

Material for Radiotalk
on
Sir C. V. Raman's 89th Birthday

- (1) Proc. Ind. Acad. Sci. - Vol 1, No. 1, (1934), p. 1 - The origin of the colours in the plumage of birds.
Sindian colours in the feathers of the tail of the peacock, and the gorgeous plumage covering the head and the neck of the Himalayan pheasant. - The gorgeous plumage of the Coracias India is strikingly seen when in flight.
- (2) Ibid - Vol. 1, No. 4, October, 1952, pp. 179-188 with 18 figures
The Indian musical drums.
The Mridanga is a very ancient invention, and its acoustical perfection must be considered a remarkable testimony to the inventiveness and musical taste of its progenitors - It is hoped that this short paper is only the precursor of a complete treatise on the musical drums of India including the Tabla.
- (3) Ibid - Vol 3, No. 1, January 1936
Presidential Address at the first annual meeting of the Indian Academy of Sciences held at Bombay, 18/12/1935.
The Academy was registered at Bangalore on 24/4/1934 and was formally inaugurated at a public meeting held at the Indian Institute of Science on 31/7/34 by Amin-ul-Mulk Sir Mirza Ismail, Dewan of Mysore.
I hope it will serve to promote the cause of the advancement of science in our great country - Academy in relation to the nation at large - to be considered as the most authoritative body to speak in the name of India on all matters touching the progress of Science. The potentialities of such an Academy in the way of national service are almost unlimited. I do not think that any calls for service from responsible quarters will find us unwilling or unprepared.
- (4) Ibid: Vol 8, No. 5, November 1938 - In commemoration of the 50th Birthday of Sir C. V. Raman and the 10th years of research on the Raman effect.
(a) Sir C. V. Raman's 50th birthday by B. S. M & C. S. V.
(b) Prefatory note to the special number by B. S. M.
Born 7/11/1888 - Earliest papers in Nature & Phil Mag in 1906. - 30 papers from 1907 to 1917 in three journals & Phys. Rev. on acoustics & optics
Palit Professor from 1917-32 & also Hon. Secy of the Ind. Assoc for the Advancement of Science - in April 33 came to I. I. S. Bangalore - one of his ambitions is to secure a prominent place for India in the scientific map of the world.

(2)

F. R. S in 1924, Knight in 1929. - Italian Society medal in 1928,
Hughes Medal of the Roy. Soc. 1930 & N. L. same year - Army. D. Sc. for Paris
Univ, Glasgow, Hon. fellow of n bodies - no training in foreign laboratories -
later went abroad for scientific meetings, international congresses, Nobel lectures &
other meetings in Canada, U. S. A., U. K., France, Germany, Stockholm, Italy,
and Russia.

L. Brillouin - I am very much pleased to seize this opportunity of this
jubilee volume to pay my tribute of admiration for the wonderful
work of your President, Sir Venkata Raman, whom I am glad to count
among my personal friends.

Haus Mueller, P. Jordan, Max Born

Max Born - As I had the privilege of collaborating with Sir C. V. Raman
in the Institute for a period of six months in 1935-36, I have a
great desire to show my admiration of his discoveries, and my appreciation
of his unceasing efforts for the advancement of science in Indian science.
Messages from C. G. Darwin, Heisenberg, G. Meitner, Pauli, Slater,
Sommerfeld, H. C. Urey & Kohlrusch.

(5) Ibid - Vol. 11, No. 5 (May 1940) - 3 articles by Raman & Melikamian
on reflection of x-rays with change
of λ .
Ref. to Raman effect published in Ind. J. Phys. 1928, 2, 387.
Also references to Compton, Brillouin, Jamin (whose article I translated for
him), Schrovinger, Sommerfeld.

(6) Ibid - Vol. 12, No. 2, August 1940
Tribute to His Highness Maharaja Sri. Krishnaraja Wodeyar Bahadur,
G. C. S. D., G. D. E.
(4/6/84 to 3/8/1940).
- Establishment of I. I. S. C. by generous grant of vast extent of land and a
generous grant of money supplemented by an annual contribution - Gratitude
of Ind. Acad. Sci. to him & Sir Muza Small for grant of land & handsome
contribution - Gratitude to Donaji Maharni & Jayachamarnji Wodeyar.

(7) Ibid - Vol. 15, No. 2, Feb. 42 - Presidential address at annual meeting of the
Academy at Nagpur Ind. on 24/12/1941 - For good or evil we live in
an age of science. - Subject on solid state of matter - Ref. to Einstein's
quantum theory of the specific heat of solids - Ref. to Debye's & Born's work on crystal
dynamics and their shown to be theoretically untenable and contradictory to
experimental facts.

(8) Ibid - Vol. 18, No. 5, Nov. 1943 - Symposium of papers on the dynamics of crystal
lattices - Criticism of Born - The Born postulate is in the clearest contradiction with the
experimental facts observed in crystals - Finding with diamond lattice show that

are wholly irreconcilable with the Born postulate and its consequences. (3)

- (9) Ibid. Vol. 19, No. 5, May 1944 - Symposium of papers on the structure and properties of diamond - luminescence of diamond, its nature and origin. Material available in the writer's collection includes 310 specimens (Panna Crystals, other Indian origin (65), 88 billions of South African origin, other 128 of Indian origin - luminescence is essentially physical in origin and not due to foreign atoms present as impurities - Beautiful figures 1 to 6 - Birefringence in diamond.
- (10) Ibid. Vol. 26, No. 6, Dec. 47 - Symposium of papers on the vibration spectra of crystals - Parts I to VI by Raman - References again to the Debye & Born-Karman Theories
- (11) Ibid. Vol. 39, No. 1, Jan. 1954 - The structure and optical behaviour of iridescent shells - name or mother-of-pearl - 22 photographs.
- (12) Ibid. Vol. 46, No. 1, July 1957 - Oceanographic studies in the Bay of Bengal by E. C. da Foud - Report prepared by him on the suggestion of S. V. C. V. (pp. 1-43)
- (13) Ibid. Vol. 47, No. 5, May 58 - Diffraction of X-rays by diamond. - Parts I-III - (45)
- (14) Ibid. Vol. 47, June 58
- (16) Ibid. Vol. 48, No. 6, Dec. 58 - Percussion figures in crystals. - Impact of a hard steel sphere on the optically polished surface of a solid bringing about permanent deformation
- (17) Ibid. Vol. 49, No. 4, April 59 - Christian Huyghens and the wave theory of light - Huyghens' *Traité de la lumière* (1690) described as a masterpiece of scientific thought and an inspiration which possesses an ever enduring value and interest. Kirchoff's ^{theory} formula is only a mathematical abstraction, not in accordance with Huyghens' ideas and has no physical relevance.
- (18) Ibid. Vol. 49, No. 5, May 59 - Optical mirages. Deals with Huyghens' work. Mirages constitute one of the most remarkable effects arising from a variation of the refractive index of the atmosphere.
- (19) Ibid. Vol. 49, No. 6, June 59 - Geometrical theory of diffraction patterns - Fresnel halftone - Huyghens' geometrical theory - 10 figures
- (20) Ibid. Vol. 50, No. 2, August 59 - Huyghens' Principle and diffraction of light. Part I - Criticism of Kirchoff's maths & support of Huyghens' Physics
- (21) Ibid. Vol. 52, No. 6, Dec. 1960 - Here start the series of papers on the perception of light & colour, and the physiology of vision - Starting from

- (22) Ibid, Vol. 54, No. 5, Nov. 1961 - Spectroscopic properties and specific heats of MgO and NaCl - Memori 127 + 128 each of four parts
- (23) Ibid, Vol. 55, No. 1, Jan. 1962 - Infrared absorption by diamond and its significance - Memori No. 129 - 10 parts - Also includes Proceedings of the 27th annual meeting from 26-28/12/1961 at Crawford Hall, Mysore & Ywaraj's college - 'William V. C.', his tribute to Sir C. V. - Sir C. V.'s popular lecture on "Gems & Gemmology".
- (24) Ibid, Vol. 56, No. 2, August 62 - The role of retina in vision - Memori 133
10 coloured figures.
- (25) Ibid, Vol. 58, No. 2, August 63 - Floral colours and the physiology of vision - Memori, 137 - 12 parts - The Queen of Flowers (Jasmint), morning glory, Jacaranda, Aster, Roses, Hibiscus & Bougainvillea, flowers showing band spectra
- (26) Ibid, Vol. 63, No. 7, Jan. 66 - New Physiology of vision, Chap. 30 - Memori ²³¹
- (27) Ibid, Vol. 63, Nos. 2-6 - Chaps 32-43 of Physiology of vision
Article on a photoelectric Raman Spectrometer by Japanese authors
- (28) Ibid, Vol. ~~66~~ 67, No. 3, March 68 - The atmosphere of the Earth - Presidential address at 33rd annual meeting at Madras, 19/12/67.
- (29) Vol. 67, No. 5, May 68 - The diamond, its structure and properties - Refers to his joint paper with Mitalan on ~~X-ray diffraction~~ dynamic reflection of X-rays called the "New X-ray effect". - Refers to his article on ~~X-ray diffraction~~ of X-rays by diamond using more powerful X-ray equipments
- (30) Ibid, Vol. 69, No. 4, April, 69 - Floral colours and their origins - Presidential address at 34th annual meeting at Ahmedabad on 22/12/68.
- (31) Ibid, Vol. 72, No. 1 - July 1970 - The flavonoides & their chemical nature and spectroscopic behaviour relative to floral colours - obituary of his last paper - Refers to literature on organic chemistry & plant biochemistry - The spectrophotometric records reproduced in this memoir were made in the Central Instruments Laboratory of the I.I.S.C. & the authors cordial thanks due to their kind assistance.
- (32) Ibid, Vol. 72, No. 5, Nov. 1970 - Published with black border on cover with portrait inside (7/11/1988 to 21/7/1970).



(33) Proc. Ind. Acad. Sci. Vol. 37, No. 3, March 53 - Commemoration of the

Jubilee of the discovery of the Raman effect. (25 years).

(a) Lecture on "new radiation" by Sir C.V. at the Inaugural address of the South Indian Science Association, Bangalore on Friday 16/3/1928 - First announcement of the Raman effect.

(b) Nobel lecture delivered by Sir C.V. at Stockholm on 11/12/30 - Refers to work done by Ramanathan, Rameswara Rao, Srinivastava, Sogani, Krishnan. Ramachandra Rao, Venkateswaram, Ramakrishna Rao, Ramdas - Ref. to work of McLenahan & Rosetti and Krishnamurti, Ramanammy, Robertson & Fox.

(c) Bhagavantam's article - Nearly 3000 articles published up to 1953 - Chemical Physics - original equipment: a glass bulb of distilled liquid or a block of ice or of optical glass, a quartz mercury lamp with a condensing lens and a pocket spectrocope - Developments in experimental techniques - $h\nu + \text{molecule} \rightarrow \text{molecule}^* + h\nu^+$ are Stokes Raman lines; $h\nu + \text{molecule}^* \rightarrow \text{molecule} + h\nu^-$ are anti-Stokes Raman lines. General theory of the Raman effect - Vibrations of polyatomic molecules - Raman effect & chemical problems (Pub. G. Herzberg: Infrared & Raman Spectra of polyatomic molecules, 1945) - Raman effect & solid state - crystals - Raman effect as a branch of spectroscopy. Prominent place in the field of modern Physics and modern Chemistry as an investigatory tool of great power.

(34) Sir C.V. Raman as physicist and teacher - My article in Proc. Ind. Acad. Sci. Vol. 28, No. 3, 1948 - 60th birthday volume.

(35) Current Science, Vol. 40, No. 9, 5/5/1971 - Sir C.V. Raman Memorial number.

(a) ~~K.R. Ramanathan~~ Preface by Bhagavantam - It will be no exaggeration to say that for many generations to come, Indian scientists will regard him as the father of Modern Science in India

(b) K.R. Ramanathan - Rutherford's speech when giving Raman the Hughes Medal - 1st paper in 1906 when he was 18 years old, a student of the Presidency College, Madras on diffraction bands published in Phil. Mag & Nature - 210, Bowbazar Street, Ind. Ass. for Cult. of Sci. - M.A. in Phys. in 1917 when he was 29 years old - colour of the deep blue sea - Primal requisite for success, a function of older generation of scientific men - 1933 Director & Prof. of Physics at I.I.T. - 1936 Academy founder - 1935 gift of 11 acres of land - Retirement from Inst. in 1948 - work in Raman Inst. after 1948 - interest in last few years - 1964 laser applied to Raman Spectroscopy - Sept. 70 whole week's meeting of Academy at Bangalore - Attendance in spite of failing health - Breakdown early Nov & passed away on 21/11/70 - His Astrophysicist son Rasthankrishnan - Raman's broadcast talk.

- (c) Bhagavantam on the Raman effect - awarded Nobel Prize in 1930 - just took him 9 years (1921 to 30) to climb to the top from scratch - Raman effect the pinnacle of India's contribution to the world science - The discovery of laser sources has introduced a new dimension to the phenomenon. Signature of a new substance is its Raman spectrum - original equipment 3 items viz a mercury lamp, a flask of benzene and a direct vision spectrograph.
- (d) T.S. Sadasivan - Talented amongst Indian scientists of this century - The Professor - His collection of natural objects - "All that glitters is not gold" with Pandit Nehru - Views on fundamental research & technological innovations - Brain drain - discovery of radium in a tin-plate, his optimism - A man calls a shade a shade; he would suffer no fools - Attempts to introduce new science policies.
- (e) T.R. Seshadri - Raman values science as his religion - Nation's responsibility to cherish Ind. Acad. Sci., Raman and Current Science
- (f) L. Rama Rao - Encouragement to Geology.
- (g) G.V.R. - Musical instruments; Theory of the bowed strings - optics the beautiful - Earth quakes, typhoons, his pet theories.
- (h) N.K. Panikkar - 1942 relinquishing directorship of I.I. Sc. - Very few in the world to match Raman as an exponent of science to the public and the layman. - His insistence on use of English as medium of scientific work
- (i) Raman & K.V. Datta - Raman & Astronomy - Astronomy as "heaven-born music" - His insistence on astronomical research
- (j) P.R. Krishna Rao - Raman's interest in meteorology
- (k) C. Ramanam - C.V.R. as a meteorologist - starting with schoolboy's concept of rotating earth & ending with important meteorological results in a paper of seven pages.
- (l) R. Manthalkrishnan - Students' ^{worship} ~~thrusting~~ under Raman to undergo rigorous searching oral examination, although he attached importance to original records, he always made his own assessment of a student - Encouragement to his students. - Let us do something original instead of brassing in Prof. Debye's backyard"
- (m) P.R. Pothandry - C.V.R. as teacher at Bangalore - About learning German - going for walks along with a student - Physics is not philosophy - spectrogram no food - 10 kw brain - Poverty - culture.
- (n) L.A. Ramdas - Technical
- (o) R.S. Krishnan - Technical - 96 ~~to~~ papers in Bibliography on Raman lattice dynamics
- (p) B.R. Selt - Technical
- (q) Nayandutt - My Professor - Boris saying "He keeps our mathematics" - Keats lines.
- (r) B. Chandrasekhar - Raman - Math theory - Technical
- (s) A.K. Ramdas - Ref. to lasers etc at the end

(t) Nair, Sniha & Venkataraman - Laser Raman Spectroscopy of organic

Compounds

(u) Mrs A. Mani - Diamond - Technical.

(v) Asundi & Pant - Diamond - Technical

(w) B. S. Ramakrishna & Anand - Stretching strips - Technical.

(x) A. Jayaraman - Reflections on Prof. Raman.

"when a lecture is delivered the audience must be under the delusion that they have understood everything that was said"

(36) Extracts from book on Hilbert - from notebook 14, pp. 151-159.

(i) items (45), (46), (42), (36), (34), (29), (28), (23), (22), (20), (18), (17), (14), (13), (8), (5), (1)

(37) Personal relations.

(1) Attending his lectures in 1919-21

(2) certificate.

(3) letter to Bhabha re. C.T.S. at Bangalore.

(4) letter re. my going to Poona.

(5) Ring-structure of electron - his remarks.

(6) Controversy with Stark

Preliminary draft

~~Celebrating birthday~~ Tomorrow Today is the 89th birthday of the late Prof. S. C. V. Raman. These birth-days are celebrated year after year in warm personal veneration for the great master who, in the words of one of his pupils, was the Father of modern science in India. Having known him for nearly half a century, he appears to me an outstanding example of a man through whom the immensely creative power of naked scientific genius manifests itself. The most obvious characteristic was his great passion for physics coupled with an intense enthusiasm and volcanic energy. Even the most casual observer could not fail to miss the fire in his sparkling eyes which seemed to radiate this energy and to be animated by the dynamic force of an active brain. He lived for his work as few men did, and his tenacity of purpose and ability to put in hard work were remarkable. His first paper appeared in 1906 in the Philosophical Magazine and Nature when he was just 18 years old, and his last paper on floral colours appeared in the Proceedings of the Indian Academy of Sciences, Vol. 72, July 1970 just a few months before his death in Nov. 1970. Thus establishing a record of over 60 years of active scientific work. His greatest achievement was, of course, the discovery of the Raman Effect for which he was awarded the Nobel Prize for Physics in 1930.

The history of science teaches us that every age has its own problems (8) which the following age solves and enriches, or casts aside as profitless. Many pessimists were of the opinion that after the Raman effect was exploited by innumerable workers in India and abroad ^{by using it to solve} ~~after applications~~ ~~of~~ ~~the~~ ~~effect~~ ~~was~~ ~~of~~ ~~minor~~ ~~significance~~ ~~to~~ ~~myriads~~ ~~of~~ ~~problems~~, its importance as a tool of research would be of minor significance. But what we now see that, with the discovery of the laser, a new lease of life has been acquired by the Raman effect by new developments known as the laser Raman spectroscopy. The work in this new field has been monopolised mostly by western workers, and we hope that, in the near future, we in this country will lead in this domain also as we did earlier in researches concerning the classical Raman ^{spectroscopy} effect.

It is perhaps not very well known that Raman has shown a deep appreciation of the beautiful in nature in the topics he chose for research. ~~His work on musical instruments~~ His love of music, colour, light, vibration, symmetry, harmony, structure ~~and architecture~~ ^{and} bear ample testimony to his aesthetic outlook. His researches on musical instruments, numerous beautiful phenomena of wave optics, the colour of the sea, ^{in flowers and} colour in the plumage of birds, iridescent shells and mother-of-pearl, and above all his studies on the form, symmetry and structure of diamond are some examples of ^{his} love of nature. In the very first article in the Proceedings of the Indian Academy of Sciences founded by him in 1934, Vol. 1, No. 1, p. 1 we ~~find the article on~~ ^{is devoted to his work on} the plumage of birds, and in Vol. ~~1~~ ⁴, No. 4, ~~we find an article~~ ^{by him} on the Mridanga in which he remarks "The mridanga is a very ancient instrument, and its acoustical perfection must be considered a remarkable testimony to the inventiveness and musical taste of its progenitors. It is hoped that this short paper is only the precursor of a complete ^{treatise} on the musical drums of India including the Tabla". It is a pity that such a treatise is not yet forth coming.

He encompassed research not merely in physics and chemistry, but had a catholic interest in many branches of science. His interests in ~~geology~~ geology, many aspects of animal and plant life specially birds, meteorology, oceanography, instrumentation, and the physiology of vision, ^{to} which subject he made striking contributions, have exerted a profound influence on the work of not only his students, but many of his contemporaries. He had planned to build a biological research unit, a mineralogical laboratory and more than all an astronomical observatory at the Raman Research Institute which he founded. It is heartening to find that his son Prof. Ravakrishnan, who is the Director of this Institute has been encouraging astronomical research by bringing together a band of workers on several aspects of astronomy, astrophysics, general relativity and cosmology, and we hope

that in course of time some fund a mental and strikingly original work (9)
will emanate from this school.

Although essentially an experimental physicist, he gave great encouragement to studies in theoretical physics and mathematics even of the pure type. Thus during the years 1940-45 when Bhabha and myself were working in Sir C.V.'s Dept at the ^{ad.} ^{of the} Institution ^{of Science} Calcutta of mesons and relativistic wave equations for elementary particles of arbitrary spin, he made constant enquiries as to how our work was progressing & gave great help in ^{having} ^{published} our researches ^{promptly} in the Proc. Ind. Acad. Sci. It is no exaggeration to say that Bhabha's ^{share} contributions to the growth of atomic and nuclear science in the country is to a great extent due to the call for self-reliance which Prof. Raman constantly gave to his students and collaborators. The same is also true to a great extent as regards ~~Raman's~~ space research in India since Sarabhai also worked for some time at Bangalore ⁱⁿ the Raman School ^{at} Bangalore. Sir C.V. laid great stress on the development of indigenous talent in ^{which} ^{to} the abundance of which he firmly believed, and he was ~~firmly~~ ^{undoubtedly} against steps that would place restrictions on genuine scientific developments ^{undertaken by our research} either in pure science or technology. In this connection, I might say with confidence that he would have ^{strongly} condemned the recent moves of the super powers to place safeguards in order to contain the development of atomic energy resources in the country, and our Government ^{indeed has reverend} ~~has~~ ^{pressure} ~~should~~ ^{is} ~~surrender~~ ^{blackmail} to this ~~blackmail~~, since ~~at~~ this would nullify to a great ~~work~~ extent the good work done by our talented scientists in the field of atomic energy.

Raman was not only a great investigator, but also a great teacher, ~~and a~~ ^{one} of the very highest order ^{most} generous towards his students. He has often given away whole lines of research to his ^{which} ^{white} ^{less} ^{men} ^{would} ^{be} ^{tempted} ^{to} ^{keep} ^{them} ^{for} ^{themselves}. Thus, when reading his Nobel lecture delivered at Stockholm on 11/12/1930, one finds copious references to the work done by a dozen of his students: on topics leading to the Raman Effect, and ^{begins to wonder if his intention is to} ^{begin to wonder at his generous} ^{generosity} ~~five credit~~ ~~all~~ ~~in~~ ~~credit~~ ~~to~~ ~~his~~ ~~students~~, and ~~underrate~~ ~~his~~ ~~own~~ ~~achievements~~. ~~in~~ ~~acknowledging~~ ~~their~~ ~~work~~ ~~the~~ ~~lecture~~ ~~ends~~ ~~with~~ ~~the~~ ~~statement~~ ~~that~~ ~~a~~ ~~certain~~ ~~observation~~ ~~made~~ ~~by~~ ~~one~~ ~~of~~ ~~his~~ ~~students~~ ~~is~~ ~~one~~ ~~of~~ ~~the~~ ~~most~~ ~~remarkable~~ ~~ever~~ ~~made~~ ~~in~~ ~~this~~ ~~new~~ ~~field~~ ~~of~~ ~~research~~!!

Even before he ^{reached} ^{eminent} ^{as} a Nobel Prize winner, his class lectures when he ^{was} ^a ^{Prof} ^{of} ^{Physics} at the Calcutta University were ~~acknowledged~~ ^{well} ^{known} ^{and} ^{very} ^{famous} in all departments of the University, and in his classes physics seemed to the students to be still "in the making", and there was no teacher in the University who came close to him. During the years 1919-21 when I was a student in the M.Sc. classes in Pure Mathematics of the Calcutta University, ^{absolutely} ^{happened} ^{to} ^{slip} ^{into} ^{his} ^{class} ^{out} ^{of} ^{curiosity} ^{to} ^{hear} his lecture. At the end of the hour he noticed me, and asked me to see him in his room later; I did so later being afraid all the ^{as to} ^{what} ^{punishment} ^I ^{would} ^{receive} ^{at} ^{his} ^{hands}. Of course, he chided me for

absent myself from one of my regular classes, but when I represented to him that a particular ^{the particular (10)} ~~class~~ ^{class} lecturer was very boring since the lecturer wrote on the blackboard what notes he had made in his notebook without facing the class. He appeared to sympathise with me, enquired about my background, what University I came from and so on. I told him that I had taken Mathematics as my main & physics as my subsidiary subject in the ~~previous~~ ^{of the M.A. class} B.Sc. (Hons) classes, and in my studies in physics I had read very little of optics. ^{I know very little about} Then he subjected me to a barrage of questions only on optics on topics like polarisation and diffraction of light, and I answered to the best of my ability. At the end he remarked "you see, I was just interested to find out what you know about things about which you know nothing. Anyway, you are a fool not to have taken ^{physics} your main subject". At the end of my course, ^{in 1921} I saw him to take leave and told him that I stood only first class second & not first class first in my final M.Sc. examination. He said "Don't bother. What is important is what you do hereafter. Study some mathematical physics & try and do some work in that field". I must admit that what little work I have done ^{as an honorary worker in his dept.} in theoretical physics, and what little service I have rendered to the Ind. Acad. Sci. as its Secretary (Sec A) for nearly two decades have been the result of my earlier associations with Sir C.V. Raman.

^{arecited} ~~the incidents~~ relating to his association with students & the advice he gave them are legion. When a student told him "Sir, I feel that this is so", his remark was "My dear young man, physics is not philosophy; your feelings have no value unless you prove them". Once he found a student working at his desk rather dejected, and ^{asked} ~~tried~~ what the matter was. The student said "The x-ray tube I am working with has only 1 K.W. power, while a distinguished scientist in the U.K. is working on the same problem with a 5 K.W. tube". Prof. Raman said "only one K.W., that is all. There is a very simple solution, but a 10 K.W. brain on the problem". To a student who expressed his inability to build up a theory explaining some experimental facts, ^{humorous} his advice was "It is better to have a wrong theory rather than to have no theory at all". When a student said "I am working on the ^{old} lines suggested by Prof. Zeno" and trying his advice was "Do something original. Don't browse in the backyard of Prof. Zeno". During 1935-36 when Prof. Max Born was a visiting Professor for six months at the Dept. of Physics headed by Prof. Raman at the I.I.T., I had worked on Prof. Born's non-linear field theory and was able to show that a ring on the basis of that theory that an electron can have a ring structure. When ^{shown} ~~mentioned~~ this result to Prof. Raman he said "Wonderful! But I see that your ring has no diamond in it!" meaning, of course, that what I had done was a pure mathematical creation without any physical significance, which was certainly true. His ~~advice to young lecturers who wanted to join the teaching profession~~ his advice was "Three times, three times, keep your ~~computations~~ ^{calculations} to the lowest level of the multiplication table, and start with the simplest examples" since he did not have a very high opinion of the abilities of the ordinary student. When some student complained of want of facilities for research he quipped back saying "Remember, Radium was discovered in a tin-shed!". As another example of his fine sense of humour might be mentioned a ~~small incident~~ ^{small incident} which occurred when the late Prime Minister Pandit Jawaharlal Nehru visited Sir C.V.'s institute. He laid two similarly dressed ores of copper and gold in the palms of Pandit Nehru, switched on the ultraviolet ^{light} ~~test~~, and asked him as to which was copper and which gold. The brighter piece under the ultraviolet light was promptly named gold by Jawaharlal Nehru, and Raman, in his inimitable style burst out saying "Mr. Prime Minister, all that glitters is not gold!" There was a chorus of laughter from those assembled in which Pandit Nehru himself joined heartily.

Prof. Raman has admirably filled the role of an eminent popular lecturer on scientific subjects, and popularisation of science in the country owes not a little to his gifts of eloquence, oration and irresistible bubbling humour. The range of subjects he chose for his popular lectures ^{were} ~~was~~ astonishing in ^{their} ~~its~~ variety and width of interest. They ranged from atmospheric to astrophysics, from birds to the blue sky, from diamonds to diffraction, from the miridgana to mirages, from floral colours to physiology of vision, from whispering galleries to weather forecasts, and so on from gems and gemmology to geological ages, from the mother-of-

heard to morning - glory, and so on. His formula for a good popular lecture was that it should be such as to put the audience under the delusion that they have understood everything that was said. It is generally supposed that he could deliver a popular lecture offhand on any topic of his choice; this is certainly not true. He took great pains to prepare these lectures down to the smallest details. That was why they were so inspiring being faithful reflections of his spirit, direct and intense. (11)

Like many great creative scientists he scarcely had any interest in science projects like organisation of school commissions, development of teaching methods in science from the kindergarten to the Universities, ~~improvement and~~ enlargement of scientific education to improve technology, and ~~in government~~ - sponsored science policies. In crazy notions like modern mathematics, semester and non-semester systems, long-distance teaching and award of degrees, and in several government sponsored science policies. There is a famous example of the great mathematician Hilbert who was not interested in such topics and considered them of inferior in rank to creative mathematics, and the senior Professor Klein of the same Göttingen school who was interested in these activities. Once Klein had arranged a seminar on scientific education in German middle schools and had filled a very large blackboard with figures relating to this topic. He looked towards Hilbert and the other great creative mathematician Minkowski & enquired if they had any comments. Hilbert just nodded his head, while Minkowski asked softly "Does 'nt it seem to you, Herr Geheimrat, that there is an unusually high proportion of prime numbers among those figures on the Board?"

This does not mean that Raman's service to science in India ^{has} not been significant. On the other hand, ~~he has rendered, by his far greater service to the progress of science in the country~~ his unique personality profoundly immersed in his work and totally dedicated to his science, his greatness as a teacher, a leader of the very highest order, and as a worker tireless and persistent in all his efforts, have all rendered far greater service to science in the country than many others whose greatness in science is considered directly proportional to the number of Govt. ~~science~~ committees on which they serve.

He was a great nationalist at heart and an ardent admirer of Mahatma Gandhi as evidenced by his arranging the sacred ritual of the Mahatma Gandhi Memorial Lecture on the 2nd October of every year at his Institute by distinguished ^{philosophers, educationists, workers,} scientists, economists and social scientists. It is very gratifying to himself, delivered one of these lectures on a previous occasion. It is gratifying to note that these memorial lectures are still ^{being continued at} a steady ~~pace~~ ^{pace} at this Institute.

He bequeathed to Indian science three great institutions, the Indian Academy of Sciences with its Proceedings which have recently been enriched by his successors by the addition of another ^{beautiful} journal the "Pramana" and made more glittering by revision of ^{their} primary ~~standards~~ ^{schedules}, the Current Science and the Raman Research Institute. May these institutions grow from strength

or to strengthen in the coming years, and fulfil his vision of (12)
scientific advance in our country by the development of indigenous talent
in which he had great faith.

Raman was a great ~~unusual~~ citizen of Bangalore with the
rare distinction of not having any ~~street~~ ^{road} or park or extension named after him.

The Station Director,
All India Radio, Bangalore.

Dear Sir,

Ref. BAN. SC (4) 77/P. of 6/9/77.

Enclosed please find the script ^{on} for the talk assigned to me, for
favour of your approval.

I find that the talk can be put through within the scheduled
time of 15 minutes, but the matter is elastic enough to be broken off
at any stage.

~~At the end of Para~~

In the last sentence at the end of Para 4 on p. 3, you will find a criticism of
our Govt nuclear policy. I leave it to your discretion to retain it or delete it. You can ~~deal~~

~~The same is true of the one sentence Para. 12 worded as follows.~~
similarly ^{deal} - ~~The one sentence Para. 12~~ sarcastic remark in Para. 12.

I shall come over to the Station for recording at 9 A.M. on 28/10/77. ~~Communications~~

Communications, if any, may be sent to my residential address as above.

Yours faithfully
B. S. M. Sharma

RADIO TALK

in connection with the 89th birth anniversary of Sir C.V.Raman.

AIR Bangalore-6-11-77 at 8.30 A.M.

(1) Tomorrow is the 89th birth day of the late Prof. Sir C.V.Raman. These birthdays are celebrated year after year in warm ^{personal} veneration for the great master who, in the words of one of his pupils, was the Father of modern ~~scie~~ science in India. Having known him for over half a century, he appears to me an outstanding example of a ^{through whom} man the immensely creative power of naked scientific genius manifests itself. He had great passion for physics coupled by an intense enthusiasm and volcanic energy. Even the most casual observer ~~could~~ could not ^{have} failed to miss the fire in his sparkling eyes which seemed to radiate this energy and to be animated by the dynamic force of an active brain. He ~~li~~ lived for his work as few men did, and his tenacity of purpose, and ability to put in hard work were remarkable. His first paper on diffraction of light appeared in the Philosophical Magazine in 1906 when he was just 18 years old, and his last paper on floral colours appeared in the Proc. Ind. Acad. Sci. Vol. 7 July, 1970 just a few months before his death in November, 1970, thus establishing a record of over 60 years of active scientific work. His greatest achievement was, of course, the discovery of the Raman Effect for which he was awarded the Nobel Prize in 1930. The history of science teaches us that every age has its own problems which the following age solves and enriches, or casts aside as profitless. Many pessimists were of the opinion that after the Raman Effect was exploited by innumerable workers in India and abroad by using it to solve myriads of problems, its importance as a tool of research would lose its significance. But what we now see is that, with the discovery of the laser, a new lease of life has been acquired by the Raman Effect by developments known as the Laser Raman Spectroscopy. The work in this new field has been monopolised by western workers, and we hope that in the near future we, in this country, ~~will~~ will lead in this domain also as we did earlier in researches concerning the classical Raman spectroscopy.

(2) It is perhaps not well known that Raman has shown a deep apprecia-

tion of the beautiful in nature in the topics he chose for research. His love of music, colour, light, vibration, symmetry, harmony and structure bears ample testimony to his aesthetic outlook. His researches on musical instruments, numerous beautiful phenomena on wave optics, the colour of the sea and the sky, colour in flowers and in the plumage ^{of} birds, iridescent shells and mother-of-pearl, and above all his studies on the form, symmetry, and structure of diamond are some examples of his love of nature. The very first article in the Proceedings of the Indian Academy ^{of} Sciences founded by him in 1934, viz: Vol. 1, No. 1, p. 1 is devoted to his work on the plumage of birds, and in No. 4. of the same Volume, we find an article by him on the Mridanga in which he remarks "The mridanga is a very ancient instrument, and its acoustical perfection must be considered a remarkable testimony to the inventiveness and musical taste of its progenitors; it is hoped that this short paper is only the precursor to a complete treatise on the musical drums of India including the Tabla". ^{I don't know if} ~~It is a pity that~~ ^{has been published so far.} ~~such a treatise is not yet forthcoming.~~

(3) He encouraged research not only in physics and chemistry, but had a catholic interest in many branches of science. His interests in geology, many aspects of animal and plant life, specially birds, meteorology, oceanography, instrumentation, and the physiology of vision to which subject he made striking contributions, have exerted a profound influence on the work of not only his students, but many of his contemporaries. He had planned to build a biological research unit a mineralogical laboratory, and more than all an astronomical observatory at the Raman Research Institute founded by him. It is heartening to find that his son Prof. Radhakrishnan who is the Director of this Institute ^{and himself an astrophysicist}, has been encouraging astronomical research by bringing together a band of workers on several aspects of astronomy, astrophysics, gravitation, and cosmology, and we hope that in course of time, some fundamental and strikingly original work will emanate from this school.

(4) Although ~~an~~ essentially an experimental physicist, he gave great encouragement to studies in theoretical physics also. Thus, during the years ¹⁹⁴⁰⁻⁴⁵~~1940-45~~ when Bhabha and myself were working in Sir C.V.'s Department at the Indian Institute of Science on the scattering of mesons, and relativistic wave equations of particles of arbitrary spin, he made constant enquiries as to how our work was progressing, and gave great help in having ~~aa~~ our results published promptly in the Proc. Ind. Acad. Sci. It is no exaggeration to say that Bhabha's fine contributions to the growth of atomic and nuclear science in the country is due in a great measure to Sir C.V.'s encouragement and inspiration. The same is true of space research in India since Sarabhai also worked for some time in the Raman School ^{at}~~in~~ Bangalore. Sir C.V. laid great stress on the development of indigenous talent in the abundance of which he firmly believed, and he was against steps that would place restrictions on genuine scientific developments undertaken by our scientists either in pure science or technology. In this connection, I might say with confidence that he would have strongly condemned the recent moves by the super powers to place safeguards in order to contain the development of atomic energy resources in ^{our}~~the~~ country, and our Government's indirect, but nevertheless meek surrender to this pressure, since this would nullify to a great extent the good work done by our scientists in the field of atomic energy.

(5) Raman was not only a great investigator, but also a teacher of the very highest order, most generous towards his students. He has often given away whole lines of research to them while lesser men might have been tempted to keep them as their own. Thus, while reading his Nobel lecture delivered at Stockholm on 11-12-1930, one finds copious references to the work done by a dozen of ~~of~~ his students on topics relating to the Raman Effect, and begins to wonder if his intention was to give (contd. next page)

all the credit to his students and underscore his own achievements in the field . Even before he reached eminence as a Nobel Prize winner, his classes, when he was Palit Professor of Physics at the Calcutta University, were famous in all Departments of the University, and in his classes physics seemed to the students ^{to be} still " in the making" ., and there was no teacher in the University who came anywhere near him. During the years 1919-21, when I was a student in the M.Sc. classes ^{in Pure Mathematics} of the Calcutta University, I once happened to slip into his class out of curiosity to hear his lecture. At the end of the hour he noticed me and asked me to meet him in his room; I did so later being afraid all the while as to what punishment I would receive at his hands. Of course, he chided me for absenting myself from a regular class in mathematics, but when I represented to him that the particular class was very boring since the concerned lecturer merely wrote on the blackboard whatever notes he had made in his notebook without facing the class, he appeared to sympathise with me, enquired about my background, what University I came from, and so on. I told him that I had taken Mathematics as my main, and physics as my subsidiary subject for the B.Sc. ^{Degree} (Hons) of the Mysore University. On being asked as to what I had studied in Physics, I told him that I knew something of mechanics, heat, electricity and magnetism, and that I knew practically nothing about light. He then ~~subjected~~ subjected me to a barrage of questions only on ^{light} ~~optics~~ on topics like polarisation diffraction, interference and so on, and I answered ^{them} to the best of my ability. At ~~the~~ the end he remarked " You see, I was just interested to find out ^{what} you know about things about which you know nothing" ., and told me that I was a fool not to have taken physics as my main subject. At the end of my course, ^{when} I saw him and told him that I had secured only a First Class second rank, and not the first rank, he said " Don't bother, What is important is what you do hereafter. Study some mathematical physics and try and do some work in that field" . I must admit that what little work I have done in theoretical physics, and what little service I have rendered to the Academy as its Secretary, Section (A) for a period of nearly two decades ~~has~~ have been the result of my earlier associations with Prof. Raman.

(6) The anecdotes relating to his association with his students, and the advice he gave them are legion. When a student told him " Sir, I feel that this

is so'', his remark was ''My dear young man, physics is not philosophy, your feelings have no value unless you prove them''. Once he found a student working at his desk rather dejected, and asked him what the matter was. The student said ''The x-ray tube I am working with has only 1 k.w power while a distinguished scientist working in U.K. on the same problem has a 5 k.w. tube''. Prof. Raman said '' Only one k.w. that is all; there is a very simple solution. Put a 10 k.w. brain on the problem''. To a student who expressed his inability to build up a theory to explain some experimental fact, his humorous advice was ''It is better to have a wrong theory rather to have no theory at all''. When a student said that he was working on the old lines suggested by Prof. Debye, his advice was ''Do something original. Don't browse in Prof. Debye's backyard''. During 1935-36, when Prof. Max Born was a visiting Professor at the Department of Physics headed by Prof. Raman at the Indian Institute of Science, I worked on Prof. Born's non-linear field theory. and was able to show on the basis of that theory that it is possible for the electron to have a ring structure. When I showed this result to Prof. Raman, he said '' Wonderful! But I see that your ring has no diamond in it'', meaning, of course, that what I had done was a pure mathematical creation without any physical significance, which was certainly true. When some student complained of want of facility for some research, he quipped back saying "Remember that radium was discovered in a tin-shed" As another example of his fine sense of humour might be mentioned an incident which occurred when the late Prime Minister Pandit Jawaharlal Nehru visited Sir C.V. Raman's Institute. He laid two similarly dressed ores of copper and gold in the palms of Pandit Nehru, switched on the ultra-violet light and asked him as to which was gold and which copper. The brighter piece under the ultra-violet light was promptly named gold by Panditji, and Prof. Raman, in his inimitable style, burst out saying " Mr. Prime Minister, all that glitters is not gold". There was a chorus of laughter from those assembled, in which Pandit Nehru himself heartily joined.

(7) Prof. Raman has admirably filled the role of an eminent popular lecturer on scientific subjects, and the popularisation of science in the country owes not a little to his gifts of eloquence, exposition, and bubbling humour. The subjects he chose for his popular lectures were astonishing in their variety, and width of interest. They ranged from atmospheric to astrophysics, from birds

to the blue sky, from diamonds to diffraction, from the mridanga to mirages, from floral colours to ^{from whispering galleries to weather forecasts} physiology of vision, from gems and gemmology to geological ages, from the mother-of-pearl to morning glory, ~~and so on~~. His formula for ^a good popular lecture was that it should be such as to "put the audience under the delusion that they have understood everything that the lecturer has said". It is generally supposed that he could deliver a popular lecture offhand on any topic of his choice; this is certainly not true. He took great pains to prepare his lectures down to the smallest details. That was why they were so inspiring being faithful reflections of his spirit, direct and intense.

(8) Like many great creative scientists, he scarcely had any interest in or the time to devote to science projects relating to topics like organisation of commissions, developments of teaching methods in science from the kindergarten to to the Universities, enlargement of scientific education to improve technology, crazy notions like the introduction of modern mathematics, semester and non-semester systems, long-distance teaching and award of degrees, and in several Government sponsored science policies. There is a famous example of the great mathematician Hilbert who was similarly not interested in such topics, and considered them inferior in rank to creative mathematics, and the Senior Professor of the same famous Gottingen Institute of Mathematics viz. Prof. Klein who was greatly interested in such activities. Once Klein had arranged a seminar on scientific education in German middle schools, and had filled a very large blackboard with figures relating to this topic. He looked towards Hilbert, and the other great creative mathematician Minkowski who was ^{also} present, and enquired if they had any comments to offer. Hilbert just nodded his head, while Minkowski asked softly "Does'nt it seem to you, Herr Geheimrat, that there is an unusually high proportion of prime numbers among those figures on the blackboard?".

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RADIO TALK

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AIR Bangalore-6-11-77 at 8.30 A.M.

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9 AM

RADIO TALK

(89th. Birth Anniversary of Sir C.V. Raman)

AIR, Bangalore-6/11/77-8.30 A.M.

9.01 AM

Tomorrow is the 89th birthday of the late Prof. Sir C.V. Raman. These birthdays are celebrated ^{year after year} in warm personal veneration ~~for~~ for the great master, who in the words of one of his pupils, was the Father of modern Science in India. He had a great passion for science, physics in particular, coupled by an intense ~~with~~ enthusiasm and volcanic energy. His first paper on diffraction appeared in 1906 when he was just 18 years old, and his last paper on floral colours in July, 1970 just a few months before his death, thus establishing a record of over 60 years of active scientific work. His greatest ^{achievement} ~~discovery~~ was, of course, the discovery of the Raman Effect for which he was awarded the Nobel Prize in 1930. The history of science teaches us that every age has its own problems which the following age solves and enriches, or casts aside as profitless. A few pessimists were of the opinion that after the exhaustive work done on the Raman effect, its importance as a tool of research would diminish. But what we now see is that, with the discovery of the laser, a new technique known as the Laser Raman Spectroscopy has been evolved, which bids fair to become a powerful tool of investigation.

It is perhaps not well known that Raman has shown a deep appreciation of the beautiful in nature in the topics he has chosen for ~~his~~ research. His love of music, colour, light, vibration, symmetry, harmony and structure ^{and} ~~is~~ his researches on musical instruments, numerous beautiful phenomena in wave optics, the colour of the ^{sea} and the sky, colour in flowers, and in the plumage of birds, iridescent shells and mother-of-pearl, and above all ~~is~~ his studies on the form, symmetry, and structure of diamond, are striking examples of his aesthetic outlook. The very first article in Vol. 1, No. 1, p. 1 of the Proc. Ind. Acad. Sci. founded by him in 1934, is devoted to his work on the plumage of birds, and in No. 4 of the same Vol. we find an article by him on the Mridanga in which he remarks "The mridanga is a very ancient instrument, and its acoustic ~~is~~ perfection must be considered to be a remarkable testimony to the inventiveness and musical taste of its progenitors. It is hoped that this short paper is only the ~~pre~~cursor to a complete treatise

on the musical drums of India including the Tabla". I don't know if this hope has so far been fulfilled.

Besides physics, he had great interest in many other branches of ~~scie~~ science like geology, meteorology, oceanography, animal and plant life, and physiology of vision to which subject he made striking contributions. This catholic vision of his has profoundly influenced the work of not only his students but that of many of his contemporaries. He was greatly fascinated by astronomy and astrophysics, and had planned to build an astronomical observatory in the ~~Raman~~ Raman Research Institute founded by him. It is heartening to note that his son Prof. V. Radhakrishnan who is the Director of this Institute, and himself an astrophysicist, has been encouraging astronomical research by bringing together a band of workers on astronomy, astrophysics, gravitation and cosmology, and we hope that in course of time a full-fledged Observatory with striking original work to its credit will ~~emanate from this~~ come up as an adjunct to the Raman Institute.

Although essentially an experimental physicist, Prof. Raman gave great encouragement to studies in theoretical physics also. Thus, during the years 1940 to 1945, when Bhabha and myself were working together in Sir C.V.'s Department at the Indian Institute of Science on the scattering of mesons, and relativistic wave equations of elementary particles of arbitrary spin, he gave us constant encouragement and great help in having our results promptly published. It is no exaggeration to say that Bhabha's fine contributions to the growth of atomic and nuclear science in the country are due in no small measure to Sir C.V.'s encouragement and inspiration. The same is true of space research since Sarabhai also worked for a time in the Raman School at Bangalore. Sir C.V. laid great stress on the development of indigenous talent in the abundance of which he had firmly believed, and he was against steps that would ^{place} restrictions on genuine scientific research undertaken by our workers either in pure science or technology. In this connection, I might say, with confidence, that he would have strongly condemned the recent moves by the super powers to place safeguards to contain the development of atomic energy resources in our country, and our Government's indirect, but ~~never~~ nevertheless meek surrender to this pressure, since this would nullify to a great

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extent the excellent work done by our scientists in the field of atomic energy.

Raman was not only a great investigator, but also a teacher of the highest order. Even before he reached eminence as a Nobel Prize winner, he had ~~earn~~ earned the ~~the~~ reputation of being a brilliant teacher when he was Palit Professor of Physics in the Calcutta University. During the years 1919-21, when I was a student in the M.Sc. Classes in Pure Mathematics of the Calcutta University, I once happened to slip into his class out of curiosity to hear him lecture. At the end of the hour he noticed me, and asked me to meet him in his room. I did so later, being afraid all the while as to what punishment I would receive at his hands. Of course, he chided me from absenting myself from a regular mathematics class, but when I represented to him that the particular ^{class} which I had skipped was very boring since the concerned lecturer merely wrote on the blackboard whatever notes he had made in his notebook, without facing the class, he appeared to sympathise with me, enquired as to what University I came from, and my background. I told him that I had taken Mathematics as my main, and Physics as my subsidiary subject for the B.Sc. Degree of the Mysore University. On being asked as to what I had studied in Physics, I told him that I knew something in mechanics, heat, electricity and magnetism, but almost nothing in light. He then bombarded me with a series of questions only on light on topics like polarisation, diffraction, and interference, and I answered them to the best of my ability. At the end he remarked " You see, I was ~~not~~ interested to find out what you know about things about which you know nothing", and told me that I had made a mistake in not taking Physics as my main subject at the B.Sc. level. At the end of my course, I saw him again, ^{when I} and told him that I had secured only the First Class Second rank in the M.Sc. Examination, he said " Don't bother. What is important is what you do hereafter. Read some mathematical physics, and try to do some original work". I must admit that what little work I have done in theoretical physics, and what little service I have ^{rendered} ~~done~~ to the Academy as its Secretary (~~Section A~~) for a period of nearly two decades have been the result of my earlier associations with Prof. Raman.

R The anecdotes relating to his association with his students, and the advice he gave them are legion. When a student told him " Sir, I feel that this is so" his remark was " My dear young man, physics is not philosophy. Your feel-

ings have no value unless you prove them". Once he found a student working at his desk rather dejected, and asked him what the matter was. The student said " I am working with ^{an} x-ray tube having only 1 k.w. power, while a distinguished ^{scientist} in the U.K. ^{is working} on the same problem with a 5 k.w. power tube". Prof. Raman said "That is all, only one k.w.; there is a simple solution; put a 10 k.w. brain on the problem". To a student who expressed his inability to build up a theory to explain some experimental fact, his humorous remark was " It is better to have a wrong theory rather than have no ~~theory~~ theory at all". When another student who said that he was working on the ^{old} lines suggested by Prof. Debye, the reply was " Do something original, don't browse in Prof. Debye's backyard". During 1935-36, when Prof. Max Born (who also received a Nobel ~~Prize~~ Prize later) was a visiting Professor at the Department headed by Prof. Raman at ~~the~~ the Indian Institute of Science, Bangalore, I worked on Born's non-linear field theory, and was able to show that on the basis of that theory ~~that~~ it was possible for the electron to have a ring structure. When I showed this result to Prof. Raman he remarked " Wonderful ! But I see that your ring has no diamond in it" meaning, of course, that it was a pure mathematical creation without any real physical significance, which was certainly true. When some student complained of ^{want of} facility for research, he quipped back saying " Remember ~~that~~ radium was discovered in a ~~tin-~~ tin-shed". As a typical example of his sense of humour might be mentioned an incident which occurred when ~~the~~ late Prime Minister Pandit Jawaharlal Nehru visited Prof. Raman's Institute. He laid two similarly dressed ores of copper and gold in the palms of Pandit Nehru, switched ^{on} the ultra-violet light, and asked ^{him} as to which was gold and which copper. The brighter piece under the ultra-violet light was promptly named gold by Panditji, and Prof. Raman, in his inimitable style, burst forth " Mr. Prime Minister, all that glitters is not gold"! There was a chorus of laughter from those assembled, in which ~~h~~ Pandit Nehru himself heartily joined.

Prof. Raman has admirably filled the role of an eminent popular lecturer on scientific subjects, and the popularisation of science in the country. owes not a little to his gifts of eloquence, exposition, and bubbling humour. The subjects he chose for his popular lectures were astonishing in their variety, and width of interest. They ranged from atmospherics to astrophysics, from birds to ~~the blue sky, from diamonds to~~

the blue sky, from diamonds to diffraction, from the mridanga to mirages, from floral colours to physiology of vision, ^{from} ~~from~~ gems and gemmology to geological ages, and from whispering galleries to weather forecasts. His formula for a good popular lecture was that it should be such as to ~~put~~ - "put the the audience under the delusion that they have understood everything that the lecturer has said". Contrary to popular belief, he took great pains to prepare his lectures down to the smallest details, and that was why they were so inspiring being faithful reflections of his spirit, direct and intense.

Like many great creative scientists, he had scarcely any interest in or the time to devote to science projects like organisation of Commissions, development of teaching methods in science from the kindergarten to the Universities, enlargement of teaching methods in science to improve technology, several Government sponsored science policies, and crazy notions like modern mathematics, ~~as~~ semester, and non-semester systems, long-distance teaching and award of degrees. There is the famous example of the great mathematician Hilbert who was similarly not interested in such topics, and considered them inferior in rank to creative mathematics, and the senior Professor of the same famous Gottingen Institute viz. Prof. Klein who was, on the other hand, greatly interested in such activities. Once Klein had arranged a Seminar on scientific education in German middle schools, and had filled a very large blackboard with figures relating to this topic. He looked towards Hilbert, and the other great creative mathematician Minkowski ^{who} ~~was~~ was also present, and enquired if they had any comments to offer. Hilbert just shook his head, while Minkowski asked softly "Does'nt it seem to you, Herr Geheimrat, that there is an unusually high proportion of prime numbers among those figures on the Board?"

This does not mean that Raman's service to science in India has not been significant. On the other hand, his unique personality totally dedicated to science, his greatness as a teacher, and his example of devotion to work have rendered far greater ^{service} to science in the country than that of many others, whose greatness is considered directly proportional to the number of Government Committees on which they serve.

He was a great nationalist at heart, and an ardent admirer of Mahatma Gandhi, as evidenced by his arranging the sacred ritual of the Gandhi Memorial Lecture on the 2nd. of October every year at his Institute by distinguished ~~scie~~ scientists, philosophers, economists, educationists, and social workers. He himself once delivered one of these memorial lectures. It is gratifying to note that these lectures are being continued at the Raman Institute.

He bequeathed three great Institutions, ^{to Indian science} the Indian Academy of Sciences with its internationally famous Proceedings, recently enriched by his successors by the addition of another beautiful Journal, the "Pramana", and made more glittering by revision of their printing schedules, secondly the Current Science, and thirdly the Raman Research Institute with its beautiful library, reading room, lecture hall and museum. May these institutions grow from strength to strength, and fulfil Sir C.V. Raman's vision of great scientific advances in our country by the development of indigenous talent in which he had abundant faith.

He was a great citizen of Bangalore with the added distinction of not having a single road, or a park, or an extension named after him.
