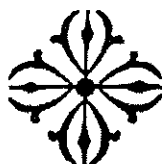


ANNUAL REPORT
OF
THE BOSE INSTITUTE
FOR
2001-2002



Bose Institute
93/1, Acharya Profulla Chandra Road
Calcutta-700 009

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CONTENTS

	Page
THE BOSE INSTITUTE	1
THE FOUNDER AND HIS STRUGGLES	1
MANAGEMENT OF THE INSTITUTE	3
SCIENTIFIC REPORTS	
BIOCHEMISTRY DEPARTMENT	5
BIOPHYSICS DEPARTMENT	7
BOTANY DEPARTMENT	8
CHEMISTRY DEPARTMENT	10
MICROBIOLOGY DEPARTMENT	12
PHYSICS DEPARTMENT	14
ANIMAL PHYSIOLOGY SECTION	16
ENVIRONMENTAL SCIENCES SECTION	17
IMMUNOTECHNOLOGY SECTION	18
PLANT MOLECULAR & CELLULAR GENETICS	18
LIST OF PUBLICATIONS	20
STUDENTS AWARDED WITH A PH.D. DEGREE	26
GRANTS-IN-AID SCHEMES	28
PARTICIPATION IN CONFERENCES, ETC.	35
SERVICE SECTIONS	
DISTRIBUTED INFORMATION CENTRE	40
J. C. BOSE UNIT AND MUSEUM	40
LIBRARY	40
MADHYAMGRAM EXPERIMENTAL FARM	41
PUBLICATION	42
WORKSHOP	42
R.S.I.C	43
SOCIALLY RELEVANT	44
LIST OF PERSONNEL	46
STATEMENT OF ACCOUNTS	51



The Bose Institute

The Bose Institute was founded by Sir Jagadis Chandra Bose in 1917 for the advancement of science and dissemination of knowledge. The Institute has served the nation for the past 85 years through its pursuit of advancement of knowledge in science and technology and by developing highly competent and able scientific manpower for the country. The Institute has on its staff highly qualified and experienced scientists working in Biological, Biomedical and Physical sciences placed in long established departments of Physics, Chemistry, Botany, Microbiology, Biochemistry and Biophysics, and the research sections on Plant Molecular & Cellular Genetics, Animal Physiology, Immunotechnology and Environmental Science. Besides, there are service centres like RSIC, DIC, Library, Workshop, etc. In addition, the Acharya J.C.Bose High Altitude Research Centre at Darjeeling and experimental field stations at Falta, Madhyamgram and Shyamnagar are parts of the Institute. The scientific infrastructure facilities available in the institute are also used by scientists from several universities and research centres in the country.

The Institute was started by a gift of Rupees four lakhs by the founder (invested in land, building and G. P. notes) and funds raised from public donations. The Institute is at present funded by the Department of Science and Technology, Government of India. As of March 31, 2002, the Institute had 142 research scholars (predoctoral and postdoctoral), 57 faculty members, 295 nonacademic employees, 182 pensioners, with an annual budget of Rs. 11.50 crores from the Department of Science and Technology. As elaborated on pages 28-34 of this report, the scientific research at this autonomous institute is additionally supported by about 74 grants-in-aid schemes awarded to various scientists.

The founder and his Struggles

Acharya Jagadis Chandra Bose was the first Indian to achieve international recognition in experimental science during the British rule. A physicist by training and profession, later turned into a plant physiologist. The Acharya made important contributions in electromagnetic radiation, verifying the laws of reflection, refraction and polarization of electromagnetic waves. Later on, he devoted much of his research on understanding the open problems involving life and non-life. His works on the response of living cells under external stimuli were ground-breaking and set the foundations of modern day biophysics.

In the *Life and Work of Sir Jagadis C. Bose* (Orient Longman, 1920) Patrick Geddes writes about Bose's early struggles, a lesser known chapter than his achievements in part :

Thrice armed with good degrees, from Cambridge and London in addition to the initial Calcutta one, young Bose felt it time to return to India, towards which not only family ties and homesickness, but increasing family cares as well, had long been straining him. ...Fortunately for him, Professor Fawcett the economist, then Postmaster-General, who had kept up an old acquaintance with Bose's much senior brother-in-law – the late Mr. A. M. Bose, afterwards a Calcutta barrister, and a man of much note and a leader of public opinion in his day, still

warmly remembered – wrote spontaneously, inviting him to call. After this Fawcett asked his colleague, Lord Kimberley, then Secretary of State for India, if he knew of any appointment in the Education Department ; but none was then intimated, so he could only advise him to go to home to India and see. Fawcett gave young Bose an introduction to Lord Ripon, then Governor-General, and this he presented at Simla on his journey home. The reception was of the kindest, and the Viceroy promised to nominate him for the Educational Service. ...

On reaching Calcutta Bose called on the Director of Public Instruction, who had already received, through the Government of West Bengal, a letter from Lord Ripon recommending him to them for an appointment. The Director was none too pleased, and blurted out, 'I am usually approached from below, not from above. There is no higher-class appointment at present available in the Imperial Educational Service. I can only offer you a place in the Provincial Service, from which you may be promoted.' Bose declined this offer. Noticing that Bose's appointment had not been gazetted, the Viceroy wrote to the Government of Bengal for an explanation of the delay. This pressure from above highly irritated the Director. When Bose saw him in answer to his letter, he told him that his hand had been forced, and he would offer him an appointment in the higher service, he would then consider the question of making his appointment permanent.

There was also a strong doubt, not to say prejudice, against the capacity of an Indian to take any important position in science. Intellectual acuteness in Metaphysics and Languages had always been frankly acknowledged, but it was assumed that India had no aptitude for the exact methods of science. For science, therefore, India must look to the West for her teachers. This view was accepted by the Government, and so strongly maintained in the Education Department that when Bose was appointed Officiating Professor of Physics in the Presidency College, its Principal protested against this appointment on the above grounds. ...

To begin with, the non-Indian reader must understand that while the Indian Civil Service is open to any Indian who can win his place by examination in it, and who thereafter is on the same scale of status and pay as his English colleagues, the Higher Education Service is accessible only by nomination ; and these posts, with extraordinarily rare exceptions, had not been given to Indians, even of the highest European qualifications. In general, the Indian professors, though of the very same duties and responsibilities, formed the 'Provincial Service', with much lower pay. ...

When Bose joined the service, an Indian professor's income, even if in the Imperial Service, was two-thirds that of a European's. (Bose succeeded later in getting this distinction abolished.) After entering on his duties, Bose found that this two-thirds pay was to be further reduced by one-half, since his appointment was only officiating. In other words, he was to get one-third of the pay normally attached to the office hitherto. ... As his protest was disregarded, he resolved never to touch the cheque received by him monthly as his pay ; and continued this for three years, with what privations accordingly need not now be entered into, save with a word of appreciation for his wife's brave acceptance of them. ...

After three years' work in this temporary post, both the Principal (Mr. C. H. Tawney) and the Director of Public Instruction (Sir Alfred Croft) came fully to realize the value of Bose's professional work ... In consequence ... Bose's appointment was not only made permanent, but with retrospective effect. He therefore received his full pay for the last three years in a lump sum, which was promptly made over to his father's creditors. ... But his future struggles were not to be for professional survival nor for family honour; and on his thirty-fifth birthday, November 30, 1894, he fully resolved that his life henceforth was to be dedicated to the pursuit of new knowledge. ...

Management of the Institute

The Bose Institute is a grants-in-aid autonomous institution under the Department of Science and Technology (DST), Government of India. It has a Governing Body with Shri Debabrata Bose as its secretary and nine other members including the Director. The management of the Institute is vested in the Bose Institute Council that has 18 members including the Secretary, DST, Govt. of India. The Institute also has a Finance Committee responsible for the financial policies and management.

Members of the Governing Body

1. Shri Sanjoy Sen (deceased on 31.8.2001)
2. Shri Debabrata Bose – Secretary
3. Prof. R. N. Chakraborty
4. Dr. (Mrs.) Debi Chakraborty
5. Prof. D. Banerjee
6. Prof. B. B. Baliga
7. Prof. S. N. Chatterjee
8. Shri Somnath Sanyal
9. Dr. A. Chatterjee
10. Prof. Parul Chakrabarti
11. Director, Bose Institute

Members of the Council

- | | | |
|--|---|---|
| <ol style="list-style-type: none">1. Shri Sanjoy Sen (deceased on 31.8.2001)2. Dr. A. Chatterjee3. Shri Debabrata Bose4. Prof. R. N. Chakraborty5. Prof. (Mrs.) Debi Chakraborty6. Shri Somnath Sanyal7. Prof. S.N. Chatterjee | } | <p>Nominees of the
Governing Body</p> |
|--|---|---|
8. Secretary, Department of Science & Technology, Government of India, or his nominee
 9. Director General, C.S.I.R. or his nominee
 10. Joint Secretary and Financial Adviser, Department of Science and Technology, Govt. of India or his nominee
 11. Representative of the Lok Sabha
 12. Principal Accountant General (A & E), West Bengal

13. Principal Secretary, Higher Education (nominee of the Government of West Bengal)
 14. Municipal Commissioner, Representative of the Calcutta Municipal Corporation
 15. Director, Bose Institute – Ex-officio
 16. Dy. Director, Bose Institute – Ex-officio
 17. Prof. Sandip Basu
 18. Prof. Asis Dutta
- } Two scientists from outside
West Bengal, nominated by
DST, Govt. of India.

Registrar, Bose Institute – Secretary

Invitees : 1. Representative of the Academic Council

2. Representative of Bose Institute Employees Association

Members of the Finance Committee

1. Shri Sanjoy Sen – (Representative of the Council) – Chairman (deceased on 31.8.2001)
2. Shri Debabrata Bose – (Representative of the Governing Body)
3. Joint Secretary and Financial Adviser to the Department of Science and Technology, Govt. of India or his nominee
4. Principal Accountant General (A & E), West Bengal
5. Director – Bose Institute, Ex-officio
6. Registrar - Secretary

Scientific report

Research Departments

Biochemistry

The department was created in 1974. Since its inception, the research activities of this department have been directed primarily towards an understanding of the process of gene expression in plants and bacteria. In the late eighties, these studies were continued using extensively the recombinant DNA technology, and several new research programmes were initiated including plant and animal biotechnology, yeast and parasite molecular biology, and structure-activity relationships of gene regulatory proteins.

Chromosome transmission in yeast (Prof. Pratima Sinha)

Faithful replication and segregation of chromosomes is essential for maintaining genome integrity. An analysis of the chromosome transmission mutants, *mcm16*, *mcm17* and *mcm19* has shown that they affect high fidelity chromosome transmission by affecting centromere function. The corresponding proteins, Mcm16, Mcm17 and Mcm19 have been shown to be localized at centromeres. Identification of newer members of the kinetochore proteins has started using Mcm17 and Mcm19 as baits in the yeast two-hybrid system. Mcm19 plays an essential role in meiosis I. The molecular mechanisms of action of these proteins are being studied.

Structure and function of tubulin (Prof. Bhabatarak Bhattacharyya)

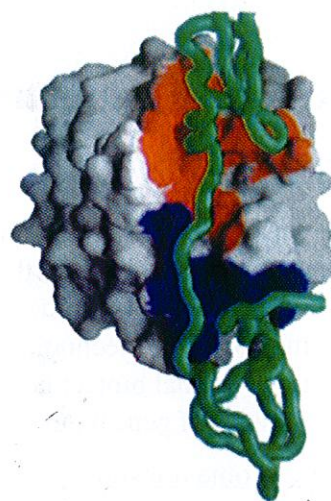
The eukaryotic cytoskeletal protein tubulin is a heterodimer of two subunits α and β and is a building block of microtubules. It was demonstrated previously from this laboratory that tubulin possesses chaperone-like activity. As an extension of this observation, we found that tubulin, like other known chaperones, also protect the biological activities of proteins against thermal stress, increase the yields of active proteins during refolding from a denatured state, in addition to its role in mitosis, cell motility and other cellular events.

Regulation of cell division cycle in *Entamoeba* (Dr. Anuradha Lohia)

Our earlier reports have shown that DNA duplication is uncoupled from cell division in *Entamoeba histolytica*. We have cloned amoeba homologs of eukaryotic genes which are known to 'licence' initiation of DNA replication. The Eh MCM 2-3-5 genes have been cloned and the recombinant protein expressed in both *E.coli* and yeast. The amoeba proteins were found to functionally complement the yeast mutants even though they lacked the N-terminal domains of the yeast proteins. Overexpression of these genes in amoeba have been carried out to study phenotypic changes. Double stranded RNA interference is also being done to knock out function of these genes in amoeba. Thus a detailed study of these genes and their functions may afford a better understanding of how DNA replication is regulated during uncoupled cell division.

Analysis of protein conformation and interactions (Dr. P. Chakrabarti)

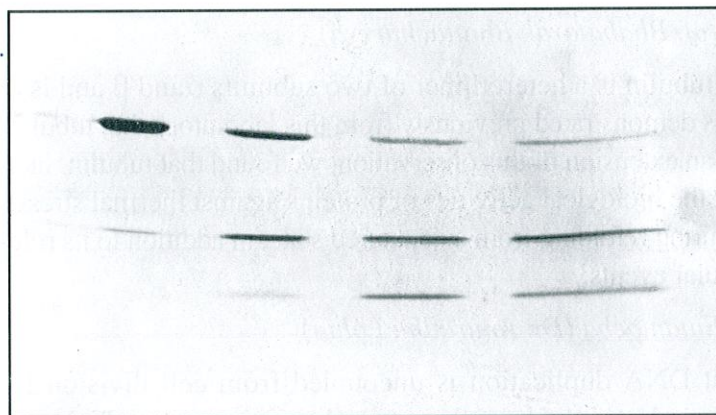
Various aspects of protein conformation, such as the effect of side chain on main-chain conformation, propensities of residues to occur in the disallowed region of the Ramachandran plot, etc. have been analyzed. Various non-bonded interactions, such as C-H $\cdots$ π , C-H $\cdots$ O, S $\cdots$ C=O, S $\cdots$ π , aromatic $\cdots$ aromatic etc. and their geometries have been elucidated; the results can be used for protein modeling and for the design of proteins and small molecule inhibitors. To carry out biological functions proteins need to recognize each other in a specific manner. The structures of protein-protein complexes have been analyzed to identify the physicochemical features of the recognition sites in protein structures. The results should be useful in identifying the surface of protein molecules that are used in binding other proteins, and eventually producing protein interaction maps in different organisms.



Two patches of thrombin in red and blue interact with ornithodorin in green

Autocleavage of λ cI repressor (Dr. R. Chattopadhyaya)

At the heart of the gene regulatory system of the double stranded DNA bacteriophage lambda is its 236 residue cI repressor. Upon a moderate dosage of ultraviolet light or other DNA



λ repressor (upper band) autocleaves into 112-236 (middle) and 1-111 (lower) fragments even when bound to operator

damaging conditions, cleavage of the regulatory protein happens at its Ala 111 - Gly 112 peptide bond. The pH-dependent, RecA-independent autocleavage has been characterized by various methods in our laboratory, and first order rate constants measured under various conditions of pH and temperature. It was found that this autocleavage occurs at a faster rate when cI is bound to operator DNA compared to the absence of operator DNA in

solution — a very surprising result. In the lysogenic state, the transcription of cI through P_{RM} has to be greater self-proteolysis determined in our experiments.

Proteins involved in the lysis-lysogeny decision in bacteriophage lambda (Dr. P. Parrack)

Of the several proteins associated with the lysis-lysogeny switch in bacteriophage lambda, we are studying the phage protein CII and some host factors. Cryo-crystallography led to 2.8Å X-ray

diffraction data on native CII crystals but suitable heavy atom derivatives could not be obtained. Synchrotron data on Selenium-methionine derivatives of the protein have been collected in an attempt to solve the structure by Multiple Anomalous Dispersion. The basis of instability of CII (a property crucial for its function) has been inferred from its flexible N- or C- terminal tails found susceptible to proteolysis. This tail may act as the initiation point of cleavage of CII by the HflB protease, known to degrade CII in vivo. In related studies, *E. coli* host proteins HflB, HflX, HflK and HflC, which play an important role in the lysis-lysogeny decision of phage lambda have been cloned in T7 and tac promoter-based overexpression systems as His-tag or GST-fusion proteins.

Characterization of the repressor of temperate mycobacteriophage L1 (Dr. Subrata Sau)

To study the lysogenic development of temperate mycobacteriophage L1, its putative repressor gene was cloned previously in a 1.4-kb *BamHI-SalI* DNA fragment. Recently, the fragment was sequenced, revealing an open reading frame encoding a 183 residue protein having 100% homology with repressor protein 71 of another temperate mycobacteriophage L5. This will lead to a better understanding of mycobacterial gene regulation.

Biophysics

This department was started in 1983 in the Centenary Building. The major theme of this department is structure, function and dynamics of biomolecules. Interests mainly centre on proteins, nucleic acids and small pharmacologically active compounds. X-ray crystallography, spectroscopic techniques and computer-aided modeling are extensively used to derive structural and dynamical information and its correlation with function. Several crystal structures of pharmacologically important molecules were solved.

Structure, function and engineering of aminoacyl-tRNA synthetases (Prof. Siddhartha Roy)

We have studied the role of zinc in Glutamyl-tRNA synthetase and found that it is important for recognition of the correct amino acid. We have created a chimeric synthetase of glutamyl- and glutaminyl-tRNA synthetase and expressed it successfully. We have studied ion and water release that occurs during the aminoacylation pathway and explored its implications for specificity. We have elucidated that non-cognate tRNAs bind to synthetases at a separate site which may be important for specificity in vivo. In separate transcription regulation studies, we have discovered that sigma32-DnaK interaction is temperature dependent. We have shown that lambda repressor is an asymmetric dimer and elucidated its role in the lambda genetic switch. We have cloned various transcription regulatory proteins from *M. tuberculosis*.

Molecular modelling, Drug design / drugs from Indian plants (Prof. Asok Banerjee)

In Biology, structures of biomolecules are inseparably connected with function. Structural and modelling studies of recognition in Protein-Protein, Protein-Nucleic acid, Protein-Inhibitor and various drug complexes are being studied critically. Our group is mainly interested in protease-inhibitor complexes which are involved in various disease states including Cancer, Asthma, Arthritis and AIDS. Many of these selected inhibitors are from native medicinal plants of India. Progress seems highly promising.

Structural studies of important proteins (Prof. Siddhartha Roy)

We have determined the NMR structure of a small indigenous protein and found that the protein has a defensin like structure. We have successfully developed in vitro transcription system and produced an important RNA from chandipura virus. We are currently studying its structure. We have elucidated important structural features of the regulatory domain of p53 and phosphorylated variants. We are currently studying NMR structure of an important regulatory protein, phd.

Aib-containing peptides (Dr. Gautam Basu, Prof. Siddhartha Roy)

Aib-containing peptides related to a native fragment of p53, potentially important for its possible anti cancer properties, were synthesized and their solution conformations were probed. The inclusion of Aib was found to substantially increase the helicity of the peptides. Further, it was shown that the designed peptides interacted with hdm2, the natural interacting partner of p53, with affinities comparable with native interactions. In addition, the Aib-containing peptide showed substantial stability against proteolytic degradation. The results strongly support the strategy of designing peptidomimetics with Aib as the starting helical scaffold.

Botany

The major research goal of this department established in 1917 is to improve crop production using conventional and modern techniques, where genes with elite characters, particularly those endowed with biotic and abiotic stress tolerance are identified and located in wild relatives, with an objective to incorporate those in cultigens of rice, *Brassica*, *Beta* and *Chenopodium* using breeding, tissue culture and genetic engineering techniques.

Improvement of medicinal plants through biotechnology (Dr. Sabita Bhattacharya)

Anti hepatitis activity of *in vitro* raised organs and tissues of *Phyllanthus amarus* (Bhui amla) has been studied. Root extracts of nontransformed as well as hairy roots established in liquid culture medium showed in vitro inhibition of binding between hepatitis B surface antigen (HBsAg) and its antibody (anti-HBs) and the percent inhibition was higher than those obtained with in vivo grown roots. Experiments on micropropagation and conservation of endangered medicinal plants are in progress.

Resistance against plant pathogens (Dr. Debabrata Basu)

The *Fusarium* wilt of tomato and *Alternaria* blight of oil-seed mustard are examples in yield loss due to biotic stress. Two different strategies have been taken to understand the resistance mechanism against the two microbes, as well as to develop resistant transgenic plants.

Identification of markers for water-stress in tea plants (Prof. Swati Sen Mandi)

A set of STS-primers was designed from the sequence of the water stress specific rice genomic gene *pws1 18*. These were used to amplify the tea genome. A STS-PCR product of ~550 base pairs was detected in drought tolerant tea clones. To determine the organization of this product, Southern hybridization experiments were conducted using it as a probe. Digestion by endonucleases EcoRI, Hind III and Msc I revealed bands corresponding to various sizes. In

a second study about flavour related enzymes in tea, the activity of β , D-galactosidase was found to be different between Darjeeling and Assam grown tea clones. In a third study, varietal difference in seed stability in rice indicated a correlation between seed vigour and DNA damage in the embryonic axis.

Pollen allergen and its significance in therapy (Dr. Swati Bhattacharya)

The airborne pollen of *Moringa oleifera* (Drum Stick), flowering in between the months of January and April was found to be allergenic as evidenced by skin prick reaction and IgE specific ELISA. In immunotherapy programmes of patients suffering from pollen allergenic rhinitis, determination of specific IgG subclasses (IgG4 and IgG1) was also considered for the study along with specific IgE.

Transgenic approach to delay fruit ripening (Dr. Dibyendu N. Sengupta, Prof. B. Ghosh)

To delay fruit ripening in tomato by inhibiting ethylene biosynthesis, tomato plants have been genetically engineered by introducing the cDNA for ACC synthase (enzyme for ethylene biosynthesis) in reverse orientation. The first generation of transgenic tomato showed extended vine life of the vegetable, enhancement of its red colour. However it has to be tested in the second generation as well.

Molecular analysis of Tikka Disease of ground nut (Dr. Dibyendu N. Sengupta)

Resistant and sensitive genotypes of ground nut, *Arachis hypogea*, obtained from Andhra Pradesh have been compared for their expression of first line of defence against biotic stress. Activities of superoxide dismutase, catalase, peroxidase were measured and the gene for the antifungal enzyme chitinase has been cloned by polymerase chain reaction.

Phenotypic, genotypic & physiological studies with some Fabaceae species (Prof. P. K. Saha)

In studies on *Tephrosia purpurea* and *Albizia procera*, in the successive F4 generation of the former showed that there is an increase in homozygosity (97 to 98.5%) of the seeds of F5 population. Peroxidase activity was measured as a cause of hardening of testa in *T. purpurea*.

Resource survey analysis of wild gene pool and their conservation (Prof. K. K. Mukherjee)

Survey and characterization of *Nypa fruticans*, a mangrove palm, indicated narrow genetic base due to localised distribution within Sunderbans. *Ex situ* conservation strategies for this endangered plant have been implemented.

Disease resistance in rice (Prof. Sukumar Gupta)

The presence of a 'susceptible' allele to bacterial blight disease in almost all (87/90) rice varieties examined and a new allele amplified at this locus in the remaining 3 varieties were found. Two types, Ashwani and Tulsi with stable reaction were selected after evaluation.

Improvement of aromatic rice (Dr. Tapas K. Ghose, Dr. S. Bhattacharya, Dr. S. Gupta Bhattacharya, Dr. S. Das)

We have collected around 250 rice landraces from different districts of West Bengal and have characterized the agro-morphology of 100 of the lines using 65 traits (Standard Evaluation System, IRRI). Our collection includes the "dual-seeded" landraces of Jugal and Dui-Satin.

Chemistry

The Chemistry department is one of the oldest departments of the Institute since its inception in 1917. Over the years the department has diversified its work keeping pace with the recent developments. At present the department has concentrated its work broadly on (i) chemistry of natural products, (ii) structure-function-interaction of proteins and (iii) medical biotechnology including drug targets.

Synthesis and reactions of condensed heterocycles (Dr. Manas Chakrabarty)

The synthesis of thiazolocarbazoles, a new class of heterocycles and of a bioactive sponge metabolite has almost been completed. Also, novel green synthesis of various di- and triindolylalkanes has been achieved by clay-mediated solvent-free reactions of indoles with various reagents.

Fatty acids in *Nasturtium* and *Cocos nucifera* (Prof. Prantosh Bhattacharyya)

Studies on fatty acid composition of different developing stages of *Nasturtium* and *Cocos nucifera* reveal that after a few days of flowering specific synthetase enzyme becomes very active for synthesis of specific fatty acid.

Cyclic AMP dependent protein kinase from bovine lens (Prof. P. C. Sen, Dr. Kali Pada Das)

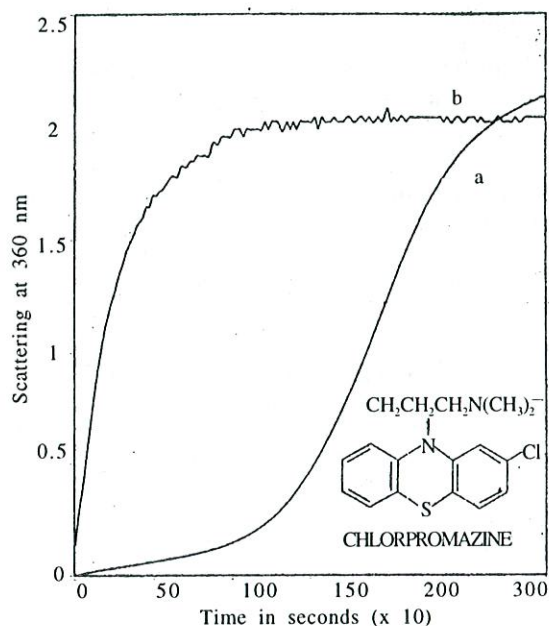
A protein kinase activated by cAMP containing both catalytic and regulatory subunits has been purified to homogeneity from bovine lens to explore its role in phosphorylation of lens protein and subsequent effect on the regulation of mechanism of cataract formation.

Endogenous modulator proteins of ATPases as contraceptive agent (Prof. Parimal C. Sen)

Modulator proteins of ATPases isolated and purified from mammalian brain extract are found to be effective as female contraceptive agent.

Protein folding and chaperones (Dr. Kali Pada Das)

In order to study the cause for the loss of function of α -crystallin as a chaperone, we are studying various factors that destabilize its structure. We are particularly interested in studying the role of phosphorylation on the chaperone activity of α -crystallin. We are also studying the role of enzymatic cleavage on the chaperone function of α -crystallin. In order to understand the role of the individual α A- and α B-chains of α -crystallin in the chaperone function, stability and reactivation of various enzymes, we are in the process of expressing and purifying recombinant α A- and α B-crystallin.



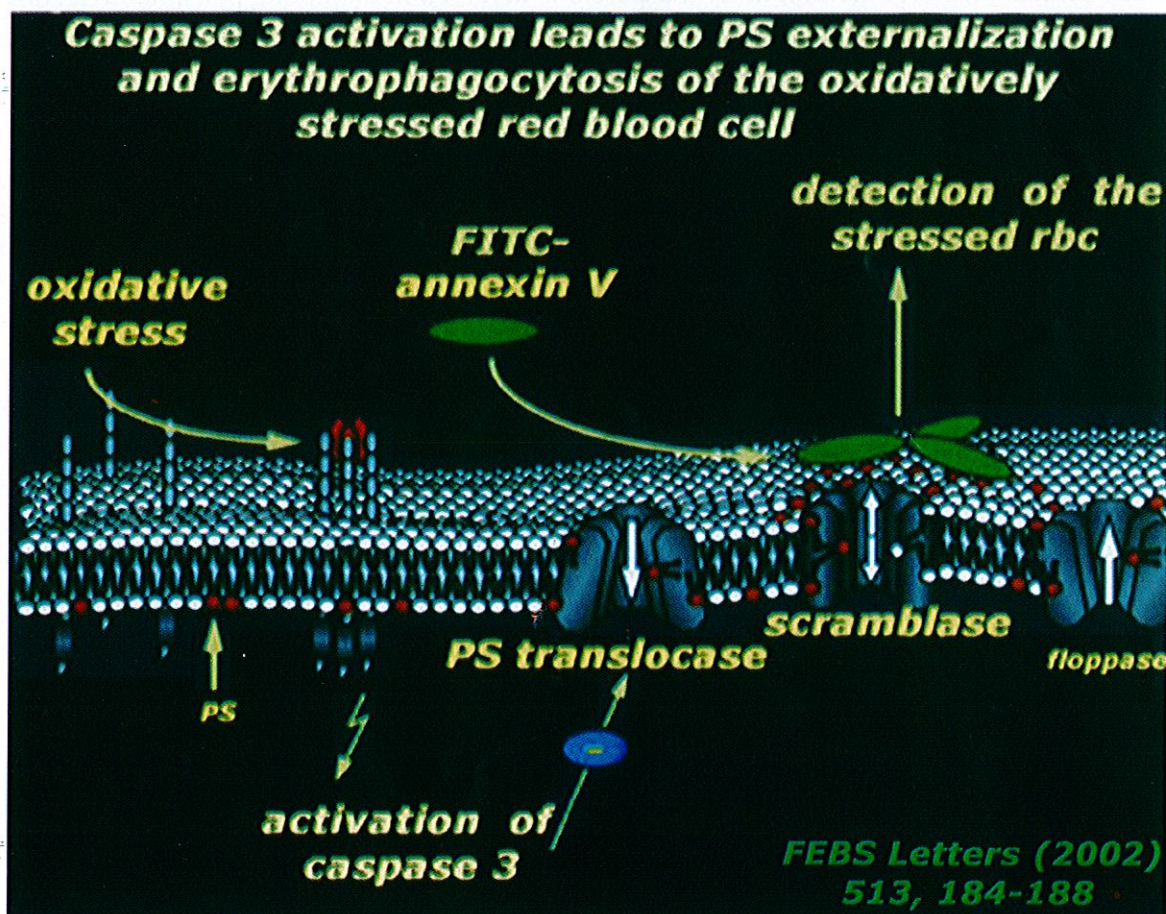
Kinetic traces of insulin B-chain aggregation at 360 nm in the presence of (a) 20mM DTT, and (b) 200 μ M chlorpromazine, whose structure is shown in the inset

Studies on hepatoprotective proteins from herbal sources (Dr. Paramesh C. Sil)

The soluble protein fraction from two different herbal sources has been shown to possess hepatoprotective activity against CCl_4 induced toxicity in mouse liver. The active principle behind this action has been purified from one source and partially characterized. Purification of the active principle from the other source is in progress.

Nematic textures in F-actin (Dr. Pradip Das)

Actin filaments, which are protein polymers occurring abundantly and ubiquitously in muscle and non-muscle cells, are known to form liquid crystal. Experimental and theoretical works have been undertaken to study actin liquid crystal organization in the vicinity of air and glass interfaces. In a parallel study, liquid crystal states of cholesterol esters are being studied to clarify their role in atherosclerosis.

Drug targets and drug resistance mechanisms in bacterial pathogens (Prof. P. Chakrabarti, Dr. J. Basu, Dr. M. Kundu)

Expression systems have been developed to elucidate the role of a lipid-transporting ABC transporter in drug resistance of mycobacteria. The role of efflux pumps in fluoroquinolone

resistance of *Vibrio cholerae* has been established. Novel interactions between C-terminal domains of the cell division proteins FtsZ and FtsW of *Mycobacterium tuberculosis* have been elucidated which may serve as points for therapeutic intervention.

Modulation of phagocyte signalling by bacterial pathogens (Dr. Joyoti Basu, Dr. M. Kundu)

The signaling pathways involved in chemokine/cytokine release on challenge of macrophages with *Mycobacterium avium* and *Helicobacter pylori* have been worked out. The role of MAP kinases in interleukin-8 release by *H. pylori* lipopolysaccharide and tumor necrosis factor- α by *M. avium* has been established.

Human red cell membrane (Dr. Joyoti Basu, Dr. Manikuntala Kundu)

The role of the aspartate-protease caspase 3 in regulating erythrocyte membrane function has been demonstrated for the first time. Caspase 3 is involved in disrupting phosphatidylserine asymmetry in the oxidatively stressed erythrocyte. The chloride / bicarbonate exchanger band 3 has been found to be a caspase 3 substrate, suggesting a novel role of caspase 3 in regulating erythrocyte function.

Microbiology

Started in 1942, this department is engaged both in basic and applied research. The research activities of this department address the problems in the areas of parasitic and bacterial infections, drug design and detoxification, plant-microbe and mineral-microbe interactions.

Controlling damage in tomato (Prof. Pran K. Chakrabartty)

Bacillus subtilis, *Bacillus circulans* and *Pseudomonas fluorescens* were identified to be biocontrol bacterial agents isolated in our laboratory against *Pseudomonas solanacearum*, the causative agent of bacterial wilt of tomato. Improved strains selected following passage through metabolites of *Pseudomonas solanacearum* elicited improved biocontrol activity against *Pseudomonas solanacearum* only, but not against *Erwinia herbicola*, another bacterium causing soft rot in tomato plants. The biocontrol strains also improved the percent germination of tomato seeds over untreated controls.

Biotransformation by microbes (Prof. Timir B. Samanta)

The purified penicillin amidase of *Alcaligenes* sp. was found to be a heterodimer. The 22 N-terminal residues of α - (23 kDa) and β - (63 kDa) subunits determined by automated Edman degradation were aligned with previously reported sequences and some positions were found to be conserved.

Evolution of pathogenic strains of *Vibrio cholerae* (Prof. Asoke C. Ghose)

Genes identical or related to the VPI and CTX elements of *V. cholerae* associated with their pathogenicity were found to exist in certain other species of *Vibrio* isolated from extra-human sources. Interesting variations were noted in respect to their association with other genes of those clusters providing useful information regarding the evolution of pathogenic strains.

Immunosuppression in visceral leishmaniasis (Prof. Asoke C. Ghose, Prof. P. C. Sen)

Immunosuppression associated with progressive visceral leishmaniasis is marked by an impairment of lymphoproliferative response to in vitro stimulation with leishmanial antigen, mitogen or even to the combination of phorbol myristate acetate and ionomycin. The impairment was attributable to down regulation of protein kinase activity, which could be reversed, at least partially, by protein phosphatase inhibitors. The deactivating cytokine TGF β , whose level was increased in experimental visceral leishmaniasis, appears to play an important role in the modulation of the T-lymphocyte activation process.

Biotechnologically improved biohydrometallurgy (Dr. Pradosh Roy)

With an aim to develop genetically engineered bacteria, suitable for application in extraction of metals from sulfidic ores, a novel *sox* (sulphur oxidation) operon identified last year in a newly isolated sulfur lithotrophic bacterium was further characterized by genome walking.

Replication and gene expression mechanisms in mycobacteria (Dr. Sujoy Das Gupta)

In order to obtain a better insight into the replication mechanism of mycobacteria, we are working with a small plasmid pAL5000, which replicates autonomously in various mycobacterial hosts. Our present goal is to investigate how the replication proteins RepA and RepB of plasmid pAL5000 interact with the origin of replication to set up a replication competent complex. Using a DNA binding assay we have demonstrated that while RepB can bind to the origin with low affinity, its activity is significantly increased when extracts of mycobacterial cells are added to the binding system. The results indicate a degree of cooperation between the Replication protein RepB and host cell factors.

In order to dissect the events associated with the thermal induction of a mutant mycobacteriophage L1 (L1c1ts) to a lytic mode leading to proliferation, we have taken up a proteomics approach towards identifying protein factors that are sequentially induced. Using two dimensional gel electrophoresis, we have resolved several spots that are exclusively present in cells in which the phage has switched over to the proliferative mode.

Development of drugs against tuberculosis has been taken up on an urgent basis globally. Our goal is to develop an inhibitor against a small protein – the 16 kDa protein of *M. tuberculosis*, the expression of which allows prolonged survival of mycobacteria even under adverse conditions such as drug treatment. The protein has been expressed in our laboratory and an assay system has been standardized for high throughput screening of drugs against this important protein. In addition search is in progress to identify inhibitory peptides from random pools of phage displayed peptides.

Ceramide signaling in visceral leishmaniasis (Dr. Subrata Majumdar)

In our investigations reported last year, it was revealed that the level of intracellular ceramide, a type of lipid (fat) molecule, was enhanced as a result of an in vitro leishmania infection of peritoneal macrophages studying the regulation of various protein kinases. Work in this was continued as regulation of excess ceramide may result in a therapy.

Biodegradation of phthalates (Dr. Tapan K. Dutta)

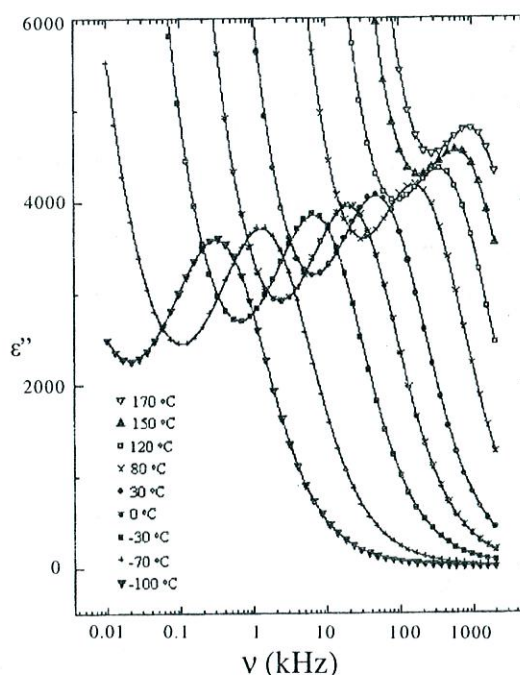
Phthalates are environmental chemicals in commercial products with detrimental effects on endocrine, reproductive and immune systems in human, wildlife and fish. To counter the phthalate associated environmental problems by microbial management, a number of soil isolates were found to be capable of using di-butylphthalate and butyl benzyl phthalate individually as carbon and energy sources. Hydrolysis of the diesters and further degradation of the phthalic acid and alcohols were ascertained from the products formed in spent media and resting cell transformation. Moreover, hydroxylation of the diesters is another side reaction in the degradation process.

Physics

This is one of the oldest departments, as the founder himself was a physicist and thus research in Physics has been carried out from the inception of the Institute till today. The main objective of this department is to improve our understanding of the basic laws of nature, in the realm of both macro and micro worlds. Current research programmes are in the areas of radiation physics, condensed matter physics and materials science, cross-disciplinary physics, high and intermediate energy physics, astrophysics, cosmology, foundational aspects of quantum mechanics, quantum information and communication. Ongoing research activities include theory as well as experiments.

Barium iron niobate - a new ferroelectric relaxor (Dr. Tripurari Prasad Sinha)

Ferroelectric relaxors are widely used in non-volatile memories, dynamic random access memories, microwave dielectrics, infrared sensors and eletro-optic modulators. Several material systems have been studied for these applications. Ferroelectric barium iron niobate ceramic, synthesized by a solid-state reaction technique was investigated for the first time. An analysis of the real and imaginary parts of the dielectric permittivity with frequency has been performed assuming a distribution of relaxation times. The temperature variations of both parts of the dielectric permittivity show broad maxima. One characteristic of relaxor ferroelectric is the appearance of a low frequency dielectric loss peak below T_M' in the ϵ'' versus $\log v$ plots as shown to the right.



The frequency dependence of ϵ'' for BFN at various T 's

Superheated drop detector for γ rays (Prof. S. C. Roy, Dr. B. Roy, Dr. B. K. Chatterjee)

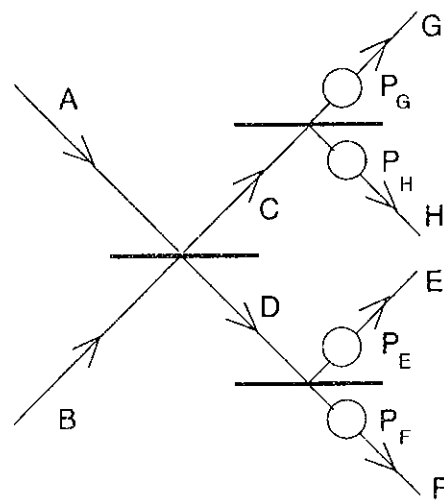
For determining the functional characteristics of an indigenously developed superheated drop detector made of R12, a halocarbon refrigerant liquid usually insensitive to gamma rays at room temperature, threshold temperatures for detecting different energetic gamma rays ranging from 59.54 keV to 1250 keV have been determined. Response of superheated drop detector made of R502, another halocarbon refrigerant to different gamma ray dose rates have been determined for dosimetric application of the detector.

Quantum antiferromagnets and strongly correlated systems (Prof. Indrani Bose)

A class of spin ladder models has been proposed for which the ground and the excited states can be determined exactly. The models are of interest as exact solutions of many body problems are difficult to obtain. The models exhibit the phenomenon of magnetization jumps and plateaus in the presence of an external magnetic field. Our ladder models provide a simple physical picture of the origin of magnetization plateaus.

Quantum mechanics, quantum entanglement and quantum communications (Prof. D. Home)

A very general and an arbitrarily efficient scheme for entangling the spins (or any spinlike degree of freedom) of two independent uncorrelated identical particles by a combination of two particle interferometry and which way detection is formulated. It is shown that the same setup could be used to identify the quantum statistics of the incident particles from either the sign or the magnitude of measured spin correlations. Our setup also exhibits a new form of complementarity between particle distinguishability and the amount of generated entanglement. This scheme therefore provides a powerful generic resource for producing entangled states which are crucial to quantum communications and computations.



A and B are the input paths, E, F, G and H are the output paths. P_E , P_F , P_G , P_H are absorptionless path detectors which do not disturb the spin

Cross-disciplinary physics (Prof. Indrani Bose, Prof. Siddhartha Roy)

Recent experiments at the level of a single cell have shown that gene expression occurs in abrupt stochastic bursts. Further, in an ensemble of cells, the levels of proteins produced have a bimodal distribution. In a large fraction of cells, the gene expression is either off or has a high value. A stochastic model of gene expression has been proposed the essential features of which are stochasticity and cooperative binding of the RNA polymerase. The model can reproduce the bimodal behaviour seen in experiments. A model of bacterial evolution has been proposed which explains the experimental results quite well.

Geometric phases in quantum and classical mechanics (Prof. Meher H. Engineer)

Observe a quantum object in any experiment and you always observe a particle. Ask : “How does it move when it isn’t being observed ?” and you may have to say, “It moves as a wave.” That is weird. But everyday objects never show this weird behaviour although they consist of quantum particles. David Bohm didn’t like these outright paradoxes. He came up with an alternative version that avoided them. So far, his version never predicted anything different from standard quantum mechanics. But the search goes on. I have investigated whether the geometric phase adds anything new to the story, by looking at the so-called classical limit, for simple, non-chaotic systems.

Standardization of transparencies for cosmic ray detection (Prof. S. Raha and Dr. S. K. Saha)

Standardization of commercially available Overhead Project Transparencies (OHPTs) is going on to establish a low-cost alternative to CR39, for detection of anomalous heavy ions in cosmic rays. Both CR39 (Intercast Europe Co., Italy) and OHPT (Gareware Polyester Ltd., India) sheets of same area were exposed to ^{252}Cf to observe the track quality and detection efficiency of both α -particles and fission fragments simultaneously in OHPT and CR39. The measured α : fission ratio from OHPT has been found to be comparable to that obtained in CR39.

Applied radioactivity (Dr. S. N. Changdar)

As reported last year, diffusion studies in liquids have been continued.

Spin observables in $\text{pd} \rightarrow \text{t}\pi^+$ and 3-body nuclear force (Dr. Swapan K. Saha)

Data collected for this reaction at 250 and 275 MeV at Indiana University are being analyzed.

Early universe and cosmological dark matter (Dr. Sanjay K. Ghosh and Prof. S. Raha)

Efforts have been devoted to investigate the role of confining phase transition occurring at the microsecond epoch after the Big Bang.

Research Sections

Animal Physiology

Established in 1930, the Animal Physiology section is mainly engaged in applied research related to Animal Biotechnology and Cancer Chemoprevention. In the early years significant contributions were made from various physiological studies on different types of spiders, ants, caterpillars, butterflies, tadpoles, fish and silkworms.

Endocrine manipulation for better production of small animals (Prof. Arun K. Ray)

Estradiol-17 β (E2), a vertebrate female sex steroid is naturally present in body fluid of silkworm, *Bombyx mori* L. It showed tremendous metabolic effect in various organs of the silkworm. Application of E2 at controlled doses at the 5th instar larval period effected to significant

improvement in the commercial parameters of silk fibre, such as cocoon shell weight, unbroken silk filament length, fineness of silk filament and number of reelable silk cocoons. A triploid (3n) variety of catfish, *H. fossilis* having 2.5 times higher growth rate than the normal (2n) counterpart, has been produced by application of cold shock to the fertilized eggs of normal variety. Although the triploid variety has high growth rate it fails to reproduce. It has been found that the sterility is due to failure of the triploid brain to produce appropriate hypothalamic factors to stimulate production of pituitary gonadotropin.

Thyroid hormone action in adult brain (Prof. Arun K. Ray)

Experimental evidences from our laboratory favour much a non-genomic action of thyroid hormone in adult mammalian brain, rather than genomic. We have found that thyroid hormone binds with the rat cerebrocortical synaptic membrane receptors and inhibits the membrane $\text{Na}^+ \text{K}^+ - \text{ATPase}$ and stimulates $\text{Ca}^{++} / \text{Mg}^{++} - \text{ATPase}$ activities with rise in intracellular Ca^{++} level and production of NO. Such changes are effected to regulation in the release of neurotransmitters. Any alterations in the plasma level of thyroid hormone that show changes in the psychobehavioral responses in humans are probably mediated through the above mentioned pathway. Phenyl hydrazine hydrochloride, an environmental pollutant affects thyroid gland by blocking secretion of thyroid hormone to plasma. It primarily damages hypothalamo-pituitary- thyroid axis and causes thyroid dysfunction.

Cancer chemoprevention (Dr. Gaurisankar Sa, Dr. Tanya Das)

We are actively engaged in finding out the mechanism(s) of anti-cancer activity of curcumin using breast cancer cells as an *in vitro* model. Curcumin could not block the expression of cyclin D1, the cell cycle progression regulatory protein, and hence the cyclin D1/Cdk4 / cyclin D1-Cdk6 complex as well as hyper-phosphorylation of retinoblastoma (Rb) protein required for entry of cells into the S phase. As the cells enter the S phase, curcumin forms DNA adduct in highly replicating DNA of cancer cells. DNA damage results ultimately in cancer cell death. Black tea has been found to kill tumour cells selectively by inducing apoptosis, inhibiting cell migration and ameliorating tumor-induced immunosuppression in the host.

Environmental Sciences

The section was created in 1992. During the last few years this section played a major role in monitoring various environmental pollution samples from different industries / foundries.

Studies of environmental pollution samples (Prof. M. Siddiqi (from 09.10.2001), Dr. N. Mandal, Prof. M. H. Engineer (till 08.10.2001))

Environmental Sciences section has carried out consultancy work regarding quality control, monitoring and control of environmental pollution at local and national levels. We have audited more than 85 industries / foundries in Howrah and Kolkata ; similar work has also been done at Santaldih Thermal Power Station, Purulia and Bandel Thermal Power Station, Hooghly. Environmental Sciences section earned Rs.7.51 lakhs in the last financial year as revenue.

Immunotechnology

The section was created in 1992. Major Research programs have been initiated in the fields of Molecular Microbiology and Immunology.

Phage induced modification of bacterial machinery (Dr. N. Mandal)

Bacteriophage induced modification and inactivation of host machinery is a well-known phenomenon. Based on this property many countries used phage therapy in the past to control bacterial diseases. We have taken an initiative in such an approach to study the molecular understanding of cholera phage ϕ 149 induced modifications and inactivation of host aminoacyl tRNA synthetase in classical *Vibrio cholerae* 154 as a model system. We have developed both *in vitro* and *in vivo* assay systems to study the molecular mechanism of phage induced modification of host aminoacyl tRNA synthetase.

Our goal is to understand the molecular mechanism of phage induced modification from structure-function study perhaps that would be able to design a new drug against bacterial disease especially for routinely used drug resistance bacterial disease.

Host virus interaction in *Penaeus monodon* or giant black tiger prawn (Dr. N. Mandal)

Shrimp aquaculture is one of the most important hard currency generating, job generating and better food quality development industries all over the world including India. However this industry is plagued due to recent outbreak of pandemic infection by many shrimp viruses. Among these, white spot syndrome associated Baculovirus (WSBV), is the most threatening in shrimp aquaculture in Asia. Our objectives are to find out the molecular interactions of early gene products with host immune system. Another goal is to develop microsatellite DNA markers to identify disease resistance population of *P. monodon* for generating disease free aquaculture of shrimp.

Plant Molecular and Cellular Genetics

This section was established in 1989 with an aim to study basic and applied aspects of plant processes through modern molecular approaches. The aims of the section are to produce high yielding crops with less input to fulfill the increasing demands placed on agriculture. The major emphasis has been given to identify the basic components coding for desirable traits through molecular approaches and its application using conventional breeding and genetic engineering technology.

Plant abiotic stress tolerance (Prof. Arun N. Lahiri Majumder)

The role of inositol pathway in abiotic stress tolerance in plants is under intensive study. The salt-tolerant inositol synthase from *Porteresia* (PINO1) has been completely characterized on expression in bacterial system. The gene has been introduced in tobacco plants and the inheritance and phenotype of the transformed plants with respect to tolerance and photosynthetic functioning under salt environment is under study. Attempts are also being made to introgress *PINO1* into

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rice and mustard plants. The putative salt-tolerance domain of *PINOI* gene is being worked out by various methods.

DNA markers in mung bean virus, cotyledon types and bamboo (Dr. Amita Pal)

Attempts are being made to identify the molecular markers linked to Mung bean Yellow Mosaic Virus tolerance from tolerant variety in an attempt to develop resistance / tolerance into the susceptible mungbean cultivar. In a separate study, a faster shoot regeneration protocol are being developed in bamboo shoots, which are otherwise with low seed variability and having long sexual cycles.

Expression of insect resistance and other useful genes into target crops (Dr. Sampa Das)

Crop protection from insect attack has been thought to be a considerable solution for increasing productivity. Sucking type of non insect pests and homopteran group of insect pests affect rice, mustard, chickpea, cotton and tea in a major way. Mannose binding plant lectins ASAL and ACAL, DEA and CEA were purified from *Allium sativum*, *Allium cepa*, *Diffenbachia sp* and *Colocasia sp* respectively. The effectiveness of these lectins to control the important pests, namely, mustard aphids, chickpea aphids, red cotton bugs and tea mites have been determined through insect bioassay using artificial diet supplemented with different doses of lectins. The binding of the lectin to the inner epithelial membrane of the insect gut have been documented. The receptor proteins of gut epithelial membrane vesicle of mustard aphid and red cotton bug, responsible for binding with lectins have been purified for further analyses.

Brassica crop improvement and low cost housing for mushroom cultivation (Dr. S. R. Sikdar)

Somatic hybrid plants between *Brassica juncea* and *Rorippa indica* have been developed with an aim to introgress different agronomic characters including aphid tolerance of *Rorippa indica* to *Brassica juncea*. Characterization of somatic hybrids is under way. Technology for building low cost house for mushroom production has been initiated at Madhyamgram Experimental Farm. The aim of this project is also to cultivate mushrooms like *Agaricus bitorquis* and *Pleurotus sp.* throughout the year.

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1. Ghosh, S, Bagchi S & Lahiri-Majumder, A N (2001) Chloroplast fructose 1-6 bisphosphatase from *Oryza* differs in salt tolerance property from *Porteresia* enzyme and is protected by osmolytes, *Plant Science*, 160, 1171-1181.
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DISTRIBUTED INFORMATION CENTRE

1. Gupta, S K & Ghosh, T C (2001) Gene expressivity is the main factor in dictating the codon usage variation among the genes in *Pseudomonas aeruginosa*, *Gene*, 273 , 67-70.
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1. Dey R, Banerjee T, Roy Chowdhury P & Chaudhuri S (2001) X-ray structure elucidation of 17 α -pregna-2, 4-dien-20-yne-(2, 3-d) isoxazole-17 β -ol. *J. Chem. Crystallogr.*, 31, 263-266.
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The above 79 publications represent those in refereed journals from Bose Institute during April 1, 2001 through March 31, 2002. Some have appeared more than once as their authors are in more than one department / section / unit. When these duplicates are removed, there are 74 in the above list. Book chapter are listed below.

BOOK CHAPTERS

1. Bose, I (2001) Low-dimensional Quantum Spin Systems in Field Theories, in *Condensed Matter Physics*, edited by Rao S, Hindustan Book Agency, New Delhi, pp. 359-408.
2. Gupta-Bhattacharya, S, Bhattacharya, K, Chakraborty, P, Bishayee, G C, Chowdhury, I & Chanda, S (2002) A contribution to the pollen-flora of tropical West Bengal as an aid to vegetational history and acrobiology, in *Perspectives of Plant Biodiversity*, edited by Das, A P. Bishen Singh Mahendra Pal Singh Publishers, pp. 437-450.
3. Chakraborty, A K (2002) Kolkata Academic Library Consortia : A Proposal for electronic resources sharing in the digital era, in *Proceedings of the National Conference on Information Management in e-libraries*, (26-27 February, 2002, IIT Kharagpur) edited by Parthan S & Jeevan V K J, Allied Publishers Ltd., New Delhi, pp. 547-555.

STUDENTS AWARDED WITH A PH. D. DEGREE

Name of Student (University, Year)	Department / Title of Thesis	Supervisor
Biochemistry		
V. M. H. Namboodiri (JU, 2001)	Purification , Biochemical Characterization and Crystallization of a lipase from <i>Aspergillus niger</i>	Dr. Rajagopal Chattopadhyaya
Prajna Mandal (JU, 2001)	Studies on mycobacteriophage L1-coded deoxyribonuclease	Prof. Nitai C. Mandal
Madhumita Basu (JU, 2001)	Regulation of the expression of <i>galK</i> gene in <i>Mycobacterium smegmatis</i>	Prof. Nitai C. Mandal
Chandrani Chattopadhyay (CU, 2002)	Studies on a <u>cis</u> - and a <u>trans</u> -specific gene regulatory element of the temperate mycobacteriophage L1	Prof. Nitai C. Mandal
Rajat Bhattacharya (CU, 2002)	Studies on the expression of late genes of mycobacteriophage L1	Prof. Nitai C. Mandal
Biophysics		
Sunanda Deb (JU, 2001)	Structural studies on cooperativity of Lambda repressor	Prof. Siddhartha Roy
Asok Kumar Pal (CU,2002)	A critical analysis of a cysteine protease and structural characterization of some organic molecules of biological importance	Prof. Asok Banerjee
Raja Dey (Guest worker) (CU, 2002)	Crystal structure and modeling study of some Biomolecules	Prof. Asok Banerjee (co-guide)
Chemistry		
Amiya Krishna Maiti (CU, 2002)	Studies on heterocyclic and organo sulfur compounds	Prof. Prantosh Bhattacharyya

**Name of Student
(University, Year)****Department / Title of Thesis****Supervisor****Microbiology**Anjan Pal
(JU, 2001)Studies on development of a potent
microbial β -lactam acylaseProf. Timir B.
SamantaAnupama Saha
(JU, 2002)Studies on the arsenic resistant bacterial
flora for the development of arsenic
detection biosensor in soil and waterDr. Pradosh
Roy**Physics**Asimkumar Ghosh
(CU, 2001)Dynamics of doped and undoped
antiferromagnetic systemsProf. Indrani
BoseUma Bhaumik
(CU, 2001)Study of anisotropic and frustrated
magnetic systemsProf. Indrani
BoseMala Das
(CU, 2001)Temperature dependence of neutron
induced nucleation of superheated liquids

Prof. S. C. Roy

Animal PhysiologyNilkanta Chakraborty
(CU, 2001)Responsiveness of adult brain synaptosomes
to thyroid hormoneProf. Arun
K. Ray**Immunotechnology**Amiya Ghosh
(JU, 2002)Protection and Reversal of Zidovudine
Induced Hematopoietic Toxicity by
Protein-A in miceProf. Prasanta
Ray**Plant Molecular and Cellular Genetics**Nitai C.Hait
(JU, 2001)L-myo-inositol- Phosphate synthase from
eukaryotic Sources : Biochemistry and
regulationProf.A.N.Lahiri
Majumder

GRANTS-IN-AID SCHEMES

Investigator / Co-investigator	Department / Title of scheme	Funded by
Biochemistry		
Prof. Pratima Sinha	Characterisation of MCM genes required for DNA replication and segregation in the yeast <i>S. cerevisiae</i> (Terminated on 31.07.2001)	CSIR
Prof. Nitai C. Mandal	Characterisation of operators and promoters of the temperate mycobacteriophage and construction of inducible expression vectors for mycobacteria	CSIR
Prof. Bhabatarak Bhattacharyya	Taxol and colchicine binding to tubulin : A Mechanistic study to understand tubulin-antimitotic drug interaction	DST
Dr. Pinakpani Chakrabarti	Analysis of interactions in helices in proteins and their use in the design of helical peptides	CSIR
Dr. Pinakpani Chakrabarti	Analysis of protein-protein association in crystals and complexes	IFCPAR
Dr. Anuradhha Lohia	Role of DNA replication licensing factors in regulating cell division in <i>Entamoeba histolytica</i>	DST
Dr. Anuradhha Lohia	Construction of yeast artificial chromosomes of <i>Entamoeba histolytica</i>	CSIR
Dr. Pradeep Parrack	Structural and Thermodynamic Studies on the Interaction of CII Protein of Bacteriophage Lambda with CII-dependent Promoters (Started on 20.08.2001)	CSIR
Dr. Anuradhha Lohia	Analysis of the <i>E.histolytica</i> genome (Started on 05.11.2001)	DBT
Prof. Pratima Sinha	Identification of novel components of the budding yeast kinetochore and determination of the roles of MCM mitotic kinetochore proteins in meiosis (Started on 01.02.2002)	CSIR
Dr. Subrata Sau	Studies on the host lethal gene of the temperate mycobacteriophage L1 (Started on 22.02.2002)	CSIR
Dr. Subrata Sau	A global study to identify, clone and characterize the essential genes affecting the growth of <i>M. smegmatis</i> and development of assay (Started on 27.03.2002)	DST

**Investigator /
Co-investigator****Department / Title of scheme****Funded by****Biophysics**

Dr. Gautam Basu	Solution NMR conformation of short peptides at low temperatures (Terminated on 31.03.2002)	TWAS, Italy
Prof. Siddhartha Roy	Exploration of Structure-Function Relationships of aminoacyl-tRNA synthetases through protein engineering techniques	CSIR
Prof. Siddhartha Roy	Spectroscopic studies of transcription initiation and regulation	DST
Prof. Siddhartha Roy	A study of structural effects of phosphorylation on the N-terminal domain of p53 (Started 01.08.2001)	DAE
Prof. Asok Banerjee	Biophysics Department Design and development of protease Inhibitors : A practical approach to blunt the protease, the Nature's Swiss Army Knife (Started on 03.01.2002)	CSIR

Botany

Dr. Swati Gupta Bhattacharya	Environmental biopollution and its impact on human health (Terminated 31.03.2002)	Dept of Environment & Forest, WB
Prof. Swati Sen Mandi / Prof. P. Bhattacharya	Potential in use of AFLP techniques in DNA fingerprinting and establishing of tea germplasm (Terminated on 31.03.2002)	DBT / Teaboard
Dr. Malobika Roy (CSIR Pool Officer)	Transgenic approach to study environmental stress tolerance in Indian rice (Transferred w.e.f. 28.02.2002 to IICB)	CSIR
Dr. Dibyendu N. Sengupta	Cloning of cDNA for DNA polymerase beta from rice for structure-function analysis	CSIR
Prof. Kalyan K. Mukherjee	Studies on iology and genetic diversity of <i>Nypa fruticans</i> from Sunderbans, India	DBT
Dr. Dibyendu N. Sengupta	Molecular analysis of Anti-fungal proteins to control Leaf-spot (Tikka) Disease of Groundnut	DAE
Dr. Dibyendu N. Sengupta	Isolation of Scaffold Attachment Region (SAR) from plants and development of inducible promoter for efficient expression in transformed cells or plants	DST (SERC)

Investigator / Co-investigator	Department / Title of scheme	Funded by
Prof. Bharati Ghosh	Molecular mechanism of polyamine induced plasma membrane stabilization and activities of membrane bound protein in salt tolerant and salt sensitive cultivars of rice (Started 21.05.2001)	CSIR (Emeritus Scientist)
Prof. Swati Sen Mandi	Characterization and improvement of tea through biotechnological tools (Started 01.11.2001)	DBT
Dr. Dibyendu N. Sengupta / Dr. P. Sil	Evaluation of delay of fruit ripening in transgenic tomato and banana plants and search for ripening specific genes from mango fruit (Started 08.03.2002)	DBT

Chemistry

Prof. Parul Chakrabarti / Dr. Manikuntala Kundu	Molecular basis of non-specific resistance in mycobacteria : role of efflux pumps (Terminated on 30.09.2001)	DBT
Dr. Joyoti Basu / Dr. Manikuntala Kundu	Molecular analysis of the functional role of palmitoylation of human erythrocyte membrane protein 4.2 (Terminated on 31.01.2002)	IFCPAR
Dr. Manas Chakrabarty	Synthesis of pyrrolocarbazoles, an emerging class of bioactive heterocycles (Terminated on 28.02.2002)	CSIR
Prof. Parimal C. Sen / Dr. Kalipada Das	Studies on the role of phosphorylation on the molecular chaperone function of α -crystallin and cataract formation	DST
Prof. Parul Chakrabarti/ Dr. Joyoti Basu	Drug permeation through the mycobacterial cell wall	DST
Dr. Manikuntala Kundu / Dr. Joyoti Basu	Mechanisms of beta-lactam resistance in <i>Shigella dysenteriae</i>	DST
Prof. Parimal C. Sen	Isolation and characterization of human semiosomal and sperm Calcium ATPases	DST- DAAD
Dr. Joyoti Basu / Dr. Manikuntala Kundu	Proteins of the cell wall synthesis and cell division machinery of mycobacteria: potential drug target sites	DST
Prof. Prantosh Bhatta- charyya / Dr. Parames C. Sil / Dr. Dibyendu N. Sengupta	Molecular analysis of the hepatoprotective protein identified from the leaves of <i>Cajanus indicus</i> L: Cloning of its cDNA and overexpression in cucumber fruit	CSIR

Investigator / Co-investigator	Department / Title of scheme	Funded by
Prof. Parimal C. Sen	Further characterization of protein kinase x (PKx) from goat spermatozoa (Started on 01.06.2001)	CSIR
Dr. Kalipada Das	Insights into the structure, folding and molecular chaperone function of α -crystallin (Started 01.07.2001)	CSIR
Prof. Parul Chakrabarti	Molecular analysis of some transporters of <i>Mycobacterium tuberculosis</i> (Started on 02.07.2001)	CSIR (Emeritus)
Dr. Joyoti Basu / Dr. Manikuntala Kundu	Modulation of host cell signal transduction by lipoarabinomannan from <i>Mycobacterium tuberculosis</i> (Started 01.08.2001)	DAE
Prof. Parul Chakrabarti / Dr. Joyoti Basu	The Drr A-B efflux system of <i>Mycobacterium tuberculosis</i> (Started on 01.11.2001)	DBT
Dr. Pradip Das	Experimental Determination of Suitability of Cholesteryl Oleyl Carbonate in Fluidizing Cholesteryl Oleate in Atherosclerotic Plaque (Started on 01.03.2002)	ICMR
Dr. Manikuntala Kundu / Dr. Joyoti Basu	Mechanisms of antibiotic resistance in enteric bacteria (Started on 01.03.2002)	CSIR
Dr. Joyoti Basu / Prof. Parul Chakrabarti / Dr. Manikuntala Kundu / Dr. Manas Chakrabarty	Genomics, proteomics and bioinformatics of some target genes of <i>Mycobacterium tuberculosis</i> for drug development (Started 01.03.2002)	ICMR
Dr. Manikuntala Kundu / Dr. Joyoti Basu	Host cell signaling in relation to <i>Helicobacter pylori</i> pathogenesis (Started on 15.03.2002)	ICMR

Microbiology

Dr. Sujoy K. Das Gupta	Understanding the mechanism of replication of the mycobacterium plasmid pAL5000 using an <i>in vitro</i> approach (Terminated on 31.03.2002)	CSIR
Prof. Pran K. Chakrabartty	Suppression of bacterial wilt of tomato and related crops caused by <i>Pseudomonas solanacearum</i> (Smith) in India making use of introduced microorganisms in the rhizosphere	ICAR
Prof. Asoke C. Ghose	Molecular characterization of a new variant of toxin coregulated pilus protein (TcpA) of <i>Vibrio cholerae</i> and evaluation of its role in the pathogenesis of cholera	CSIR
Prof. Asoke C. Ghose / Prof. Parimal C. Sen	Cellular and molecular mechanisms of immunosuppression in visceral leishmaniasis	DST

Investigator / Co-investigator	Department / Title of scheme	Funded by
Dr. Subrata Majumdar	Role of chemokines in host signal transduction and immunotherapy in experimental visceral leishmaniasis	CSIR
Prof. Timir B. Samanta	Enzyme reaction engineering : Synthesis of penicillins by immobilized β -lactamase free penicillin amidase in organic solvent under reduced water activity	DBT
Dr. Sujoy K. Das Gupta /Prof. Asoke C. Ghose	Generation of peptide mimics against the immunodominant lipoglycan / lipopolysaccharide antigens of <i>Mycobacterium tuberculosis</i> and <i>Vibrio cholerae</i> using phage display libraries and their evaluation as diagnostic and prophylactic agents	ICMR
Dr. Sujoy K. Das Gupta / Prof. S. Roy, Dr. G. Basu / Dr. P. Chakrabarti, Prof. B. Bhattacharyya /	Latent tuberculosis, New targets, drug delivery systems and bioenhancers and therapeutics	CSIR (NMTLI)
Dr. Sujoy K. Das Gupta	Investigation into the developmental expression of mycobacteriophage L1/L5 genes during the latent phase of growth using proteome analysis tools (Started on 01.04.2001)	CSIR
Dr. Pradosh Roy	Identification of genetic loci involved in sulfur oxidation : Genomics of sulfur lithotrophy (Started on 12.03.2002)	CSIR

Physics

Prof. S. C. Roy	Investigations on photon detector using Superheated liquid and development of an educational kit to demonstrate through sight and sound the radiation interaction with matter (terminated on 31.12.2001)	DST (WB)
Dr. T. P. Sinha	Vibronic Coupling Effect on Fe-Ions in Insulators	CSIR

Animal Physiology

Dr. Gaurisankar Sa	Intracellular signaling mechanisms of basic fibroblast growth factor-stimulated early gene transcription	CSIR
Dr. Tanya Das / Dr. Gaurisankar Sa	An approach to induce selective apoptosis in tumor cells without harming the normal cells of the host by black tea extract	NTRF
Dr. Garisankar Sa / Dr. D.W.Stacy (USA)	Proliferative signaling and topoisomerase II α regulation USA	NIH,

Investigator / Co-investigator	Department / Title of scheme	Funded by
Prof. Arun K. Ray	Identification of estradiol-17 β specific binding protein (receptor) in different organs of silkworm, <i>bombyx mori</i> L and study of its physiological significance (Started on 04.06.2001)	CSIR

Environmental Sciences

Prof. Prasanta K. Ray	Environmental Monitoring and Control of Air Pollution of Santaldih Thermal Power Station (Terminated in December, 2001)	WBSEB (Govt. of W. Bengal)
Prof. Prasanta K. Ray	Environmental Monitoring and Control of Air Pollution of Bandel Thermal Power Station (Terminated in July, 2001)	WBSEB (Govt. of W. Bengal)

Immunotechnology

Dr. Nripendranath Mandal	Development of Microsatellite DNA Markers for Shrimp to Identify Disease Resistant Populations (Started 01.10.2001)	DBT
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Plant Molecular and Cellular Genetics

Prof. Arun N. Lahiri Majumdar / Prof. Bharati Ghosh / Dr. Tapas K. Ghose	Metabolic engineering of inositol pathway in rice: Implications in the chloroplast functions (CPMB Phase II) (Terminated on 31.03.2002)	DBT
Prof. Arun N. Lahiri Majumdar	Plant Fructose-1-6-bis-phosphatase(s) : Regulation and expression during salinity stress in rice (Starting date, 18.02.1999)	CSIR
Dr. Amita Pal / Dr. Tapas K. Ghose	Development of PCR-based DNA-marker(s) Linked with MYMV-resistance in <i>Vigna mungo</i> (Starting date, 22.6.1999)	DBT
Dr. Sampa Das	Cloning of a new lectin gene from <i>Alium</i> Species in order to develop transgenic Aphid resistant plants (Starting date, 28.09.1999)	DAE
Dr. Amita Pal	Micropropagation of commercially important species and in vitro induction of precocious flowering (Starting date, 24.11.1999)	CSIR

Investigator / Co-investigator	Department / Title of scheme	Funded by
Prof. Arun N. Lahiri Majumdar	Identification of active site amino acid residues of eukaryotic L-myo-inositol 1-phosphate synthase-a biochemical and molecular approach (Starting date, 03.10.2000)	DST
Prof. Arun N. Lahiri Majumdar	Matrix assisted laser desorption ionization -time of flight, analysis of mammalian brain fructose-1,6-bisphosphatase (Starting date, June 2001)	DST- DAAD
Dr. Samir R. Sikdar	Generation of Spawn and fruiting body of edible mushroom and demonstration of the technology to the rural SC/ST population (Starting date, 16.10.2001)	DBT
Dr. Samir R. Sikdar	Development and characterization of somatic hybrid plants between <i>Brassica juncea</i> and <i>Rorippa indica</i> (Starting date, 01.11.2001)	CSIR
Dr. Sampa Das	Development of transgenic insect resistance Indian cultivar of chickpea (Starting date, 01.04.2001)	Indo-Swiss Collaboration

Participation in national conferences

Prof. Pratima Sinha (Biochemistry), **Dr. Anuradha Lohia** (Biochemistry) and **Prof. Arun N. Lahiri Majumder** (PMCG) all gave talks at the GRC meeting on or around December 18, 2001 at Orange City, Karnataka. Prof. Pratima Sinha also gave an invited talk at the meeting 'Yeast 2002' on February 15, 2002 at Jawaharlal Nehru University, New Delhi.

Dr. Pinakpani Chakrabarti (Biochemistry) was invited to deliver talks at a Workshop on Bioinformatics and its application, IIT, Kharagpur, September 28-29, 2001 and at a WHO Workshop on Telemedicine, Chittaranjan National Cancer Institute, Kolkata, February 23, 2002.

Prof. Bharati Ghosh (Botany) delivered an invited talk in a National Symposium on Plant biotechnology and Molecular Biology organized by the Plant tissue culture society and Delhi University, South Campus, during October, 2001.

Mr. Rajan Kumar Mishra (Botany) delivered a talk on "use of AFLP technique for DNA fingerprinting study of tea clones" in a National Symposium on Plant Genetic Resources and Management : Advances and Challenges, New Delhi, during August 1-4, 2001.

Dr. Manas Chakrabarty (Chemistry) delivered an invited Lecture entitled "Some recent findings on the chemistry of indoles" and Chaired a session on the 23rd December, 2001 at the 20th Annual Conference of the Indian Council of Chemists, held at Mysore University, Mysore during December 22-24, 2001.

Dr. Kalipada Das (Chemistry) gave an invited talk entitled: "Molecular chaperones – understanding of their structures and interactions" in the Physical Chemistry Section at the 38th Annual Convention of Chemists held at Jai Narain Vyas University, Jodhpur during December 26-29, 2001. Sri Sandipan Sarkar (Chemistry) presented a paper at the same Convention. **Dr. Kalipada Das** also delivered an invited lecture on "Structural aspects of molecular chaperones - a possible micellar connection" at the "National Conference on Self Aggregating Systems – Recent Advances" held at the Chemistry Department, Jadavpur University, on March 16, 2002.

Prof. Pran K. Chakrabartty (Microbiology) chaired a session in the national symposium in "Microbial Biotechnology and Applications" held at Department of Botany, Calcutta University on January 18, 2002.

Dr. Biva Roy (Physics) presented a paper in the "DAE-BRNS Symposium on Nuclear Physics" at Saha Institute of Nuclear Physics, Kolkata during December 26-30, 2001.

Dr. S. N. Changdar (Physics) presented a paper at the Solid State Physics symposium held at BARC, Trombay in December 26-30, 2001.

Prof. Indrani Bose (Physics) delivered invited talks at the Colloquium on Complex Systems Theory in the Department of Applied Mathematics, Calcutta University on February 14-15, 2002; Workshop on Mathematical Physics organised by the Department of Applied Mathematics, Calcutta University on March 11-13, 2002. **Prof. I. Bose** and **Prof. Parimal C. Sen** (Chemistry)

delivered talks at a National Workshop on Biologically Inspired Physics organised by the S. N. Bose National Centre for the Basic Sciences, Calcutta on March 18-21, 2002, while **Prof. Meher H. Engineer** (Physics) was a speaker in the summing-up session at that workshop.

Prof. Meher H. Engineer (Acting Director till October 8, 2001 and Physics) talked at a Rotary International Meeting on "Golden Rice" at Taj Bengal, July 10, 2001; was invited to the DBT Conference on Mangroves held in Port Blair, Aug 5-8, 2001; was invited by the Nehru Science Centre, Homi Bhabha Science Center, Worli, Mumbai, to act as a Judge for their National Science Seminar, September 3-6, 2001; was invited to participate in the National Children's Science Congress, Pune, December 26-31, 2001; on the topic "Indigenous Scientific Knowledge for a better tomorrow", in the DST Group Monitoring Workshop (PAC) meeting on Health Science, November 23-24, 2001 and in one day meeting on "Problems of the River Damodar", February 28, 2002.

Mr. Samir Kunkri and Mr. Debabrata Parihari of Physics each presented a paper in the "Fourteenth National Symposium on Radiation Physics" at the Dept. of Physics, Guru Nanak Dev University, Amritsar during November, 1-3, 2001.

Prof. Arun K. Ray (Animal Physiology), **Dr. Gaurisankar Sa** (Animal Physiology) and **Dr. Tanya Das** (Animal Physiology) delivered invited talks in the Physiology Section of the Indian Science Congress Academy in January, 2002 at Lucknow, Uttar Pradesh.

Prof. Arun N. Lahiri Majumder (PMCG) and **Dr. Sampa Das** (PMCG) participated and reported in the Annual Pulse Net Work meeting organised by Indo-Swiss collaboration in Biotechnology on October 2-4, 2001. They both participated and presented papers in the National Rice Biotechnology Network at Aurangabad on October 21-24, 2001. They both organized and lectured at the National Symposium on "Plant Physiology & Biochemistry in Transgenic Era and Beyond" at Bose Institute, December 1-3, 2001.

Dr. Samir R. Sikdar (PMCG) participated in the Indian Mushroom Conference-2002 held during March 6-7, 2002 at the Tamilnadu Agricultural University, Coimbatore, Tamilnadu and presented a paper on "Quantitative changes of Lignocellulosics in Paddy straw during cultivation of *Pleurotus sajor-caju*".

Invited talks delivered in India at various organizations

Dr. Rajagopal Chattopadhyaya (Biochemistry) delivered talks at the Indian Association for Cultivation of Science, Jadavpur on the occasion of a meeting held on September 28, 2001, to celebrate the birthday of late Prof. Kedareshwar Banerjee (1900-1975).

Prof. Dipankar Home (Physics) spoke at the India Habitat Centre, New Delhi on April 21, 2001 on "Emerging Vistas in Quantum Communications" in the 2001 Science Odyssey Lecture-Series organized by the Centre for Philosophy and Foundations of Science, New Delhi.



Professor M. Siddiqi, Director, Bose Institute invites Mr. Debabrata Bose, Secretary, Governing Body to inaugurate the Science Day exhibition in the main campus on February 28, 2002. Some assembled faculty members and institute staff, as well as school students who arrived for the Science Day celebrations, are also seen



Doctoral students explain a point to visiting school students on Science Day, February 28, 2002



Prof. Ramanath Cowsik, Director, Indian Institute of Astrophysics, Bangalor, pays his homage at the *Samadhi Mandir* of Acharya J. C. Bose on November 30, 2001. He delivered the 63rd Acharya J. C. Bose Memorial Lecture titled "The Birth and coming of Age of the Universe" on the occasion of the 85th Foundation day



Participants of the workshop "Modelling of Protein Structures and Interactions" with the Director on the lawn at the Centenary Campus

Prof. Arun K. Ray (Animal Physiology) delivered the “Prof. Anima Dutta Memorial Lecture” at Presidency College, Calcutta in February, 2002 whereas Prof. M. H. Engineer (Physics) spoke at the same college on “Newton’s derivation of Kepler’s laws” on March 13, 2002.

Prof. Arun N. Lahiri Majumder (PMCG) delivered invited talks at Madurai Kamraj University in November 17, 2001 and Bidhan Chandra Krishi Viswavidyalaya, Kalyani around September, 2001.

Symposia organized at Bose Institute

A National Symposium on Plant Physiology & Biochemistry in Transgenic Era and Beyond, held in Bose Institute, Kolkata, December 1-3, 2001. Dr. Dibyendu N. Sengupta and Prof. Prabir K. Saha acted as organizing secretaries of this symposium. Other than faculty members and students from the Botany department and PMCG section, many scientists from other organizations participated. There were a total of about 100 participants including scientists, teachers, research students, etc. in this symposium. It was supported by the Society for Plant Physiology and Biochemistry, New Delhi and the Plant Physiology Forum, Kolkata.

A workshop on “Modelling of protein Structures and Interactions” was organized by the Distributed Information Centre during February 27-28, 2002 with thirty registered participants from all over India and other unregistered attendees. Prof. Maqsood A. Siddiqi, Director, Bose Institute, inaugurated the workshop. In the post-genome era, structural bioinformatics has become a major field of scientific activity. The experimental procedure in determining actual three dimensional structures of proteins is relatively slow. Therefore, a major thrust is to determine the three dimensional structures of proteins in silico. The workshop covered some of the basic issues on protein structures and stabilizing interactions that are found in the native folds. Elaborate hands-on training was given on homology modeling using Insight-II, Sybil, docking using Gold and other software from Indian laboratories. Dr. Shekhar Mande (CDFD), Dr. K. Guruprasad (CCMB), Dr. Ansuman Lahiri (Calcutta University), Prof. Chabinath Mandal (IICB), Dr. Swagata Dasgupta (IIT Kharagpur), Dr. Francis Rodier (CNRS, Gif-Sur-Yvette, France) and Dr. Pinakpani Chakrabarti, Dr. Debjani Roy and Dr. Rajagopal Chattopadhyaya of Bose Institute gave talks at the meeting.

***Participation in international conferences or talks
delivered abroad***

Dr. Rajagopal Chattopadhyaya (Biochemistry) presented a poster at and participated in the 12th Conversation on Biomolecular Stereodynamics held at the State University of New York, Albany, New York, during June 19-23, 2001. He also delivered talks at the Scripps Research Institute, University of California, San Diego and University of California, Los Angeles during July 17-20, 2001.

Dr. Pinakpani Chakrabarti (Biochemistry) and **Prof. Asok Banerjee** (Biophysics) both spoke at an International Symposium on Crystallography and Bioinformatics in Structural Biology, held at the Indian Institute of Science, Bangalore, during November 22-25, 2001. Mr. Ajit Bikram Datta (Biochemistry) participated in the same and presented a poster.

Prof. Asok Banerjee (Biophysics) participated in the IVth Meeting of Asian Crystallographic Association international meeting during November 18-21, 2001 at Indian Institute of Science, Bangalore with his students and presented two posters.

Prof. Swati Sen Mandi (Botany) visited Nagoya, Japan for an International Conference on O-CHA (tea) to deliver an invited lecture on "Genome analysis and isozyme studies for molecular markers associated with drought tolerance in tea plant" on October 3-9, 2001. She also visited the Institute of Crop Science and Plant Breeding, Christian-Albrechts-University, Kiel, Germany for a study and research programme during October 15 to December 14, 2001, sponsored by DAAD, Germany.

Dr. Kalipada Das (Chemistry) gave an invited talk on "Microcapsules of α -lactoglobulin : possible application as a controlled release agent", at the *International Conference on Progress in Disperse Systems* held at Calcutta University during January 16-18, 2002.

Dr. Joyoti Basu (Chemistry) delivered talks in the 11th European Congress of Clinical Microbiology and Infectious Diseases, Istanbul 2001 during April 1-4, 2001 and in the 27th FEBS Meeting in Lisbon, during June 30-July 5, 2001. Dr. J. Basu (Chemistry) and Dr. Manikuntala Kundu (Chemistry) undertook a visit to the laboratory of Prof. Jean Delaunay, Hospital Kremlin Bicetre, Paris, France under a collaborative Indo-French project during September-October, 2001. Dr. J. Basu delivered a talk on "Caspases in the human erythrocyte" there.

Dr. Manikuntala Kundu (Chemistry) presented papers in the 11th International Workshop on Campylobacter, Helicobacter and Related Organisms, Freiburg, Germany, in September, 2001 and in the 3rd International Symposium on Antimicrobial Agents and Resistance, Seoul, South Korea, during April 12-13, 2001.

Dr. Tapas C. Ghosh (DIC) attended and delivered a talk on "Codon usage as a tool to predict the lateral gene transfer in genomes" at the "5th Anton Dohrn Workshop on natural selection and the neutral theory" held at Ischia, Italy, on October 24-27, 2001.

Honours Received

Prof. Pratima Sinha (Biochemistry) received the 'Pratima and Dr. Sucharu Chakravarty Samman' woman scientist of the year 2001, sponsored by the Pratima and Dr. Sucharu Chakravarty Charitable Trust, Yorkshire, England, as announced in *Current Science*, Vol. 82, No. 10 of May 25, 2002.

Dr. Anuradha Lohia (Biochemistry) received the Department of Biotechnology Woman Scientist of the year 2001 as advertised in *Current Science*, Vol. 81, No. 2 of July 25, 2001. She was chosen a member of the Medical Research Committee of CSIR for a period of three years starting 2001, a member of the RAP/SAC Committee of the National Institute of Immunology, New Delhi and a member of the Peer Review Committee of National Centre of Cell Sciences of Pune.

Dr. Pinakpani Chakrabarti (Biochemistry) was selected a member of the Programme Advisory Committee (PAC) in Chemical Sciences (Organic Chemistry) under Science & Engineering Research Council (SERC) of DST. He also reviewed papers for *J. Amer. Chem. Soc.*, *Protein Science*, *Acta Crystallographica* (Section D).

Prof. Prabir K. Saha (Botany) has been elected an editor of the journal *Plant Cell Biotechnology and Molecular Biology*.

Prof. Arun N. Lahiri Majumder (PMCG) became member in the Guha Research Conference in December, 2001.

Dr. Tapas C. Ghosh (DIC) was awarded a Biotechnology Overseas Associateship by the Department of Biotechnology during 2001.

Service Departments

Distributed Information Centre

The Bioinformatics Centre of Bose Institute started in 1988 as one of nine Centres under the Biotechnology Information System (BTIS) programme of the Department of Biotechnology, Government of India, with genetic engineering and molecular modelling as major thrust areas. The centre has become the main source of information related to bioinformatics and its dissemination in eastern India. The centre works as the backbone of the research and development activities in various fields, like genetic engineering, macromolecular crystallography and nmr molecular modeling, etc.

The main areas of research using this facility are genome analysis, molecular modeling, plant genomics and proteomics, protein folding and threading, and biomolecular structure and recognition. A workshop on "Modelling of protein structures and interactions" was organized by this centre on February 27-28, 2002 and is described on page 37 of this report in further details.

J. C. Bose Unit and Museum

During the year, a good number of visitors both from India and abroad including Prof. R. J. Strasser, University of Geneva, on August 1, 2001 and Prof. M. Nakajima, Kyoto, Japan, on February 22, 2002, visited.

The J. C. Bose Unit and Museum furnished information regarding Acharya J. C. Bose and his works to various organizations, eminent persons and common men on request.

Special displays in the Museum were organized on the Foundation Day of the Institute (November 30, 2001) and on Science Day (February 28, 2002).

Mr. Dibakar Sen, in-charge, delivered the "Labanya Manjari Memorial Oration" at the Jadavpur University Campus, organized by the National Council of Education, W. Bengal, on December 30, 2001. He also delivered a lecture as a part of a training programme on science communication and media practice, organized by the Indian Science News Association on July 24, 2001.

Library

The Bose Institute Library was established in 1917 by Acharya J. C. Bose in the main campus. A Wing of the Library has been opened at Acharya J. C. Bose Centenary Building in 1983 with reading and lending facilities, now also a library. Taken together, the Institute Library system is one of the best Science Reference Libraries in Eastern India. The Library is primarily meant for use of research staff / faculty members of its ten departments / sections. It is also frequently used by many research scholars / faculty members of the eight Universities of West Bengal including School of Tropical Medicine, Medical Colleges, Indian Institute of Chemical Biology, Central Glass and Ceramic Research Institute and many other research institute located in and around Kolkata.

Presently, the library is open from 9.45 A.M. to 6.15 P.M. on weekdays [Monday to Friday] in both campuses.

Library contains 33,638 [22,746 Bound journals + 10,592 Books + 300 Theses] volumes of Books/Journals/Theses] upto 31.03.2002. Total number of periodicals subscribed (foreign + Indian) were 75 during this year due to paucity of funds, whereas in the recent past as many as 114 were subscribed. During the year, 3025 readers used the Library for their reference work, 76 permission cards were issued to the outside readers. Under Inter Library Loan system books / journals were issued to other institutions and also books / journals were taken on Loan. Some 838 bound volumes of books / journals and 4236 loose periodicals were issued by our research scholars and faculty members throughout the year for their reference work. Total 1,52,795 copies of photocopying (Xerox) services were given to our faculties and also outside users from other institutions.

The library has started online service for the faculty members and research scholars. This year, library has subscribed to BMN Reviews, which is online full-text service of all *Current Opinion* and *Trends*, core supplements to those and review articles from all other Elsevier Life Science Journals. The *Current Opinion* full text journals include those in *Biotechnology*, *Cell Biology*, *Chemical Biology*, *Genetics & Development*, *Immunology*, *Microbiology*, *Neurobiology*, *Pharmacology*, *Plant Biology* and *Structural Biology*. The *Trends* in ones are in *Biochemical Sciences*, *Biotechnology*, *Cell Biology*, *Cognitive Sciences*, *Ecology & Evolution*, *Endocrinology and Metabolism*, *Genetics*, *Immunology*, *Microbiology*, *Molecular Medicine*, *Neurosciences*, *Parasitology*, *Pharmacological Sciences*, *Plant Science* respectively. It is now possible to login into this service (<http://reviews.bmn.com>) from either campus and download articles of choice from the above mentioned journals.

Library has started its computerization activity since September, 2000. Till date library has created following databases (i) Theses : Database of Thesis at BI Library, (ii) BIL-JR : Database of Journal holdings at BI Library (iii) Books.

Eight Pentium IV computers were acquired for the library during this period.

Madhyamgram Experimental Farm

Experimental crops and plants were grown in a total of 4 acres of land during the year. The crops and plants included the following: rice, *Brassica*, *Rorippa*, mung, palang, pointed gourd, snake gourd, *Ipomea*, *Tephrosia*, castor, bamboo, arhar, gram, groundnut, and tomato. A number of micropropagated medicinal plants including *Andrographis*, *Rauwolfia*, *Costus*, *Abroma*, *Withania* were established in the field and grown to maturity. A demonstration medicinal garden is being maintained since 1999. More than 100 species of different medicinal plants are being maintained from the year 1999-2000 in the form of a demonstration garden funded by ICAR. A large number of micropropagated plants have been established and are being maintained in the field.

Technology for building low cost house for mushroom production has been initiated at Madhyamgram Experimental Farm. The aim of this project is also to cultivate mushrooms like *Agaricus bitorquis* and *Pleurotus* sp. throughout the year. A Rural Biotechnology Laboratory and Seed Storage Facility have been initiated.

Publication

Since its inception in 1980 the Publication Section has been doing all sorts of publications from this institute i.e. *Transactions* of the Bose Research Institute ; Annual Report (both English and Hindi versions) ; Memorial Lectures ; Director's Report ; Folders ; Posters and Leaflets of different Symposia, Seminars and Training Programmes ; and works of Sir J. C. Bose. Beside these Publication Section provides photocopying facilities to the staff members of both the Campuses of the Institute.

M/s. Das Gupta & Co. Private Limited, 54/3, College Street, Calcutta 700073 has been appointed as sole distributor of our publications. The following books are available for sale from their counter.

J. C. BOSE AND MICROWAVES - A COLLECTION	RS.	200.00
SCIENCE AND SOCIETY - REFLECTIONS	RS.	1050.00
J.C. BOSE - A SCIENTIST AND A DREAMER		
VOL. I	RS.	1250.00
VOL. II	RS.	1250.00
VOL. III	RS.	600.00
VOL. IV	RS.	1500.00
VOL. V	RS.	550.00
PATRABALI	RS.	150.00
ACHARYA JAGADIS CHANDRA BOSE	RS.	12.00

Workshop

The Workshop of Bose Institute consisting the following units for maintenance, repair and fabrication of different instruments as needed. The units are as follows :

Units	Requisition receipts	Job discharged	Continuing job
Mechanical	146	80%	20%
Electrical	839	95%	5%
Carpentry	55	90%	10%

Units	Requisition receipts	Job discharged	Continuing job
Refrigeration	152	100%	10%
Glass blowing	50	100%	Nil
Drafting	21	100%	Nil
Electronic	83	100%	Nil
Lecture and Seminars Attended	270	100%	Nil

Regional Sophisticated Instrumentation Centre

The Regional Sophisticated Instrumentation Centre has continued to provide instrumental and consultancy services to the scientific and industrial communities of the region. With the release of some maintenance grants from DST, efforts are being made to recommission some of the instruments that have been lying out of service for some time. Particularly the single crystal X-ray diffractometer (0 sample), Mass Spectrometer (3 samples) and Transmission Electron Microscope (8 samples) yielded no or little output ; the number of HPLC samples went down to 25 samples from 301 in the previous year. Only the Fluorescence Spectrometer saw an increase from 105 samples last year to 316 this year, while the Atomic Absorption Spectrometer had about the same number as last year. Efforts are continuing to obtain funds to replace some of the older instruments — in particular the Scanning Electron Microscope — with new state-of-the-art models. The services of the technical staff of RSIC have also been requisitioned in the maintenance of instruments in various departments of the Institute.

Name of Instrument	No. of samples		Revenue Earned (Rs.)
	Internal	External	
Atomic Absorption Spectroscopy	32	1225	71,850
Electron Paramagnetic Resonance Spectrometer	0	26	1,300
Fluorescence Spectrophotometer	276	40	12,920
Gas Liquid Chromatograph	0	51	2,750
Mass Spectrometer	1	2	600
Transmission Electron Microscope	0	8	800
Single Crystal X-Ray Diffractometer	0	0	0
High Pressure Liquid Chromatograph	25	0	3,900

Social relevance of some research performed at Bose Institute

The projects undertaken in Animal Physiology have great relevance for improvement of commercially important aquacultural products, vis-à-vis improvement of socio-economic condition and drug development from herbal sources for cancer.

The structural study of protein, nucleic acids and compounds extracted from Indian medicinal plants / herbs are characterized for knowledge and their activity for effective drug design for the benefit of humanity.

Relevant areas include crop improvement and plant biodiversity conservation. Under crop improvement, one is the development of basmati-quality long grain aromatic rice of wider adaptation, cultivation of which will uplift the economic status of farmers in the Gangetic plains, understanding the mechanism of stress tolerance and plant quality improvement through cell-molecular studies / transgenic approach, which in turn will allow us to grow crops in drought prone and saline coastal areas. For conservation of medicinal and other economically important plants with special emphasis on endangered species, micropropagation protocols have been evolved; appropriate technology for some of the plants has already been transferred to the Department of Science and Technology, Govt. of West Bengal. A survey of wild gene pool for conservation of valuable plants growing particularly in Eastern India was done in the native region, in the field away from the native area or tissue culture in the laboratory for gene banking. Environmental issues with reference to airborne pollens and fungal spores causing allergy and respiratory diseases are being extensively studied for diagnostic and therapeutic uses. Faculty members also participate in training programmes aiming at human resource development in latest technologies important in resource generation in an era of global IPR regime and bio-patenting. For protection of bioresources, characterization of important plant species through DNA fingerprinting is a major thrust area of the department.

Many of the diverse activities are aimed at understanding diseases and development of their remedies. Thus, work is being carried out on the search for mainly hepatoprotective substances, on the development of green chemical syntheses of mainly heterocyclic drugs, on drug-targeting in the fields of tuberculosis and dysentery, on small proteins involved in the regulation of fertility, on eye-lens proteins to understand the mechanism of cataract formation and on biomolecules such as cholesterol esters and F-actin for the prevention of atherosclerosis and muscle atrophy.

To improve plant productivity and crop yield works on biocontrol of plant diseases have been undertaken. In health related aspects, attempts are under way to develop diagnostics and detection of tuberculosis. Characterization of cholera-causing epidemic strains as opposed to non epidemic strains is being carried out for better understanding and prevention of cholera. Signal transduction mechanism during leishmaniasis is being studied to provide protection against the disease. Microbial biotechnological process for the utilization of lower grade ores and minerals has been studied.

This process is environment friendly and economically viable compared to the chemical process in metallurgy.

Superheated Drop Detector (SDD) technology has been transferred to two National Laboratories, the Defense Research Laboratory, Jodhpur and the Indira Gandhi Centre for Atomic Research, Kalpakkam. Three 'Pressure Reactors' and three 'Measuring Devices' have been fabricated in our workshop with guidance from our faculty and sent to the Defense Research Laboratory, Jodhpur for their work on SDD. Measured AC susceptibility of stainless wires for M/s. N. B. Fasteners, dielectric constants of some ACCI paints and solvents for M/s. IEL Limited, noise levels generated by an industry near a residential neighbourhood at Rajpur, 24 Parganas, WB. Studies on Quantum Entanglement have possible applications in secret information transfer.

Through different research programmes, attempts are being made of quality improvement against biotic (viral- and pest- resistance) and abiotic (salt tolerant) stresses in rice, mustard, chickpea and urd bean. Molecular understanding of mechanism of halotolerance has been developed and tolerant genes are being incorporated in rice and mustard to increase crop production. In another study, tissue culture technique is being adapted to circumvent the problems inherent in the traditional bamboo propagation method. Technology for the mushroom seed (spawn) and fruit-body production is being developed which will help to develop entrepreneurship through training of the SC/ST community.

List of personnel

Administration

Prof. Maqsood A. Siddiqi (Director, from 09.10.2001), Prof. Meher H. Engineer (Acting Director, till 08.10.2001)

Birendra N. Singh (Registrar)

T. K. Ghorui (Deputy Registrar)

Kajal Chaudhuri (Asstt. Registrar I), R. K. Kundu (Asstt. Registrar II), Debidas Saha (Asstt. Registrar III w.e.f. 01.07.2002), Satyananda Pal (Accounts Officer), R. N. Bhattacharyya (Audit & Finance Officer, retired on 31.01.2002), Shakti P. Shit (Audit & Finance Officer, w.e.f. 01.07.2002)

Supporting Staff, Centenary Campus : PAs to Director : Arup K. Sengupta, Sankar Nath Sinha (w.e.f. 03.04.2002); Accountants : P. K. Barman, T. Mukherjee, S. Kar, S. Sen, A. Chakraborty, P. C. Das ; Cashier : T. Chakraborty ; Office Superintendents : Ankur Dutta, M. S. Mitra, Amit K. Ghosh, Nikhilesh R. Ghatak ; Others : E. Pal, S. R. Chaudhuri (VRS on 28.02.2002), Swapan K. Sinha, Dhrubajyoti Sen, Sujit K. Ghosh, B. K. Mondal, M. C. Das, Rita Nath, Sisir Chakraborty, Baladeb Goswami, Rubi Sarkar, Sudam Jana, Rina Das, Somnath Das, Sujata Roy, Sukumar Das (VRS on 31.05.2001), S. Chatterjee, R. C. Sarkar, Dipak Dutta, C. Rangwa, K. Sur, T. K. Banerjee, K. Turi, S. Suri, K. Basar Molla, N. Yadav, K. Ansari, Kanai Hazra, Prafulla Bhunya, Nemai Das, Kanak Baran Hazra, Duryodhan Nayak, Bablu Mandal, Sukanta Chakraborty, Subrata Banerjee, Dulal Turi, Amarnath Hela, Ranjit Das, Sukumar Mandal, Bulaki Das, Kamala Turi, Sanat K. Dhara (Plumber w.e.f. 18.09.2001), Thakur Gond, Rajbrat Ram, Kasinath Pal (absent from 09.07.2001 till date), R. R. Pandey, P. K. Mullick, R. Chakraborty, S. K. Chaki, D. Koley, A. Bhowmik, Sanjib K. Das (transferred to Institute Research Scholars' Hostel w.e.f. 28.09.2001).

Supporting Staff, Main Campus : Arun Kumar Das Gupta, Dibakar Sen, Rina Roy, Rabindra Nath Karmakar, Ramani Kanta Jana, Chandra Kanta Sasmal, Tarun Chakraborty, Sarada Devi, Sanat Kr. Dey, M. N. Shee, Santosh Kr. Patra, Jubaraj Paul, Harekrishna Thoyal, Madhusudhan Marick, Fulchanda Sardar, Kalicharan Turi, Kissan Das, Munna Turi, Kodan Das, Sk. Kalu, Md. Eliash, Sm. Manju Turi, Rajkamal Balmiki.

Animal Physiology Section

Faculty* : Prof. Arun K. Ray (Head), Dr. Gaurisankar Sa, Dr. Tanya Das

Students** : Dr. Mitali Pramanik, Suman Pal, Tathagata Choudhuri, Mrs. Sreya Chattopadhyay, Puspita Sarkar (up to 30.11.2001), Ramendranath Saha (up to 30.11.2001), Sumedha Ray, Angshuman Biswas (From 17.04.2001), Mrs. V. Subbulakshmi (from 01.06.2001 to 31.12.2001), Jhuma Dey (from 04.06.2001), Arimdam Bhattacharya (from 13.07. 2001), Antara Banerjee (from 12.07. 2001 to 31.12.2001), Samita Kundu (from 27.07.2001)

Supporting Staff : Indrajit Ray, Sujit K. Ghosh, Narayan Ch. Jana (up to 30.06.2001)

Biochemistry Department

Faculty : Prof. Pratima Sinha (Chairperson), Prof. Bhabatarak Bhattacharyya, Prof. Nitai C. Mandal (Emeritus Scientist), Dr. Pinakpani Chakrabarti, Dr. Anuradha Lohia, Dr. Rajagopal Chattopadhyaya, Dr. Pradeep Parrack, Dr. Subrata Sau.

* Faculty : a collective term for Lecturers, Senior Lecturers, Readers and Professors.

** Students : Includes Research Scientists/Research Associates/Post docoral Fellows/Pool officers/Senior Research Fellows/Junior Research Fellows.

Students : Anasuya Ganguly (till 06.11.2001), Tapas Kumar Manna, Sujata Hajra, Rajashri Bhattacharyya, Rima Chattopadhyay, Paromita Roychowdhury (till 27.08.2001), Shubhra Majumder (from 18.12.2001), Sulagna Banerjee, Suchismita Das, Santanu Kumar Ghosh, Taradas Sarkar, Ajit Bikram Datta, Lipika Pal, Suvroma Gupta, Dr. C. Ganesh Kumar (till 22.09.2001), Ranjit Prasad Bahadur, Doyel Mitra (till 09.01.2002), Promita Roy (from 07.05.2001), Rudra Prasad Saha (from 25.07.2001), Dipak Dutta (from 25.07.2001), Gopa Mitra (from 25.07.2001), Sudeshna Lahiri (from 06.08.2001), Mithu Banerjee (from 27.08.2001), Chandrama Mukherjee (from 05.09.2001), Bhaskar Dasgupta (from 10.10.2001), Gursharan Kaur (from 19.11.2001), Pamela Ghosh (from 19.11.2001), Phuljhuri Chakraborty (from 13.12.2002), Alakesh Bera (from 07.03.2002), Soumitra Sau (from 08.03.2002).

Supporting Staff : Subhash Chandra Debroy, Durga Charan Das, Swapan Kumar Das, Ashim Kumar Banerjee, Narayan Chandra Dutta, Susanta Kumar Das, Subhash Chakraborty, Asim Kumar Poddar, Debarati Kanjilal, Sri Biswanath Bez (till 31.03.2002), Asraf Ali Molla, Sri Sudhangsu S. Maity, Sri Basudeb Ghorui, Sri Dulal Chandra Mandal, Ranubala Das.

Biophysics Department

Faculty : Prof. Siddhartha Roy (Chairman), Prof. Asok Banerjee, Dr. Gautam Basu

Students : Rajat Banerjee, Atanu Maiti, Suparna Bhattacharya, Sibani Chakraborty, Dr. Soumen Ghosh, Amlanjyoti Dhar, Rajesh Saha, Smarajit Polley, Ruchira Chattopadhyay, Soma Samaddar, Suranjana Chattopadhyay, Soumi Guha, Sanchari Bhattacharya, Srijata Mukherjee, Sanchaita Das.

Supporting Staff : Amitava Bhattacharya, Basudeb Marick, Barun Mazumder, Bijoy Munshi, Swapan Jogsharma.

Botany Department

Faculty : Prof. Bharati Ghosh, Prof. Sukumar Gupta, Prof. Kalyan K. Mukherjee, Prof. Swati Sen-Mandi (Chairperson), Prof. Prabir K. Saha, Dr. Dibyendu N. Sengupta, Dr. Swati Gupta-Bhattacharya, Dr. Sabita Bhattacharya, Dr. Tapas K. Ghose, Dr. Debabrata Basu.

Students : Sarat Raj, Kamala Niyogi, Dr. Gaurab Gangopadhyay, Dr. Tanoy Bandyopadhyay, Siraj Datta, Dr. Malabika Roy, Subhra Talai, Rajan Kumar Mishra, Sudeshna Bhattacharya, Rupa Banerjee, Rituparna Kundu, Mekhala Maity, Sudip Kumar Das, Mausumi Sengupta, Aryadeep Ray Chaudhuri, Kakali Mukherjee, Kamala Niyogi, Sawasati Laha, Sujit Roy, Rohini Trivedi, Dr. Sawasati Sen, Dr. Sailendra Nath Sarkar, Debajyoti Ghosh, Dr. Indrani Chowdhury, Rajasri Bhattacharya, Dr. Santi Ranjan Dey, Mitu De, Sudarsana Biswas, Narottam Dey, Tathagata Raychaudhuri, Sanjukta Dey.

Supporting Staff : Sankar Bose, Sukumar Majumder, Dr. Romit Poddar, Chanchal Chakraborty, Jadab Kumar Ghosh, Binoy Krishna Modak, Chaitali Roy, Kaberi Ghosh, Shyamal Kumar Ghosh, Dilip Kumar Chakraborty, Sukdeb Das, Sasanka Shekhar Bera, Shambhunath Debnath, Rabin. N. Roychudhury, Bipul Kr. Nag, Kanan Singh, Jagannath Das, Sarama Pradhan, Manimohan Ghosh.

Central Instrumentation Facility

Faculty : Prof. T. B. Samanta (Chairman)

Supporting Staff : Jaganmay Guin, Ranjan K. Dutta, Smriti Ranjan Maji, Mrinal Das, Alpana Bhattacharya.

Chemistry Department

Faculty : Prof. Parimal C. Sen (Chairman), Prof. Parul Chakrabarti (Emeritus Scientist), Prof. Prantosh Bhattacharyya, Dr. Manas Chakrabarty, Dr. Kalipada Das, Dr. Joyoti Basu, Dr. Manikuntala Kundu, Dr. Parames C. Sil, Dr. Pradip Das.

Students : Sandipan Sarkar, Madhumouli Chatterjee, Dr. Debasish Ghoshal, Ramkrishna Basak, Sanjib Bhakta, Nandita Ghosh, Sudipa Saha, Ashima Bhattacharyya, Baisakhee Saha Chowdhury, Bhaswati Samanta, Somesh Baranwal, Debabrata Mandal, Shresh Pathak, Samiran Saha, Kasturi Sarkar, Arunava Dasgupta, Indranil Chakraborty, Ashis Biswas, Pratik Datta, Rajesh Bhattacharyya, Dr. Dipankar Bhattacharyya, Dr. Sujata Law, Madhuchhanda Kundu, Rajib Barik.

Supporting Staff : Nirmal Kumar Das, Prasanta Kumar Pal, Aniruddha Aich, Sukumar Maitra, Gopinath Mukherjee, Pranab Kumar Dey, Bhabani Prasad Banerjee, Debdas Nandy, Rama Chatterjee, Gopal Kumar Biswas, Amarnath Bhatta, Tapas Ghosh, Arindam Basu, Dipak Chandra Konar, Subhas Chandra Paul, Ashoke Kumar Maity, Sachidanand Ram, Kalyan Das.

Distributed Information Centre

Dr. Pinakpani Chakrabarti (Scientist-in-charge)

Supporting Staff : Dr. T. C. Ghosh, Dr. D. Roy, V. S. Sundararajan, T. K. Bhattacharyya, S. K. Gupta, S. Majumdar, J. Mandal.

Environmental Sciences Section

Faculty: Prof. M. A. Siddiqi (Head, from 09.10.2001), Dr. Nripendranath Mandal

Supporting Staff : Anandamay Adak, Asis Kumar Dalal, Sudam Chandra Jana, Siddhartha Ray.

Immunotechnology Section

Faculty : Prof. M. A. Siddiqi (Head, from 09.10.2001), Dr. Nripendranath Mandal

Students : Srikanta Jana (till 03.11.2001), Supratik Dutta (from 23.02.2002), Kuntal Mukherjee (from 15.01.2002).

Supporting Staff : Uttam Kumar Ghosh, Ranjit Das, Amartya Sen.

Madhyamgram Experimental Farm

Dr. Tapas Kumar Ghose (Scientist-In-Charge), Dr. Samir Ranjan Sikdar (Co- Scientist-In-Charge)

Supporting Staff : Sri Pulak Kumar Roy, Sri Kachiram Koley, Sri Rakhal Chandra Jana, Sri Dilip Pramanik, Sri Chittaranjan Mallick, Sri Sukumar Das, Sri Subhas Senapati, Srimati Sabita Baishya, Sri Jagobandhu Nayak, Sri Rabin Talukdar, Sri Lakshmi Kanta Pradhan, Sheikh Inal Ali, Sri Bhanu Kisku, Sri Mahesh Dasgupta, Sri Rajkishore Lanka, Sri Tapas Chakraborty, Sri Bimal Chandra Modak (expired on 11.12.2001).

Microbiology Department

Faculty : Prof. P. K. Chakrabarty (Chairman), Prof. Asoke C. Ghose, Prof. Timir B. Samanta, Dr. Pradosh Roy, Dr. Subrata Majumdar, Dr. Sujoy K. Dasgupta, Dr. Tapan K. Dutta

Students : Dr. Anup K. Halder, Dr. Madhumita Sirkar, Dr. Sovan Roy, Ananda Mukherjee, Sandip Bhattacharya, Sanjukta Ghosh, Bisweswar Nandi, Shuvendu Das, Chandrajit Lahiri, Abhijit Basu, Mahashweta Mitra, Mithu De, Amit Sarkar, Anasuya Ray, Piyali Mukherjee, Avik Saha, Archana Sharma, Sujoy Chatterjee, Jiaur Rahaman Gayen, Sutapa Biswas Majee, Ranjana Roy, Sujoy Chatterjee (from 4.3.02), Wriddhiman Ghosh (from 12.3.02)

Supporting Staff : S. K. Das (II), N. K. Malakar (expired on 24.03.02), B. N. De Sarkar, B. N. Mandal, P. K. Chattopadhyay, P. Gupta, S. Gazi, D. Sarkar, Babli Marrick, Prabir Halder, Debashis Majumdar, B. Bahali (01.03.02), N. Patra, J. Prasad, D. Bhattacharyya, R. Prasad, B. Ram, S. Das, Rabin Pal, Sankar Bari, Purnendu Manna, Narayan Patali.

Physics Department

Faculty : Prof. Indrani Bose (Chairperson) Prof. Suprakash C. Roy, Prof. Meher H. Engineer, Prof. Shivaji Raha, Prof. Dipankar Home, Dr. Satya Narayan Changdar, Dr. (Mrs.) Biva Roy, Dr. Barun K. Chatterjee, Dr. Swapan K. Saha, Dr. Tripurari Prasad Sinha, Dr. Sanjay K. Ghosh (joined on 18.03.2002).

Students : Dr. Basudhara Basu Nandi, Mala Das (upto 21.04.2001), Shibaji Banerjee (upto 18.09.2001), Som Shubhro Bandyopadhyay (upto 09.04.2002), Sonali Saha, Emily Chattopadhyay, Ujjwal Sen (upto 21.09.2001), Debabrata Parihari, Samir Kunkri, Rajesh Karmakar.

Supporting Staff : N. C. Dey, A. K. Ganguli, K. C. Das, S. P. Singha, S. S. Mallik, S. Banerjee, Manas Datta, Subrata Das, Tarun Kumar Maji, B. P. Ram, B. Dutta, D. K. Thakur, S. K. Basu, R. K. Mourya, Prabir Halder.

Plant Molecular and Cellular Genetics Section

Faculty : Prof. Arun N. Lahiri Majumder (Head), Dr. Amita Pal, Dr. Sampa Das, Dr. S. R. Sikdar

Students : Dr. Sanghamitra Bhattacharyya, Manoj Majee, Anirban Chatterjee, Krishnarup Ghosh Dostider, Dr. Shilpi Ghosh, Sushmita Maitra, Lily Goswamy, Aparajita Das, Dr. Biswajit Das, Sudipta Ray, Jolly Basak, Malay Das, Santanu Bandyopadhyay, Pralay Majumder, Anindya Sarkar, Dipankar Chakraborty, Indrajit Dutta, Prasennjit Saha, Palash Mandal, Ritu Kapoor, Sharmistha Mazumder.

Supporting Staff : Puspita Mukherjee, Ashim Kr. Nath, Motilal Singh, Sk. Eklas Ali, Arup Kr. Dey, Nadiram Kayal, Subal Basak.

Publication

Arun K. Das Gupta (Superintendent), C. K. Sasmol

Regional Sophisticated Instrumentation Centre

Dr. Dilip Kumar Mukherjee (Scientist-in-Charge)

Supporting Staff : Dr. Siddhartha Chaudhuri, Tapan Datta, Shyam Sundar Kundu, Gobinda Das, Amit Kumar Mahindar, Jaideb Kumar Chattopadhyay, Pathik Ranjan Ray, Alokanda Sarkar, Arup Kumar Sen, Samir Kumar Mukherjee, Pradip Kumar Karmakar, Subhas Chandra Maikap, Tanimod Modak (Dhar), Manisha Banerjee, Ranjit Kumar Ghosh, Debabrata Polley, Sankar Santra, Saraswati Sarkar (Sen).

Workshop

Alok K. Mukherjee (Superintendent)

Supporting Staff (Main Campus) : Ashutosh Sarkar, Samar Dutta, Sisir kr. Ghosal, Sithil Mukherjee, Tarapada Das, Dipen Sen, Bankim Dutta, Subhas Chakraborty, Sk. Ehia Hossain, Basanta K. Shit, Bholanath Saren, Sourendra Nath Chakraborty, Abdul Rahaman Molla, Panchanan Santra, W. D. Rozario, Panchugopal Karak, Rajkumar Das, Pranab Banerjee, Subrata Basak, Lochan Shee, Gopal Ch. Das, Sairoom Begum, Sk. Farruck, Kishori Mohan Saha, Kalachand Sen, Bramdeo Prasad, Sanjoy Kr. Santra, Kalipada Das, Alok Kundu.

Supporting Staff (Centenary Building) : Dipak Dutta, Anil Sengupta, Tapan K. Mondal, Jogendra Nath Das, Ashit Banerjee, Sk. Raffick, Murari Mohan Shee, Baidya Nath Murmu.

**Statement of Accounts
for the year
2001-2002**

Bose Institute
93/1, Acharya Prafulla Chandra Road
Kolkata-700 009

AUDITOR'S REPORT

We have audited the attached Balance Sheet of the Bose Institute as at 31st March 2002 and also the Income and Expenditure Account for the year ended on that date in which are incorporated the accounts of the Council and the Governing Body audited by a separate auditors. The financial statements are the responsibility of the Institute's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with auditing standards generally accepted in India. those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

We draw the attention of the management to our observations/comments on the accounts of Bose Institute as annexed herewith for necessary action.

Further we report that :

- i) We have obtained all the information and explanations, which to be best of our knowledge and belief were necessary for the purposes of our audit.
- ii) In our opinion, proper books of account as required by law have been kept by the Institute so far as appears from our examination of those books.
- iii) The Balance Sheet and Income & Expenditure Account dealt with by this report comply with accounting standards issued by the Institute of Chartered Accountants of India.

In our opinion and to the best of our information and according to the explanations given to us, the said Balance sheet and Income & Expenditure Account read with the Notes in Schedule IX and subject to Note Nos. 8 and 10 of Schedule IX and subject to our observations / comments as annexed herewith, the accounts give a true and fair view in conformity with the accounting principles generally accepted in India :

- (a) In the case of the Balance Sheet of its state of affairs as at 31st March, 2002, and
- (b) in the case of the Income & Expenditure Account of the surplus (Plan Account), after adjustment of deficit of Non Plan Account for the year ended on that date.

Enclo : Observations/Comments

For RAY & RAY
Chartered Accountants

6, Church Lane
Kolkata-700001
Dated 20th September, 2002

Sd/.
(N. Saha)
Partner

Bose Institute

Kolkata

SCHEDULE NO. IX

NOTES FORMING PART OF ACCOUNTS FOR THE YEAR ENDED 31ST MARCH, 2002

A. NOTES ON ACCOUNTS :

1. Land at Madhyamgram :

Government of West Bengal acquired plots of land measuring 40.99 acres for Sir J. C. Bose Centenary Laboratory Building, out of which a total area of 18.73 acres was handed over to the Institute through Certificate of possession on different dates. The balance land could not be handed over as the same was disputed. The Governing Body in its meeting held on 31.07.1989 decided not to claim the balance land from the Government of West Bengal, considering other related factors.

2. Fixed Assets :

(a) Register of Fixed Assets relating to Council Account has been updated upto 98-99 by a firm of Chartered Accountants and for the year 99-2000, 2000-2001, 2001-2002, it has not yet been done.

(b) As Governing Body's Account is concerned, similar register is yet to be introduced.

(c) As per previous practice no depreciation is being charged on fixed assets.

3. Grant-in-Aid Schemes :

(a) The scheme accounts are usually treated on cash basis except for terminated schemes where all outstanding expenses and accrued income are taken into account.

(b) Net excess of receipts over expenditure of grants-in-aid schemes, sponsored by various bodies are included in the bank balance with Savings Bank Account of Union Bank of India, Manicktala Branch, Kolkata (Schedule IV of the Balance Sheet may be referred).

Regarding ISCB/DBT and ISCB/SDC projects, two separate bank accounts have been opened with the same bank during the year.

4. The Institute has a hybrid system of accounting. In respect of items like Salary, Gratuity, Leave Salary, Interest on Bank Deposits, Prepaid Service Contract Values, Rates and Taxes etc., cash basis is followed. Liabilities for amount payable to suppliers of materials

3. Investments are stated at cost.
4. Consumable stores are charged to expenditure on purchases.
5. Retirement benefit :
 - i) Institute has General Provident Fund and Contributory Provident Fund Schemes. The Institute also has a Pension Scheme.
 - ii) Leave encashment, Gratuity, Provident Fund and Pension are accounted for on cash basis.
6. Recognition of Income & Expenditure :
 - (i) All income other than Government Grant are considered on cash basis. Government Grant receivable, is accounted for only if order sanctioning the Grant is received before the end of the financial year. Grants on specific schemes are accounted for on cash basis.
 - (ii) For accounting of expenses, the Institute has a Hybrid System of Accounting. Liabilities for amounts payable to suppliers of materials and services are partly considered on accrual basis. Other expenses are accounted for on cash basis. In this connection Notes No. A3(a) and A4 may also be referred.
7. Foreign Currency Transactions :

Transaction in foreign currency are recorded at the exchange rate applicable on the date of transaction.
8. Research and Development Costs :
 - i) Research and development costs are charged as expense in the Income & Expenditure Account for the year in which it is incurred.
 - ii) Capital expenditure is included in Fixed Assets under appropriate heads.

FOR RAY & RAY
CHARTERED ACCOUNTANTS

6, Church Lane
Kolkata-700 001
Dated : 20th September, 2002

Sd/-
(N. Saha)
Partner

and services are partly considered on accrued basis. In this connection item B6 (ii) under Accounting Policies may also be referred.

5. Funds required during the year for Capital Expenditure have been generated by transferring requisite amount from Plan Grants. This has been done as the Central Government has provided Grants during the year in lumpsum without earmarking any part thereof as Plan/Non-Recurring Grant.
6. In respect of House Building Loans given to employees, interest becomes receivable after recovery of the principal amount in full. Interest is therefore, accounted as and when become receivable. This is being done as per Central Government guidelines.

7. Contingent Liabilities :

Letter of Credit : Rs. 4,13,000.00 (Previous year Rs. 8,76,004.00)

8. (a) In the Finance Committee dated 24.09.96, the Jt. Secretary & F.A., Department of Science & Technology, Govt. of India suggested that the Director may consider investing funds in higher income yielding approved securities in respect of General and Contributory Provident Funds and also suggested to consider forming Trust Committee to manage the Provident Funds. These suggestions await consideration.

(b) Although by virtue of the provision 9 of the "Bose Institute Employees Pension Scheme Regulations" approved by the Government of India, Department of Science & Technology and Rule 3.3 of the "Bose Institute Contributory Provident Fund Rules" the Pension Fund, General Provident Fund and Contributory Provident Fund vest with the Bose Institute, separate Income and Expenditure Account & Balance Sheet have been prepared in respect of the said three Funds and appended hereto.
9. To accommodate revised salary since 1998-1999, institute had to borrow Rs. 226.41 lakhs in the year from Development and Modernization Fund owing to lack of budgetary support from Department of Science & Technology. Out of Which during the current financial year 2002-2003, dated 9th July, 2002, a sum of Rs. 117.00 lakhs has been replenished by investing in fixed deposit with the Union Bank of India, Manicktala Branch, Kolkata.
10. Accumulated deficit of Rs. 323.51 lakhs upto 2000-2001 entirely arose for pay revisional effect for the year from 1998-99 to 2000-2001 under Non Plan as a result of non-receipt of required additional budgetary support in this respect. Now finding no other alternative the same has been transferred to Miscellaneous Expenditure Account with a View to adjust the same out of savings of Plan grant.
11. Previous year's figure was regrouped/recast wherever necessary.

B. ACCOUNTING POLICIES :

1. Accounts are prepared on historical cost convention.
2. Fixed Assets.
Fixed assets are stated at cost. Cost includes purchase price and attributable expenses. No depreciation is charged on fixed assets.

Observation / Comments on the Accounts of the Bose Institute (Refer Auditors' Report dated 20th September, 2002)

1. The requirement of Section 16 and 17 of the West Bengal Societies Registration Act, 1961 in regard to holding of Annual General Meeting and filling of Annual Return were not complied with. Similar violation occurred in earlier years also.

2. **Governing Body Account**

Details of movements during the year in respect of various Funds and Property and Investments and brief break-up of other assets and liabilities in respect of Governing Body account have not been mentioned in the attached Balance Sheet and Schedules annexed thereto. Those details are available in the Balance Sheet and related Schedules of Governing Body account audited by M/s. A. K. Chakraborty & Associates, Chartered Accountants. Copies such audited accounts of Governing Body are enclosed with the Institute's amalgamated Balance Sheet, Income and Expenditure Account and related Schedules. Regarding Income & Expenditure Account of Governing Body only net deficit has been considered. It is suggested to club each head of account of Income & Expenditure Account of Governing Body with the Council Income & expenditure Account.

3. **Madhyamgram Land (Note 1 Schedule IX)**

The acquired land at Madhyamgram and Structures thereon show following cost as per records :

a)	Land [shown in attached Balance Sheet under Sir J. C. Bose Centenary Laboratory Land (G.B.) Rs. 15,96,685.19]	4,07,690.98
b)	Building (shown under Schedule V of attached Balance Sheet)	7,30,444.27
c)	Boundary Wall (Do)	2,85,737.27
d)	Metal Road (Do)	2,39,393.00
		16,63,265.52

4. **Schedule – IV : Grant-in-Aid Schemes**

- a) The Grant-in-Aid Schemes also include Rs. 46,31,452.45 recoverable from 62 sponsors in respect of terminated Schemes. Most of these terminated Schemes were completed between 1990 to 2001 and a few between 1986 to 1989. During this year a sum of Rs. 2.37 lakhs has been adjusted from such terminated Schemes. In our opinion, the entire amount of Rs. 46.31 lakhs is considered as bad or doubtful of recovery as no action has been taken to recover any amount from the persons concerned and full provision for bad and doubtful debts should have been made in the accounts with approval of the competent authority (Department of Science & Technology).

- b) Grant-in-Aid Schemes also include Rs. 20,27,651.66 recoverable from 43 Schemes – Fellow i.e. which are in progress other than terminated schemes. We have not received any year wise break-up of the debit balance of Rs. 20,27,651.66
- c) Grant in Aid Received during 2000-2001 as per Schedule IV was Rs. 3,60,95,219.00 which was verified from individual sanction of sponsoring authority.
- d) Expenditure as per Schedule IV for Rs. 3,19,10,327.53 was found in conformity with the books of accounts.
- e) The Institute has introduced some control measures of Grant-in-Aid projects. In our opinion Internal audit system should be introduced in this area to restrict the expenditure within the sanctioned grant.
- f) At the time of checking of liability list of schemes, we observed that liabilities have been taken as on 31.03.02 without supporting documents (e.g. purchase orders, bills etc.) Few examples are given below :—

Name of Scheme	Total Amount
D.B.T.—Prof. S. S. Mandi	1,29,492.00
CSIR—Prof. P Bhattacharya	4,694.00
D.S.T.—Prof. P. C. Sen	21,319.00
N. A. T.—Prof. S. S. Mandi	14,092.00
C.S.I.R.—2 Dr. K. P. Das	1,13,088.00
C.S.I.R.—Prof. P Chakraborty	36,000.00

- g) Fixed Assest worth Rs. 69,02,452.75 was transferred to Bose Institute from terminated Schemes long time back, since then no further transfer was made although the number of terminated schemes are steadily increasing year after year.
- h) It was evident from the Bank Reconciliation Statement of Schemes that two cheques for Rs. 6,07,502.00 (A/C No. 4453) issued on 27.03.2002 and another cheque for Rs. 3,02,828.00 (A/C No. 4480) issued on 27.03.2002 which were considered in Bank Reconciliation Statement although these were deposited into Bank (A/C No. 3355) on 17th June, 2002. In our opinion, this practice should be discontinued.
- h) Approval of DBT, Govt. of India was not made available to us regarding transfer of Fund from DIC (DBT Sponsored Project) for Rs. 86,737.00 to Bose Institute Employees pension Fund.

5. Schedule-III : Deposits and other Liabilities

Earnest Money in respect of Global Tender Rs. 1,57,295.02 received in foreign currency is refundable and effect of variation in foreign exchange would be accounted for in the year of such payments.

6. Schedule-V

Fixed Assets

- i) In the Council Account, an unsigned record of date-wise purchases of assets for some years is maintained. It does not conform to the concept of Asset Register showing details of purchase and value added/disposed in respect of each asset in different period, identification, any physical verification thereof, state of usability/obsolescence, out of operation/damaged assets and reconciliation with financial accounts etc. This is particularly important in respect of the following assets.

a) Apparatus & Equipments	Rs. 6,00,56,543.09
b) Workshop & Apparatus	Rs. 7,74,414.74
c) Furniture & Fittings	Rs. 35,26,063.64
d) Books & Journals	Rs. 4,39,59,650.91
e) Air Conditioning	Rs. 42,31,780.51
f) Electrical Installation	Rs. 12,74,100.38
g) Motor Car	Rs. 18,25,020.09
e) Fixed Assest under Institute Development & Modernisation Fund Investment	Rs. 6,14,41,498.15

In the absence of proper register of Fixed Assets and the physical verification thereof by management, the Fixed Assets as shown in the Balance Sheet were not verified by us. No inventory for Library books was made available for our verification.

- ii. In the Governing Body Account, an Asset Register is yet to be introduced. Auditor M/s A. K. Chakraborty & Associates, Chartered Accountants observed that in absence of such Register, fixed assets could not be verified.
- iii. It appears that no Insurance policies were taken for building, furniture, apparatus and equipments etc., which should be taken care of.
- iv. Since depreciation is not charged, identification of obsolete/damaged assets and assets out of operation and adjustment of value thereof is essential in order to indicate a fair view of the value of the assets shown in the Balance Sheet.

- v. Title deeds for property under the custody of the Council at C.I.T Scheme, Kolkata-700 054 (Centenary Building) and at Salt Lake, Kolkata-700 091 (Hostel) were not made available to us for our verification. However, it was stated to us that Institute possess the title of land and building.
- vi. During the year of our audit there were no system of tender/quotation etc., at the time of purchases. It was stated that it has been introduced recently.

7. Depreciation

Depreciation on Fixed Assets, the amount of which has not been ascertained, has not been charged in the accounts. We are advised that arrear depreciation on fixed assets as per past practice of the Institute has also not been ascertained and provided for in the accounts.

8. Schedule VII

Special Fund Investment (Governing Body Account)

a) Richard Mary Keating Funds Investment

Auditor M/S. A. K. Chakraborty & Associates, Chartered Accountants verified Share Certificates of 843 Nos. of $7\frac{1}{2}\%$ preferential shares of Rs. 10/- each fully paid up of The Calcutta Electric Supply Corporation (India) Ltd. (at present C.E.S.C. Ltd.) and the total value of shares comes to Rs. 8,430.00. But the value of shares as shown in the Balance Sheet is Rs. 6,041.67 and the difference of Rs. 2,388.33 remained unexplained to the auditor.

- b) In respect of the following five special Funds while the income from investments was being added to augment the Funds, matching investment has not been made out of the same income resulting in shortfall of total investment of Rs. 12,60,266.55 as on March 31, 2002 as per details below :-

	Balance as on 31.03.2002		
	Funds Rs.	Investment Rs.	Shortfall Rs.
a) Sir J.C. Bose Medal Fund	2,94,265.46	1,72,750.00	1,21,515.46
b) Sir J.C. Bose Endowment Lecture Fund	17,66,994.77	10,00,000.00	7,66,994.77
c) Sir Nilratan Sarkar Prize Fund	61,259.83	39,000.00	22,259.83
d) Samir Sinha Memorial Fund	33,351.25	19,500.00	13,851.25
e) Sir J.C. Bose's Contribution through Trust Fund	3,32,929.54	68,000.00	64,929.54
f) Publication Fund	25,000.00	—	25,000.00

	Funds Rs.	Investment Rs.	Shortfall Rs.
g) J. C. Bose Scholarship Fund	63,750.00	50,000.00	13,750.00
h) Urmila Devi Benevolent Fund	15,065.95	11,793.75	3,272.20
i) Birla Jute Scholarship Fund	23,300.00	20,000.00	3,300.00
j) R. M. Keating Scholarship Fund	1,29,935.17	1,04,541.67	25,393.50
	<u>27,45,851.97</u>	<u>14,85,585.42</u>	<u>12,60,266.55</u>

9. Schedule-VIII : Security Deposits

Security Deposits Rs. 1,90,414.00 : Confirmation in respect of deposits lying with various parties were not made available for our verification.

- 10.** Accrued liability in respect of gratuity and leave encashment on retirement have neither been actually valued as at the end of the year nor provided for in the accounts subject to an annual provision of Rs. 20.00 lakhs for contribution towards gratuity.
- 11.** There has been variation in the expenditure incurred during 2001-2002 between Plan and Non-Plan items compared to those of the budget submitted to the Department of Science & Technology, Government of India.

12. Contribution towards Gratuity / Pension Fund

Total contribution towards Gratuity and Pension Fund due to revised Government Rules has been Rs. 20.00 lacs and Rs. 1,19,95,048.19 respectively.

- 13.** (a) Bose Institute Modernization and Development Fund
- Rs. 10,22,97,760.78
- (b) Bose Institute Modernisation and Development Fund Investment
- Rs. 7,95,47,132.15
- Rs. 2,27,50,628.63**

The above Fund is sanctioned for the up-gradation and modernization of the Bose Institute and the Fund is to be utilized for certain specific purposes. Out of Rs. 2,27,50,628.63, a sum of Rs. 226.41 lakhs has been utilized by the Council in contravention of the conditions laid down while granting fund for up-gradation and modernization of Bose Institute in the year 1998-99.

14. Medical Advance :

Old Medical Advance are lying unadjusted since long time as stated below :

Prof. M. H. Engineer Rs. 1,75,150.00 outstanding since 22.03.96 in the year 1995-96. It was stated that after repeated request Prof. M. H. Engineer submitted on 07.04.2000 some vouchers

towards adjustment of the advance drawn by him in the year 1995-96 which were difficult to be verified after such a long period. Due to non-refund/adjustment of such advances for more than 5 years, Institute has lost more or less the same amount of interest.

15. The following amounts are lying outstanding for more than one year under different heads of account as detailed below. Appropriate steps should be taken to realise/adjust the same at the earliest.

Head of Account	Total Amount as on 31.03.2002 (Rs.)	Outstanding for more than one year as on 31.03.2002 (Rs.)
a) Platinum Jubilee Celebration Committee	28,411.43	28,411.43
b) Leave Travel Concession Advance	6,400.00	6,400.00
c) Receivable from Overseas Suppliers (mainly representing difference between amount remitted and actual cost of supplies made)	2,04,740.03	No ascertained.
d) Advance (includes Rs. 43,834.00) paid to Prof. M. H. Engineer from 1989 to 2001-02)	1,72,759.00	-Do-
e) Receivable from Shri Debabrata Bose, Secretary, Governing Body appearing in Governing Body Account	45,318.93	-Do-
f) Other (Governing Body Advance)	56,321.20	-Do-

16. AECD Fund with P. F. Commissioner Rs. 6,213.96 (As per last Account). No supporting paper was made available for our verification.
17. Only one Finance Committee Meeting was held during the year as against minimum of two as required by Byelaws.
18. (a) The Institute does not strictly followed allocation of expenditure of Revenue Account between Plan and Non Plan. As result a lot of Non Plan Expenditure on Revenue Account has been transferred to Plan Account to reduce the deficit on Non Plan expenditure.
- (b) For the year a sum of Rs. 53,23,666.81 has been transferred from the surplus of Plan Account to Non Plan Account to make good the deficit in the Non Plan Expenditure.
19. In pension fund, matching investment has not been made with reference to Capital Fund in the year 2001-2002. But it appears that the same has been replenished in 2002-2003 by making fixed deposit with State Bank of India on 17.04.2002 for Rs. 26.00 lakhs.

20. Work-in-progress for Rs. 52,98,701.00 are being carried forward for long time without capitalization. Appropriate steps should be taken to capitalize it after obtaining completion Certificate from the executing authority with out further delay.
21. Inadequate budgetary support under Non Plan has created a perpetual practice of transferring shortfall amount under Non Plan from Plan Grant-in-Aid.
22. In our opinion, all expenses and Income of Schemes/Fellowship should be routed through Council Income & Expenditure Account.

FOR RAY & RAY
CHARTERED ACCOUNTANTS

6, Church Lane
Kolkata-700 001
Dated : 20th September, 2002

Sd/-
(N. Saha)
Partner

Bose
93/1, Acharya Prafulla Chandra Road
Balance Sheet

As at 31st March 2001 Rs. P.	Funds and Liabilities	Schedule No.	As at 31st March 2002 Rs. P.
14,40,29,278.95	CAPITAL FUND	I	14,52,19,428.95
	DEVELOPMENT FUND		
10,10,39,491.78	Institute Development & Modernisation Fund		10,22,97,760.78
7,21,41,357.28	OTHER FUNDS	II	8,00,51,244.91
1,22,07,202.45	CURRENT LIABILITIES	III	1,55,90,299.29
1,12,11,755.84	Excess of Income over Expenditure in respect of Grant-in-Aid Schemes	IV	1,47,77,547.44

34,06,29,086.30
=====

35,79,36,281.37
=====

Institute**Kolkata-700 009***as at 31st March, 2002*

As at 31st March 2001 Rs.	Properties and Assets P.	Schedule No.	As at 31st March 2002 Rs.	P.
14,40,71,794.44	FIXED ASSETS	V	14,52,51,889.44	
52,98,701.00	WORK IN PROGRESS	VI	52,98,701.00	
31,68,110.38	INVESTMENTS	VII	31,84,010.38	
	INSTITUTE DEVELOPMENT AND MODERNISATION FUND INVESTMENT			
1,15,64,414.00	In Fixed deposit with Bank		Rs. 1,28,22,683.00	
6,14,41,498.15	In Fixed Assests		Rs. <u>6,14,41,498.15</u>	7,42,64,181.15
	CURRENT ASSETS, LOANS & ADVANCES VIII			
63,79,827.92	A. CURRENT ASSETS		Rs. 2,07,99,087.94	
77,09,922.93	B. LOANS & ADVANCES			
	Secured :		Rs. 2,01,14,898.00	
	Unsecured :			
	Considered Good		Rs. 12,43,259.13	
	Considered bad or doubtful not provided for		Rs. —	
			<u>2,13,58,157.13</u>	4,21,57,245.07
57,96,763.98	Excess of Expenditure over Receipts in respect of Grant-in-Aid Schemes	IV		66,59,104.11
1,51,59,545.55	Employees Pension Fund Investment etc. (As per Balance Sheet attached)			1,51,34,003.05
4,43,27,953.52	Employees General Provident Fund Investment etc. (As per Balance Sheet attached)			5,14,56,190.44
30,61,880.26	Employees Contributory Provident Fund Investment etc. (As per Balance Sheet attached)			36,32,585.26
30,79,80,412.13			34,70,36,909.90	

Contd.

Bose
93/1, Acharya Prafulla Chandra Road
Balance Sheet

As at 31st March 2001 Rs. P.	Funds and Liabilities	Schedule No.	As at 31st March 2002 Rs. P.
B/F 34,06,29,086.30			35,79,36,281.37

34,06,29,086.30
 =====

35,79,36,281.37
 =====

Sd/-
 P. Barman
 Accountant
 Bose Institute

Sd/-
 S.P. Sit
 A & FO
 Bose Institute

Sd/-
 S. Pal
 Accounts Officer
 Bose Institute

Sd/-
 T. K. Ghorui
 Dy. Registrar
 Bose Institute

Institute**Kolkata-700 009***as at 31st March, 2002*

As at 31st March 2001 Rs.	P.	Properties and Assets	Schedule No.	As at 31st March 2002 Rs.	P.
30,79,80,412.13				34,70,36,909.90	
		MISCELLANEOUS EXPENDITURE :			
		Excess of Expenditure over Income (Nonplan)			
		As per last Account			
3,23,51,087.07		Council :	Rs. 3,23,51,087.07		
		Less : Excess of Income			
		over Expenditure (Plan)			
		during the year	Rs. 2,18,46,611.88	1,05,04,475.19	
		Excess of Expenditure over Income			
		as per Income & Expenditure Account :			
2,97,587.10		Governing Body	Rs. 2,97,587.10		
		Add : Excess of Expenditure			
		over Income during the year	Rs. 97,309.18	3,94,896.28	
34,06,29,086.30				35,79,36,281.37	

This is the Balance Sheet referred to in our attached
report of even date.

Sd/-
B. N. Singh
Registrar
Bose Institute

Sd/-
Prof. M. Siddiqi
Acting Director
Bose Institute

Sd/-
N. Saha
Partner
Ray & Ray
Chartered Accountants

Dated : 9th October, 2002

Bose**93/1, Acharya Prafulla Chandra Road***Income and Expenditure Account*

2000-2001		Expenditure	Non-Plan		Plan		Total	
Rs.	P.		Rs.	P.	Rs.	P.	Rs.	P.
To								
A. Pay & Allowances :-								
67,00,970.00		Director and Administration	55,33,503.00		13,66,819.00		69,00,322.00	
2,13,02,440.35		Research Staff	1,07,53,993.55		1,00,98,658.00		2,08,52,651.55	
34,05,338.00		Workshop	31,82,826.00		2,37,302.00		34,20,128.00	
9,60,211.00		Library	7,28,270.00		3,24,667.00		10,52,937.00	
1,27,41,430.00		Dearness Allowances	90,24,562.00		48,69,948.00		1,38,94,510.00	
9,89,791.00		City Compensatory Allowances	6,28,541.00		3,35,627.00		9,64,168.00	
94,68,300.00		House Rent Allowance	60,29,844.00		32,77,748.00		93,07,592.00	
13,81,867.00		Transport Allowances	8,15,864.00		5,31,563.00		13,47,427.00	
28,15,568.52		Arrear Dues	—		—		—	
1,55,94,724.01		Pension (Contribution to pension fund)	—		1,19,95,048.19		1,19,95,048.19	
20,00,000.00		Gratuity (Contribution to Pension Fund)	—		20,00,000.00		20,00,000.00	
1,90,124.00		Provident Fund Contribution	73,830.00		19,626.00		93,456.00	
18,09,313.00		Leave Encashment	—		12,23,336.00		12,23,336.00	
7,47,526.00		Ad-hoc Bonus	3,81,432.00		2,54,808.00		6,36,240.00	
13,99,191.00		Medical Benefit	—		14,61,853.00		14,61,853.00	
42,479.00		Subsistence Allowance	23,825.00		—		23,825.00	
70,813.00		Small Family Incentive	—		41,001.00		41,001.00	
8,16,20,085.88			3,71,76,490.55		3,80,38,004.19		7,52,14,494.74	

Contd....

Institute**Kolkata-700 009***for the year ended 31st March, 2002*

2000-2001		Income	Non-Plan		Plan		Total	
Rs.	P.		Rs.	P.	Rs.	P.	Rs.	P.
By								
A. Grants and other Receipts :-								
9,47,00,000.00		Grant from Govt. of India (DST)	3,40,00,000.00		8,10,00,000.00		11,50,00,000.00	
		Service Charge :						
3,78,967.00		Hostel & Guest House	4,11,634.00		---		4,11,634.00	
84,240.00		Pick-up Service Charges	79,757.00		---		79,757.00	
12,12,025.00		Over-head Charges	14,88,265.00		---		14,88,265.00	
2,58,651.08		Interest from Bank : S.B. A/c. : 1,88,024.03 T.D.R. : <u>34,677.00</u>	2,22,701.03		---		2,22,701.03	
24,315.50		Interest on Security Deposit :	25,458.71		---		25,458.71	
2,58,599.30		Miscellaneous Receipts	1,80,486.00		---		1,80,486.00	
17,500.00		Institute Consultancy	4,00,068.00		---		4,00,068.00	
31,952.00		Income from Institute car	5,350.00		---		5,350.00	
58,155.00		Sample Testing (RSIC)	85,430.00		---		85,430.00	
47,17,053.26		Deficit meet up Fund	53,23,666.81		---		53,23,666.81	
52,070.00		Bid Fees	9,500.00		---		9,500.00	
1,49,950.00		Instrument usages	1,54,420.00		---		1,54,420.00	
10,000.00		Sale proceeds of J. C. Boses publication	13,485.00		---		13,485.00	
10,19,53,478.14			4,24,00,221.55		8,10,00,000.00		12,34,00,221.55	

Contd....

Bose**93/1, Acharya Prafulla Chandra Road***Income and Expenditure Account*

2000-2001		Expenditure	Non-Plan		Plan		Total	
Rs.	P.		Rs.	P.	Rs.	P.	Rs.	P.
To								
B. Office Maintenance & Other Establishment Expenses:-								
7,44,788.95		Office Expenses including General Maintenance and Stationery	3,75,851.00		2,31,657.50		6,07,508.50	
54,000.00		P o s t a g e	83,000.00		---		83,000.00	
1,64,470.00		Advertisement	15,507.00		---		15,507.00	
15,750.00		Audit Fees (for 2000-2001)	15,750.00		---		15,750.00	
5,02,013.00		Telephone, Telex, EPABX	2,45,009.00		2,99,660.00		5,44,669.00	
71,02,907.32		Electric Bill	26,02,011.00		41,00,013.00		67,02,024.00	
6,35,440.00		Travelling Expenses	1,63,058.00		2,13,614.00		3,76,672.00	
17,520.00		Children Education Assistance	11,280.00		---		11,280.00	
4,23,585.00		Building Repair and Maintenance	---		4,51,356.00		4,51,356.00	
6,47,609.00		Car Repair and Maintenance	6,30,694.00		---		6,30,694.00	
71,950.00		Garden Maintenance	66,175.00		---		66,175.00	
3,07,662.00		Legal Expenses	2,550.00		---		2,550.00	
9,59,373.00		Security Guard	10,12,846.00		---		10,12,846.00	
4,70,199.00		Leave Travelling Concession	---		42,143.00		42,143.00	
57,065.00		National Science Day Celebration	---		91,288.00		91,288.00	
2,06,160.00		Assistance for Hindi Language Education	---		18,000.00		18,000.00	
2,36,940.00		Assistance to Staff Canteen	---		2,29,713.00		2,29,713.00	
1,26,17,432.27			52,23,731.00		56,77,444.50		1,09,01,175.50	

Contd....

(69)

Institute

Kolkata-700 009

for the year ended 31st March, 2002

2000-2001		Income	Non-Plan		Plan		Total	
Rs.	P.		Rs.	P.	Rs.	P.	Rs.	P.

Contd....

Bose

93/1, Acharya Prafulla Chandra Road

Income and Expenditure Account

2000-2001		Expenditure	Non-Plan		Plan		Total	
Rs.	P.		Rs.	P.	Rs.	P.	Rs.	P.
To,								
C. Laboratory Expenses :-								
5,98,862.80		Physics	—		7,17,509.50		7,17,509.50	
5,98,837.90		Chemistry	—		7,98,418.00		7,98,418.00	
6,86,838.90		Botany	—		10,50,300.50		10,50,300.50	
8,86,964.60		Microbiology	—		9,85,367.00		9,85,367.00	
8,58,290.50		Bio-Chemistry	—		8,81,714.00		8,81,714.00	
5,11,804.00		Bio-Physics	—		5,36,787.50		5,36,787.50	
4,37,720.50		Animal Physiology	—		4,60,841.00		4,60,841.00	
1,35,649.50		Library	—		1,47,932.00		1,47,932.00	
4,78,942.50		P.M.C.G.	—		5,47,959.00		5,47,959.00	
1,84,138.50		Immunotech Lab.	—		1,89,093.50		1,89,093.50	
1,62,631.00		Environment Science Section	—		90,766.00		90,766.00	
1,38,785.60		Workshop	—		1,61,868.50		1,61,868.50	
1,66,073.26		Experimental Farms	—		1,63,903.86		1,63,903.86	
2,15,825.00		Publication	—		1,85,423.00		1,85,423.00	
2,63,062.75		Scholar's Hostel	—		2,88,502.00		2,88,502.00	
51,650.00		Assistance to Institute Scientific Symposium/ Seminar/Exhibition etc.	—		59,500.00		59,500.00	
36,681.00		R. S. I. C.	—		1,37,741.00		1,37,741.00	
2,17,273.00		Central Instrumentation Lab.	—		3,34,536.00		3,34,536.00	
4,03,642.00		F.T.N.M.R. Maintenance	—		4,51,860.26		4,51,860.26	
		Internet/Website Facility Maintenance	—		7,34,100.00		7,34,100.00	
70,33,673.31			—		89,24,122.62		89,24,122.62	

Contd....

(71)

Institute

Kolkata-700 009

for the year ended 31st March, 2002

2000-2001		Income	Non-Plan		Plan		Total	
Rs.	P.		Rs.	P.	Rs.	P.	Rs.	P.

Contd....

Bose**93/1, Acharya Prafulla Chandra Road***Income and Expenditure Account*

2000--2001		Expenditure	Non-Plan		Plan		Total	
Rs.	P.		Rs.	P.	Rs.	P.	Rs.	P.
To								
D. Transfer to Fund for Capital Expenditure :-								
19,52,146.00		Books and Journals	—		70,648.00		70,648.00	
		Apparatus :						
1,10,500.00		a) Physics	—		2,88,450.00		2,88,450.00	
1,70,304.00		b) Chemistry	—		70,013.00		70,013.00	
43,148.00		c) Botany	—		1,37,135.00		1,37,135.00	
—		d) Microbiology	—		38,700.00		38,700.00	
52,900.00		e) Bio-Chemistry	—		—		—	
32,315.00		f) Animal Physiology	—		92,500.00		92,500.00	
1,06,050.00		g) Office Equipment (General)	—		53,700.00		53,700.00	
21,850.00		h) Central Instrumentation Lab.	—		—		—	
1,18,790.00		i) Air-Conditioner	—		24,861.00		24,861.00	
		j) FURNITURE :						
84,572.00		Institute	—		53,088.00		53,088.00	
		Scholars' hostel						
3,365.00		k) Internet/Website Facility	—		3,44,555.00		3,44,555.00	
—		P.M.C.G.	—		16,500.00		16,500.00	
47,17,053.26		Deficit meetup Fund	—		53,23,666.81		53,23,666.81	
59,650.00		Metal Road at Madhyagram	—		—		—	
—		Excess of Income over	—		2,18,46,611.88		2,18,46,611.88	
		Expenditure						
74,72,643.26			—		2,83,60,428.69		2,83,60,428.69	

Contd....

(73)

Institute

Kalkata-700 009

for the year ended 31st March, 2002

2000-2001		Income	Non-Plan		Plan		Total	
Rs.	P.		Rs.	P.	Rs.	P.	Rs.	P.

Contd....

(74)

Bose

93/1, Acharya Prafulla Chandra Road

Income and Expenditure Account

2000-2001		Expenditure	Non-Plan		Plan		Total	
Rs.	P.		Rs.	P.	Rs.	P.	Rs.	P.
10,87,43,834.72		Total (A + B + C + D)	4,24,00,221.55		8,10,00,000.00		12,34,00,221.55	
-----			-----		-----		-----	
10,87,43,834.72			4,24,00,221.55		8,10,00,000.00		12,34,00,221.55	
-----			-----		-----		-----	
67,90,356.58		Excess of Expenditure over Income for the year Brought down		---		---		---
2,55,60,730.49		Excess of Expenditure over Income Brought Forward	3,23,51,087.07			---	3,23,51,087.07	
-----			-----		-----		-----	
3,23,51,087.07			3,23,51,087.07			---	3,23,51,087.07	
-----			-----		-----		-----	

Sd/-
Accountant
Bose Institute

Sd/-
A & F.O
Bose Institute

Sd/-
Accounts Officer
Bose Institute

Sd/-
Deputy Registrar
Bose Institute

Sd/-
Registrar
Bose Institute

(75)

Institute

Kolkata-700 009

for the year ended 31st March, 2002

2001-2002		Income	Non-Plan		Plan		Total	
Rs.	P.		Rs.	P.	Rs.	P.	Rs.	P.
10,19,53,478.14		Total	4,24,00,221.55		8,10,00,000.00		12,34,00,221.55	
67,90,356.58		Excess of Expenditure over Income Carried Down		---		---		---
-----			-----		-----		-----	
10,87,43,834.72			4,24,00,221.55		8,10,00,000.00		12,34,00,221.55	
-----			-----		-----		-----	
3,23,51,087.07		Net Balance transfered to Miscellaneous Expenditure	3,23,51,087.07			---	3,23,51,087.07	
-----			-----		-----		-----	
3,23,51,087.07			3,23,51,087.07			---	3,23,51,087.07	
-----			-----		-----		-----	

This is the Income & Expenditure Account referred to in
our attached report of even date.

Sd/-
Director
Bose Institute

6, Church Lane
Calcutta 700 001

For RAY & RAY
Chartered Accountants

The 20th September 2002

Sd/-
(N. SAHA)
PARTNER

Regional Sophisticated

Managed by :

Balance Sheet

As at 31st March, 2001 Rs. P.	Fund & Liabilities	Rs. P.	As at 31st March 2002 Rs. P.
	GRANT-IN-AID		
3,76,49,772.93	As per last account	3,76,49,772.93	
	Received during the year	<u>1,13,000.00</u>	3,77,62,772.93
	CURRENT LIABILITIES		
—	Sundry Creditors		1,34,500.00
	ADVANCE FROM CUSTOMERS :		
20,182.00	For Sample Testing		20,182.00
	Excess of Income over Expenditure		
2,01,254.00	As per last Account	2,01,254.00	
	Add During the year	<u>212.00</u>	2,01,466.00
<u><u>3,78,71,208.93</u></u>			<u><u>3,81,18,920.93</u></u>

Sd/-
P. Barman
Accountant
Bose Institute

Sd/-
S. P. Shit
A & F Officer
Bose Institute

Sd/-
S. Pal
Accounts Officer
Bose Institute

Sd/-
T. K. Ghorui
Deputy Registrar
Bose Institute

Instrumentation Centre**Bose Institute***as at 31st March, 2002*

As at 31st March, 2001 Rs. P.	Assests & Properties	Rs. P.	As at 31st March 2002 Rs. P.
	FIXED ASSETS :		
2,90,29,556.06	As per Last Account	2,90,29,556.06	
	Spares		
64,99,100.63	As per Last account	64,99,100.63	
	Add During the year	1,90,750.00	
	Furniture & Air-Conditioner :		
3,32,211.20	As per Last Account	3,32,211.20	
		-----	3,60,51,617.89
	CURRENT ASSEST, LOAN & ADVANCES:		
1,63,328.58	Cash & Bank Balance :		
	Cash in Hand	734.00	
	Cash with Scheduled Bank in Savings Bank Account		
	[1] Union Bank (I.E.P. Br)	5,447.78	
	[2] Union Bank (MNT Br.)	1,67,358.80	
		-----	1,73,540.58
	Security Deposit		
6,000.00	As per Last Account		6,000.00
	BOSE INSTITUTE		
4,44,012.46	As per Last Account	4,44,012.46	
	Add during the year	14,43,750.00	18,87,762.46
13,97,000.00	ACCRUED GRANT ACCOUNT		
	Receivable from D.S.T.		—
-----			-----
3,78,71,208.93			3,81,18,920.93
=====			=====

This is the Balance Sheet referred to in our attached Report of even date.

Sd/-
B. N. Singh
Registrar
Bose Institute

Sd/-
Prof. M. Siddiqi
Director
Bose Institute

6, Church Lane
Calcutta 700 001

For RAY & RAY
Chartered Accountants

The 20th Septemper 2002

Sd/-
(N. SAHA)
PARTNER

(78)

Regional Sophisticated

Managed by :

Income and Expenditure Account (Non-Plan)

2000-2001 Rs. P.	Expenditure	Rs. P.	2001-2002 Rs. P.
11,95,954.00	Arrear dues paid to the staff		—
2,01,254.00	Excess of Income over Expenditure for the year transferred to Balance Sheet		212.00
----- 13,97,208.00 =====			----- 212.00 =====

Sd/-
P. Barman
Accountant
Bose Institute

Sd/-
S. P. Shit
A & F Officer
Bose Institute

Sd/-
S. Pal
Accounts Officer
Bose Institute

Sd/-
T. K. Ghorui
Deputy Registrar
Bose Institute

Instrumentation Centre**Bose Institute***for the year ended 31st March, 2002*

2000-2001		Income	Rs. P.		2001-2002	
Rs.	P.				Rs.	P.
13,97,000.00		By, Grants received from D.S.T. for payment of arrear dues of R.S.I.C. staff vide Sanction No. IDP/RS/CL-2/97 dated 29.3.2001				—
208.00		Bank Interest				212.00
----- 13,97,208.00 =====					----- 13,97,208.00 =====	

This is the Income & Expenditure Account referred
to in our attached report of even date.

Sd/-
B. N. Singh
Registrar
Bose Institute

Sd/-
Prof. M. Siddiqi
Director
Bose Institute

6, Church Lane
Calcutta 700 001

The 20th September 2002

For RAY & RAY
Chartered Accountants

Sd/-
(N. SAHA)
PARTNER

CB-SV-2010

Acc No.