

S. Chandrasekhar and C. V. Raman—Some letters

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Some early correspondence between S. Chandrasekhar and C. V. Raman has recently come to light. These letters reveal the relationship that existed between uncle and nephew, two amongst the greatest scientists India has produced. The collection comprises nearly 50 letters, but in this article I will attempt only to give a flavour of the correspondence. In my selection I have given preference to those relating to interesting incidents that do not appear in Wali's biography.

Already by 1927 Chandrasekhar had decided to devote himself to research; '... like my uncle ... at that time I knew the names of only two Indian scientists, Ramanujan and Raman. They were in a sense my role models' (Wali, p. 56). When he was in the first year BA Hons., Chandrasekhar spent the summer of 1928 in Raman's laboratory in Calcutta. At the age of 17 he wrote his first scientific paper 'The Thermodynamics of the Compton Effect with reference to the Interior of Stars' and Raman published it in the *Indian Journal of Physics* (1928, 3, 241). The next year Chandrasekhar wrote his second paper entitled 'The Compton Effect and the New Statistics', which appeared in the *Proceedings of the Royal Society* (1929, 125, 231). According to colleagues present at the time, Raman remarked that 'This young man shows all the signs of being a genius. He will surely leave an indelible mark on physics.' Chandrasekhar left for England in July 1930. On board the ship he wrote his famous paper 'The maximum mass of ideal white dwarfs' (published in the *Astrophysical Journal*, 1931, 74, 81). Since then till 1944 Chandrasekhar sent reprints of every one of his publications to Raman who always acknowledged them. Raman's letters usually had a congratulatory part, a chatty/newsy part and an enquiry about his nephew's well being and scientific progress. The letters were always typed, began with 'My dear Chandrasekhar' and ended 'Yours affectionately, C. V. Raman'. Most of Chandrasekhar's letters were hand-written, and often had a nostalgic part, asking for news from India and the state of science here.

Early letters

Extracts from a typical letter written soon after Raman left Calcutta and moved to Bangalore:

Bangalore
19 July 1933

My dear Chandrasekhar,

I am delighted to receive the reprints of your series of papers on 'Distorted Polytropes' and hope that you will continue to have striking success in your future work as in the past. I have now been over three months at Bangalore and I am not fully acclimatized.... As I am only member of the physics staff progress in organizing the new department has been very slow.

Ultimately, I think the department should have at least three lecturers, one for theoretical physics, one for experimental physics and one for applied physics. But I am not making these appointments until men with requisite capacity and energy are available...

I hope you will find time to write to me a few lines occasionally about your progress.

Yours affectionately,
C. V. Raman.

In early 1934 Raman proposed that Chandrasekhar (just 23 years old) be a Founder Fellow of the Indian Academy of Sciences which Raman was establishing.

In 1935 Raman seems to have assured himself that there was one with '... requisite capacity and energy' and offered Chandrasekhar an Assistant Professorship (not lectureship) at the Indian Institute of Science - (Wali, p. 155).

Extracts from Chandrasekhar's reply:

My first impulse was to send a cable accepting the offer; but on second thoughts I am becoming diffident as to whether I could do justice to the position.... I am afraid I may prove a disappointment for them (the experimental physicists)....

There is one other rather delicate matter. I have had reports that a certain part of the press... is violently antagonistic to you. I realize of course that such attacks are launched by people... who are jealous of the powerful school you are building around yourself. I am a little afraid that... (the press)... might start a fresh scheme of scandals, if I were appointed to a position at your Institute....

Yours affectionately,
S. Chandrasekhar.

Kameshwar Wali in his biography suggests that this letter refusing the job was written by Chandrasekhar with tongue in cheek to pull the wool over the eyes of an 'an elderly uncle...'. He may be right. But there could be another point of view. Over the years, Chandrasekhar rejected more than a dozen job offers from India, including the Chairmanship of the Atomic Energy Commission. One could well understand his not accepting offers like the AEC Chairmanship, Vice Chancellorships, Directorships, etc., because of the administrative chores associated with them. On the other hand, at least seven others, were amongst the best academic positions that the country could ever offer any active scientist - faculty positions at the Indian Institute of Science; the universities of Dacca, Allahabad, Andhra, TIFR, Jawaharlal Nehru University, etc. Consistently he found valid reasons to reject them, but always with ambivalence. One part of him had a nostalgic yearning to come back, while the other was suspicious whether conditions in India would be conducive to his scientific development. His decisions must have been made more difficult by his colleagues wanting him to stay back. Wrote Otto Struve to C. V. Raman (24 May 1941) when the Allahabad offer was made (to occupy the chair previously

occupied by M. N. Saha and K. S. Krishnan).

When I asked Chandrasekhar to come to Yerkes I knew he was one of the most brilliant young astrophysicists of the world . . . I should have regretted it greatly, if Chandrasekhar had decided to leave . . . (for Allahabad).

Nostalgic letters

My dear uncle,

I was delighted to learn this morning that you have been awarded a Franklin medal. Please accept my sincere congratulations on this most deserved recognition. I feel that the terms of the award are particularly appropriate and it is fitting that your leadership should be thus explicitly recognized . . .

As Krishnan and Bhabha are two further Fellows of the Royal Society, Indian physics has certainly come of age. I wish that circumstances had been that I too could have taken some part in this renaissance . . . (underlining is mine)

*Yours affectionately,
S. Chandrasekhar.*

Fellowship of the Royal Society

By 1941 the stack of reprints had increased to nearly 60, and Raman decided to propose Chandrasekhar to the Fellowship of the Royal Society (for the year 1943). On 24 June 1941, he sent a cablegram:

DESIRE PROPOSE YOU FOR FELLOWSHIP.
CABLE CONCURRENCE MENTIONING
NAMES OF FIVE BRITISH FELLOWS WELL
ACQUAINTED WITH YOUR WORK . . .

- RAMAN

The reply was immediate:

Many thanks, Milne, Fowler, Eddington, Jeans and Whittaker.

- Chandrasekhar.

Raman decided that E. A. Milne of Oxford who had collaborated with Chandrasekhar in 1932 should be the one to second the proposal.

28 July 1941

My dear Prof. Milne,

I have been watching with pleasure and admiration the splendid work

which Dr Chandrasekhar has been doing in the field of astronomy and astrophysics; and have felt that it would be appropriate to put him up for election to the Fellowship of the Royal Society. I have prepared the accompanying certificate on his behalf and am enclosing it herewith for your kind consideration.

I shall be most grateful if you could kindly consent to be his seconder and also arrange to obtain the signature on the forms of other Fellows in Great Britain who are familiar with Chandrasekhar and his work and forward the papers to the Society.

Professors Fowler, Eddington and Whittaker and Sir James Jeans amongst others know Chandrasekhar and his work well. I am sending them copies of the certificate requesting them to support . . .

*Yours sincerely,
C. V. Raman.*

Raman received letters agreeing to support Chandrasekhar from Sir James Jeans (I have signed it with much satisfaction),

R. H. Fowler, H. H. Plaskett (*I am delighted that you have taken the initiative in bringing his name forward*) and A. S. Eddington (*I appreciate Chandrasekhar's fine work in astrophysics and particularly in dynamical astronomy and have much pleasure in supporting his candidature*) [see box] and Milne (*I am glad indeed you have nominated him this year, for as it happens a number of astronomers are being proposed just now. I am glad to help to sponsor Chandrasekhar as he and I have been such good friends ever since his first coming to Cambridge from India*).

He also wrote to K. S. Krishnan, H. J. Bhabha and Birbal Sahni the Indian Fellows and they too signed the certificate.

On 21 March 1944 Raman's cable read:

Warmest greetings from Bangalore physicists rejoicing in your election to the Fellowship of Royal Society.

Chandrasekhar's reply was:

25 March 1944

My dear uncle,

It was a special pleasure receiving your cablegram and the greetings from

1941 Oct. 29

Dear Su Venkata

I appreciate Chandrasekhar's fine work in astrophysics and latterly in dynamical astronomy and have much pleasure in supporting his candidature.

Prof. Milne sent me the certificate a few weeks ago, so that I have added my signature

With kind regards

yours sincerely

A. S. Eddington

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

Yours affectionately,
Laliha &
S. Chandrasekhar.

Announcing Chandrasekhar's election Raman wrote an article in *Current Science* (1944, 13, 66) which ended with:

Chandrasekhar is one of that small rare group of men who combine a profound grasp of physical theory and principles, an unrivalled grasp of mathematical analysis and a deep and abiding interest in the phenomena presented to us by Nature in the fields of physics and astronomy. The names of Newton, Laplace and Einstein spring to the mind when we contemplate the history of astronomical science and the debt to men who have exhibited this combination of qualities. In the achievement of Chandrasekhar during the past fifteen years we have at least a promise of a career which should place him in the front rank of the world's great astronomers. The cordial wishes of all our readers will go out to encourage him in his future activities and to wish him and the talented young lady who shares his home at Yerkes observatory an uninterrupted welfare and happiness.

Chandrasekhar must have been very happy as his childhood dream of becoming an F.R.S. was fulfilled. One could comment that since his colleagues in England had not proposed him and had even given higher priority to others, Raman's spontaneous initiative proved timely and welcome.

Proposal for the Nobel Prize

17 November 1948

My dear Chandrasekhar,

I have an idea of proposing you for the Nobel Prize in Physics. I wonder whether you would consider such a move premature

Yours affectionately,
C. V. Raman.

To this Chandrasekhar replied:

29 November 1948

It is certainly flattering to know that you are considering proposing me for the Nobel Prize. Besides the fact that astronomers are not eligible for the Prize (they would not consider Russel or even Bethe for his discovery of the carbon cycle) . . . why, for example, have they not considered G. I. Taylor whose claims for the Prize seem to me obvious. I am not being falsely modest in any sense, but I sincerely feel that it would be inappropriate to have my name forwarded to the Nobel Committee

Yours affectionately,
S. Chandrasekhar.

Raman persisted and in 1949 he wrote:

21 December 1949

My dear Chandrasekhar,

. . . I do not think however the argument that astronomers are ineligible for the Prize is correct . . . If I could have (such) a statement of your achievements it would be easier for me to say there is a prima facie case for you or not

Yours affectionately,
C. V. Raman.

Chandrasekhar refused again:

28 December 1949

I do not think that anything I have done qualifies for the Nobel Prize In the very remote possibility of my qualifying for the Nobel Prize would it not really be more appropriate if an astronomer . . . more conversant with my work, than I have any right to expect of you, sends in my name . . . I do request you to regard my refusal as final, . . . I assure you of

my very great appreciation of your interest.

Yours affectionately,
S. Chandrasekhar.

It so happened that I went to see Raman in early January 1950 when the above letter of refusal had just arrived. After reading it he showed it to me along with the previous letter of 21 December 1949. Replying to many of my queries he started musing:

I thought of proposing him to the Prize as he is definitely Nobel Prize material. The more important reason was because of the paper he wrote from Copenhagen when he was just 21 or 22. He concludes that in a star having a mass greater than a particular value, the perfect gas equation of state does not break down. The consequence of this is that as the pressure increases due to the inexorable gravitational contraction the star cannot but go through a central singularity. Absurd is what normal common sense would say; so would I have said. But Chandrasekhar, in my view, is different. All his later papers completely vindicate his original stand. If this prediction turns out to be true he was clearly opening up a completely new chapter in Physics.

Twenty-five years later Chandrasekhar was awarded the Nobel Prize. Had Raman been alive it would have warmed the cockles of his heart. His cup of joy would have overflowed with the knowledge that Chandrasekhar got the Nobel Prize for the work he had guessed as being worthy of it.

It is not as if Chandrasekhar had not considered previously the possibility of the Prize for his work. '*. . . thought of the Nobel Prize had my work in the early thirties received recognition without the unhappy controversy with Eddington*' (Wali, p. 296).

The Raman Institute

1 August 1943

My dear uncle,

This is just to say how very pleased I was to learn from some announcements I have lately received from the Indian Academy of Sciences, at long last you have now the opportunity to build an Institute entirely according

to your fashion . . . I feel confident that the building of the Institute will be a crowning achievement in a life full of achievements . . .

*Yours affectionately,
S. Chandrasekhar.*

In almost every letter after this Chandrasekhar enquires about the progress of the Institute. Raman kept him informed at each stage—about the construction of the main building, the workshop, the hostel, the admission of students, etc.

Some other letters

Raman, in a series of letters, poses many questions to Chandrasekhar about the origin of the magnetic field in sunspots, the limit of faintness of the stars visible with the naked eye, how the celebrated Olbers paradox was resolved by modern cosmological theories and so on. For all these questions Chandrasekhar pens replies and sends him relevant papers/reprints, etc.

The following two letters could be of some interest:

22 October 1960

My dear uncle,

I was delighted to receive the other day a copy of your 'Lectures on Physical Optics' with your inscription. I had earlier seen this book with Pancharatnam when he visited us last summer. I was most impressed with this book at that time, and I am very happy now to possess a copy.

By accident it happens that I am lecturing on advanced optics and I intend to make use of your book in these lectures . . .

*Yours affectionately,
S. Chandrasekhar.*

Chandrasekhar once remarked to me (after Raman's death):

There is no doubt that in optics he was a master and belonged to the small band of greats like Rayleigh, Michelson and others.

A letter addressed to Chandrasekhar when he was in India:

9 December 1961

My dear Chandrasekhar,

A few days ago I received from Oxford University Press a presentation copy of your treatise on 'Hydrodynamics and Hydromagnetic Stability . . .'. The magnificent way in which it has been printed, illustrated and got up is beyond all praise. The beautiful photographs and drawings interspersed throughout the volume would attract many readers who might otherwise have been put off by the rigors of the mathematical analysis. You have rescued from oblivion the work of many investigators in this field which might otherwise have remained buried in the learned periodicals. They have reason to be grateful to you for surveying their results and presenting them along with your own thoughts and contributions. It is remarkable how many different fields of study the book illuminates and is likely to illuminate during the years to come.

I am grateful to you for the presentation.

*Yours affectionately,
C. V. Raman.*

*Dr S. Chandrasekhar (F.R.S)
C/o Shri R. R. Sharma, ARIBA, AIAA
Chartered Architect,
1, Southern Avenue, Madras*

(This letter will put the incident described by Wali, p. 253, in a different light. It is possible that it was not forwarded to Chandrasekhar.)

Conclusion

Raman in his later years had become cynical and had put on a very gruff exterior. Perhaps because of this, or for other reasons, many concluded wrongly that his relationship with Chandrasekhar was not good. Reading these letters one cannot but conclude that during this period (1930–1967, Raman died in 1970) there was a very affectionate personal relationship between the two. After Chandrasekhar left for England in 1930 they met each other probably four or five times. Here again from all accounts the meetings were cordial, often hilarious, each poking fun at the other. There were of course serious discussions.

Chandrasekhar's letters, especially the one just after his election to the Royal Society, indicate his admiration for Raman for his initiative and leadership in science. Raman's regard and admiration for Chandrasekhar was unbounded. Making him a Founding Fellow of his Academy, offering him a faculty position at the Indian Institute of Science, proposing him for the Fellowship of the Royal Society and insisting that he put him up for the Nobel Prize were all indications that the uncle recognized the genius of his nephew from their meeting in 1928 to his dying day.

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