

## Errors in reference works

I have just acquired a volume of the *Encyclopedia of Classical Indian Sciences* edited by H. Selin and R. Narasimha, published by Universities Press, which has been widely advertised. It is well produced but on glancing through a few of the short essays such as 'Colonialism in science' authored by Deepak Kumar, I found errors which are not to be expected in a reference work of this nature. I quote a few lines from a paragraph (p. 106) relating to the luminaries of modern Indian science:

'In the first quarter of the 20th century, those who put India on the scientific map of the world were J. C. Bose who studied the *molecular phenomenon* produced by electricity on living and non-living substances, Ramanujan mathematical genius and P. C. Ray who analysed a number of rare Indian minerals to *discover in them some of the missing elements in Mendeleev's Periodic Table*. C. V. Raman's research on the scattering of light *later* (?) won him the Nobel Prize in 1930 and gave the name to Raman Spectroscopy. Meghnad Saha pioneered the field of astrophysics while S. N. Bose's *collaboration with Einstein* led to what is known as the Bose-Einstein equation.'

J. C. Bose is recognized as a pioneer in the discovery of millimeter wave radiation. IEEE USA has instituted a medal in honour of this discovery. The first half of his research career was entirely devoted to electromagnetics which included a demonstration of radio-wave propagation in which he predated Marconi. Bose obtained a 1904 US patent on 'semiconductor-metal detectors', later known as Schottky barrier detectors. It is about this work that Neville Mott remarked to S. D. Chatterjee that 'Bose was 60 years ahead of his time'. Not a mention of this is found in the essay. On the other hand, some of his work in biophysics such as on the mechanism of the rise of sap was controversial and accepted in the West.

Ramanujan is dismissed as a 'mathematical genius' with not a mention of the

areas in which he worked. However, there is a biographical essay on Ramanujan elsewhere in the book. For a lay reader, the lines about Raman will leave him none the wiser. The importance of Raman's work in opening up an entirely new field in optics and the importance of Raman spectroscopy in chemistry and materials science has escaped the writer. As for Saha, was it too much effort to find out about his precise contributions to astrophysics?

The howlers are reserved for P. C. Ray and S. N. Bose. Pray, which elements in Mendeleev's periodic table did Ray discover? As is well-known, Ray prepared the hitherto unknown stable chemical compound mercurous nitrite, other nitrites and hyponitrites of different metals and later compounds of gold, platinum, iridium. He was the first Indian scientist to establish an industry stemming from his research 'The Bengal Chemical and Pharmaceutical Works' in Kolkata in 1893. Surely worth mentioning as an achievement in Colonial India!

S. N. Bose, again well-known to those who have a smattering of knowledge of science, did his work *independently* in Dacca and sent the paper to Einstein for publication. He was not a *collaborator* of Einstein in the sense there were no papers authored jointly by them. Such careless remarks diminish the originality of his work. There is no Bose-Einstein equation but Bose-Einstein statistics, now shortened to Bose statistics and particles that go by the name bosons!

The references to this essay include Ashis Nandy's *Alternatives Sciences* (1980) which is a flawed analysis of the lives of J. C. Bose and Ramanujan. Nandy, as he has later admitted, was completely out of his depth in assessing the remarkable contributions of these two scientists and came to the conclusion that J. C. Bose was an example of a failure in Western science. Nandy, like Deepak Kumar, was completely unable to assess the importance of Bose's work on milli-

metre wave radiation, which is the basis of the modern terahertz technology (THz). The genius of Ramanujan was, of course, beyond his sociological analysis.

Similar remarks are also present in another chapter on 'Physics' (p. 327) authored by W. T. Johnson which mentions three Indians – J. C. Bose, C. V. Raman and 'finally' (sic) Jawaharlal Nehru! J. C. Bose is again presented as 'a biophysicist who explored response of plants and animals to electrical stimulation'. Nehru did not have physics as a subject in his Natural Sciences Tripos at Cambridge; the subjects he studied were chemistry, geology and botany!

I think such slipshod writing by so-called social scientists calls for some analysis. Natural scientists either dismiss these writings as irrelevant or put the authors on a pedestal – it is the latter in this case since the authors were asked to contribute to such prestigious volumes without following the first tenets of science – accuracy and verification. Where is the verity of other statements in these essays? The affiliations of these authors, which are missing, would have provided some insight into their backgrounds.

Patrick Geddes wrote a biography of J. C. Bose in 1920. More recently, Subrata Dasgupta in *Jagadis Chandra Bose and the Indian Response to Western Science* (Oxford, 1999) has covered his entire range of research. The present authors did not think it worthwhile to consult these publications. I am sure scientists/engineers/technologists with interest in the history of science and who have taught these subjects would have done a much better job, armed as they are with facts and much less baggage.

DWARKA N. BOSE

*University of Calcutta,  
92 APC Road,  
Kolkata 700 009, India  
e-mail: dvarakabose322@gmail.com*