

India's contribution to science

I think I have found a valuable Indian contribution to science vocabulary. My Internet search for 'scientific temper' on Google on 10 May 2005, a day before National Technology Day, yielded 11,500 results. I found that a recent issue of *Science Reporter* has an article outlining an action plan for its promotion¹; the Second International Conference for Science Communication (ICSC 2003), 20–23 June 2003 had a whole session² devoted to it; before he became President, A. P. J. Abdul Kalam said on 19 June 2002 that every Indian should develop it; our present Prime Minister referred to it while giving away the S. S. Bhatnagar prizes for science and later while inaugurating the 92nd Indian Science Congress.

The coining of this phrase is attributed to our first Prime Minister, Jawaharlal Nehru, who is credited with being the architect along with H. J. Bhabha, of our first Scientific Policy Resolution way back in 1958, thereby making India one of the first countries to adopt such a resolution. Interestingly, one of the objectives of the National Youth Policy 1988 is... 'to help develop in the youth qualities of discipline, self-reliance, justice and fairplay, a burning concern for public weal, sporting spirit and above all a *scientific temper* (emphasis added) in their modes of thinking and action, which *inter alia*, will enable them to combat superstition, obscurantism and the numerous social ills that beset the nation...'

When I tried to get the exact definition, I could not find 'scientific temper' defined in any dictionary, either general or science and technology. Cambridge defines only science, scientific, scientifically, scientist. Webster's covers science, science fiction, scientific, scientific method, scientism,

scientist. Chambers gives only science as a separate term and all others (scienced, scient, scientific, scientology...) under it. Understandably, the Chambers S&T dictionary confines itself only to science. Not even the site which searches 992 on-line English dictionaries could find the term. Of all the dictionary terms, the definition of 'scientism' comes closest... 'the methods or mental attitude of scientists'.

One would have thought that with so much coverage in our media, the term would have been well established. Even *Current Science*³ uses it. In fact, it was the recent editorial paying tribute to late H. Narasimhaiah which started me off on this voyage of discovery. However, this seems to be a peculiarly Indian usage (like pre-pone). I was surprised when I studied in detail the first 150 of the 11,500 hits and found that except four, all the other pages were from India!

However, others have written on this issue, what we commonly understand by this term; the spirit of enquiry and curiosity. I think this is what Feynman⁴ found lacking in the students of Brazil, though he had not used the term as such. When I read his account of teaching science to a group of students – how the students could answer very well if asked direct questions, but could not derive anything by themselves; how they were unable to solve problems; how they were learning everything by heart; how other teachers dictated notes in class and how all the students religiously copied them; how asking questions was discouraged in class as waste of time – I found that the same could be applied to India as well!

Recently, however, the coinage is gaining popularity. No less a person than Bruce

Alberts, President, National Academy of Sciences, USA has referred to this. Writing the President's column on 'Science in Society for the 21st Century' in the *Infocus* journal⁵, he says 'India's Prime Minister, Jawaharlal Nehru had it right when he emphasized, some fifty years ago the importance of imparting a scientific temper to his nation'. Alberts conveyed this message again while delivering the keynote lecture at the 75th annual meeting of the Mississippi Academy of Sciences in February this year. These were two of the four 'hits' of non-Indian origin in my search.

The other two hits pertained to a book in German; so slowly but surely we are getting there. This pithy phrase, which describes succinctly the qualities every thinking citizen should have, will probably make it to the next edition of dictionaries. Even as I am giving the final reading to my print-out, I find Narlikar has used it while discussing about his latest science fiction book!

1. Singh, D. P., *Sci. Rep.*, 2004, **41**, 26–28.
2. <http://216.15.204.147/cgi-bin/ncsc/Bulletin.asp>.
3. Balaram, P., *Curr. Sci.*, 2005, **88**, 329–330.
4. Feynman, R. P., *Surely You're Joking, Mr. Feynman*, Unwin, London, 1985, pp. 199–220.
5. <http://infocusmagazine.org/4.3/president.html>.

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The future of postdocs

Due to wide variations in curriculum and course work in Master's degree programmes in Indian universities, those who emerge from some institutions have disadvantages due to inadequate infrastructure facilities and lack of adequate teaching. In the newer universities, omnibus 'life sciences' departments were created, which have failed to develop in traditional areas, while

struggling to carve a niche in modern biology¹. Several students get their PG degrees every year from such institutions and some of them choose to do a Ph D.

After getting a Ph D degree, there is the million dollar question about the career of the doctoral candidate. One can continue his/her research after submission of thesis, with extended SRF post from CSIR.

With a Ph D degree, one can either get a RA/SRA post from CSIR or Young Scientist (fast track scheme, international network programme) post from DST. Since the number of fellowships available is merely one-tenth of the actual number of Ph Ds, meritorious scholars may sometimes not be able to get a berth. Some may also be unemployed or under-employed. Mostly,

they are engaged in teaching at self-financed arts and science, or engineering colleges or even in government colleges or universities. Since there are no proper jobs or research opportunities in India, a large number of PhDs from well-reputed institutes/universities go abroad for postdoctoral programmes and most of them settle down there.

Schatz² stated that postdocs – together with the graduate students – are major engines that drive scientific innovation. Postdocs and graduate students do most of the experiments and make most of the scientific discoveries. However, postdocs are finding it harder to get suitable jobs. The collapse of the ‘iron curtain’ and scientific growth in many Asian countries have swelled the number of those wanting to get postdoc positions in USA and Western Europe. But back home, long-term jobs are often scarce or non-existent. Also, the academic job markets in Europe and Japan are notorious for their insider trading and rarity of independent junior positions. All these problems have led to a massive traffic jam at the end of the postdoc tunnel. Those trapped inside the tunnel must do a second or even a third round of postdoc tenure. But a string of postdoc stints looks bad on the CV and makes it even harder to find a long-term research position.

Is postdoctoral work necessary before getting a job in science? Since publications are vital for obtaining a good position, and postdoc is the best time for producing a good CV, it seems logical that doing a postdoc is essential for getting a job in science, especially in biology³. A recent report indicates that Indian scholars boost S&T research in Taiwan. A total of 698 postdoctoral scholars from India were recruited to work in various science-based research projects sponsored by the National Science Council of Taiwan⁴. The authors of the report also narrate the role of our scholars in S&T development in Taiwan. Though the authors lauded these Indian scientists, we have to be ashamed because our institutional set-up with inadequate infrastructure facilities, is not able to utilize such potential candidates or the institutes

recruit persons only ‘with minimum academic qualifications’.

According to Krishnapillai⁵, India always had the technical capabilities to defend itself, but the will has been and is missing. There is no objection to his statement and we wish to put the word ‘suppressed’ instead of missing. The power of the will may be suppressed and dominated by many factors (biotic and abiotic). The health of our research institutions has been a subject of debate. Many quantitative indicators suggest that research productivity has stagnated and the domains of both S&T and higher education are loaded with problems that need immediate attention⁶.

Primary school teachers, university professors and scientists in national laboratories should shape the students and researchers to promote S&T in India.

Authorities of CSIR, ICAR, ICMR, DST, UGC, DBT and other funding agencies should increase the number of fellowships (postdoctoral) in the already existing schemes and introduce new schemes for PhD degree holders to continue their research in India through universities and national laboratories. Authorities of S&T should look into the factors that are responsible for decline in scientific productivity in India and work out a solution for improvement of S&T in national laboratories/universities.

For many years S&T was an area in which Prime Ministers took special interest; but for the past fifteen years the perceived importance of their portfolio has declined dramatically, and even in the universities, the inability to recruit a new generation of enthusiastic and competent faculty with strong research interests, has been debilitating. The year 2004–05 is a landmark in history of India, since both our Honourable President A. P. J. Abdul Kalam and Prime Minister Manmohan Singh are highly qualified and well-known scholars in their respective fields around the world. Manmohan Singh also mentioned some important steps to be taken for S&T development during his inaugural speech at the 92nd session of Indian Science Congress on 3 January 2005 at Ahmedabad.

‘First, I affirm our commitment to the development of basic science, applied science and the promotion of excellence. I do not believe the issue here is of basic versus applied science. It is not an “either/or” issue. We must devote equal attention to the development of basic and applied sciences, both in teaching and research.

Second, I am committed to rebuilding the science base in universities. This will include creating synergy between new initiatives in S&T and our university system.

Third, we will promote public–private partnerships, to increase funding for frontier areas of scientific and technological research.

Fourth, the de-bureaucratization of S&T institutions will be ensured and their academic autonomy assured.

Fifth, we will restructure our S&T support systems.

Sixth, we will create exciting career opportunities for scientists so that we can retain our talent at home. We must build more centres of excellence in science like the Indian Institute of Science. India deserves a dozen such institutions, in various fields of science.’

We believe that both leaders will help activate science, technology and economic development.

1. Balaram, P., *Curr. Sci.*, 2004, **86**, 1583–1584.
2. Schatz, G., *FEBS Lett.*, 2004, **568**, 1–3.
3. Grace, H. W. Wong, *Nature Biotechnol.*, 2005, **23**, 151–152.
4. Hsu, M. J. and Agoramoorthy, G., *Curr. Sci.*, 2004, **87**, 131–132.
5. Krishnapillai, M., *Curr. Sci.*, 2003, **86**, 625.
6. Balaram, P., *Curr. Sci.*, 2004, **86**, 1467–1468.

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