

PROFESSOR K. R. RAMANATHAN



1893–1984

PROFESSOR K. R. RAMANATHAN, a member of the Current Science Association, since its very inception in 1932 and its Vice President from 1968 passed away at Ahmedabad on December 31, 1984. He was always a warm supporter of this Journal and he published in *Current Science* his important discoveries on the vertical thermal structure of the atmosphere as early as 1933.

With his passing, an era in Indian Science has come to an end. His is *the* name that comes to mind in connection with every development in the field of geosciences in India in the last sixty years, like meteorology, hydrology, atmospheric physics, geophysics, aeronomy, sun-earth relationships and ionospheric and space sciences. His scientific contributions to these areas are notable and he actively encouraged the growth of young scientists in these fields, as also the

establishment of a number of institutions where they could develop and flourish. He was the father figure to a whole generation of scientists in India, who grew to full stature in the warmth of his beneficence; he did this so unobtrusively that few of them were fully aware of the help that they had received at crucial moments in their careers.

Kalpathi Ramakrishna Ramanathan was born in Kalpathi, Palghat, on 28 February 1893. His father was a Sanskrit scholar of eminence. After taking his B.A. degree at the Government Victoria College, Palghat and the M.A. degree in Physics at the Presidency College, Madras, he started his career as a demonstrator in Physics in 1914, at the Maharajah's College of Science in Trivandrum. Because of the interest he showed in meteorology and the other activities of the Observatory in Trivandrum, he was appointed its Honorary Director.

In 1921 he joined Professor C. V. Raman in Calcutta and collaborated with him on studies of molecular scattering of light and x-ray diffraction in liquids. In less than one year he published ten papers on these subjects; for this work he was awarded the D.Sc. degree of the University of Madras. It is interesting that this was the first time that a D.Sc. degree was awarded by the Madras University.

In 1922 Ramanathan was appointed assistant professor of Physics at Rangoon University, but during his vacation he continued to collaborate with Prof. Raman. In 1925 he was appointed a senior scientist in the India Meteorological Department and served there with distinction, until he retired at the age of 55. The next day, he joined the Physical Research Laboratory, Ahmedabad as its first Director and Professor of Atmospheric Physics. He retired from the Directorship in 1966, but continued there as Emeritus Professor, attending the Laboratory every day until a few days before his death.

Professor Ramanathan's work on light scattering is well known. It was during his vacation visits to Calcutta that he began the work on the

examination of the molecular diffraction of light by water and alcohols. He detected a "feeble fluorescence" in the scattered beam. Raman's belief that it was a characteristic property of the scatterer and his persistent investigations of this "feeble fluorescence" during the next few years led to the discovery of the Raman Effect in 1928.

Although Ramanathan took part in Raman's epoch-making researches on the scattering of light and made important contributions to many fields, it is as a meteorologist and as one who contributed significantly to the building up of scientific meteorology that he will be remembered most.

Professor Ramanathan's research work in the India Meteorological Department covered a wide range of subjects, solar and atmospheric radiation, the spectrum of the night sky, meteorological optics and acoustics, terrestrial magnetism, seismology, the Indian monsoon, storms, depressions and cyclones in the Indian seas and the general circulation of the atmosphere over India and its neighbourhood. These are described in the Introduction to the "Selected Papers of Prof. K. R. Ramanathan" published by the Indian Academy of Sciences in 1983, to commemorate his ninetieth birthday. His major contributions in meteorology are the elucidation of the zonal vertical thermal structure of the earth's atmosphere over the world and the systematic analysis of the upper winds over India and its neighbourhood and the structure of tropical depressions, their movements and evolution.

His years in Poona were the most productive ones, when papers literally flowed from him and his group of devoted students and colleagues. He always praised his colleagues, especially Mr. K. P. Ramakrishnan, to whom he generously attributed the major share in the work on the vertical thermal structure of the atmosphere and the general circulation of the atmosphere over India and its neighbourhood. Poona in the thirties and forties was a centre of intense scientific activity and a centre of world renown.

He was the Director of the Colaba and Alibag observatories for a short period and his interest

in geomagnetism and seismology was a life-long one. Not only did he make significant contributions in the area but took interest in its growth and development—he never failed to visit Colaba when he was in Bombay—into the present Indian Institute of Geomagnetism. He took an equal interest in the establishment of the National Geophysical Research Institute at Hyderabad and its activities and was the Chairman of the Central Board of Geophysics and President of the Indian Geophysical Union for many years.

He was the Director of the Kodaikanal Solar Physics Observatory for some years and his interest in astronomy and its development in India was again an enduring one. He encouraged the establishment of the Rangapur and Kavalur observatories and was the first visitor to Kavalur when the 40 inch telescope was being installed.

Prof. Ramanathan's research work at the Physical Research Laboratory was mainly concerned with studies of atmospheric ozone, night airglow, ionospheric and space physics and solar galactic influences on the ionosphere. The world's leading authority on atmospheric ozone, his work on ozone spanned five decades. His main contributions in atmospheric ozone are on the extremely important relationship between atmospheric ozone and the general circulation of the atmosphere, the dependence of ozone distribution on meteorological phenomena and the discovery of the quasi-biennial oscillation of total ozone in the tropics associated with the 26-month oscillation in stratospheric winds and temperatures.

Of importance are also the contributions made by Professor Ramanathan and his students to ionospheric and space studies during the last 30 years. He considered, long before any one else, the ionosphere as another region where circulation systems similar to those in the lower atmosphere were bound to exist. Of even greater importance in the long term is the interest and support Professor Ramanathan provided for the studies of the interaction between the neutral and electrical atmospheres. His recognition of the thread of unity, which is a principal characteristic of space age atmospheric physics, is possibly

his greatest contribution.

As the first director of the Physical Research Laboratory, his advice in the planning and organisation of the Laboratory and its work, was constantly sought by Dr Vikram Sarabhai, who was then the Professor of Cosmic Ray Physics. Later when Dr Sarabhai became the Chairman of the Indian National Committee for Space Research, Professor Ramanathan was closely associated with the establishment of the Thumba Rocket Launching Facility and the Space Science and Technology Centre at Trivandrum and the extensive experiments in meteorology, aeronomy and ionospheric physics carried out at Thumba.

Though he retired from the Meteorological Department in 1948, his ties with its scientific activities and the young scientists of the Department remained close. He took keen interest in the developments taking place in various areas and was indirectly responsible to a considerable measure for the growth of the Department. The development of the Indian ozonsonde and the revitalization of the network of Dobson ozone spectrophotometers and the establishment of a network of radiation measuring stations in the country owe much to him. When the Handbook of Radiation Data for India was published in 1980, Prof. Ramanathan went through every page of the large volume and wrote a critical review on it. He was 88 years old at the time.

His interest in any area of science that would contribute to human welfare was overriding. While atmospheric ozone was his earlier passion—he was known to the international meteorological community as 'Mr. Ozone'—in later years he devoted most of his time in the organisation of water resources management and development. He was responsible for the establishment of the Hydrology Unit of the CSIR in Delhi and was the Chairman of the International Hydrological Decade Programme and took an active part in the development of the vital field of hydro-meteorology, applying meteorology to water problems. His anxiety about the lack of co-ordinated assessment of our scarce water resources led to his campaign for the

establishment of a central water authority for the country.

He has had an enduring influence on the growth of geo-sciences in India. The establishment of important divisions in meteorology, hydrology, geomagnetism and aeronomy at the Physical Research Laboratory, meteorology and remote sensing at the Space Applications Centre, Ahmedabad and aeronomy and ionospheric physics at the Vikram Sarabhai Space Centre, Trivandrum, illustrates of his keen and wide ranging interests. He discovered able young scientists and spared no efforts to provide them with an environment in which they could grow. He also saw that awards and rewards came to them at the right time.

Prof. Ramanathan played an important role in every international programme in which India took an active part during the last three decades. He was the Chairman of the Indian National Committee for the International Geophysical Year, the International Indian Ocean Expedition, and the International Monsoon Experiment. He was closely associated with equipping the first Indian oceanographic ships, the IIOE observational programme and its results, the establishment of the International Meteorological Centre at Colaba to provide special meteorological services to the Expedition ships, and the establishment of the National Institute of Oceanography at Goa later.

He was a member of the Bhagavantam Committee for the re-organisation of the India Meteorological Department, whose recommendations led to the formation of the Indian Institute of Tropical Meteorology, the Indian Institute of Astrophysics and the Indian Institute of Geomagnetism. The Indian Institute of Seismology also proposed at the same time is yet to come into existence. He was the first Chairman of the Governing Council of the Institute of Tropical Meteorology.

Professor Ramanathan has during the last four decades held many distinguished national and international positions connected with research in earth sciences. He was elected President of the International Association of Meteorology in 1954, President of the International Union of

Geodesy and Geophysics in 1957, and President of the International Ozone Commission for three terms from 1961–1967. In India he was the Chairman of the Central Board of Geophysics and of the Board of Nuclear Sciences in the Department of Atomic Energy. He was a Foundation Fellow of both the Indian Academy of Sciences and the Indian National Science Academy.

Though Prof. Ramanathan never left the shores of India until after his retirement from the Meteorological Department, the world meteorological community, which knew of his outstanding contributions to meteorology, awarded him the International Meteorological Organization Prize in 1961. The Royal Meteorological Society elected him an Honorary Fellow in 1960. The Indian National Science Academy awarded him the Aryabhata medal. The President of India awarded the Padma Bhushan in 1965 and Padma Vibhushan in 1976 for his services to science and the country. He occupied the prestigious Raman Chair of the Indian Academy of Sciences in 1980.

An indefatigable reader, he spent almost all his time in recent years, both in the laboratory and at home, studying the latest books, publications and journals and would discuss them daily with Prof. P. R. Pisharoty, with whom he shared an office in the Physical Research Laboratory for the last seventeen years.

In spite of his erudition, his scientific achievements and the national and international recognition he received, he was the most accessible of great men. His office and house in Ahmedabad saw a constant stream of visitors, everyone of whom he welcomed with unfailing courtesy and gentle affection. His modesty and humility were proverbial and his kindness and generosity to his students and colleagues difficult to equal. A benevolent and understanding elder statesman-scientist, he has influenced and was respected by many generations of scientists in India, K. S. Krishnan, M. S. Krishnan, S. Bhagavantam, L. A. Ramdas, S. P. Venkiteswaran, P. R. Pisharoty, R. Ananthakrishnan, V. Sarabhai, M. G. K. Menon, M. K. Vainu Bappu, U. R. Rao and many others in India and abroad too numerous to mention.

We are privileged to publish this tribute to a great human being and a great scientist, who by his energy and enthusiasm for research, and by his example, inspired many generations of students and has had an enduring influence on the growth and development of several scientific fields during the last seven decades, both in this country and abroad.

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