

## SOME REMINISCENCES OF MY ASSOCIATION WITH PROFESSOR RAMAN

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FROM 1914 to 1921, I was a Demonstrator and Lecturer in Physics in the Maharajah's College, Trivandrum. I became interested in problems of Meteorology, Geomagnetism and the Optics of the Atmosphere. I learnt laboratory techniques including glass-blowing, construction of vacuum lamps, etc. from my senior colleagues, and when I found something interesting, I used to correspond with Prof. Raman. In 1920, Prof. Raman wrote to me if I could go to Calcutta to work in his Laboratory.

I went to Calcutta in December 1921 as a Research Scholar from the Madras University. I first met Prof. Raman in the rooms of the Indian Association for the Cultivation of Science, at 210, Bowbazar Street. He had returned a few months previously from his first visit to Europe. His voyage across the wide seas had brought him face to face with a natural phenomenon of great grandeur and beauty, namely, the colour of the deep blue sea. During the voyage, he had studied various aspects of the light from the sea and sky with characteristic freshness of mind and had come to the conclusion that the theories so far advanced to explain the deep blue colour of sea were inadequate and that the primary origin of the colour of the sea was fundamentally the same as that of the colour of the sky, namely the scattering of light by the molecules and the colour was not dependent on the presence of any suspended matter. After he returned to India, he had repeated and extended the experiment of Lord Rayleigh (the younger Rayleigh) on the scattering of light by dust-free liquids and sent in a brilliant and comprehensive paper on the molecular scattering of light in liquids and the colour of the sea

to the Royal Society. In this paper, he had made use of the Einstein-Smoluchowski formula of scattering based on the thermodynamical fluctuations of density in fluids to calculate the intensity and polarisation of the light scattered.

Mr. K. Seshagiri Rao who was then working in the Government Test House in Calcutta was making quantitative measurements in the Laboratory to test with what accuracy the Einstein-Smoluchowski formula was obeyed in liquids under ordinary conditions.

There were other workers in the laboratory engaged in various problems in optics or x-rays. Professor Laljee Srivastava of Ajmer was working on the scattering of light by transparent crystals; ice and rock-crystal or quartz were the main crystals studied. Professor Raman had observed the blue colour of deep glaciers in the Alps.

Professor Tamma of Meerut was working with crystals of sugar-candy and sulphur on the phenomenon of internal conical refraction. Dr. Panchanan Das was working away with paper and pencil on problems of vibrations of strings with frequent excursions into Sommerfeld's *Atombau*, and Mr. Y. Venkataramiah of Vizianagram was setting up some glass apparatus or other for studying the properties of  $H_2$ . Mr. Ramdas and Mr. K. S. Krishnan were still students in the University College but Ramdas used to flit in and out of the Laboratories of the Association, regaling his friends with music and jokes and unusual photographs. Mr. Krishnan had come to Calcutta, but he was only an occasional visitor.

The next two years were years of intense activity in the development of the subject of classical molecular scattering in liquids and

gases both in its experimental and theoretical aspects. Under the guidance of Prof. Raman, the following problems were tackled. The influence of the optical anisotropy of the molecules on scattering, scattering near the critical point in fluids and in mixtures of fluids, the problem of x-ray scattering in fluids, the systematic and mathematical study of the scattering of light by different liquids, all these received attention, and it was possible to make some worthwhile progress.

In September 1922, I received an offer of Lecturership in Physics in the University of Rangoon, I accepted the offer and went to Rangoon by sea in September 1922. Prof. Raman arranged for my collecting sea-water from different areas of the Bay including areas far away from land, where the sea was deep. On examination of the samples of water with concentrated sunlight and colour filters, it was found that in addition to the expected blue light, there was also some green component in the scattered light. On my return to Calcutta during the summer vacation of 1923, a study was made of the scattering by carefully purified and double distilled water, and it was found that the scattered light contained a green component distinct from the blue. This was attributed to "a trace of fluorescence" and a similar effect was found in pure distilled methyl alcohol and ethyl alcohol also. The phenomenon of the "trace of fluorescence" was not understood at the time; it was later

studied by Mr. Krishnan and Mr. Venkateswaran in many other liquids and vapours with complementary filters and polarisers at Prof. Raman's Laboratory. Persistent investigation by Prof. Raman with the assistance of Mr. K. S. Krishnan and Mr. Venkateswaran proved it to be the Raman Effect.

The atmosphere of the Association, when I worked there, was one of great informality, and extreme cordiality. All the workers lived either on the corner rooms of the Association or in rooms very near the Association, and work went on from morning seven till sunset with short intervals snatched for food and other personal requirements. The Assistant Secretary Mr. Ashutosh Day or Ashu Babu as he was affectionately called, with his loud voice and hearty laughter was always available to make all arrangements required for work and was the presiding deity to arrange all the smaller but none the less essential requirements for work—just as Prof. Raman was the Central Sun round which the whole institution revolved and from which each part derived its energy.

It still gives me a thrill of pride to think that I was privileged to work in those premises in those days and to take a small share in the vital activities of the Association during the period 1921–1924. After I went to Rangoon in late 1922, I was a periodic visitor to 210, Bowbazar Street, during summer vacation each year, till I joined the India Meteorological Department in 1925.

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