

BY PUSHKALA VENKATRAMAN

A CONVERSATION WITH PADMA SHRI AWARDEE, DR. BALASUBRAMANIAN ('57 MSc CHEMISTRY)

Meet Padma Shri Dr. Balasubramanian – A 65 year old energetic, zestful, ambitious and a highly successful individual who loves and lives life to its fullest. Anyone who has a conversation with him is sure to feel energized, totally positive and raring to go. I did! A molecular biologist by profession, Dr Balasubramanian specializes in finding cures for blindness of the eye. He is working hard on various programs that seek to eradicate common causes of blindness amongst the poor in India. Apart from this, he has immense interest for various forms of music including Carnatic classical, Hindustani classical and Western classical. He plays billiards, tennis and bridge with avid enthusiasm. His pet activity is to teach students and share their budding love for the subject. The number of accolades and awards that have been showered upon him from various corners of the world is no mean achievement and through all this his wife Shakti has been with him quietly encouraging him to achieve all that he set out to do.



Name: Dr. Balasubramanian

Education: BITS Pilani

Current Position: Director of Research, L. V. Prasad Eye Institute

Prior Positions: Director, Centre for Cellular & Molecular Biology (CCMB), Professor & Dean, University of Hyderabad, Lecturer, Assistant Professor, IIT, Kanpur

Research: Molecular and Cellular Approaches to Understand and Treat Diseases of the Eye. Published 145 research papers and 2 books.

Describe your times at Pilani...

I went to Pilani in June 1953, right after my SSLC from P. S. High School, Madras. I was then 13 years and 8 months. Madras

University would not allow students to enter college before 15 years of age. Fortunately for me, my uncle was Prof. V.

Lakshminarayanan, the then Principal of Birla Engg College, Pilani, and the one who fused the three colleges at Pilani to make BITS in 1963-64 told my father to send me to Pilani for college. So there I landed up one hot morning at Loharu, and then to Vidya Vihar. I joined I. Sc. (Intermediate in Science), and finished it in 1955. After my BSc I went back to Pilani and joined MSc in Chemistry, finished it in 1959- first class first rank!! The degree was of course from Rajasthan University, since BITS was yet to be.

I had some great teachers in Chemistry notably Mr Raja Rao and Dr Sitaramiah. During the final year of MSc at Pilani, I was all by myself since there was no teacher in Physical Chem. That was good, since I got to be somewhat independent. This also meant that someone was needed to fill in. After graduation, I was taken as a tutor in Chem., which I taught for the year 1959-60. By this time I had already started applying to the US for a PhD degree and was taken in by Columbia University, New York.

Thus I left Pilani in August 1960, to land in The Big Apple. This was the NYC of 1960, with but 100 Indians, no Indian shops, nothing!! Those were some great times. I was in NYC until 1965, then went to U Minnesota for a post doctoral, and came back to India, landing a job in the chemistry dept at IIT Kanpur in February 1967.

For friends there were many, several fellow kids of course, and also the faculty and their families (e.g., TSKV Iyer and co). I took part in debating on behalf of Pilani, and went to the youth festivals in Delhi and Calcutta in 1957-59. I did a lot of swimming at Shiv Ganga (you could do it those days, it was banned later) and played billiards at the faculty club while I was a faculty in 1959-60.

I think my move into a career in chemistry, started thanks to the great teachers in Chemistry that I had in Pilani.

There is still nothing to top Pilani ka Peda. The late Madanji at Connaught Place must be ranked among the world's best confectioners. I get to go to Pilani once or twice a year, as their visiting professor and to give talks at their Apogee- and can't wait to get hold of the Pedas!

Describe a particularly fun moment that brings a smile to your face even to this day...

We had one Mr. Chatterji who taught physics. He had a ultra-heavy Bangla accent. "Bawter" for water, "Phlowz" for flows, "bith" for with, and "belositee" for velocity. Try and say for yourself, in his accent, his statement "water flows with a velocity of...".

What are the highlights of your life? In terms of proud and momentous occasions

Awards: "Padma Shri": National honor by the President of India, 2002

"Chevalier de l'Ordre National de Merite": National honor by the President of France, 2002

Bhatnagar Prize in Chemical Science, India 1981

Ranbaxy, Goyal, Bhasin and FICCI Awards, India

Third World Academy of Science Award in Basic Medical Sciences, 1995

Khwarizmi Award of Iran in Basic Medical Sciences, 1996

UNESCO Kalinga Prize for the Popularization of Science, 1997, Paris, France.

Indian National Science Academy's Indira Gandhi Prize for Science Popularization,

DST/NCSTC National Prize for Science Popularization 2002

I must say that academically IITK where I got my job was my testing ground, and polished me up. The students were often smarter, challenging- and the fellow faculty members were

excellent. It was here that I learnt how true the statement is: "excellence breeds excellence, mediocrity breeds itself". Teaching first year chemistry to the IITK kids has been unforgettable. They teach you how to teach. To this day, teaching is something I really enjoy. To have been voted the best teacher in 1969, and then to have been called by the class of 1972, and again by the class of 1977, at their Silver Jubilee reunion at IITK, and being given the best teacher certificate have been some of my proudest moments.

It was also at IITK that I started learning in real earnest Hindustani singing. We also had group singing- faculty families- who each brought some songs from their region and we'd meet every fortnight and sing together. And then the students would drop by home for a meal and we would discuss ragas. I'd start with film songs, tell them what raga they are based on, and take off from there. These were magical and beautiful moments. These are not exactly moments that you'd call 'proud' or 'momentous' - but of such pure joy! I miss them now. Two years ago, when I got a national award, the guy sitting next to me, also for the award, was Narayana Murthy of INFOSYS. I introduced myself to him, and he says: 'Sir, I know you well; I used to come to your home at IITK to listen to music. You have forgotten'.

Another momentous occasion was meeting my wife -to-be, Shakti. Her sister Dhruvi is married to Prof MM Chaudhri, who was across my house at IITK. As a bachelor, I used to hang around their place, playing with the kids, listening to music, gorging on their food. And Dhruvi's younger sister Shakti drops by from Baroda for a holiday. It was love

at second sight! She had come earlier in 1969, but we did not pay much attention (she says she didnt and I say I didnt) then. This time, it was momentous!

Working at the Centre for Cellular & Molecular Biology (CCMB) was another great experience. Here too, the graduate students were superb, chosen carefully from a large lot. Teaching them and learning from them was fun. By this time, as you would have gathered, my research interests moved completely from physical chemistry into biomedical sciences. It was at this time that Dr G. N. Rao came back from Rochester NY and started his L V Prasad Eye Institute at Hyderabad in 1986-87. He wanted to initiate basic research and since I, at the CCMB, was already looking at proteins of the eye lens, we joined hands. My lab at CCMB became de facto the LVP research lab, and his hospital gave me my medical collaborators and also patient's material. It was thus that in late May 1998 that I decided to quit a nice cushy government job of Director CCMB, and took voluntary retirement to join the LVP full time. Now, this too was a rather remarkable turn in my life, an unusual step. In retrospect, what I did was the best. I am enjoying it, and it is in a sense 'dharma', since LVP is a charitable hospital. I hope to be there until I turn 70, which will be in 2009.

What is the nature of your work in general? I read about it on the internet and saw that you work on finding cures for rare eye diseases. Can you please elaborate on this?

It might come as a surprise to many that 80% of the blindness in the world is needless- it can be cured in 30 minutes or less, or avoidable. Yes, of the 15 odd million in India, who cannot see at all, about 9 million or so are blinded by cataract. A 20 minute operation, removing the diseased lens and inserting a synthetic lens (called

intraocular implant) cures the condition and restores vision. A national effort involving all ophthalmologists across India is called for, as also across the world. This is what is now being done, under the leadership of Dr G. N. Rao, the Founder Director of our Institute, who has since quit directorship to engage himself fully into this.

as our pilot experiments with 15000 people have shown. Rao is trying to generate about 500-1000 such Vision Guardians, and 50 primary and secondary stage eye hospitals, across the length and breadth of AP. Mr Naidu, the then CM of AP had pitched in with Rs 26 crores. What a pity he lost the elections! But the project will go on, I hope, regardless of who runs the government.

or delay its progression? This way, we give the surgeon lead time, and also benefit health economics. That means we need to understand the causes of cataract, and this is one area I have been working on close to 20 years, even while I was at CCMB. Indeed, this is how Rao and I got together.



I have been looking at the mechanisms of damage caused to the lens molecules by both light and by oxidative stress, and some people think I have done something useful in this area. One major cause of such accumulating damage is oxidation of the cell molecules and organelles. Oxidative stress is caused by light damage (just as sunlight burns the skin, it damages eye material too, ironic for a light capturing organ!), diabetes, and by systemic depletion of protecting molecules with age, bad eating habits or malnutrition. The craze in the US you see about antioxidants is largely correct, since oxidative damage hits you with arthritis and hypertension - and we showed that it is the common factor to cataract and molecular degeneration (where the business part of the retina is also affected).

Would you believe there are close to 3 million Indians who are blind, just because they do not wear glasses/ contact lenses? Criminal! Diagnose their 'power' and give them eyeglasses; in 10 minutes, they can see again. You may wonder why this happens. Most of these people in rural areas do not have access or are scared to want to go to eye doctors. They resign themselves to a fate of blindness. Then there are people who have broken their glasses and do not have replacement. Here we are attempting to do something by using community participation. Imagine educating local people to read eye charts, diagnose the 'power' of the eye, and give glasses to the needy. This vast effort called Village Vision is being attempted with some rural women's group in AP. I think such efforts are truly workable,

The third major cause of blindness is infection of the eye. It blinds about 1.5 million Indians. By the time the patient comes to the hospital, it has advanced badly. If basic care is taken about personal hygiene it will be ample. Simple education about this works wonders.

So you see 80% of the blindness does not need research- certainly not rocket research. It needs a systems approach and sociology. This is precisely what the program called "Vision 2020- the Right to Sight" hopes to achieve by the year 2020, when we can hope to give many people 20/20 vision.

Where do I come in, in all this? What about the rest 20% of blindness that is not solved by the above approach? Can we reduce the burden on, say cataract? Can we delay its onset by a few years,

Well, the Americans and rich Indians can afford to buy and eat antioxidant pills and delay pathology- but what about the rest? It is here that we looked at some of the traditional diet components, traditional medicine and health aids that common Indians use (what you might call grandma remedies). They drink tea, eat a bit of greens daily, and use traditional medicines and tonics on occasions (pregnancy, childbirth, puberty, when weak with illness...). We looked to see if these have natural antioxidants and will administering them delay cataract? Well, we looked at tea (black, green, + milk or no, does not matter), Ayurvedic stuff like ashwagandha, Chinese stuff like ginkgo biloba. We showed that they are all cataract-static in animal trials.

If we promote greater daily doses of these materials then perhaps we can delay these age-related eye disorders. Some strength for this argument comes if you see why I, at age 65, am just starting to get cataract, while most people less well off than me get it at age 50 or less, and we all have the same genes, by and large. I eat well, at least better and probably use much more antioxidants in my diet.

When someone in the US showed, in 1994-5, that you can heal the wound to the outer surface of the eye (caused by chemical or fire burns) by using human amniotic membrane (HAM-the stuff thrown out after the baby is born), our clinicians at LVP got excited and began wound healing with HAM. But it is only part cure. The necessary corneal transplant that would restore vision has not been obtained yet. A new technique was needed. Then, in 1998 a guy in the US showed that in the limbus, surrounding the cornea, there exist stem cells. They are not embryonic stem cells that Bush hates; they are 'adult' stem cells which will grow into the tissue/organ, and perhaps also other tissues. We jumped at it, harvested these limbal stem cells from the patient (if possible) or next of kin, and grew them (cultured) on HAM, and lo and behold- we got a transparent stitchable corneal outer layer tissue! Today, we are No. 1 in the world, having treated 190 patients with this stem cell technology, the largest human trial of adult stem cell methods anywhere. We have had a 70% success rate, and the patients have restored vision- full or in major part. To me this is great satisfaction.

BUT, I will not take all credit for this. I direct the show. The hard work is done by the cell biologist Geeta and the clinician Sangwan in my 'team'. They do the hard work, and I go around singing their praise. My name is the paper because I fetch some of the money, give an occasional idea, and write parts of the papers.

LV PRASAD EYE INSTITUTE

Founded in 1986, L V Prasad Eye Institute is a non-profit organization that aims to combat eye disease through a comprehensive approach to eye care delivery. Over the past 14 years, the institute has served more than 1.4 million out-patients and performed over 140,000 surgical procedures successfully. LVPEI has established rural eye health centers that provide high-quality eye care at the lowest possible cost, or at no cost. This same model is used in LVPEI's primary center in Hyderabad, Andhra Pradesh, where nearly 50 percent of patients are treated free of cost.

What in your work satisfies you the most?

The fact that I am no longer just a bench scientist, but am attempting to organize something that can be of direct use. The 'high' one gets with a well written scientific paper that is accepted in a good journal has to be felt, not described. It is like when you hit the right note in music, when you win a Bridge hand after having been challenged by the opposition with a 'double', and so forth. It is an individual personal experience. When some application of the idea of this type happens to patients, and they can see again, the feeling is also an

intense 'high' but at the same time humbling.

How important has the BITSian experience been in your life?

There is no question that Pilani turned me from a kid to a man. It taught me to respect other lifestyles and traditions and cultures. It made me Pan-Indian and prepared me for the world. It rekindled my love for music. Hobbies such as tennis, billiards and Bridge came largely from family, since my father and also uncle played tennis etc. Pilani also gave the opportunity. My stay at IITK was another high. You learn so much from students! Nothing pleases me and Shakti more than having a house full of students, even to this day.

Am curious about your role in keeping the Indo-French relations which also led to the award Chevalier de l'Ordre National de Merite by the President of France.

Some of it grew from science, when in the late 1980s I was asked to participate and help initiate a joint Indo-French research program. But more of it grew out through participation in the activities of Alliance Francais Hyderabad (AFH). In the late 1990s, when the Director of AFH was having a miserable time, thanks to some of the other committee members, I stood by him and helped AFH do things at my own risk- such as help them move, help with expenditure, and most of all ensure that it does not get closed (there was a real danger), by directly talking to the Embassy and the Ambassador himself twice or more. Thank God AFH stays and has grown, though to some, I am still persona non grata!!

Your ideals and idols

I think you may now get a feel for the kind of ideals and beliefs that I have in life. Regarding idols, I do not think

I have any. Idolizing someone is an act of unreasoned acceptance, where even major faults/crimes/sins are rationalized and excused. This is not appropriate to me, and so no I have no idols.

But, I have learnt a lot from a few people, and admire them greatly, because they have molded my life. My father is one, who gave up much in his life, as a young widower, and until the last day was supportive of my brother and me. My uncle was another great influence. He taught me to appreciate language and literature- English and Tamil. I realize only now how much he must have taught me, in an informal and non-intrusive way. Then Professor Lakshminarayanan at Pilani. He

was in some manner my role model, and I still admire his ways. And then Dr. G. N. Rao, my colleague at the LV Prasad Eye Inst., who called me over to work with him. He is so focused, so disciplined and straight as an arrow in his goal. He has some of the qualities that I sadly lack.

Most of all, my wife of the last 33 years, Shakti. She has encouraged and directed my life in ways unknown. She has stood by, letting me know I can do it, to aim high, not to give in or give up. She is also a disciplinarian (I am a lazy guy, and she gives me a tongue-lashing, a bit too often in my reckoning!). She is disciplined, organized, caring, fair, willing to try anything, rational and yet accommodating, cultured, stylish and elegant, interested in fine arts-

painting, music, fabrics, you name it. She is a fantastic cook and runs a great home. She has brought up two wonderful kids. What more can I ask for?

What advice do you have for youngsters?

Be prepared for anything and don't be put off by an earlier bad performance. You really do not ever know how much you are capable of. Be honest; treat others as you want them to treat you. As the book *"I learnt all I have to know in kindergarten"* said it, Be clean, don't hit others, do your homework, clean up after you are done...!

Learn to laugh; do not take yourself seriously, then you won't be hurt. Above all, do not advise others- least of all youngsters! ;

Padma Shri



The Padma Shri is awarded to recognize distinguished service to the nation, in any field, including services rendered by government servants. The decoration may be awarded posthumously. It is the fourth highest award, after the Bharat Ratna, Padma Vibhushan and Padma Bhushan.

The Padma Shri was originally established, in January 1954, as the "Tisra Varg" or "Third Class" of a three-class "Padma Vibhushan" award. This medal was originally described as circular bronze medal, 1-3/8 inches in diameter, with an embossed lotus flower in the center with the legend "Padma Vibhusman" above and a floral wreath below. The reverse was to depict the state emblem with the legend "Desh Seva" or "National Service" above and a lotus wreath below. This medal was to be worn from the ribbon described below. This design was altered within a year, and there is no indication that any awards of the Padma Vibhushan, Tisra Varg, in this style ever took place (though some specimens and prototypes were probably produced?). On 8 January 1955, the badge was altered to that described below.

The original (1954) statutes of the decoration provided for bars to represent subsequent awards of the medal; no record of these awards has been located. This provision has been dropped since the 1955 modifications and, in practice, most initial appointments have been to Padma Shri, with subsequent promotions to Padma Bhushan and Padma Vibhushan representing continued national service of an increasingly high order, although direct appointments to higher levels of the award have been rarely noted.

From 13 July 1977 until 26 January 1980, awards of this decoration were suspended.

Neither the Padma Shri nor the Padma Vibhushan and Padma Bhushan are easily rendered into English, so the clumsy rendering of their names into this latter language must be taken as more approximate than usual!