

BOOK REVIEWS

Jagadish Chandra Bose: The First Modern Scientist. Dilip M. Salwi. Rupa & Co, 7/16 Ansari Road, Daryaganj, New Delhi 110 002. 2002. 59 pp. Price: Rs 95.00

Salwi deserves praise for a very good presentation of Bose's life and work to lay readers and school children interested in such knowledge about our scientists, who ushered in modern science as a serious scholarly activity in India during British rule. The book, through five small chapters, clearly brings out the significant aspects of Bose's growth from childhood to his development into a scientist of international repute (first two chapters), essence of his works in physics (third chapter) and in plant physiology (fourth chapter), and as an institution builder – now called Bose institute – for promotion of modern science in India (fifth chapter). A few of Bose's inspiring statements along with a chronology chart of milestones in his life, and a short bibliography for further reading ends this 59-page, small, hardbound book with additional, neatly formatted, four blank pages meant for recording notes by the reader. It is surprising that Salwi missed out probably the most authentic biography¹ of J. C. Bose by one of his Western peers and admirers, Patrick Geddes, Professor of Botany, St. Andrews University, UK, that was first published in 1920 when Bose was still alive, but reprinted two years before this book. Nevertheless, Salwi does capture the essential lesson, amply evident in Geddes' account, and conveys it well: Bose succeeded in showing we could match the global best and that modern experimental science was not alien to our culture.

The language is simple and the style is lucid. The book is printed in large type, and its size is small enough for a lay reader to grasp the essentials of Bose's contributions while reading in a bus or a train, and finish it before boredom overpowers curiosity. I wish such books somehow found their way into our formal education system. The figures are nice, with a flavour of 'original' view of a number of instruments of his famous experiments filling nearly half the space without unwanted detailed legends. Parents of growing children, who may read it by some chance, may even feel inspired that Bose could have been as rich as Bill Gates or win a Nobel Prize if only

he cared to patent his contraptions, though his parents too were nearly as ordinary as them. Many parents today sacrifice as much or even more for their children to acquire a university degree for a secure job or send them abroad as Bose's parents did. However, in this, Salwi unwittingly gives a very wrong signal to young minds. Scientists do not work for a Nobel Prize, which comes to a few driven by a sincere desire to explore the unknown among several equally good contributors, most of the time. The glamour of the Nobel Award has even blinded Indian intellectuals. For instance, in a recent collection of essays on innovators², J. C. Bose does not figure at all; he was not even considered worthy enough to be referred to, in the two independent essays on Marconi and Appleton, obviously because, unlike them, Bose was not awarded the Nobel Prize.

Indeed, the study of J. C. Bose provided Salwi an experienced critic of the nature of scientific activity in India today, a fine opportunity to address those questions. Instead, he undertook a trivial exercise of lionizing a lion. His emphasis lacks much that is vital in the current context. I discuss below some of these with suggestions to future historians of science and biographers, even at the risk of being labelled irreverent.

It makes little sense to pick up someone as 'The first modern scientist', from a number of Indian scientists who seemed to be together, almost in a burst as it were, making a deep impression on the international scientific community. In less than 30 years of formation of the first three universities under the British system of education, Indians matched Westerners' level of excellence in contributions to science. Jagadish Chandra Bose happened to be one among several who excelled during that period and all had comparable hurdles. P. C. Roy and young Ramanujan are other equally familiar names. In fact, Ramanujan was the first to receive the first formal recognition from the Western scientific community, as the Fellow of Royal Society, London. This comment is not to belittle Bose's struggle. What ought to be highlighted is that they were struggling to give expression to their *personal creative urge* for specifically individual contributions. We look back with astonishment that so many out of so few who learnt science as students, succeeded like giants in comparison to most of us who are se-

curely placed in government 'jobs' from day one. Paradoxically, however, we also struggled in spite of secure jobs! What went wrong? Or did we really struggle? Why could we not rise to their levels?

Biographers of our past masters need to answer such relevant questions today. There were no cozy government jobs, nor were there 250 universities then. We should warn the coming generation to watch their steps carefully before following the ways of their predecessors. We have not learnt the right lessons yet, and manage to produce more and more students, particularly the brighter ones, who literally hate science research instead of being spontaneously drawn into the profession that demands creativity of the highest order. Masters obviously slipped, and we are not told precisely where and why. Only when students learn that past giants were ordinary mortals like them, comparable targets will appear achievable and, therefore, may lure the courageous among them into science research. We could perhaps learn a few lessons from Bose's life to our advantage.

Bose turned out to be a colossal pioneer of experimental science in India, deeply influenced by his physics teacher at St. Xavier's College, Fr Eugene Lafont. This influence was so deep indeed that when he could not pursue medicine at London on health grounds, he fell back on physics to continue studies there. Many of Swadeshi spirited intellectuals today may find it hard to reconcile with this truth, but here it is in black and white. Geddes had the following to say¹:

'At sixteen Jagadis passed from school of St. Xavier's College; and there – while doing the ordinary work, in a more or less ordinarily respectable way, but as yet without marked interest or distinction – he fell under the influence which plainly determined his turning to Physics, rather than to natural history of his own more prominent tastes. All the pupils of Father Lafont, so long Professor of Physics in that college, recall *his teaching and influence as truly educative*. His wealth of experiments and vivid clearness of exposition of them, made his class most interesting in the whole of college; and his patient skill, his subtlety, as well as brilliance of experimentation, were appreciated by this young student above all. *Here was Bose's first discipline towards that combination of intellec-*

tual lucidity with wealth of experimental device and resource by which he has all the more fully represented and honoured his old master by surpassing him' (emphasis added).

Nearly all the first rate contributors of that period had in common three important features in their development as in Bose's case: (1) Most came from ordinary middle-class or poor, respectable families – implying *academic or research career was considered a respectable profession for upward social mobility as in most Western societies*; (2) *They were influenced by good and dedicated teachers or sympathetic researchers who were European in origin, who took pains to train their native pupils obviously without prejudice, to prepare the keen ones compete internationally, and whom the pupils respected too* – implying that the European teachers, exceptions apart, were fair and not politicized unlike the breed of Indian teacher today; (3) All excelled internationally in spite of poor facilities at home, where they conducted most of their pioneering research (Ramanujan was an exception) – implying that *teachers disciplined and trained them not to be detracted from the primary goal of achieving academic excellence in their fields, whatever the hurdles*. But they only sharpened the faculties for individual excellence, since no labs humming with research scholars were around to establish a tradition of tolerance amongst intellectual giants under one roof.

Salwi rightly points out a major lacuna that Bose did not generate a school by training students. The lay readers, however, are hardly likely to appreciate its significance, least of all the school students, unless presented cogently to force them to introspect on their own role as parents, teachers or students. Most masters then did not visualize this pitfall in their behaviour that was going to set an unhealthy trend resulting in increasingly poorer contributions to science from subsequent generations of Indian researchers and deteriorating the quality of higher education as well.

Frustrated by the prolonged mediocrity, we now constantly look back to that era as the golden era of Indian science with a sense of nostalgia and explain the phenomenon as a consequence of so-called 'Swadeshi spirit'. We fail to notice that modern science had

already acquired a new character requiring interdisciplinary research. That demanded higher level of mutual tolerance to remain competitive, because increasing specializations cross-fed to accelerate, nearly exponentially, the progress all around. Our culture and education did not support that behaviour then, nor does it support now, resulting in our miserable mediocrity. Bose only had to train a tinsmith³ to make those exquisitely sensitive instruments that surprised the Western scientific community no end. The seed of high-tech was clearly there, but there were no takers. Bose should have attracted young theoreticians. Such capable students who surpassed their teachers were coming up in his neighbourhood. S. N. Bose and M. N. Saha, for instance, emerged soon from such crops.

A mystic position defying Popperian insights into how modern science progresses, understandably, kept even the bright young scholars in India away from following the trails of his research. Salwi is wrong in claiming '... his classic experiments showed that very minute pulses of electricity coursing through different parts of plants explained several of these phenomena' (p. 48). At best his experiments showed a correlation, not explained them in the sense acceptable to modern science. The startling emergence of theoretical foundation of wave and quantum mechanics, beginning with the concepts introduced by Max Planck and reinforced later by Bohr, that nearly mystified reality at subatomic level *with mathematical rigor* and yet beautifully explained macroscopic phenomena with remarkable ease, should have outweighed soon the appeal of Bose's conclusions on unification of consciousness to captivate the minds of Indian students mastering modern science, whose appetite for mysticism could not have been much less than Bose's. The contributions of Raman, S. N. Bose and Saha made clear sense because they integrated smoothly within the body of the new physics to provide much greater insights for their times than did Jagadish Bose's. If only Bose had communicated with the younger lot and appreciated the contradictions in (classical) physics of his times, he may have integrated his findings better in fast-changing paradigms, both in physics and biology. But that was not to be. Ashutosh Mookerjee, with his uncanny foresight, tried to draw the sen-

ior into the fold only to be shown a cold shoulder! It teaches us that intellectual giants cannot work under the same roof for long in India. Haldane's enthusiasm and efforts did not subdue it. This explains why our R&D institutions do not produce first-rate, prolific contributors in science any more in spite of very bright inputs to several of our centres of excellence (Note Geddes' observation on Bose's aptitude as a student in the quote above). Ashutosh's experiment ended with him in Kolkata. Nothing comparable ever took off anywhere else in India either. Saha and Raman established two separate national academies in due course because of that same cultural constraint – that of intolerance. And for similar reasons, S. Chandrasekhar very wisely (he had the advantage of hindsight)⁴ did not even return to India. He could not have done half as much to shape the science we now call astrophysics, acknowledged by his peers.

In view of the degrading standards of education infested with corrupt practices, today's biographers' responsibility is to point out explicitly our weaknesses, particularly intolerance among the scholars that is easily provoked on linguistic, regional, caste and religious considerations, that have led to our degeneration. This needs to be done with greater courage and conviction covering as much in their narration, if not more than the individual's technical skills in the art that made them professionally competent.

1. Geddes, P., *An Indian Pioneer of Science: The Life and Work of Sir Jagadish C. Bose*, Longmans, Green and Co, 1920 (reprinted by Asian Educational Services, New Delhi, 2000), p. 23.
2. Parthasarathy, R., *Paths of Innovators*, East-West Books (Madras) Pvt Ltd, Chennai, 2000, pp. 63–68.
3. Subrata Dasgupta, *Jagadish Chandra Bose: An Indian Response to Western Science*, Oxford University Press, New Delhi, 1999, p. 55.
4. Wali, Kameshwar, C., *CHANDRA: A Biography of S. Chandrasekhar*, Penguin Books, 1987, pp. 247–307.

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