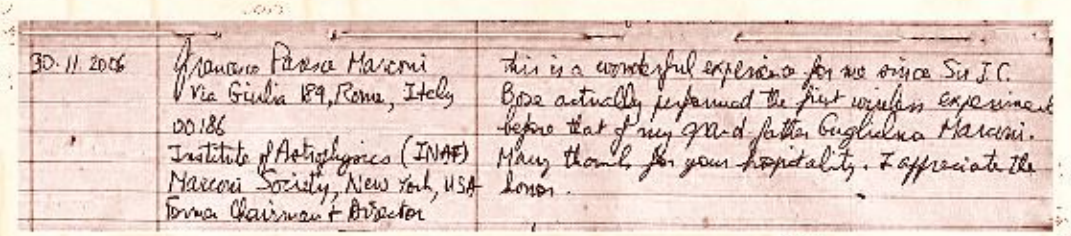
HUNDRED YEARS OF BOSE INSTITUTE

BOSE INSTITUTE CENTENARY CELEBRATION



The doyen of modern science in India, Acharya Jagadis Chandra (J. C.) Bose, was a pioneer in the true sense of the word. He was the first to demonstrate wireless transmission of signals (although the Nobel Prize for the discovery was awarded to Guglielmo Marconi), which paved the way for radio communications. He was the first in the world to employ semiconductor technology, 60 years ahead of the times, in the words of the Nobel Laureate Sir Neville Mott. His path-breaking and seminal work on electrophysiology started the discipline of Biophysics. In these researches, it is now recognized that he was a hundred years ahead of his times. Albert Einstein once famously commented that if monuments were to be erected for scientific discoveries, there would be at least six monuments dedicated to J. C. Bose.

In spite of all these achievements, the scientific career of J. C. Bose was one of incessant struggles. While his first discovery, that of wireless transmission, was promptly hailed in the West, his later works, totally unanticipated by the scientific community then, was frowned upon, to the point of ridicule; insurmountable obstacles were put in his path. J. C. Bose chose to prove his scientific results through tenacious and rigorous demonstrations, often designing and fabricating, with the aid of local craftsmen and artisans, intricate scientific instruments, the accuracy and ingenuity of which continue to amaze the community. All of this was achieved almost without any institutional support. J. C. Bose acutely felt such lack of support and encouragement from the powers that be; this prompted him to establish a haven for scientific research for the benefit of his successors, the future generations of scientists in India. He found great support in his resolve from people like Rabindra Nath Tagore, Sister Nivedita, Gokhale and Mahatma Gandhi, just to name a few.


30. 11. 2006

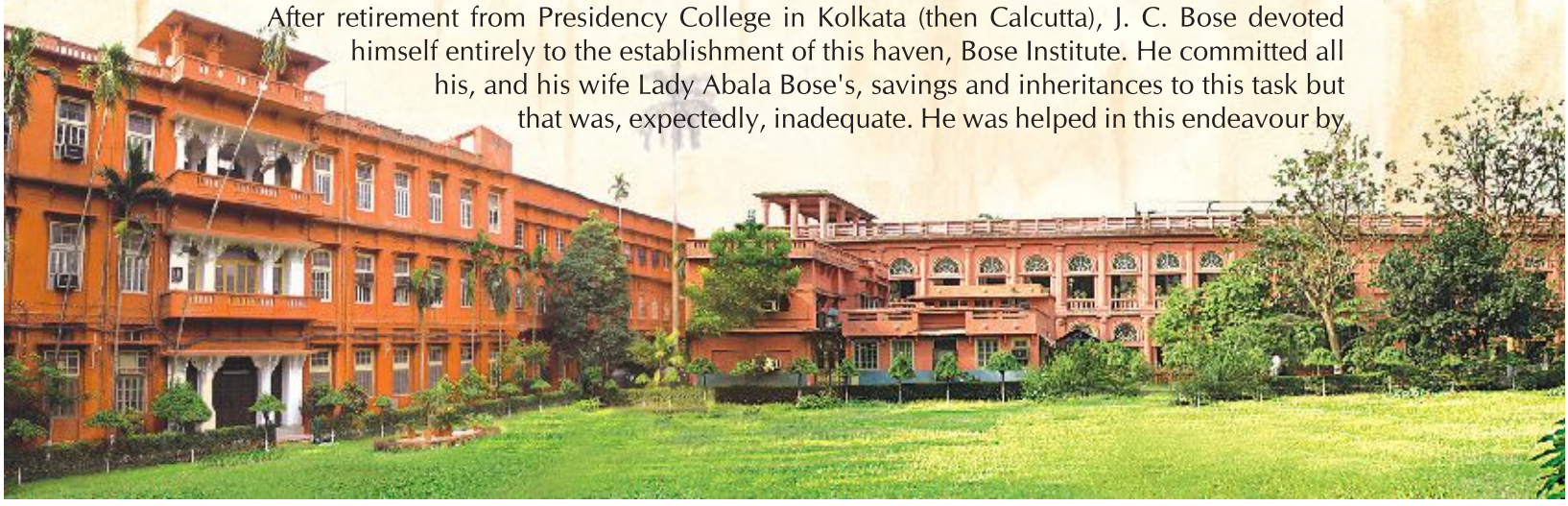
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Former Chairman & Director

This is a wonderful experience for me since Sir J.C. Bose actually performed the first wireless experiment before that of my grand father Guglielmo Marconi. Many thanks for your hospitality. I appreciate the honor.

"This is a wonderful experience for me since Sir J. C. Bose actually performed the first wireless experiment before that of my grandfather Guglielmo Marconi. Many thanks for your hospitality. I appretiate the honor."

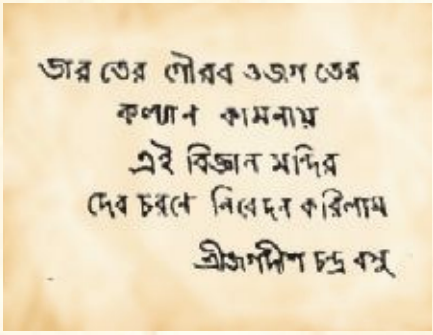
-Remark by *Prof. Francesco Paresce Marconi,* grandchild of the celebrated Italian scientist G. Marconi on the former's visit to Bose Institute and J.C. Bose Museum on 30th November, 2006

After retirement from Presidency College in Kolkata (then Calcutta), J. C. Bose devoted himself entirely to the establishment of this haven, Bose Institute. He committed all his, and his wife Lady Abala Bose's, savings and inheritances to this task but that was, expectedly, inadequate. He was helped in this endeavour by

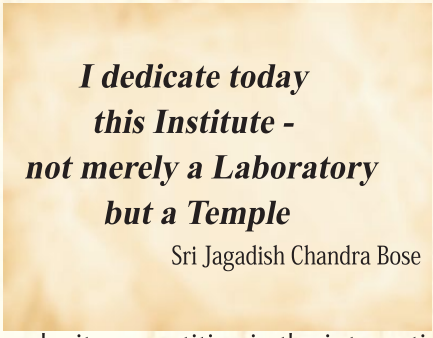


many patriots, some of whom named above. Their influence raised substantial contributions from various quarters. Notably, J. C. Bose even resorted to giving scientific demonstration-lectures all over India where admission fees were charged to help found the institute. Thus, the establishment of Bose Institute can be rightly termed as being the manifestation of India's hope to establish the nation's self-esteem as an equal to the colonizing west. On 30th November 1917, which coincided with his birthday, J. C. Bose inaugurated Bose Institute at the premises located at 93/1, Upper Circular Road (now A. P. C. Road) adjacent to the Rajabazar Science College,

with the profound proclamation: ***I dedicate today this Institute – not merely a Laboratory but a Temple.***



J. C. Bose exhorted his followers to pursue *further and fuller investigation of the many and ever-opening problems of the nascent science which includes both Life and Non-Life…. The advance of science is the principal objective of this Institute and also the diffusion of knowledge…., to associate the advancement of knowledge with the widest possible civic and public diffusion of it; and this without any academic limitations, henceforth to all races and languages, to both men and women alike, and for all the time coming …. Thus the lines of physics, of physiology and of psychology converge and merge. And here will assemble those who would seek oneness amidst the manifold.* These are indeed prophetic words, motivating the pursuit of seamless science, or inter-disciplinary scientific research, as we call it today.



With this lofty ideal, Bose Institute has been striving for the past hundred years to justify the expectation of its illustrious founder. After the passing away of J. C. Bose in 1937, his nephew, Dr. Debendra Mohan (D. M.) Bose, then Sir Rashbehari Ghose Professor of Physics at the University of Calcutta, was prevailed upon by Rabindra Nath Tagore to take over the reins of Bose Institute as Director. During his helmsmanship of 30 years, Bose Institute progressed to a modern laboratory with the appropriate structure and goals to make it competitive in the international scientific scene. Under his tutelage, research in high energy physics and nuclear physics were started for the first time in India, with remarkable success. D. M. Bose and his student Biva Chowdhury succeeded in detecting a new elementary particle, the pi meson, by exposing photographic emulsions at mountain altitude. That they were denied the Nobel Prize for this profound discovery is a matter of ill-fate; they needed some emulsion of finer resolution than the ones they were using, to conclusively quantify their results but were unable to procure such films because of the raging Second World War at the time. Meanwhile, C. F. Powell independently succeeded in making the discovery with the required accuracy and bagged the Noble Prize for it. In his Nobel Lecture, however, Powell did acknowledge the original work of Bose and Chowdhury. After J. C. Bose, that was another occasion of Bose Institute, and India, being deprived of a well-deserved Nobel Prize.



D. M. Bose set Bose Institute on a course of internationally current and competitive programme. He established the first Microbiology Department in India at Bose Institute. He initiated research in understanding the observations of J. C. Bose in plant electrophysiology from the standpoint of biochemical processes and paved the way for

establishing the discipline of molecular biology in India. Bose Institute was one of the first institutions in India to embark on such studies and earned an enviable reputation in the area. Another major discovery, worthy of a Nobel Prize, was carried out in the Chemistry laboratory of Bose Institute, the seminal discovery of the Cholera endotoxin, by Prof. Sambhu Nath De, a professor of pathology at Calcutta Medical College. Nobel Laureate Joshua Lederberg did nominate De for the Nobel Prize on more than one occasion, but unfortunately without success.



The later generations of scientists at Bose Institute have tried to follow in these lofty paths, if not with similar achievements but with intense dedication and commitment and commendable success. They can boast of significant contributions in plant genetics and biotechnology, structural and computational biology, microbiology, systems biology, molecular medicine (molecular basis of diseases and drug action), astroparticle, particle and quantum physics and environmental sciences. Bose Scientists have been eagerly sought for collaborative efforts in a number of international endeavours both in physical and biological sciences. True to the exhortation of the Founder, Bose Institute undertakes extensive social outreach programmes in rural biotechnology, aiming at bringing the fruits of science and technology to the economically weaker section. Bose Institute conducts regular science camps for school children and science teachers, especially from the North-Eastern states of India, to introduce them to the joys of science through hands-on experiments and demonstrations. In addition, the Institute contributes to manpower development through an integrated M.Sc.-Ph,D, programme in Physical and Life Sciences as well as training of doctoral and post-doctoral students.



Tribal beneficiaries were engaged in rearing silkworm larvae at Bhutadih village in Purulia district under the sericulture project of Scheduled Tribe-Specific Rural Biotechnology Programme.

The activities of Bose Institute are spread over 7 academic campuses and experimental field stations, spread all over the state of West Bengal. On the occasion of the Centenary of the Institute, a new unified academic campus of Bose Institute is being readied at its Salt Lake campus which would bring all the scientists under one roof and fulfill the Acharya's dream of fostering close and intense collaboration between all disciplines.

Acharya J. C. Bose was an ardent nationalist who desired India to rediscover its glorious heritage and reclaim its leading position in the world of science and technology. Bose Institute indeed has been fortunate to inherit his great legacy and tried to prove itself worthy of this inheritance. To keep the spirit of inquiry alive and fulfill the Founder's dream, the Institute plans to embark on some novel directions of research in the coming years, which would build on the present expertise and take on new challenges.

Acharya J. C. Bose's pioneering approach of probing Biology from the vantage point of Physical Sciences dominates modern scientific research today. Befitting the centenary of the institute, we plan to explore a couple of areas in the interface of Biology and Physics which, though at the cutting edge, are underdeveloped in our country. We propose to set up two advanced programs in interdisciplinary scientific research that aim to become leading scientific research programs in the country.

Charting a new course on the occasion of Centenary of Bose Institute: Honouring the Historic Legacy of J. C. Bose

1. Interdisciplinary Programs for Advanced Scientific Research:

(a) Program in Synthetic and System Biology

Modern Biology advanced by leaps and bounds only after a molecular view of life emerged, both in terms of structure and function. However, it is becoming clearer that a reductive view alone is not sufficient to describe living beings; rather an integrative approach is desired to fully comprehend the nuances of the living systems. Tools for exploring living systems by a global approach have already emerged, such as, genomics and proteomics. This integrative approach to understand living systems is often called systems biology. Another emerging area in biology is synthetic biology, which involves engineering metabolic and signaling pathways in a biological system to alter the global properties of the system. A systems level understanding is crucial for performing such an engineering. The proposed program will focus on therapeutically and agriculturally important problems in biology using approaches of systems and synthetic biology. Among other objectives, the programme proposes to engineer organisms to produce naturally occurring complex drugs in large quantities, thus making them affordable. Also, we propose to design crops that would be compatible with the global changing environment with sustainable crop productivity.

(b) Program in Complex Systems

The study of complex systems is a new approach to science where relationships between parts, yielding collective behavior of a system, and the interaction of the system with its environment, are investigated. The approach is primary mathematical, borrowing from statistical physics and information science, but with wide ranging applications spanning from humanities to natural sciences. The focus of the proposed program in Complex Systems, probably the first of its kind in India, will be on the transmission of information in synthetic circuits, network of networks, quantum networks leading to quantum internets and aspects of cosmic and astrophysical topological defects vis-à-vis similar defects in liquid crystals. Centered around complex systems, the program will also serve as a unique bridge between biology and physics.

2. New Social Outreach Programs for Rural India:

Bose Institute has been conducting regular hands-on training program for income generation for rural people under the Rural Biotechnology Program since 2008. Moreover, since 2013 Bose Institute has been running social outreach programs for the scheduled tribe beneficiaries. Currently we are working in about 80 villages covering 5 districts of West Bengal towards implementing income generation schemes for the scheduled tribe people. In the proposed initiative we intend to extend this income generation program to all sections of rural people living below poverty level across the state of West Bengal and would initiate development of a number of model villages.

3. Educational Upliftment Programs for Empowering Young India:

For more than past one decade, Bose Institute has shepherded innovative hands-on science training camps for young school children from all states of North-East India at its Darjeeling Campus. Based on the success of the program, we propose to conduct the program more frequently and on a much larger scale, where participants would include school children from the entire Eastern India. In addition, we will also conduct innovative Teacher Training programs and develop pedagogic materials that would be widely available in the public domain. A dedicated centre for conducting these programs is proposed to be set up at the institute's Falta Campus, including laboratories, auditorium and Hostel facilities. Further, apart from the in-house science camps at Bose Institute, complementary school visits by faculty members, contributing towards school teaching, would be an integral part of the program.