

S. PANCHARATNAM

Extracts (modified and rearranged) from the Foreword to Collected Works of S. Pancharatnam by Prof. George W. Series

Pancharatnam was born on the 9th of February 1934 in Calcutta. His father Sivaramakrishna held a high position in the Indian Audit and Accounts service. His mother Sitalaxmi was very knowledgeable about Indian languages and profoundly interested in music. C. V. Raman was one of her three brothers.

It was a chance meeting with Raman which brought Pancharatnam to Bangalore, though he had already decided, at the conclusion of a brilliant undergraduate career at Nagpur University, to take up research in physics.

The circumstances under which Pancharatnam came to work with Raman were quite extraordinary. In Pancharatnam's mind the fact that one of his brothers had taken his doctorate with Raman and that another was still his student had closed the same avenue for him. He was therefore looking for other centres and other mentors when the accidental meeting with Raman took place and changed the course of events. The strangest part of this encounter was that Raman was not aware that he was talking to his sister's son and the younger brother of two of his students. At the end of a two-hour conversation the young man of nineteen was invited to join him, provided a formal application was sent in within 10 days (S. R.).

The work of Pancharatnam on the optics of crystals, published between 1954 and 1963 in the *Proceedings of the Indian Academy of Sciences*, was carried out with the encouragement of C. V. Raman, the Nobel Laureate, in the Research Institute which the latter had established some years earlier at Bangalore. While still at this Institute, he was elected a Fellow of the Indian Academy of Sciences (1958) at the age of 24. He was the second youngest to be elected and only a few months older than the Astrophysicist S. Chandrasekhar was at the time of his election. Pancharatnam was also a member of the Council for a short while before his departure to Oxford some years later.

In 1961 he left Bangalore with another of Raman's students to go to the newly formed postgraduate centre of the University of Mysore where he joined Chandrasekhar, one of his brothers, and where he took a



In Mysore. Sitting from extreme right: S. Pancharatnam, D. Krishnamurti, S. Chandrasekhar (Head of the Department).

major part in the organization of the physics department. At Mysore he completed and prepared for publication some of the work he had begun in the Raman Institute.

Two years later he was awarded the Research Fellowship of St. Catherine's College which brought him to Oxford. He had some teaching duties in the college; but his research was carried out at the Clarendon Laboratory where the emphasis of his researches shifted from crystal optics to atomic physics.

Pancharatnam visited the United States and Canada in 1960 attending the Conference on the Coherence Properties of Electromagnetic Radiation in Rochester and visiting other centres of research. He visited Rochester again in 1966 for the Second Conference on Coherence and Quantum Optics, and Warsaw in 1968 for the Conference on Optical Pumping and Atomic Line Shapes.

His contributions to these meetings are represented by the papers 'Coherency Matrix Techniques for the Description of Modulated Light' and 'Theory and Experimental Observation of Modulated Birefringence'. The paper 'Light Shifts in Semiclassical Dispersion

Theory' – a simple and elegant semi-classical demonstration of the connection between light shifts and dispersion – elicited a letter of appreciation from V. Weisskopf. The posthumous paper on the 'Theory of Dispersion in Relation to Light Shifts' establishes the same connection by the methods of field quantization.

The paper on 'Theory and Experimental Observation of Modulated Birefringence' delivered at the OPALS Conference in Warsaw in 1968, comes closest to the incomplete notes he had prepared which were evidently to have formed part of a monograph. We, as scientists, are the poorer in that his premature death has deprived us of a manuscript which would have formed part of the enduring literature on optical pumping.

There exists a definitive article on crystal optics to which Pancharatnam made an important and substantial contribution, but which does not appear in his *Collected Works*, since he was unwilling to have his name included as a co-author. It is the article which



Pancharatnam (left) in 1952 with his brother S. Ramaseshan

G. N. Ramachandran and S. Ramaseshan (another of Pancharatnam's four brothers) wrote for the *Handbuch der Physik* (1961), Vol. 25/1. The article draws very heavily on Pancharatnam's original work and concludes with an acknowledgement of his unstinting co-operation.

Pancharatnam was a young man – only 35 years old when he died in Oxford on 28 May 1969. He had suffered from a chest illness even before he left India. He was severely ill the winter before he went to



In Oxford. Pancharatnam (centre) and Prema Pancharatnam

Warsaw, and did not recover from a recurrence the following winter. His wife Prema, whom he met and married in Mysore, remained in Oxford after his death.

It was not only in physics that Pancharatnam had distinguished himself as an undergraduate: his concern for humanity first emerged during this period when he was 17. The social and political consciousness which developed in him at that time found expression in his forceful writings as editor of the college magazine. Commenting on a news report of a graduate who had taken to the profession of rickshaw-pulling, he wrote 'It is bitter to face the fact that into a similar lot will more and more graduates, in future, be thrown. But it is far more bitter to swallow the fact that, in a sense, this is as it should be. To say this is not to be callous; it is to venture the distasteful controversial assertion that a graduate is not to be endowed with a superior social status; ... What is wrong with taking a pan-wallah, giving him education, then letting him remain a pan-wallah? ... Education, not universities! ... A University (today) gives you a stamp, a licence to abhor manual labour, to demand more than the rest. Education gives you no such stamp – except in the head and heart.' The traditional Scottish ploughman and his Plato, it would seem, seen under the Indian sun, but seen with a compassion that was to grow in Pancharatnam until, in

his days in Bangalore, it was as if the feeling that he himself was overprivileged, grew to the point where he was compelled to go out and serve the underprivileged, the out-castes and the undernourished. He gave not only money, but time and personal service, all this privately, as if he were afraid that public knowledge would vitiate its value.

Pancharatnam was a scholar for whom to understand nature was more important than to exploit it. But he was more than a scholar: he was a man of deep sensitivity and compassion. His sensitivity was apparent to those who knew him, but the extent and manifestations of his compassion were known only to a few.

Raman had always been a source of great inspiration to Pancharatnam, and his influence (and wonderful collection of minerals and gem-stones) determined the course of Pancharatnam's research at Bangalore, though only one paper – on the optics of mirages – was published under their names jointly. As to the opinion Raman held of Pancharatnam, we may judge from correspondence exchanged between them in 1963, from which it emerges that Raman had been contemplating Pancharatnam as his possible successor, and had advised him to return to the Raman Institute. With the utmost courtesy and respect, Pancharatnam declined to return at

that time, 'though,' he writes, 'I am sure you understand that this does not mean that I am not being true to you in the larger sense of the term – i.e., true to Science, which is what you have basically stood for'.

Sir C.V.Raman, N.L.,
Director

Raman Research Institute
Hebbal Post, Bangalore.6.

Ref: No.

30th May, 1969

My dear Jayaram,

My file regarding Pancharatnam

begins with a letter in his own handwriting dated the 1st of June 1953 stating his qualifications and applying for admission to the Raman Research Institute.

The last letter on the file is a Christmas Card from him informing me of his having accepted a position at the T.I.F.R., Bombay. I have many other letters on the file, most of them in his own handwriting. I am very sorry indeed that his file is now closed. There is not much that I could say to soften the blow to you and his mother on his passing away in a foreign land so suddenly. There can be no question of his extraordinary abilities as a physicist. The results are on record for anyone to see.

Yours affectionately,

Rao Bahadur
S. Sivaramakrishnan,
Accountant-General (Retired),
"Sreemati Nivas",
5, First Main Road, Kasturbanagar, ADYAR, MADRAS.20.

