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## SCIENCE NEWS

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[Extracts from the Opening Remarks at a Science Seminar on the Occasion of 'INDIA: A FESTIVAL OF SCIENCE' at the Museum of Science and Industry, Chicago, August 10, 1985 by S. Chandrasekhar, The University of Chicago, Chicago, Illinois.]

"Let me begin with a few recollections. I remember very well a day in April, 1920 (when I was hardly ten years old), my mother drawing my attention to an article in a newspaper of the day of the death of Ramanujan with the comment that a very great Indian had died in his prime. It is my judgement that Ramanujan is the greatest man of science, India has produced in the present century and is likely to be the greatest in the foreseeable future. I shall have more to say of him presently. Let me pass on.

I have an equally vivid recollection of a day in early March of 1928, when Professor Raman visited our home in Madras on his way to Bangalore where, on the 16th of March, he was to give the address announcing his discovery of what was soon to be called the Raman effect. I remember well his showing slides of the first Raman spectra ever taken and of the state of euphoria he was in. On that occasion someone drew attention to the discovery of the Compton effect some two years earlier, and Raman responded with, "Ah, but my effect will play a very great role for chemistry and for molecular structure!" That statement was indeed prophetic. Later during the summer of 1928 I spent two months at the Indian Association for the Cultivation of Science at Raman's laboratory, where, at that time, there were many young men who together with Raman were pursuing the new discovery. Among them were several who were later to become leaders of Indian Science: Professor K. S. Krishnan who later became the Director of the National Physical Laboratory; Professor S. Bhagavantam, who was to occupy the very responsible position of the Scientific Advisor to the Defence Minister and Director General of Defence Laboratories; Dr S. Venkateswaran, later the Registrar of Trade Marks and Patents; Dr L. A. Ramdas, later the Director of Agricultural Meteorology; and a host of others. You can imagine what a marvelous experience it must have been for a young man to have witnessed at such close quarters a group of enthusiastic scientists caught in the wake of a great discovery.

I also remember meeting Professor Meghnad Saha in December, 1929, when he had the great courtesy to

ask me (still a student in college) to join him for dinner along with other leading men of science of India of the day.

May I in this context draw your attention to a fact not sufficiently well known. In 1919, only three years after the founding of the general theory of relativity, Saha and S. N. Bose produced the first English translation of Einstein's papers on general relativity—a fact which reveals extraordinary perceptiveness on the part of two very young men.

I can also recall the time when I accidentally met Professor S. N. Bose at a railway station, and the enthusiasm with which he spoke about physics and astrophysics.

My narration of these incidents will remind you that the twenties was a time when scientists of the highest stature and caliber walked the corridors of Science; and it raises an interesting historical question. Here was a period of time that was not unique to science in any way: it was also the time when great national leaders like Mahatma Gandhi, Motilal and Jawaharlal Nehru, Sardar Patel, Rajendra Prasad, Sarojini Naidu and many others of comparable stature were launching India's struggle for independence. And of course, there was also Rabindranath Tagore, who by his writings and by his songs inspired entire generations of Indians. I could go on adding to the list. The early decades of this century was a time when the air was more bracing and the wind was more fresh than it ever was or ever has been. The national creative spirit was high at all levels of human activity; and the development of science was only a part of that activity.

May I in conclusion make some remarks about Ramanujan, since it is for me a disappointment that his picture does not occupy a central place in the Gallery of Scientists mounted at this festival. Without going into any great detail about Ramanujan's life, or of the tragic circumstances of his early death, I shall quote from three mathematicians closely associated with him and his work.

The first quotation is from Hardy who of course knew Ramanujan very well during his precious Cambridge years. Hardy was indeed responsible for Ramanujan going to Cambridge. Here is an extract

from a biographical memoir that Hardy wrote in 1920.

It was his insight into algebraical formulae, transformations of infinite series, and so forth, that was most amazing. On this side most certainly I have never met his equal, and I can compare him only with Euler or Jacobi. He worked, far more than the majority of modern mathematicians, by induction from numerical examples; all of his congruence properties of partitions, for example, were discovered in this way. But with his memory, his patience, and his power of calculation, he combined a power of generalization, a feeling for form, and a capacity for rapid modification of his hypotheses, that were often really startling, and made him, in his own peculiar field, without a rival in his day.

The next quotation is from Professor Richard Askey, who has for several years been interested in Ramanujan's work and has contributed greatly to pursuing threads originating in Ramanujan's work. I shall read from some of what he said earlier this year.

... in the spring of 1976 George Andrews went to Europe for a meeting and stopped in Cambridge to see what old manuscripts [of Ramanujan] he could find. One find was not a manuscript but 140 pages formulas in Ramanujan's handwriting. . . These

pages are not dated, but from internal evidence they were written late in Ramanujan's life, much of it in his last year. Two thirds of the pages deal with basic hypergeometric series and most of this work is significantly deeper than Ramanujan's earlier work on the same subject. Try to imagine the quality of Ramanujan's mind, one which drove him to work unceasingly while deathly ill, and one great enough to grow deeper while his body became weaker. I stand in awe of his accomplishments; understanding is beyond me. We would admire any mathematician whose life's work was half of what Ramanujan found in the last year of his life while he was dying.

And finally from R. A. Rankin, who was responsible for preserving the lost note book of Ramanujan to which Professor Askey refers. In a recent article he has written,

"Undoubtedly, his most fruitful period was the six years between his arrival in Cambridge and death in Madras. What he accomplished during this time is truly remarkable, particularly when one considers that he was rarely out of bed during his last three years."

Yes, there were men amongst us!

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## NEWS

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### TESTS OF ARTIFICIAL GLASS BLOWER

A high-speed automatic machine for blowing electric bulbs is undergoing tests at the leading plant of the Iskra association in Lvov, the Ukraine. The annual capacity of the production line is 400 million bulbs. The molten glass mass getting between two rollers, turns into a continuously rolled tape moving at a speed of 75 meters per minute. In 60 seconds, various devices blow and shape 1,000 bulbs of very accurate size. This is important for the assembling of electric lamps.

The amount of bulbs turned out by the automatic machine is sufficient to meet domestic needs and for export to the CMEA countries. Experts from Iskra believe that such machines can also be used for producing egg-shell laboratory and house-hold glass-ware and New Year's tree decorations by replacing a considerable part of ineffective equipment. (*Soviet Features*, Vol. XXIV, No. 136, September 10, 1985)