

## Choosing Raman's successor for Raman Research Institute

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*The Raman Research Institute, Bangalore, is an internationally recognized scientific research centre. How, soon after the founder C. V. Raman's death, it was transformed from a private work place into a state-funded national facility is a fascinating chapter in the institutional history of modern science in independent India. This transformation is discussed here in the light of primary source material not consulted before and oral history recorded expressly for the purpose.*

Chandrasekhara Venkata Raman (7 November 1888–21 November 1970), recipient of the 1930 Physics Nobel Prize, joined the Indian Institute of Science (IISc), Bangalore on 1 April 1933 as Director and professor-head of the physics department which he was asked to set up<sup>1</sup>. As desired by the Institute Council of Management, Raman resigned the directorship on 19 July 1937. He however continued as professor of physics. After superannuation in November 1948, he moved to his own Institute, Raman Research Institute (RRI), situated a short distance away.

In late September or early October 1948, Raman received appointment from Government of India as the country's first National Research Professor<sup>2</sup>. According to a government website, the professorship was instituted in 1949 and carried a monthly honorarium of Rs 2500 (ref. 3). The appointment, initially made for a period of five years, was extendable by another term of five years. 'After completion of the first term or the extended second term', the professor was entitled to a life pension. It has been claimed that Raman's appointment was for life<sup>4</sup>.

### Raman's institute

The Indian Academy of Sciences was registered in April 1934 and inaugurated on 31 July 1934 by Sir Mirza Muhammad Ismail (1883–1959), Diwan of Mysore. Raman was elected the Academy's president year after year till his death. Accepting Raman's request for the gift of a piece of land 'near enough to' IISc, the Government of the Maharaja of Mysore sanctioned, on 8 December 1934, the grant of an 11-acre plot 'for the construction of a building for the Indian Academy of Sciences, subject to certain conditions'<sup>5</sup>. According to Wikipedia<sup>6</sup>, the land could be resumed by the government after seven years, if it remained unused. The genesis of Raman Research

Institute lies in this legal requirement<sup>7</sup>. The Academy Council at its 9 December 1941 meeting resolved that 'an Institute of Research in Physics be established' as 'an independent entity' with 'Sir C. V. Raman as Honorary Director to hold office until such time as he desires to relinquish the same'<sup>8</sup>. A formal agreement to this effect was signed between Raman and the Academy on 10 February 1943 which established Raman Research Institute, and delegated 'all authority in respect of the constitution, control and management, present and future, of the said Institute' to Raman<sup>9</sup>. The construction of the building was commenced in 1943 and completed in 1948. It was occupied in 1949 (ref. 10).

As activity increased at the Academy and the Institute, the need was felt for more land. Raman obtained an additional grant of four acres of contiguous land from the Mysore Government, on 22 December 1950 (ref. 11). Five years later, on 19 October 1955, he privately purchased an additional five acres for Rs 77,842 from the legal owner, the former Maharaja of Mysore, bringing the campus to its present dimensions<sup>12</sup>. In 1956, Raman irrevocably transferred his considerable real estate to the Academy for the sake of 'the development, maintenance and working' of the Institute<sup>13</sup>. Raman had wisely invested in shares and securities. After making provision for his wife, Raman bequeathed these to the Institute.

As time passed, the future of the Institute after him occupied Raman's mind. His thoughts went to his sister's son and former student, the brilliant physicist Sivaramakrishna Pancharatnam (1934–1969), who was in Oxford from 1964 till death. From the correspondence between him and Raman, 'it emerges that Raman had been contemplating Pancharatnam as his possible successor, and had advised him to return to the Raman Institute'. However, '[W]ith utmost courtesy and respect, Pancharatnam declined to re-

turn'<sup>14</sup>. Raman now pinned hope on his Australia-based radio astronomer son, Venkataraman Radhakrishnan (1929–2011). Raman had been following Radhakrishnan's professional career with obvious pride and affection, keeping track of his research publications and enthusiastically recommending them to his associates<sup>15</sup>. A major role in persuading Radhakrishnan to agree to return to India was played by his cousin Sivaraj Ramaseshan<sup>16</sup> (1923–2003). It was recognized by all, including Raman, that Radhakrishnan valued Ramaseshan's counsel<sup>15</sup>. Three vital decisions in Radhakrishnan's life carry Ramaseshan's stamp, as we shall see: completion of formal education (1950), embarking on a scientific career (1955) and acceptance of RRI directorship (1972).

In 1968, Raman took two important initiatives which had a bearing on the succession issue. First, Radhakrishnan was made a Fellow of the Academy (probably at the 6 July 1968 meeting)<sup>17</sup>. Secondly, on 2 December 1968, Raman constituted a permanent Board of Management for the Institute which would discharge all functions and exercise all authority which Raman had so far been doing as the Director of the Institute. At the time the Board comprised five members listed in order: Raman, Lady Raman, Suri Bhagavantam (1909–1989), Toppur Seethapathy Sadasivan (1913–2001) and Gopalamudram Narayana-Iyer [G. N.] Ramachandran (1922–2001). The two last named were among the four vice-presidents of the Academy<sup>18</sup>. Raman called a meeting of the Board just two days before his death. Held on 19 November 1970 and attended by Raman, Lady Raman and Sadasivan, it co-opted three more members: Radhakrishnan, Ramaseshan and Mambillikalathil Govind Kumar Menon (b. 1928), the last two being members of the Academy Council. Raman was unable to sign the minutes which he said may be regarded as

‘having been agreed to and signed by him’<sup>19</sup>. This seems to have been the last official meeting of any kind attended by Raman.

The next Board of Management meeting was held on 3 December 1970, immediately after the mourning period was over. It was attended by Lady Raman, Sadasivan, Ramaseshan, Menon, Bhagavantam and Radhakrishnan<sup>20</sup>. ‘[a]fter a detailed discussion, the Board resolved to invite Mr V. Radhakrishnan to accept the Directorship of the Raman Research Institute. This resolution will be communicated formally to him and if he signifies his acceptance in principle, details should be gone into.’ At the next Board meeting held on 13 March 1971 and attended by Lady Raman, Sadasivan, Ramaseshan and Bhagavantam, it was ‘noted with satisfaction that Mr V. Radhakrishnan has accepted the Directorship of the Institute and indicated that he expects to join sometime early 1972’ (ref. 21). At the time, the Director of a national laboratory was placed in the grade Rs 2000–100–2500. The Board decided to place Radhakrishnan at the maximum of the grade and recorded that ‘[T]he perquisites permissible may be fixed in due course’ (ref. 21).

In the meantime, the Council of the Academy was reconstituted for the term 1971–1973. This is significant because it was the first one without Raman. Sadasivan was appointed the acting President while two previous active members, Menon and Ramaseshan, were made (two of the four) vice-presidents. Radhakrishnan was inducted into the Council as member. On 7 July 1971, Sadasivan presided over an emergency meeting of the General Body of the Academy (as distinct from the Council) attended by 34 Fellows. This was the last time the Academy discussed the Institute. The Academy gave its concurrence for the proceedings of the Board meetings held on 19 November 1970, 3 December 1970 and 13 March 1971 which, as noted above, dealt with the invitation to Radhakrishnan, his acceptance and pay fixation. The President informed the General Body that Raman had drawn up in 1968 a draft deed for the creation of a public charitable and educational trust to be called Raman Research Institute Trust<sup>22</sup>. Honouring Raman’s wish, first expressed in 1941, the Academy now resolved to decouple itself from the Institute by creating the Trust, which came into legal

existence the very next day, 8 July 1971. Its founding Trustees, in order of their listing, were Sadasivan, Lady Raman, Bhagavantam, G. N. Ramachandran, Radhakrishnan, Ramaseshan and Menon. Sadasivan signed the document twice, first as the President of the Academy and then as a Trustee of the Institute<sup>23</sup>.

It is stated in Radhakrishnan’s obituary that ‘In 1972 he [Radhakrishnan] accepted an invitation from the Raman Research Institute (RRI) Trust to return to India and head the RRI’<sup>24</sup>. This can be true only in a legal sense. As we have seen, invitation to Radhakrishnan was given by the Board of Management as early as 3 December 1970 and his formal acceptance taken on record on 13 March 1971.

The Academy records are silent on a vital aspect of the issue, namely future funding for the Institute. For his own reasons, Raman had ‘decided, as far as possible, not to accept money from Government’<sup>25</sup>. Given the force of his personality, he was able to obtain grants and donations for the Institute on ad hoc basis. He however was practical enough to realize ‘that it will not be possible for others to run or grow a good institution without funds’. He ‘therefore will not put it as a condition that no Government funds should be accepted by the Institute’<sup>25</sup>.

It was not merely sufficient to decide on Radhakrishnan as Raman’s successor. Before his actual joining, it was necessary to establish his academic credentials in the eyes of the Government and persuade it to financially support the Institute in a sustained and liberal manner. The task was undertaken and accomplished by three eminent persons: Menon with easy access to the highest echelons of power; Ramaseshan, the master strategist; and the Chicago-based Subrahmanyan Chandrasekhar (1910–1995)<sup>26</sup>. While Chandrasekhar’s physics Nobel prize was still into the future, he enjoyed formidable world-wide reputation as an astrophysicist. His support turned out to be crucial because of its international dimension.

The following narrative is based on primary source material which does not seem to have been utilized before in this context. I consulted the Subrahmanyan Chandrasekhar Papers deposited in the University of Chicago Library, in September–October 1997, during my stint as a Fulbright scholar. The papers are arranged in boxes and within a box in folders. Mrs Lalitha Chandrasekhar per-

mitted me to access the Papers except for boxes 1–9 which contain Series I, Personal Correspondence and ‘which she prefers that researchers not consult at this time’<sup>27</sup>. This Series however has no bearing on the discussion at hand. (In the following, S. Chandrasekhar Papers Box *m*, Folder *n*, is cited as SCP *m* : *n*) In the obituary of Ramaseshan, it is said that he pursued the goals to identify a successor to Raman and secure ‘adequate funding’ for the Institute ‘with the support of Satish Dhawan [1920–2002] and M. G. K. Menon’<sup>28</sup>. However, neither the Academy records nor the Chandrasekhar Papers make any mention of Dhawan. Also, Chandrasekhar’s role is known only from his own Papers.

Constructing a sequence of events on the basis of one person’s correspondence has its limitations. Even within its own framework there is scope for confusion. We know when a letter was written, but we do not know when it was received at the other end. Also, at times letters were written at the two ends more or less at the same time and would have crossed. As an aid towards appreciating the chronology, Table 1 has been prepared and details of letters cited have been given in the endnotes.

### Radhakrishnan in transition, 1950–1955

As far as formal education went, Radhakrishnan obtained his B Sc (Honours) from Mysore University in 1950. A student of Central College, Bangalore<sup>24</sup>, he had been persuaded by Ramaseshan to sit for the examination, keeping in mind the long-range advantage of having an academic degree, especially because Radhakrishnan already had plans to go abroad<sup>15</sup>. During the Second World War, many countries built radars to generate radio waves, directed them at distant objects like enemy ships and aircrafts and received the signals back after their bouncing (The acronym radar, from radio detection and ranging, did not come into existence till November 1940.). ‘[T]he Second World War placed in the hands of astronomers a new and enormously powerful tool for the exploration of space. The concentration of work on radio and radar for military purposes resulted in technical advances, in the space of a few years, which might have otherwise occupied a generation of research workers, and when these techniques were

## HISTORICAL NOTES

**Table 1.** From Raman to Radhakrishnan: important developments at Raman Research Institute, Bangalore, 1934–1972

1934 Jul. 31	Indian Academy of Sciences inaugurated with Raman as president
1943 Feb. 9	Through an agreement signed with Raman, the Academy establishes Raman Research Institute and delegates all authority with respect to it to Raman
1949	Raman Research Institute becomes functional
c. 1964	Raman invites Pancharatnam to take over after him, but he refuses
1968 (Jul. 6?)	Radhakrishnan made Fellow of the Academy
1968 Dec. 2	Raman forms a five-member Board of Management (including himself and Lady Raman) for the Institute
1970 Nov. 19	Raman expands the Board of Management with inclusion of Radhakrishnan, Ramaseshan and Menon
1970 Nov. 21	Raman dies
1970 Dec. 3	The Board of Management invites Radhakrishnan to take over as Director. He is present at the meeting.
1971 Feb. 26	Radhakrishnan writes to Chandrasekhar telling him of his acceptance of RRI directorship. Implies that Sadasivan and Ramaseshan already knew of the decision. This is the first documentary proof of choice of Raman's successor
1971 Mar. 13	The Board of Management takes on record Radhakrishnan's acceptance of the Directorship which he would join in 1972
1971 Apr. 30	Chandrasekhar writes to M. G. K. Menon promising all help towards Radhakrishnan's directorship. Accepts Ramaseshan's suggestion to obtain international assessment of Radhakrishnan's work and abilities
1971 Apr. 30	Chandrasekhar writes to J. P. Wild, J. G. Bolton and (presumably on the same day) to Jesse Greenstein, asking for testimonials on Radhakrishnan. Replies received during 10–17 May
1971 May 21	Chandrasekhar sends the three testimonials to Menon along with Radhakrishnan's bibliography compiled by him
1971 Jul. 8	Raman Research Institute Trust established
1971 Jul. 10	(Menon fixes Radhakrishnan's meeting with Indira Gandhi.) Radhakrishnan sends a telegram to Chandrasekhar requesting him to write to Indira Gandhi and follows it up with a letter
1971 Jul. 14	Chandrasekhar writes to Indira Gandhi in support of Radhakrishnan
1971 Jul. 21	P. N. Haksar writes a brief note for the Prime Minister in support of Radhakrishnan
1971 Jul. 21–23	Radhakrishnan, accompanied by Menon, meets Prime Minister Indira Gandhi sometime between these two dates
1971 Jul. 26	Indira Gandhi replies to Chandrasekhar referring to her meeting with Radhakrishnan and promising Government support for the development of Raman Research Institute
–	Radhakrishnan sent formal appointment letter
1972	Radhakrishnan joins RRI as director

applied to the investigation of these radio waves generated in the cosmos spectacular results were obtained. After the War, it was relatively a simple matter to modify the radars to receive radio waves coming from the cosmic sources.<sup>29</sup> War-time engineers now became radio astronomers. Radhakrishnan found himself among these pioneers and discovered his true calling.

An important event on the national calendar may be noted here in chronological order. A number of foreign scientists were invited to attend the 37th Indian Science Congress which began at Poona on 2 January 1950. Raman scheduled the 15th annual meeting of the Academy in Bombay during 29–31 December 1949 so that Poona-bound foreign delegates could be invited to address the Academy<sup>30</sup>. One of the important delegates was Olof Erik Hans Rydbeck (1911–1999), who founded Onsala Space Observatory as part of the Chalmers University of Technology, Gothenburg, in 1949 (ref. 31). At the Academy meeting, he spoke on the work done at his newly founded Observatory<sup>32</sup>.

Rydbeck was in India on a busy schedule. During the Science Congress, the National Chemical Laboratory was inaugurated on 3 January 1950. Subsequently, Rydbeck attended the inauguration of

National Physical Laboratory, New Delhi, on 21 January 1950 (ref. 33). He visited Raman in Bangalore also, where the pleasant task of driving him to the railway station was entrusted to Radhakrishnan. The car journey turned out to be momentous indeed. During it, Rydbeck asked Radhakrishnan to look him up if he ever visited Sweden. Radhakrishnan's Sweden visit would materialize five years later and embark him on a highly productive scientific career.

Information on Radhakrishnan's meeting with Rydbeck in Bangalore comes from Roy Booth (pers. commun., dated 9 August 2014) who succeeded Rydbeck as the Director of Onsala Space Observatory and remained in office 1981–2006. Booth knew Radhakrishnan well. During his tenure, Radhakrishnan spent six months at Onsala in 1989/90 as a Chalmers Jubileums Professor. They went together to the site of European Southern Observatory in La Silla, Chile. In Onsala, the two sailed a few times in Booth's small boat. Booth was not in Onsala when Radhakrishnan arrived in 1955, but as Booth puts it, Radhakrishnan 'made a strong impression and there are many stories about his visit'.

Radhakrishnan's activities from 1950 till 1955 are only vaguely known. For

about a year during 1951–1952, he worked as a research assistant in G. N. Ramachandran's laboratory in the physics department of IISc<sup>34</sup>. He next spent about a year at Madras Institute of Technology<sup>35</sup>. While in Madras, he met with an accident while riding a motor bicycle which permanently damaged his leg. He however received some money by way of compensation which along with the proceeds from the sale of the motorbike went into buying a ticket to England<sup>15</sup>. He went to England in August 1953 and remained there till late 1955. During his stay in London, he is said to have taken up some odd jobs including work at British Acoustic Films<sup>34</sup>, a well-known instruments company of the day within the Rank Organization, which made cameras and projectors as well as sound recording and reproduction equipment. He along with other Indians was hired as an extra for the movie *Bhowani Junction* partly filmed in England and released in 1956 (ref. 15).

A minor family reunion of sorts took place in London in August 1955. Ramaseshan who had been spending a year in USA at Polytechnic Institute of Brooklyn, briefly stopped at London on his way back to India, while his wife Kausalya arrived from India for an extended

holiday. As already planned, Radhakrishnan bought a used car on Ramaseshan's behalf and served as the 'captain' of the team, comprising himself, Ramaseshan, his wife, and one B. Vittal Rao, which went on a three-week western European tour, leaving on 11 August 1955 and returning on 3 September 1955 (ref. 36). At the time of the European tour, Radhakrishnan 'was literally on the dole' (ref. 36, p. 3). Radhakrishnan's life took a definitive direction after this.

We have it on the authority of Kausalya Ramaseshan that during his London stay and the European tour, Ramaseshan impressed on Radhakrishnan the need to do something worthwhile with his life and convinced him that he should go to Sweden to meet Rydbeck<sup>15</sup>. After the tour, Ramaseshan returned to India, but Kausalya stayed back for a time as house guest of Ramaseshan's brother Sivaramakrishna Chandrasekhar (1930–2004) in Cambridge where Radhakrishnan was a frequent visitor<sup>15</sup>.

### **Making of Radhakrishnan, 1955–1971**

Eventually, Radhakrishnan travelled to Sweden from London later in 1955, and met Rydbeck. Radhakrishnan's own version of his meeting with Rydbeck, recorded half a century after the event, is somewhat different. Radhakrishnan says he came to Sweden in late 1955, 'ran out of money, and tried to see him [Rydbeck] to ask if he could give me a temporary job in his laboratory so that I could save money for further travels. In hindsight, it is not surprising that he did not want to see me and he sent word that the laboratory had no job to offer, and he was reluctant to pay wages to an unqualified Indian to do a job he had no training to do who turned up unexpectedly at his door. At the time, I did not know there was any hydrogen in the sky, and I did not really care ... I was not looking for a career in astronomy, just some money in order to keep traveling. Despite all this, he found a job for me.'<sup>37</sup>

Booth provides an interesting account about Radhakrishnan's arrival in Onsala, from the Swedish side: 'Rad [Radhakrishnan] certainly turned up here [Onsala] in late 1955 and made his presence known to Olof. Whether he had run out of money or not, I don't know but he asked if he could work at the Observatory/Chalmers University. People were

unclear about his ability and apparently, he offered to work for a pittance on the understanding that if he turned out to be acceptable, they would reimburse him later. The 1950s were, I understand, the time of the "high" professor and it is said that Olof didn't actually speak with Rad but dealt with him through his senior staff. However, since Rad had nowhere to stay he was accommodated in Olof's department "Electron Physics" and certainly surprised the other occupant of the room, Bert Hansson, when he came in from "night-school" to find Rad in the second bed! However, Rad impressed the people in the Department and out at the Observatory – in his memoirs, Olof refers to Rad as a charming person, highly creative with lots of ideas. Radhakrishnan collaborated with Bertil Hoeglund and Joel Elder to build a radiometer for hydrogen line. Subsequently, Radhakrishnan returned to Onsala in Rydbeck's time as external examiner for Joel Elder's Ph.D.'

After spending three fruitful years 1955–1958 at Onsala as a research assistant, Radhakrishnan decided to go to USA as it 'seemed to be the only place where I could earn enough money to buy a sailing yacht before I became too old to handle it' (ref. 37, p. 143). Helpfully, Rydbeck provided a reference. John Gatenby Bolton (1922–1993) came to California Institute of Technology (Caltech) in 1955 and spent six years there before returning to Australia in 1961. In 1958, he established Owens Valley Radio Observatory<sup>38</sup>. The same year, Rydbeck wrote to Bolton saying that Radhakrishnan had 'potential far beyond the electronic engineering which he was doing at Gothenburg', and could Bolton give 'Rad a position at Caltech'?<sup>39</sup>. According to Radhakrishnan, he 'was hired to maintain the radio equipment...'<sup>38</sup>. He spent five years, 1959–1964, at Caltech as a senior research fellow. Radhakrishnan followed Bolton to Australia in 1965 where he worked first as senior research scientist and then as principal research scientist at the CSIRO Division of Radiophysics which position he held till 1971 when he moved to Meudon Observatory before returning to India in 1972 (ref. 24).

### **Developing the Raman Institute**

On 26 February 1971, Radhakrishnan sent a letter to Chandrasekhar from Australia: 'You may have heard from Sada-

sivan or Ramaseshan that I was offered the Directorship of the Raman Institute, and for some strange reason accepted it. We [Radhakrishnan and his wife Dominique] are back in Australia now and busy tying up loose ends before our departure to India in about a year's time.'<sup>40</sup> Chandrasekhar wrote in reply: 'No, I have not heard that you had accepted the Directorship of Raman Research Institute. I am surprised.'<sup>41</sup>

This is the earliest documented proof of Radhakrishnan's acceptance of the Directorship. Radhakrishnan's reference to Sadasivan and Ramaseshan as possible source of information for Chandrasekhar implies that Radhakrishnan had at least informally accepted the offer while in India itself (see discussion above; ref. 20).

It will be helpful to view Chandrasekhar's relationship with Radhakrishnan from a slightly larger perspective. On 29 December 1965, Rustom Roy (1924–2010), Director, Materials Research Laboratory, Pennsylvania State University, wrote a long letter to Chandrasekhar saying that he was probably aware that Raman planned to visit USA in 1966 to collect funds to the tune of US\$ 100,000 to endow a chair at his Institute. Roy wanted Chandrasekhar's opinion on Raman's 'chances of obtaining substantial support before I encourage him further'<sup>42</sup>. Interestingly, during this visit, Raman planned to visit, among other centres, Caltech through Radhakrishnan<sup>42</sup>. Roy could include in the itinerary any other place Chandrasekhar thought it would be worthwhile for Raman to visit. Chandrasekhar's reply of 4 January 1966 was frosty<sup>43</sup>. No, he did not know that Raman was seeking funds in USA. Since his own scientific interests lay in fields very different from Raman's, Chandrasekhar did not feel competent to make any suggestions. If Raman should come to USA and should pass through Chicago, Chandrasekhar should naturally be delighted to extend to him his personal hospitality. Chandrasekhar was sorry that he was unable to make any suggestions with respect to Roy's larger enquiries. The frostiness in Chandrasekhar's relationship with his uncle was more than made up by the warmth towards his cousin.

Chandrasekhar was in India in connection with the year-long 25th anniversary celebrations of the Tata Institute of Fundamental Research (TIFR), Bombay that began in 1970. The visit turned out to be far more important for RRI than TIFR.

We have on record letters dated 8 March 1971 (ref. 41) and 30 April 1971 (ref. 44) written by Chandrasekhar from Chicago. This suggests that he was probably in India during March–April 1971. During his stay in India, Chandrasekhar took the opportunity to visit Madras and Bangalore and acquaint himself with the RRI affairs. He communicated the essence of his various conversations to Menon in a confidential and private letter written on 30 April 1971 (ref. 44). Chandrasekhar recorded that ‘My general impression was that Lady Raman was slightly disappointed that the Board of Governors was not more active.’ [There was no Board of Governors, only Board of Management; after Raman’s death the governance of the Institute vested in the Academy Council.] Chandrasekhar further added ‘More generally I got the impression that Bhagavantam was playing a somewhat obstructive role’<sup>44</sup>. Those who were in the know of things through their contacts with the main players then believe that Bhagavantam was himself interested in the job as were some other seniors<sup>15</sup>.

On his own part, Chandrasekhar assured Lady Raman, Ramaseshan and Sadashivan that ‘I have no wish to interfere in any way with the way the Board of Governors of Raman Institute execute their responsibilities, but if there is any way at all that I can be helpful, then I shall do my best to cooperate’<sup>44</sup>. Ramaseshan made a ‘positive suggestion’ on which Chandrasekhar agreed to act immediately. Ramaseshan asked Chandrasekhar to ‘obtain a carefully documented assessment of Dr Radhakrishnan’s unique qualifications for the Directorship’, as ‘such an evaluation would strengthen the positions both of Dr Radhakrishnan and of Board of Governors [in the eyes of the Government]’<sup>44</sup>.

The day he wrote to Menon (30 April 1971), Chandrasekhar also wrote a personal and confidential letter to John Paul Wild (1923–2008), Chief of CSIRO Division of Radiophysics, saying by way of preamble that ‘while the Board of Trustees of Raman Institute [no such body existed at the time] have offered the position to Dr Radhakrishnan, they are not as fully aware, as I believe they should be, of his accomplishments as a radio astronomer’<sup>45</sup>. Could Wild enlighten them? Similar letters were sent to Bolton and to Jesse L. Greenstein, professor and executive officer for astronomy at Caltech. Bolton sent his reply on 10 May 1971

(ref. 39), Greenstein<sup>46</sup> on 11 May, and Wild<sup>47</sup> on 17 May 1971.

In the meantime, on 9 May 1971, Menon sent his reply to Chandrasekhar’s letter of 30 April 1971. Like Lady Raman he also lamented the tardiness. ‘With regard to Raman Research Institute I must admit that things have moved a bit slowly. I am, however, fairly satisfied that they have moved in the right direction. In Dr Radhakrishnan, that Institute will have a very fine Director. The Board of Management has made him an offer which he has accepted; it was a great surprise that he did so, but also most fortunate.’ Note that like Chandrasekhar, Menon also expresses surprise at Radhakrishnan’s acceptance. Menon continued: ‘It would be very nice to have from you [Chandrasekhar] an evaluation concerning him and his qualifications for the Directorship; such a document would be an important one which would strengthen our hands to the more important task of developing the Institute.’<sup>48</sup> Here, Menon makes the same point from his side which had already been made by Ramaseshan. Developing the Raman Institute was indeed the key issue. Without the Government’s agreeing to do it, there would be no point in bringing Radhakrishnan back.

There was an interesting side point on which Chandrasekhar and Menon differed. In his 30 April 1971 letter, Chandrasekhar had written: ‘Since Dr Radhakrishnan is a radio astronomer, it seems to me that some kind of formal agreement between your Institute and the Raman Institute with respect to the accessibility of your radio telescope [installed at Ootacamund under the leadership of Govind Swarup (b. 1929)] to Dr Radhakrishnan will be very useful’<sup>44</sup>. Menon was not enthused. ‘I do not think that a formal agreement between TIFR and RRI concerning the availability of the Ooty telescope is really necessary ... The radio astronomers at this Institute, and I, have friendly relations with Rad and respect for his abilities.’<sup>48</sup> It is easier to maintain friendly relations if the domains do not intersect.

Chandrasekhar replied to Menon’s 9 May letter on 21 May 1971. The reply is significant because of its annexures. Before attempting ‘careful evaluation’ of Radhakrishnan’s contributions to radio astronomy, Chandrasekhar decided to ‘first obtain the evaluations of Bolton, Wild, and Greenstein’, all of whom had

been closely acquainted with Radhakrishnan. Chandrasekhar explained: ‘Their letters which I am enclosing provide so complete and detailed statements that any further attempt on my part would be superfluous.’ While praising the high standard of his published work, the three experts spoke glowingly of Radhakrishnan’s other sterling qualities. Bolton particularly referred to ‘his ability to contribute significantly to the work of other people’ which ‘will ensure his success at the Raman Institute’<sup>39</sup>.

Greenstein pointed out that Radhakrishnan ‘was particularly valuable to us for the many ingenious ideas he had for novel and effective use of radio equipment’. I am sure he will be equally ingenious in discovering applications for the new, large telescope in India, and that his original mind will lead others in his Institute in the proper directions to contribute to international science<sup>46</sup>. Wild said of Radhakrishnan: ‘He is only satisfied with deep understanding of any concept and his interest increases with the strangeness or significance of the phenomenon.’ Wild drew attention to a number of his characteristics including ‘his desire to discuss matters with people at all levels, [and] his concern for the lower ranks who are doing a first rate job’<sup>47</sup>.

Helpfully, Greenstein prepared a bibliography of Radhakrishnan’s publications brought out during his Caltech days, pointing out that one of Radhakrishnan’s collaborators was a Ph D student Robert Woodrow Wilson (b. 1936), later ‘the co-discoverer of the 3°K background radiation, supposedly the remnants of the Big Bang’<sup>46</sup>. Interestingly, this was written seven years before the 1978 announcement of a share for Wilson in the physics Nobel prize. On his part, Chandrasekhar compiled ‘a fairly complete bibliography’ of Radhakrishnan’s papers, proudly pointing out to Menon, as he had done to Wild, that five of these appeared in the last *Astrophysical Journal Supplement* under Chandrasekhar’s editorship<sup>49</sup>. Incidentally, while discussing Radhakrishnan, Wild particularly referred to ‘his modesty’<sup>47</sup>. Indian observers would probably have failed to notice this trait on their own. It should however be noted that Radhakrishnan’s persona was not based on the office he came to hold.

The same day (21 May 1971) he wrote the above letter to Menon, Chandrasekhar addressed a letter to Radhakrishnan

in which he philosophized: 'As I told Ramaseshan, in India people often try to solve problems by hoping for miracles; in this instance [RRI Directorship] it seems to have worked.' More to the point was the next part: 'I admire your courage in accepting the Directorship; and if there is any way at all in which I can be of assistance to you, I should be more than delighted.'<sup>50</sup> Earlier, Chandrasekhar had assured Lady Raman, Ramaseshan and Menon that he would further Radhakrishnan's cause. Now, for the first time, he was directly assuring Radhakrishnan of his assistance.

### Indira Gandhi

Armed with the international endorsement of Radhakrishnan, Menon and Ramaseshan back home were now in a position to take the next, vital, step. Menon arranged a meeting for Radhakrishnan with Prime Minister Indira Gandhi. The meeting took place sometime between 21 and 23 July 1971 and was attended by Menon also. As part of preparation for it, Radhakrishnan sent a telegram to Chandrasekhar and followed it up by a confirmatory letter. The telegram has not survived, but the letter has. It is dated 10 July 1971 (ref. 51); presumably the telegram was sent the same day or a little earlier. The telegram was sent 'After much consideration and consultation with Dr Ramaseshan', who alone knew about it<sup>51</sup>. Chandrasekhar would have 'gathered from the telegram' that 'things have proceeded more rapidly than anticipated'. Menon told Radhakrishnan that 'a meeting with the Prime Minister might come off, and that it was advisable to bring her into the picture even at this early stage'. Radhakrishnan 'felt that if I was going to see her, it might make all the difference if she had your [that is Chandrasekhar's; underlined in the original] opinion both as to my standing abroad and also as to the degree of support necessary to make the Raman Institute worthy of the name'<sup>51</sup>.

The letter of course took its time arriving. Chandrasekhar's response was to the telegram itself. Since he was at the time on a brief visit to Massachusetts Institute of Technology, he could comply with Radhakrishnan's telegraphic request only on 14 July 1971 (ref. 52). That day he wrote a letter to Indira Gandhi 'about the future of the Raman Institute, in Bangalore'. Chandrasekhar wrote: 'While I was recently in India in connection with the

twenty-fifth anniversary celebrations of the Tata Research Institute, I had the occasion to meet several members of the Board of Management of the Raman Institute; and I was very favorably impressed with the steps they had already taken towards its future development.' He continued: 'In particular, I am in wholehearted support of their having offered the Directorship of the Institute to Dr Radhakrishnan.' Chandrasekhar referred to 'the careful evaluation of Dr Radhakrishnan's qualifications' by several leading radio astronomers of the United States and Australia which he had secured for the Board of Management and which 'amply confirm my own'.

Chandrasekhar pointed out to the Prime Minister that the Institute 'is presently orientated towards the personal needs of its late founder'. 'The appointment of a radio astronomer to the directorship of the Institute together with the need to modernize' it requires 'a substantial financial investment far beyond the present assets of the Raman Institute'. 'I am fully convinced that such an investment will not only make the establishment of a truly lasting memorial to the immense contributions that Professor Raman made to India during his long life, but it will also secure for India the return, under challenging circumstances, of a distinguished scientist whose services have hitherto been in other lands.'

Chandrasekhar went on to say that 'Dr Radhakrishnan's deep humanity, to which his Australian colleagues have testified, will serve the cause of science in India most well'. Chandrasekhar concluded by saying: 'I should greatly hope that the Raman Institute can look to you for an understanding of its goals', significantly adding that 'And I should myself be willing to assist the Institute in any way I can'. Chandrasekhar replied to Radhakrishnan's confirmatory letter on 26 July 1971. He 'greatly' hoped 'that she [Indira Gandhi] will have received my letter prior to your appointment with her. I hope my letter serves some purpose, but I was glad to write'<sup>53</sup>.

We have an interesting document from within the Prime Minister's office pertaining to Radhakrishnan's meeting with Indira Gandhi. Her influential personal secretary during 1967–1973, Parameshwar Narayan Haksar (1913–1998), prepared a briefing note for the Prime Minister. It is signed by him, marked 'Internal' and dated 21 July 1971. He wrote

by way of introduction that 'I had asked P.S. to P.M. (N. K. Seshan) to arrange for Professor M. G. K. Menon and Dr V. Radhakrishnan to call on P.M. I presume this is being done'. Haksar pointed out that Radhakrishnan is personally most allergic to being identified as son of his distinguished father. In point of fact, he left this country for Australia only to escape being submerged in the dominant personality of his father. [Haksar is right to the extent that Radhakrishnan left the country; Australia became his destination much later.]

Haksar continued: 'I am glad he did this. He has now blossomed forth as one of the world's leading astrophysicists. Although he has agreed to become Director of the Raman Research Institute, he is still extremely sensitive and apprehensive. His main concern is to assure himself that he will receive blessings and support from Government for his ideas on how the Raman Research Institute should develop.' Haksar finally came to the operative part of his note: 'I submit that P.M. should give him encouragement and express the hope that he will develop his proposal and that P.M., on her part, will give support. The amounts involved are pitifully small, but if Dr Radhakrishnan comes and takes up his residence, we will have in Raman Research Institute one of the finest institutions of scientific eminence from world standards.'

On 26 July 1971, Indira Gandhi sent a graciously worded reply to Chandrasekhar which is consistent with Haksar's note. She pointed out that 'Dr Radhakrishnan came to see me a few days ago and I was impressed with his presentation of the lines along which he would like to develop the Institute'. Radhakrishnan's proposal, a copy of which was also given to C. Subramaniam, Minister for Science and Technology, 'may need to be studied from the substantive and administrative points of view', but she concluded with the assurance that 'I do not see any difficulty, in principle, to Government giving financial support to the Raman Research Institute'<sup>54</sup>. Indira Gandhi kept her word, and Raman Research Institute was transformed from the founder's personal work place into a state-funded national research facility under the founder's son.

The work carried out by Radhakrishnan and co-workers won international recognition. We have already noticed his 1989–90 visiting professorship at Onsala.

## HISTORICAL NOTES

He was awarded a Honorary Doctorate (Doctor Honoris Causa) of the University of Amsterdam on 8 January 1996. As Edward P. J. van den Heuvel, who recommended Radhakrishnan's name, explained: 'Our University, at the date of its anniversary (January 8) each year, bestows a honorary doctorate on one to three scientists from elsewhere in the world, who have made outstanding contributions to their field of research and have cooperated with scientists of our university (Edward P. J. van den Heuvel, pers. commun., 8 May 2014).

As the executive head, Radhakrishnan did not believe in hierarchy and was averse to red tape. His enthusiasm for research was infectious. He encouraged independent thinking and welcomed new ideas no matter where they came from. More important than his personal accomplishments has been his role in defining the culture of the new institute which inspires and attracts young talent.

1. Precise date of Raman's joining comes from Subbarayappa, B. V., In *Pursuit of Excellence: A History of the Indian Institute of Science*, Tata McGraw, New Delhi, 1992, p. 112.
2. *Curr. Sci.*, 1948, **17**, 292 (The issue is dated 10 October).
3. <http://pib.nic.in/newsite/erelease.aspx?relid=53708>
4. Parameswaran, Uma, *C.V. Raman: A Biography*, Penguin, New Delhi, 2011, p. 217.
5. Government Order G. 99-103/G. W. 124-34-8 (originally handwritten).
6. [http://en.wikipedia.org/wiki/Raman\\_Research\\_Institute](http://en.wikipedia.org/wiki/Raman_Research_Institute)
7. Venkataraman, G., *Journey into Light: Life and Science of C. V. Raman*, Oxford University Press, New Delhi, 1988, p. 418.
8. Hand-written minutes of the Academy Council Meeting, 9 December 1941.
9. Photocopy of the original agreement.
10. Bhagavantam, S., *Biographical Mem. R. Soc.*, 1971, **17**, 565–592; see pp. 575–576.
11. Government of Mysore Order No. 13144-13150/G.B. 320-50-1.
12. Photocopy of the sale deed.
13. Photocopies of various transfer deeds.
14. Series, G. W., *Curr. Sci.*, 1994, **67**, 290–292; see p. 292.
15. Kausalya Ramaseshan (b. 1929), personal conversation. Her memory is still very sharp and she was kind enough to converse with me on telephone a large number of times.
16. Ramaseshan was the elder brother of Pancharatnam mentioned above. Incidentally, Ramaseshan's first name is his pet name rather than his father's personal name.
17. The website of the Indian Academy of Sciences says that Radhakrishnan was elected in 1968. But the minutes of the 2 December 1968 meeting do not mention his name among the 10 Fellows elected. He therefore must have been inducted at the preceding meeting held on 6 July 1968.
18. Minutes of the Academy meeting held on 2 December 1968.
19. Minutes of the Meeting of the Board of Management, 19 November 1970.
20. Minutes of the Meeting of the Board of Management, 3 December 1970.
21. Minutes of the Meeting of the Board of Management, 13 March 1971; see para 2.
22. Proceedings of the Emergency Meeting of the Indian Academy of Sciences, 7 July 1971.
23. Indenture of RRI Trust executed on 8 July 1971.
24. Nityananda, R., *Curr. Sci.*, 2011, **100**, 1090–1091; see p. 1090.
25. Ramaseshan, S., *Curr. Sci.*, 1971, **40**, 248.
26. Chandrasekhar was the son of Raman's brother.
27. E-mail dated 20 September 1997 to me from Daniel Mayer, Department of Special Collections, University of Chicago Library.
28. Srinivasan, G., *Curr. Sci.*, 2004, **86**, 224–226; see p. 225.
29. Lovell, A. C. B., *J. R. Soc. Arts*, 1955, **103**, 666–682; see p. 669.
30. Singh, R. and Riess, F., *Notes Rec. R. Soc. London*, 2004, **58**(1), 47–64; see p. 59.
31. Booth, R., *Bull. Am. Astron. Soc.*, 2001, **33**(4), 1580–1581.
32. *Curr. Sci.*, 1950, **19**(1), 4.
33. Rajagopal, N. R., Qureshi, M. A. and Singh, B., *The CSIR Saga*, CSIR, New Delhi, 1991, p. 108.
34. Nityananda, R., pers. commun., 2014, RRI website ([http://www.rri.res.in/htmls/library/imprints\\_collection/bios/radhakrishnan.html](http://www.rri.res.in/htmls/library/imprints_collection/bios/radhakrishnan.html)) says he was hired as a research scholar, which is unlikely.
35. Ref. 15. The stint at Madras Institute of Technology is not mentioned on RRI website (ref. 34), which leaves a blank for the year 1952.
36. Ramaseshan, Kausalya, *The Austin Princess of 1928 and her Travels with her Passengers*, 2009, p.12; see pp. 5 & 11. This publication, based on the author's jottings in the diary of the period, was brought out on the occasion of Radhakrishnan's 80th birthday at his insistence and a copy presented to him (Author, pers. convers.). The publication itself does not carry any date.
37. Radhakrishnan, V., *J. Astr. History Heritage*, 2006, **9**(2), 139–144; see pp. 142–143.
38. Radhakrishnan, V., *J. Astrophys. Astr.*, 1993, **14**, 115–120; see p. 117.
39. Bolton, J. G. to Chandrasekhar, 10 May 1971 (SCP 25:10).
40. Radhakrishnan to Chandrasekhar, 26 February 1971 (SCP 25:10).
41. Chandrasekhar to Radhakrishnan, 8 March 1971 (SCP 25:10).
42. Rustom Roy to Chandrasekhar, 29 December 1965 (SCP 26:4).
43. Chandrasekhar to Rustom Roy, 4 January 1966 (SCP 26:4).
44. Chandrasekhar to Menon, 30 April 1971 (SCP 22:1).
45. Chandrasekhar to Wild, 30 April 1971 (SCP 25:10).
46. Greenstein to Chandrasekhar, 11 May 1971 (SCP 25:10).
47. Wild to Chandrasekhar, 17 May 1971, Personal (SCP 25:10).
48. Menon to Chandrasekhar, 9 May 1971 (SCP 22:1).
49. Chandrasekhar to Menon, 21 May 1971 (SCP 22:1).
50. Chandrasekhar to Radhakrishnan, 21 May 1971 (SCP 25:10).
51. Radhakrishnan (from Bangalore) to Chandrasekhar, 10 July 1971 (SCP 25:10).
52. Chandrasekhar to Indira Gandhi, 14 July 1971 (SCP 25:10).
53. Chandrasekhar to Radhakrishnan (replying to his letter of 10 July 1971), 26 July 1971 (SCP 25:10).
54. Indira Gandhi to Chandrasekhar, 26 July 1971 (SCP 25:10).

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