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Ground zero of Indian science

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Thousands of scientists took to the streets in 25 cities across India, decrying the drying-up of funds and scientific temper. What simmers beneath?

“When the freezer empties, we’ll have to stop,” says Chetana Sachidanandan, walking me through a lab stacked with plastic tubs of zebrafish at Delhi’s Institute of Genomics and Integrative Biology (IGIB). The senior scientist and molecular biologist stops to open a relatively empty incubator. A petri dish containing newly-hatched zebrafish is brought out. Pairs of black globes stare right back at you as you peer into the microscope at the translucent hatchlings and observe the faint gush of blood swirling about their hearts. Sachidanandan and her team have injected hundreds of samples of the fish with mutant genes to study the effects on them at various stages of embryonic development. Some fish are genetically modified to have no pigmentation or have fluorescent hearts and livers, some are given heightened visibility as that would be useful for live imaging. The research aims to understand the causes of genetic diseases. And in the years to come, a possible breakthrough in finding a cure for rare diseases might come from this very lab. But right now, Sachidanandan finds herself staring at a dead end, as she digs out remnants of the reagents needed to keep the research going. “Our project funding expired on March 31,” she explains. She and her team have since been hunting, in vain, for funding.

Her project assistants, most of whom are PhD scholars with the institute’s parent organisation, the publicly funded Council of Scientific and Industrial Research (CSIR), have not been paid since April. Preparing the fish feed, one of them, Rohit Yadav, says, “We have been begging, borrowing and depleting our savings to make ends meet.” He has not received his monthly stipend of ₹25,000, plus house rent allowance, for five months now. The most humiliating of all has been the experience of visiting the CSIR office for funds, he says. “Although we cleared competitive exams to be selected as fellows, within their office we are at their mercy.” He is willing to wait until the end of the year, but plans to go on leave if the situation doesn’t improve by then.

“You need a lot of passion to not want to give up under such circumstances. Few can afford it,” says Sachidanandan.

On August 9, thousands of scientists took to the streets in 25 Indian cities. Echoing the global March for Science held in over 60 countries in April to protest US president Donald Trump's rejection of the Paris Agreement, the Indian march flagged two concerns: shortage of funds for science; and the erosion of scientific temper under the current dispensation. Compared to the huge turnout in Bengaluru, Pune and Mumbai, the science march in New Delhi was more subdued — a few hundred walking in silence from Mandi House to Jantar Mantar. The dampener was a note from the CSIR warning some employees of “proper administrative action” if they took part in the protest, as that would be “considered as insubordination”. Among the largest publicly funded research bodies globally, the CSIR runs 38 national laboratories.

Despite the low turnout, many believe the protest succeeded in sending out a relevant message. “Scientists are on the streets! Now that's a sight to behold,” says Delhi University botany professor R Geeta. She, however, adds, “There's a reason why those who are marching are either students or scientists like me on the verge of retirement. The rest, who are at the peak of their careers, are too scared to speak.”

The business of science

Aside from the simmering anger at the Delhi march, what is equally palpable is a sense of quiet desperation.

‘Science answers what religions cannot’; ‘Defend science not de-fund science’; and ‘Mythology is not history’... these are some of the placards visible at the march, each telling the story of a scientific research compromised or a research grant shortchanged.

In the timeline of the ongoing funding crisis, many agree that a crucial inflection point was the Dehradun Declaration emerging from the ministry of science and technology's two-day ‘Chintan Shivir’ (brainstorming) held for the scientific community in June 2015. The government asked CSIR to source nearly half of its research funding from corporate entities and embark on ‘self-financing’ projects. Additionally, every laboratory had to send monthly reports on how its research was “focusing its resources on developing specific lines of inventions which would contribute to the social and economic objectives of the Narendra Modi government for the poor and the common man”. The summit ended with CSIR's representatives resolving to turn research projects into ‘for-profit’ ventures over the next two years and to develop a revenue model “with a clear cost-benefit analysis”.

Subsequently, in an interaction with the heads of top scientific institutions in July this year, Prime Minister Narendra Modi expressed disappointment over their failure to take up social problems such as malnutrition. Pure science research is all well and good, he is reported to have said, but ‘translational research’ was the need of the hour.

With energies now focused on creating a market value, scientists bemoan the stress on quick turnarounds, instead of the standard five-year plans, leading to a proliferation of piecemeal research projects of little value. “If you have to show an output in 12-18 months, you'll only tackle small problems and steer clear of the large, time-consuming ones,” says a CSIR scientist on condition of anonymity.

Pointing out that most of the significant innovations in the world have been the result of years of research, Asmita Chatterjee, a CSIR PhD scholar in molecular biology who was participating in the Delhi science march, queries: “If your basic research lacks a strong foothold, how can you apply it?”

“In disease biology, it takes 20 years to bring a drug into the market. But all the years of failed experiments, clinical trials and toxicity tests don't indicate our inability. That is how science is. We need the support until it is a market success,” says Sandeep Basu, a PhD scholar in molecular biology at Delhi University. Basu hasn't received his fellowship for four months and his savings are fast depleting.

“ISRO's achievement looms so large because of the sustained focus of the Government. It perfectly shows the success that can come about when a government decides to take you seriously,” says Urmila Jagtap, a molecular biologist and PhD scholar, whose project's funding has not been renewed since April. She now struggles to make detailed cost assessments to find out if she can afford to do the experiments her project demands.

While developed nations on average spend three per cent of the GDP on science, in India it has remained below 0.9 per cent for years. And now, scientists find themselves forced to step outside their academic citadels and account to the public what they do on a daily basis. For the first time, through the march, they are literally making a case for their existence.

Mismanaged funds

In June this year, CSIR director general Girish Sahni declared in an email to his staff countrywide that the organisation was facing a financial emergency.

Of the ₹4,063 crore budgetary allocation for the current year (2017-18), after meeting the cost of salaries, pensions, capital and other commitments, “the balance available for laboratory allocations and various new research projects” was merely ₹202 crore. Of this, ₹158 crore had already been allocated. “If we were to release further sums we will be left with no funds to support new research projects,” he wrote to the laboratory directors. “This is the stark reality,” said the email, accessed by BLink. Sahni further warns the directors that there would be limited funds for critically required infrastructure, R&D facilities and skill development. Also, ongoing projects would be reviewed for further funding.

So Sachidanandan's zebrafish might just be left high and dry, after all. With little money to pay electricity bills or maintain their servers, the IGIB office is struggling for daily survival.

Some insiders allege that funds aren't the problem at all, since CSIR's budget was actually increased by 10 per cent this financial year to compensate for salary hikes under the Seventh Pay Commission. “This is pure mismanagement of funds, since 30 per cent of CSIR's positions are vacant today,” says Souvik Maiti, a senior scientist with IGIB. “I am

aware that much of CSIR funds are getting diverted in non-transparent ways. I was once surprised to see a budget allocated to build low-cost toilets in Tamil Nadu,” says another CSIR scientist on condition of anonymity.

The requirement to align one’s research to the government’s priorities is a problematic one, the scientists say. Is your project under Swachh Bharat? Or Swasthya Bharat? Or Ayush? Or Start up India? No? Then sorry, folks, please try again.

Amit Singh, a scientist with the Indian Institute of Science in Bangalore, argues that while a people-centric approach to science is not a bad thing, what India needs is more transparency in the process of securing grants.

“Much of our science research today is readdressing problems that have already been tackled in other countries. We are dealing with fringe concerns, rather than the local issues we face,” he says.

He points to the need for an expert panel to review science funding proposals in all priority areas. “There should be feedback from the panel, which will give scientists the chance to improve the quality of the project proposal and reapply. Indian reviewers give such cryptic comments,” he says.

And even when approved, the funding is delayed. “An idea which I proposed two years ago is already obsolete. What’s the point if the funding comes now?” Singh asks.

This non-transparency in fund disbursements has led to disenchantment among many scientists and technologists who gave up lucrative careers abroad and returned to India in their desire to “give back” to their homeland.

Sankar Basu, a post doctoral scientist with the Science Engineering and Research Board (SERB) is among them. Despite winning an SERB grant on merit for his research on biomolecular structures in computational biophysics, he hasn’t received a penny since he moved back from Norway in May. “The system here is so complicated, hierarchical and full of discrimination. This is a power structure where we aren’t judged on capability. Post-docs are made to feel like beggars,” he says, when we meet at the science march.

A logical twist

If mismanagement is one area of worry, there are other endemic ones too rocking India’s science ark. “The more worrying concern is that scientists are becoming marginalised, as people are predisposed to accepting things without evidence. This is dangerous,” says Soumitro Banerjee, a professor of physical sciences at the Indian Institute of Science Education and Research (IISER) Kolkata.

Consider the following claims: Maharishi Bharadwaj’s Vaimanika Shastra prescribes a chemical formula that can make a flying plane invisible; the 100 Kaurava brothers were the first evidence of human cloning; cow urine can cure cancer. The challenges for the scientific community are all the more burdensome in a country that loves to blithely mix mythology with science.

In 1991, the Hindu right-wing organisation Rashtriya Swayamsevak Sangh set up Vigyan Bharti (or VIBHA) as a science organisation dedicated to promoting “swadeshi science”. Today, when there is a renewed, and official focus on highlighting the merits of “Vedic Science”, many men of science hint darkly at the real forces pulling the strings at the science ministry. “What is available in the Vedas and Upanishads can give India a big leap. Government should promote research based on them,” Dr Somdev Bhardwaj of VIBHA told Hindustan Times in 2015.

But this hasn’t necessarily meant that the government is willing to promote intensive research to enquire into the scientific basis of ancient Indian knowledge systems such as, say, ayurveda.

Dr Mitali Mukerji, a senior genomics scientist and Dr Bhavana Prasher, an MD in ayurveda have been researching precisely this at the CSIR-TRISUTRA Unit in IGIB. Their project aims to use ayurgenomics to identify genetic markers for an individual’s constitution type (Prakriti) and link this with the physiological imbalance caused due to diseases (Vikriti). Their studies have provided credible molecular links which might be useful in modern medicine to more accurately prescribe personalised remedies for diseases.

It has meant bringing together an interdisciplinary team with specialists in biology, mathematics, ayurveda and modern medicine. However, despite the use of credible research, international science publications tend to rubbish it as “hocus pocus”, they say. To make matters worse, their project has been starved for funds since April.

“Since the focus has been towards increasing the understanding and acceptance of ayurveda biology in clinical research and practice, it is difficult to conceive a direct market linkage yet. But it can only be done over time in a phased manner,” says Mukerji. What she shies away from saying is that the lack of patience from the authorities has impeded the research and forced them to bid farewell to 24 of their uniquely trained staff members.

Meanwhile, the scientific community continues to be startled by newer developments. According to a Mint article this month, the Indian Institute of Technology (IIT)-Delhi received around 50 proposals from top research institutions, including CSIR labs, to explore the benefits of panchagavya — a mixture of cow urine, dung, milk, ghee and curd. This followed a national-level workshop organised by the institute in December 2016 to deliberate on the ‘Scientific Validation and Research on panchagavya (SVAROP)’ for its possible use in agriculture, medicine, nutrition, and consumer products such as soaps and mosquito repellents. “But enquiry is the basis of all science. How can a project be named with ‘validation’ right at the start?” asks an insider requesting anonymity.

When queried, Prof VK Vijay, who teaches renewable energy technology at IIT-Delhi, said, “Yes, we have received several projects for the scientific validation of panchagavya but we are yet to decide which projects will get the approval. And, no, I disagree with the claim that India is losing its scientific temper.” He refused to comment further.

In the meantime, at the country's oldest IIT, in Kharagpur, a course in vastu shastra was introduced in April for both undergraduate and postgraduate students of architecture. "Times are changing, and across the globe there is a renewed interest in ancient Indian knowledge. So it is natural that we will tweak our syllabus to include vastu in architecture and infrastructure classes," Joy Sen, a faculty member, had told The Times of India then. He declined to respond to BLink's request for an interview.

At the Delhi science march the wisest words so far come from Pran Sharma, a senior citizen as old as independent India. Sharma has no professional affiliation to science but says, "All our social problems need scientific solutions not astrological or mythological ones."



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