

the credit due to me as can be seen from his Nobel Lecture and the recommendation he wrote to the Vice Chancellor of the Andhra University.'

As I said before, I was greatly impressed with what I had heard and left Krishnan's house with the greatest of admiration for this remarkable man.

### Tailpiece

Much later when I met Subrahmanyan Chandrasekhar, the astrophysicist of Chicago, Professor's nephew, I asked him 'K. S. Krishnan and you were very great friends. Did you ever discuss the discovery of the Raman effect with him and did he ever tell you that Raman had deprived him of the credit due to him (KSK)?' Chandrasekhar said, 'I had discussed the matter with Krishnan and said to the best of my knowledge Krishnan had never said a word against Raman. Even so Raman made many statements impugning Krishnan's integrity.'

I also repeated to him of the concluding statements made by Krishnan to me. Chandrasekhar said 'I do not agree with him at all. When two scientists collaborate it is improper to ask whose idea it was as many ideas really emerge because of the mutual discussions they have had also

since they toss ideas between each other. I shall repeat what I have often said about the Raman effect. I stick to this statement I make in spite of what Krishnan told you.'

'My own view is that the discovery of the Raman effect was possible because two absolutely original scientists (Raman and Krishnan) complemented each other. I would also point out that Raman's Nobel lecture did not fail to acknowledge Krishnan's contributions. Since I was in Calcutta almost immediately after the Discovery, let me quote what I wrote to Raman in 1944 when he congratulated me on my election to the Royal Society.'

'It was a special pleasure receiving your cablegram and the greetings from Bangalore. Under the circumstances it was natural that my thoughts should have gone back to the summer of 1928 when as an undergraduate I had the unique privilege of witnessing a band of physicists exploring the possibilities of a great discovery made by one of them and with that disinterested enthusiasm which is possible only under a great master in the presence of fields of knowledge freshly revealed. That was sixteen years ago and meantime our scientific interests have diverged but the impression made on me then has remained with me ever since ....'

### Post Script

I sent the above essay to a few senior scientists who knew both C. V. Raman and K. S. Krishnan well, for their comments. Each of them not only approved of the article, but said that it must be submitted for publication. One of them made the following comment regarding the Kramer-Heisenberg paper: 'Prof. Krishnan in his loyalty is rather generous to Prof. Raman in his statement regarding Kramer-Heisenberg paper. I feel that Prof. Krishnan being an expert in quantum mechanics must have played quite a substantial role in the actual physical interpretation of the Kramer-Heisenberg dispersion theory to the phenomenon of light scattering.'

Due to the efforts of A. Ratnakar, Librarian of the Raman Research Institute, we were able to get a copy of the certificate written by Raman himself when he proposed Krishnan for the Fellowship of the Royal Society, which we reproduce here with special permission of the Royal Society, London.

---

*S. Ramaseshan is in the Raman Research Institute, Bangalore 560 080, India.*

---

## The tragedy of K. S. Krishnan: A sociological fable

*Shiv Visvanathan*

Anniversaries are moments of cliché and crisis. They also provide triggers to re-write memory and deliver justice. Unfortunately, one of the ironies of Indian science arises in this context. One hears the general declaration that science is about objectivity and truth and yet hagiographies are rampant in Indian science. Science in India survives in terms of iconography rather than history. Even the history of science in India is inane or used instrumentally to combat an inferiority complex. Indian science textbooks even have capsule biographies of Aristotle, Darwin, Einstein which are too banal to be called myths. Why is science so untruthful about itself? Is it because

of the split of the observer and the observed? Science emphasizes the importance of method and how it controls the biases of the observer and yet it leaves the observer as a black box. Beyond this, there is a problem peculiar to India. One cannot find a decent biography of an Indian scientist which understands his relations to his children, his religious views or his politics. The scientific man in India, like the heuristic of the economic man, seems profoundly illiterate outside his own domain. Even G. Venkatraman's biography of Raman, a painstaking book, tells you little of Raman as a person. Kameshwar Wali's Chandrasekhar appears like a mask carefully constructed

in unwitting collaboration with the subject. Chandrasekhar's political innocence in supporting the Emergency is dismissed in a few lines. This is not a simple problem because the Emergency was justified in the name of science. The scientific establishment has often harassed dissenters by dubbing them as anti-scientific and anti-national.

The reader might ask by this time what this has to do with K. S. Krishnan. The answer is, everything. A commemorative act which refuses to see and tell the truth is a reinforcement of falsity. A lot of Krishnan has been hidden in the crevices of the Raman myth. It is time to tease him out. But this act has to be a colla-

borative one where the scientist, and *Current Science* in particular, needs to participate because one generation of the journal through a conspiracy of silence has created the strange tragedy of K. S. Krishnan.

I want to explore both the individual and collective aspects of this story. Let us begin *Current Science* style by citing keywords: biography, priority, industrial research, science, tragedy. Five key terms around which we can unravel a thought experiment.

Biographies and autobiographies of scientists in India lack a backstage, a sense of the person and his inner tensions. The only biography with a backstage became controversial. Ashis Nandy's *Alternative Sciences*<sup>1</sup> showed that Jagadish Chandra Bose eventually succumbed to the pressures of being original and fabricated his data<sup>2</sup>. Most studies of Bose including the centenary offerings do not mention this. The Bose family in fact wished to take Nandy to court for libel. The question of why the autobiographies and biographies of Indian scientists, Jagdish Bose to C. V. Raman, lack a backstage needs critical attention.

Let us now look at Krishnan's scientific biography. A *Who's Who* or the *INSA Biography of Science* captures the bare facts but we need to go beyond them to establish the range and grandeur of the man. Two stories in particular remain striking. One is from the first days of NPL.

When NPL was being built there were two trees in front which were creating problems. The builders decided to cut them down. When the axe was about to fall, Krishnan was just driving in. He stopped, astonished and horrified and then came running up to the tree cutters jabbering in his not too articulate Hindi. Seeing Krishnan's distress, Kanvinde, the architect, also rushed to the scene. Krishnan asked them 'Why are you cutting down these trees? The architect answered 'Sir, we thought they looked asymmetrical in the landscape'. Krishnan fell silent and then replied, 'You can still create symmetry. Not by cutting down a tree but by adding one more'. The aesthetics of the man who loved Whitehead and admired Pavlova is captured in this vignette. I am tempted to add another story that my mother told me.

Krishnan had come home to Jamshedpur for one of the meetings at NML. I

was told later I sat on his lap. The conversation ranged all the way from physics to children to *saris*. My sisters were dressed up for the occasion in a gorgeous red with gold embroidery. Krishnan asked them in Tamil. 'Do you know what colour your dress is?' '*Shahap*', they said as if red was too obvious to be anything but red, Krishnan smiled, 'Not *shahap*' he said, 'but *araka*'. He knew the right nuance of red, and shared it with two children. They remembered it thirty years later. They felt he wanted to celebrate the varieties of red and the celebration of language that went with it.

For many Krishnan embodied the play element in Indian science. Johan Huizinga discusses in *Homo Ludens*<sup>3</sup> the playfulness of play. The category of play goes beyond laughter and the comic. It transcends the categories of serious and non-serious or the anti-thesis of wisdom and folly. Even children's games can be played with profound seriousness. He defined play by its voluntarism. Playing to order is no longer play. It needs the quality of disinterestedness and is marked off as it were from the rest of life. Play seeks order and has its own enchantment. For many, science was the archetypal embodiment of play. It is this sense of play that marked the world of Krishnan. It is evident even his obituaries in the *JSIR* or *ISI Bulletin* or the more protestant *Science and Culture*. One senses the ludic quality of the man, an aesthetic delight in science, sport, language and dance. When one reads the reports on the Krishnan of the early years, one senses this sense of play. But when one reads about Krishnan of the NPL era, there is stiffness, a sense of loss that needs to be explored. The slow disappearance of the sense of play makes Krishnan's life a sociological fable. Remember here was a man deeply rooted in his own culture, proficient in Tamil and Sanskrit, a classicist, a superb sportsman, a champion tennis player of the Dacca University Club, a competent bridge player, a badminton enthusiast on the rooftops of Bow Bazaar Street, a willing football player on the Calcutta *maidan*. A man who brought to sport, philosophy and science, a sense of play. He embodied an aesthetic delight in science. K. Ramanathan's lovingly wooden essay observes about Krishnan in Madurai 'I have heard he used to conduct informal lunch hour discussion classes which were attended by large number of students

from neighbouring colleges and in which any question in mathematics, physics or chemistry could be raised there and then, starting from first principles'<sup>4</sup>.

Krishnan was at heart a university man, at home at Dacca, Allahabad, or even the freewheeling ambience of Bow Bazaar, the old building of IACS. The isolation, the lack of facilities at the university does not daunt him. Ramanathan writes that Krishnan accepted the directorship of NPL although it 'meant getting away from teaching and research, at least temporarily ...'<sup>5</sup>. Ramanathan's article was published in 1958 by which time Krishnan was caught in a network of administrative work and a plethora of committees. It is in the everydayness of the latter that the tragedy of Krishnan surfaces.

Krishnan was not at home as director. It was Shoenberg who captures it in a matter of fact way 'During this time Krishnan gradually became one of the elder statesmen of Indian science, no official committee was complete without him, and he was much in demand for opening ceremonies.'<sup>6</sup> Shoenberg adds that 'administration was not really to his taste' and that 'his kindness had its drawbacks when it came to administration, for he could not bring himself to say anything which would disappoint his hearer, and preferred to defer a difficult decision indefinitely rather than cause disappointment'<sup>7</sup>. Shoenberg also notes that 'he could scarcely even be persuaded to write a letter' and remarks 'that as a result a visit from Krishnan usually came as a surprise'<sup>8</sup>. What was personal idiosyncrasy in a friend was disaster in a director of a large laboratory. One of his close colleagues sadly confessed 'Krishnan must have been in a few hundred committees in the NPL era. He had no time to do justice to any of them'. Another who wanted to remain anonymous added that 'when Krishnan died and they opened his cupboards they found hundreds of unanswered letters'. A senior scientist at NPL told me 'Krishnan used to do what all our papers. Many times, our papers would be untouched. I always used to wonder what the half-life of these papers was'<sup>9</sup>.

When India became independent Krishnan moved, like many other scientists to the new laboratories of CSIR, in fact to its most heralded organization, the NPL. The choice at one level is perplexing.

What did Krishnan the scientist hope to achieve in a standards laboratory? Would he have been happier in a university laboratory with a *gurukul* of students? I would like to suggest so.

Krishnan, as director of NPL, was a disaster. True he brought to the initial years, a magic. The cafe was alive with scientists. To many of the intellectuals of that generation, it was always Krishnan's laboratory, not NPL. Krishnan, Bhatnagar, Nehru formed a strange triad of power. Legend has it that Homi Bhabha used to haunt the corridors asking Bhatnagar to get an appointment with Nehru<sup>10</sup>. Whenever Nehru was free he used to rush down to NPL for a chat, with Bhatnagar scurrying hurriedly behind.

NPL oozed with enthusiasm. The International Geophysical year saw a superb collaboration among scientists. Krishnan was happy in such a domain. But deep within, he knew that NPL was not for a celebration of esoteric science. It was an industrial research laboratory but Krishnan had little sense of this. He became captive to the dreams of science in Delhi. Nothing captures this more than the solar cooker affair. If Krishnan's biography showcased 'pure science' as play, as creativity, the solar cooker affair was NPL's first major foray into technology. In fact it represented the populist phase of NPL over which Krishnan presided reluctantly. At one level it was an exercise into what was to be later called 'Intermediate Technology'. It was also a venture into technology as salesmanship, a hardsell of a kind that only S. S. Bhatnagar could create. A scientist said, Bhatnagar offered it as a revolution. 'I remember once John Haldane came to NPL and asked what is the use of all this for a poor country. People who asked such questions were taken down to the solar unit, Bhatnagar's pride and brain-child'<sup>11</sup>.

Initial work was done on a hotbox but it was soon found that though this device was appropriate for keeping food warm it was not very useful for cooking food. By 1954, a prototype of such a cooker had been built. The NPL's solar cooker formed the subject of a BBC science programme in 1954. The firm of a Devi Dayal commenced production but the cooker was to die a sudden death. The publicity and premature claims of Bhatnagar killed it. The press had publicized it as one of the cornucopia of miracles

that was to flow from the laboratories. D.D. Kosambi in an acerbic comment captures the NPL snafu:

'Some years ago, an Indian solar cooker did appear on the market. It was shown in the news-reels in our cinema theatres. The President, the Prime Minister and others saw the demonstration and tasted a meal which as announced as having been cooked from scratch on the said cooker in just 30 minutes. The statement in itself was not improbable, but there is no cooker on the market now. Some specimens were sold quickly and the manufacturing company is reputed to have made profits by selling off the stainless steel and the machinery, whether as scrap or as useful materials. The cooker, when tried by ordinary mortals away from the newsreel cameras, just refused to work.

'Any scientist could have said why. The reflector which concentrated the solar energy was too small in area. In addition, the pot at focus was just as bright, of polished stainless steel as the reflector, thus turning away most of the heat concentrated on it. Any high-school student could have said that the cooking pot must be black outside and then calculated the necessary area for the mirror. Where were our world-famous scientists? The sole announcement that I have read was that the scientists of the National Physical Laboratory had designed the said cooker, inspired by a great thought that the then President had during his *satyagraha* days. With this bit of gratuitous publicity, the scientists returned to their profound speculations. Some of them managed to represent India at international conferences on solar energy nevertheless.'<sup>12</sup>

T. V. Ramamurthi, one of the few committed technologists in the NPL of the time, repeatedly talked of Krishnan's reluctance to engage with commercial technology. 'K. S. Krishnan was never happy with the cooker. Later when there was a backlash from parliament and press, he withdrew going off anything technological.'<sup>13</sup> Krishnan saw it as an invitation into everydayness that the scientists did not need. The world of science was the world of the paper producing scientist. It was an aesthetic world uncontaminated by the agony of pilot plants. The solar cooker affair anticipated NPL's later travails with technology. In fact one scientist told me that 'when Krishnan died, questions of relevance were unleashed. It was a time of populism in science. I remember

that there was a tennis court in NPL. They dug it up to grow vegetables after the Chinese attack as part of the 'Grow more food' campaign. It was a philistinism that wouldn't have happened under Krishnan.'<sup>14</sup> The aesthetic and cognitive delight of science was what Krishnan embodied. An aesthetics that was to collapse before a kind of populism constructed ideologically as 'relevance'.

A person listening to the stories of the time and examining the records is haunted by Krishnan as the Hamlet of industrial research with a weakness about power and bureaucracy. This part of Krishnan goes hand in hand with Ramanathan's assessment of a Krishnan as a creative thinker carrying out his 'inner *dharma* unperturbed by changing fashions'<sup>15</sup>.

There is a studied silence in many narratives about Krishnan. I once asked the astrophysicist S. Chandrasekhar about such controversies in general. He began by telling me about a note he had written, a starched Victorian piece about Srinivasa Ramanujan. It was part editorial, part observation and referred to one of the strangest moments in Ramanujan's life. When the mathematician was in England, he was utterly lonely and used to write to his wife. His mother intercepted these letters and his wife never understood till later why her husband 'never' wrote to her. Chandrasekhar's attitude was interesting. He gave me the piece and said 'don't show it to anyone'. But I said 'This is public knowledge. Read Nandy's *Alternative Sciences*'. He was upset and we began discussing other silences about leading scientists like J. C. Ghosh and Nil Ratan Dhar. Suddenly I asked Chandrasekhar about the relation between Raman and Krishnan. I was interested in it not for the sake of scandal. Sociologists are all too aware of battles for priority from Newton and Leibniz to Popov and Marconi. I felt Krishnan was too embedded in the coral reef called Raman and his students. True, Raman was *primus inter pares* but I felt the relation between Raman and Krishnan was more complex.

The conversation drifted and Chandrasekhar then talked about Yang and Lee and how they no longer talked to each other. Chandrasekhar told me that the order of names between Yang and Lee was reversed with every paper till some misunderstanding arose which signalled the end of the collaboration. He then added Raman was a difficult man. The

raconteur in him took over. 'Raman wanted a second Nobel prize for his work on flowers. To this Chinamma (his wife) replied 'with one Nobel you were impossible, with two you would be intolerable'. He was building up to something more significant. He said 'I have studied the Krishnan diaries, talked to K. Ramanathan in detail. Krishnan's was the significant experiment and he deserved credit. In fact if the real story is told it would be of two outstanding scientists.' Fear of gossip, a false sense of impropriety has kept the real story from being told but Raman's students now owe it to future generations to release the Krishnan Diaries. I want to argue this for two reasons. Firstly an injustice was done to a fine scientist. Secondly, silence creates the scandal. Fights about priority are everyday and acrimonious. This is a sociological fact. The Raman-Krishnan story is now a remote event in Indian science. We should now write about it objectively. The past is precious but not if it is a specious one or if it is constructed coyly.

It is obvious that Krishnan came to NPL burdened with this quarrelsome legacy. His life ended in a stranger irony. If his collaboration with Raman was fruitful and problematic, his stay in NPL brought to the fore a pandora's box of unresolved sociological problems – the

contiguity of science to power, the 'magical' instrumentality of pure science, the debate between science and technology, all which exploded on the public stage in the personal and ideological acrimony of the Zaheer-Atma Ram era<sup>16</sup>.

P. K. Kitchlu, the second director of NPL, was prose to Krishnan's poetry. Yet he was a no-nonsense man. Kitchlu was later maligned for his attitude to Jain who revelled in the Krishnan legacy. The Kitchlu affair, like a Chinese box, is encapsulated in the Zaheer-Atma Ram controversy, idiotically read as a battle between committed left scientists and their more bourgeois brethren. Kitchlu and Atma Ram were difficult men who were mercilessly attacked by those who masqueraded as the science policy establishment. There is a need to open these boxes and tell the truth. Here again I believe Zaheer and Atma Ram will survive. What may not survive is the self-seeking politicking of lesser scientists who hid behind ideological justifications. There is a chain of falsity connecting a lot of leading scientists. But in the end it goes back to the real story of one scientist. Krishnan's is a life of a grand scientist. It is also a tragedy, a fable. One needs to understand it especially in the year of his hundredth anniversary. The Raman effect might be science. But the story of Krishnan is part of the social

history of science in an important era. One hopes *Current Science* which has been amoral in a mousy way will provide the space for this truth. That much it owes K. S. Krishnan.

1. Ashis Nandy, *Alternative Sciences*, Allied Publishers, Delhi, 1980.
2. *Ibid*, p. 41–82, for a sympathetic psycho-analytical explanation of Bose's later years.
3. Johan Huizinga, *Homo Ludens*, Beacon Press, Boston, 1970.
4. Ramanathan, K., *J. Sci. Ind. Res.*, 1958, A17, 485.
5. *Ibid*, p. 486.
6. Shoenberg, D., *Nature*, 1961, 191, 541.
7. *Ibid*, p. 542.
8. *Ibid*, p. 542.
9. All interviews with NPL scientists collected during field work between 1975 and 1978.
10. Interview T. V. Ramamurthi, former deputy director, NPL.
11. See Shiv Visvanathan, *Organizing for Science*, OUP, Delhi, 1985, pp. 152–156.
12. Kosambi, D. D., 'The Sun' in *Seminar*, 182, Oct. 1974, p. 41.
13. Interview, T. V. Ramamurthi.
14. Interview, Scientist NPL.
15. Ramanathan, p. 485.
16. Visvanathan, 160–200 and Estimates Committee, 1966, Delhi, Reporter the NPL, Third Lok Sabha.

*Shiv Visvanathan is at the Centre for the Study of Developing Societies, 29 Rajpur Road, Delhi 110 054, India.*