MANALI KALLAT VAINU BAPPU

(1927—1982)

Elected Fellow 1968

Birth And Parentage

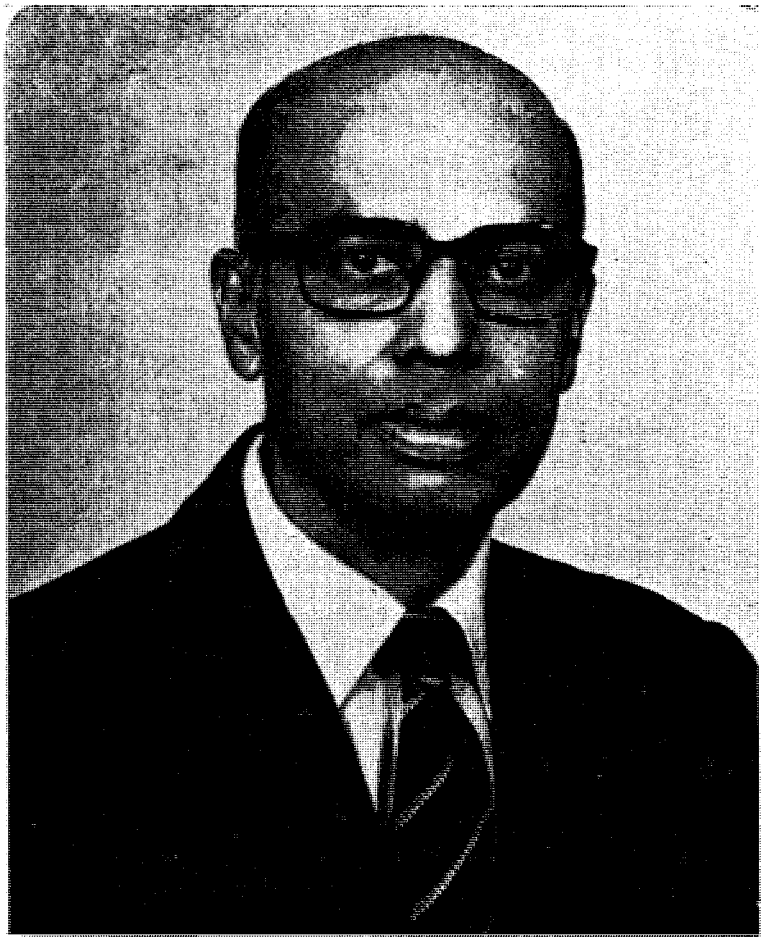
Manali Kallat Vainu Bappu was born on August 10, 1927 in Madras. Mrs Sunanna Bappu, his mother, who hailed from Tellichery, had lost her own mother at an early age. She was brought up by her maternal aunt, Mrs Govindan. It was at her place, in Vepery, Madras, that Vainu was born.

Vainu Bappu's ancestors hailed from Cannanore. His grandfather was the noted Malayalam author, Bappu Gurikkal; several members of his family had left their ancestral home and settled in Mangalore and nearby places. Vainu's father Manali Kakuzhi Bappu, had joined Nizamiah Observatory and settled down in Begumpet, Hyderabad. He got married to Sunanna in 1925 ; Vainu, their only child, was born two years later.

Early Education

Vainu's early years were spent in Hyderabad. He first joined St. Anne's Convent and later Islamiah High School, Hyderabad. His gift of oratory and writing from a very early age evoked widespread admiration among his teachers. Vainu apparently inherited this quality from his parents. His mother's elder brother, Rao Bahadur U Shankunny was a famous literateur and orator ; another brother U Balakrishnan, a headmaster, was known for years to have cultivated the love of reading in his students. This special quality of Vainu was also fostered by his teacher in Hyderabad, Mr P G P Nair, who encouraged him to take a leading role in the debating and literary activities of the school.

Vainu Bappu joined Nizam's College in 1942. He was then below the age limit for admission to the college and a special exemption had to be sought. He was instrumental in running the college magazine and organising scientific activities. He became the Secretary of the College's Physics Association, and was most active in arranging meetings and lectures. He was an ardent admirer of scientists and was bent on becoming one later. In 1943, when Sir C V Raman delivered a series of lectures in Hyderabad, Vainu did not miss a single word; for this purpose, he had to cycle ten miles each way daily after his classes.



M K Vaun Dapton

But all these scientific activities did not diminish his love for the artistic. He was a voracious reader of the classics ; he loved to recite the poetry or Wordsworth, Shelley and Keats, and was equally fond of more modern poets like Owen or Kipling. He had a special fascination for Urdu literature ; Mirza Ghalib was his favourite poet ; often he would make a special effort to be present at Mushairas organised by Urdu lovers in Hyderabad.

Vainu was an ardent admirer of Homi Bhabha ; he admired him not only as a scientist and scientific organiser, but also for his ability as an artist, and as a true lover of nature. During my association with Bappu, whenever we visited the Tata Institute of Fundamental Research at Colaba or the Atomic Research Establishment at Trombay he used to draw my attention to the finer points of architecture that were due to Bhabha. He took up painting later in life. He has shown his artistic taste not only in his canvasses but also in all his creations ; the exquisite gardens and the telescope domes at Kodaikanal, Kavalur and Bangalore bear mute testimony to his artistic vision ; at the same time I am reminded of his admiration for the great scientist-dreamer of our country.

At a press conference in Europe, after he became the President of the IAU, Bappu confided that all through his life he had found directions from the lives of great men. When asked what his advice to young astronomers would be, he said : "I would give some unusual advice : to read the biographies of eminent people. I myself have read the biographies of great scientists ever since my boyhood : Kelvin, Rayleigh, Thomson, Maxwell, Raman. I was curious to know what circumstances determined their lives, what they thought about the world, what their own scientific work was. There is no doubt that these outstanding personalities created contemporary science. And what was their source of inspiration ? It was, primarily beyond doubt, the examples set by and the work of their own predecessors ; that is why they set for themselves new goals and finally reached them. I believe that such reading is very stimulating, particularly for young people. Before my visiting Mr Peltier I read his republished biography "Starlit Nights". I think everybody who has read it will agree with me that if we try really hard, we shall achieve what we wish".

Vainu Bappu was an all rounder in every sense of the word. His scientific and literary activities were matched by his ability as a sportsman. In college, he was an outstanding cricketer and an excellent tennis player and he maintained his athletic activities until his Kodaikanal days. He had a secret ambition of becoming a pilot, chiefly because of the adventure it was supposed to provide, but it was never realised. One of his favourite books in his own library was "The Spirit of St Louis"—the immortal saga of Charles A Lindbergh.

Vainu Bappu And Astronomy

Vainu Bappu was introduced to the mysteries of the sky at a very early age. He loved to accompany his father to the telescopes at Nizamiah Observatory, while still in school. He developed a deep familiarity with the sky and the instruments and this experience remained an important asset throughout his life. While still in college, he built a spectrograph all by himself and obtained a spectrum of the night sky air glow ; he exposed the plate for six consecutive nights through his bedroom window for this purpose. His first paper in a standard scientific journal was published in 1946.

Vainu wanted to follow a career in astronomy ; but the opportunities available in India at that time were severely limited. He passed his MSc examination in 1948, but could not find an opening in the subject of his choice. He was offered a research fellowship to work on a project on telecommunication at the Battersea Polytechnic in London ; in the absence of other offers, he was thinking of accepting it, when fortuitous circumstances presented a unique opportunity towards the realisation of his life's goal.

Sir Harold Spencer Jones, Astronomer Royal, UK, and Professor Harlow Shapley of Harvard University, USA, were visiting India at that time. Vainu read in the papers that they would be coming to Hyderabad and decided his course of action—he would meet Professor Shapley and find out if any opportunity in the USA could be found. He met Shapley at his hotel ; Shapley had already heard of Vainu Bappu's work as an amateur astronomer. Mainly through his efforts, Vainu found himself in Harvard in early 1949 on a Government of Hyderabad scholarship to do research in Astronomy.

The 1949 astronomy batch at Harvard, where Vainu was enrolled, was a remarkable one; it included several students who were later to hold pivotal positions in the development of several new branches of the oldest science. Among his classmates were Harlan Smith, Bill Buscombe, Frank Kerr, Ivan King, William Liller and many others who now head prestigeous research groups all over the world. Among the teaching members of the faculty were Professor Bart J Bok, Donald Menzel, Fred Whipple, Cecilia Payne Gaposhkin and Shapley himself. Vainu found himself among an ideal group of young men and guided by the ablest teachers of that time.

Within a few months of his arrival at Harvard, Vainu was involved in a comet discovery. On a routine sky plate taken on the night before, Vainu's keen eyes noticed an unusual object. He and his colleague, Gordon Newkirk, together with Professor Bok took a few more plates on successive nights and computed the orbit of the object. It was found to be a new comet ; Comet Bappu-Bok-Newkirk remains till today the only comet bearing an Indian name. Bappu was awarded the Donhoe Comet Medal of the Astronomical Society of the Pacific for this discovery.

Strangely, after the discovery, Bappu received a reprimand from the Government for deviating from his research ; it was an interesting communication apparently originating from an overzealous bureaucrat who lacked basic knowledge about scientific research. Harvard University, however, took it as an affront criticising their system of education and wrote back to the Indian Embassy. The case was hushed up and Bappu was not bothered about his research anymore. Nevertheless, the incident left a deep mark on Bappu's mind, which could be noticed in his dealings with the bureaucracy later in his life.

The three years spent by Bappu at Harvard are cherished by all his colleagues and teachers among their fondest memories. One of his closest friends, Professor Harlan Smith later described how Vainu's enthusiasm used to infect everybody around him. He was constantly planning to do something new ; arranging meetings and seminars or planning new observations. He organised perhaps the only cricket team within a hundred miles of Harvard and coached his friends in the intricacies of the game. He never missed any of the meetings of the American Astronomical Society ; this often involved travelling in old cars belonging to friends and spending nights in sleeping bags on observatory lawns. There, Bappu would tell about his dreams of building up observatories and research institutions. Professor Smith recalls that he wondered at Bappu's confidence, when he was not even sure of a steady job in his own country which hardly had an established astronomical institution.

In August 1951, Bappu completed his PhD thesis in almost record time and was offered the Carnegie Fellowship for a year. He was the first Indian to receive that prestigeous fellowship in Astronomy. He thus had access to the Palomar 200 inch telescope, the largest telescope then existing in the world, and picked up for this investigations some of the most challenging problems in stellar spectroscopy. During his fellowship, he made an exhaustive survey of Wolf-Rayet stars, a subject in which he remained an authority throughout his life. He investigated the incidence of H and K emission from ionised calcium in late type stars ; the results revealed a relation connecting the equivalent width of the H and K lines with the absolute magnitude of the star. The analysis was done jointly with Professor OC Wilson of the Observatory and the relation has entered the annals of astronomical literature as the Wilson-Bappu effect. This is one of the fundamental relations often used in stellar luminosity determination. He also obtained an excellent series of spectra of RT Aurigae, a cepheid variable, and the shell of Pleione.

After the completion of his fellowship at Pasadena, Bappu worked as a guest investigator at Lick Observatory, California. He completed a photoelectric study of early-type supergiants around the open cluster H and χ Persei. He was offered positions in several observatories outside India, but

he refused them all. His intention was to return to India and to build up a base for research in astronomy and astrophysics. He denied himself the personal benefits he could have gained by a continued stay abroad and returned home without even the promise of a job.

Bappu's Contributions To Astronomy In India

Bappu returned to Hyderabad in early 1953 and was without a job for almost a year. During this time he was encouraged by Mr Akbar Ali, Director of Nizamiah Observatory, to continue his analysis of stellar spectra taken earlier in the USA. It was during this time that he helped Akbar Ali in his plans to acquire a 48-inch telescope for Nizamiah Observatory. He secured a Senior Research Fellowship of the National Institute of Science in 1954, which helped him to continue his work on the detailed spectrograms of Wolf-Rayet stars taken at the Palomar and Lick Observatories.

Bappu had executed a bond with the Government of Hyderabad to serve them for ten years after his return. The Government, however had no suitable job for him. He was offered the post of Lecturer of Physics at Osmania University which he refused. Subsequently, through Mr Akbar Ali's help, he obtained a release from the bond.

In November 1954, Bappu joined the Uttar Pradesh State Observatory at Varanasi as Chief Astronomer. From the day he joined, he was up with the instruments that were available, trying the observing conditions over Varanasi. Before a week was out, he sought an interview with Dr Sampurnanand, the Chief Minister, and explained to him the need for shifting the Observatory to a better site. The request was granted and Bappu went with a young team to select a suitable site. A small hill near Nainital, Manora Peak, was chosen as the final location. Professor D D Pant, the noted spectroscopist, who was teaching in a degree college at Nainital, took a keen interest in this work and helped Bappu in selecting the site.

Drs S D Sinvhal and T D Pandey were with the Varanasi scientific team at Nainital; a team of enthusiastic young scientists joined them. It speaks for Bappu's inspired leadership and teaching that many members of this group still continue to do research in astrophysics. Of this group, the names of Drs M C Pande, S S Kumar, A Bhatnagar, S C Joshi, N B Sanwal and others are well known today. Pending construction of the main building at Manora Peak, the Observatory started functioning in a rènted building in Nainital town. A 10-inch telescope was installed at Devi Lodge and star observations were started. Bappu used to spend his entire day supervising construction at Manora Peak and often spent the whole night at the telescope.

Bappu negotiated for the installation of a satellite tracking camera at Nainital, which the Smithsonian Institute was only too happy to put in his

charge. He laid special emphasis on the workshop building, which he realised was essential for the development of the observatory. He led two scientific expeditions from Nainital, the first to Ceylon to observe the total solar eclipse of June 20, 1955 and the second to Tuticorin in 1959 for observations of Venus occulting Regulas. He led the Indian delegation to the X IAU General Assembly in Moscow in 1958.

On April 1, 1960 Bappu handed over the charge of the Director of the Observatory to Dr S D Sinvhal and came over to Kodaikanal to begin a glorious chapter in his life and in the history of the Indian astronomy.

Bappu at Kodaikanal

Bappu became the youngest-ever Director of the 170-year old Observatory and took up developmental plan in right earnest. The Astronomical Observatory was set up by the British East India Company, at Madras in 1792 and had done fundamental work on astronomical problems. In 1899, it was shifted to Kodaikanal and placed under the direct control of the Government of India. Along with other astronomical investigations, Kodaikanal Observatory had done frontline research work in solar physics.

In 1945, the Government of India had set up a committee of scientists to draw up a development plan for the growth of Astronomy in India. The Committee was chaired by Professor M N Saha and made certain recommendations for the development of the observatory. Following the recommendations, new instruments were added to the observing equipment at Kodaikanal during the first two Five Year Plans of Independent India. But it was left to Bappu to bring about the major development of establishing a modern observatory for stellar studies and equipping it with at least one large telescope.

Bappu set about achieving the objective with his characteristic vigour and enthusiasm. He raised a fresh team of young scientists and set out to find a suitable site. From Kannyakumari to the seven hills of Tirupathi, he searched every hill for a suitable location. At last, he came across the sandalwood forested Javadi hills and immediately recognised the suitability of the place for his dream-observatory. A plateau ringed by hills created a natural trap for still air, producing excellent stability of the local atomsphere. A dense forest of sandal-wood trees reduced ground heating by insulation. The site was accessible by a motorable road ; not too far away from a small town, yet free from pollution by industrial smoke and city lights, it seemed to offer all the requisites of a modern observatory. He arranged for a long term lease of 40 acres of forest land and set up the first instruments for astronomical observations. Kavalur Observatory thus came into existence : the first observations with an indigenously built 38 cm telescope were made in late 1967.

In the meanwhile Bappu continued his efforts for the modernization of the observational set up at Kodaikanal. The operation of the newly installed Grubb-Parsons solar telescope was vitiated by faulty design of the dome ; Bappu took the old structure off, and installed a new one, which not only removed the defects, but stands out as one of the best examples of graceful dome architecture in the world today. He introduced modern electronic controls in the telescope and the spectrograph and commenced on new investigational projects in studies of the sun.

Arvind Bhatnagar and L M Punetha had followed Bappu from Nainital ; they were joined by a young student Nirupama Raghavan, the first woman to enter the field of observational astronomy in modern India, and the team started observations in new problems in solar physics. I joined the group in the middle of 1964 on transfer from the Instruments Division of the India Meteorological Department, Poona, and K R Sivaraman followed me a year later. The Kodaikanal solar telescope was equipped with a photoelectric solar magnetograph, totally designed and constructed in the Observatory's laboratories. This was the first instrument in solar observational studies in the country employing sophisticated electronics and brought new scientific information on the dynamics of the solar atmosphere. Bappu was the guiding spirit in all these investigations.

Night sky observations at Kodaikanal had always been hampered by poor seeing. John Evershed, who attempted stellar studies in the early part of this century had realised these limitations, and this had prompted Bappu to look for an alternative site. But pending the establishment of Kavalur Observatory, Bappu proceeded to build up a strong stellar-observation astronomers' group. Among his early associates and students at Kodaikanal were N Visvanathan, who later migrated to Australia, K Ganesh, J V Narayana, P Viswanadham, A Thulasi Doss and R Rajamohan. However, his efforts in this direction were really fruitful only after Kavalur Observatory was established. Ganesh succeeded in discovering several new features of the Wolf-Rayet binary, γ-Velorum, using the old 20-inch Bhavanagar telescope which was made operational by Bappu after almost fifty years of semi-active existence.

Radio observations of the sun had commenced at Kodaikanal in the early fifties through the efforts of A K Das and B N Bhargava. Bappu strengthened the observing team by sending U V Gopala Rao to Australia for training and by persuading Ch V Sastry from Yale Observatory to join his group at Kodaikanal. His efforts later culminated in the establishment of the Giant Low Frequency Array at Gauribidanur for radio studies of celestial objects.

But, by far, the most important endeavour of Bappu was to create an opti-

cal laboratory for grinding and figuring large optical surfaces. He persuaded A P Jayarajan to help in an ambitious plan to build up facilities for in-house optical instrumentation. From a small beginning at Kodaikanal, his dream blossomed into the Optics Laboratory of the Indian Institute of Astrophysics in Bangalore, which could undertake the task of fabricating the entire optics of the 234 cm telescope. Today this is the only laboratory in the country capable of grinding,polishing and figuring large optical components which are in demand not only by astronomers but also by organisations dealing with various branches of experimental science.

Bappu's dream observatory : Kavalur

Professor Harlan Smith, while reminiscing about his days at Harvard where he was a classmate of Bappu, describes an obsession which haunted both their minds. Both cherished a common dream of building up a modern observatory equipped with large telescopes and accessories ; Harlan Smith succeeded as the Director of McDonald Observatory and built a 107-inch telescope ; Bappu had to cross many hurdles before he could realise his dream. After coming back to India, he had already laid the strong foundations of Nainital Observatory, but he wanted to build something greater.

He had selected the Kavalur site as early as 1962 and formed clear plans for its development. The location of various instruments among the greenery was chalked out by him even before the acquirement of the site. He knew the location of every large tree in the campus ; the great lover of Nature that he was, he would not dream of felling them. Instead, he had only the undergrowth cleared and planned a forest of flowering trees like Gulmohor, Jacaranda and Cassia ; the roads that connected the telescope sites were to be lined with rows of Bougainvillaea and Poinsettia. Small cottages would dot the landscape, bearing the names of astronomers like Tycho, Kepler, Galileo and Copernicus, or the celestial nymphs of Hindu mythology : Urvasi, Menaka, and Rohini. They would be spaced artistically between the snow-white telescope domes. All these were planned and various sketches drawn while he was waiting for the clearance of his project from the administration.

The land was given on lease to the Kodaikanal Observatory (then a part of the India Meteorological Department) in 1967, and Bappu persuaded authorities to place an order with Carl Zeiss of West Germany for a one-metre telescope to be used in the new observatory. Plans of the building and dome for the new telescope were with the Central Public Works Department and it was five years before they could be built. In the meanwhile, Bappu made arrangements for observational work to start. He started work on photometry and spectroscopy of stars with a 38 cm telescope in a sliding roof shed, made

solar seeing observations in the day time, and even planned a radio-interferometer for solar investigations.

The one-metre Zeiss telescope was the only basic instrument ; he had, in the meanwhile, designed a complete set of instruments for observations. His plan was highly ambitious, aiming to create facilities matching those available in the leading observatories of the world. These included high dispersion coude spectrograph cameras on-line computer controlled spectrum scanners, high speed photometry equipment for the study of transient events and many other instruments enabling experiments at the frontiers of observational astronomy. During the next few years, Bappu devoted himself totally to the achievement of these objectives.

Dame fortune smiled on him. Barely a fortnight had passed after the installation of the telescope, when a rare occultation event observed at Kavalur brought in unexpected evidence of a trace of atmosphere on Jupiter's largest satellite Ganymede. Five years later, the same telescope discovered the rings of Uranus, a major step in the advancement of our knowledge about the solar system.

Bappu thus succeeded in creating an observatory which could match any leading astronomical centre of the world in its capability to achieve results in observational astronomy. The trend set by him continues, and Bappu's dream observatory has bagged several more discoveries in recent years.

Formation of the Indian Institute of Astrophysics

At the turn of the present century, when the administration of the erstwhile Madras Observatory was taken over by the Imperial Government of India, it was merged with that of the India Meteorological Department for administrative convenience. After Independence the activities of the Meteorological Department expanded manifold and it was soon felt that the laboratories where pure research was being conducted had to be separated. A committee headed by Professor S Bhagavantham was appointed by the Central Government. It examined the entire question in 1966-67 and submitted recommendations for reorganisation. Accordingly, on April 1,1971 the old Kodaikanal Observatory and the newly formed Kavalur Observatory together formed an autonomous research institute named "The Indian Institute of Astrophysics'.

The formation was a major step in Bappu's plan for the development of an astronomical centre in India and he spent more than five years in achieving it. Although he was totally preoccupied with installing and equiping the one-metre telescope when the order came, he launched a multipronged plan for the development of the new Institute. He was extremely lucky to have the help of eminent scientists like Professor M G K Menon and Dr Raja Ramanna as members of the Institute's first Governing Council. Two major

areas on which he laid special emphasis were the development of a strong theoretical group in various topics in astronomy and the project of indigenously constructing a large optical telescope in India. Kodaikanal lacked the facilities for such development and thus a centre was opened on the premises of the Raman Research Institute, Bangalore where many new scientists joined the research programmes of the Institute. A site for the laboratories was chosen at Koramangala, at the south eastern corner of the city, where work for the construction of new laboratories was started. The first new building was formally occupied on November 5, 1975 ; the Optics Laboratory moved into its proper building next year, and at the same time Bappu shifted the Institutes headquarters from Kodaikanal to Bangalore. The main laboratory building was completed in 1977 and the building was formally occupied on Dussera day. Bappu took extreme pains to look into the architectural aspects of the building and the campus ; he personally supervised construction and directed the planting of trees and flowering plants all around. The campus of the Institute has acquired fame for its grace and beauty, and the entire credit for such a distinction goes to the artistic sense of Bappu.

His main emphasis, however, was on building up the academic stature of the institute. The new scientists who joined found facilities and freedom not available in other research institutes. Bappu laid special stress on the library ; on one occasion he told me "Remember, a time may come when the free flow of funds for research will dry up. If such a time comes, (heaven forbid !), then you will find that this is the only section which will keep our academic activities moving".

He encouraged seminars, colloquia and other academic activities among the staff. At considerable expense he had an in-house computer installed and started regular training courses for young scientists. He always endeavoured to find funds for new equipment which he felt would help the Institute's progress in research.

Bappu was in the midst of several improvement programmes when cruel fate snatched him away from us. But the impetus given and the foundation laid by him with so much care allowed the smooth progress of his plans and ideas even without his physical presence.

The large telescope project

Harlow Shapley once lamented that although India had produced so many great theoretical astronomers, her observing facilities were practically nil. The Saha Committee also, in 1945, realised this shortcoming and recommended the acquirement of a large telescope. But the high cost of a large telescope and the difficult foreign exchange situation prevented successful implementation of the recommendation. Bappu had toyed with the idea of indige-

nously manufacturing one such telescope for a long time. Around 1968, he started producing sketches of the proposed telescope. In 1972, Mr Hunter from a Canadian firm, M/s Dilworth Secord, Meagher & Associates visited him at Kodaikanal with Mr Jagannathan of Tata Consulting Engineers; they assured him of their help in the design and indigenous fabrication of an optical telescope if such a project was undertaken. Bappu sent a proposal for such a venture in 1973 and the same was approved by the Governing Council. An order for the primary mirror blank had been placed in the meanwhile and it was received in May 1974. M/s Tata, Dilworth Secord, Meagher and Associates were awarded the design contract and they submitted a feasibility report in November 1976.

Bappu was involved in the herculian task of managing the technical aspects of the project while convincing the financial authorities about the advantages of embarking upon this venture. He convinced the leading group of scientists in the country about the positive advantages of the project and with their help, the financial assurance was obtained. The project, which involves complex design and manufacture in civil works, mechanical engineering, electronics and computer science, as well as in advanced technologies like optics, hydraulics and cryogenics, may rank among the most difficult tasks in present day scientific instrumentation. But such was his versatility and extensive knowledge in matters pertaining to all aspects of this complex equipment, that Bappu could actively participate and significantly contribute to all discussions. It is a matter of extreme regret that he did not live to see the realisation of his dream.

Expeditions

Earlier, while in Nainital, Bappu had led two scientific expeditions; he led three more successful total solar eclipse expeditions, during the next two decades. In May 1963, while he was in the United States on a lecture tour, he organised a group consisting of his old students and conducted successful observations of the solar corona, in Maine. In 1970, he led a two-man team to Miahuatlan, Mexico. The expedition resulted in an excellent haul of coronal data. In 1980, he organised two elaborate eclipse camps at Hosur and Jawalgere in Karnataka and obtained valuable data on the solar chromosphere and corona.

Bappu undertook three major expeditions in India in connection with the selection of sites for observatories. He toured the Kumaon Hills before hitting on Manora Peak as a site for Nainital Observatory in 1955. His search for Kavalur was over the period 1961-62 when he toured the entire southern tip of the country. The last time he went on a long expedition was in 1973-74 when he covered the entire length of the Deccan to find a suitable location for the large telescope.

International Activities And Service To Astronomy

Bappu exhibited a truly international outlook all through his life. He was an active member of the American Association of Variable Star Observers during his student days and took part in the activities of many astronomical societies while in the United States. He was elected a Fellow of the Royal Astronomical Society, London, in 1951 and later an Honorary Associate of the Society in 1978. He attended all General Assemblies of the International Astronomical Union from 1958 onwards. He was elected Vice-President of the Union for a period of six years, at the XIII Assembly in Prague in 1967, and was finally elected President at the XVII Assembly in Montreal. He was in the organising committees of several IAU symposia and was the convener of the IAU Symposium No 49 on Wolf-Rayet stars held in Buenos Aires in August 1971. He was elected Honorary Foreign Associate of the Belgian Academy of Sciences in 1969 and Honorary Member of the American Astronomical Society in 1982. He undertook a tour of Japan on invitation from the Japan Society for Promotion of Science. He accepted the task of writing a chapter on Astronomy in a series on the History of Mankind sponsored by UNESCO.

Bappu was an authority on the history of astronomy in India during the British period. He painstakingly collected material from the central and state archives and had hoped to put down the history of astronomical studies in a book. Although that dream remains unfulfilled, he has left behind a series of articles describing the endeavours of astronomers over the last two centuries. I do hope that, some day, through the efforts of his colleagues and students, a proper history of Indian Astronomy will be written showing the monumental efforts of Bappu in this direction.

Bappu was very keen to develop a love for astronomical studies among the younger generation. He expressed a specific wish that his six-inch personal telescope be donated to the Kavalur Observatory to be used by school children in getting acquainted with the night sky. He always found time to address young people who were keen on astronomy. He was a superb speaker and could hold any audience spellbound with his wonderful way of talking. Although a natural speaker who could captivate any gathering with his extempore speeches. He preferred to prepare his deliveries with due care ; in this respect, he followed Winston Churchill, who not only wrote his speeches before hand, but punctuated them with "pause" and even "applause" and was very careful in timing his deliveries. All these came naturally to Bappu ; those of the scientific community who had the chance of listening to him will totally agree with me in saying that if we had to look for a perfect speaker on a scientific subject during the second half of the present century, the choice would inevitably have been in his favour.

Bappu was an accomplished amateur astronomer in his younger days. He was very enthusiastic about the development of amateur astronomers. "Love of the subject", he once told a reporter, "is the sole criterion to classify an amateur. A professional uses astronomy for his livelihood .....the study of meteors, sunspots and solar flares were all results of amateur activity and astronomy depends on them for progress". His Institute's doors were always open to enterprising youngsters who wanted help and advice in making their own telescopes.

Bappu actively associated himself with many academic societies of the world ; he also sought to build societies meeting national needs. He was a Founder Member of the Indian Astronomical Society, Calcutta which had been formed in 1959, but failed to take off for quite some time. When a second society, the Astronomical Society of India was formed in 1972, he agreed to serve as President for the first two-year term and set the course of its development. The latter has, indeed, developed as planned and, among other activities, is regularly publishing a journal in astronomy. When the Indian Academy of Sciences decided to start an international journal on Astronomy brought out from India, Bappu took the responsibility for it regular publication as Chairman of its editorial board. The publication has since completed its fifth year and has recently brought out a prestigeous special issue on the occasion of the golden jubilee of the Academy's foundation.

Awards And Honours

Bappu won many laurels during his multifaceted career, starting from his school days when he won myriad prizes for his activities in general proficiency, debating elocution and sports. His first major international award was the Donhoe Comet Medal of the Astronomical Society of the Pacific in 1949. In 1960 he was elected a Fellow of the Indian Academy of Sciences ; he later served as a Member of its Executive Council during 1971-73 and as Vice President during 1980-82. He was elected to the Fellowship of the Indian National Science Academy in 1968, and served in its Council during 1972-74. He won the Shanti Swarup Bhatnagar Prize for Physical Sciences in 1970 and the Sri Hari Om Ashram Award in Physics in 1977. On Republic Day, 1981, he was honoured with the national award of "Padmabhushan". He was awarded the S N Bose Medal of the INSA for 1983, the formal presentation of which unfortunately had to be done posthumously.

Personal Life

On November 14, 1956, Bappu married Yemuna, the second daughter of Mr R K Sukumaran, perhaps the most popular IPS Officer of Madras in recent years. Mrs Bappu had a Master's degree in Political Science from Madras

University but she chose to sacrifice her career to help in her husband's endeavour. She helped Bappu achieve his objectives in many ways; she accompanied him on some of his outlandish journeys, twice outside India and many more times within the country. Her contribution to the beautification of the Observatory gardens at Kodaikanal, Kavalur and Bangalore is overwhelming.

Bappu lost his father in 1958; his mother is alive today. The Bappus did not have any children of their own, but their home always vibrated with the young voices of children of many relatives, friends and neighbours who found the atmosphere of Uncle Venaton's house most cordial and enchanting. Often they would host dinner parties which always ended with an interesting game or home movies which Bappu loved to make by editing shots collected during his travels.

Bappu had the first indication of his failing health in 1970, just before his trip to Mexico, when some anomalies in his heart beat were noticed during a routine check up. In 1973, he had a minor stroke of facial paralysis while attending a symposium in Australia. In 1978 he suffered from a severe angina problem and was hospitalised for three months. He slowly recovered from this problem and again launched into his hectic life of lectures and travel. In January 1982, another medical check up revealed an advanced stage of arterio-sclerosis, necessitating bypass surgery. In May 1982, he left India for Munich on a scientific assignment. His illness continued and he consulted the specialists there; on their advice he underwent cardiac bypass surgery. Two days later he suffered a cardiac arrest; although revived temporarily, his condition worsened day by day, and on the afternoon of the August 19th, he breathed his last. Mrs Bappu and her brother, Mr Krishna Kumar, were at his bed-side when the end came. His mortal remains were flown back to Bangalore for the last rites, and according to his wishes, his ashes were immersed in the river Kaveri.

Epilogue

The life of Vainu Bappu will stand out as a memorable event in the history of Astronomy in India. He came into this world with a purpose. Although he had to leave before it could be fully achieved, he created the necessary infrastructure and atmosphere for the future scientists of his country to regain lost glory in the oldest of its sciences.

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