



# THE

# ANTI-BUREAUCRAT

**K. VIJAYRAGHAVAN  
IS DETERMINED  
TO CUT THROUGH  
RED TAPE  
AND BUILD UP  
BIOLOGICAL  
SCIENCE IN INDIA.**

BY APOORVA MANDAVILLI

On 12 April, Krishnaswamy VijayRaghavan posted an update to his more than 2,500 Facebook friends. It announced a bold plan from India's Department of Biotechnology (DBT) — the agency that VijayRaghavan leads, and the country's largest funder of biomedical research — to establish a new marine-biology institute and research stations along India's vast coastline. Within hours, 500 people had 'liked' the post and more than 60 had left comments of congratulations.

Only one offered a critical note. A graduate student said that starting programmes is all well and good, but the DBT must hold the researchers whom it already funds accountable for the quality of their science. Shortly after, VijayRaghavan replied: "Your words are very wise

and correct! Thank you. We must keep your points in mind if we are to get maximum for our Rupee and have quality science."

It is rare for a public official to be so responsive and open to criticism, especially in a country as steeped in bureaucratic hierarchy as India, says biologist Inder Verma at the Salk Institute for Biological Sciences in La Jolla, California, who has served as a scientific adviser to the Indian government since the 1980s. Yet almost anyone who contacts VijayRaghavan by Facebook, Twitter or e-mail gets a personal response in minutes. "Vijay is a breath of fresh air," Verma says.

VijayRaghavan is more than that. He is a respected fly geneticist and administrator who helped to build the National Centre for

SAM MOHAN

Biological Sciences (NCBS) in Bangalore, one of India's most prestigious institutions, from the ground up. In January 2013, he left his job as NCBS director and moved to New Delhi to lead the DBT. He says that he wants to inject rigour into Indian science and train scientists to work together on tractable problems. As grand visions go, his can seem muted, almost modest. "I'm not going to be stupid and try something completely nutty; I'm going to try something within my grasp," he says.

Researchers are optimistic about what he might be able to achieve. "It's very rare to have a scientist of Vijay's calibre heading a government department," says Jyotsna Dhawan, a stem-cell biologist who worked with VijayRaghavan for seven years. "So I think all of us in the scientific community have very high hopes."

But they also recognize the challenges, which include wrangling with New Delhi's murky politics — known for ensnaring plans in red tape — and the DBT's long, painful grant-review process. In the past couple of years, the Ministry of Finance has made it difficult for the agency to honour even approved grants. And although the DBT is a major funder of extramural research, the money that it actually gets each year — a little more than 14 billion rupees (about US\$225 million) — is a fraction of that commanded by analogous agencies elsewhere, such as the US National Institutes of Health.

Given the challenges, even the most ardent well-wishers are holding their applause. "It's not entirely apparent to me what an individual, even one so dynamic and forward-looking as VijayRaghavan, can do to cut through the red tape," says Dhawan.

### A PASSION TO LEARN

A self-described "air-force brat", VijayRaghavan grew up all over India, moving every few years. He was hungry for knowledge, and, as a teenager, used to cycle to his local branch of the British Council or the US Information Service — the main sources of foreign publications in those days — and read every book and magazine that he could find. "In the pre-Internet days, that was my food," he says.

After studying chemical engineering at the Indian Institute of Technology Kanpur, VijayRaghavan was preparing to leave for a bioengineering PhD programme in Switzerland when he chanced on an article by renowned molecular biologist Obaid Siddiqi on using genetics to understand the nervous system. It was a departure from the work that VijayRaghavan had originally planned to do, but, he says, "I found the formalism of genetics easy to grasp, and that excited me very much."

He sought out Siddiqi at the Tata Institute of Fundamental Research (TIFR) in Mumbai, where he began a PhD programme. It was, at the time, a place that afforded considerable freedom to its students. "You did what you

pleased and you joined whomever you wanted to for your research," VijayRaghavan says. "It was an exhilarating experience."

But there was a growing air of complacency and nepotism at the TIFR that frustrated Siddiqi. For years, he had been planning to build a new institute, and he saw a natural ally in VijayRaghavan. The pair began to hatch plans, even as VijayRaghavan embarked on further training at the Medical Research

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Council Laboratory of Molecular Biology in Cambridge, UK, and later, undertook a post-doctoral fellowship at the California Institute of Technology (Caltech) in Pasadena.

Elliot Meyerowitz, VijayRaghavan's adviser at Caltech, says that lab members routinely tried to flummox foreign postdocs with US slang and customs, but they could never rattle VijayRaghavan. "I don't know whether he understood, or if he was just so cool, we didn't know he didn't understand," Meyerowitz says. VijayRaghavan says that he did understand, thanks to his time devouring British and US magazines.

### FROM THE GROUND UP

In 1988, VijayRaghavan left Caltech and returned to India to head a lab at the TIFR, and he, Siddiqi and a handful of other scientists laid groundwork for the research centre in Bangalore. They wanted the institute, which would be named the NCBS, to be different from any in India before it. Siddiqi became founding director, but VijayRaghavan and a few others were closely involved in its development. "We were in the trenches together — young, some very talented, all very driven," VijayRaghavan says. "We had a sense of rebellion."

From the start, VijayRaghavan wanted to recruit people trained in multiple disciplines who were focused on cutting-edge techniques, such as single-cell analysis, says statistician Partha Majumder. "This trait of being able to look way into the future is what sets him apart."

In 1991, VijayRaghavan moved to Bangalore to launch the NCBS's first lab. Over the next year, two more faculty members joined him. The entire centre was a "shack", he recalls, situated on one floor of the radio-astronomy building at the Indian Institute of Science. VijayRaghavan had to cycle 1.5 kilometres to the nearest biology lab to photograph his DNA gels. "We had an absolute ball of a time," he says.

Along with building the institute, VijayRaghavan was strengthening his scientific reputation. He borrowed equipment to set up a series of elegant genetic experiments that

would enable him to write several high-profile papers defining specific events in *Drosophila* muscle development.

Other faculty members, such as Gaiti Hasan, M. K. Mathew and Jayant Udgaonkar, were publishing groundbreaking papers in cell signalling and protein folding, which in turn helped to entice other scientists to join the NCBS. "We made extraordinarily rash promises that we would do everything for

them, which we did," VijayRaghavan says.

In 1993, for example, VijayRaghavan learned that Satyajit Mayor, a cell biologist in New York City whom he was trying to recruit, needed a pricey Zeiss inverted microscope. VijayRaghavan had been promised some equipment for his own lab through a grant from the Rockefeller Foundation in New York City, but stringent rules from the TIFR and the Indian government had held up the procurement for years. He changed his request to get the microscope instead.

All that Mayor knows of the negotiation is that he sent an e-mail to VijayRaghavan one night telling him that he would not be able to join the institute without that type of microscope. He woke up the next morning to VijayRaghavan's reply: "It'll be here when you arrive." Mayor joined the NCBS about 18 months later.

### UNITED BY SCIENCE

VijayRaghavan took over from Siddiqi as director of the NCBS in 1996. As the institute grew, he strove to build a democratic system, in which even graduate students had a say, and criticism was not just accepted, but expected. Before moving ahead with any new plans, he always made sure that he "brought people along with him", says Mayor, now the institute's director.

In 1999, for example, the leaders of the institute were considering adding a master's programme in wildlife ecology and conservation. At first, only 3 or 4 of its then 22 faculty members were in favour of the idea. At a meeting, VijayRaghavan carefully listened to the pros and cons, and was ultimately able to convince everyone, recalls Mayor. "Everybody left that meeting feeling like we'd done the right thing," he says. "The way the discussion and the dialogue and the arguments were put across, quite masterfully, was so Vijay."

The programme has become one of the institute's most successful, with eight field stations across the country and faculty members drawn from the United States and Germany. By the time VijayRaghavan left, the NCBS was widely regarded as one of India's



**K. VijayRaghavan (bottom right) in a class photo at the Tata Institute of Fundamental Research in Mumbai in 1980. Obaid Siddiqi sits top left.**

COURTESY OF K. VIJAYRAGHAVAN AND TIFR

leading research organizations.

But the NCBS, and a few other select institutes, are exceptions in India. Much of the country's science is beset with the same problems it has had for decades — interminable waits for reagents, or a granting scheme that places a 3-year limit on funding, forcing researchers to write new applications in unrealistic cycles.

VijayRaghavan's predecessor at the DBT, Maharaj Kishan Bhan, had done much to modernize Indian research and make it more independent, including helping to develop a low-cost rotavirus vaccine and setting up an organization to support entrepreneurs. "If Bhan was not able to succeed in some places," says Verma, it was because of limited resources and not having enough people to support his vision. "Perhaps he bit off more than he could chew — the same could happen to Vijay."

### BACK TO BASICS

Since his arrival at the DBT, VijayRaghavan has unveiled a few plans. Financially, Indian science is no match for that in the United States, Europe or China, something that he freely acknowledges. But he says that India can make big gains by capitalizing on its advantages and by collaborating with others.

His main priorities are to invest in basic research areas — such as computational biology, in which India is already strong — to break down the barriers between disciplines and to improve training for all scientists.

"I think he's got a very, very strong vision about the importance of fundamental and basic science," says Eve Marder, a neuroscientist at Brandeis University in Waltham, Massachusetts, who serves alongside VijayRaghavan on the scientific advisory board for the Janelia

Research Campus in Ashburn, Virginia.

The DBT's marine-biology initiative exemplifies this vision. The effort, intended to chart biodiversity and identify compounds for biotechnology development, is the DBT's — and VijayRaghavan's — brainchild. But it involves the Indian Space Research Organisation in Bangalore and the Ministry of Earth Sciences in New Delhi, both first-time partners for the DBT. In addition, the French National Centre for Scientific Research and the Pierre and Marie Curie University in Paris will help to train Indian researchers. The project is part of VijayRaghavan's strategy to compensate for the DBT's limited budget by partnering with every ministry that has funds allotted for science and technology, including the sanitation, maternal-health and nutrition ministries.

In the next year, he plans to roll out an Indian body modelled after the European Molecular Biology Organization — a scientific society that would promote India as a hub for international collaborations and offer online training for scientists at all levels. He is also encouraging local collaboration on training and research. In the Delhi area, for example, he plans to persuade the leaders of well-established immunology, mathematics, engineering and medical institutes to work together. "Boom!" he says. "Within a few years, you're going to have extraordinary-quality people being trained, both engineers and clinicians."

In the short term, he wants to play to India's strengths. Getting India's thriving community

of mathematicians and computer scientists to work on problems in biology, for example, could help the country to gain an edge in bioinformatics and quantitative biology — fields that do not typically require as much funding as bench biology.

This is all easier said than done, VijayRaghavan admits, but he intends to use financial incentives and disincentives — what he calls "fire in the belly" and "fire in the rear" — to make it happen.

In the past, the DBT has set out strict budgetary allocations at the beginning of each year, and had little flexibility in later months. But last year, VijayRaghavan set aside a pot of about \$33 million from the DBT's annual budget. The money can be used to respond to innovative ideas, reviewed by international experts. This is sure to aggravate some institutes that are used to being well-funded, but VijayRaghavan is unmoved. "It's about time that we recognize excellence and recognize shoddiness," he says.

VijayRaghavan is also tackling the grant-review process. He is streamlining the DBT's online application system, he has created timelines for submitting grants and has introduced the DBT's first open-access and conflict-of-interest policies.

"When people complain about problems in India, it's rather astounding how few of us are actually doing something about them," he says. "If you actually start doing something about anything, the situation changes."

But some colleagues have concerns. Mayor says that VijayRaghavan's desire for consensus and harmony could prove a weakness. "He is so keen to be extremely positive about everyone," Mayor says. "When you're operating in the real world where you have to get things done, that, I would say, is a bit of a problem."

And in a government department, VijayRaghavan will not be able to hand-pick people who share his vision, as he did at the NCBS. "I'm a little concerned that if he doesn't have that, he will burn out, because he will try to do it all himself," Mayor says.

VijayRaghavan shows no sign of burnout yet. He still maintains a lab, albeit a lean one, conferring with his team in the evenings through Skype and returning to Bangalore every weekend. Besides the tweets and Facebook posts, he blogs and makes time to run several times a week — and, he says, he is having fun doing it all.

"I have to tell you one simple rule in any job. If you wake up for several days in a row and say, 'Why am I doing this?' then you're better off quitting," he says. "Not only has that not happened, I'm actually quite excited when I wake up every day. I just look at the day and hit it hard." ■

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