used as a model system to explore underpinnings of microbial evolution. Using this system, it has recently been shown that genome reduction in such bacteria is degenerative rather than adaptive evolution. This is indicated by erosion of regulatory genes, accumulation of mutations affecting protein stability, pseudogene formation and a continued reduction in replication and repair machinery[5]. The long-term evolutionary consequences of such changes are mutational meltdown and population extinction[5,6]. Studies on comparative genomics of microbes obligately associated with eukaryotic hosts as exemplified above and many more such as mutualistic *Wolbachia* of filarial nematodes, parasitic *Wolbachia* of arthropods, bioluminescent *Vibrio fischeri* of squid host and the classical *Rhizobium* and its ilk may reveal new paradigms of evolution and extinction, and their effects on the hosts. The subject of evolutionary biology of microbes is relatively unexplored and needs further impetus. Thus, it may not only help us to resolve the riddles of the past but also enable us to manage better the future of the biosphere[7].

1. Balaram, P., *Curr. Sci.*, 2003, **85**, 5–6.
2. Hacker, J. and Carneil, E., *EMBO Rep.*, 2001, **21**, 376–381.
3. Suau, A., Bonnet, R., Sutren, M., Godon, J. J., Gibson G. R., Collins, M. D. and Dore, J., *Appl. Environ. Microbiol.*, 1999, **65**, 4799–4807.
4. Ochman, H. and Moran, N. A., *Science*, 2001, **292**, 1096–1098.
5. van Ham, R. C. H. J. *et al.*, *Proc. Natl. Acad. Sci. USA*, 2003, **100**, 581–586.
6. Lynch, M., Bürger, R., Butcher, D. and Gabriel, W., *J. Hered.*, 1993, **84**, 339–344.
7. Woodruff, D. S., *Proc. Natl. Acad. Sci. USA*, 2001, **98**, 5471–5476.

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Activity index vs standard of science education

Discussions about the standard of Indian journals are not new. In 1990, Ratnakar[1], in his Ph D thesis, analysed the publication policy of Indian physicists such as Raman, Saha, Bose and Krishnan. He found that during 1910–30, most of their findings were published in foreign journals. He also pointed out the problems and suggested solutions to improve the quality of Indian journals[1]. In 1994, Ramaseshan wrote another excellent article[2]. He discussed various issues such as: why do our scientists prefer to publish in foreign journals; why we should not give too much importance to the *SCI*; how we can improve the standard of Indian journals. If the responsible authorities had read these documents and employed the suggestions, most of the later discussions would not have been necessary.

Many articles and letters have been published in previous issues of *Current Science* dealing with the standard of Indian journals and science education in India. I would like to refer to the correspondence by Gupta and Garg showing the activity index (AI) of different countries[3]. With concrete examples from USA and Germany, I would like to show that the Al is not warranted for a good education system at the school level.

The Programme for International Student Assessment (PISA) measures the cumulative educational experience of students from 9th to 12th grade. The programme was designed to measure literacy more broadly, that is, the learning that takes place in and out of school. Out of 30 member countries of the Organisation for Economic Co-operation and Development (OECD), 27 participated in the contest. In 2000, under PISA, 31 evaluated countries also had four non-OECD members, namely Brazil, Latvia, Lichtenstein and the Russian Federation. A table (in: wysisyg://145/http://www.spiegel.de/uni.../0,1518,grossbild-151582-195212,00.html, dated 11 August 2003) shows the ranking of mathematics literacy and science literacy for the 31 countries. In the following discussion the mathematics literacy and science literacy rankings, respectively are given in parentheses. If we compare this study with the AI values given by Gupta and Garg, the following interesting points emerge:

- Though Japanese students are better (ranking 1 and 2) than American (19 and 14) and German (20 and 20) students, yet the AI of all the three countries is nearly the same, i.e. 99, 99 and 98 for Japan, USA and Germany respectively.
- In the case of South Korea (2 and 1) and Australia (5 and 7), the achievements of students and scientists (Al 111 and 101 for Korea and Australia, respectively) are better than those of USA and Germany.
- Though Russian students are worse (22 and 27) than those of USA and Germany, the AI of Russian journals is as good as that of others, i.e., 99.
- AI of Swedish journals is as good as those of USA and Germany, though her students are better (15 and 10).
- Another surprising fact is that a small country – Finland – has the best rank (4 and 3) among European countries.

On the whole, we conclude that the AI does not give the true picture of the education system of a country. It suggests that we need to know more parameters to correlate scientific productivity with the standard of science education.

1. Ratnakar, A., Ph D thesis, Karnatak University, 1990, pp. 41–43; 251–255.
2. Ramaseshan, S., In *Science in India – Excellence and Accountability* (ed. Srivastava, P. N.), Angkor Publishers, New Delhi, 1994, pp. 311–328.
3. Gupta, B. M. and Garg, K. C., *Curr. Sci.*, 2002, **83**, 1431–1432.

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