

# **BENGAL SCIENCE LECTURE**

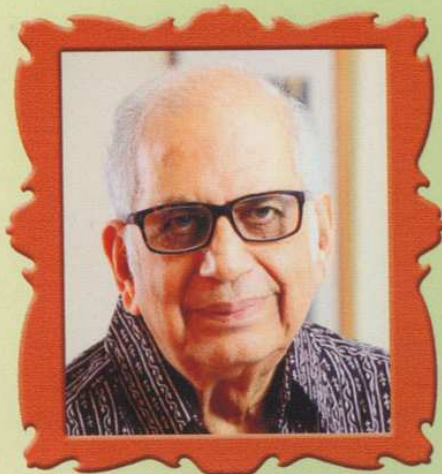
9th January, 2013

*by*

**Prof. P. M. Bhargava & Prof. P. C. Kesavan**



**West Bengal State Council of Science & Technology  
and  
Department of Science & Technology  
Government of West Bengal**



**Dr. P. M. Bhargava**

**Scientist, writer, thinker, institution builder, administrator.  
Former and Founder Director of Centre for Cellular and Molecular  
Biology (CCMB), Hyderabad & widely regarded as the architect of  
modern biology and biotechnology in India.**

Educated at Varanasi and Lucknow. Obtained his Ph.D. at the age of 21. Worked in the U.S.A., U.K., France and Germany.

Travelled in over 60 countries. Delivered over 250 invited lectures in 125 institutions outside India and over 2000 invited lectures in India.

Over 100 major national and international honours and awards including : Legion d'Honneur from the President of France (France's highest honour); Padma Bhushan from the President of India; Fellowship of World Academy of Art and Science, National Academy of Medical Sciences, India & all the three Indian Science Academies; National Citizens Award (India); Visiting Professorship: College de France; Life Fellowship: Clare Hall; Cambridge Wattumal Memorial Prize for Biochemistry; FICCI Award for Medical Sciences; Ranbaxy Award for Medical Sciences; SICO Award for Biotechnology and many other awards.

Over 125 major scientific publications, and nearly 500 other articles and write-ups in a variety of subjects, in some of the best-known publications around the world. Five books including a monograph on "Proteins of Seminal Plasma"; a national integrated science text book ; "The Saga of Indian Science since Independence: In a Nutshell" ; and the highly acclaimed book "Angels, Devils and Science".

**Past President** : Society of Biological Chemists of India, Indian Academy of Social Sciences, Society for Scientific Values, Association for Promotion of DNA Fingerprinting and



other DNA Technologies, Past or present member (or chairman) of over 125 major national and international standing committees. Former Vice-Chairman, National Knowledge Commission, Government of India. Former Member, National Security Advisory Board, Government of India & connected with numerous scientific, social and cultural organisations.

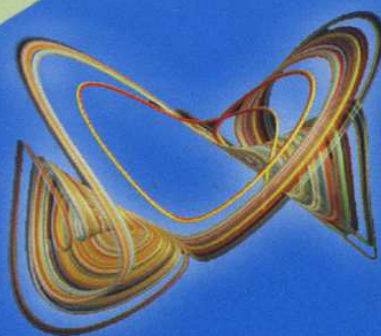
**Currently Chairman:** Council for Social Development Southern Regional Centre, The MARCH (The Medically Aware and Responsible Citizens of Hyderabad ), Sambhavna Trust, Biographies appear in numerous national and international Who's Who.

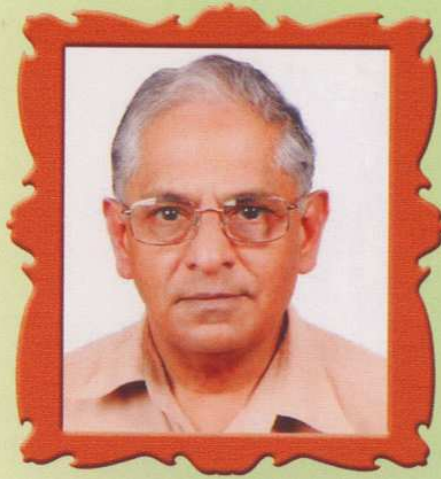
### **Abstract of Lecture**

#### **TWO FACES OF THE BEAUTY : SCIENCE AND ART**

In this presentation evidence in favour of the following eight thesis will be presented and discussed:

- **The First Thesis:**  
Nature is inherently beautiful at all levels of resolution
- **The Second Thesis:**  
Nature follows laws and science
- **The Third, Fourth and Fifth Thesis:**  
Nature loves certain mathematical relationships that we are genetically programmed to recognize, such recognition giving us an evolutionary advantage
- **The Sixth Thesis:**  
Man's aesthetic creations are inspired by nature
- **The Seventh Thesis:**  
All forms of creativity have elements of beauty
- **The Eighth Thesis:**  
A scientist is intuitively partial to beauty





**Dr. P. C. Kesavan**

**Emeritus Professor of Sustainability Science at IGNOU, New Delhi & Distinguished Fellow at M.S. Swaminathan Research Foundation, Chennai**

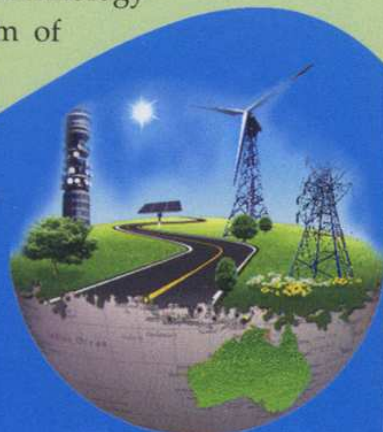
He held previously the following positions: Department of Atomic Energy Homi Bhabha Chair in Nuclear Sciences and Sustainable Development (1998 - 2007), Honorary Executive Director, M.S. Swaminathan Research Foundation, (1999-2003), Director, Bioscience Group of Bhabha Atomic Research Centre, Mumbai (1993-1998) and Professor and Dean, School of Life Sciences, Jawaharlal Nehru University (JNU), Delhi (1980-1998).

**Fellowships :** Fellow of the Indian National Science Academy (FNA), National Academy of Sciences (FNAsc), National Academy of Agricultural Sciences (FNAAs), the Institute of Physics, London (FInstP).

**Association with Professional Societies :** *Life Member and past President* of the Environmental Mutagen Society of India (1995-98) & Indian Society for Radiation Biology (1991-93). *Life Member* of Indian Nuclear Society, Indian Association of Radiation Protection & Indian Association for Radiation and Photochemical Sciences.

**International Association :** Member of Editorial Board of  
*i. International Journal of Radiation Biology* (Taylor & Francis, Canada)  
*ii. Journal of Radiological Protection*, Institute of Physics, London.  
Delegation of the Government of India to the United Nations Scientific Committee on Effects of Atomic Radiations (UNSCEAR), IAEA, Vienna (1995 - 1998) and 2012.

Currently involved in harnessing science and technology for human welfare, particularly in the realm of sustainable management of natural resources for rural development and livelihood security of the coastal farming and fishing communities.



His current research links harnessing frontier science and technology with traditional knowledge for enhancing food and livelihood security **without** causing environmental problems. His work on integrating disaster preparedness with early warning systems has been adopted by National Disaster Management .

His recent (2012) book "**Evergreen revolution in agriculture: Pathway to green economy**" with Professor M.S. Swaminathan deals with principles and pathways to fight the famine of food and famine of livelihoods in eco-friendly ways to avoid ecological and social harm.

Basically, he is a geneticist and a radiobiologist. **He is known internationally for his work on elucidation of the pathways of modification of radiobiological effects by caffeine.** His demonstration that caffeine competes with electrons for oxygen and blocks the formation of reactive oxygen species, scavenges hydroxyl radicals and several other reactive oxygen species (ROS) provided the premise for its substantial protection against radiation and chemical carcinogens/clastogens induced damage to biological systems. **For these studies, he was awarded the Jawaharlal Nehru Birth Centenary Award 2009** by the Indian Science Congress.

His early work in the 1980s at the Jawaharlal Nehru University, New Delhi revealed that low priming doses of gamma rays induce **adaptive response** to withstand lethal exposures to ionizing radiation.

Since 2008, he is engaged in developing course material for teaching and action research in Sustainability Science at IGNOU, New Delhi. He is actively involved in teaching Post-graduate Diploma Programme in Sustainability Science at Indira Gandhi National Open University.



## Abstract of Lecture

### **TRANSFORMING GREEN REVOLUTION INTO EVERGREEN REVOLUTION : PATHWAY TO GREEN ECONOMY**

While the 'Green Revolution' or the 'Exploitative Agriculture' as it was aptly referred to by Professor M. S. Swaminathan, changed India's image as 'Begging Bowl' to 'Bread Basket' and also saved over 80 million hectares of forest land from being converted into agricultural land, it also led to considerable degradation of soil health and depletion of biodiversity. Further, it did not ensure food security at the household level of hundreds of millions of resource-poor farming and landless rural families. Despite 60 to 70 million tonnes of food grains as buffer stock, India even today continues to be home to the largest number of hungry people in the world. The paradox of 'Mountains of grains on one hand, and millions of hungry' on the other, still prevails. Hence, a '*Systems Approach*' to integrate environmental and social dimensions for achieving productivity in perpetuity without accompanying ecological harm was needed. Such a system conceived and developed by Professor M. S. Swaminathan since 1990s is the one that can fight both the famines of food and rural livelihoods without causing environmental degradation. He called it 'Evergreen Revolution'. The field level implementation of 'Evergreen Revolution', unlike the green revolution, is substantially pro-nature, pro-poor and pro-women. Biodiversity conservation, use of renewable energy, enhanced water-use efficiency, reduction of the use of chemical fertilizers, and pesticides, integration of crops and animals in a 'Mixed Dynamic Farming' system, use of Integrated Pest and Nutrition Management (IPM and INM), and sustainable use of locally available resources for creating on-farm and non-farm livelihoods and harnessing frontier technologies blended with traditional knowledge and ecological prudence as the requisite tools are some of the major elements of the evergreen revolution. A departure from fossil fuel based intensive agriculture to biologically derived inputs is the pathway to green economy. Such an approach is prudent to enhance the resilience in an era of climate change. These aspects will be briefly discussed.

