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## CORRESPONDENCE

### What ails Indian science? Some suggested remedies

A number of articles<sup>1-6</sup> have appeared in *Current Science* recently (*Curr. Sci.*, 74, nos. 3 and 5) highlighting the poor state of health of Indian science. Avinash Khare<sup>1</sup> has clearly identified the strengths and weaknesses of Indian science and technology. He has highlighted the success stories of Indian science, viz. green revolution, space programme, nuclear energy, drugs and pharmaceuticals. He has also enumerated failures and identified grey areas.

(i) The single most important thing that needs to be done is to strengthen our universities and take back basic research to the universities where it should ideally belong. It was a blunder of Himalayan proportions to open National institutes of basic research outside the University system.

(ii) Like China, we must identify areas of our strength and try to plan big in those areas.

(iii) Basic research is the mother of all applied research and technology. It must be strengthened to produce a talented scientific manpower to make progress in applied research or to develop new technology. In fact, all the three must march together.

(iv) The bureaucracy has caused havoc in the universities and slowly the disease is spreading to the institutes also.

(v) There is utter neglect of instrumentation in our country. We give more weightage to a theory paper and ignore technical innovations.

(vi) There must be a change in the colonial attitude and feudal outlook of our Indian scientists which is a legacy of the British rule in India.

However, I also differ with Khare's statements that:

(i) Even in many of the premier universities, people hardly knew modern subjects (like quantum mechanics in physics) before 1947 and

(ii) There is a tremendous enthusiasm in young people for science and technology in India which needs to be harnessed properly.

As a student of history of science, I recall with pride the leading role played by some of the Indian Universities in promoting research of highest calibre comparable to the best universities in Europe. For example, during the golden thirties, Calcutta University excelled in physics, Punjab University in chemistry, Lucknow University in palaeobotany, BHU Varanasi and Mysore universities in spectroscopy and Allahabad University in astrophysics. Even some government degree colleges at Patna, Decca, Lahore and Ravenshaw College, Cuttack could boast of stalwarts like S. N. Bose, Bawa Kartar Singh, Ruchi Ram Sahni and P. S. Gill on their faculties before 1947. Physical Society of Lahore arranged weekly lectures on popular science topics including relativity theory and quantum mechanics during early forties. Einstein's theory of

special relativity was translated by S. N. Bose into Bengali and his epoch-making paper (derivation of Planck's law of radiation) was communicated while he was serving as a Lecturer in Government College, Decca. I cannot believe that Indian physicists were ignorant of quantum theory in physics.

Young people in India are quite enthusiastic about making a career in civil services, business and marketing, medicine and engineering. The cream opts out for lucrative jobs offered by multinationals in India or abroad. Only second or third rate graduates opt for basic science as their career. In Punjab, more than 80% of the science students belong to the fairer sex and their first preference is to get admission in B Ed after passing M Sc. During the last ten years, only one student could clear NET of UGC from our department. No one is interested in a research career in science. In our DST project, none of the candidates from North India applied for JRF even when NET condition was relaxed. The quality of candidates seeking admission to Ph D programmes has deteriorated over the years. This is highlighted in a recent article by Sushil Kumar *et al.*<sup>2</sup> about the decline of interest of fresh graduates in doctoral and post-doctoral research.

The gloomy picture for the future of Indian science was highlighted by C. N. R. Rao, Chairman of the Scientific Advisory Committee to the Cabinet, at the 85th session of Indian Science Congress<sup>3</sup> held during 3-7 January, 1998 at Hyderabad. In his view, the gap between

the advanced countries of the West and India in science and technology is increasing rapidly, and the visibility of Indian science is rather low in the global market. He lamented, 'How did we fail to motivate the young and attract them to research and how did we fail to persuade industry to support science'?

In the same meeting<sup>3</sup>, C. K. N. Patel, Vice Chancellor of Research University of California, Los Angeles vehemently criticized poor quality of Indian scientific research. He once recommended closing down of Indian national laboratories to the Prime Minister of India as they had out-lived their usefulness.

P. Rama Rao in his Presidential Address<sup>4</sup> to the Indian Science Congress at Hyderabad has outlined in greater detail the growth of S&T institutions in India during the British rule and after independence. It is by far the best documented Address presented at any session of the Indian Science Congress, which I have attended since 1975. Rao is also worried about the health of science in Indian Universities. He remarked, 'It is heart-rending to hear about the inexorable decline in research standards in several universities in our country. Rejuvenation of the Indian universities, their capability and vitality is a paramount and urgent need.'

S. Arunachalam *et al.*<sup>5</sup> have done an excellent job in mapping scientific research in India in their recent article published in *Current Science*. Their analysis based on CD-ROM version of *SCI* brings out clearly the declining trend of publications by Indian scientists at the global level. There has been a slide down for India from 8th position to 12th position

among the top 20 nations of the world. India is left behind Italy, The Netherlands, Australia and Spain in the quality and number of publications. The Indian journals, too, are losing their position in *SCI* rating based on impact factor.

So, the health of Indian science should worry our scientific planners genuinely when we are celebrating the golden jubilee of our independence. Can we inject some dose of inspiration and vitality which may rejuvenate Indian science at the threshold of 21st century? Following the Russian launch of the Sputnik, the American science curriculum was revolutionized at all stages from school level up to the university stage. A similar exercise is called for to resuscitate Indian scientific research.

To overhaul the entire system, I offer some suggestions:

(i) Creation of 'Centres of excellence' in some of Indian universities at par with TIFR and IISc.

(ii) Linkage of Universities with National Research Laboratories for liberal exchange of equipment/scientific manpower/infrastructural facilities, etc.

(iii) Creation of more Inter-University Centres of research. Nuclear Science Centre at New Delhi is one such example.

(iv) Identification of universities and colleges which can award Ph D degrees in science through a National Commission.

(v) Identification of priority areas of research and putting a ban on wasteful expenditure being incurred on aimless/third rate research being carried out in Universities/National laboratories.

(vi) Creating parallel positions for researchers in the teaching departments

with free option to carry on teaching and/or research duties.

(vii) Liberal travel grants to carry out experiments at international centres of research where necessary facilities are available. CERN in Geneva is one such centre where Indian physicists have participated.

(viii) Reorientation of theory and laboratory courses at all levels, making B Sc as the terminal degree for entry into research stream.

(ix) Reorientation of M Sc programme for producing a cadre of science teachers and researchers as being done in Hungary and some other European countries.

(x) Abolition of rigid bureaucratic control, democratization of university governing bodies but at the same time introducing self-appraisal reports and peer review to make accountability a watch-word for science teachers and researchers.

1. Avinash Khare, *Curr. Sci.*, 1998, 74, 191-195.
2. Kumar, S., Khilnani, S. and Sehgal, Y. P., *Curr. Sci.*, 1998, 74, 20-24.
3. Arunachalam, S., *Curr. Sci.*, 1998, 74, 397-402.
4. Rama Rao, P., *Curr. Sci.*, 1998, 74, 418-432.
5. Arunachalam, S., Srinivasan, S. and Raman, V., *Curr. Sci.*, 1998, 74, 433-441.
6. Virk, H. S., *Curr. Sci.*, 1998, 74, 397.

H. S. VIRK

Department of Physics,  
Guru Nanak Dev University,  
Amritsar 143 005, India.

## Shall we close our ranks?

S. Arunachalam *et al.* (*Curr. Sci.*, 1998, 74, 433-441) clearly bring out the truth that over the years, the number of Indian journals included in *Science Citation Index (SCI)* has dropped considerably. One of the reasons could be the lack of regularity in publication. In my own discipline of physiology, there are four societies (Association of Physiologists and Pharmacologists of India, Physiological Society of India,

Society of Animal Physiologists of India and the Indian Association of Biomedical Scientists) each with its own publication. No wonder that none of these journals figures in the list of journals indexed by *SCI*. While each society can hold its annual meeting and bring out the proceedings in the form of a booklet, will it be possible to merge their journals into a single publication ensuring quality and regularity? Or better

still, pooling their resources, opt for a separate physiology section in an indexed journal like *Current Science*. This will certainly go a long way in obtaining better exposure for publications in physiology from India.

J. PRAKASA RAO

Department of Physiology,  
Christian Medical College,  
Vellore 632 002, India