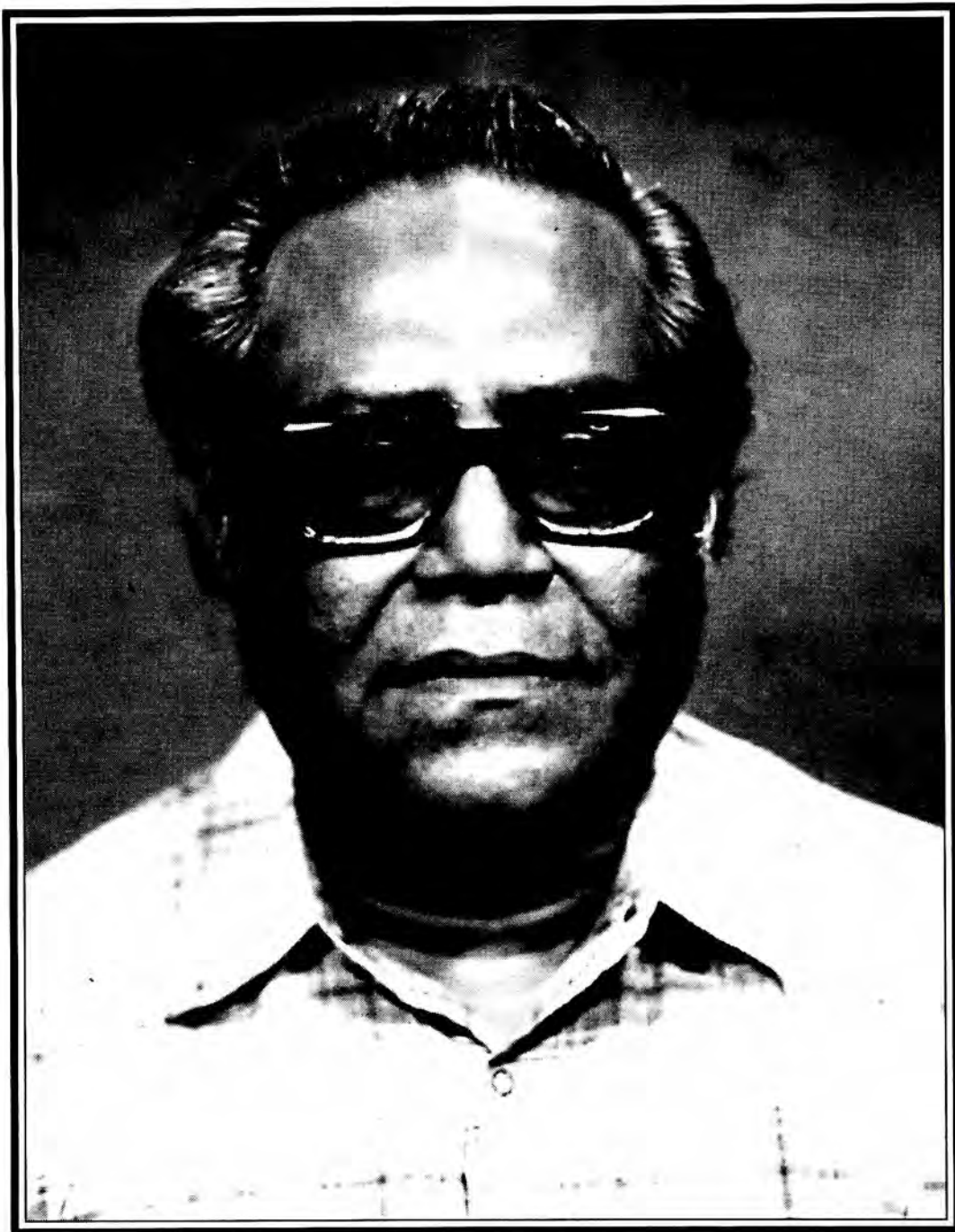


# AMAR NATH BHADURI

(11 November 1935 - 6 June 2003)

*Biog. Mem. Fell. INSA, New Delhi* 35 101-109 (2009)





Amarnath Bhaduri



# AMAR NATH BHADURI

(1935-2003)

Elected Fellow 1985

## INTRODUCTION

This is a tribute that I write with pride because the name AMAR NATH BHADURI has meant so much to all of us who are still working in the areas of Leishmania Biology at Indian Institute of Chemical Biology. The brilliant character of Amar Nath Bhaduri inspired distinct categories of scientists over the years. He was better known as Amar-da to his colleagues at IICB and as ANB to his students. It is rather difficult to capture the essence of ANB because his accomplishment is extraordinarily diverse. He trained a number of scientists either directly or peripherally, many of whom are distinguished nationally. Their loyalty to and affection for their mentor is not only in appreciation of good training in science but also for the encouragement and support which they received from him over the years. We remember him as a man of integrity, indomitable spirit, leadership, wisdom and judgment – someone whom all of us loved deeply.

His eminence in biochemistry has been recognized nationally and internationally. But his interest spread beyond the confines of research. He has given great service and leadership throughout his term of office and it has been a key note of his Directorship of IICB (1990-2000) that he has always led by example. Despite his many activities, direct research by him was paramount; yet he still managed to couple this with enthusiastic support of the research team which he commanded at the institute. He always found research exciting and conveyed this excitement to those who worked in his institute. Always full of praise for the achievements of others in research, he was as excited as they were when research brought forth successful results. But above all, ANB had been a leader whom all of us regarded as a close personal friend. His warmth, zest for life, enthusiasm, and abiding interest in our affairs is reflected in how we have all seen him as a Director of the Institute. His boundless energy has carried IICB to the forefront of international recognition as far as leishmania research is concerned. He had an overriding desire to ensure that the quality of everything that was underway during his tenure at IICB be as high as possible.





## FAMILY BACKGROUND AND EDUCATION

ANB was born to Adi Nath Bhaduri and Smriti Bhaduri on November 11, 1935 in Calcutta. His father was a Chemist and headed a moderate sized chemical industry where he patented a technique for Azo print development. His uncle, Dr. Param Nath Bhaduri was a member of INSA and acting Vice-Chancellor of Burdwan University. ANB studied Chemistry at the Presidency College, Calcutta and subsequently earned MSc in Applied Chemistry from the University of Calcutta. He received his doctoral degree from the University of Michigan in 1963 and was a Research Fellow in Biochemistry at the Harvard Medical School during 1963-1965. Joining Jadavpur University in 1966, he became Professor of Biochemistry in the School of Pharmaceutical Sciences in 1976. He was honoured with numerous awards including the SS Bhatnagar Award in 1983 in Biochemistry and Biophysics Section. He held the Honorary Doctorate of Science of Burdwan University. After years of his stay at Jadavpur University, he moved to IICB in 1985 as Scientist-in-Director's grade. Subsequently he became the Director of IICB in 1990 and retired in 1995. During his period of stay at IICB, ANB headed a comprehensive program on the biology of leishmania parasites funded by the United Nations Development Program (UNDP). He had served as a member of the Leishmania Research Committee of the World Health Organization, Geneva during 1989-1993. Supervision of research students was, of course, part of his duties. But there is a great deal of inadequately recognized work in such things as membership of editorial board of journals, and acting as a reviewer and a referee in applications for scholarly advancement of his colleagues.

## SCIENTIFIC ACHIEVEMENTS

ANB's own scientific achievements have been profound. He pioneered in understanding the structure-function relationship of proteins using UDP-gal epimerase as a prototype of a protein. Working over two decades, Professor Bhaduri made decisive contributions in the field of molecular enzymology of UDPglucose 4-epimerase, the prototype enzyme of a new class of oxido-reductases that utilize pyridine nucleotide as a true cofactor and not as a cosubstrate as in the case of classical dehydrogenases. Novel enzymological phenomena like asymmetry in allostericity and substrate-induced catalytic suicide inhibition have been established with this enzyme. The assembly pathway of the dimeric holoenzyme with a single catalytically functional active site was elucidated using a reconstitution system. Extensive kinetic and physico-chemical studies led to the elaboration of the chemical architecture of the active site in molecular detail. Two conformationally vicinal thiols, a histidine, an arginine and a hydrophobic pocket for the adenine moiety of the coenzyme were demonstrated to be present at the active site. The thiols are closely spaced; while one resides at a distance of 5 Å in a hydrophobic milieu and is directly involved in the catalytic process in tandem with the neighbouring histidine





the other is involved in generating the coenzyme fluorescence. In summary, Professor Bhaduri's work has made decisive impact at the fundamental level on the study of a new class of oxido-reductases and has also uncovered new enzymological phenomenon of potential biological significance.

In the field of biochemical parasitology, Prof. Bhaduri made intensive studies on metabolic pathways of *Leishmania donovani*, the causative protozoal pathogen for kala-azar, with a view to developing newer drugs and also understanding the molecular basis of its pathogenic transformation. His intensive study of the pyrimidine biosynthetic pathway of the organism led to the identification of N-phosphonoacetyl aspartic acid (PALA) and acivicin as two potential new drugs for combating leishmaniasis. More significantly, he has demonstrated the role of calcium as a biomodulator and second messenger in the pathogenic transformation of the parasite. A plasma membrane  $\text{Ca}^{2+}$  carrier, that allows rapid influx of  $\text{Ca}^{2+}$  on membrane depolarization and has several properties analogous to a  $\text{Ca}^{2+}$  channel, has been biochemically characterized. Finally, channel blockers have been demonstrated to arrest morphogenetic transformation at physiologically relevant concentrations. In short, extensive mechanism for  $\text{Ca}^{2+}$  homeostasis and  $\text{Ca}^{2+}$  signalling was demonstrated for the first time in this protozoal pathogen. He had avid interest to study glucose transport across parasite membrane as parasites survive during their intracellular life cycle on host cell glucose supply. In course of this investigation ANB together with his group characterized two important plasma membrane enzymes: one of them is calmodulin-sensitive  $\text{Ca}^{++}$ -ATP-ase whose role is to transport  $\text{Ca}^{++}$  across the plasma membrane and the other one is  $\text{Mg}^{++}$  ATP-ase which is a  $\text{H}^+/\text{K}^+$  antiporter involved in glucose transport.

He spent his career refining the mechanism of enzyme action and active site modification. There is no question that his contributions are marked by creativity accomplished by rebelliousness against current dogma, when necessary. ANB was one of those rare scientists who became a true mentor in all counts. The quality of ANB's own scientific research has been profound. Such insight combined with the simplicity of technique adopted is exceptional but both have always been the hallmarks of this great biochemist who unquestionably deserves the credit to have initiated the study of structure-function relationship of proteins in the country. Excellent workers flocked to ANB's lab because the man had insight into what is important in our field.

On the day of his retirement from IICB, a very special symposium was held at the institute to commemorate the occasion. With their reminiscences, the speakers painted a vivid picture about ANB as a very human person and about the exciting years he had at IICB. He was a real connoisseur for Western classical music. He was fond of Herbert von Karajan's conduction and had special interest for the musical requiem of Mozart. Less known is the fact that he was a legendary batsman in the





cricket team for his college, and was presented a bat for making a century, a rare feat for a college not known for games. At the same time from an early age, he was moved by the poverty and suffering in the slums near his house, and joined the undivided Communist Party of India at a fairly early age as a student. After the split of the communist movement, he continued on his return to India in 1965 as Member of the Communist Party of India (CPI), and while researching in Jadavpur University as a 'Pool Officer' he was elected a Councillor of Kolkata Corporation from his area.

ANB always had a smile and a word of encouragement even in the face of imminent disaster. He was never timid about expressing his opinion even when they were guaranteed to stimulate controversy. He was equally effective in speaking to scientists, lay members of the community, or politicians. In one sense, an era in the life of IICB ended with his passing; in another and exciting way, a legacy on which to build just began. Broad-mindedness, tolerance and humour combined with intense dedication to science characterized ANB's personality. He was dynamic and at the same time, a very kind person. He was inspired by the thought that basic biomedical research would be an important way of improving the life quality for man. The author had been fortunate enough to be included in his circle of affection. His untimely demise remains a personal tragedy for the author. He is survived by his wife Reena Bhaduri, daughter Tisha and son Kauskik. But above all ANB will survive for generations as a scientist through his scientific children, grandchildren and further down the lineage; this is a remarkable testimony for a great man and a great scientist.

### ACKNOWLEDGEMENT

The author is thankful to Professor Hiren Das and Professor Amit Bhaduri and to Dr. B Achari for providing valuable information.

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