



# DREAM 2047

July 15, 1999

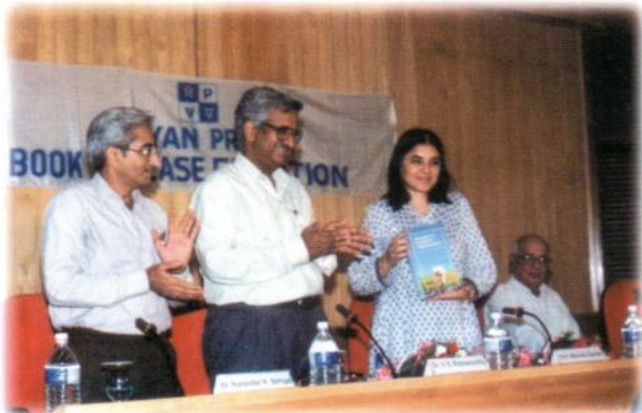
Vol. 1

No. 10

## VP News

### Vigyan Prasar Publication on Alternatives to Pesticides Released

A book titled "Alternatives to Pesticides in Tropical Countries: Sustainable Agriculture-Food Security with Food Safety" was released by Smt. Maneka Gandhi, Minister of State for Social Justice & Empowerment, Government of India, in a function held at India Habitat Centre, New Delhi, on 21 June 1999. This book attempts to highlight some of the most pertinent issues related to indiscriminate use of chemical fertilizers, pesticides and allied chemicals to the soil which has resulted in large-scale environmental degradation and health hazards. The Secretary to the Department of Science & Technology, Govt. of India, Prof. V.S. Ramamurthy and Director of Vigyan Prasar Dr. Narender K. Sehgal spoke on the occasion besides the Chief Guest. Dr. A.T. Dudani, author of the book and a noted agricultural scientist of India introduced the book to the audience and the media.



Smt. Maneka Gandhi, Minister of State for Social Justice and Empowerment releasing the book. (seen from left to right) Dr. Narender K. Sehgal, Director, Vigyan Prasar, Prof. V.S. Ramamurthy, Secretary, Department of Science & Technology, Smt. Maneka Gandhi and Dr. A.T. Dudani.

A section of the audience present in the function.



## Inside

Millennium's  
Last  
Total Solar  
Eclipse



Yellapragada SubbaRow

### "Bipanna Basudha" Gets an Extension

The maiden effort of Vigyan Prasar and Akashvani Guwahati "Bipanna Basudha" will now run upto October 1999 (It was earlier scheduled to end in July). It is broadcast during prime time on Saturday evenings from 8.00 to 8.30 PM. The radio serial dealing with ecology and other scientific aspects of environment in Assam has received very good audience support and publicity. This resulted in the 13-episode extension of the serial during a review meeting-cum-workshop jointly organised by Vigyan Prasar and AIR Guwahati, held in Guwahati on 15-16 June 1999. Several new and interesting features have been added to this programme in its second phase.

... think scientifically, act scientifically ... think scientifically, act scientifically ... think scientifically, act ...

## IMPOSSIBLE DREAMS?

What is life without an impossible dream? I am sure you would have not only heard of this, but agreed with it one hundred per cent! Well, I certainly do.

What sort of dreams are we talking about, here? For, there can be dreams of all kinds—very personal and about self, about immediate family and friends, about the organisation you work for, about your country, and so on. Being an incorrigible dreamer myself, though I have dreams of all kinds, we are talking here of dreams about our country.

What dreams do I dream about India? Actually, I do have whole lot of them ranging from very 'simple' ones to some that many others might find unthinkable! Let me begin with the simple ones—simple because they are eminently achievable, would cost no money to implement, and everyone would benefit from their realisation—and yet they have remained unfulfilled thus far!

"That day I went to Palam Airport in Delhi to board a flight to Mumbai. From the time I alighted from the office car and boarded the plane, I saw very orderly, single-file, queues everywhere: at the entry into the premises, at the check-in counters, at security gates, for security checks, at the tea kiosk, inside toilets, at the boarding gates, for baggage identification and near the plane – and without any pushing or shoving".

"It was past 11 pm and we were still in the train which had come to a stop a few kilometers from the New Delhi Railway Station, perhaps awaiting a green signal. Finally, when we came out of the railway station looking for transport, it was already a few minutes past midnight! We stood at the appointed place where three-wheeler taxis were picking up passengers in an orderly fashion. When our turn came, the driver got off his vehicle, welcomed us, helped put our luggage in the vehicle and off we went towards our residence. We reached there at 0040 hrs. We were charged the prescribed fare as per the meter reading plus night charges. The driver even apologised for having to stop at a petrol pump on the way and said "good night" with a smile. No hassles, no arguments about the fare!"

That should give you some idea of my 'simple' dreams. I have many more of these but the above should do for the present. Now on to harder stuff.

"It was 04.30 hrs and after a very smooth landing, our plane was on the ground moving towards the arrival terminal at the Jalandhar International Airport. I stepped out of the plane with my hand baggage and walked towards the Immigration counters. Our plane had brought in more than 250 passengers and apparently some other flight had landed just half an hour prior to ours. Enough counters were in operation and it took me only 20 minutes to come out - everything went like clock-work. No problems, no hassles. All the staff were courteous and efficient, smartly turned out and the entire arrival terminal was neat and clean, with all amenities, equipment and fixtures in good working order; even the bathrooms were well kept and maintained clean with all taps, pipes and fixtures in place without leaks or rust.

Once at home, the newspaper came around 06:30 hrs. It felt good reading the newspaper, with a steaming cup of Indian tea. Some of the headlines made absorbing reading: "American President's India visit in Jeopardy; America's Human Rights Record at Home Continues to cause Concern." "India Poised to Become World's Number One Economy". "USA and UK seek rescheduling of Their Debt Repayments to India". "Restrictions on Software Exports to Europe and Japan". "China Seeks Indian Agricultural Technology". "Indian Rupee Makes Further Gains". "French President learning Hindi". "Indian Technology Exports Cross 100 Trillion Rupee Mark". "Europe and Japan Mull Switching over to Rupee Reserves". "India not to Increase Quota for Visas to Americans".

On the sports pages, Indians were among most of the headlines: "Indian Athletes dominate". "Indian Coaches for more European Teams".

Amusing? Far-fetched? Impossible? Perhaps! I did say "Impossible dreams", didn't I? But then dreams, even impossible ones, have been known to come true! Moreover, if it weren't for all the world's dreamers, we would have remained bereft of many a good thing which we now take for granted. Things such as airplanes, satellites, telephone, fax, photographic camera; Taj Mahal, Eiffel Tower, Qutab Minar and so on are there only because there were dreamers. The world would certainly have been a much poorer and far duller a place to live in, if it were not for the dreamers.

Coming to our dreams for India, let us see what they imply and what it would take to realize them! In the case of the simple dreams, all that is required is a change in our individual attitudes and a close matching of what we 'do' with what we 'say'. Changes in attitudes have to do with doing things meticulously and seeking/demanding perfection in whatever we do/get done — in three words: "Banish chalta hai"! This would also be essential for realising all the other dreams.

If one examines the other dream(s), they would be discovered to imply two basic things: well developed India, economically very strong, self-reliant and independent, backed by a very strong security set-up on the ground, in the air and on the seas, capable of neutralising any kind of threats and dangers diplomatically, physically as well as directly. This would also imply technological strengths in terms of world leadership, independence in policy and decision making, as also superiority through excellence and innovation.

Obviously, all this cannot come about without full participation of a fully literate and healthy population contributing to the overall national effort, with high levels of efficiency and productivity and a work-ethics based on nation before self and above all else.

Just because it has not happened thus far, does not mean that it is impossible. In the above, everything looks possible and doable.

Let's set our minds to it and do it!

NKS

## MILLENNIUM'S LAST TOTAL SOLAR ECLIPSE

In broad daylight the complete obscuration and darkening of the Sun, even though for a few minutes, is perhaps the most spectacular sight observed by man in the sky. It is no wonder that people in past ages felt greatly alarmed by the sight of a total solar eclipse. In their endeavour to fathom the celestial phenomenon they created many fascinating myths. Though no more a mystery, even today a total solar eclipse is a most awe-inspiring spectacle to every beholder.

Not only one of the most impressive events to be seen in the sky, a total solar eclipse is also a rare occurrence. On an average, a total solar eclipse is visible from some place on the earth once every 18 months. But the path of totality of such eclipses is so narrow (maximum width 270 km) that from a particular place the chance of observing a total solar eclipse is about once in 375 years. Most people never see one in the course of their lives. People living in London could not see a total solar eclipse in the 19th century, nor they are lucky enough to observe one in the present century. They will miss the path of totality of the eclipse of 11 August by only a few kilometers!

The last total solar eclipse seen in India occurred on 24 October, 1995. Its path of totality passed through densely populated regions of northern India, affording millions to observe this grand show of nature. It evoked keen interest among students, scientists and general public. It was also shown live on TV. I witnessed the bewitching cosmic drama, first time in my life, from the high portico of the historic *Buland Darwaja* at Fatehpur Sikri.

After a gap of about four years, another total solar eclipse will be visible from India on Wednesday, August 11, 1999 (Sraavan 20, 1921 Saka Era). Its path of totality passes over thickly populated regions (Gujarat, Maharashtra, Madhya Pradesh, Andhra Pradesh and Orissa) of India providing millions another opportunity to view this most magnificent spectacle of nature. The only worry is that during the month of August southwest monsoon is very active all over India. But about climatic conditions, most unpredictable as they are, nothing can be said with certainty.

Before discussing the celestial event of 11 August it would be useful to understand some

basic facts relating to eclipses. The traditional belief that the Sun or the Moon is engulfed by a demon Rahu during an eclipse, though still much prevalent, is not correct. Fifteen hundred years ago, the celebrated mathematician-astronomer Aryabhata (499 A.D.) had clearly stated that, "the Moon eclipses the Sun and the great shadow of the Earth eclipses the Moon."

Eclipses occur because of some natural coincidences. Both the Sun and the Moon are more or less spherical bodies. Also, the ratio of the diameters of the Sun and the Moon is approximately equal to the ratio of their distances from the Earth, i.e.  $\approx 400$ . That is why both the Sun and the Moon appear to be of the same angular size in the sky.

A solar eclipse occurs when the Moon is directly between the Sun and the Earth. The Moon must then be at or near conjunction with the Sun, that is, it must be new Moon. As, however, the orbital plane of the Moon is inclined at an angle of about  $5^\circ$  to the plane of the ecliptic, the conditions for the occurrence of a solar eclipse require that the Moon must be on or near the ecliptic, that is to say, the Moon must be at or near one of the two nodes, which are the intersections of the two orbits. In traditional Indian astronomy the 'ascending node' is known as *Rahu* and the 'descending node' as *Ketu*.



The orbits of the Moon and the Earth are not perfectly circular but elliptical. Therefore, the distances of the Moon and the Sun from the Earth vary considerably, resulting in similar variations in their apparent sizes. These variations in angular diameters coupled with the inclination of the Moon's orbit give rise to mainly three types of solar eclipses: (1) A *total eclipse* of the Sun occurs over the portion of the Earth within the umbra of the Moon's shadow. During totality, the bright surface of the Sun is entirely hidden from view by the Moon; (2) An *annular eclipse* of the Sun occurs when the shadow of the Moon is not long enough to reach the Earth; therefore the Moon does not entirely cover the disk of the Sun, but leaves a ring of the Sun round the dark Moon; (3) A *partial eclipse* occurs when the Moon conceals only part of the solar disk. In such a case the umbral cone will not touch the Earth at all and the penumbra alone will cover parts of the Earth.

When a source of light that is not a point source, such as the Sun, casts a shadow of an object, this shadow consists of two parts : the *umbra* or total shadow is the region completely cut off from the light, while the *penumbra* remains partly illuminated. When the Moon's shadow travels across the Earth, an observer in its penumbra will see a partial or annular eclipse of the Sun and one in its umbra will see a total eclipse.

A number of geometrical factors determine the duration of totality of a solar eclipse. The longest totality time will be when the Sun is at the greatest distance and the Moon is at the least distance from the Earth and the eclipse occurs in the equatorial regions. Totality can last for a maximum time of 7.5 minutes, but usually duration is only a few minutes. The duration of totality of the solar eclipse of 11 August will be hardly a minute.

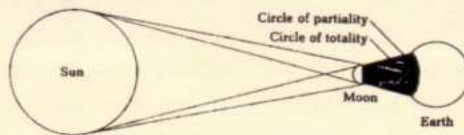
There are references to solar eclipses in the *Rigveda*, where their cause is ascribed to a demon, called Swarbhanu. It appears that the Atri clan took great interest in the observation of the eclipses. Chaldean astronomers, in the sixth century B.C., discovered that eclipses, both solar and lunar, recur after 223 months or 18 years plus 10 or 11 days. This period is called the *Saros* cycle.

It would be, perhaps, of interest to know the number of eclipses that can occur in a year. It is possible to have in one year 4 eclipses of the Sun and 3 of the Moon (total,

annular or partial), or 5 eclipses of the Sun and 2 of the Moon (total or partial). The minimum number of eclipses in a year is two, and both are solar. But because the width of totality path is never more than 270 km and three-fourth of the Earth's surface is covered with oceans, most of the total solar eclipses remain unseen.

During a total solar eclipse four contacts are recognised. A total eclipse begins at *first contact*, when the limb of the Moon appears to touch the edge of the Sun's disk. With this follows the partial stage during which the day grows dim as more and more of the Sun is obscured. Just before *second contact*, the beginning of totality, there appear on the rim of the Moon patches of sunlight called Baily's Beads. They disappear almost at once, and the pearl-white *corona* flashes into view. During totality, which lasts only for few minutes, some bright stars and one or two planets can be seen in a dusky sky. At *third contact* the Sun begins to re-emerge. But just after the end of totality there appears a beautiful sight known as Diamond Ring. At *fourth contact* the Moon draws itself clear from the solar disk ending the cosmic drama of the totality.

Eclipses permit very accurate determinations to be made of the motion of the Moon and the Earth. During the few minutes of totality scientists conduct important atmospheric and ionospheric experiments. A prediction contained in the Theory of Relativity that light is bent towards a gravitating body was confirmed by photographs taken during a total



**LOCAL CIRCUMSTANCES OF THE PARTIAL PHASE**

STATION	Partial Eclipse Begins			Greatest Phase			Partial Eclipse Ends			Obscuration %
	h	m	s	h	m	s	h	m	s	
	(evening)			(evening)			(evening)			
Agra	4	53	29	5	55	36	6	51	49	81-93
Allahabad	4	57	41	5	57	53	—	—	—	82-75
Ujjain	4	57	22	6	0	44	6	57	45	95-83
Calcutta	5	3	8	6	0	24	—	—	—	85-14
Kanpur	4	55	42	5	56	37	—	—	—	81-44
Chennai	5	12	53	6	11	49	—	—	—	80-11
Jaipur	4	52	22	5	55	46	6	52	55	85-09
Delhi	4	51	4	5	53	30	6	50	0	78-82
Patna	4	58	51	5	57	24	—	—	—	97-23
Pune	5	2	52	6	6	20	7	3	15	91-04
Bangalore	5	12	25	6	12	16	—	—	—	77-09
Mumbai	5	1	36	6	5	42	7	3	5	91-24
Lucknow	4	55	33	5	56	7	—	—	—	79-83
Varanasi	4	58	22	5	57	59	—	—	—	82-01
Srinagar	6	42	11	5	45	1	6	42	2	67-48

\*—\* Sunset occurs before eclipse ends.

**LOCAL CIRCUMSTANCES OF THE TOTAL PHASE**

STATION	Eclipse Begins			Totality Begins			Totality Ends			Eclipse Ends		
	h	m	s	h	m	s	h	m	s	h	m	s
	(evening)			(evening)			(evening)			(evening)		
Akola	5	1	26	6	3	24	6	4	21	—	—	—
Anand	4	56	29	6	0	48	6	1	42	6	59	17
Kheda	4	56	0	6	0	40	6	1	11	6	59	6
Chandrapur	5	3	29	6	4	14	6	5	10	—	—	—
Jagdarpur	5	5	33	6	4	59	6	5	51	—	—	—
Jaigaon	5	0	1	6	2	56	6	3	47	—	—	—
Bhuj	4	53	0	5	59	15	6	0	0	6	59	4
Bhusawal	5	0	19	6	3	1	6	3	51	—	—	—
Malkapur	5	0	48	6	3	12	6	4	4	—	—	—
Yeotmal	5	2	22	6	3	45	6	4	43	—	—	—
Baroda	4	56	58	6	1	3	6	2	7	6	59	30
Shahpur(MP)	5	0	19	6	2	45	6	3	42	—	—	—
Srikakulam	5	7	3	6	5	43	6	6	13	—	—	—
Surendranagar	4	55	18	6	0	14	6	1	21	6	59	22

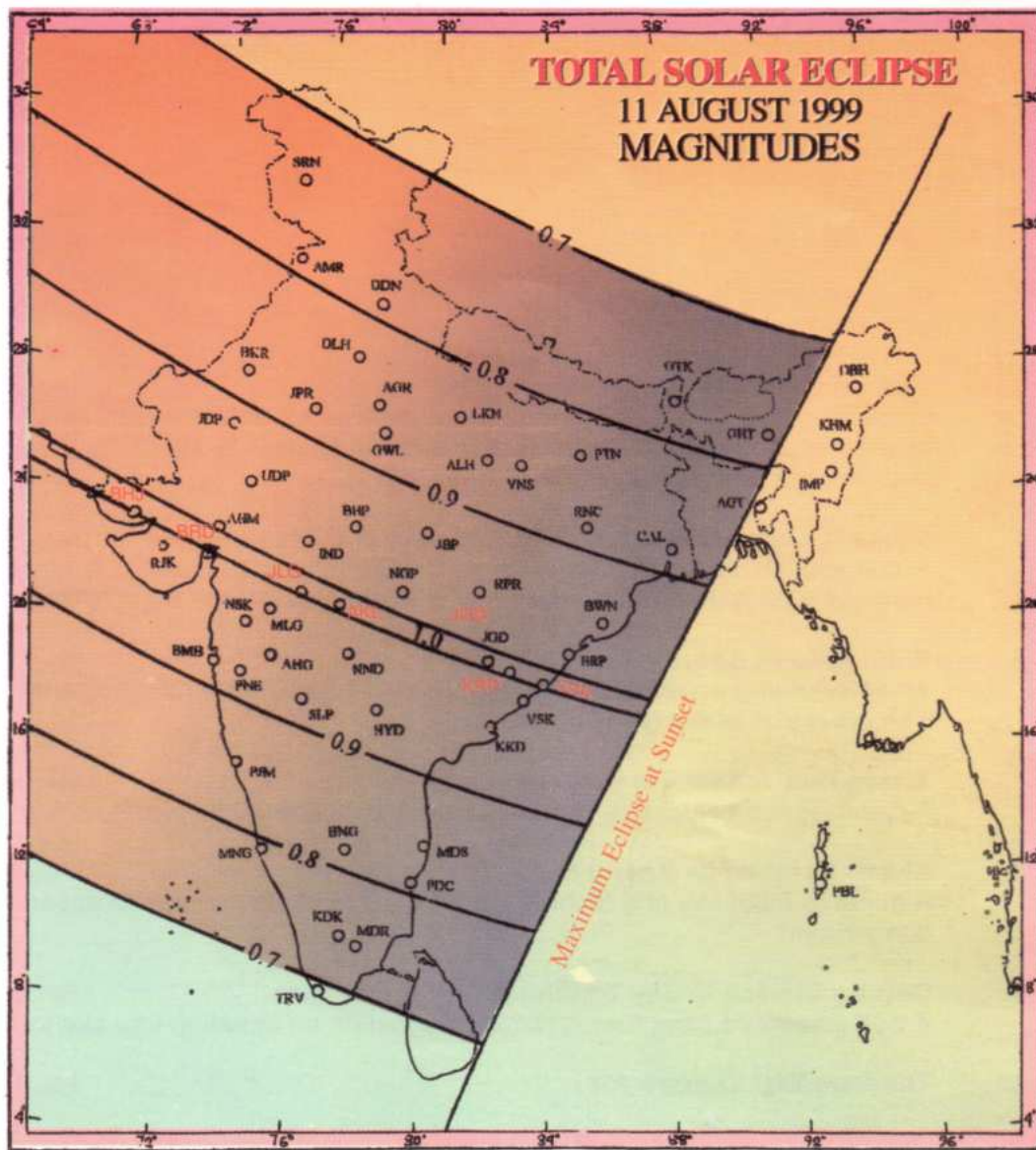
\*—\* Sunset occurs before eclipse ends.

solar eclipse in 1919. Eclipses have also helped in dating accurately many historical events.

On Wednesday, August 11, 1999 a total solar eclipse will be visible from many countries of Europe and Asia. From the point of view of the whole Earth, the eclipse of 11 August begins at 13<sup>h</sup> 56<sup>m</sup> (IST) and ends at 19<sup>h</sup> 10<sup>m</sup> IST. On that day the cone of the umbral shadow will touch the Earth in the north Atlantic Ocean east of New York at approximately 15<sup>h</sup> 00<sup>m</sup> IST. There the width of the shadow will be about 61 km and the duration of totality about 47 sec.

The shadow of totality after crossing central Europe, western Asia and Pakistan will reach the western end of India about one minute before 6 (17<sup>h</sup> 59<sup>m</sup> IST) in the evening. There the path of totality will be 82 km wide and the duration of totality 1 minute and 11 sec. The totality path will then run towards south-east passing through Bhuj, Anand, Baroda, Bhusawal, Yeotmal, Chandrapur and Shrikaku-lam, and crossing India will end at sunset at 18<sup>h</sup> 6<sup>m</sup> (IST) in the Bay of Bengal. Finally the Moon's shadow will leave the Earth at 19<sup>h</sup> 10<sup>m</sup> (IST) in the Indian Ocean. The beginning of the partial phase of the eclipse will be seen from all parts of India. But as the Sun will set before the end of the eclipse the ending of the partial phase will not be seen from many parts of the country.

The total eclipse can be seen with the naked eye but one must not look directly at the partial eclipse without scientifically tested solar filters. The unclipsed portion, even



Source: Total Solar Eclipse of August 11, 1999 (Savana 20, 1921 Saka era), India Meteorological Department

when it is just a thin crescent, can cause permanent or partial blindness. The retinal cells get damaged if too much radiation falls on them. Therefore, for safe viewing, the intensity of the sunlight has to be reduced 1,00,000 times and the ultra-violet radiation has to be cut off.

Total solar eclipse is a rare celestial spectacle. We should prepare ourselves to witness this grand drama of nature on Wednesday, 11 August. The next total solar eclipse visible from India will occur only after a decade on July 22, 2009 A.D.

Gunakar Muley



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## THE MAN WHO MADE MIRACLE DRUGS

In every generation, a few individuals toil and struggle to achieve seemingly impossible feats. Some of them rise against all odds, even when their own survival is not assured. Some give up lucrative positions in society to achieve something unique. Some even after being despised and persecuted by society for their bold initiatives do not give up, or accept defeat. These are the ones who inspire and beckon people from successive generations to take up challenges, to rise above drab mediocrity, and to excel. Life of every such individual is unique eventhough there may be some commonalities in the circumstances from which such individuals rise. Of course, generally there are factors that are common among them, like total devotion to a cause, perseverance and hard work. No society can progress without role models. Precedents of successes from extremely harsh conditions motivate many who had given up the struggle. Everyone may not be impressed by all such individuals. For some Charlie Chaplin is the role model, for some it is Srinivasa Ramanujan and still for some others it is Tenzing Norgay and so it goes. What is important is that stories of the lives of such individuals should be told and retold. Unfortunately eventhough some achieved so much for fellow human beings, they have remained largely unknown. Yellapragada SubbaRow is one such name.

Now the first question many of us will ask is: Who is SubbaRow? Let us answer this question by quoting an American who wrote: "You've probably never heard of Dr. Yellapragada SubbaRow, yet because he lived you may be alive and well today. Because he lived you may live longer."

SubbaRow was the man behind development of many wonderful drugs like folic acid vitamin, tetracycline antibiotics, antifilarial drugs, antimalarial drugs and so on. He worked on some fundamental concepts in biochemistry. His interest was not confined to research alone. He was a great adventurer. He tried his hand at many things — boxing, bowling, tennis, golf, archery, swimming, horseback riding and what not. He got his Private Pilot's License on October 15, 1947, just less than a year before his death. His greatest quality was his leadership — the loyalty he could command from his colleagues. His zeal for achieving something worthwhile bordered on fanatical. In his professional pursuits he was ruthless.

SubbaRow was born on January 12, 1895 in Bhimavaram in West Godavari district of Andhra Pradesh. His father Jagannadham after graduating from high school entered the provincial revenue service. But he had to take premature retirement on a meagre pension and during the last years of his life he mostly remained ill (he was afflicted with beri-beri). At one time the family was forced to move to his mother Venkatamma's widowed sister Bamma's house at Modekurru. SubbaRow's family had to pass through long years of poverty. He attended the Taylor High School at

Narsapuram. In early years his performance at school education was far from satisfactory. Often he would plan to run away from home. In fact once he decided to shift to Varanasi where he thought he would make lakhs of rupees just by selling bananas to the pilgrims but he was intercepted and was brought back. He was once "struck off" the rolls of the Taylor High School to be readmitted later. But he could not pass through the matriculation examination. From Taylor High School SubbaRow was shifted to Viresalingam Theistic School at Rajahmundry but here again he failed. He was again shifted yet to another school — this time at Madras, the Hindu High School in Triplicane. But then his father died in 1913 just two-and-a-half months before his matriculation examination. However, this time SubbaRow passed the examination. He joined the Madras Presidency College for the intermediate course where he opted for mathematics, physics and chemistry. Besides he had to study Telugu and English. He was financially helped by his roommate B. Narayanamurthy. After passing the intermediate examination he joined the Madras Medical College. During this time he

was much influenced by the ideals of the Ramakrishna Mission. In fact it is said that he took up medicine at the instance of the Mission. However, whatever may be the reasons he did not finally join the Mission. He developed a passion for medical research. His economic condition was very precarious during his medical studies at Madras. His friend also could not help him. This time he was given money on loan by Kasturi Suryanarayana Murthy who later became his father-in-law.

During his medical studies SubbaRow was very much influenced by the teachings and practices of Mahatma Gandhi. Following Gandhiji's call he decided to boycott British-made goods. He started wearing surgical gowns made of khaddar which incurred the displeasure of his surgery professor M. C. Bradfield. Though he did not attend classes regularly, in his final examination, he did well in all the papers except that of surgery and consequently he was awarded the lesser L.M.S. certificate instead of the M.B.B.S. degree. He neither took up the examination again to attain the M.B.B.S. degree, nor did he start medical practice as he was entitled to by the L.M.S. certificate. Instead he decided to go to the United States of America for higher studies in tropical medicine. In 1921 he got admission to the postgraduate course in Tropical Medicine of the Harvard School of Medicine (of the Harvard University). The major hurdle was to collect money for the trip. The only prospect was that his brother Purushottam was hopeful of securing a scholarship for SubbaRow from Kakinada's Malladi Satyalinga Naicker Charities because of his proximity with Malladi Subramanyan, one of the trustees of the Charities. One of the objectives of the M.S. Naicker Charities was to send "every year one Madras Hindu for higher or technical education to Europe, America, Japan



Yellapragada Subbarow  
1895-1948

or any other foreign country". But then Purushottam died after suffering from tropical sprue, a vitamin deficiency marked by impaired digestion and anaemia. After eight days of Purushottam's death SubbaRow's younger brother Krishnamurti also died in Eluru of a stomach ailment. The pre-matured deaths of his brothers from tropical diseases fuelled SubbaRow's urge for research in tropical medicine. But for obvious reasons SubbaRow had to abandon his plans of going to America. He tried to enter the Madras Medical Service without success. He then took up the job as Lecturer in Anatomy and Physiology at Dr. Lakshmi Pathi's Madras Ayurvedic College — one of the earliest attempts in India at putting Ayurveda on a modern footing to meet the challenge of western Medicine. The College traced its origin to a school started by the trustees of Chennapuri Kanyaka Parmeswari Devasthanam for training vaidyas. He started taking genuine interest in Ayurveda. He made an attempt "to place the innumerable Indian herbs on a standardised basis so that they will be of use to practitioners of all systems of medicine" by compiling (with the help of his students) a volume on "properties of vegetable drugs of northern India as described by Charaka, Drudhabala, Vrudha, Susruta and Vagabhata (both the Elder and the Younger)." But then he realised that the conditions at the college and also the objectives of its founder were not conducive to true research in Ayurveda.

So he once again decided to go to America. But then after seeing the mention of his association with Ayurveda in his bio-data did not amuse Richard Strong the then Dean of the School of Tropical Medicine at Harvard University. He informed SubbaRow "that we do not think we can render you the assistance you desire" and he advised SubbaRow to continue his studies in India. SubbaRow wrote again explaining his case. Finally he got a cable from the University in April 1923 stating: "You will be admitted in September. No Scholarship." The question now before SubbaRow was where to get the money. Though he could manage an annual scholarship of Rs. 1500 for three years from the Charities mentioned earlier but for some reason the Charities could not release the first year grant. Anyway with Rs. 2500 raised by his father-in-law SubbaRow left for America on the ship S. S. Khagar. The ticket upto New York together with the 'head tax' cost Rs. 1300.

SubbaRow reached Boston on the night of October 26, 1923, and his real struggle started. Out of the total amount

(equivalent to US \$ 750 that he brought from India) he was left with about one hundred dollars and he needed to pay a fee of US\$50 in advance. Dr. Strong came in his rescue. He offered SubbaRow some money so that he could register and meet other immediate expenses. Even with Dr. Strong's support SubbaRow could not get any fellowship. Moreover his medical degree was not enough for getting internship appointment in Boston Hospitals. He took up a job of night porter in the Peter Bent Brigham Hospital. His monthly salary was US \$ 50. He had to work for three hours in the night and his task involved washing urinals and bedpans of patients.

SubbaRow was awarded the Diploma of the Harvard University School of Tropical Medicine on June 1, 1924. After completing the Diploma SubbaRow became interested in biochemistry and started working with Cyrus Hartwell Fiske. They developed a rapid calorimetric method for the estimation of inorganic phosphorus, organic phosphorus, organic phosphates and lipid phosphorus in blood and


urine. This method and their work on phosphocreatine and ATP became part of biochemistry text books in the early 1930s. Fiske and SubbaRow also unravelled many of the mysteries of muscle chemistry. He got his Ph.D. degree in 1930 working in the Biochemistry Department of the Harvard Medical School. This was a long and arduous period for SubbaRow and during this period he was helped by Prof. Otto Folin, the head of the Biochemistry Department. After the Ph.D. he got a junior faculty position. To cut the story short, from Harvard SubbaRow moved to Lederle

Laboratories in 1940 where he directed research and did work in the development of drugs till his death in August 1948. SubbaRow authored/co-authored research papers on calorimetric determination of phosphorous; phosphocreatine and ATP (Adenosine triphosphate); the anti-pernicious anaemia factor (vitamin B<sub>12</sub>); pantothenic acid; biotin; miscellaneous B complex vitamins; cancer drugs; hetrazen; polymaxin, aureomycin; darvisul; steroids; tuberculosis; trypanosomiasis and blood pressure.

It is to be noted here that Shri S.P.K. Gupta, formerly of the Press Trust of India, has done commendable work in spreading the story of life and work of SubbaRow. Shri Gupta in collaboration with Edgar L. Milford has written a biography (and the only biography) of SubbaRow. But still very few in India know about SubbaRow. More needs to be done.

Subodh Mahanti

**"You've probably  
never heard of  
Dr. Yellapragada  
SubbaRow, yet because  
he lived you may be  
alive and well today.  
Because he lived you  
may live longer."**

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