



XINHUA/VEVINE

The Indian Space Research Organisation launch a rocket carrying a navigational satellite.

# INDIA

*Although not a major scientific player, India hopes that attracting foreign researchers will help it achieve its ambitions.*

BY T.V. PADMA

“India is a dynamic place with a fast-developing research landscape,” says biophysicist Darius Koster. “Coming here provides an opportunity to bring in your own ideas and be part of this change.”

Originally from Germany, Koster moved to India in 2011 to study the mechanisms of cell-membrane organization as a postdoc at the National Centre for Biological Sciences (NCBS) in Bangalore. As a foreign scientist working in the country, he is part of a small minority: in the past, Indian institutions have not tried to attract researchers from abroad.

India is not a major global scientific player. It has few scientists relative to its population, and many of its most talented researchers move abroad to work. The country invests less than 0.9% of its gross domestic product in research and development. Many think it needs to embrace experience from outside the country to achieve its ambitions. “We can no longer afford to have a frog-in-the-well attitude,” says astrophysicist Tarun Souradeep at the Inter-University Centre for Astronomy and Astrophysics (IUCAA) in Pune. “Foreign scientists bring a diversity of research cultures and values.”

A few institutions have begun to hire foreign postdocs and faculty members. These include the Tata Institute of Fundamental Research in Mumbai, the Indian Institutes of Technology, the Indian Institutes of Science Education and Research, the IUCAA and the NCBS.

India has big ambitions. In 2015, the government announced a plan to become a leading nation in terms of computing power by creating a network of around 70 supercomputers to connect the nation’s academic and research institutions. It also revealed a five-year strategy to turn the country into a global genomics hub. And in 2018, the Indian Space Research Organisation plans to launch Chandrayaan-2, its second lunar mission, consisting of an orbiter, lander and rover.

The low price of goods and services relative to average salaries in India mean that researchers can enjoy a good standard of living. The average salary in both Pune and Bangalore buys more goods and services of an equivalent standard than the average wage in New York City, according to the crowdsourced database Numbeo. However, publicly-funded institutions do not contribute to pension schemes for foreign scientists, as they do for local employees.

Life in India can be challenging. “We knew that India would be hot, but nothing prepared us for our first summer here,” says physicist Richard Morris, whose 2015 move from the United Kingdom with his wife and two daughters to work at the NCBS came shortly before a severe heat wave and drought. Axel Brockmann, a German honeybee specialist at NCBS who took an assistant-professor position in 2012, found it difficult to get used to the cows that roam freely in the road and to different attitudes to time-keeping in some quarters. “Here, 5 minutes can mean anything from 15 minutes upwards,” he jokes. ■



NATIONAL CENTRE FOR BIOLOGICAL SCIENCES

## SATYAJIT MAYOR

Director of the National Centre for Biological Sciences (NCBS) in Bangalore

### What are the attractions of doing research in India?

India does not have many postdocs, so there is the potential, in this small system, for pursuing one’s own vision. At a time when research resources are plateauing in most parts of the world, India has an opportunity to invest more — much as China and Japan are doing.

### Are there any downsides for researchers coming to the country?

The notorious Indian bureaucracy is the country’s Achilles heel. For foreign scientists, getting permission to work in India can be complicated. The slow delivery of funds from funding agencies and the creaking research infrastructure can also be an issue. And high-quality research is mostly confined to a few top institutes.

### How has the NCBS attracted scientists?

The NCBS has an open structure, without rigid departmental boundaries. It works on biology at every scale — from molecules to the ecosystem — and has a strong interdisciplinary, multidimensional research culture. A good example is its programme on chemical ecology, which is the study of chemicals involved in the interactions within and between organisms. It is a unique opportunity to study uncharted territory in biology.

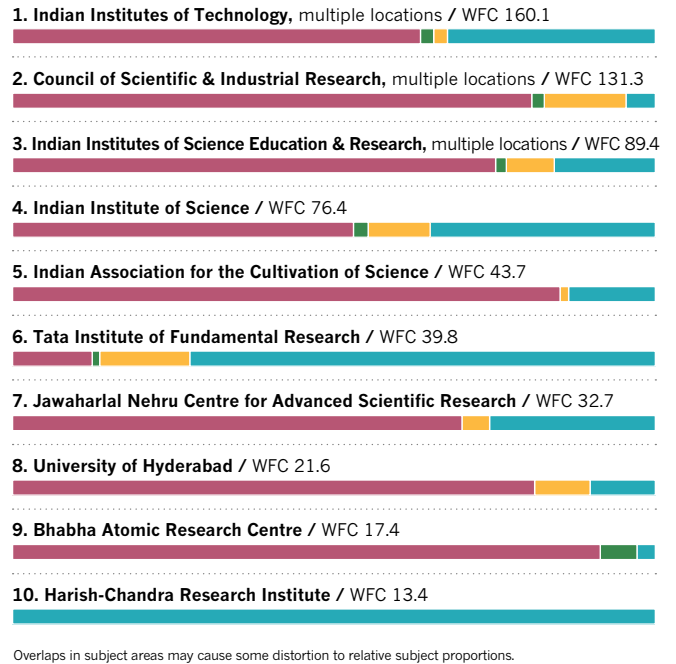
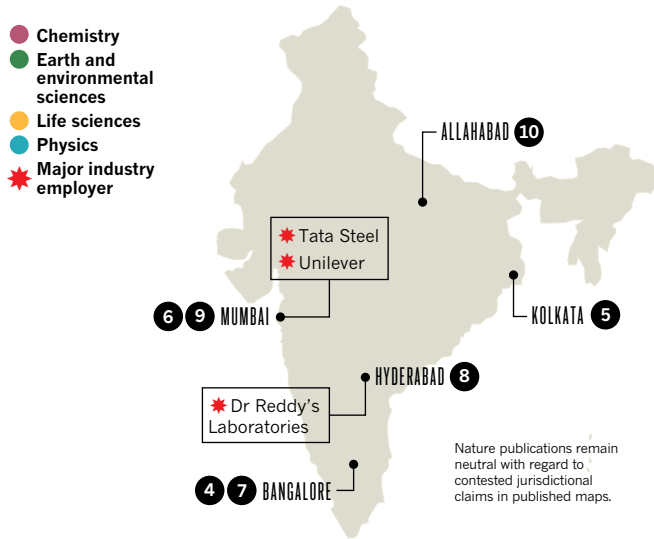
### What opportunities does India offer?

As India’s small scientific community grows, there is enormous scope to chart new directions in research across all disciplines. The Indian subcontinent has unique geological systems that reflect rare changes in Earth’s geological history. It also has a diverse human genetic pool and is teeming with unexplored ecological niches — all of which offer great research opportunities. **T.V.P.**

**This interview has been edited for length and clarity.**

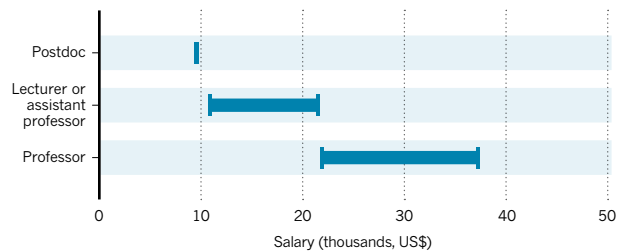
**WHERE TO WORK**

The top ten institutions in India, based on research output included in the 2015 *Nature Index*, May 1 2015–April 30 2016, shown as weighted fractional count (WFC), a measure of the relative contribution of an author to an article weighted to correct for imbalances between subjects. Bars are divided according to the proportion that each subject area contributes to the overall score.



**SALARIES**

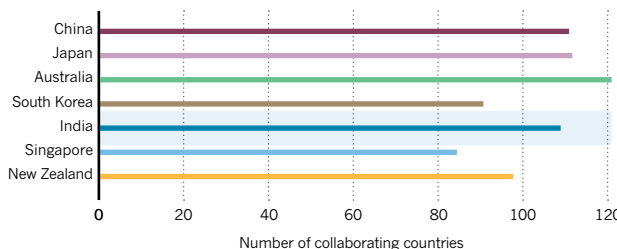
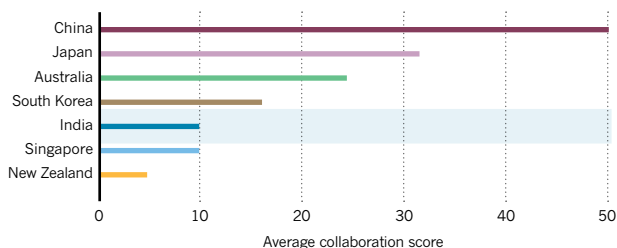
Starting salaries in India are the lowest of those in the Asia-Pacific countries profiled, according to data collected in *Nature's* interviews\*.



\*Figures include a recently agreed pay rise for professors and lecturers or assistant professors.

**COLLABORATIONS**

India's average collaboration score (top) — the sum of *Nature Index's* fractional count (the relative contribution of authors to an article) for international collaborations divided by the number of countries India collaborates with.



**RESEARCH FOCUS**

Ripples in space-time called gravitational waves were detected for the first time in 2015 — around 100 years after Albert Einstein predicted them in his general theory of relativity. Astronomers hope that the observations, made by twin Laser Interferometer Gravitational-Wave Observatory (LIGO) detectors in the United States, will provide a better understanding of gravity and answer other major questions about the Universe.

In February, India signalled its growing ambitions in astronomy by agreeing to build a third LIGO observatory, costing US\$183 million. Alongside its US counterparts, LIGO-India will allow astronomers to pinpoint the source of the cataclysmic cosmic events that cause gravitational waves — such as the collisions of massive stars or black-hole mergers — much more accurately. The Inter-University Centre for Astronomy and Astrophysics has been advertising for postdocs and faculty members to support this research.

In 2015, India formally joined an international collaboration seeking to build the Square Kilometre Array (SKA), which would be the world's largest radio telescope, at sites in Australia and South Africa. It is leading the part of the consortium dedicated to the development of the hardware and software needed to control SKA. India has also emerged as a possible contender to host the Thirty Metre Telescope, the world's most advanced optical and near infrared telescope, following protests over the original plan to build on land in Hawaii considered sacred by native people.

**OPPORTUNITIES & CONTACTS**

- The Wellcome Trust/DBT India Alliance — jointly funded by the UK Wellcome Trust and India's Department of Biotechnology — offers Early Career Fellowships for postdoctoral biomedical researchers who want to develop their research careers in India. Intermediate and senior fellowships are also available.
- The Human Frontier Science Program, based in Strasbourg, France, offers postdoctoral fellowships to those who want to pursue basic life-sciences research abroad, including in India, in a field other than their own. ■