changes in output from the top 10 institutions since 2008.

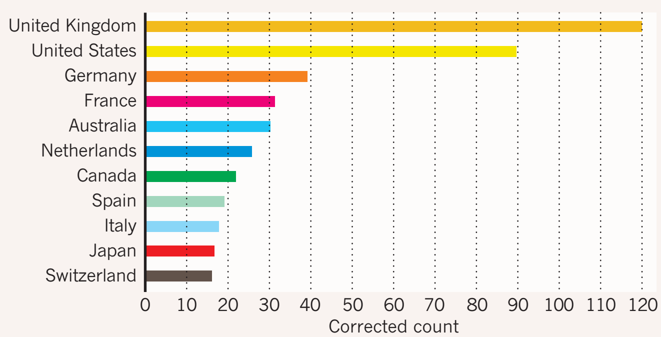


RESEARCH STRENGTHS

The subject areas in which the UK achieved its corrected count.



The countries with which the UK collaborates most. Its corrected count achieved without collaboration is shown for comparison.



ARTICLES: 594

CORRECTED COUNT: 277.81

Germany

Scientific prowess and technological innovation underpin Germany's economic strength. In recent years, the centre-right federal government led by Angela Merkel has stressed the importance of both public sector and industrial investment in research and development. A specific objective of federal policy is to attract the world's best scientists to the country's leading research institutions.

Germany ranked third in the 2012 Global Nature Publishing Index (NPI) for the third consecutive year. Its total corrected count (CC) of 277.8 put it once again just behind the UK (which it had briefly supplanted in second place in 2009) while maintaining a lead over fourth-placed Japan. These three remain well behind the United States, but maintain a sufficient lead over China (currently sixth just behind France) to provide a buffer from the likelihood of being imminently over-taken by the emerging player.

Despite the global economic downturn, Germany's expenditure on research and development (R&D) has increased year-on-year. In 2010, in absolute terms, Germany's spend of US$86 billion was the fourth highest in the world behind the United States, China and Japan. As a proportion of national income, at 2.8% of GDP, its R&D expenditure was higher than that of all of the top six-ranking NPI countries except Japan.

Two German associations are among the leaders in the global NPI. Foremost is the Max Planck Society, comprising 5,400 researchers and 4,800 visiting scientists spread across 80 member institutes. (Five of these institutes are outside Germany and their contributions are credited to Max Planck and to the host country.) On corrected count, Max Planck is number three in the world in 2012 (behind only Harvard and Stanford). The Helmholtz Association of German Research Centres, the country's largest scientific organization with 11,000 scientists and 6,300 visiting students and researchers working in 18 centres, ranks 21st in the world.

Together, the 98 Max Planck and Helmholtz institutes account for almost a third of Germany's total corrected count. Six other German institutions (including four universities) also appear in the Global Top 100 in 2012 —bettered only by the United States.

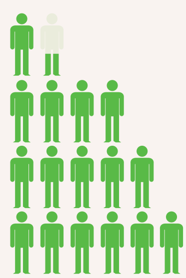
EMBRACING EXCELLENCE

It was a central objective of German federal policy in 2012 to increase "the international charisma of our excellent research capacity". To that end, the government's Excellence Initiative, launched in 2006, was expanded with

GERMANY TOP TEN

Germany has 17 institutions in the Global top 200.

Global rank 2012	Institution	2012 National rank	2012 Corrected count	2012 Articles	2011 National rank	2011 Corrected count	2011 Articles	2008–12 National rank	2008–12 Corrected count	2008–12 Articles
3	Max Planck Society	1	64.31	186	1	64.00	161	1	301.59	769
19	Helmholtz Association of German Research Centres	2	27.30	130	2	16.16	92	2	101.68	502
66	University of Freiburg	3	10.30	33	17	4.57	22	5	31.13	110
70	Ludwig Maximilian University of Munich (LMU)	4	9.75	52	3	10.95	53	3	45.64	233
76	Heidelberg University	5	9.28	46	8	5.90	30	4	33.18	154
85	Leibniz Association	6	8.49	28	14	5.20	18	7	30.72	102
87	Technical University Munich (TUM)	7	8.32	29	5	7.63	38	8	28.31	145
68	European Molecular Biology Laboratory (EMBL)	8	8.04	22	7	6.20	19	9	28.17	79
111	University of Stuttgart	9	6.80	14	9	5.90	12	13	24.33	50
122	University of Bonn	10	6.20	26	–	–	–	6	31.04	113



Researcher population (one figure represents 20,000 researcher FTEs)

GERMANY 2012

POPULATION: 82 M

RESEARCHERS: 327,500

GERD AS % OF GDP: 2.82%

Gross domestic expenditure on R&D (GERD)

SOURCE: UNESCO

a further €2.7 billion in funding for its latest five-year round, which began in June 2012. This programme gives special backing to an elite group of 11 universities to support their long-term strategies for innovative research.

The elite group includes three in the NPI Top 100: Munich's Ludwig Maximilian University (LMU), the Technical University of Munich (TUM), and Heidelberg University. One surprise in the 2012 funding round was the non-renewal of elite status for the University of Freiburg, currently the highest ranked German university in the NPI. Others omitted were Göttingen (ranked at 175 in the global NPI), which has historically been regarded as Germany's top university, and Karlsruhe, despite its leading role in the foundation of the Karlsruhe Institute of Technology (ranked 391). Institutions to maintain their status were; the University of Konstanz, RWTH Aachen University and the Free University of Berlin. Five new beneficiaries were selected: the Universities of Tübingen, Cologne and Bremen, the Humboldt University of Berlin and Dresden University of Technology — the first in the former East Germany to achieve this status.

One goal of the Excellence Initiative is to create research clusters that integrate university laboratories more closely with local non-university institutes such as Max Planck and Helmholtz centres. The clusters are also intended to form a conduit between academia and business, a sector which funds and conducts two-thirds of German R&D. The Centre for Integrated Protein Science Munich, created in 2006 as one of the first Excellence clusters, now features regularly in the NPI and is a prime example of how this strategy is changing the institutional status quo of German science.

Cross-institutional integration is a sign of how federal government influence on science policy is reaching the university sector. It blurs the distinction between the institutes of the Helmholtz, Max Planck, Leibniz and other associations — which rely substantially on federal grants — and the country's 86 universities, which were placed by the German constitution under state rather than federal jurisdiction. In 2012, in a controversial sign of the times, the minister of education and research floated the idea of a constitutional change that could enable the creation of federal universities.

Germany's non-university research institutions received a boost with the passage in December 2012 of the Academic Freedom Act, which allows these institutions greater flexibility in seeking private funding to improve salaries and invest in facilities. The Act comes on top of a series of 5% annual increases in federal government grants from 2011 until 2015 under the Joint Initiative for Research and Innovation.

SPECIAL STRENGTHS

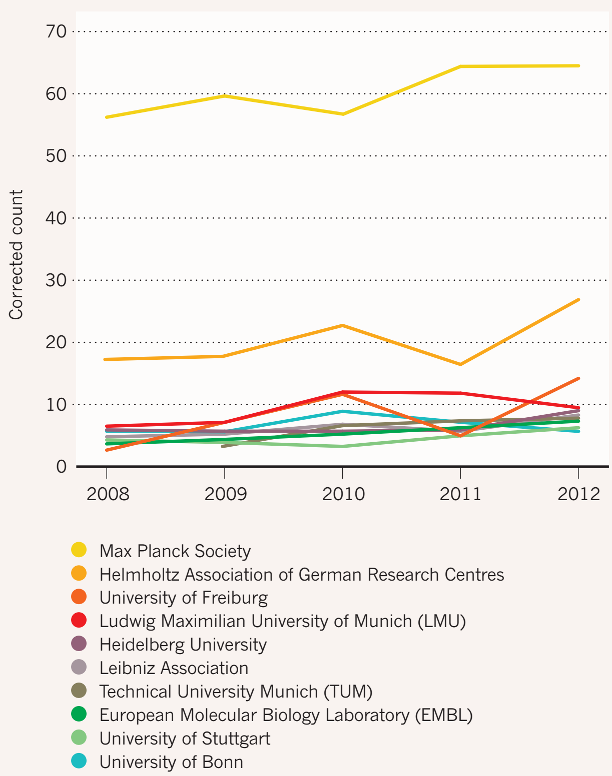
The Max Planck Society regularly scores the highest, by some distance, of all German institutions in each of the four main subject areas of the NPI. In 2012 it ranked second in the world in Earth & environmental sciences, third in physical sciences and chemistry, and fourth in life sciences. The Helmholtz and Leibniz associations both also showed most prominently in Earth sciences, in 10th and 35th positions respectively.

In regional terms, the strength of Munich's two big elite universities (LMU and TUM) contribute to the Bavarian capital's reputation as the centre for scientific research, further boosted by the presence of the headquarters of the Max Planck Society. Heidelberg is also notable, especially in the life sciences, both for its university and as the host city of the multinational European Molecular Biology Laboratory (EMBL).

Both these cities lie in south and south-western Germany, where a large portion of federal Excellence funding has been directed. However justified the concentrated distribution on scientific merit, such decisions do spark complaints of regional imbalance, only partly eased by Dresden's success in the 2012 funding round. The drive to raise the profile of 'elite' universities, in tandem with the promotion of Excellence clusters, is reinforcing the importance of the most favoured geographical centres in the research landscape. At the same time, the high status and comparative wealth of the leading non-university institutes are powerful assets in Germany's drive to attract and retain talent. New institutions may arise from mergers within clusters, and federal universities might emerge to complicate the picture, but Max Planck and Helmholz are likely to remain the leading NPI lights. ■

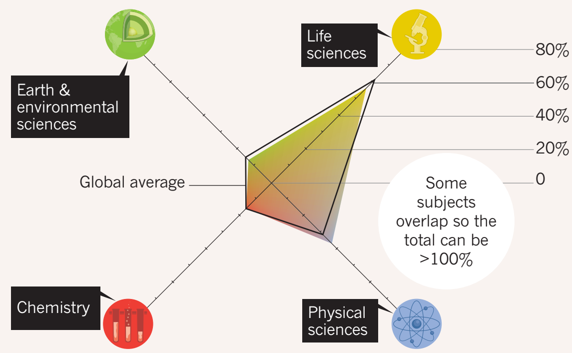
INSTITUTIONAL PUBLISHING TRENDS

Charting the changes in output from the top 10 institutions since 2008.

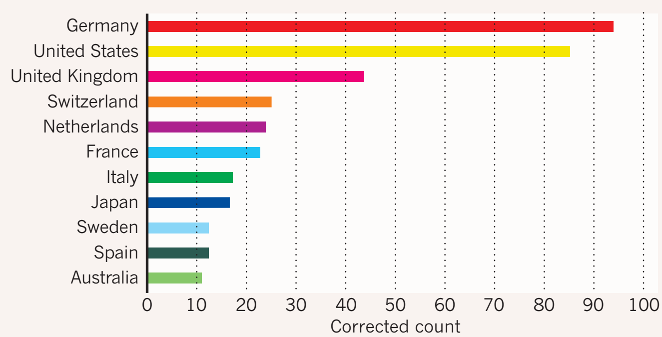


RESEARCH STRENGTHS

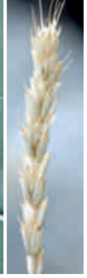
The subject areas in which Germany achieved its corrected count.



The countries with which Germany collaborates most. Its corrected count achieved without collaboration is shown for comparison.





Open to the world, engaged with society, exploring new frontiers —

Discover TUM. The Entrepreneurial University.

Wolfgang A. Herrmann
PRESIDENT
Technische Universität München

The Technische Universität München (TUM) is a dynamic, competitive research university that draws strength from its distinctive history and inspiration from the next generation of scientific explorers, innovators, and entrepreneurs.

As President of TUM, I want to extend my personal invitation to young talents the world over: Take a closer look at Munich's "entepreneurial university" and consider the opportunities it offers for you to shape your career, and your century.

What does a "TU" do — and what sets TU Munich apart?

Germany's technology-oriented universities have always had a core mission, dating back to the 1860s in our case, that is strongly directed toward practical outcomes, based on fundamental frontier research. From bridges, tunnels and waterworks to the modern automotive, aerospace, chemical, computing and communications industries, the benefits to society can be seen everywhere.

Less tangible but just as vital is the interplay between fields that can have immediate impacts on society — such as the medical, agricultural, and engineering sciences — and fundamental scientific inquiry. Basic insights spur innovations and new technologies enable discoveries, in an endlessly creative cycle.

This kind of interplay is in our institutional DNA. Our founding director was Karl Maximilian von Bauernfeind, a 19th-century pioneer in geodesy, the measurement and representation of the Earth. His scientific legacy included technical innovations, research advances, and international collaborations with practical value — for example, establishing regional "level" values that civil engineers could (literally) build on — as well as helping to launch the careers of young visionaries like Carl von Linde and Rudolf Diesel.

Today the cutting edge in Bauernfeind's discipline is the precise determination of Earth's gravitational field from space, and here again TUM researchers are active at the forefront. Their scientific excellence, initiative, and capacity for international cooperation can be seen in GOCE — the Gravity Field and Steady-State Ocean Circulation Explorer — a satellite mission of the European Space Agency (ESA). A technically bold project that has exceeded all expectations, GOCE is producing data that will establish a global reference level for civil engineering, enable geophysical insights into the interior structure and dynamics of our planet, and even measure ocean circulation, so crucial to climate studies, from space.

Among German technical universities, TUM commands the broadest portfolio of disciplines, covering natural and life sciences, engineering sciences, medicine, and economics. TUM fosters research and teaching at the highest level in all of these disciplines. To date, 13 faculty members and alumni of TUM have won Nobel Prizes. A new indicator of TUM's strength in basic research is its ranking in the present Nature Publishing Index, 88th among all universities worldwide and the only German TU to place in the world's top 100. In the "Shanghai Ranking" (ARWU) we have repeatedly headed the German top league.

Furthermore, TUM strongly promotes interdisciplinary exploration, cultivates collaborations with industry and other partners, and actively prepares researchers for success in founding startup ventures. In research, teaching, and partnerships as well as in public outreach and dialogue, today's TUM is oriented toward the major challenges facing society: energy, climate and environment, natural resources, health and nutrition, communication and information, mobility, and infrastructure. Addressing society's challenges requires interdisciplinary approaches that transcend boundaries of all kinds — more so now than at any time since the founding of our university.

Building on talents — starting with 100 new tenure track professorships

In 2012 as in the first round of competition, TUM again won recognition and significant funding — around 165 million euros over five years — through the Excellence Initiative of the German federal and state governments. The funding will bolster TUM's activities as a leading partner in five major research collaborations known as *Clusters of Excellence*, further the development of our *International Graduate School of Science and Engineering*, and help us follow through on our winning institutional strategy, *"TUM. The Entrepreneurial University."*

Talents in all their diversity are central to this strategy. TUM has introduced an end-to-end recruiting and career system that is competitive with elite universities worldwide and unique in Germany, particularly in terms of what it offers the world's most promising *young* researchers: real opportunities, based above all on performance, to achieve scientific independence and professional security. This system is flanked by policies and services that make it easier for international professors and their (often dual-career) families to make themselves at home in Munich — one of the world's best places to live and work.

In a strong boost for a fast start, the TUM Faculty Tenure Track System kicks off with the hiring of 100 tenure-track professors by the year 2020. TUM wants to lead the transformation of the conventional German *appointment* system, choked with obstacles, into an end-to-end, performance-oriented *career* system. This culture-changing enterprise is grounded in the recognition that the world's best young talents can only be won as professors where they know they can advance within the system. Performance-based criteria — for the initial appointment of an *assistant professor* as well as for advancement to *associate professor* and *full professor* — have been defined and are being transparently implemented.

TUM Faculty Tenure Track, together with eight new senior-level professorships reserved for distinguished *women* in research and a suite of family-friendly programs, will make TUM a more formidable competitor for top talent worldwide — a key to its continued scientific excellence and its effectiveness as a servant of society.

TUM. The Entrepreneurial University. Get to know us better at www.tum.de

Opportunities for Talents

TUM

Technische Universität München

TUM is the first university in Germany to reinforce its recruitment policy by establishing a comprehensive tenure track system. Based on best international standards and transparent performance criteria, TUM FACULTY TENURE TRACK offers merit-based academic career options for high-potential young scientists, from the appointment as Assistant Professor through a permanent position as Associate Professor and on to Full Professor.

The **TUM Center of Life and Food Sciences Weihenstephan** invites applications for the following TUM Faculty Tenure Track positions:

Tenure Track Assistant Professorship »Biothermodynamics«

We are looking for an excellent junior scientist with a high potential for developing an internationally recognized research agenda in the field of biothermodynamics. The successful candidate is expected to conduct research and teaching in experimental and theoretical thermodynamics for multicomponent mixtures relevant to food or other biotic systems (e.g. bio polymers, proteins, or colloids). The focus should be on bridging the gap between molecular understanding and technological implementation. Example areas of interest are technologically significant transport and/or surface phenomena as well as phase equilibria.

Tenure Track Assistant Professorship »Fluid Dynamics of Complex Biosystems«

We are looking for an excellent junior scientist with a high potential for developing an internationally recognized research agenda in the field of fluid dynamics of complex biosystems. The successful candidate is expected to conduct theoretical and experimental research and teaching in engineering aspects of flow behavior and fluid dynamics of complex bio, food and pharmaceutical systems. Especially, the linkage between material properties of complex fluids and their processing behavior in relevant unit operations should be addressed. Example areas of interest are rheology, tribology, and computational fluid dynamics.

Tenure Track Assistant Professorship »Solids Process Engineering«

We are looking for an excellent junior scientist with a high potential for developing an internationally recognized research agenda in the field of solids processing relevant to food, pharmaceutical and/or biotechnological systems. Especially, a strong experimental background ranging from physico-chemical understanding to technological implementation is expected. Example areas of interest are technologically relevant particle properties, particle-particle interactions or particle-surface interactions in all size ranges from macroscopic to nano-scale lengths.

For all Tenure Track Assistant Professorships the following requirements apply:

The initial appointment will be for 6 years with an initial pay-scale grade W2. After positive evaluation in the final year, the candidate is tenured on an Associate Professor level. In exceptional cases, the tenure evaluation may be initiated after a minimum of three years. Such cases will have to be justified by outstanding achievements of the candidate and when the candidate contributes to strategically shaping the university's profile. The regulations according to "TUM Faculty Recruitment and Career System" (http://www.tum.de/tenuretrack_statut.pdf) apply.

Eligible candidates have established a strong track record in the postdoctoral phase, and demonstrate pedagogical and personal aptitude as well as substantial international experience. Family leave will be taken into consideration.

Supported by competitive start-up resources, candidates are expected to develop an independent and vigorous research program. Furthermore, candidates should be committed to excellence in undergraduate/graduate teaching and in supervising PhD students.

Teaching assignments include courses in the subject area and the basic courses offered by the department as well as courses for other academic TUM departments. Prerequisites for this position are a university degree, a doctoral degree, teaching skills at university level, and additional academic achievements (according to Art. 7 and Art. 10 BayHSchPG). The ability to teach in English is a prerequisite for TUM Professors.

As part of the Excellence Initiative of the German federal and state governments, TUM has been pursuing the strategic goal of substantially increasing the diversity of its faculty. As an equal opportunity and affirmative action employer, TUM explicitly encourages nominations of and applications from women as well as from all others who would bring additional diversity dimensions to the university's research and teaching strategies. Preference will be given to disabled candidates with essentially the same qualifications. The TUM Munich Dual Career Office provides support for dual career couples and families.

All positions are to be filled as soon as possible. Applications accompanied by supporting documentation in English (CV, certificates, credentials, list of publications, 3 selected reprints and a short statement with a max. of 1,000 characters about their novelty and impact, list of courses taught, presentation of research and teaching strategies, third-party funding, as well as the names and addresses of at least 3 references) should be submitted by July 31, 2013 to:

Dean, Center of Life and Food Sciences Weihenstephan
Technische Universität München
Alte Akademie 8, D-85354 Freising (Germany)
E-Mail: dekanat@wzw.tum.de

ARTICLES: 398

CORRECTED COUNT: 234.4

Japan

Japan has been in fourth place in the NPI since 2008, but there are signs of deceleration in the country's scientific output. Six out of seven Japanese institutions in the 2011 Global Top 100, including the University of Tokyo, lost ground in 2012. Concerns are growing that Japan's stalled performance indicates a decline in basic academic strength and a reluctance to engage in international collaboration.

For the Japanese scientific community, the end of a gloomy 2012 brought a glimmer of hope when the unpopular Democratic Party of Japan (DPJ) was ousted from power. The DPJ evoked outrage in the research sector in 2009 when it announced funding cuts for many scientific projects. But the new Prime Minister, Shinzo Abe, of the Liberal Democratic Party (LDP), which returned to power in December 2012, is giving encouraging signals about prioritizing science again. In January 2013, his government announced a ¥10.3-trillion (US$106 billion) supplementary budget that allocates ¥994.9 billion (US$10.2 billion) for science and technology. This funding will be used for induced pluripotent stem (iPS) cell research and for the X-ray free electron laser facility SACLA, among many other projects. To return the economy to full strength, he said in March 2013, "we will put our emphasis on innovation" in science and technology.

At first glance, Japan looks to be maintaining its edge with its strengths in life sciences, physical sciences and chemistry. Like many other countries, Japan's overall productivity in both the number of articles and corrected count (CC) grew from 2011. Moreover, Japan's CC ranked second globally in *Nature Immunology*, *Nature Materials*, *Nature Medicine* and *Nature Communications*, and third in *Nature Photonics* and *Nature Physics*.

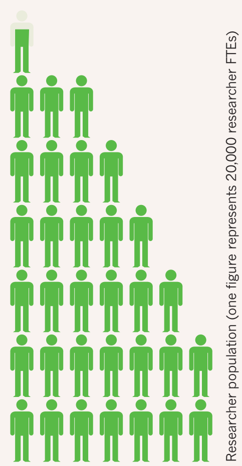
Among Japan's major achievements of 2012 was work by University of Tokyo researchers and collaborators to elucidate the molecular mechanisms of algae-derived, light-gated ion channels, which could lead to the development of devices for neuroscience research. Meanwhile, a Japanese-European team provided detailed insight into the timing and amplitude of a rapid period of sea-level rise off Tahiti in the past, which could lead to prediction on the behaviour of ice sheets.

But there is a fear that Japan's global scientific presence is diminishing and the NPI provides some evidence for this. The CC gap between third-ranked Germany and Japan widened by 43 points between 2011 and 2012, and its edge over fifth-ranked France narrowed. "The question now is not how Japan can move up in the ranking, but how long it can maintain the current position," says Atsushi Sunami, who specializes in science policy

JAPAN TOP TEN

Japan has 11 institutions in the global top 200.

Global rank 2012	Institution	2012 National rank	2012 Corrected count	2012 Articles	2011 National rank	2011 Corrected count	2011 Articles	2008–12 National rank	2008–12 Corrected count	2008–12 Articles
9	University of Tokyo	1	39.72	116	1	42.83	109	1	178.14	453
26	Kyoto University	2	22.47	55	2	23.98	56	2	92.29	218
33	RIKEN	3	19.57	80	3	19.96	70	3	92.10	300
36	Osaka University	4	18.22	54	4	17.43	48	4	77.52	208
65	Nagoya University	5	10.50	30	6	9.67	26	6	36.40	100
84	Tohoku University	6	8.55	27	5	10.99	29	5	40.78	117
103	National Institute of Advanced Industrial Science & Technology (AIST)	7	7.30	23	7	8.82	22	7	27.79	88
134	Kyushu University	8	5.81	20	8	4.58	19	8	18.32	68
140	Hokkaido University	9	5.47	17	10	4.26	16	10	17.14	54
171	Tokyo Institute of Technology	10	4.60	16	12	3.39	14	11	15.62	65



JAPAN 2012

POPULATION: 127 M

RESEARCHERS: 655.530

GERD AS % OF GDP: 3.36%

Gross domestic expenditure on R&D (GERD)

SOURCE: UNESCO

at the National Graduate Institute for Policy Studies in Tokyo.

Japan's weaker performance can be partly attributed to its general economic woes and on the enormous cost of the devastating Earthquake and tsunami that crippled northern Japan in 2011. Science and Technology Promotion Expenditure, which accounts for a third of the government's science and technology budget, peaked in 2009 and the 2013 total of ¥1.3 trillion yen (US$13.4 billion) is down 1% from 2012.

But other factors are at work. The Japanese government has been calling for internationalization for many years, but the effect has yet to emerge. "Japan is slow to open up and join forces with other countries," Sunami says. According to a recent report by the National Institute of Science and Technology Policy in Tokyo (NISTEP), the number of papers co-authored between Japan and other countries from 2009 to 2011 was less than half the number for Germany and the UK. Japanese national science institutions are also exposed to regular cuts in salaries and in the funding devoted to the so-called Management Expenses Grants. Under such constraints it has become increasingly difficult to maintain motivation and efficiency in the research environment. Universities cannot provide enough tenure positions, resulting in greater job insecurity for young researchers.

DOWNWARD TREND

By institutional ranking, the picture is even bleaker. The number of Japanese institutions in the Global Top 100 fell from seven in 2011 to six in 2012 as the National Institute of Advanced Industrial Science and Technology (AIST) plummeted from 74th to103rd. Five of the remaining six institutions — RIKEN plus the universities of Tokyo, Kyoto, Osaka and Tohoku — fell in the ranking. Only Nagoya University edged up, from 68th to 65th.

The University of Tokyo — the only Japanese institution in the global top ten — slid from sixth in 2011 to ninth in 2012. It is still a front-runner in the Asia-Pacific region in 2012, though the Chinese Academy of Sciences appears poised to take that position in 2013 or soon thereafter. Nearly half of the University of Tokyo's CC was earned from *Nature Communications*, a partial open-access journal with less impact than many other Nature-branded publications. RIKEN, Japan's biggest institutional network of natural science research institutes, started to push life sciences as a new pillar of its research activities about 15 years ago, and had been making good progress according to the NPI. But after reaching 21st in this field in 2011 and 18th in 2008, it dropped to 39th in 2012. In contrast, RIKEN made impressive progress in chemistry, soaring from 96th place to 17th. Tohoku University, renowned for its strength in physics, materials and medical research, was badly affected by the 2011 Earthquake and its position in the global rankings dropped from 57th to 84th.

MORE REFORMS

Abe has acknowledged the importance of reforms to provide proper support for research activities. He plans to beef up the role of the Council for Science and Technology Policy, an advisory body headed by the prime minister, so he can make swift decisions to ease bureaucratic bottlenecks.

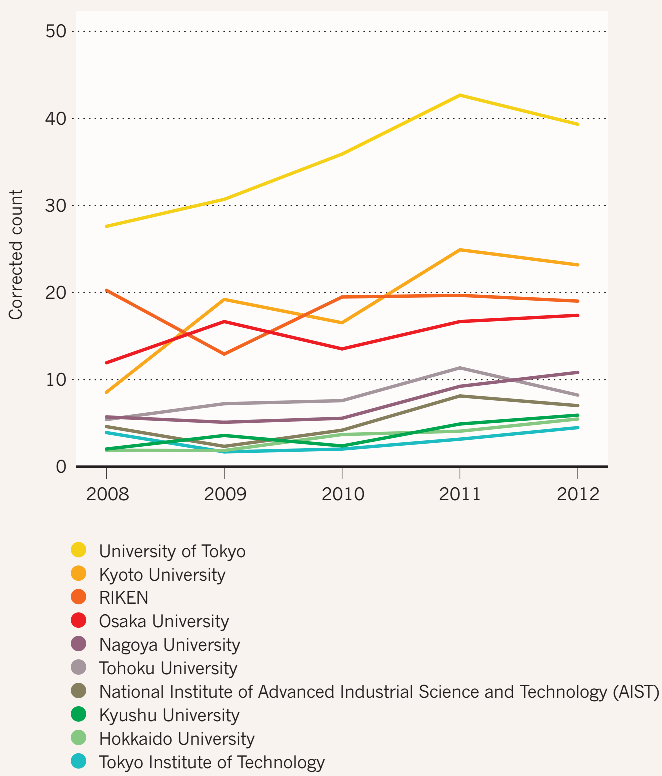
The government's funding is likely to be more concentrated on large-scale projects that are expected to bring technological or medical applications. A recent highlight is the ¥110 billion (US$1.13 billion) set aside for iPS cell research for the next 10 years. The funding comes after Kyoto University's Shinya Yamanaka shared the 2012 Nobel Prize in Physiology or Medicine for inventing the method to deprogramme differentiated cells back to an embryo-like state, pioneering the entire field of iPS research.

Promotion of these priorities could create hardship for minor universities on the cusp of survival because major projects are usually led by researchers at powerful universities. Likewise, many research fields that are not linked with practical applications could suffer from funding shortfalls; positions for young researchers could be limited to short-term contracts, and only in certain fields at a limited number of universities.

There is a danger, then, is that as it tries to raise its national competitiveness and profile, Japan would starve the potential of great science that can derive from a diverse research landscape. ■

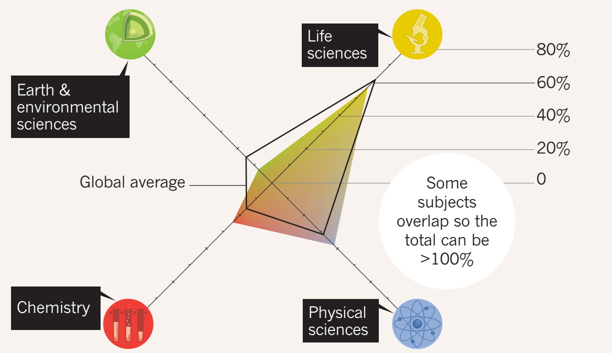
INSTITUTIONAL PUBLISHING TRENDS

Charting the changes in output from the top 10 institutions since 2008.

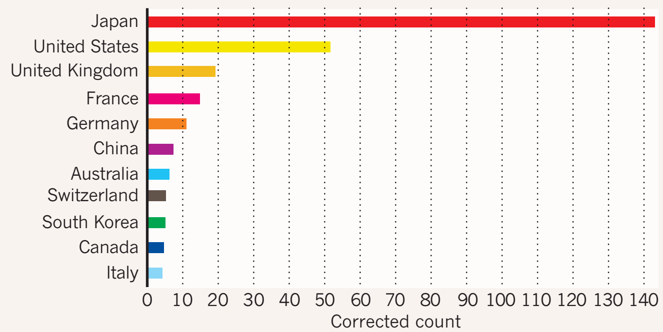


RESEARCH STRENGTHS

The subject areas in which Japan achieved its corrected count.



The countries with which Japan collaborates most. Its corrected count achieved without collaboration is shown for comparison.



The University of Tokyo

AN INNOVATIVE LEADER

The University of Tokyo has long held the reputation of being one of the world's most prestigious universities. To see that the university deserves its accolades, one can look at the achievements of any number of its laboratories, a few of which are highlighted here. The university's many successes are built upon its dynamic environment and cutting-edge facilities that attract researchers from across the world.

Maintaining its forward-looking approach, the University of Tokyo is committed to continuing its mission of offering top-class education and training to future leaders who will serve vital roles in an increasingly global world. The university recognizes the importance of cultivating students who are comfortable in an international setting, able to communicate effectively and tenacious enough to overcome setbacks. Junichi Hamada, president of the University of Tokyo, sums up his vision for education with a slogan: "More global, more resilient."

Creating an international future

Hamada is leading the way to change the function of not only the University of Tokyo but all Japanese universities by setting a model for them to follow. One of his aims is for all University of Tokyo students to spend time abroad, studying in different cultural settings and being exposed to new challenges. To realize his goals, Hamada is working to revamp the system and overcome obstacles to internationalization.

In Japan, university enrolment begins in April, while 70% of other universities worldwide start in the latter half of the year. Hamada proposes to change Japan's system to September enrolment, allowing students to align their schedules with study abroad programmes. While the proposal is well supported by many companies, it may take some time before the initiative is fully implemented.

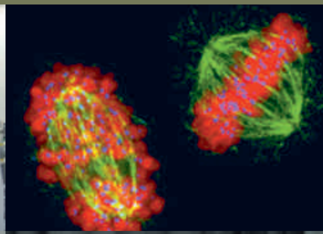
Unwilling to wait, the University of Tokyo is going forward with various internationalization projects of its own, including strategic partnerships with universities overseas. An agreement with Princeton University is the first of several planned agreements that take these ties one level deeper. The partnership will provide matching funds for faculty and student exchanges and promote other mechanisms for extending collaborations in teaching and research. In January 2013, following a call for proposals for joint teaching and research projects, the Kavli Institute for the Physics and Mathematics of the Universe embarked on a collaborative observational cosmology project with a team of Princeton researchers.

On current trends, the University of Tokyo is set to fulfil its mission of revolutionizing the higher education environment in Japan, cultivating a new generation of students who are more global, more resilient and well prepared to take on the roles of leaders of tomorrow.

Courage to think differently

University of Tokyo professors and researchers also display resilience and the willingness to explore new ideas. One example can be found in the work of Takashi Kadowaki and his colleague, Toshima Yamauchi, who successfully demonstrated in 2001 that low levels of adiponectin — a hormone released by fat cells — were related to insulin resistance and that higher levels could correct this problem and protect against diabetes. Following these highly-cited findings, the pair discovered the adiponectin receptors, AdipoR1 and AdipoR2, and elucidated their roles in major cellular pathways.

However, the biggest surprise for Kadowaki was his difficulty in convincing other scientists of the receptors' close relationship with diabetes. Describing his 2007 study, which showed that replenishing these two receptors in obese diabetic mice with reduced AdipoR1 and AdipoR2 expression lowered glucose







levels, increased fat burning and alleviated diabetes symptoms, Kadowaki says: "It was direct proof *in vivo* of adiponectin's connection with insulin and diabetes. But it took several years to convince other scientists of this."

At present, the pair is teaming up with colleagues Miki Okada-Iwabu and Masato Iwabu to develop a drug that binds to adiponectin receptors, mimicking caloric restriction and exercise. "We want to be the first and best in the class," says Kadowaki. "The integration of clinical, genetic, and mouse expertise at the University of Tokyo has led us to where we are. And it will also make this possible."

Commitment to careful study

Yoshinori Watanabe is remarkable for his commitment to basic research in a time where biologists are increasingly seeking speedy commercial applications of their research. His dedication to the study of fundamental mechanisms driving living cells has led to discoveries in chromosome dynamics and propelled him to the cutting edge of biomedical research across the fields of infertility, birth defects and cancer.

With a focus on meiosis, Watanabe's group detected a protein that forms a complex to prevent the separase enzyme from snipping chromatids apart, naming it shugoshin (Sgo) — meaning "guardian spirit" — due to its protective nature.

Given that other factors seem to interact with Sgo, Watanabe is now carrying out large-scale biochemical screens to look for them. In the future, he plans to examine the role of Sgo in cancer — his group has already found that Sgo shows an abnormal distribution in tumour cells. "Although fine regulation of shugoshin localization is important to prevent chromosomal instability and tumourigenesis, its inactivation selectively kills dividing cells such as cancer cells," Watanabe explains. "Sgo is a potential anti-cancer drug target."

Sgo could also aid the understanding of Down's syndrome and other chromosome disorders. Sgo's therapeutic applications are exciting, but Watanabe will continue pursuing the protein's basic principles. "I'd like to make clear everything about shugoshin's functions," he says.

Spirit of adventure

The University of Tokyo is an environment in which bold ideas and creative thinkers can flourish. When Takuzo Aida took over the laboratory of a retiring professor in 1996, he abandoned its synthetic polymer chemistry work and headed in a completely new direction: supramolecular systems. Aida's determination soon led to discoveries that showed how branching macromolecules known as dendrimers could be used to efficiently harvest light from low-energy sources. Over the last decade and a half, his group has been investigating various kinds of macromolecules with critical applications across a range of fields.

Aida's team has developed sturdy hydrogels, novel materials with robust mechanical properties that could potentially replace some plastics. His laboratory has also invented a paste-like "bucky gel" that is now being commercially developed to control Braille displays on hand-held devices for the blind. This series of innovations has won him acclaim in Japan and internationally.

Aida always encourages his staff and students to "follow their curiosity" in order to remain free from the rut of received wisdom, a mantra the professor firmly believes and adheres to. "People predict based on past experience. I try to look in different ways," says Aida.

Aida's unique approaches have attracted dozens of up-and-coming researchers, students and staff to his group. One-third come from abroad, and laboratory meetings, held in English, can be intimidating for some. "I want to emphasize that the University of Tokyo is supposed to be one of the top research universities," he says. "You should be ready." ■

OIST

Okinawa Institute of Science and Technology Graduate University (OIST)

A MULTI-DISCIPLINARY EXPERIENCE FOR EDUCATION AND RESEARCH

The Okinawa Institute of Science and Technology Graduate University (OIST) is bringing about change in the global practice of education and research. Jonathan Dorfan, president of OIST, describes the challenges faced by universities in the twenty-first century.

"For many centuries, 'knowledge creation' and 'knowledge dissemination' have been the two central missions that defined a university and these two fundamental roles have not changed in recent times. However, the demographics and dynamics of the society that universities serve have changed quite dramatically. The world is now highly globalized and interconnected and universities must adapt their role and function accordingly if they are to maintain their societal relevance.

"To ensure sustainability for our fragile planet, humanity must meet enormously complex challenges. Knowledge creation is potentially the most powerful tool for providing solutions to the problems of energy supply, climate change, human health and food and water shortages. Universities have an increasing obligation to engage in, and help solve, the problems that beset our global society. Universities also need to foster global networking and collaboration, in addition to educating their students to become effective citizens and leaders in a globalized world. It remains important, therefore, that society continues to protect the tenets that have allowed universities to fulfil their societal role effectively, namely, academic freedom, institutional autonomy and openness in research.

"Research universities must continue to pursue basic research: historically, the most impactful innovation has come from high-risk, long-term R&D. Of course, the agenda of R&D must also include applied research, namely research which is focused on near-term outcomes. In creating the appropriate balance between basic and applied research, great care must be taken not to squeeze out funding for the pursuit of basic research whose relevance emerges powerfully only with time. While maintaining a balanced research agenda, it is incumbent on research universities to more aggressively and systematically support their faculty and researchers so that intellectual property can be responsibly transferred to the private sector, thus accelerating the adoption of inventions for the benefit of all."

Funded by the Japanese government with the goal of creating a best-in-class research university, OIST began attracting principal investigators and researchers to the island of Okinawa, located in Japan's southernmost prefecture, in 2005 and received accreditation to award the qualification of PhD from the Ministry of Education, Culture, Sports, Science and Technology (MEXT) in October 2011. The university officially opened in November 2011 and currently encompasses 46 members of faculty and approximately 300 researchers. The first intake of students, comprising 34 graduate students, began their studies in September 2012.

Jonathan Dorfan, president of OIST

OIST was created to be a truly international university: educational and research functions are conducted in English, and the academic year begins in September. Almost two-thirds of faculty staff and half of the university's researchers come from around the world, originating from about 30 countries. OIST's current students hail from 18 different countries and regions spread across

the continents of Africa, Asia, Europe and North America.

In seeking to fulfil its mission of knowledge creation, OIST has set high standards to ensure that it appoints only the most talented individuals and can provide an optimized environment for cross-disciplinary innovation and research. The university also networks extensively with other global institutions of higher education and research. In pursuit of knowledge dissemination, its second mission, OIST is able to recruit its students and researchers from a global pool of exceptional candidates. As a university, OIST encourages individuality of purpose, thought and action among its students and researchers and immerses them in a research environment that promotes cross-disciplinary opportunity and a broad-based graduate curriculum.

OIST believes that the major discoveries and innovation at the beginning of the twenty-first century will occur at the interface of the traditional life, physical and environmental sciences disciplines. In anticipation, considerable care was taken by the founders of OIST to enhance such interdisciplinary opportunities by removal of the barriers that separate these fields in traditional universities. As an example, OIST has no formal academic departments. Instead, the educational experience is provided and shaped by the faculty as a whole. The university has implemented a North American-style, tenure-track academic structure where every member of faculty has full independence, each heading his or her own research unit. In addition, the physical layout of the university's campus promotes the mixing of students, researchers and faculty staff. Much of the research equipment at OIST — which includes microscopes, sequencers, spectrometers and clean room facilities — operates as part of shared or common facilities, providing highly skilled support personnel — many of whom are educated at the doctoral level — and training to facilitate broad and efficient use of the state-of-the-art equipment. By operating in this way, all members of the university are provided with straightforward access to the majority of OIST's diverse suite of equipment, meaning that curious students or postdoctoral researchers can easily expand their horizons far beyond the confines of their supervisor's sphere of study.

The curriculum at OIST is multi-disciplinary. Students embark on courses in their area of specialization but also elect to take courses from outside their core discipline and which contribute to a sizeable portion of their studies. Students also undertake a research project in three different research laboratories during their first three terms at the university. At least one of these 'rotations' must be completed in a laboratory from outside their anticipated core discipline. For instance, a life sciences student will have the opportunity to experience research in a physical sciences laboratory. By making the curriculum and the rotation system so diverse, OIST students are introduced to the language and methods used across a number of disciplines and this enables them to apply their core capabilities to solving important problems in unrelated disciplines, which they might otherwise find to be inaccessible.

As befits a newly established university, OIST has created a new and exciting model for research and education in science and technology which has been specifically adapted to meet the demands and challenges of the twenty-first century. Through this model, the university will train a new breed of talented students and young researchers who, after receiving strong interdisciplinary training, will be well-equipped to become future leaders of academia and industry.

OIST

www.oist.jp/

ARTICLES: 383

CORRECTED COUNT: 151.83

France

Despite an improvement on 2011 performance, reforms of higher education and employment law are making French scientists nervous about maintaining the country's role as a global scientific leader. Some fear funding concentration will adversely affect the research enterprise.

The importance of scientific research and the knowledge economy has been a rare common thread between successive French governments in recent years. Former president Nicolas Sarkozy and his socialist successor, Francois Hollande, both declared this a priority even when other budgets were being cut. In practice, the proportion of French gross domestic product spent on research and development has risen slightly, from 2.21% in 2011 to 2.25% in 2012, which keeps France just above the European average. However, judging by the record of publications in Nature journals by researchers at French institutions, it would take a rather higher increase to improve the country's standing in the NPI.).

France ranks fifth in the global NPI, but it is trailed very closely by China, whose corrected count (CC) has shown a fourfold increase since 2008. It will be a surprise if France is not relegated to sixth by further Chinese improvement in 2013.

France's 2012 score (CC 151.8) does nevertheless represent an 18% increase from its 2011 performance, and narrows the (still substantial) gap from fourth-placed Japan (234.4). The French National Centre for Scientific Research (Centre National pour la Recherche Scientifique, CNRS) was the world's fifth-highest ranking research centre, up from seventh in 2011.

By subject area, France is particularly strong in Earth & environmental sciences. Consistently ranking fourth (just ahead of Japan), it had a corrected count score in 2012 that represents 6.2% of the global total in this area; the CNRS was number one worldwide in this set of disciplines.

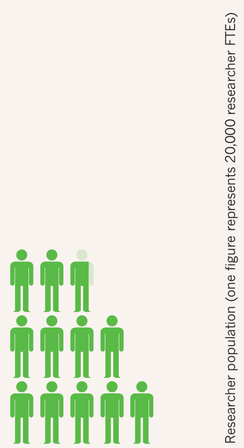
France also performed well in physical sciences. It regained fifth position in 2012 ahead of China, which had overtaken France in 2011. The year was notable for the award of the Nobel Prize in Physics to Serge Haroche, a quantum physicist at the Collège de France in Paris. Haroche won the prize jointly with US physicist David Wineland for their work on experimental methods that allow the manipulation of individual particles without destroying their quantum state.

The light of French research shines less brightly in other fields.

FRANCE TOP TEN

France has 10 institutions in the Global top 200.

Global rank 2012	Institution	2012 National rank	2012 Corrected count	2012 Articles	2011 National rank	2011 Corrected count	2011 Articles	2008–12 National rank	2008–12 Corrected count	2008–12 Articles
5	French National Centre for Scientific Research (CNRS)	1	45.91	246	1	42.60	204	1	191.60	919
63	National Institute for Health and Medical Research (INSERM)	2	10.68	92	2	11.57	90	2	49.76	374
105	Pierre and Marie Curie University (Paris 6)	3	7.20	55	3	6.26	64	4	28.11	223
155	Pasteur Institute	4	4.95	30	4	4.27	35	3	29.81	149
156	Atomic Energy and Alternative Energies Commission (CEA)	5	4.94	38	13	2.28	13	5	19.26	104
157	University of Strasbourg	6	4.90	22	6	3.45	24	9	14.64	81
176	University of Paris Sud (Paris 11)	7	4.52	36	17	1.84	22	6	16.94	130
189	Ecole Normale Suprieure (ENS)	8	4.17	28	11	2.77	21	10	14.24	101
192	Joseph Fourier University (UJF)	9	4.14	29	12	2.30	16	7	15.48	92
194	Aix-Marseille University	10	4.08	27	19	1.54	18	11	13.58	92



FRANCE 2012

POPULATION:	65 M
RESEARCHERS:	234,201
GERD AS % OF GDP:	2.25%

Gross domestic expenditure on R&D (GERD)

SOURCE: UNESCO

The country's life sciences ranking fell from fifth to sixth in 2012, overtaken for the first time by China. In chemistry, France ranked seventh.

WANTED: WORLD-CLASS UNIVERSITIES

Most of the French research published in Nature journals comes not from universities but from non-university research institutions CNRS, Institut National de la Santé et de la Recherche Médicale (INSERM) and the Atomic Energy and Alternative Energies Commission (CEA). Indeed, the highest placement in the global NPI for a French university is for Pierre and Marie Curie University (UPMC, or Paris 6), at 105th. In all there were 27 French institutions in the top 500 in 2012.

Under reforms of French higher education there is a programme to develop a number of French universities that can compete for global elite status. One vehicle to finance and encourage this is the Idex 'centres of excellence' initiative, providing endowments to the chosen few. Essentially these centres are regional consortia formed around the country's top existing research universities. Four of the Idex centres will be formed from the reorganization of universities in the Paris region. The lead institutions for the four other centres are the universities of Aix-Marseille, Bordeaux, Strasbourg and Toulouse. Higher education reform is still on the agenda under Hollande's presidency, but it is a controversial issue about which defenders of the principle of equal treatment for all universities have mounted vocal protests under the banner of 'Sauvons l'Université' (Save the University).

More dissent within the French research community has arisen due to an overhaul of employment law. Ostensibly the change aims to prevent the common practice of keeping staff on repeating short-term contracts. A law that went into effect in March 2012 decrees that any post retained longer than six years should be made permanent — which in French research institutions means moving it on to a civil service grade. Many researchers fear, however, that unless institutions have sufficient guaranteed income to commit to posts with tenure, this requirement will lead to job losses. The impact is likely to be most severe at universities outside the elite group.

MODIFYING THE FRENCH MODEL

French universities are also at a disadvantage because the bulk of the country's research is carried out in laboratories run under CNRS auspices, and attributed to the CNRS in the NPI corrected count. This proportion could change through projects aiming to integrate local CNRS research units and to consolidate research with key universities, creating centres of research and higher education known by their acronym in French, PRES. Encouraged by the Idex initiative, it is likely these PRES will form closer affiliations to become super-universities — in which case they may claim the credit for the research under their own names.

Among the key determinants of researchers' affiliations will presumably be their employment contracts — and who holds the purse strings. The CNRS, with its 10 national-level institutes and 1,000-plus research units (the large majority of which are partnerships with universities or industry), is by far the largest employer of French researchers. Drawing on its 85% government-funded budget of €3,416m (2013 forecast), CNRS employs 11,415 researchers (excluding scientists on short-term contracts).

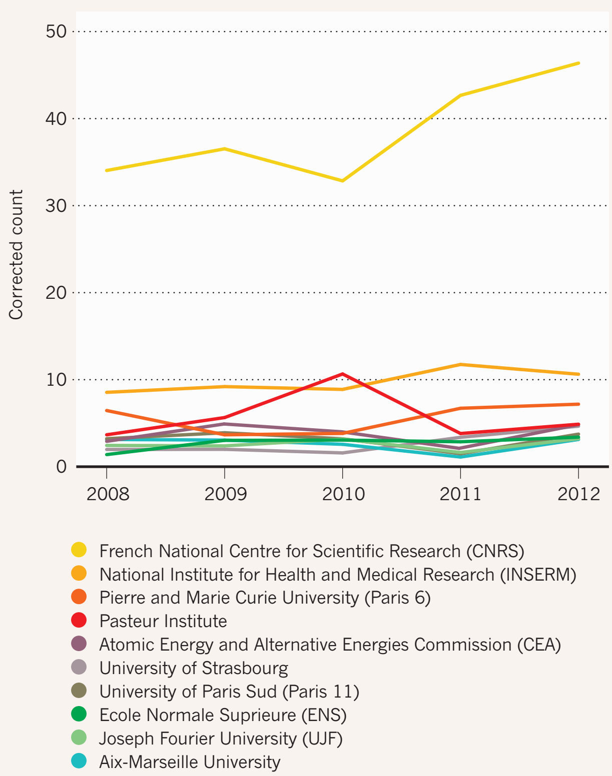
Meanwhile, having nominally taken on more individual budgetary responsibilities, in practice universities must increasingly compete for project-based research funding allocated and evaluated by two new national bodies.

The central plank of Idex, however, is the endowment of its designated elite research centres with capital sums whose investment income will provide their own secure funding streams. Eight centres were chosen in two Idex approval rounds in July 2011 and February 2012 to receive endowments ranging from €750-950 million.

As France's university reform process unfolds, the extent to which the elite centres coalesce with new identities will clearly affect how French institutions stand in future NPIs. The hope, too, is that higher profile universities will be better able to compete globally to attract both talent and funding, and thereby improve France's overall score — if not its actual rank — in future years. ■

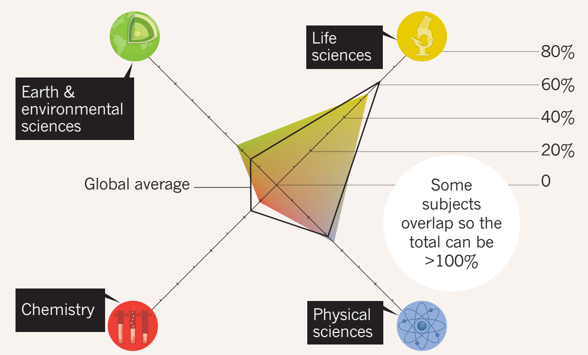
INSTITUTIONAL PUBLISHING TRENDS

Charting the changes in output from the top 10 institutions since 2008.

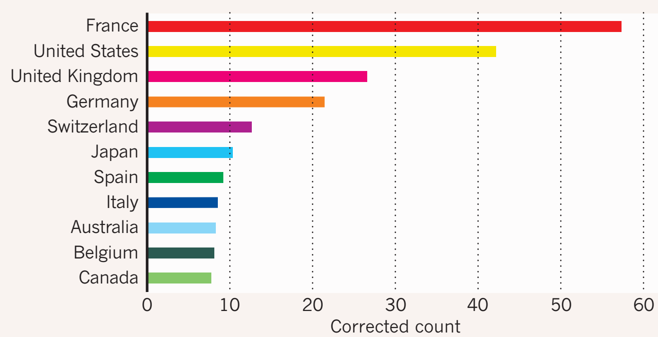


RESEARCH STRENGTHS

The subject areas in which France achieved its corrected count.



The countries with which France collaborates most. Its corrected count achieved without collaboration is shown for comparison.



Five countries to watch

The top echelon of the NPI is populated by the usual suspects. Looking further down the index, we spotlight countries that are relative newcomers but are rapidly increasing their research output. These nations have been chosen for the magnitude of their increase in corrected count, for the speed of their climb in the NPI rankings, and for their regional scientific leadership.

CHINA

A decade of 20%-per-year increases in government funding, along with robust industrial development, have propelled the world's most populous country into the upper echelons of science.

The growth in China's contribution to the Nature Publishing Index since 2011 is a clear indication of the increase in quality scientific output. There are 43% more Chinese institutions in the NPI than in 2012 and the country now represents 30% of all the NPI score from the Asia-Pacific region.

In 2008, articles featuring China-based authors accounted for 3.6% of the whole NPI; in 2012 it was 8.5%. The Chinese share of corrected count (CC) has similarly risen, from 1.5% in 2008 to 4.2% in 2012. Looking only at articles published in the flagship journal *Nature*, the Chinese share of the CC has risen from 1.5% to 2.5%.

These gains can largely be attributed to increased funding. The last decade has seen Chinese spending on research and development (R&D) grow by around 20% per year putting the country in second place — behind only the US — in total science expenditures. And the Chinese government plans to increase R&D spending from its 2012 level of 1.75% of GDP to at least 2.5% by 2020.

Healthcare policies allocating billions of dollars to drug development are encouraging China's life sciences institutions to become bigger global players. Moreover, private funds are also pouring in. US pharmaceutical giant Merck has announced plans to spend US$1.5 billion over the next five years on R&D in Beijing. Merck will be joining other companies that have made similar investments, including Eli Lilly, GSK and Pfizer. Domestic companies are joining forces with foreign organizations for drug discovery and clinical development.

But, China has gaps in its support. Investment in basic science is only 4.6% of R&D spend (compared to the 15–25% of R&D funds that most developed countries devote to basic science). And in the last ten years, the percentage spend on public institutions has fallen by more than a third, indicating greater reliance on private sector funding.

Regulatory constraints are also impeding research. Limits on payments to graduate students and postdocs mean that in most cases,

CHINA 2012

POPULATION: 1.35 B

RESEARCHERS: 1.152 M

GERD AS GDP: 1.7%

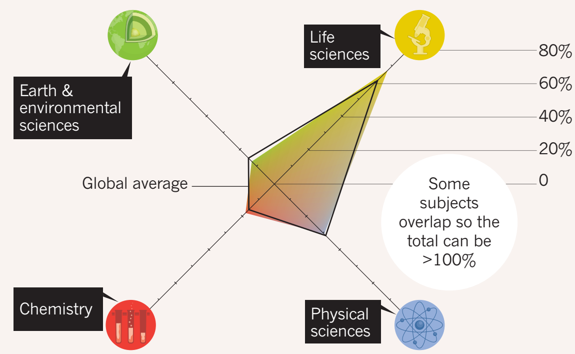
Gross domestic expenditure on R&D (GERD)

ARTICLES: 303

CORRECTED COUNT: 150.02

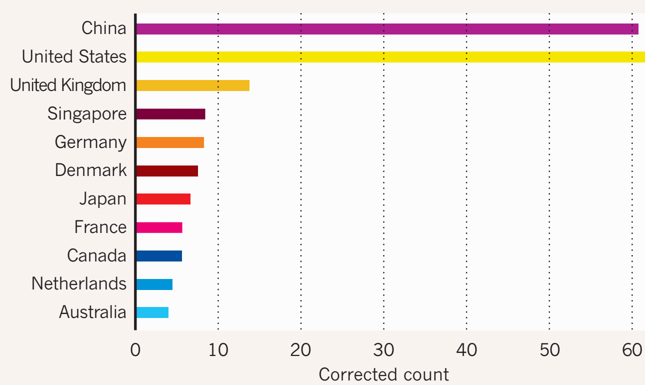
RESEARCH STRENGTHS

The subject areas in which China achieved its corrected count.



RESEARCH COLLABORATION

The countries with which China collaborates most. Its corrected count achieved without collaboration is shown for comparison.



TOP FIVE INSTITUTIONS

China has 9 institution in the 2012 Global top 200.

2012 Global rank	Institution	2012 CC	2012 Articles	2011 CC
12	Chinese Academy of Sciences (CAS)	37.88	91	22.52
72	University of Science and Technology of China	9.46	17	8.58
88	Tsinghua University	8.26	31	6.36
93	Peking University	8.10	29	7.24
116	Shanghai Jiao Tong University (SJTU)	6.62	30	3.74

IRELAND 2012

POPULATION: 4.59 M

RESEARCHERS: 21,393

GERD AS GDP: 1.79%

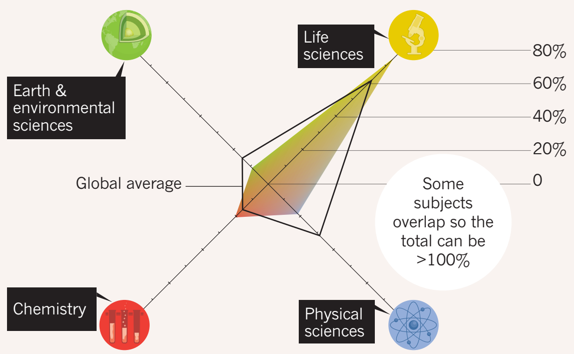
Gross domestic expenditure on R&D (GERD)

ARTICLES: 45

CORRECTED COUNT: 14.05

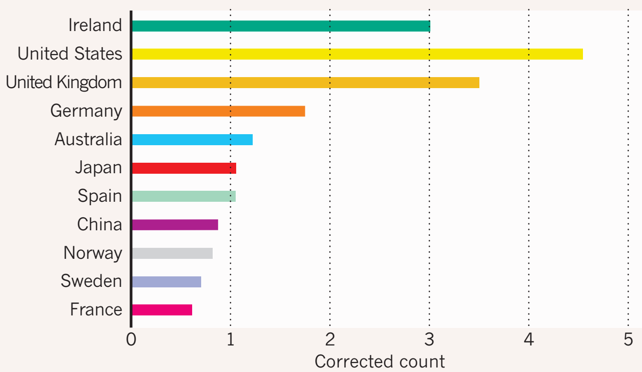
RESEARCH STRENGTHS

The subject areas in which Ireland achieved its corrected count.



RESEARCH COLLABORATION

The countries with which Ireland collaborates most. Its corrected count achieved without collaboration is shown for comparison.



TOP FIVE INSTITUTIONS

Ireland has one institution in the 2012 Global top 200.

2012 Global rank	Institution	2012 CC	2012 Articles	2011 CC
145	University of Dublin	5.16	22	1.21
269	University College Dublin (UCD)	2.72	14	1.03
423	National University of Ireland Maynooth (NUI Maynooth)	1.40	2	0.00
*	National University of Ireland Galway (NUI Galway)	1.00	8	0.00
*	University College Cork (UCC)	0.94	3	0.15

* RANKED OUTSIDE THE TOP 500 GLOBALLY

less than 15% of a project's funding can be spent on salaries. As a result, many good scientists are lost to more lucrative jobs abroad.

China has a historical strength in engineering and is traditionally strongest in the physical sciences. Nevertheless, the 2012 NPI shows its growing prowess in life sciences. China was the top Asia-Pacific nation in five Nature journals in 2012: *Nature Biotechnology, Nature Cell Biology, Nature Genetics, Nature Structural & Molecular Biology* and *Nature Methods*.

The Chinese Academy of Sciences (CAS) is clearly the dominant research institution and ranks 12th globally, up from 22nd in 2011. CAS is number one in China in each of the four subject areas. The number two spots in the four areas are spread among different institutions: Tsinghua University (chemistry), BGI (life sciences), University of Science and Technology of China (physics) and Zhejiang University (Earth and environmental sciences).

While China improves, Hong Kong is slipping; two of its institutions fell in the ranking: the Hong Kong University of Science and Technology (HKUST) dropped from 180th globally in 2011 to 282nd in 2012, and the University of Hong Kong (HKU) slid from 198th in 2011 to 260th in 2012. Hong Kong's leaders are not giving science the same priority as in mainland China, allocating just 0.7% of GDP to R&D.

IRELAND

While austerity measures have cramped the economy overall, successive coalition governments have maintained spending on research and science budgets have stayed largely intact.

The once roaring Celtic tiger is dead and gone. More than a decade of unprecedented growth and prosperity came to an abrupt end in 2008, leaving Ireland to struggle with massive sovereign debt, rising unemployment, and the prospect of a generation of young people leaving the small island nation.

An English-speaking workforce, along with business-friendly corporate tax rates, saw Ireland become one the world's hot spots for foreign investment in the mid-1990s, igniting the economy after decades of sluggish growth and mass emigration.

Investment in scientific research has been prioritized by successive coalition governments as one of the best ways to create jobs and strengthen national competiveness. Research spending has been largely spared the savage cuts inflicted on other sectors as the government meets the austere conditions of its €67.5 billion European Union rescue package.

This science-friendly regime has borne fruit, as seen by Ireland's impressive rise up the NPI — from 30th in 2008 to 20th in 2012. And if you count the number of published pieces in *Nature* as a proportion of the number of full-time researchers, Ireland ranks 8th in the world. By that same measure for *Nature Immunology*, Ireland ranks first.

Unsurprisingly, Ireland's biggest and best institutions — University of Dublin (better known as Trinity College) and University College Dublin (UCD) — have by far the highest corrected counts, at 5.2 and 2.7, respectively. A notable study on gut microbiota in elderly people by UCD and University College Cork, amongst other Irish and Welsh contributions, was published in *Nature*. The National University of Ireland, Maynooth, (NUIM) claims third spot with a CC of 1.4, on the strength of being the sole contributor to papers on interleukin-17 signalling in *Nature Communications*, and on the expression of interferon in *Nature Immunology*. Despite these highlights, Irish universities do not dine at the top table of world-class science institutions. Trinity ranks 145th and UCD is 269th while NUIM dwells at 423rd.

Irish universities have had to adapt to austerity measures. In 2010, UCD laid off about 8% of its 3,378 staff, including 82 academic posts, while Trinity College had to dip into its endowment to maintain research staff levels.

This year, the Irish government announced new investment in innovative research. The 6-year, €300-million (US$392-million) plan will create seven hubs to connect private companies with academic researchers. The goal is to promote Ireland's strategic research strengths, such as renewable energy, photonics and nanotechnology, functional foods and drug synthesis.

If Ireland is to build a knowledge-based economy, one that rides the boom and bust of inflated property markets and easy international finance, it's making the right moves.

BRAZIL

Wide-ranging efforts in the largest Latin American nation spread from stem cell research to high-energy physics.

With major efforts to increase international collaboration and a "publish or perish" culture, the largest Latin American country is moving up the NPI rankings, but its scientific community still struggles to produce high-impact publications

Brazil's position in the Nature Publishing Index (NPI) implies an improving status for science in the country. The Latin American nation, in 27th position, has moved up seven places in the global NPI rankings since 2008. Its corrected count has risen by an annual average of 29.3%.

But such growth in absolute numbers masks a research environment in flux. Critics accuse the funding agencies of focusing too much on the quantity of papers rather than on their impact. "Brazilian scientists have incentives to publish, and are under unprecedented pressure to do so," says biochemist Rogério Meneghini, a scientific director at sciELO, a database of electronic and open-access journals jointly funded by Fapesp (the São Paulo State Science Foundation) and Brazil's federal government.

Brazil's national commitment to science funding has risen slightly in the past few years. At the federal level, research funding as a portion of GDP has crept up from 1% to 1.2%. In São Paulo State, which is responsible for about half of the country's science output, research spending as a share of GDP has risen from 1.5% to 1.66%. After a genomics boom that started in the late 1990s, most large-scale projects (many funded by Fapesp) now focus on bioenergy, biodiversity and predicting the effects of climate change, with particular consideration given to possible implications on Brazil's booming agribusiness sector.

Basic research in Brazil is largely the remit of public universities, both at federal and state level. The campuses of the University of São Paulo (USP), through their size (about 90,000 students overall, a third of whom are graduate students) and regular state funding, are strong in many fields, particularly biomedical research and quantum physics.

The Federal University of Rio de Janeiro (UFRJ), with about 50,000 students, has a similarly high profile. Its scientists have led important clinical trials using adult stem cells to treat heart disease and were the first to obtain human iPS cells (induced pluripotent stem cells) in Brazil. In the corrected count for all Nature journals, UFRJ is Brazil's top-ranked institution, followed by USP; based on the corrected count for only the journal *Nature* itself, USP takes the highest position.

Brazil also has publicly-funded research institutes that are not affiliated with universities. Examples include the Brazilian Association for Synchrotron Light Technology, which houses the National Synchrotron Light Laboratory — a 'Brazilian LHC' that uses beams of concentrated energy to study materials and the structure of proteins; and the Oswaldo Cruz Foundation (Fiocruz), a leader in tropical medicine research since the early twentieth century.

In recent years Brazil has made efforts to forge international partnerships. In the federal arena, the most visible and ambitious programme is Ciência Sem Fronteiras (Science Without Frontiers), established in 2011. Its main goal is to provide around 100,000 scholarships for Brazilian undergraduates and graduate students to spend time at universities abroad. The programme also offers financial incentives for foreign researchers to become visiting professors in Brazil. Fapesp is trying to attract senior foreign scientists to São Paulo State with its São Paulo Excellence Chairs. Researchers are encouraged to submit proposals for a five-year project and successful candidates will spend about three months each year for the duration of the project.

"We have some modest signs that things are improving in terms of international collaboration," says Meneghini. "But we're still struggling

BRAZIL 2012

POPULATION: 194 M

RESEARCHERS: 137,187

GERD AS GDP: 1.6%

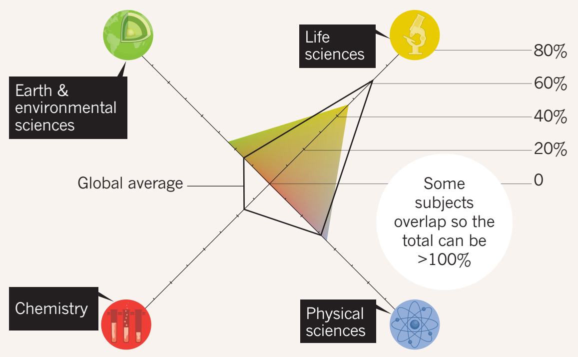
Gross domestic expenditure on R&D (GERD)

ARTICLES: 39

CORRECTED COUNT: 5.71

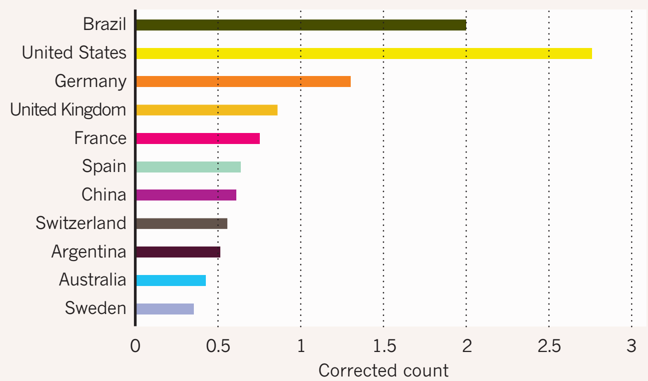
RESEARCH STRENGTHS

The subject areas in which Brazil achieved its corrected count.



RESEARCH COLLABORATION

The countries with which Brazil collaborates most. Its corrected count achieved without collaboration is shown for comparison.



TOP FIVE INSTITUTIONS

Brazil has no institutions in the 2012 Global top 200.

2012 Global rank	Institution	2012 CC	2012 Articles	2011 CC
428	Federal University of Rio de Janeiro (UFRJ)	1.26	6	1.24
*	University of São Paulo (USP)	0.79	11	0.57
*	Brazilian Association for Synchrotron Light Technology (ABTLuS)	0.60	1	0.00
*	University of Campinas (UNICAMP)	0.38	2	0.09
*	State University of Norte Fluminense (UENF)	0.28	1	0.00

* RANKED OUTSIDE THE TOP 500 GLOBALLY

KENYA 2012

POPULATION: 38.61 M

RESEARCHERS: 2,105

GERD AS GDP: 0.48%

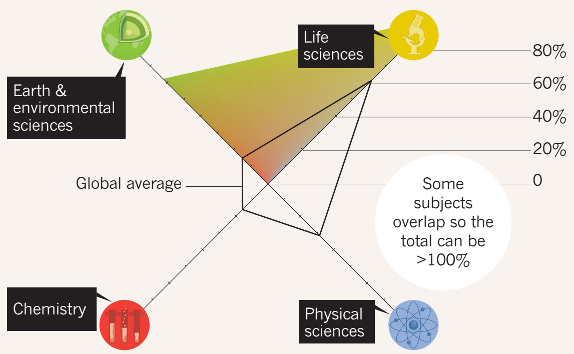
Gross domestic expenditure on R&D (GERD)

ARTICLES: 9

CORRECTED COUNT: 1.71

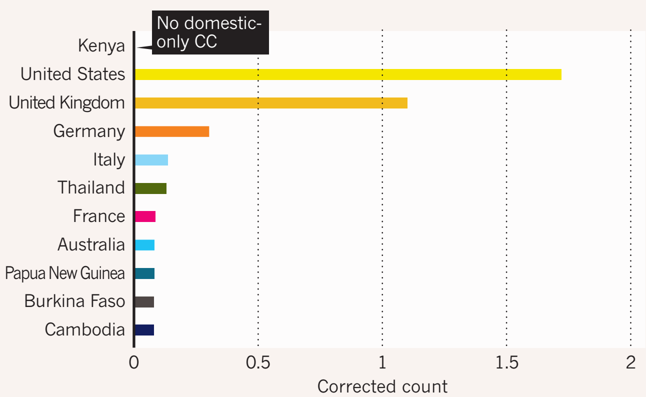
RESEARCH STRENGTHS

The subject areas in which Kenya achieved its corrected count.



RESEARCH COLLABORATION

The countries with which Kenya collaborates most. Its corrected count achieved without collaboration is shown for comparison.



TOP FIVE INSTITUTIONS

Kenya has no institutions in the 2012 Global top 200.

2012 Global rank	Institution	2012 CC	2012 Articles	2011 CC
*	Kenya Medical Research Institute (KEMRI)	0.81	3	0.33
*	Mpala Research Centre (MRCC)	0.31	1	0.00
*	Turkana Basin Institute	0.29	1	0.00
*	University of Nairobi	0.22	1	0.00
*	Center for Microbiology Research	0.05	1	0.05

* RANKED OUTSIDE THE TOP 500 GLOBALLY

compared with other countries." Indeed, he says, while European countries typically collaborate in 50% of their papers, for Brazilian scientists the figure is closer to 25%.

"In that regard, we're not so different from India or China, or even Japan, which are not nearly as well connected as the European Union countries," Meneghini argues. "Maybe the language barrier is relevant and of course geography still matters."

Despite the growth of its basic science portfolio, there is still a lack of collaboration between Brazil's scientists and its private sector, and "entrepreneur scientists" are rare. A programme announced in April 2013 by the federal government, amounting to around US$15 billion, will try to stimulate technology transfer and innovation in Brazilian companies as an engine for economic growth.

KENYA

Driven mainly by research on endemic diseases like malaria and its urgent need to develop energy, Kenya's NPI ascent is impressive.

Kenya's rapid climb up the Nature Publishing Index since 2008 — the fastest of any country tracked in the NPI — marks the country as one to watch.

Kenya has enjoyed stable economic growth over the past decade. Recent oil and gas discoveries have brightened the outlook further, with projected real GDP growth rates over the next few years of 5–8%.

As the financial hub for East Africa, Kenya attracts investments from international companies and organizations wanting to establish a presence in the region. The capital, Nairobi, is home to many research institutes, largely internationally funded, such as the International Livestock Research Institute (ILRI) and the International Centre of Insect Physiology and Ecology (ICIPE). Such institutes dominate research in Kenya, where medical science accounts for much of the NPI achievement.

More than half the articles were produced by, or pertain to, a single initiative — the KEMRI-Wellcome Trust, a research collaboration between the Kenya Medical Research Institute (KEMRI) and the British medical research charity. With links to institutions such as the University of Oxford in the UK, the programme has nurtured a small group of internationally competitive local researchers, focusing on malaria. One of its key achievements is the Malaria Atlas Project, which is the first map of the epidemiology and burden of the disease worldwide. The programme has since been extended to other diseases including HIV-infection and sickle-cell disease.

Kenya's gross expenditure on science remains small. The most recent comprehensive spending data puts the country's total R&D investments at 0.48% of its GDP in 2007/08—far from its target of 1% of GDP. Virtually all research funding comes from government or international donors; industrial investments account for barely 2.5% of the total.

The Kenyan government plans to divert more resources from its growing economy to research. Last year, it approved a plan to create a research endowment by investing a lump sum of 2% of GDP — roughly US$660 million. However, the new government that came into power in May 2013 has so far said nothing about whether it will carry out this initiative.

The government also wants to encourage more industry-led R&D. It is investing in technology parks around the capital to attract foreign companies. State funding of 1 billion Kenyan shillings (US$10 million) has already been poured into a 5,000-hectare site south of Nairobi. The Jomo Kenyatta University of Agriculture and Technology, just outside the capital, and the University of Nairobi are also planning technology parks to nurture links between Kenyan academia and the private sector.

Information and communications technology is likely to feature strongly in Kenya's future research growth. The country is already home to M-Pesa, a hugely successful mobile-phone-based money transfer service. In 2012, IBM gave this industry a thumbs-up by opening its first African lab in Nairobi.

The government is also building new solar and geothermal energy plants in order to expand the electricity supply (only 16% of Kenyans now have access to electricity). Kenya's universities are launching engineering courses to provide the skills needed in the renewables sector.

Kenya's economic and scientific advances are fragile. Although considered politically stable (by African standards), ethnic tensions combined with marked inequality occasionally spark flashpoints. While the government's commitment to science is well-documented, it has many other concerns including climate change, unrest in the horn of Africa and the global economic downturn.

SAUDI ARABIA

A marked increase in the demand for energy to fuel a much-needed desalination programme has seen the Saudi government make significant investment in research.

The desert kingdom is using its oil wealth to fund ambitious scientific research efforts, and has risen rapidly up the NPI ranks.

The Kingdom of Saudi Arabia (KSA) has an ambitious strategy to expand its scientific achievement and its performance in the Nature Publishing Index (NPI) shows that strategy is working. Its corrected count over the past five years has increased by an annual average of 140%, lifting the country up seven places in the NPI since 2008, making it one of the world's fastest improvers.

Published research covers issues especially pertinent to the country's future, such as energy and agriculture, and also more abstract fields such as advanced materials, immunology and epidemiology, genetics and chemistry. Such work includes a *Nature* paper outlining how textured superhydrophobic surfaces can be used to prevent vapour explosions in say, a nuclear power plant. A *Nature Materials* paper describes a technique that "opens new avenues to control light, heat and mass transport at the nanoscale". The national scientific organization in charge of leading these endeavours — the King Abdulaziz City for Science and Technology —has, since its establishment in 1977, supported scientific research on hundreds of projects in various sectors.

The KSA is funded by a continuous stream of oil revenue. But the government is also investing in alternative energy forms, with plans to build 16 nuclear reactors at an estimated cost of US$80 billion. The Kingdom's energy needs are immense; one of the biggest consumers is its water desalination programme — already the largest in the world — which it must expand to address its acute water shortage. KSA plans to spend US$66 billion on plants and upgrades over the next 10 years.

Saudi Arabia has established 24 research centers in the past three decades, attracting international talent as well as paying for nationals to study abroad. In 2012, some 130,000 Saudi students were studying overseas — half of them in the United States — funded by the King Abdullah Scholarship Program.

The KSA is also attempting to raise the level of education at home. Its most prominent institutions include King Abdulaziz University, the King Abdullah University of Science and Technology (KAUST) and the King Saud University. KAUST opened in 2008 under the presidency of Shih Choon Fong, the former president of the National University of Singapore. In February 2013 KAUST named as his successor Jean-Lou Chameau, formerly in charge at the California Institute of Technology (Caltech), home of NASA's Jet Propulsion Laboratory. It is hoped the appointment will also bolster the KSA's efforts in astronomical research which include a partnership with NASA on moon and asteroid research.

Universities in the KSA are able to offer attractive salary packages for foreign staff and, despite the country's deep conservatism, there is a significant expatriate community, a legacy of its historical attraction for international oil workers.

A possible drawback to KSA's progress is the lack of opportunity for women, a cultural tradition that precludes females from pursuing education in many fields such as engineering and life sciences. In 2009, only 1.4% of researchers in the KSA were women, according to UNESCO data.

In addition to its domestic research, the KSA is also forging relationships with foreign institutions, including its US$3.2 million sponsorship of research at the University of California, Los Angeles (UCLA) in nanoelectronics and clean energy. Those supporting science in the KSA hope that these investments pay off in the long run. ■

SAUDI ARABIA 2012

POPULATION: 29.2 M

RESEARCHERS: No data available

GERD AS GDP: 0.25%

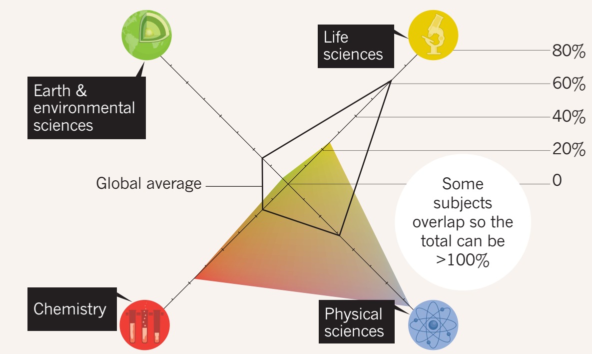
Gross domestic expenditure on R&D (GERD)

ARTICLES: 11

CORRECTED COUNT: 1.13

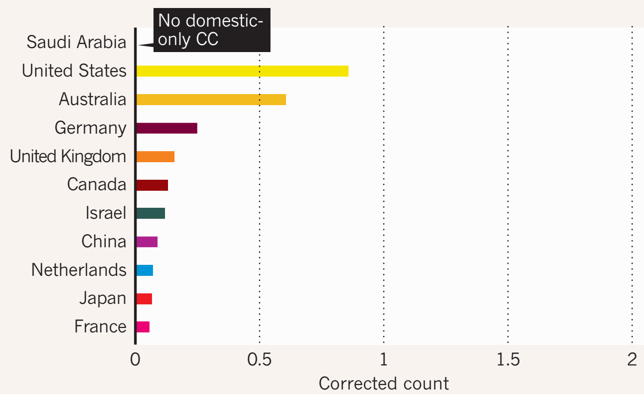
RESEARCH STRENGTHS

The subject areas in which Saudi Arabia achieved its corrected count.



RESEARCH COLLABORATION

The countries with which Saudi Arabia collaborates most. Its corrected count achieved without collaboration is shown for comparison.



TOP FIVE INSTITUTIONS

Saudi Arabia has no institutions in the 2012 Global top 200.

2012 Global rank	Institution	2012 CC	2012 Articles	2011 CC
*	King Abdullah University of Science and Technology (KAUST)	0.77	3	1.09
*	King Saud University (KSU)	0.12	3	0.17
*	King Abdulaziz University	0.11	2	0.12
*	King Fahd Armed Forces Hospital	0.06	1	0.00
*	King Khalid University	0.00	1	0.00

* RANKED OUTSIDE THE TOP 500 GLOBALLY

A guide to the Nature Publishing Index

A complete guide to understanding the compilation, structure and definitions used in the Nature Publishing Index. For more information see nature.asia/publishing-index.

The Nature Publishing Index (NPI) is maintained by Nature Publishing Group (NPG), a business of Macmillan Science & Education, publisher of *Nature*, the international science weekly, and more than 30 Nature-branded primary research and review journals covering a broad spectrum of the life sciences, physical and chemical sciences, and medicine. NPG journals are among the most cited in scientific literature and are renowned for their publication of high-quality, high-impact research.

The NPI ranks institutions and countries/territories according to the number of primary research articles they publish in the Nature family of journals in a single year. It presents both raw numbers of published articles with author affiliations to a given country or institution, and a corrected count (CC) that is adjusted according to the relative contribution of each author to each article based on the percentage of authors from that institution or country in the paper's affiliations. This CC is tallied over a period of one year and is used to measure contribution to Nature journals. Only articles printed during the ranking period are included — advance online publications are not included until assigned an issue number and sent to press. The Global Nature Publishing Index 2012 covers the period from 1 January 2012 to 31 December 2012.

The index, online at nature.asia/publishing-index, is updated each week with a moving window of one year of data. The index website provides links to the abstracts of all articles used to calculate corrected counts, providing the details of individual papers and authors contributing to an institution or country's rank in the index and making the index fully transparent. It also provides data for review articles published in Nature journals. Review articles are not included in the annual rankings, however, because reviews are commissioned by journal editors rather than being submitted by researchers.

NATURE PUBLISHING INDEX

The index is updated weekly and includes articles published in the latest issues of the Nature journals. Users of the index website can subscribe for email alerts to keep up to date with the latest results from the region. A print publication presenting the frozen data for each calendar year is published each year.

CORRECTED COUNT

The NPI is based on an article's corrected count (CC) — a calculation that takes into account the number of affiliated institutions per author and the percentage of authors per institution. All authors are factored to have contributed equally to each article. The maximum CC for any article is 1.0. The overall CC for a country/territory reflects the sum of the corrected counts of all institutions in that region. The rules governing the calculation of CC with respect to the way affiliations are presented are adjusted regularly to account for new scenarios.

The NPI 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 and every effort is made to count affiliations consistently, making reasonable assumptions (outlined on the index website) to determine the corrected counts, which are approximations based on these assumptions and no counts are definitive.

RANKINGS, GRAPHS AND LISTS

Country rankings

Countries and territories are ranked according to CC and can also be filtered by article type using the selector at the top of the page. Clicking on a country name will display a list of institutions within that country/territory.

Institution rankings

The institutional rankings track institutions in the region according to their CC. Data for primary research articles (Articles, Letters and Brief Communications), reviews, or a combination of both, can be viewed by selecting the appropriate tab in the article filter at the top of the page. By default, the top 25 institutions are listed; clicking on 'Show all' at the bottom of the list will display all of the institutions. Clicking on the number in the 'Articles' column displays a list of all the articles from that particular institution.

Rankings by* Nature *journal

The journal rankings group all articles according to Nature research journal, and can be filtered by article type. By default, the top five institutions are listed for each journal. Clicking on 'Show All' lists all of the institutions that have affiliations listed in that journal, and clicking on the number of articles displays a list of the articles from that journal with affiliations from that institution.

Rankings by subject area

The rankings by subject area track institutions in four subject areas: chemistry, Earth & environment, life sciences and physical sciences.

Historical rankings

The historical rankings track data by country for primary research articles (reviews are not included) for past years. Clicking on the year at the top of the table displays the rankings for that year based on the corrected count.

Historical graphs

These graphs provide a visual representation of the historical data based on primary research articles (only). Users can select up to five institutions or countries and the graph redrawn to represent the selection.

Latest research

The latest research section provides a breakdown of the latest publications in Nature journals by country/territory, including journal name and article title. ■

THE NPI ONLINE: HOW IT WORKS

Research published in Nature journals can be tracked online through a comprehensive service which is updated weekly. nature.asia/publishing-index-global offers a 12-month rolling view of how institutions are ranking and the journal in which to find particular articles, letters and brief communications.

Article filter
An article filter at the top of most ranking lists allows users to track research articles and gives an option to access data on reviews

Research Articles
This is the default display reflecting the index's focus on primary research articles

To view a list of articles click on the number in the right hand column. Rankings by country, by journal and historical data from the last five years are also available

Research Articles | Reviews | All

Institution	Corrected Count[2]	Articles[3]
1. The University of Tokyo, Japan	39.4	116
2. ⊞Chinese Academy of Sciences (CAS), China	37.88	91
3. Kyoto University, Japan	22.47	55
4. ⊞RIKEN, Japan	18.96	78
5. Osaka University, Japan	18.18	54

Reviews
This displays data for review articles

Research Articles | **Reviews** | All

Institution	Corrected Count[2]	Articles[3]
1. The University of Auckland, New Zealand	3.25	4
2. The University of Sydney, Australia	2.7	4
3. The University of Tokyo, Japan	2.46	4
4. Monash University, Australia	2.4	5
5. The University of Melbourne, Australia	2.09	5

All
This displays both primary research articles and reviews

Research Articles | Reviews | **All**

Institution	Corrected Count[3]	Articles[4]
1. The University of Tokyo, Japan	41.86	120
2. ⊞Chinese Academy of Sciences (CAS), China	38.94	94
3. Kyoto University, Japan	22.47	55
4. ⊞RIKEN, Japan	20.85	82
5. Osaka University, Japan	18.59	56

Expanded Affiliations
Many organizations, such as the Chinese Academy of Sciences and Singapore's Agency for Science, Technology and Research (A*STAR), are umbrella agencies for many affiliated institutions. Such organizations are indicated by a plus mark ('+') in the index lists and can be expanded to show the contribution from each constituent institution

Research Articles | Reviews | **All**

Institution	Corrected Count[3]	Articles[4]
1. The University of Tokyo, Japan	41.86	120
2. ⊟Chinese Academy of Sciences (CAS), China	38.94	94
Shanghai Institutes for Biological Sciences (SIBS), CAS	6.42	15
Institute of Biophysics (IBP), CAS	4.67	15
Institute of Physics (IOP), CAS	3.6	9

Clicking on a plus mark (+) will show any affiliated institutions of an organization, listed in order of their corrected count

Clicking on an article count brings up a chronological list of the research articles and reviews published by that institution in the last 12 months

Articles
The number of articles encompasses the total contributions of a particular institution or country and each body is credited once per article. Clicking on the number of articles in any of the index ranking lists presents a complete list of the articles published by an institution or country/territory in the past year. Among these are the articles counted in the index along with the Nature journal in which it was published and the corrected count the article achieved. Hovering over the article title reveals its DOI and clicking on the title opens the article abstract on nature.com

Research Articles | Reviews | All

Journal	Title	CC[2]
Nature	An integrated encyclopedia of DNA elements in the human genome	0.02
Nature Biotechnology	Genome mapping on nanochannel arrays for structural variation analysis and sequence assembly	0.09
Nature Cell Biology	c-Abl promotes osteoblast expansion by differentially regulating canonical and non-canonical BMP pathways and p16 expression	0.22
Nature Cell Biology	c-Abl promotes osteoblast expansion by differentially regulating canonical and non-canonical BMP pathways and p16 expression	0.22
Nature Cell Biology	c-Abl promotes osteoblast expansion by differentially regulating canonical and non-canonical BMP pathways and p16 expression	0.22

Clicking on the title of the article leads to its full text on the journal website

These rankings are updated weekly and are based upon papers published as research Articles, Letters and Brief Communications in Nature and Nature monthly research journals (excluding journals from scientific societies)

Global Top 200

The Global Top 200 ranking counts the primary research published in all Nature journals by any institution worldwide. International institutions get credit for research done in their labs outside their home country. Funding agencies such as the Medical Research Council in the United Kingdom or the US Department of Energy are credited only if they directly manage institutions — otherwise it is the host institution that takes the credit. The table below lists the world's top 200 scientific institutions in 2012. ■

2012					2011			2008–2012		
RANK	INSTITUTION	COUNTRY	CORRECTED COUNT (CC)	ARTICLES	RANK	CC	ARTICLES	RANK	CC	ARTICLES
1	Harvard University	United States	150.25	369	1	135.39	308	1	658.57	1499
2	Stanford University	United States	76.34	161	2	67.48	140	3	288.08	582
3	Max Planck Society	Germany	64.31	186	3	64.29	164	2	301.88	772
4	Massachusetts Institute of Technology (MIT)	United States	60.39	199	5	44.07	144	5	235.68	728
5	French National Centre for Scientific Research (CNRS)	France	45.91	246	7	42.60	204	6	191.60	919
6	National Institutes of Health (NIH)	United States	43.82	143	4	58.21	154	4	247.23	668
7	University of Washington	United States	40.97	102	14	29.38	85	14	147.83	399
8	University of Cambridge	UK	39.80	137	12	33.28	116	12	152.71	510
9	The University of Tokyo	Japan	39.72	116	6	42.83	109	8	178.14	453
10	Swiss Federal Institute of Technology Zurich (ETH)	Switzerland	39.28	72	23	22.07	48	18	118.35	242
11	University of California Berkeley	United States	38.23	98	8	37.57	90	9	167.06	408
12	Chinese Academy of Sciences (CAS)	China	37.88	91	22	22.52	62	24	103.92	265
13	University of California, San Diego (UCSD)	United States	37.44	95	10	34.27	103	10	156.98	390
14	University of Oxford	UK	36.97	131	13	30.79	118	15	136.69	482
15	Columbia University in the City of New York	United States	34.76	89	15	28.36	79	13	152.47	345
16	Yale University	United States	34.46	82	9	37.07	84	11	154.71	345
17	University of California, San Francisco (UCSF)	United States	33.74	95	11	34.15	91	7	178.29	426
18	Johns Hopkins University	United States	32.82	94	21	22.86	82	17	130.17	368
19	Helmholtz Association of German Research Centres	Germany	27.30	130	38	16.16	92	25	101.68	502
20	University of California, Los Angeles (UCLA)	United States	26.97	82	35	17.37	57	19	118.14	329
21	University of Michigan	United States	25.89	76	16	26.44	81	22	108.25	324
22	Northwestern University	United States	25.34	54	29	20.20	50	23	105.63	218
23	University of Chicago	United States	24.88	54	31	19.19	47	36	79.25	208
24	University of Illinois	United States	24.49	55	17	25.72	48	26	99.70	201
25	California Institute of Technology	United States	24.28	63	19	24.69	50	16	133.09	282
26	Kyoto University	Japan	22.47	55	20	23.98	56	30	92.29	218
27	The Scripps Research Institute	United States	22.20	44	18	24.92	53	28	95.23	199
28	University of Pennsylvania	United States	21.24	58	32	18.54	61	21	111.10	290
29	Washington University in St Louis	United States	20.85	72	43	13.50	51	31	85.65	270
30	Weizmann Institute of Science	Israel	20.54	34	44	13.12	32	46	58.83	123
31	Princeton University	United States	20.39	44	48	12.46	30	33	82.47	171
32	Duke University	United States	20.03	67	39	15.49	47	35	79.75	216
33	RIKEN	Japan	19.57	80	28	20.21	71	29	92.78	303
34	Cornell University	United States	19.54	67	26	21.43	72	20	115.68	304
35	New York University	United States	18.53	47	42	13.62	32	34	80.35	199
36	Osaka University	Japan	18.22	54	34	17.43	48	37	77.52	208
37	University of Toronto	Canada	17.15	63	25	21.94	79	27	97.65	303
38	University College London	UK	16.21	79	24	21.96	71	32	83.86	292
39	Memorial Sloan-Kettering Cancer Center	United States	16.17	44	30	19.25	43	38	73.85	173
40	Medical Research Council (MRC)	UK	16.12	38	37	16.17	30	39	72.95	159
41	University of North Carolina at Chapel Hill	United States	15.24	52	70	9.56	41	49	51.66	197
42	Swiss Federal Institute of Technology (EPFL)	Switzerland	15.17	43	46	12.78	31	53	48.98	139
43	University of Texas at Austin	United States	14.91	43	51	11.76	25	55	48.08	123
44	University of Texas Southwestern Medical Center at Dallas	United States	14.61	32	47	12.57	25	41	68.01	146
45	University of Geneva	Switzerland	14.10	43	65	9.98	35	75	39.37	131

		2012			2011			2008–2012		
RANK	INSTITUTION	COUNTRY	CC	ARTICLES	RANK	CC	ARTICLES	RANK	CC	ARTICLES
46	University of Pittsburgh	United States	14.01	44	99	7.03	32	71	40.74	155
47	University of Minnesota	United States	13.89	47	145	4.79	29	41	13.83	47
48	Lawrence Berkeley National Laboratory	United States	12.97	73	40	14.67	67	44	60.01	280
49	F. Hoffmann-La Roche Ltd	Switzerland	12.85	25	82	7.95	16	66	41.51	93
50	The University of Texas MD Anderson Cancer Center	United States	12.48	33	63	10.56	34	72	40.53	129
51	University of Maryland	United States	12.35	52	41	13.83	47	47	55.40	207
52	University of Bristol	UK	12.30	41	58	10.94	35	56	46.43	161
53	Utrecht University	Netherlands	12.08	45	91	7.44	35	60	45.11	173
54	University of Edinburgh	UK	11.95	52	49	12.18	54	51	50.57	219
55	University of Colorado Boulder	United States	11.89	37	59	10.92	35	45	59.98	147
56	Salk Institute for Biological Studies	United States	11.84	24	67	9.69	17	62	42.74	92
57	University of Massachusetts Medical School (UMMS)	United States	11.68	28	69	9.56	23	57	45.75	102
58	University of Zurich (UZH)	Switzerland	11.49	41	78	8.45	33	63	42.48	166
59	The Rockefeller University	United States	11.35	31	27	21.19	39	40	70.45	145
60	Spanish National Research Council (CSIC)	Spain	10.83	47	55	11.25	60	69	41.01	185
61	University of Wisconsin-Madison	United States	10.80	31	36	16.52	51	42	67.18	183
62	University of Melbourne	Australia	10.78	48	66	9.83	46	94	32.08	157
63	National Institute for Health and Medical Research (INSERM)	France	10.68	92	52	11.70	91	52	49.94	377
64	University of Copenhagen	Denmark	10.59	54	73	8.98	51	76	38.70	204
65	Nagoya University	Japan	10.50	30	68	9.67	26	81	36.40	100
66	University of Freiburg	Germany	10.30	33	155	4.57	22	99	31.13	110
67	Baylor College of Medicine	United States	10.26	38	146	4.79	24	54	48.70	151
68	European Molecular Biology Laboratory (EMBL)	Germany	9.98	38	71	9.22	31	74	39.58	133
69	Imperial College London	UK	9.96	64	33	18.02	60	43	62.73	272
70	Ludwig Maximilian University of Munich (LMU)	Germany	9.75	52	57	10.95	53	58	45.64	233
71	Mount Sinai School of Medicine	United States	9.63	35	106	6.44	26	82	36.31	127
72	University of Science and Technology of China	China	9.46	17	76	8.58	17	118	26.53	56
73	University of British Columbia	Canada	9.42	36	50	11.92	43	48	54.53	166
74	Howard Hughes Medical Institute (HHMI) - Janelia Farm	United States	9.41	16	94	7.25	12	106	29.95	53
75	National University of Singapore (NUS)	Singapore	9.37	47	110	6.25	32	128	24.79	124
76	Heidelberg University	Germany	9.28	46	116	5.90	30	87	33.18	154
77	Vanderbilt University	United States	9.24	41	142	4.88	27	83	36.23	137
78	Pennsylvania State University	United States	9.22	35	79	8.43	33	68	41.20	146
79	Los Alamos National Laboratory (LANL)	United States	9.21	23	98	7.08	18	116	27.59	69
80	Purdue University	United States	9.12	22	124	5.70	19	90	32.59	90
81	University of Southern California (USC)	United States	9.00	47	81	8.16	39	77	38.65	165
82	University of California Irvine (UCI)	United States	8.67	36	83	7.88	24	97	31.49	111
83	Ohio State University	United States	8.61	30	89	7.45	24	84	35.32	113
84	Tohoku University	Japan	8.55	27	56	10.99	29	70	40.78	117
85	Leibniz Association	Germany	8.49	28	136	5.20	18	98	31.14	103
86	University of Utah	United States	8.36	29	164	4.44	20	93	32.26	108
87	Technical University Munich (TUM)	Germany	8.32	29	88	7.63	38	113	28.31	145
88	Tsinghua University	China	8.26	31	107	6.36	16	125	25.39	77
89	Rutgers, The State University of New Jersey	United States	8.22	25	113	6.09	16	59	45.56	109
90	Argonne National Laboratory	United States	8.21	24	143	4.82	21	112	28.32	97
91	University of California Davis	United States	8.20	41	87	7.68	24	73	40.44	141
92	St Jude Children's Research Hospital	United States	8.12	19	62	10.68	23	92	32.26	75
93	Peking University	China	8.10	29	95	7.24	21	137	23.17	83
94	Australian National University (ANU)	Australia	8.10	21	96	7.18	13	108	29.58	79
95	National Research Council (CNR)	Italy	8.09	49	102	6.60	40	86	33.99	192
96	University of Groningen	Netherlands	8.02	37	85	7.74	26	133	23.64	105
97	Cold Spring Harbor Laboratory	United States	7.80	27	61	10.75	26	85	34.44	92
98	McGill University	Canada	7.78	43	97	7.17	25	67	41.34	159
99	University of Manchester	UK	7.76	34	90	7.44	27	89	32.85	131
100	Georgia Institute of Technology	United States	7.64	17	197	3.60	11	109	29.41	66
101	University of Sheffield	UK	7.62	24	270	2.59	16	139	22.55	87

2012					2011			2008–2012		
RANK	INSTITUTION	COUNTRY	CC	ARTICLES	RANK	CC	ARTICLES	RANK	CC	ARTICLES
102	Leiden University	Netherlands	7.37	42	163	4.45	30	142	22.08	137
103	National Institute of Advanced Industrial Science & Technology (AIST)	Japan	7.30	23	74	8.82	22	115	27.79	88
104	Rice University	United States	7.27	24	75	8.74	17	88	32.89	78
105	Pierre and Marie Curie University (Paris 6)	France	7.20	55	109	6.26	64	114	28.11	223
106	Stony Brook University	United States	7.17	21	220	3.30	18	148	21.51	78
107	University of Queensland	Australia	7.07	41	86	7.71	34	105	30.19	128
108	Boston University	United States	7.02	37	80	8.32	36	101	30.82	147
109	Universit Libre de Bruxelles (ULB)	Belgium	7.01	23	256	2.75	8	183	17.62	56
110	Cancer Research UK	UK	6.92	19	158	4.49	18	80	36.45	89
111	University of Stuttgart	Germany	6.80	14	117	5.90	12	130	24.33	50
112	Brown University	United States	6.78	24	72	9.09	22	111	28.47	79
113	IBM	United States	6.66	11	183	3.82	7	103	30.64	48
114	Radboud University Nijmegen	Netherlands	6.65	36	127	5.57	27	122	25.98	142
115	Agency for Science, Technology and Research (A*STAR)	Singapore	6.63	36	225	3.24	21	129	24.68	111
116	Shanghai Jiao Tong University (SJTU)	China	6.62	30	188	3.74	21	229	13.33	68
117	University of California Santa Barbara (UCSB)	United States	6.61	21	64	10.20	25	50	50.97	114
118	Arizona State University	United States	6.35	21	213	3.39	12	146	21.77	62
119	BGI	China	6.27	20	231	2.97	11	223	14.04	42
120	University of Southampton	UK	6.25	32	260	2.71	18	168	19.28	108
121	Oregon Health & Science University (OHSU)	United States	6.21	13	93	7.26	17	121	26.11	58
122	University of Bonn	Germany	6.20	26	211	3.41	20	100	31.04	113
123	University of Tübingen	Germany	6.19	21	144	4.81	22	135	23.43	89
124	University of Basel	Switzerland	6.19	22	167	4.40	20	160	19.93	78
125	University of Hamburg	Germany	6.12	29	92	7.31	29	117	26.71	110
126	Catholic University of Leuven	Belgium	6.11	40	128	5.55	35	157	20.22	127
127	University of Virginia	United States	6.06	23	123	5.77	17	91	32.57	92
128	Aarhus University (AU)	Denmark	6.05	33	190	3.70	17	123	25.73	112
129	Mayo Clinic	United States	5.99	27	100	6.88	25	120	26.15	98
130	University of Dundee	UK	5.88	17	257	2.72	13	199	16.25	68
131	Wellcome Trust Sanger Institute	UK	5.87	51	53	11.70	55	61	44.98	237
132	University of London - King's College London	UK	5.86	41	119	5.84	37	127	24.89	162
133	Albert Einstein College of Medicine of Yeshiva University	United States	5.84	23	60	10.83	26	79	37.87	102
134	Kyushu University	Japan	5.81	20	154	4.58	19	176	18.32	68
135	University of Nottingham	UK	5.80	20	103	6.54	17	134	21.83	76
136	Karolinska Institute	Sweden	5.68	32	101	6.77	39	95	31.98	167
137	University of Amsterdam	Netherlands	5.57	30	191	3.67	22	150	21.15	112
138	University of California Santa Cruz (UCSC)	United States	5.53	23	112	6.19	24	102	30.66	109
139	Goethe University Frankfurt	Germany	5.50	20	130	5.44	14	143	21.94	73
140	Hokkaido University	Japan	5.47	17	172	4.26	16	190	17.14	54
141	Yonsei University	South Korea	5.46	14	438	1.20	6	317	8.73	31
142	Technion-Israel Institute of Technology	Israel	5.43	11	147	4.76	11	162	19.82	51
143	Novartis International AG	Switzerland	5.18	17	166	4.42	13	110	29.02	85
144	Oak Ridge National Laboratory (ORNL)	United States	5.18	18	268	2.60	11	185	17.43	64
145	University of Dublin	Ireland	5.16	22	129	5.51	11	216	14.48	79
146	Delft University of Technology	Netherlands	5.14	12	129	5.51	11	145	21.77	51
147	University of Erlangen-Nuremberg	Germany	5.09	24	141	4.93	19	177	18.30	81
148	University of Barcelona	Spain	5.09	22	227	3.17	16	256	11.44	61
149	Austrian Academy of Sciences	Austria	5.07	21	132	5.34	19	131	24.30	86
150	University of Vienna	Austria	5.03	20	108	6.30	16	175	18.43	66
151	University of Iowa	United States	5.00	21	105	6.45	11	147	21.70	79
152	Tel Aviv University (TAU)	Israel	4.96	24	316	2.03	16	210	15.07	77
153	Wageningen UR	Netherlands	4.96	16	131	5.42	13	294	9.44	46

2012					2011			2008–2012		
RANK	INSTITUTION	COUNTRY	CC	ARTICLES	RANK	CC	ARTICLES	RANK	CC	ARTICLES
154	University of Calgary	Canada	4.95	12	162	4.47	12	136	23.31	55
155	Pasteur Institute	France	4.95	30	288	2.35	14	161	19.89	108
156	Atomic Energy and Alternative Energies Commission (CEA)	France	4.94	38	171	4.27	35	107	29.81	149
157	University of Strasbourg	France	4.90	22	205	3.45	24	212	14.64	81
158	US Geological Survey (USGS)	United States	4.87	13	121	5.80	16	149	21.16	63
159	Case Western Reserve University (CWRU)	United States	4.82	14	149	4.73	19	141	22.43	71
160	Brookhaven National Laboratory (BNL)	United States	4.81	18	153	4.64	18	131	24.14	73
161	Cardiff University	UK	4.71	24	114	6.06	28	138	23.06	101
162	Emory University	United States	4.71	21	77	8.49	34	65	41.76	133
163	Zhejiang University	China	4.70	15	241	2.96	8	282	9.98	40
164	Ghent University	Belgium	4.68	31	204	3.46	23	200	16.17	101
165	Stockholm University	Sweden	4.66	15	135	5.20	25	222	14.10	52
166	University of Leeds	UK	4.64	24	118	5.85	25	178	18.05	95
167	Institute of Photonic Sciences (ICFO)	Spain	4.64	10	156	4.57	10	252	11.66	28
168	University of Colorado Denver | Anschutz Medical Campus	United States	4.63	13	224	3.25	15	189	17.22	61
169	University of Würzburg	Germany	4.63	15	122	5.80	23	119	26.27	79
170	University of Oslo (UiO)	Norway	4.62	23	179	3.89	23	215	14.49	75
171	Tokyo Institute of Technology	Japan	4.60	16	212	3.39	14	205	15.62	65
172	Seoul National University	South Korea	4.60	26	54	11.27	32	104	30.35	96
173	Charit University Medicine Berlin	Germany	4.56	30	274	2.52	16	179	17.95	102
174	Stowers Institute for Medical Research	United States	4.53	7	263	2.66	6	170	19.24	34
175	University of Göettingen	Germany	4.52	24	84	7.86	26	124	25.40	107
176	University of Paris Sud (Paris 11)	France	4.52	36	342	1.84	22	194	16.94	130
177	University of Helsinki	Finland	4.49	26	161	4.47	31	152	21.02	142
178	University of Rochester	United States	4.48	23	133	5.33	11	126	25.22	74
179	Huazhong University of Science and Technology (HUST)	China	4.41	14	481	1.00	6	405	5.76	22
180	University of Sydney	Australia	4.41	24	140	5.00	30	171	19.04	100
181	Eindhoven University of Technology (TU/e)	Netherlands	4.39	7	226	3.18	5	174	18.48	34
182	Lund University	Sweden	4.37	29	245	2.90	24	201	16.11	112
183	University of California Riverside (UCR)	United States	4.36	15	168	4.39	11	154	20.81	61
184	Uppsala University	Sweden	4.25	25	202	3.52	26	166	19.51	115
185	University of Waterloo	Canada	4.23	8	192	3.67	10	217	14.34	34
186	Fred Hutchinson Cancer Research Center (FHCRC)	United States	4.21	23	228	3.16	12	206	15.55	69
187	Carnegie Institution of Washington (CIW)	United States	4.21	14	218	3.31	12	159	19.99	63
188	Newcastle University	UK	4.20	17	181	3.86	16	164	19.67	86
189	École Normale Supérieure (ENS)	France	4.17	28	254	2.77	21	218	14.24	101
190	National Institute of Standards and Technology (NIST)	United States	4.16	20	45	12.84	26	78	38.03	93
191	University of Birmingham	UK	4.16	22	252	2.80	20	227	13.58	82
192	Joseph Fourier University (UJF)	France	4.14	29	290	2.30	16	207	15.48	92
193	Russian Academy of Sciences (RAS)	Russia	4.10	21	275	2.52	22	195	16.91	99
194	Aix-Marseille University	France	4.08	27	380	1.54	18	228	13.58	92
195	Korea Advanced Institute of Science & Technology (KAIST)	South Korea	4.03	15	187	3.74	13	186	17.32	48
196	Research Institute of Molecular Pathology (IMP)	Austria	4.00	7	210	3.41	11	196	16.72	44
197	Keio University	Japan	3.96	19	258	2.71	9	187	17.25	56
198	Woods Hole Oceanographic Institution (WHOI)	United States	3.92	12	165	4.44	13	169	19.26	56
199	Fudan University	China	3.90	13	289	2.34	14	299	9.19	47
200	James Cook University	Australia	3.89	12	421	1.26	7	422	5.40	24

- Corrected counts (CC) for each institution are shown to two decimal places only. When two or more institutions have achieved the same CC, their positions in the NPI are determined by the third decimal place (or beyond).
- Rankings are based upon 2012 primary research papers published in the Articles, Letters and Brief Communications sections of *Nature* and Nature monthly research journals (excluding reviews and journals from scientific societies).
- These rankings are based on the most recent data available as of May 8, 2013. Owing to continual refinements of the data the figures in the database are liable to change and might differ to those printed in the supplements.

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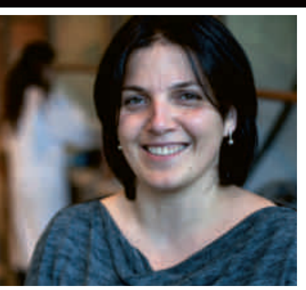
Born scientists reach for infinity



Source: Jeroen van Kooten

Syuzanna Harutyunyan,
Assistant Professor of Synthetic Organic Chemistry

"I have first-hand experience that the University of Groningen tenure track system allows researchers to develop their own independent research line from an early stage in their career."

Rinse Weersma, Professor of Gastroenterology and Hepatology

"The combination of treating patients and performing fundamental research is challenging but incredibly rewarding. I get excellent support to conduct both at the highest level."

Watch these excellent scientists
in their quest for infinity
on Unifocus video

Source: Corné Sparidaens

96 in Nature Publishing Index

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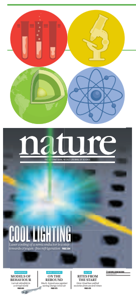
Rankings by journal

The Nature Publishing Index is comprised of 18 journals. The flagship journal is *Nature*, founded in 1869, and its many sister publications, including one online-only journal: *Nature Communications*. *Nature* and *Nature Communications* are multidisciplinary whereas most others fall into one of our four subject categories: life sciences, chemistry, physical sciences and Earth & environmental sciences. The exception is *Nature Chemical Biology*, which falls under life sciences and chemistry.

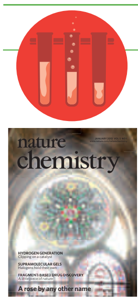
Below are the aggregated five-year data (2008–12) showing the top ten contributors to each journal by country. *Nature Communications*, *Nature Climate Change* and *Nature Chemistry*, show the most complete data. On the following pages we show the top five contributors to each journal by institution. ■

Contributions by country



NATURE

RANK	COUNTRY	CC	ARTICLES	RANK	COUNTRY	CC	ARTICLES
1	United States	469.46	604	6	Switzerland	21.12	63
2	United Kingdom	64.07	177	7	China	20.55	56
3	Germany	54.48	144	8	Canada	19.56	87
4	France	28.65	100	9	Netherlands	15.96	68
5	Japan	26.03	66	10	Australia	15.25	64



NATURE CHEMISTRY

RANK	COUNTRY	CC	ARTICLES	RANK	COUNTRY	CC	ARTICLES
1	United States	51.97	63	6	Canada	5.04	7
2	United Kingdom	17.52	24	7	Germany	4.98	11
3	Netherlands	7.31	10	8	Switzerland	4.98	6
4	Japan	6.96	10	9	China	2.37	7
5	France	5.06	9	10	South Korea	1.76	5

NATURE BIOTECHNOLOGY

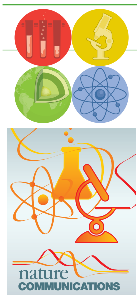
RANK	COUNTRY	CC	ARTICLES	RANK	COUNTRY	CC	ARTICLES
1	United States	48.47	59	6	Australia	1.99	5
2	United Kingdom	6.62	11	7	Switzerland	1.79	3
3	Germany	3.82	5	8	Sweden	1.28	3
4	China	2.83	7	9	Canada	1.17	2
5	Belgium	2.53	3	10	Israel	1.06	2

NATURE CLIMATE CHANGE

RANK	COUNTRY	CC	ARTICLES	RANK	COUNTRY	CC	ARTICLES
1	United States	34.48	53	6	Canada	4.52	11
2	United Kingdom	11.05	24	7	France	4.33	13
3	Australia	9.45	18	8	China	3.40	6
4	Switzerland	5.58	11	9	Denmark	2.41	7
5	Germany	5.53	16	10	Austria	1.96	6

NATURE CELL BIOLOGY

RANK	COUNTRY	CC	ARTICLES	RANK	COUNTRY	CC	ARTICLES
1	United States	48.35	63	6	France	4.82	8
2	United Kingdom	10.98	21	7	China	4.71	10
3	Germany	8.83	19	8	Belgium	4.16	6
4	Switzerland	5.26	8	9	Canada	3.99	8
5	Netherlands	5.07	11	10	Italy	3.44	6

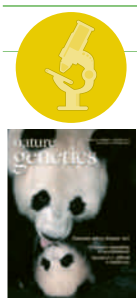


NATURE COMMUNICATIONS

RANK	COUNTRY	CC	ARTICLES	RANK	COUNTRY	CC	ARTICLES
1	United States	226.70	341	6	France	26.11	65
2	Japan	99.77	138	7	Switzerland	23.79	49
3	Germany	63.08	111	8	Spain	16.84	30
4	United Kingdom	59.28	113	9	Italy	16.28	34
5	China	49.62	82	10	Australia	14.46	29

NATURE CHEMICAL BIOLOGY

RANK	COUNTRY	CC	ARTICLES	RANK	COUNTRY	CC	ARTICLES
1	United States	65.76	86	6	Austria	2.59	4
2	Germany	10.73	17	7	Belgium	2.52	5
3	United Kingdom	8.36	13	8	Canada	2.02	6
4	Japan	3.76	5	9	Switzerland	1.91	5
5	China	3.09	7	10	France	1.58	3



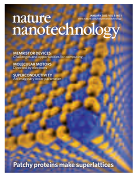
NATURE GENETICS

RANK	COUNTRY	CC	ARTICLES	RANK	COUNTRY	CC	ARTICLES
1	United States	65.98	151	6	France	11.26	46
2	United Kingdom	27.92	96	7	Netherlands	11.22	56
3	China	20.66	35	8	Australia	3.89	42
4	Japan	12.77	29	9	Canada	3.84	39
5	Germany	11.69	54	10	Spain	3.70	31

NATURE GEOSCIENCE

RANK	COUNTRY	CC	ARTICLES	RANK	COUNTRY	CC	ARTICLES
1	United States	55.43	88	6	Switzerland	4.46	11
2	United Kingdom	16.93	36	7	Canada	4.19	11
3	France	12.21	21	8	Australia	3.52	13
4	Germany	9.05	23	9	Denmark	2.84	6
5	Japan	6.79	10	10	Netherlands	2.18	8

NATURE NANOTECHNOLOGY



RANK	COUNTRY	CC	ARTICLES	RANK	COUNTRY	CC	ARTICLES
1	United States	57.18	64	6	Japan	3.97	8
2	Germany	8.03	14	7	United Kingdom	3.84	7
3	Switzerland	7.15	9	8	China	3.81	13
4	Netherlands	6.22	8	9	France	3.24	7
5	South Korea	5.31	9	10	Spain	2.04	3

NATURE IMMUNOLOGY

RANK	COUNTRY	CC	ARTICLES	RANK	COUNTRY	CC	ARTICLES
1	United States	55.25	74	6	Canada	3.01	6
2	Japan	6.31	13	7	Germany	2.07	12
3	United Kingdom	5.64	16	8	France	1.97	8
4	Australia	4.53	10	9	Netherlands	1.89	5
5	China	3.90	9	10	Israel	1.62	2

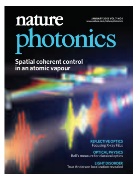
NATURE NEUROSCIENCE

RANK	COUNTRY	CC	ARTICLES	RANK	COUNTRY	CC	ARTICLES
1	United States	110.51	133	6	Switzerland	5.43	11
2	United Kingdom	15.04	25	7	China	3.93	6
3	Germany	14.34	29	8	Italy	3.76	7
4	Japan	8.94	17	9	Canada	3.51	9
5	France	7.81	15	10	South Korea	3.20	6

NATURE MATERIALS

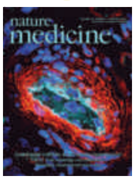
RANK	COUNTRY	CC	ARTICLES	RANK	COUNTRY	CC	ARTICLES
1	United States	54.81	75	6	China	5.17	11
2	Japan	12.85	21	7	Spain	4.75	9
3	Germany	12.57	23	8	South Korea	4.45	9
4	United Kingdom	11.15	23	9	Italy	3.65	7
5	France	7.09	15	10	Switzerland	2.81	9

NATURE PHOTONICS



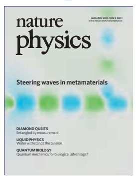
RANK	COUNTRY	CC	ARTICLES	RANK	COUNTRY	CC	ARTICLES
1	United States	34.89	46	6	France	4.70	8
2	Germany	10.45	18	7	Switzerland	3.79	7
3	Japan	10.06	13	8	Netherlands	3.61	5
4	United Kingdom	6.90	12	9	Italy	2.91	3
5	China	5.38	7	10	Spain	2.09	3

NATURE MEDICINE



RANK	COUNTRY	CC	ARTICLES	RANK	COUNTRY	CC	ARTICLES
1	United States	71.25	106	6	China	4.11	12
2	Japan	14.36	26	7	Australia	3.90	8
3	Germany	12.30	23	8	Spain	3.89	8
4	United Kingdom	5.82	19	9	France	3.22	13
5	Canada	4.77	10	10	Italy	1.88	8

NATURE PHYSICS



RANK	COUNTRY	CC	ARTICLES	RANK	COUNTRY	CC	ARTICLES
1	United States	41.20	60	6	Switzerland	5.11	15
2	Germany	13.73	26	7	Austria	4.31	5
3	Japan	12.83	21	8	China	4.08	10
4	France	11.12	23	9	Israel	3.75	4
5	United Kingdom	9.15	24	10	Spain	3.02	8

NATURE METHODS

RANK	COUNTRY	CC	ARTICLES	RANK	COUNTRY	CC	ARTICLES
1	United States	71.31	82	6	United Kingdom	3.73	7
2	Germany	15.17	22	7	China	3.28	7
3	France	6.61	10	8	Netherlands	2.29	5
4	Switzerland	3.99	7	9	Austria	2.03	4
5	Canada	3.96	4	10	Italy	1.92	3

NATURE STRUCTURAL & MOLECULAR BIOLOGY

RANK	COUNTRY	CC	ARTICLES	RANK	COUNTRY	CC	ARTICLES
1	United States	75.93	88	6	Switzerland	6.28	8
2	United Kingdom	19.36	29	7	Japan	5.14	6
3	Germany	16.96	27	8	Canada	3.30	7
4	France	11.85	17	9	Australia	2.85	4
5	China	7.61	11	10	Spain	2.38	6

TOTAL NUMBER OF ARTICLES PUBLISHED IN NATURE TITLES IN 2012: **3560**

Contributions by institution

NATURE

RANK	INSTITUTION	COUNTRY	CC	ARTICLES
1	Harvard University	United States	223.70	518
2	Max Planck Society	Germany	97.39	276
3	Stanford University	United States	88.82	206
4	Massachusetts Institute of Technology (MIT)	United States	78.27	243
5	University of California, San Francisco (UCSF)	United States	61.29	143

NATURE CHEMISTRY

RANK	INSTITUTION	COUNTRY	CC	ARTICLES
1	The University of Tokyo	Japan	12.88	17
2	Northwestern University	United States	12.34	16
3	Scripps Research Institute	United States	9.42	11
4	Harvard University	United States	9.08	10
5	Stanford University	United States	8.80	16

NATURE BIOTECHNOLOGY

RANK	INSTITUTION	COUNTRY	CC	ARTICLES
1	Harvard University	United States	33.10	74
2	Massachusetts Institute of Technology (MIT)	United States	22.51	59
3	Stanford University	United States	19.27	29
4	Memorial Sloan-Kettering Cancer Center	United States	6.39	12
5	University of Washington	United States	6.07	16

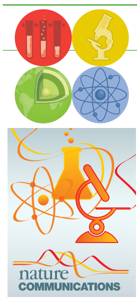
NATURE CLIMATE CHANGE

RANK	INSTITUTION	COUNTRY	CC	ARTICLES
1	Swiss Federal Institute of Technology Zurich	Switzerland	3.31	7
2	James Cook University	Australia	3.22	5
3	US Geological Survey (USGS)	United States	2.31	6
4	Commonwealth Scientific and Industrial Research Organisation	Australia	2.07	9
5	University of Queensland	Australia	2.05	4

NATURE CELL BIOLOGY

RANK	INSTITUTION	COUNTRY	CC	ARTICLES
1	Harvard University	United States	24.51	59
2	National Institutes of Health (NIH)	United States	18.26	32
3	University of Cambridge	United Kingdom	16.35	27
4	University of California, San Francisco (UCSF)	United States	13.90	27
5	Max Planck Society	Germany	13.25	33

NATURE COMMUNICATIONS

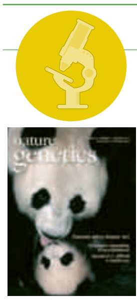


RANK	INSTITUTION	COUNTRY	CC	ARTICLES
1	Harvard University	United States	30.25	63
2	The University of Tokyo	Japan	29.90	69
3	Max Planck Society	Germany	22.67	55
4	Chinese Academy of Sciences (CAS)	China	21.83	43
5	Stanford University	United States	20.91	38

NATURE CHEMICAL BIOLOGY

RANK	INSTITUTION	COUNTRY	CC	ARTICLES
1	Harvard University	United States	25.45	43
2	Scripps Research Institute	United States	16.81	28
3	Max Planck Society	Germany	12.02	20
4	University of California, San Francisco (UCSF)	United States	11.01	22
5	National Institutes of Health (NIH)	United States	9.05	22

NATURE GENETICS

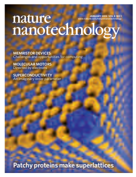


RANK	INSTITUTION	COUNTRY	CC	ARTICLES
1	Harvard University	United States	45.57	238
2	National Institutes of Health (NIH)	United States	24.83	163
3	Wellcome Trust Sanger Institute	United Kingdom	16.49	130
4	University of Washington	United States	16.03	98
5	RIKEN	Japan	15.27	50

NATURE GEOSCIENCE

RANK	INSTITUTION	COUNTRY	CC	ARTICLES
1	University of Washington	United States	13.93	31
2	Woods Hole Oceanographic Institution (WHOI)	United States	13.03	34
3	California Institute of Technology	United States	12.20	30
4	US Geological Survey (USGS)	United States	11.98	34
5	French National Centre for Scientific Research (CNRS)	France	11.72	53

NATURE NANOTECHNOLOGY



RANK	INSTITUTION	COUNTRY	CC	ARTICLES
1	Stanford University	United States	18.67	22
2	Harvard University	United States	18.15	27
3	Massachusetts Institute of Technology (MIT)	United States	14.25	24
4	IBM	United States	14.01	16
5	University of California, Berkeley	United States	9.81	20

NATURE IMMUNOLOGY

RANK	INSTITUTION	COUNTRY	CC	ARTICLES
1	Harvard University	United States	38.97	71
2	National Institutes of Health (NIH)	United States	29.33	52
3	University of California, San Francisco (UCSF)	United States	16.13	25
4	Yale University	United States	12.11	28
5	Washington University in St Louis	United States	10.60	23

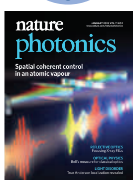
NATURE NEUROSCIENCE

RANK	INSTITUTION	COUNTRY	CC	ARTICLES
1	Harvard University	United States	44.63	79
2	National Institutes of Health (NIH)	United States	30.10	54
3	University of California, San Francisco (UCSF)	United States	23.45	40
4	Stanford University	United States	20.43	34
5	University College London	United Kingdom	19.93	40

NATURE MATERIALS

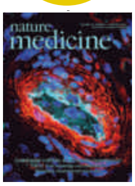
RANK	INSTITUTION	COUNTRY	CC	ARTICLES
1	Massachusetts Institute of Technology (MIT)	United States	18.32	38
2	French National Centre for Scientific Research (CNRS)	France	17.50	56
3	The University of Tokyo	Japan	15.03	31
4	University of California, Berkeley	United States	14.23	32
5	Lawrence Berkeley National Laboratory	United States	13.23	43

NATURE PHOTONICS



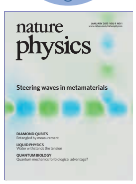
RANK	INSTITUTION	COUNTRY	CC	ARTICLES
1	Max Planck Society	Germany	11.79	23
2	Stanford University	United States	10.57	20
3	Massachusetts Institute of Technology (MIT)	United States	8.53	16
4	Harvard University	United States	7.17	14
5	National Institute of Standards and Technology (NIST)	United States	6.78	10

NATURE MEDICINE



RANK	INSTITUTION	COUNTRY	CC	ARTICLES
1	Harvard University	United States	43.29	101
2	National Institutes of Health (NIH)	United States	21.46	64
3	University of California, San Diego (UCSD)	United States	14.84	28
4	University of Pennsylvania	United States	10.59	26
5	University of Toronto	Canada	9.99	21

NATURE PHYSICS



RANK	INSTITUTION	COUNTRY	CC	ARTICLES
1	Max Planck Society	Germany	26.60	65
2	French National Centre for Scientific Research (CNRS)	France	19.86	83
3	Harvard University	United States	15.31	33
4	The University of Tokyo	Japan	14.15	35
5	Stanford University	United States	13.82	33

NATURE METHODS

RANK	INSTITUTION	COUNTRY	CC	ARTICLES
1	Harvard University	United States	49.81	72
2	Max Planck Society	Germany	22.78	37
3	Stanford University	United States	17.43	30
4	University of Washington	United States	13.17	16
5	University of California, San Francisco (UCSF)	United States	11.68	23

NATURE STRUCTURAL & MOLECULAR BIOLOGY

RANK	INSTITUTION	COUNTRY	CC	ARTICLES
1	Harvard University	United States	35.90	59
2	Max Planck Society	Germany	30.81	59
3	National Institutes of Health (NIH)	United States	24.90	41
4	Stanford University	United States	17.23	27
5	Columbia University in the City of New York	United States	16.70	29

Global Top 100

The Global Top 100 tallies national contributions to the NPI. Countries are credited for publications that originate at all institutions within their borders, but not for publications from researchers at subsidiary institutions that are based in other countries.

The vast majority of contribution to the NPI comes from North America, Western Europe and the Asia-Pacific. Some of the fastest growth, however, comes from countries in other regions of the world (see 'Five Countries to Watch', page 24). ■

RANK	COUNTRY	2012 CC	2012 ARTICLES	CC CHANGE 2011–12
1	United States	1638.92	2236	8.5%
2	United Kingdom	303.34	677	6.7%
3	Germany	277.81	594	10.1%
4	Japan	234.40	398	8.2%
5	France	151.83	383	18.3%
6	China	150.03	303	36.3%
7	Switzerland	109.13	259	29.4%
8	Canada	82.38	247	–24.2%
9	Netherlands	74.07	230	15.9%
10	Australia	68.26	223	5.6%
11	Spain	57.27	175	4.9%
12	Italy	56.82	195	10.7%
13	South Korea	40.82	112	–0.4%
14	Israel	38.08	81	28.6%
15	Belgium	32.48	113	37.2%
16	Sweden	30.77	125	29.0%
17	Austria	29.03	85	6.4%
18	Denmark	26.59	99	27.8%
19	Singapore	21.19	71	57.1%
20	Ireland	14.05	45	346.0%
21	Taiwan	11.68	38	20.6%
22	Norway	10.36	50	11.8%
23	Finland	10.12	51	–7.9%

RANK	COUNTRY	2012 CC	2012 ARTICLES	CC CHANGE 2011–12
24	India	8.24	25	–3.5%
25	Russia	6.93	41	68.2%
26	Brazil	5.71	39	52.6%
27	Hungary	5.65	18	356.1%
28	New Zealand	4.64	24	–12.5%
29	Greece	4.22	25	40.0%
30	Iceland	4.15	25	–6.4%
31	Czech Republic	4.09	26	15.6%
32	Mexico	3.90	17	123.4%
33	South Africa	3.80	20	124.5%
34	Portugal	3.07	25	–35.5%
35	Chile	3.00	18	109.1%
36	Argentina	2.88	12	5.7%
37	Poland	2.87	20	–24.0%
38	Kenya	1.71	9	74.0%
39	Croatia	1.23	15	119.4%
40	Estonia	1.18	17	41.6%
41	Saudi Arabia	1.13	11	–49.5%
42	Ukraine	1.01	8	78.8%
43	Turkey	0.77	9	–66.9%
44	Philippines	0.76	4	144.0%
45	Vietnam	0.75	5	26.1%
46	Latvia	0.69	3	N/A

RANK	COUNTRY	2012 CC	2012 ARTICLES	CC CHANGE 2011–12
47	Bulgaria	0.65	6	119.7%
48	Thailand	0.62	11	25.4%
49	Slovenia	0.61	10	–60.4%
50	Ghana	0.52	4	1504.3%
51	Cyprus	0.50	5	N/A
52	Colombia	0.47	7	1939.0%
53	Burkina Faso	0.46	4	N/A
54	Ethiopia	0.46	3	77.5%
55	Pakistan	0.43	4	–23.8%
56	Romania	0.40	6	34.9%
57	Gambia	0.36	3	N/A
58	Cuba	0.33	1	N/A
59	Mali	0.26	2	N/A
60	Peru	0.25	4	142.6%
61	Egypt	0.22	6	–42.8%
62	Slovakia	0.19	4	250.1%
63	Malawi	0.18	3	N/A
64	Indonesia	0.17	3	–76.3%
65	Venezuela	0.16	2	–58.8%
66	Panama	0.16	4	–73.9%
67	Qatar	0.14	4	–73.3%
68	Azerbaijan	0.14	1	9591.8%
69	Tunisia	0.14	1	–62.5%
70	Uruguay	0.14	3	–58.9%
71	Jordan	0.12	1	N/A
72	Costa Rica	0.12	3	–44.9%
73	Serbia	0.12	2	87.9%

RANK	COUNTRY	2012 CC	2012 ARTICLES	CC CHANGE 2011–12
74	Mongolia	0.12	2	N/A
75	Lebanon	0.11	3	N/A
76	Tanzania	0.11	1	–61.8%
77	Iraq	0.10	1	N/A
78	Congo	0.09	3	N/A
79	Luxembourg	0.08	1	0.0%
80	Cook Islands	0.08	1	N/A
81	Uganda	0.08	3	371.1%
82	Mozambique	0.07	1	N/A
83	Bermuda	0.07	1	–66.7%
84	Kuwait	0.07	3	N/A
85	Puerto Rico	0.06	3	–9.8%
86	Georgia	0.06	1	3080.7%
87	Ecuador	0.06	1	N/A
88	Malaysia	0.06	3	–80.3%
89	Papua New Guinea	0.06	2	–18.5%
90	Cameroon	0.06	2	N/A
91	United Arab Emirates	0.06	1	55.6%
92	Sudan	0.05	1	N/A
93	Botswana	0.05	1	N/A
94	Gabon	0.04	2	N/A
95	Syria	0.04	1	N/A
96	Bolivia	0.04	2	–90.6%
97	Macedonia	0.04	1	N/A
98	Central African Republic	0.03	2	N/A
99	Nigeria	0.02	1	244.0%
100	Guatemala	0.02	2	N/A

- Corrected counts (CC) for each country are shown to two decimal places only. When two or more countries have achieved the same CC, their positions in the NPI are determined by the third decimal place (or beyond).
- Rankings are based upon 2012 primary research papers published in the Articles, Letters and Brief Communications sections of *Nature* and Nature monthly research journals (excluding reviews and journals from scientific societies).
- These rankings are based on the most recent data available as of May 8, 2013. Owing to continual refinements of the data the figures in the database are liable to change and might differ to those printed in the supplements.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