

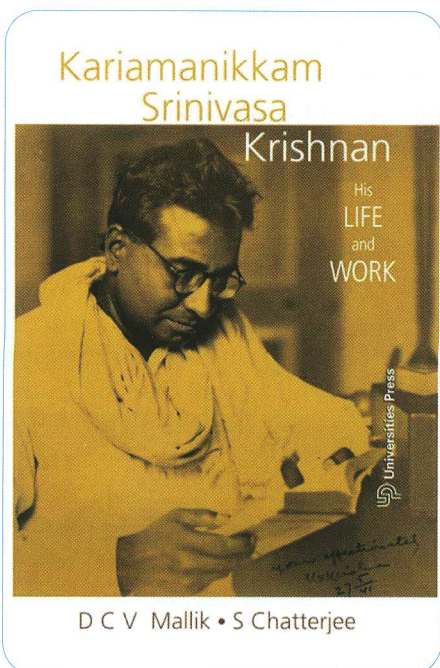
## BOOK REVIEW

### Kariamanikkam Srinivasa Krishnan - His Life and Work

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This is a book that describes not only the life and scientific work of Dr. K.S. Krishnan and those of the great Indian scientists who lived during that period, it also gives a very good picture of the life in those times, particularly the early times before independence.

It is sobering to realize that during Krishnan's childhood in the village Watrap and surroundings, electricity was unknown. In the Hindu High School in Srivilliputtur, to which Krishnan moved for further studies, the medium of instruction was English, because the founders "did not want the students of the (neighbouring) Church Missionary Society's School ...to have an edge over their students." This kind of snippets occurring throughout the

book— some humorous, some touching, some mischievous—make it fascinating to read. A glimpse of colonial India is there, for example, the reference to Macaulay's famous or, should I say infamous, idea of imparting education to create "a class of persons Indian in blood and colour, but English in tastes, in opinions, in morals and in intellect". The evolution of Krishnan's interest in science comes out very well -- science in the curriculum in the Hindu High School backed by excellent teachers, his experiments there with the Archimedes' Principle in the Fifth Form, and his college years in American College, Madurai, and Christian College, Madras(now Chennai). When I was studying B.Sc(Hons) Physics In Presidency College in Madras(where incidentally both Sir C.V. Raman and Dr. S. Chandrasekhar took the same degree in earlier years), Christian College continued to be the main competitor in Madras in Physics. When he was in Christian College, Krishnan was inspired by Raman and Ramanujan, and came to realize that "it was possible to do science sitting in India".

For young people, it is important to know how even people who became great later, went through trying times getting jobs to their liking. Krishnan liked the post of 2<sup>nd</sup> assistant at the Kodaikkanal observatory, which actually he got. But due to the interference by a more senior technical person, the job offer was changed to a more routine post in the Meteorological Office, which he did not like. His quitting the latter job was a blessing in disguise because that is what led to his working with Sir C.V. Raman.

The following chapters in the book contain an engrossing account of the development of science in India as a backdrop to the work of Krishnan, in particular, the close enmeshing of his research with that of his mentor and collaborator Sir C.V. Raman. The chapter on the "Scattering of Light", which was Raman's long-term fascination, starting from the explanation of the deep blue of the Mediterranean Sea, to the discovery of the Raman Effect in 1928, which had been earlier mistaken, in Raman's laboratory, for 'feeble fluorescence'. It was Krishnan's careful experiments which conclusively showed that it was "modified scattering rather than fluorescence". There has been off-and-on a controversy whether Krishnan should have got greater credit for the discovery of the Raman Effect, and the book has given an excellent account of the relevant facts. Krishnan was an outstanding and very careful experimenter but Raman is the greatest experimental physicist India has produced. And 'Scattering of Light' was Raman's problem.

Krishnan is most widely known for his pioneering work on the magneto-optic behavior of crystals and its relationship to their structure. As the book mentions, Lonsdale and Bhabha called Krishnan's papers in this field 'the foundation stones of the modern fields of crystal magnetism and magneto-chemistry. Most of this work was done after Krishnan joined the physics faculty at Dacca University. The book contains an excellent scientific description of this work, which led to his D.Sc. degree and later to the Fellowship of the Royal Society. The detailed scientific

explanations of Krishnan's work on magnetism (this pattern is also there in the section on light scattering), often with formulae, are most unusual for a biography but enhances immeasurably its value for a scientist reader. It comes out clearly here that Krishnan backed his experimental brilliance with significant theoretical skills, and this also helped him in choosing important problems for study.

There is a good description of the infighting in the scientific community which led to the formation of the two Academies – The Indian Academy of Sciences in Bangalore by C.V. Raman and the National Academy of Sciences in Allahabad by M.N. Saha. There is also now a third Academy, the Indian National Science Academy. There have been continued sporadic discussions over the years about the value of keeping these Academies separate or merging them. Krishnan temperamentally was above petty politics and also had excellent relationships with other leading scientists in India and abroad. The correspondence between him and Chandrasekhar, reproduced in the book, is particularly interesting. Another important facet of Krishnan's personality, mentioned in

the biography, is that 'Krishnan was very particular that his students get full credit for the work they did'. Einstein once said that 'it is not the intellect that makes a great scientist, it is his character'!

Krishnan had considerable administrative and management skills, though research and teaching were his first love. And these come out in his sojourn in Allahabad University, as he started reorganizing the Physics Department four years after Saha had left, and as the first Director of the National Physical Laboratory (NPL).

K.S. Krishnan supported Homi Bhabha strongly in his development of the atomic energy programme. The authors of the biography briefly describe the meeting hosted by Krishnan in NPL, where Bhabha in the presence of Nehru talked about how nuclear energy would satisfy the future energy needs of India and about the complex technological problems which need to be addressed. The meeting had been called to address the opposition some scientists had to the way Bhabha was initiating the atomic energy programme. The authors quote Raja Ramanna, one of the pioneers of the atomic energy programme, on how

Krishnan saved the day by exhorting the scientists to get on with the work instead of engaging in endless unproductive discussions. This Krishnan did in his characteristic style by telling the audience a story about a student of the mathematician Jacobi (who told the student). 'For heaven's sake begin somewhere, anywhere! If your father had waited to investigate all the girls before deciding to marry one, there would have been no you. Much less any of your research!' The immediate challenge to the Atomic Energy Commission, as Ramanna said, was put off by Krishnan's humour.

K.S. Krishnan was a gentleman, a man of character, full of humour—I remember being in a scientific session which Krishnan was chairing in the late fifties and he told one speaker: 'you are too fast in your delivery even for a South Indian!'—and most of all a great scientist. All this comes out in this excellent biography, written in excellent English and, I am sure, after a great deal of painstaking investigation.

Dr. R. Chidambaram

*(Dr. Chidambaram, a past President of IPA, is a former Chairman of the Atomic Energy Commission. He is presently the Principal Scientific Advisor to the Government of India)*

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