

PERSONAL NEWS

person. My friend's husband recovered so rapidly and was touched by Kalam's personality. Incidences such as the ones above are neither isolated nor have been only reserved for a chosen few. I personally know of many people who have had similar experiences with Kalam.

Once, a well-known politician who was an admirer of Kalam, told me that Kalam must be the reincarnation of God. She said that 'one can be good to all the people sometime, can be good to some people all the time. How can he be good to all the people all the time if he is not God's reincarnation?'

Kalam was heavily influenced by Tamil poet Thiruvalluvar who wrote the famous Thirukkural. Thirukkural was created sometime between 3rd century BC and 1st century BC and has 1330 couplets that cover almost all aspects of our life and the philosophy behind it. Kalam had written several couplets that have motivated many a person and were original in thought. A compilation of all of these would act as a bible for everyone.

Kalam died while he was delivering a lecture to the students in Shillong. He died doing what he liked the most. In his death, most of us in the academia have

lost a colleague and a friend, every Indian had lost a guide and saviour of the country and the whole world lost a great human being. There is one in a quadrillion chances that God would create another Kalam within the next million years. He was a mother, father, brother, teacher, friend and guide, all rolled into one.

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Govindasamy Shanmugam (1938–2015)

Govindasamy Shanmugam, fondly called by colleagues and students as GS, was an internationally and nationally recognized Cancer Biologist. He did his post-graduation in Chemistry from Annamalai University. He completed his Ph D in the Regional Research Laboratory, Hyderabad working with P. M. Bhargava and carried out research on the uptake of exogenous RNA by liver slices and the effect of Actinomycin D on the synthesis of ribonucleic acid and protein in rat liver parenchymal cells in suspension and liver slices. He moved to the Institute for Molecular Virology, St Louis University School of Medicine, St Louis, Missouri, USA to work with the famous tumour virologist Maurice Green. During postdoctoral training, he worked with Giancarlo Vecchio of Italy and Nobuo Tuschida of Japan on 'transcription and translation of viral RNA in cells transformed by RNA tumour viruses'. He demonstrated the presence of virus specific messenger RNA in the polyribosomes of cells with replicating murine sarcoma-like viruses and their effective translation into viral-encoded proteins. Later he became an Assistant Professor at the same Institute and during his independent research career (1973–1978), he continued his work on viral RNAs and published two papers. He also collaborated with his post-docs in the laboratory to work on adenovirus type 2-induced early polypeptides; identified six early viral-induced polypeptides and two of those polypeptides (75 kDa and 45 kDa) were found to be associated with the DNA replication complex suggesting their role in the replication of adenovirus DNA. This work was published in *Nature* (1975).

After his independent career in US, he wanted to move to India and establish his own laboratory at Madurai Kamaraj University (MKU) during late 70s. S. Krishnasamy, then Chairman, School of



Biological Sciences invited him to join as a Reader in Biochemistry in MKU. He established the Cancer Biology Research Unit as a part of the Department of Biochemistry. His research students were known for their passion, enthusiasm and love for science, and high quality research. During early period at MKU, his group carried out research in the following areas: (1) Role for single- and double-stranded DNA binding proteins in human placenta and tumour tissues; (2) isolation and characterization of RNA processing enzymes in human placenta and plants; (3) role of intracellular and secreted proteins in normal and neoplastic cells in culture.

Shanmugam's group identified and purified novel DNA binding proteins from human placenta and demonstrated recombinase activity by using innovative Rec-Blot method, which was an easy and inexpensive method to demonstrate the

enzymatic activity. He also established a modern cell culture facility to conduct studies and understand cell cycle mechanisms in both normal and cancer cells especially the synthesis of new proteins when the cells undergo transition from G0–G1 and S phases by radiolabelling methods. He analysed the proteins that were expressed transiently both at intracellular–cellular and secreted in the medium. Among the many interesting intracellular and secreted proteins, his research group identified a secreted protein over-expressed during G0–G1 transition, but relatively low expression during S phase. The protein was purified to homogeneity and interestingly, it inhibited DNA synthesis in a variety of cells. Shanmugam continued his focus on the regulation of cell cycle proteins and identified novel extracellular matrix proteins that show differential expression in cancer cells that were transformed by oncogene transfection methods. Besides focusing on doing good science and guiding Ph D students, he took efforts to conduct three DBT workshops to train aspiring students and scientists in the country, to introduce them to advanced cell culture technology and also gene transfer methods.

In the early 90s, Shanmugam's lab started to shift from working with cell culture system to primary tumours. Shanmugam extensively analysed the genetic alterations such as mutational activation of oncogenes (*H-*, *K-*, *N-ras*) and inactivation of tumour suppressor genes (*p53*, *FHIT*, *ING1*, *p16*, *p15* and *p14 ARF*) collaborating with his post-doc colleague Nobuo Tsuchida in Tokyo Medical and Dental University, Japan. He

explored the role of epigenetic modification and reported that the promoter hypermethylation was common in *MGMT* (41%) and *ECAD* (35%) followed by *p16* (23%) and *p15* (23%) genes. Among the tumour suppressor genes, *p53* was reported as preferred target for mutational inactivation in oral cancer and majority of them were transition mutations, suggesting the role of tobacco specific nitrosamines. Interestingly, the *p53* mutations were found to be less frequent (<25%) and *H-ras* mutations were more frequent (>35%) in oral cancers. His laboratory showed the association of ADH1C*2/*2/MTHFR 677TT genotype combination with the risk of developing oral cancer in alcoholics. His research group isolated two potential anticancer compounds Cleistanthin A and Cleistanthin B from a poisonous plant *Cleistanthus collinus* and showed that both compounds induced DNA damage, growth arrest and apoptosis in cancer cells.

Shanmugam received several awards and honours: ICMR Award for Biomedical Sciences, INSA Senior Scientist Award and UGC National Lectureship. He was an elected fellow of the Indian National Science Academy (New Delhi), Indian Academy of Sciences (Bengaluru), and National Academy of Sciences, India (Allahabad).

Besides cancer biology research, he actively participated and penned his opinion in *Current Science* about GM crops and suggested that scientists should have greater responsibility to consider the documented environmental impacts before recommending GM crops. He also wrote about improvement of higher education in India and the need for good quality teachers. He proposed a certified teachers examination (CTE) at the national level for aspiring teachers. The top 5–10% candidates who clear CTE may be declared as National Certified Teachers. In college accreditation, he considered that weightage should be given also to the number of national certified teachers employed in that institution. He believed that interest towards science should be encouraged in the young minds at school level. When we planned to institute an endowment in Shanmugam's name in the School of Biological Sciences, MKU he advised us to allocate sufficient funds for two prizes/citations for school children, one each to be given to a boy and girl during the science day celebration.

Finally we would like to share one of his students Padmaja's observations that will nicely sum up who Shanmugam is: *'It is also what he did NOT do that made Prof. GS the great man he was and will be remembered for. He did not have the high and might superior attitude. In a true Socratic tradition, he did not impose any sort of intellectual limitation on his students. His students were as free to choose their topics as they were to make mistakes. He did not ridicule when his students faltered, neither did exalt the success of any one person. He did not set a hierarchical system within his domain. From the glassware washer to the post-doc, everyone was on the same footing in the lab. His attitude was perhaps best epitomized by the fact that he never locked his room and every student could walk right in without once knocking.'* We salute him for the inspiration and support he extended to all the students of School of Biological Sciences, MKU.

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Govindaswamy Shanmugam (GS), pioneer cancer biologist of the country, died on 15 April 2015 in Madurai at the age of 77 years. He was born on 18 December 1938 at Vallampadugai, Tamil Nadu. He received his Ph D degree from Osmania University in 1968 and served as an Assistant Professor at the Institute for Molecular Virology, St Louis, USA from 1973 to 1978. GS worked on the synthesis and assembly of adenoviruses and moloney murine leukaemia virus in human cells. He discovered the subgenomic viral mRNAs and their function. In 1979, he moved to the School of Biological Sciences at Madurai Kamaraj University (MKU), first as a reader and then became

a Professor in 1985 until formal superannuation in 1999. GS continued his work at Madurai as INSA Senior Scientist and emeritus professor until 2008, when he became Director of the Oncophyta Labs. His contributions included the biosynthesis of viral components in murine leukaemia virus-infected cells. He had an abiding interest in understanding the molecular mechanisms of cell proliferation, oncogenes and tumour suppressor genes. Pioneering the research work on replication of DNA and DNA tumour viruses, he discovered a double-stranded RNA-specific nuclease involved in the processing of ribosomal and retroviral RNAs. These findings have been quoted as biological concepts in textbooks.

Establishing a Cancer Biology Laboratory at the School of Biological Sciences, MKU, GS trained a large number of M Phil and Ph D students. He pioneered work on characterizing DNA repair and various enzymatic activities in the placenta. He used mouse and chick embryonic cells and fibroblasts to study the carcinogenic and toxic features of various chemicals and plant-derived compounds. His group investigated the mutations of major tumour suppressor and oncogenes of oral, cervical and breast cancer patients from South India. His work in this area paved the way for the emergence of polymorphism and mutation data from cancer patients in India and eventually led to the establishment of several research groups.

GS is known for his soft-spoken nature and friendly mode of training and guidance, and has been a role-model for many young researchers. He was also a renowned teacher of cell biology. As part of his extension work, GS popularized the traditional Ayurvedic ginger treatment as an option for kidney failure.

He was a Fellow of the Indian Academy of Sciences, Bengaluru (1991), Indian National Science Academy, New Delhi (1993), National Academy of Sciences, India (Allahabad), and International Union of Cancer.

GS leaves behind his wife, two sons, a daughter and a large number of students and admirers.

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