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EDITORIAL

Curing the Ills of Indian Science: Is the Remedy Worse than the Malady?

For Indian Science, it is the best of times; it may also be the worst of times. The best is primarily due to the pro-science (or, to be more specific, pro-scientist; it is entirely up to the readers, under no obligation to maintain a facade of propriety, to be as snide or vitriolic as they wish about the distinction) policies of successive governments. The financial support has been steadily on the rise, so are the salaries, fellowships, number of awards, initiatives, opportunities, etc. It is perhaps also the worst of times, if one looks at the various indicators of scientific progress – number of publications, citations, the much talked of H index, etc.

One must admit that these indicators by themselves do not paint a gloomy picture at all. The graph of number of publications versus time has shown a more or less steady rise during the past few years. In fact, in 2005, for the first time, the number of papers published from India (as listed in the *Web of Science*, a product of the Thompson Corporation), crossed a figure of 25,000. There is every indication that the number would be higher in the next year. It is also easy to provide theoretical reasons as to why Indian Science should be going through a boom phase. The rapidly expanding reach of the internet and the relatively easy availability of the broadband connection with adequate bandwidth has brought the latest scientific periodicals to the desktops of almost every active researcher working even at remote universities/institutions (be it through open access journals, or through consortia such as the INDEST, or through INFONET (*Curr. Sci.*, 2006, **90**, 293), the highly commendable and successful initiative of the University Grants Commission. On-line and e-mail based manuscript submissions have done away with postal charges and related hassles. Add to it the expanding suite of on-line journals and archives (arxiv.org, for example), and the complete infrastructure for an explosive growth in the number of papers from India seems to be fully in place. There is of course the minor matter of having some results that are worth reporting (though opinions vary considerably about the strictness of this requirement). Easy availability of computers, software, datasets (and, for the fortunate few, large grants for buying expensive instruments) has thrown open one route; the rich faunal

and floral wealth of India taken together with the biodiversity bandwagon points to another, increasingly well-travelled one. In short, theory as well as observation both seem to be in agreement about the projected upward swing in Indian Science.

What, then, is the justification for the alarm bells about the stagnation of Indian Science? Restricting oneself to the narrow confines of science-related causes, one can probably identify just two main causes for worry (by deftly omitting to mention the crisis due to the total absence of effective leaders – remember how an entire generation was declared as ‘lost’ not too long ago?). One is the unpalatable realization that the short-term growth seen in scientific publications is more of an illusion. One of the factors for the increase in the number of publications listed in the databases is just the increased number of journals/articles covered by them. Secondly, what one needs to examine is the growth of other countries – which turns out to be most often much better. Thirdly, there is the question of quality. The Impact Factor (of the journal where an article is published) and the Citation Count (number of papers citing the article) are the two widely used indices for judging the quality of an article. These too show the same picture; Indian performance is at best average, and most often below average.

The second, and much more serious problem about the future of Indian Science has to do with the present and projected shortage of manpower, especially when compared to other sectors. Going by the present trends, on the industry (especially IT and Biotech) front, India is likely to become a major player sooner than later. One has seen a sustained, rapid growth of these fields, both in terms of the investment and manpower. Particularly noticeable in these sectors is the ever-increasing influx of bright, talented and young workforce. These sectors are also the preferred career choices of most of the enthusiastic youngsters.

In stark contrast, there is virtually no growth in the faculty strength of most universities and research institutions; in fact, a steady decline in numbers is the norm. The dwindling number of students makes it increasingly difficult for the inexorably graying researchers to even continue the existing pace and schedule of research, let

alone think about expansion and growth. The small number of new recruits generally *begin* their research career in India around the age of 33–35 (about the same age by which Anil Kumble takes 500 wickets, to put matters in perspective).

Clearly, the situation calls for remedial actions – and several strong medicines have been recommended.

The first one, from the ‘West as Role Model’ school of thought, sets a one-point agenda – publish, publish and publish. After all, ‘Publish or Perish’ is the dictum accepted by the institutions who top the Shanghai Rankings. On the other hand, importance of publishing is not emphasized strongly enough in our top-ranking institutions (ranked somewhere between 250–300 in the worldwide list of 500). Ergo, make publications as the one and only yardstick for evaluation for promotion, awards, grants, etc. To paraphrase Vince Lombardi (one of the most successful coaches in the US Football history), ‘Publishing is not the main thing, it is the **only** thing’.

In fact, implementation of this has already begun in right earnest – and increasingly often, the outcome is best understood from the apologetic lament of the kindly but helpless mentors:

‘So, you have spent a lot of time and effort in building this instrument? Very nice, a wonderful job indeed. But you see, the committee said that your colleague Vikram Dikshit has several more papers in the prestigious “Journal of Computational...” and therefore, you know...’.

‘I see that you have taught several courses, have set question papers for the entrance exams, have been involved in bringing out the proceedings of the conference. What will any organization do without dedicated people like you? But the committee.. ummm.. er.. saw that your colleague Vikram Dikshit has been publishing very regularly in the well known “Transactions of the computational...”, and, you know, ...’

‘So, it was really nice to see you folks working in such a close collaboration with the defense research team. Just the other day, their group leader said that because of the design proposed by you, they can now hope to make the prototype ready, well ahead of schedule. It is a pity that the report is classified – that unfortunately means no publications to show for, and that was the main problem! The committee showed me the three recent papers by your colleague Vikram Dikshit in the “Communications of the Computational...”, “Bulletin of the Computational...” and “Proceedings of the Computational...”, and you know, with that kind of publication record, it is very difficult to argue against their decision, I am so sorry.’

Mind you, all this of course is only for the law-abiding, low ranking majority. One or more of these criteria can suddenly become crucially important depending on what the favoured candidate possesses and what the unfavoured one lacks – but that is another story, and a very old, often narrated one at that.

The second approach, by the ‘catch them young’ brigade, describes a two-pronged attack. One involves setting up brand new, high profile, and well-funded institutes in metropolitan cities to attract bright young minds to science as a career. A lower-cost alternative version involves the starting of undergraduate programs in reputed research institutes (trading higher learning for lower teaching, say the unenlightened cynics). The most likely outcome of such initiatives is a several year decrease in the ‘age at the time of export’ of the product, something that is already visible in some places – but when has adverse evidence ever made any impact on the high and mighty who have made up their minds?

The second prong of the approach aims at lowering the recruitment age by trying to cut down the number of years that students take to complete the Ph D – the absolute requirement for a research career. Two strategies have been conjured up for accomplishing this goal, each one more brilliant than the other. The first one simply cuts off the fellowship awarded to the research students after a fixed period, the duration to be shortened gradually but inexorably. To counter the partial relief available to the few lucky ones (whose research supervisors or other guardian angels have the necessary wherewithal and sensitivity to make alternative arrangements), the sword of Damocles named ‘cancellation of registration’ has also been thoughtfully manufactured. The time constraints are even more severe for the college teachers, coerced into doctoral programs just for protecting their careers. But then, isn’t hands-on research experience a must for a good teacher? And we do need good teachers to attract good students to Science. Remember, All noble causes demand sacrifices (questions such as who sacrifices whom, for what better, remain unasked).

Fortunately, all these remedies notwithstanding, one is still hopeful about a brighter future for Indian Science in the years to come, for there is no dearth of talent. Coming to think of it, in the younger age category, India has always done well, be it in games like tennis, chess and billiards or in academics like the Olympiads. Another heartening feature is the enthusiastic and overwhelming response to science-related events from the younger age groups (be it Nature camps or mathematics lectures or children’s science congress) everywhere. The wikipedias, the ‘open courseware’ initiatives, the increasing availability of Distance-Learning and E-learning programs have the potential for making high quality education available to all. Better, perhaps to wait, watch and facilitate the incipient natural recovery. It may be useful to remember that, in a market-oriented and complex economy, decisions about aggressive deployment of therapies are influenced by many considerations; patients’ welfare may or may not be at the top of the agenda.

N. V. Joshi