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GUEST EDITORIAL

Support for science

During the past couple of years, Indian science has been going through a rough patch. There have been substantial cuts in public R&D expenditure. Uncertainties prevail in several segments of the scientific establishment. Furthermore, science appears to have largely gone out of national discourse. As a community, scientists need to face up to the situation.

After independence, the political leadership has been generally favourably disposed to science. The first Prime Minister, Jawaharlal Nehru, along with leaders of science like Homi Bhabha and Shanti Swaroop Bhatnagar, was responsible for laying the foundations of organized science in the country. Most of the subsequent Prime Ministers were supportive of science, irrespective of their different political persuasions. The present Prime Minister, Narendra Modi, has laid great emphasis on development. Science and technology (S&T) constitutes a major instrument for promoting development. Therefore, support for science has been, and should be, treated as a bipartisan issue.

The present crisis is not the only one Indian science has faced. During the span of my career, a crisis occurred in 1978. That was a time when the Department of Science and Technology (DST) was at its infancy. The Department of Biotechnology (DBT) did not even exist. The main support for research in the non-strategic sector came from the Council of Scientific and Industrial Research (CSIR). In 1978, the government initiated a serious move to partially disband CSIR. That would have been a disaster. The scientific community vociferously protested against this move and eventually the move was shelved to the delight of the community.

The 1980s, when Indira Gandhi and Rajiv Gandhi successively led the government, was an excellent decade for Indian science. By then, thanks substantially to the Green Revolution, India was back on its feet. DST initiated its massive Thrust Area Programme. It started the National Biotechnology Board, which subsequently became DBT. Many institutions like the National Institute of Immunology (NII) and the Centre for Cellular and Molecular Biology (CCMB) were established during that period. Handsome support was provided to many areas, including molecular and structural biology. Those were heady days. The R&D expenditure rose close to 1% of the GDP by the end of the decade.

Then there was a precipitous fall in the 1990s, dictated partly by economic compulsions and substantially by ideological considerations¹. The avowed aim of the government then was to withdraw from higher education and research. R&D support precipitously fell from about 1% to 0.67% of the GDP². Appointments in institutions, including universities, were frozen. In a way, the scientific community felt orphaned. The Government policy in the early and mid-nineties has had disastrous consequences. Many of the deleterious consequences still linger on.

The situation began to improve by the late 1990s, partly because of the realization by the political leadership of our situation vis-à-vis the Chinese situation. While support for science was declining in India, it was galloping ahead in China. Earlier, India used to be described as the superpower of Third World science. We ceded that position to China. The political leadership became aware of this situation. There were other factors as well. From then on, support for science began to steadily go up. Atal Bihari Vajpayee even coined the slogan 'Jai Jawan, Jai Kisan, Jai Vigyan'. The Manmohan Singh government that came later also continued to be supportive of science. The performance indices of Indian science perceptibly improved during this period. The scientific community was again buoyant. As mentioned in the beginning, science in India subsequently hit a rough patch during the last couple of years.

What should we as a community do in the present situation? For one thing, we need to engage proactively with the political leadership, media and the public, not in an adversarial manner, but creatively. The scientific community cannot be at odds with the government. We have to work with the government irrespective of its political complexion and irrespective of the ideological predilections of individual scientists. We have to project Indian science a little more persuasively. We need not be too much on the defensive. There are many things wrong with Indian science, but there are many things right with it as well. We have maintained a reasonably good standard in fundamental science, although peaks have been few and far between. Our efforts should be to raise the overall standards. The peaks would then automatically appear. Everest does not stand alone; it exists only in the

context of the Himalaya. We should concentrate on the Himalaya, not on the Everest.

I feel that the contribution of S&T to national reconstruction is often underestimated. The Green Revolution was not based on fundamental work done in India, but our agricultural scientists did a great job in adapting the available knowledge and effectively implementing the results. I think the Green Revolution was a defining event in the history of independent India, which substantially alleviated hunger in the country. The leadership role we have in the area of generic drugs is based on our competence in synthetic organic chemistry. There could be disputes about the level of scientific and technological content of our IT sector, but it has added muscle to the Indian enterprise. Even the US President Barack Obama is wary of Indian competition in this area. Indian knowhow is now being increasingly used by Indian industry. The Chandrayaan and Mangalyaan bear testimony to the Indian technological prowess based exclusively on home-grown S&T. As the story of the cryogenic engine demonstrates, what India has achieved in space has been done in spite of the advanced West. At the other end of the spectrum, biotechnology industry in India is perhaps at the take-off stage. S&T could have contributed even more to national regeneration, but what it has done is substantial. It should be our conscious endeavour to make the government and public aware of these contributions. It is not an accident that most developed countries are strong in S&T, which is an immensely powerful engine for development.

What do we expect from the political leadership? First and foremost, the cuts in R&D expenditure should be restored. The provision for R&D should step by step increase to the level of 2% of GDP. Secondly, the structure of Indian science needs to be reformed. As of today, it is highly bureaucratic and hierarchical. Institutional autonomy is being continuously eroded. The bulk of the community has no role in decision-making processes. Some of these problems can be solved by the scientific leadership itself, but political will on the part of the government is necessary to solve the bulk of these problems. I have dealt with this issue elsewhere in some detail^{3,4}. Thirdly, the scientific community should be involved in setting the developmental agenda in the country.

In our discussions, we should carefully avoid one trap. Often suggestions are made that we need to seek private funding in order to make us relatively independent of the government. Transition from dependence on public funding to that on private funding is like a transition from the frying pan to the fire. The core activities of autonomous

institutions should be funded essentially by the government. That in itself does not compromise autonomy. The judicial system, the Election Commission, etc. are funded by the government; yet they remain autonomous. Of course we need private funding. But that should be in addition to, and not instead of, public funding. We also need to be cognizant of the Indian reality, which cannot be changed overnight. Unlike in the West, we do not have a great tradition of philanthropy in education or private investment in research. Almost all the great scientific and educational institutions in the country, mostly established after independence, are funded publicly. There are indications of a few good private universities emerging, from among a conglomeration of crassly commercial teaching shops. They are yet to make a major impact. Thus, the primary responsibility for higher education and research, particularly basic research, should remain with the government, while at the same time encouraging private participation in the effort.

The last couple of years have been a period political and economic turbulence and change in India. In such circumstances, science often receives the short shrift. I would like to therefore believe that the present crisis in support for science is transient. However, before it does irretrievable damage to the system, it is important that we initiate action to contain the same. In addition to financial and other forms of support, a measure of stability and continuity in management practices, service conditions, policy guidelines, etc. is also important for the healthy growth of science. Learning lessons from the present and past crises, we should also help evolve ways and means to substantially insulate the R&D sector from political fluctuations. I am sure that political and societal leaders are cognizant of the importance of S&T in the material and intellectual development of the country and that our concerted engagement would yield positive results.

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4. Vijayan, M., *Curr. Sci.*, 2011, **101**, 605–606.

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