

K. S. Krishnan and the Kodaikanal Observatory

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In 1920, K. S. Krishnan was a demonstrator in chemistry in Madras Christian College. Alexander Moffat, his teacher in physics, was very fond of him and had already spotted his exceptional talent in science. So, when Moffat's friend John Evershed, the distinguished Director of the Solar Physics Observatory in Kodaikanal, mentioned to Moffat that there was an opening for the Second Assistant's position in Kodaikanal, Moffat at once recommended Krishnan for the post. Krishnan sent a formal application to Evershed and both sides were hopeful that he would soon arrive in Kodaikanal to embark on a career of research in solar physics. However, through a series of circumstances, described in this paper, Krishnan's appointment in Kodaikanal fell through and he left for Calcutta in July of the same year to enroll himself in the post-graduate programme in physics of the University of Calcutta. As his friend and the pioneer agricultural meteorologist, L. A. Ramdas later said, 'Solar Physics lost all that Physics gained by this decision of Krishnan'.

This is the story of an association that was never really consummated and one may only speculate how the course of Indian science in the twentieth century would have been affected, had it really happened.

Lewis Fermor, the eminent geologist and the first President of the National Institute of Sciences of India averred that the introduction of Western science and learning into India dates from the arrival in Calcutta of William Jones in 1783 followed by the foundation in 1784, of the *Asiatick Society*¹. Within two years of the latter development and apparently unconnected with it, a private observatory was set up in Madras by one William Petrie, a civilian in the service of the East India Company. The observatory of Petrie was located in his sprawling 11-acre estate in Egmore, Madras. It was furnished with some equipment and it soon became India's Greenwich by providing a reference meridian in British India to be used effectively by Michael Topping in his famous survey of the treacherous Coromandel Coast². Petrie's observatory was taken over by the Company in 1790 and it moved to its own campus in Nungambakkam, Madras where it functioned for more than a hundred years. It was during the last decade of the nineteenth century that serious considerations were given by the British Government in India to the founding of a modern research observatory in the newly emerging field of physical astronomy. As a result of these deliberations, a solar physics observatory was set up in Kodaikanal in the Palni Hills. The books and instruments from Madras were transferred to Kodaikanal and the Government Astronomer, C. Michie Smith, took up his residence there by the end of February 1899. The observatory formally came into existence on

1 April 1899, with Michie Smith designated the Director, Kodaikanal and Madras Observatories. There was no change in the administrative set-up except the change of venue and the administrative control remained in the hands of the India Meteorological Department, as before.

Not very far from Kodaikanal, only forty-eight miles to the south-west of the temple town of Madurai, is the prosperous village of Watrap. To the north of the village loom large the Western Ghats, reaching a height of about 4000 ft in these parts. The hills stretch southward in a semicircular pattern. Watrap is situated in the deep bay of these mountains. The rain-fed streams coming down the Ghats provide for the rich vegetation in and around, making Watrap a centre of plentiful agricultural produce. Farming has been and still is the main occupation of the people settled in the area. At the turn of the century, the period to which our story relates, the brahmins dominated the village owning most of its wetlands and the tanks. Amongst them lived a deeply religious and learned soul, known for his scholarship and profound knowledge of the Classical Tamil and Sanskrit scriptures. A Thengalai Iyengar by caste, he was popularly known as 'Kariamankkam Vathiyar'. His actual name was Srinivasa Iyengar. He lived a life of great piety in action and purity in thought. On 4 December 1898 he was blessed with a son who took the family and father's names, as per the prevailing custom, and was christened Kariamankkam Srinivasa Krishnan or K. S. Krishnan for short.

The years 1898 and 1899, Watrap and Kodaikanal – the coincidence in space and time is rather remarkable. Thus in about two decades when Krishnan, a young and talented student with a passion for science, was in search of an opening to embark on a research career, Kodaikanal Observatory as a premier research institution was also in search of motivated young individuals to fill its ranks to carry out its scientific programmes. It was but natural that the two would have sought out each other. Here is the story of what really happened.

Krishnan's early years

Krishnan's early schooling was in the rural surroundings of his native village and at the Hindu High School in nearby Srivilliputtur. After matriculation, Krishnan proceeded to study in the American College, Madurai (1914–1916) and then in the Madras Christian College (MCC, 1916–1918), where he studied in the science group II – physical sciences. He distinguished himself as a meritorious student winning the Aberdeen Prize for Physical Science in 1918. He became a favourite of Alexander Moffat, professor of physical science and a great scholar. Moffat saw in Krishnan a rare flare for science and he did not want to lose him. So, soon after Krishnan finished his studies in BA, Moffat found an opening for him in the chemistry department of MCC and prevailed upon the college authorities to offer him an appointment. In October 1918, Krishnan joined MCC as a temporary demonstrator

in chemistry. He soon endeared himself to the students. His activities extended far beyond the confines of the chemistry lab. Calamur Mahadevan, later to become a distinguished geologist and head of the geology department, Andhra University, Waltair was a student in Krishnan's lab and years later he wrote: 'He was my teacher for chemistry in the Madras Christian College some years before and beloved of all the students, on account of the interest that he took in their work. I also attended the lectures that he was giving to Biology group students in the mathematical problems of physics in the tiffin interval between 1 and 2 pm. This voluntary class was always overflowing with students not only from the Christian College but from the Pachalappa's and Presidency Colleges'.³

Many of the students in Krishnan's voluntary lunch time class later commented that they had learnt more physics there than in the regular classes. Moffat was exceedingly pleased, for he recalled the opposition he had from some quarters in the college when Krishnan was about to be appointed. He felt totally justified in imposing his choice overruling the recommendations of some of his senior colleagues.

The Kodaikanal Observatory

Since its inception, the observatory in Kodaikanal was almost entirely engaged in research on the sun, since the conditions at Kodaikanal for solar observations were excelled at few, if any, of the observatories in the world. The research programmes included the study of the physical constitution of the sun, the solar disturbances and the solar atmospheric phenomena in general. It had highly specialized instruments not to be found anywhere else in India. The pride of place belonged to the spectroheliograph, which John Evershed perfected into the finest instrument of its kind in the world. It took regular spectroheliograms in both the Ca II K and H α lines. In 1909, Evershed discovered the effect of radial flow of gases in sunspots, known today as the 'Evershed Effect'.

MCC and the Presidency College in Madras had a close association with the Madras Observatory for years perhaps dating back to the times when these colleges were first established. There are numerous instances when senior staff

members of these colleges helped the observatory in running its day-to-day administration. Michie Smith, the first Director of the Kodaikanal Observatory was a professor in MCC before he became a Government Astronomer and the Director of the Madras Observatory in 1895. He continued as the Director of Kodaikanal and Madras Observatories till 1911. In 1899, when the headquarters moved to Kodaikanal with the establishment of the Solar Physics Observatory there, the designation of the chief in Madras was changed to Deputy Director. The Deputy Director's immediate boss was the Director in Kodaikanal. By an arrangement within the Government, the professor of physics, Presidency College was assigned the additional charge of the Deputy Director of the Madras Observatory. R. L. Jones was the first Deputy Director and he continued in the same position until his retirement in 1919. During the periods of absence of Jones, one of the senior professors of either MCC or Presidency College was always requested to act as the Deputy Director of the Madras Observatory. In 1902, when Jones went on long leave, Moffat was requested to officiate in his place. Years later when Jones retired and the Government could not immediately fill up the vacancy, C. E. Barnes, professor of chemistry, MCC was asked to officiate as the Deputy Director. Krishnan was a favourite of both Barnes and Moffat.

Krishnan and Kodaikanal

Although he enjoyed his work in the chemistry laboratory of MCC and especially the tiffin-hour discussion sessions with the students, Krishnan was in search of a more permanent placement in life, one more suited to his taste. His inner desire was to take up a career in research. Moffat instinctively knew that MCC was too small a place to offer adequate opportunities to this young and talented student of his. By then the fame of C.V. Raman's Calcutta School of Physics had spread far and wide and bright and young students, especially from the south, were being attracted to it. Instead of pursuing a graduate programme in Madras, Krishnan decided to try for a seat in the M Sc physics programme of the University of Calcutta where Raman lectured regularly. He sent an application for the academic session due to begin in July 1920. He had

not yet fully decided whether to really take the plunge and leave the familiar south and travel far from home to an entirely new environment. Just then Moffat learnt that the Solar Physics Observatory in Kodaikanal was in urgent need of a suitable person to fill in a vacancy in the Second Assistant's post. He urged Krishnan to apply for it and he strongly recommended him to the Director, John Evershed. This was in February 1920.

The position of the Second Assistant had fallen vacant when G. Nagaraja Ayyar succumbed to a severe attack of influenza in October 1918. During that year a peculiar form of influenza had made its appearance practically all over the globe and in India alone a record number of five million deaths were reported, directly or indirectly caused by the killer disease. The Government Memorandum issued in June 1919 stated that 'the epidemic left behind it a legacy of minor ailments with consequent national debility'. The Kodaikanal Observatory did not escape the ravages of the epidemic for in the death of Nagaraja Ayyar, it had lost an excellent worker. In his year-end report the Director wrote: 'Mr Nagaraja Ayyar was a good observer and was very skillful in the handling of instruments. He early succeeded in photographing an excellent series of spectra of large sunspots and was the author of a paper on the weakened lines in spot spectra published in *The Astrophysical Journal*, 1907, **XXVI**, 143 (ref. 4).

The vacancy created by this premature loss of a scientist was not immediately filled. Evershed's attempts to recruit somebody locally came to nought. In February 1919, he received a letter from Gilbert T. Walker, the Director-General of Observatories (DGO) suggesting that the post be kept vacant. Almost a year went by and no action was taken. Meanwhile, the work of the observatory was getting affected, for in those days only a handful of Scientific Assistants along with the Director and the Assistant Director handled all the work. Evershed was not happy with the situation and when Walker visited Kodaikanal in the winter of 1919-1920, Evershed impressed upon him the urgent need for a qualified man in the Second Assistant's position. Fortunately, Walker agreed and suggested both he and Evershed should try their best to find a suitable person. Thus, Evershed spread the word in the

portals of MCC and Walker, on his way to Calcutta from Kodaikanal, did the same in Presidency College.

Krishnan's application was received in Kodaikanal on 17 February 1920 to which Evershed responded immediately. In his letter dated 20 February he wrote:

Dear Sir,

With reference to your application for the post of 2nd assistant at the Kodaikanal Observatory, the terms of appointment are as follows:

- (1) The pay of the post is Rs 125–10–175 with rent-free quarters.
- (2) You will serve on probation for 1 year and if approved will be confirmed in the appointment.

The nature of the work is solar observations, including spectroscopic work, spectrum measurements and reductions and the taking of spectra for measurement. You will also assist in the routine work, including preparation of bulletins for the press and in any research work that may be undertaken. There is a large amount of measuring work which requires considerable training before the required degree of accuracy is attained.

If you care to accept this appointment let me know how soon you will be prepared to come to Kodaikanal. The appointment is now vacant and there is an unfurnished house ready for occupation.

Yours faithfully,
sd/-
J. Evershed
Director

Krishnan was thrilled. This seemed to be the opportunity he was waiting for. In his school days he often dreamt that he would become an engineer some day, but later during the undergraduate years, his attention had turned mainly to physics and mathematics. Kodaikanal was closer home and Evershed's reputation as a scientist was enviable. The observatory he headed was known to be one of the best in the world. Krishnan decided he would go to Kodaikanal.

The observatory in Kodaikanal is located at the top of what came to be known as the Observatory Hill, about 5 km to the north-west of the town centre. From the hot and humid plains of the southern districts to the cool heights of the Palni Hills was a transition not so easily made by the people from the plains and taking

up an appointment at the observatory was always preceded by preparations spread over several weeks. The Government was sympathetic and generous and it allowed reimbursement of the expenses incurred in procuring the special clothing and footwear one needed to tackle the comparatively severe climatic conditions of the place. Krishnan ordered his clothes. While these were being tailored in Madras, some unexpected development took place which upset Krishnan's plans.

In the Madras Meteorological Office, part of the Madras Observatory and directly under the administrative control of the Director, Kodaikanal and Madras Observatories, there was one P. R. Chidambara Ayyar who also nurtured a desire to work under Evershed in Kodaikanal. When he heard that a rank outsider is being appointed as the Second Assistant there, he was incensed. Here was a chance for him to realize his dream, if he could just obtain a transfer to Kodaikanal, but that chance was being lost, as the Director decided to bring in a new man. Chidambara Ayyar did not let the matter rest until he had made a serious attempt. He made a representation to the authorities and requested for a transfer to Kodaikanal. Chidambara Ayyar was many years senior to Krishnan and had worked in the Madras Meteorological Office since 1914. In his plea for a transfer to Kodaikanal, he pointed out that he was already in the service of the observatories and had several years of experience. Surely the authorities could not afford not to listen, and although Evershed had already issued a letter of appointment to Krishnan, he had to find a clever way of retracting it without causing himself too much embarrassment.

Evershed did not know Krishnan at all and he thought since Krishnan was a fresh entrant, he might not mind a position in Madras, since both the observatories were administratively the same, being part of the India Meteorological Department of the British Government. However, the activities of the two were very different in nature and the Madras Observatory could not be considered a research institution by any stretch of imagination. Evershed spoke to Moffat and requested him to convince Krishnan to take up Chidambara Ayyar's position in Madras, while he committed to Walker he would transfer Ayyar to Kodaikanal. Krishnan was clear in his mind what he

wanted to do. He surely did not want to spend his precious hours in a day collecting routine data at the Madras Meteorological Office. For him it was either solar research at Kodaikanal in a proper research environment or pursuit of a higher degree in Calcutta. So, when Moffat conveyed the revised decision of the Director, Kodaikanal to Krishnan urging him to take up the position to be vacated by Chidambara Ayyar in Madras, Krishnan refused. In April 1920, Chidambara Ayyar received his appointment as Second Assistant in the Kodaikanal Observatory and soon after Krishnan heard from Calcutta that he had been offered a seat. He resigned from the demonstrator's position at MCC and started a very different kind of preparation for starting a new chapter in his life.

In all fairness, Evershed kept Krishnan's application pending, with the instruction that if ever a vacancy arose Krishnan should be made the offer. John Evershed went on long leave in May 1920. T. Royds, the Assistant Director was the Acting Director during Evershed's period of absence, which lasted till December of the same year.

Krishnan's early days in Calcutta

In July 1920, Krishnan arrived in Calcutta and took up his residence in the busy Bow Bazar area of Calcutta. He soon made acquaintance with L. A. Ramdas, N. Padmanabhan and others, all fellow students at the University College of Science and all craving for an opportunity to work with the great professor C. V. Raman. Krishnan was well-versed in Sanskrit and Tamil and he knew the epics well. So, in the spare time in evenings, he would recount stories from the epics to his friends and discuss with them the tenets of Vaishnavite philosophy to which he was deeply attracted. His friends soon realized that here was a person whose learning and interests went far beyond practising science.

The Kodaikanal episode had left an unpleasant taste and Krishnan resented what had happened. He left a trunk full of warm clothing in Madras which he had specially gotten tailored for use in Kodaikanal. He had spent a considerable amount of money on the venture and he did not know what to do with the finery. In August 1920, he wrote a polite letter addressed to the Director, Kodaikanal

Observatory with a list of what he had procured and the expenses he had incurred. Royds, the Acting Director, wrote back saying that the observatory would gladly buy the warm clothes from Krishnan, if he decided to sell them at the cost price. Krishnan accepted and intimated the observatory that he was willing. It is not clear from the records what actually happened after this. Did Krishnan follow up by arranging the clothes to be despatched to Kodaikanal? We do not know. It is clear though that the financial transaction had not yet been completed when Krishnan heard from the Director next. Perhaps Royds did not act immediately. He was still keen that Krishnan should join Kodaikanal and he was waiting for the right opportunity to make the offer.

Concluding section

In October of the same year, S. Balasundaram Ayyar, working as the Fourth Assistant at Kodaikanal Observatory expressed a desire to move to Madras for purely personal reasons, perhaps to find a suitable alliance for his growing daughter, a job that would surely be more effectively handled if he were in Madras. Balasundaram Ayyar was a hardworking man and he had not taken leave since the war started in 1914. At the same time, Edward Barnes, professor of chemistry at MCC, who was also the officiating head of the Madras Observatory, was short of staff, for the position vacated by Chidambaram Ayyar was yet to be filled. Barnes made it clear to Royds that he could not carry on with the work at the observatory forever with inadequate staff. Royds was waiting for just this opportunity. He could shift Balasundaram Ayyar to Madras and then offer his position to Krishnan.

But Royds had to ascertain first from Krishnan whether the latter was willing to come to a different grade for the Fourth Assistant's pay was starting at Rs 100, less by Rs 25 compared to the salary of the Second Assistant. Krishnan received a cable at his Bow Bazar residence in early November asking him if he would accept this somewhat lower position. Krishnan had been in Calcutta just a few months. He did not feel completely settled yet. Kodaikanal still held its charm

for him and his desire to plunge directly into research surged up again. Krishnan was hesitant. His friends Ramdas and Padmanabhan argued that Calcutta was still the better choice and Raman's laboratory was the right place for him. But they failed to convince him. After a good deal of thought Krishnan decided he would go to Kodaikanal. He replied to the cable in the affirmative.

Balasundaram Ayyar was already on leave in Madras and now he put a condition that he would happily agree to the transfer provided his leave with full pay is extended by another three months, claiming a privilege under the G.O. dated 7 March 1919, wherein a person prevented from taking leave during the war years, could actually accumulate up to six months of leave, as opposed to the normal three months allowed in peacetime conditions. Royds requested Balasundaram Ayyar to produce the required certificate that indicated that he was indeed prevented from taking leave the previous few years due to the war conditions. The latter failed to produce the certificate and Royds had no choice but to tell him that the extension of another three months of leave was possible, only if Balasundaram Ayyar was willing to forego three months of pay. Royds' plan collapsed when Balasundaram Ayyar, incensed at the Government's refusal to grant him the extra three months of privilege leave, refused to accept the transfer to Madras. He replied that he would arrive in Kodaikanal at the expiry of his three months of leave. For the second time around, the Director, Kodaikanal Observatory faced an embarrassment. In a letter dated 18 November 1920 Royds wrote:

Dear Mr. Krishnan,

I beg to thank you for being willing to take up an appointment at Kodaikanal but it now appears that there will be no vacancy in the immediate future. I am extremely sorry for this and for raising your hopes but the matter was beyond my control.

I have done my best to secure you an appointment at Kodaikanal but now there is no chance. I will bring the matter of your expenses in preparing for Kodaikanal before Mr Evershed on his return.

Yours faithfully,
sd/-
T. Royds

Obviously, as of November 1920 the observatory had not yet sent Krishnan the money they owed him for the warm clothes. Thus ended Krishnan's brief association with The Solar Physics Observatory in Kodaikanal which never went beyond the exchange of a few letters between him and the two directors of the period – John Evershed and T. Royds.

In 1945, the Government of India appointed a high-powered committee for planning the post-war development of astronomy and astrophysics in India. Meghnad Saha was appointed the chairman and K. S. Krishnan was one of its nine members along with S. K. Banerji, D. S. Kothari, A. L. Narayanan, S. Bhagavantam, A. C. Banerji, M. Ishaque and T. P. Bhaskara Sastri. This committee met several times during 1945 and 1946 but the records show that Krishnan never attended a meeting nor did he communicate his views about the planned reorganization to the Committee in writing⁵. His interest in astronomy, however, never waned and there is ample evidence that he kept abreast of the latest developments in the field and spoke on them whenever an occasion presented itself.

1. Fermor, L. L., in *Addresses by Presidents 1935–1984*, Indian National Science Academy, New Delhi, 1984, p. 3.
2. Kochhar, R. K., *Vistas Astron.*, 1991, **34**, 69–105.
3. Mahadevan, C., *South India Club Twenty-sixth Anniversary Number*, 1952–1953, p. 1.
4. Evershed, John, Report of the Kodaikanal Observatory, 1918, p. 1.
5. Post-war Plan, Astronomical and Astrophysical Observatories in India, Kodaikanal Observatory Records, 1948.

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