



C.V. Raman's Laboratory and Discovery of the Raman Effect by Rajinder Singh published by Shaker Verlag, 2018. Paperback, 172 pages. Price EUR 21.90/SFr 27.40.

An article on the Raman Effect appeared in the 22 July 1945 issue of *People's War*, the newspaper of the Communist Party of India. Written by DD Kosambi under the pseudonym "An Indian Scientist", this article is remarkable for several reasons, not least of which is that it is an early example of science journalism in India that mixes the hard science with the human story. That it appeared in a newspaper just as World War II ended, makes it quite unusual as well. There are a number of versions of this article among the Kosambi papers that are available in the Nehru Memorial Museum and Library but let me quote from the printed version:

"Though this group did important work in sound and made a few almost negligible contributions to theory, their work was mainly experimental, with magnetism, and light which is after all, electromagnetic waves. It was important that Calcutta was a great centre of shipping and machine production.

Whenever some costly apparatus was required, but no funds were forthcoming, Professor Raman would charter a taxi, prowl through the junk-shops of Calcutta and emerge with ridiculously cheap scraps which were soon rebuilt into what was required.

For example, a costly electro-magnet which would have taken six months and several thousand rupees to import was built out of an ancient burnt-out dynamo for less than a hundred rupees all told. Of course, one could not improvise an X-ray tube like this, but the students learned that they had to try on their own rather than wait for someone else to supply the apparatus, or whine about the lack of an 'atmosphere' and 'facilities'."

The motivation that underlies Rajinder Singh's slender book (which runs to something like 120 pages with a bibliography of an additional 30 pages) as stated in the preface, is to offer a critical analysis of Raman's laboratory and funding. It is widely believed – as in Kosambi's account quoted above - that Raman's discovery in the late 1920's cost no more than a few hundred rupees, and that it was possibly an early instance of the much touted Indian *jugaad* mentality at work. As Rajinder Singh brings out very well, given Raman's level of ambition, his intellectual sophistication and his acute awareness of the standards of scientific quality of those times, this image is quite far from the truth. To quote again from Kosambi's article:

"But Raman had made a trip to Europe that year and seen scientists like Ruark looking for the scattering of light by the very small particles of matter which we call atoms. They had failed. [...] If so, cried Raman, his brain working with furious rapidity, progressively more complicated molecules must give progressively more complicated satellites. Sixty or more experiments were designed by him in a single week to prove or disprove this idea conclusively; the handful of students and their teacher worked night and day. A new effect was announced in Raman's own *Indian Journal of Physics*, beating to the discovery of two Soviet Physicists (Landsberg and Mandelstam) who were checking their own results. India had produced a scientific discovery of the highest class and Raman had again proved that in the world of science it is the man who makes the experiment great, rather than

the experiment making the man great.”

There is a lot of primary material that Rajinder Singh has accessed to bring out quite clearly that Raman was indeed well supported by Calcutta University, both in terms of his own salary as well as his laboratory funding. Raman had indeed been abroad several times in the 1920's, to the US (1924), England (1921, 1924, 1929), Russia (1925), and Europe (1924, 1929, 1930). He knew the leading scientists across the world - indeed, he had the vision to not only start his own journal (now the Indian Journal of Physics) but was also keen to make the Indian Association for the Cultivation of Science (IACS) some sort of scientific academy.

As Rajinder Singh clearly brings out, there was a lot of equipment already available in Calcutta, either at the IACS or at Calcutta University, and that Raman had a thriving research enterprise. It is astounding to read that in 1923, there were 15 researchers in Raman's group, 21 in 1924, and by 1927 the number was 36 of whom 23 were full-time research students. Rajinder Singh notes that these students were from all over undivided India except for a few provinces, and that many (but not all) published papers. Indeed, for a single research group to publish something like 49 papers a year (the data is for 1928) would be

impressive at any time. There are any number of lessons here for us today!

All in all, though, this is an interesting book that takes a new look at Raman and his milieu. Serious historians of science are always able to reexamine archival material, find new evidence, and make fresh commentaries, as the author states in the preface.

There are, however, several shortcomings of the book. It is very poorly produced. The text has not even been proofread carefully. The typesetting is very amateurish, and the photographs that have been included in the book are neither of the highest quality, nor have they been chosen particularly wisely. The fact that the publisher, Shaker Verlag is unlikely to have their books widely distributed in India may be an advantage: I believe it would serve readers of the book if efforts were made to have the book republished locally, but with more care. □

*Ramakrishna Ramaswamy
School of Physical Sciences
Jawaharlal Nehru University, New Delhi
and*

*President, Indian Academy of Sciences, Bengaluru
e-mail: ramaswamy@jnu.ac.in*