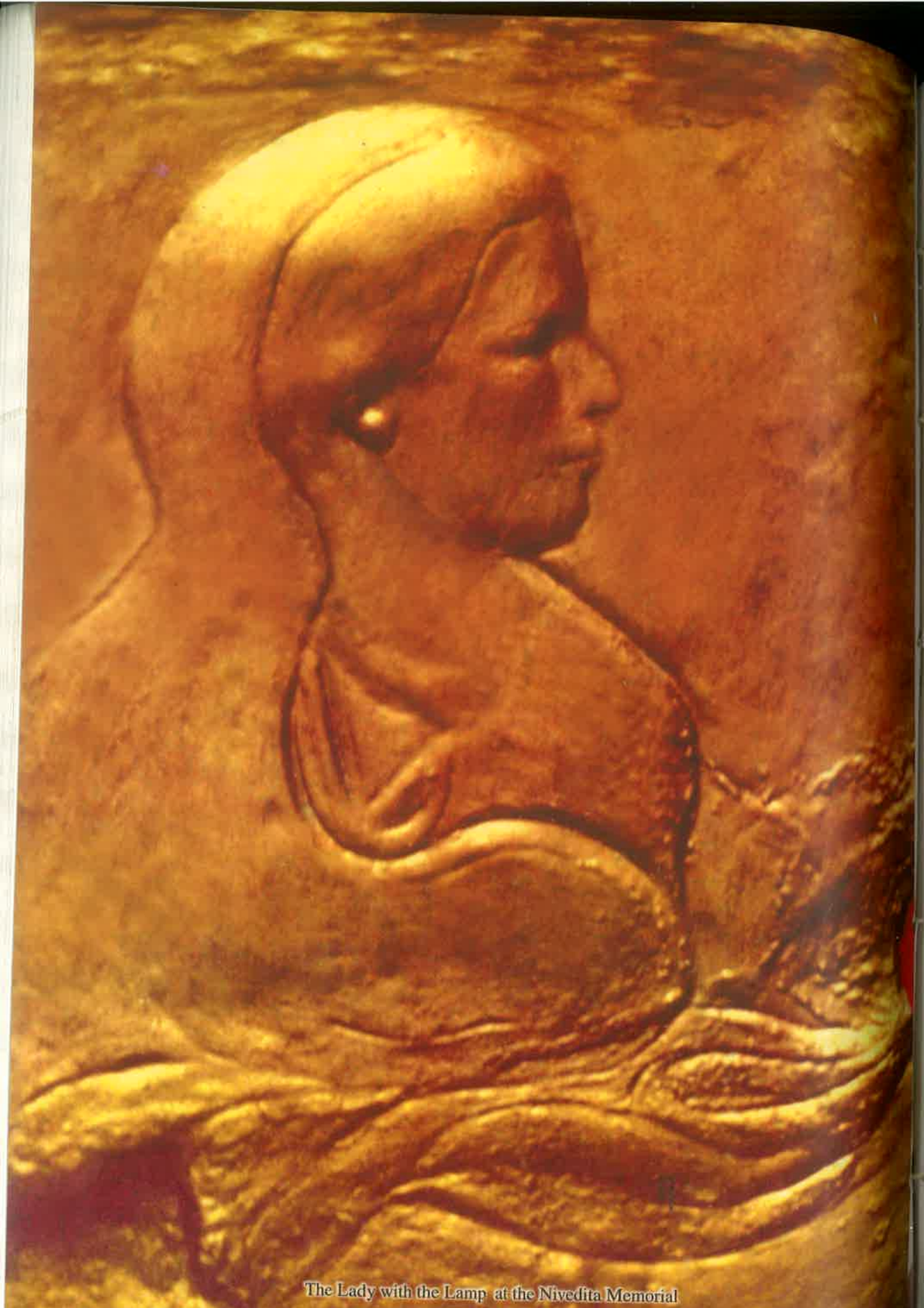

The Lady with the Lamp at the Nivedita Memorial

BOSE INSTITUTE

ANNUAL REPORT 2003-2004

BOSE INSTITUTE
CALCUTTA

Telephone No 4019

93, UPPER CIRCULAR ROAD,

Calcutta, the 3rd Aug 1925

To The Scholars

I leave you my last wishes. I want you to grow into true manhood, strong and self-reliant. Follow only the real object you have chosen. Care for all small things, meanness as poisoning. Try the friend of each other's welfare. Do not talk much but do things. I have lived my utmost for you under many difficulties. Justify my life-work.

J. C. Bose

ANNUAL REPORT
OF
THE BOSE INSTITUTE
FOR
2003-2004

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

Compiled and edited by the Annual Report Committee 2003-2004 consisting of the following members :

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CONTENTS

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 86 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, in the 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 SAIF, 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 integral facilities available in the institute are also used by scientists from several universities and research centres in the country.

Management of the Institute

The Bose Institute is a grants-in-aid autonomous institution under the Department of Science and Technology (DST), Ministry of Science & Technology, Government of India. It has a Governing Body with Shri Debabrata Bose as its secretary and eleven 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. Prof. R. N. Chakraborty
2. Prof. Debi Chakraborty
3. Prof. S. N. Chatterjee
4. Shri Somnath Sanyal
5. Prof. D. Banerjea
6. Dr. Anutosh Chatterjee
7. Dr. Manish Chakraborty
8. Mr. D. Mondal
9. Shri Dilip Bhattacharyya
10. Shri Debabrata Bose
11. The Director, (Ex-officio)
12. Prof. Parul Chakrabarti – Secretary

Members of the Council

1. Dr. Manish Sekhar Chakraborty
2. Shri D. Mondal
3. Prof. R. N. Chakraborty
4. Prof. (Mrs.) Debi Chakraborty
5. Shri Somnath Sanyal
6. Prof. S.N. Chatterjee
7. Mr. Dilip Bhattacharyya

Nominees of the Governing Body

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. Representrative of the Lok Sabha
12. Principal Accountant General (A & E), West Bengal
13. 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 K. Basu (upto July, 03)
    Dr. Amit Roy (from March 28th, 04)
18. Prof. Asis Dutta (upto July, '03)
    Prof. Aloke Bhattacharyya (from March 28th March, '04)

} Two scientists from outside West Bengal, nominated by DST, Govt. of India.

Members of the Finance Committee

1. Principal Secretary, Higher Education Department, Govt. of W. B.—Chairman
2. Shri D. Mondal – (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
   Registrar – Secretary

87th Foundation Day

Prof. M.S. Valiathan offering floral tribute at the Samadhi of Acharya J.C. Bose

The 87th Foundation Day of Bose Institute was celebrated on 30th November 2003. **Prof. M.S. Valiathan**, President, Indian National Science Academy, New Delhi graced the occasion as Guest of Honour and delivered 65th Acharya Jagadis Chandra Bose Memorial Lecture on **The Legacy of Caraka**. Dr. A.P. Mitra, FRS, Honorary Scientist of Eminence, National Physical Laboratory, New Delhi, presided over the function. **Sir Nilratan Sirkar Prize 2003** was awarded to Ms. Rajasri Bhattacharyya, a Senior Research Fellow, Department of Biochemistry. **Prof. B.B.Biswas Outstanding Student Award 2003** was presented to Sri Anirban Chatterjee, a Senior Research Fellow, Plant Molecular & Cellular Genetics Section. The day's celebration began with floral offerings and garlanding of SAMADHI and BUST of Achrya J.C. Bose at both campuses of the Institute. Prof. Maqsood Siddiqu, Director, Bose Institute, delivered Welcome address and presented the Institute report.

Symposium on Acharya J.C. Bose the Scientific Legacy

Prof. M.G.K. Menon delivering the inaugural address

On the occasion of the Centenary of Acharya Jagadis Chandra Bose's US patent on the Detector for Electrical Disturbances a **3-day International Symposium** on **Acharya J.C. Bose – the Scientific Legacy** (March 29 – 31, 2004) was organized jointly by the Bose Institute, Govt. of West Bengal and Govt. of India. The symposium was inaugurated by Prof. M.G.K. Menon. A number of invited speakers like Prof. A.P. Mitra and Prof. S. Irfan Habib from New Delhi, Prof. B.R. Nag from Kolkata, Prof. S. Krishnan from Bangalore, Prof. V.J. Shephard from Australia and Prof. K. Schlegel from Germany and others reviewed the Acharya's important works and their impact on modern science. Distinguished scientists participated in panel discussion on the legacy of Acharya. An Exhibition inaugurated by Prof. V.S. Ramamurty, Secretary, DST, Govt. India was also arranged highlighting Acharya's life, works and the legacy. Prof. Maqsood Siddiqi, Director, Bose Institute acted as Chairman, Working Committee and Dr. T.S. Bandyopadhyay, DST, Govt. of West Bengal and Prof. Sibaji Raha, Bose Institute acted as Organizing Secretaries.

Scientific Report

Biochemistry

The department was created in 1974. Since its inception, the research activities of the 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 the recombinant DNA technology, and several new research programmes were initiated, including plant and animal biotechnology, yeast and parasite molecular biology, structure-activity relationships of gene regulatory proteins. In recent years, the elucidation of protein structures using X-ray crystallography and NMR spectroscopic methods, studies aimed at understanding protein conformation, folding, protein-protein association and theoretical modeling of protein structures and docking have been undertaken.

Chaperone-like activity of MAP2 (*Prof. B. Bhattacharyya*)

It is well established that tubulin possesses chaperone-like activity. Negative charges of the C-termini of both subunits of tubulin are essential for this property. It is expected that the microtubular proteins (MTP, tubulin with microtubular-associated proteins, i.e. MAPs bound to the C-terminius) should not possess any chaperone-like activity. To our surprise, we noticed excellent chaperone-like activity of MTP. We isolated and purified microtubular associated protein 2 (MAP2) and tau. Experiments with purified proteins demonstrated that it is the MAP2 of MTP that exhibits significant chaperone-like activity. Tau, which shares a homologous C-terminal domain with MAP2, possesses no such activity.

DNA replication initiation and chromosome segregation in the budding yeast *(Prof. P. Sinha)*

Work has continued on the characterization of Ch11 protein of the budding yeast, a putative DNA helicase with a human homolog, BACH1 that binds to human breast cancer-related protein BRCA1. More detailed studies of this protein have shown that Ch11p is an S-phase replication checkpoint protein, also required for transcriptional silencing. In another area, we have established that the kinetochore protein Im13/Mcm19 is also required in meiosis to prevent sister-chromatid separation. We are continuing our studies on the structure; assembly of kinetochores using *mcm* mutants.

Protein conformation, folding and association (*Dr. P. Chakrabarti*)

On the basis of the similarity in the residue composition of α-helices with β- and α-turns, a helix nucleation scheme has been proposed. The structures of protein-protein complexes have been analyzed to identify the physicochemical features of the recognition sites in protein structures; these can be used to distinguish physiologically relevant contacts from non-specific interactions.

Elucidation of the geometry of interactions in protein structures and complexes (*Dr. P. Chakrabarti*)

It has been shown that proline-aromatic contacts (leading to the formation of non-bonded interactions, such as C-H···π, C-H···O) occur quite frequently in protein structures and complexes and that these are conserved amongst the members in a protein family.

X-ray crystallographic investigation protein structures (*Dr. P. Chakrabarti and Dr. P. Parrack*)

The structure of CII, an important transcriptional activator protein from lambda phage, has been solved using multiple anomalous dispersion (MAD) data collected at synchrotron sources at Spring 8, Japan, and EMBL, Hamburg, Germany. The mode of interaction in the tetrameric structure is unprecedented and is useful for interpreting a vast amount of biochemical data.

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

We have characterized amoeba homologs of proteins regulating chromosome segregation. This includes CENP-E, Eg5, KLP2 and other kinesin-like proteins. These genes have been fused to the HA epitope at their 3' end and cloned into the *E. histolytica* expression vector pJST4. Transformants expressing the HA-tagged Eh CENP-E were selected with G418. Using monoclonal antibodies against HA, we have immuno-precipitated the protein complex involved in binding to the centromeric sequences. This complex has been analysed by 2-D gel electrophoresis. Similarly, using chromatin immuno-precipitation (CHIP) we have isolated putative centromeric regions from *E. histolytica* transformants expressing HA-tagged Eh CENP-E. Wrok in progress is directed at identifying the proteins bound to Eh CENP-E by mass spectrometry and DNA sequence of genomic fragments isolated by CHIP.

Characterization of the linker region of the lambda cI repressor (*Dr. R. Chattopadhyaya*)

Purification of the lambda cI repressor was carried out to obtain high purity (~99%) and yield. Kinetic studies of the repressor autocleavage at various pHs and temperatures in the presence and absence of O_L1 operator DNA were further consolidated and analyzed. Near neutral pH, the autocleavage rates of the repressor in the operator-free and -bound states were measured to be nearly equal. Thus the structure and dynamics of the cleavage site (Ala111-Gly112) relative to the catalytic site (Ser149, Lys192) are probably similar in both states near neutral pH.

Structural studies on proteins involved in the lysis-lysogeny decision of bacteriophage lambda (*Dr. Pradeep Parrack*)

The CII protein of bacteriophage lambda is an important determinant for the lysis- lysogeny decision of the phage. The three dimensional structure of this protein has been solved by X-ray crystallography. The protein *hflA* from *E. coli*, belonging to the *hflA* locus that has a role in enhanced lysogenisation of lambda phage, was found to be a GTPase with a unique GTP mediated autophosphorylation activity.

Tools for anti-bacterial drug discovery, L1 phage-specific repressor (*Dr. Subrata Sau*)

To develop tools for anti-tubercular/staphylococcal drug discovery, several approaches were followed. A gene indispensable for growth of *M. smegmatis* was cloned. Two L1 phage-specific

genes affecting the growth of *M. smegmatis* were also cloned and characterized to an extent. Two promoters of *S. aureus* were cloned for constructing drug discovery-proficient reporter strains. To study the structure-function relationship of any mycobacteriophage-specific repressor, the wild-type repressor of phage L1 was purified near to homogeneity.

Biophysics

In the department of Biophysics, the research focus is on Structural Biology. Projects in the area of Protein-nucleic acid interaction, bioinformatics, drug design, spectroscopy and protein engineering are in progress.

Design of Drugs from Indian plants by X-ray crystallography, Molecular modeling, and other Biophysical methods (*Prof. A. Banerjee*)

In view of inseparable reality of structure-function in biology, structural studies on recognition in protein-protein, protein-nucleic acid, protein inhibitor, glycoproteins and various drug complexes are continuing. The main interest is in protease inhibitor complexes, which are involved in various diseased states including Arthritis, AIDS, Osteoporosis, Asthma and Cancer. Some of the selected inhibitors are from native medicinal plants of India and may be potential candidate as drug.

Analysis of electrostatic signatures of adenine/guanine binding sites in proteins (*Gautam Basu*)

We have analyzed electrostatic potential (ESP) patterns at adenine- and guanine-binding sites of a large number of proteins and demonstrated that ESP (alone) is sufficient for annotating known and putative purine-binding sites in proteins as adenine/guanine-specific.

Topogenesis and prediction of transmembrane helices in proteins (*Gautam Basu*)

Weak rules for membrane integration have been sought from experimental data and we are in the process of developing a new prediction algorithm using these rules. In addition, a program called OM (Orient Membrane) is being developed that can predict the protein/ lipid boundary of transmembrane proteins.

Transcription Regulation (*Prof. Siddhartha Roy*)

2-Aminopurine labeled promoters were used to identify steps in the transcription initiation using real-time fluorescence kinetics. A model has been developed based on Brownian dynamics to address the kinetics of target search by DNA binding proteins in a genome. Role of protein specific chaperones on the viral transcription cycles has been elucidated.

Aminoacyl-tRNA synthetases (*Prof. Siddhartha Roy*)

Salt and solvation effect on specific and non-specific interaction of tRNA with AARS was measured. Osmolyte effect on the unfolding transitions of GlnRS has been measured. It was concluded that

osmolytes act in a osmolyte and protein specific manner. Solvation dynamics in molten globule state of GlnRS was measured. Role of Zinc in recognition of tRNA by GluRS was elucidated.

Botany

Scientists are engaged in both basic and applied research in the following areas e.g. biotic and abiotic stress in crop plants, DNA finger printing in Tea, ultra-structure of seeds, single polypeptide DNA polymerase in DNA repair; Acetyl CoA- carboxylase and high seed vigor. In addition, improvements of aromatic rice for West Bengal, improvements of existing tissue culture condition for micropropagation, delay of tomato fruit ripening in transgenics are also significant achievements. Identification of a 100 kDa thermolabile allergen as an esterase, PPIase activity of the recombinant novel allergen of Periwinkle pollen and its similarity to human cyclophilin-A could be considered as major breakthrough in this area. A patent application submitted by DBT, Govt. of India and Bose Institute on a novel marker for drought tolerance in plants and process of enhancing storability of seeds without loss of germination is a matter of pride for the Department.

Manipulation of gene expression for improvement of tolerance to Salinity stress, delay of fruit ripening in tomato, development of inducible promoter, DNA repairing DNA polymerase from Plants *(Dr Dibyendu N. Sengupta)*

Samdecarboxylase overexpression in transgenic tobacco enhances polyamine level and tolerance to salinity stress. Synthetic ABRE and ABRC based promoter prepared in this laboratory, showed salinity stress and ABA inducible GUS expression in transgenic tobacco plants. Ethylene biosynthesis was inhibited 50% in transgenic tomato but expression of Le-MADS-Rin was found to be unaffected. Fruit ripening specific promoter from upstream of ACS4 gene and cDNA for MA-ACS1 have been cloned from tomato and banana, respectively. Miss match correction by Base excision repair pathway has been detected from rice nuclear extract using oligo – duplex with G.U and inhibitor ddNTP or antibody against DNA polymerase beta inhibits the BER.

Phenotypic and physiological studies with seeds of *Bauhinia (Prof. Prabir K. Saha)*

The ultrastructures of the testa of *B. variegata* revealed the presence of hilum, pores and pseudolens. The difference in the water uptake of viable and non-viable seeds showed the change of shrinkage and loss of seed weight during the physiological changes in relation to their viability. Thus water uptake pattern can be used as a parameter for assessing the viability of the seeds.

Application of biotechnology in medicinal plant studies (*Dr. Sabita Bhattacharya*)

A number of medicinal plants (prioritized by National Medicinal Plant Board) has been conserved *in vitro* with the aim of developing an *in vitro* gene bank. Concomitant with this work, data collection for developing a database providing information on several important aspects of some selected medicinal plants, in particular their conservation status, has been undertaken in collaboration with Dr. S.Chaudhury, SAIF, Bose Institute.

Studies on Air-borne allergenic pollen grains and Spores : Biochemical, Clinical and Molecular approach. *(Dr. Swati Gupta Bhattacharya)*

The thermo-labile 100 kDa allergen from *Carica papaya* pollen has been purified and documented as an esterase. The PPIase activity of the recombinant novel allergen of Periwinkle pollen has been proved. This allergen is highly similar to some fungal allergens (Mal s6, Asp f11) and to human cyclophilin-A. Homology modeling of these cyclophilins identified common surface-exposed patches, designated as putative cross-reactive epitopes. Biochemical and clinical studies have revealed the allergenic potential of the avenue trees like *Delonix* sp., *Peltophorum* sp.

A clinico-immunological study on the fungal aerosol identified the species of *Aspergillus* as the most allergenic among agricultural workers suffering from respiratory allergy.

Improvement over existing methodologies in plant tissue culture (*Prof. K. K. Mukherjee)*

An efficient and simple micropropagation protocol of *Philodendron 'Xanadu'*, highly esteemed for their beautiful foliage, has been established. A study on *in vitro* root development in conventional agar-gelled media in comparison to liquid media with two alternative matrices like *Luffa* sponge and coir indicated the suitability of *Luffa* sponge over the others. The characteristic pattern of leaf morphology though was absent in the micropropagated plants initially but the notches and crevices of the lamina appeared gradually with age after transplantation to soil. RAPD profiles of the randomly selected clones of different age in comparison to the mother plant revealed identical profiles, thus assuring a totally genetic fidelity maintained protocol for this commercially important plant.

DNA fingerprinting (using AFLP, RAPD, SCAR methods) and development of agronomic / quality trait-related markers in economically important plants (viz. rice and tea) *(Prof. Swati Sen-Mandi)*

Studies focussing on functional genomics suggest that UV signaled upregulation of Acetyl CoA carboxylase gene, present in high copy number in high seed vigour varieties, confer high seed storability in rice. Data on enzyme kinetics shows low Acetyl Co-A Carboxylase activity in low vigour varieties that exhibit poor storability during post harvest storage.

DNA fingerprinting of tea plants using AFLP technique has been established in TRA released as well as in garden grown tea clone as part of a National Network Programme in collaboration with TERI and Delhi University.

A DNA marker that was found to be associated with drought tolerance in Darjeeling grown tea clones has been checked in Assam grown tea clones; the PCR product observed in the drought tolerant Darjeeling clones was found to be present also in the drought tolerant Assam clones.

Studies involving biochemical and molecular parameters suggest an epigenetic control on flavour / aroma of tea.

Plant-Pathogen Interaction : Understanding of resistance mechanism at the molecular level *(Debabrata Basu)*

Crops like oil-seed mustard and tomato incur huge yield loss due to *Alternaria* blight and *Fusarium* wilt. Therefore, following studies have been taken up.

Suspension culture and root culture of different tomato lines, *Arabidopsis* and *Brassica* have been established to understand the resistance mechanism at the biochemical as well as at the molecular level upon elicitation with fungal elicitors.

Evaluations of the amount of diversity existing among different germplasms, including wild types and resistant lines at the DNA and R-gene (resistance gene) level have been started. cDNA AFLP mediated RNA fingerprinting of both infected and control plant mRNA are going on to identify genes at the transcript level.

Improvement of aromatic rice (*Dr. Tapas Kumar Ghose)*

A Linkage map of chromosome VIII was produced, in two groups, from the segregation data of the alleles of 10 SSLP markers, and the phenotype for the trait aroma as the 11th marker, using 113 F6 lines from the cross combination Pusa Basmati-1/ IR-72. Linkage analysis placed the trait aroma between RM-284 (at 10cM) and RM-80 (at 8cM). A total of 6 QTLs, one each for cooked kernel elongation (CKE), kernel length after cooking (LAC), kernel length before cooking (LBC), kernel breadth before cooking (BBC), kernel length/breadth ratio before cooking (L/B-BC), and apparent amylose content (AC) were identified on this chromosome through simple interval analysis, ANOVA and single marker regression. The positive alleles for CKE and LAC were from the parent Pusa Basmati-1.

Chemistry

This department has been in existence since the beginning of Bose Institute. All the research activities of this department are primarily oriented towards the eventual discovery of drugs. More specifically, the different areas of research are the synthesis and reactions of condensed heterocycles, cell signaling and the mechanism of its regulation, the chaperone activity of a-crystallin, drug targets and mechanism of resistance to drugs in pathogenic bacteria, hepatoprotective proteins from herbal sources and organisation of liquid crystals.

Drug targets and drug resistant mechanisms (*Prof. Parul Chakrabarti, Dr. Joyoti Basu, Dr. Manikuntala Kundu)*

A novel transpeptidase [encoded by the ORF Rv0016] has been demonstrated to be phosphorylated by a serine/threonine kinase present in the same operon in the genome of *Mycobacterium tuberculosis*. Inactivation of the counterpart of the gene of this PBP in *M. smegmatis* led to elongated cell morphology and a reduction in cell growth of mycobacteria indicating a potential role of this transpeptidase in cell wall biogenesis. This protein has been found to be associated with the kinase in phosphorylated form.

The transmembrane protein FtsW of *M. tuberculosis* has been found to interact with the cell division-specific transpeptidase FtsI through two putative periplasmic loops. These interactions are of likely importance in regulating cell wall synthesis during cell division.

Two translationally coupled open reading frames, *drrA* and *drrB*, encoding an ABC-type transporter of *Mycobacterium tuberculosis* have been cloned and expressed in *M. smegmatis*. Using site-directed mutagenesis, we have demonstrated that mutations K48M, D165G, L203N affected ATP binding with the nucleotide binding protein, DrrA.

An efflux pump with specificity towards norfloxacin and ciprofloxacin has been cloned and characterized from *Vibrio cholerae*. This pump could confer resistance towards quinolones when it was introduced into an *E. coli* strain where the gene of the efflux pump AcrAB had been knocked out. Mutational analysis has identified amino acid residues in the putative periplasmic loops required for the function of this pump.

Dependence of the efficacy of phosphorylation of synthetic peptides by purified catalytic subunit of PKA (PKAcat) from bovine lens on the amino acid sequence of peptides (*Prof. Parimal C. Sen, Dr. K. P. Das and Prof. A.C. Ghose in collaboration with Prof. Ferenc Hudecz and Dr. Gabor Mezo, Budapest, Hungary*)

PK A catalytic (PKA cat) subunit with molecular mass 41 kDa has been purified to homogeneity from bovine lens. The kinase phosphorylates histone IIIs and other synthetic modified peptides of VRKRTLRRL with different amino acid environments. Extent of phosphorylation depends not only on the presence of Ser or Thr (phosphorylating residues) but also on the other surrounding amino acid residues. Though some peptides compete in phosphorylating histone, it was not very significant. The result suggests that the extent of phosphorylation depends on the amino acid residue(s) surrounding phosphorylable residue(s) on the peptide.

Bi-functional role of a 70 kDa protein isolated from goat spermatozoa cytosol (*Prof. Parimal C. Sen in collaboration with Dr. P. Das, NICED, Kolkata and Prof. G. Olson and Dr. S.K. Nagdas, Vanderbilt, USA*)

A 70 kDa protein isolated, purified and characterized from goat spermatozoa cytosol was found to be a specific inhibitor of Na^+,K^+-ATPase. Recently, the N–terminal amino sequence analysis and activity assay suggest some similarity with aryl sulphatase A. The localization and expression of the protein in the goat testis as well as its species-specificity and organ-specificity have been investigated.

Synthesis and reactions of condensed heterocycles (*Prof. Manas Chakrabarty in collaboration with Prof. Y. Harigaya, Kitasato University,Tokyo, Japan and Dr. Samita Basu, SINP, Kolkata*)

In addition to accomplishing the synthesis of two novel indolic and quinazolinone alkaloids and a few bis(indolyl)alkanes, all of natural origin, new reactions of indoles on clay and silica gel, viz. thiocyanation, CAN-mediated nitration and dethionation have been successfully carried out. Besides, studies on the physicochemical properties of some carbazoles have been pursued fruitfully.

Chaperone activity of α-crystallin (*Dr. K. P. Das*)

We have shown that the oligomeric structure of α-crystallin is not strongly coupled to its chaperone behavior, as is commonly believed. By limited tryptic digestion, we have been able to identify

several peptide fragments of a-crystallin devoid of large oligomeric structure but having considerable chaperone activity. We have also shown that thermal chaperone assay may not reflect the function of a chaperone under physiological conditions. The role of the various sequence domains of a-crystallin in its chaperone function and oligomeric structure is being probed by site directed truncation studies.

Modulation of host cell signaling by bacterial pathogens *(Dr. Joyoti Basu, Dr. Manikuntala Kundu)*

The signalling pathway involving mitogen-activated protein kinase (MAPK)-mediated release of prostaglandin E_2 (PGE_2) from *Mycobacterium avium*-challenged macrophages has been deciphered. Two promoter elements, namely CRE and NF-kB have been found to regulate transcription of the *cox-2* gene, encoding the inducible cyclooxygenase-2, the rate-limiting enzyme in PGE_2 synthesis.

A secreted peptidyl prolyl cis/trans isomerase of *Helicobacter pylori* has been found to stimulate the release of interleukin 6 (IL-6) from macrophages in a p38 as well as p42/44 MAP kinase and NF-kB-dependent manner.

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

We have demonstrated that caspase 3 activation is a feature associated with erythrocyte senescence, since activated caspase 3 is present in aged cells only. Cytosolic extracts from aged red cells were found to cleave the cytoplasmic domain of band 3 present in young red cells in a DEVD-sensitive manner. Preliminary investigations suggest that the upstream signaling pathway involved in the activation of caspase 3 in the aged red blood cells most likely involves caspase 8 and Fas.

Studies on hepatoprotective protein(s) from herbal sources (*Dr. Parames C. Sil*)

Studies on the role of the active principle(s) responsible for the hepatoprotective action and anti-oxidative stress against various potent hepatotoxins in mouse liver have been carried out independently from the water (phosphate/tris buffer, physiological pH) soluble fractions of two different herbs. The active principle(s) from both the sources appear to behave similarly in most of their preventive and curative activities. Further characterization of these active principles is currently in progress.

Molecular structure versus thermotropic mesophase behaviour and surface organization of lyotropic mesophase (*Dr. Pradip Das*)

Our observation of a tilted smectic-C* phase in a binary eutectic mixture of cholesteryl oleate and cholesteryl oleyl carbonate is being explained on the basis of computer simulation results emerging out of a rod-chain-dipole model of a mesogen. In the field of lyotropic liquid crystal polymers, we have established that very long actin filaments adsorb parallel to the air-water interface whereas strong end effects force the short filaments adsorb perpendicular to the interface. Our model based on the Smoluchowski equation in a potential field explains this dichotomy.

Microbiology

The Department of Microbiology which was the first department of its kind in India was established in 1942. Since its inception, work was done on production of important metabolites of microbes including antibiotics, utilization of waste, control of pathogenic microorganisms and on biofertilizer production.

At present the research activities of this department address the problems in the areas of parasitic and bacterial infections of human, drug design and detoxification, plant-microbe and mineral microbe interactions and degradation of environmental pollutants.

Controlling damage in tomato (*Prof. Pran K. Chakrabarty*)

Biocontrol strains of *Bacillus subtilis*, *Bacillus circulans* and *Psudomonas fluorescens* earlier isolated against *Ralstonia solanacearum*, the causative agent of bacterial wilt of tomato, revealed PGPR activity causing increased percent germination of tomato seeds and elongation of their roots. Except the stationary phase cells of *P. fluorescens* which had two isozymes of catalase, all the other cells of *P. fluorescens* and *R. solanacearum* had only one band of catalase and of superoxide dismutase. Quantitatively, the cells of *P. fluorescens* always exhibited higher catalase activity than those of *R. solanacearum*. Siderophore over-producing mutant of *P. fluorescens* had increased host root colonization ability than the wild type or the non-producing mutant.

Gluconate metabolism and its regulation by GntR in *Vibrio cholerae* (*Prof. A. C. Ghose*)

The presence of *gntR* gene could be demonstrated in clinical and environmental strains of *V. cholerae* belonging to different serogroups and biotypes. Transcriptional activation of *gntR* was documented in *V. cholerae* grown in a nutritionally defined medium in the presence of gluconic acid, but not glucose or glutamic acid. The inducible nature of *gntR* expression in *V. cholerae* is somewhat in contrast to its constitutive nature of expression in *E. coli*.

T-cell anergy in progressive visceral leishmaniasis (VL) (*Prof. A. C. Ghose*)

The impairment of in vitro proliferative response of T-lymphocytes derived from the lymph node of BALB/c mice with progressive VL was attributed to defects in the activation pathway of protein kinase C and p42/44 MAP kinases that are important check-points in cell cycle progression. Interestingly, the T-cell anergy could be reversed by protein phosphatase inhibitors leading to the activation of these kinases as well as of the Il-2, Il-2R and IFN-ã genes. The data indicate the immunomodulatory potential of these inhibitors that can be utilised in antileishmanial therapy.

Newer β- lactams by *Alcaligenes* sp. (*Prof. Timir B Samanta*)

The 16S-rDNA sequence analysis of *Alcaligenes* sp., which produces a β- lactamase-free penicillin amidase, supports its position very close (99% sequence similarity) to *Alcaligenes denitrificans* and *Alcaligenes xylosoxidans* in the phylogenetic dendrogram. The newer β-lactams synthesized by immobilized beads had activity against both gram positive and organisms gram negative and were found to be least toxic like penicillins.

A novel *sox* D gene in the sulfur oxidation gene cluster. (*Dr. Pradosh Roy*)

Genetic characterization of the chemolithotrophic bacterium *Pseudaminobacter salicylotoxidans* KCT001 led to the mapping of three independent sulfur oxidation (Sox) defective mutations in a novel *sox*D gene that had an overlap of six codons with the immediately proceeding *sox*C gene of the Sox gene cluster *soxSRT-VWXYZABCD*. The predicted *Sox*D gene product (379 amino acid residues) encodes a periplasmic protein having a cytochrome C_2 domain comprised of 103 N-terminal amino acid residues. The three *sox*D mutants were phenotypically defective in chemolithotrophic oxidation of both thiosulfate and tetrathionate. We hypothesize that the unique *sox*D of KCT is responsible for conferring the ability to oxidize tetrathionate in addition to thiosulfate in the sulfur chemolithotrophic process of this bacterium.

Role of chemokine in leishmaniasis (*Dr. Subrata Majumdar*)

Chemokine has been shown to have an antileishmanial role since it restricts the parasitic burden by regulating the elevated ceramide level within the host cell during infection. We found that exogenous addition of chemokine can restore the free radical generation and the phosphorylation status of the signaling parameters like Akt and PKC. This could be a positive target for controlling the leishmanial infection.

Dual role of interleukin-10 in LAM treated macrophages (*Dr. Subrata Majumdar*)

Interleukin-10, an important anti-inflammatory cytokine, stimulates the expression and activity of survival factors (PI-3K, Akt) and inhibits the cytotoxic and apoptotic factors (iNOS activity), NO Caspases 9 & 3 etc) in ManLAM treated cells. On the other hand IL-10 upregulates the expression of apoptotic factors in AraLAM treated macrophages. Therefore, we conclude that IL-10 which acts as a survival factor in ManLAM treated cells, facilitates cytotoxicity and apoptosis in AraLAM treated cells.

Translational coupling and protein. (*Dr. Sujoy K. Das Gupta*)

The mycobacterial plasmid pAL5000 replication region consists of the replication genes *repA* and *repB* organized in the form of an operon. While investigating the mechanism of action of the pAL5000 Rep proteins, it was observed that when *repB* expression was coupled to that of the upstream *repA* gene, the RepB polypeptide folded into a more active structure. Based on this observation it has been speculated that in coupled systems co-translational folding of the polypeptide expressed from the downstream ORF is enhanced, possibly due to increased folding competence of translationally primed ribosomes. According to this hypothesis translational coupling is necessary not only for regulated expression, but also for optimal activity of proteins synthesized from polycistronic genes.

Microbial degradation of polycyclic aromatic hydrocarbons (*Dr. Tapan K. Dutta*)

One of the Gram-positive bacterial strains isolated from creosote-contaminated soil was found to be capable of utilizing individually phenanthrene and other PAHs as sole sources of carbon and energy. With phenanthrene as the model substrate, various metabolic intermediates were isolated and several of them were structurally characterized. Formation of naphthalene-1, 2-dicarboxylic

acid as one of the intermediates in the pathway of phenanthrene assimilation indicated the involvement of a novel pathway in the test organism.

Bacterial metabolism of phthalate esters (*Dr. Tapan K. Dutta*)

The microbial degradative characteristics of butyl benzyl phthalate (BBP) was investigated by a *Gordonia* sp. strain MTCC 4818 isolated from petroleum-contaminated soil. The test organism can utilize a number of phthalate esters as sole source of carbon and energy, where BBP was found to be totally degraded within 4 days under shake culture conditions. Benzyl alcohol and butanol, the hydrolyzed products of BBP were individually utilized as carbon source while benzyl alcohol was degraded via benzaldehyde, benzoic acid and catechol to *cis, cis*-muconic acid, which in turn, was further degraded to TCA cycle intermediates and butanol was utilized by classical b-oxidation pathway. Crude enzyme preparations showed catechol 1,2 dioxygenase activity apart from benzyl alcohol and benzaldehyde dehydrogenases. The esterase(s) was found to be inducible in nature and can hydrolyze *in vitro* six different phthalate esters of environmental importance irrespective of their ability to support on the growth of the test organism.

Physics

The Physics Department is one of the oldest Departments in Bose Institute, The Department's main research activities are in the following areas:

- Radiation Physics research with Photons and Neutrons
- Aspects of Strong Interaction Physics in the Laboratory and in the Cosmos
- Exactly Solvable Spin Models, Strongly Correlated Systems and Cross-disciplinary Physics
- Quantum Entanglement, Communications and Foundational Problems of Quantum Mechanics
- Strong Interaction Physics-mechanism of Pion Production and Detector Development for SQM
- Ferroelectric Relaxors: Prepartion and Characterization

It may be noted that this research programme, apart from contributing to fundamental knowledge, has major applications relevant to industry and society in general.

Superheated emulsion detector *(Prof. S.C. Roy, Prof. B. Roy, Dr. B.K. Chatterjee)*

Determination of neutron induced nucleation rate of superheated emulsion using precision active device showed an unusual curvature in the semi logarithmic plot of the nucleation rate against time, which should be a linear one for superheated drop nucleation. Experiments were performed to understand the physics behind this curvature and the analysis of observed data revealed the existence of size and lifetime distribution of superheated drops. Measured droplet size distribution is found to satisfy the lognormal distribution.

An experiment has been performed to find out the attenuation length of neutrons in the holding medium of superheated drops from which limiting neutron detection efficiency could be determined.

A portable active device for counting drop nucleation has been designed and fabricated in our Lab.

An alternative method to calculate incoherent scattering factor in Compton scattering (*Prof. S.C. Roy, Dr. B.K. Chatterjee, Prof. R.H. Pratt*)

Inelastic scattering of photons is one of the fundamental processes by which photons interact with matter. A new method, to calculate the incoherent scattering factor (ISF) to calculate inelastic scattering cross sections, has been indicated. The present method constitutes a simple method of determining the ISF, particularly when Hubbell's ISF is inadequate. The validity of this method over a wide range of photons and elements and its theoretical implications are currently under investigation.

Interdisciplinary physics (*Prof. Indrani Bose*)

We have explored the possible origins of haploinsufficiency (HI) using simple mathematical models of gene expression (GE). HI occurs when one of the gene copies in a diploid organism is mutated so that the amount of proteins synthesized falls below a threshold level for the onset of some desired activity. We have suggested possible scenarios for the occurrence of HI using both deterministic and stochastic models of GE.

In experiments, the response to an inducing signal in a cell is found to be either graded or binary. We have shown that in some cases binary response is a manifestation of stochastic bistability. The theoretical results provide a good description of the binary response observed in single cell experiments.

Foundations of Quantum mechanics and Quantum Entanglement *(Prof. D. Home)*

A protocol has been formulated using which the *mean arrival time* of free particles is computed using the *quantum-mechanical probability current*. This is *uniquely* determined in the nonrelativistic limit of the Dirac equation, although the Schroedinger probability current has an inherent nonuniqueness. We find that the Dirac probability current, even in the nonrelativistic limit, contains a *spin-dependent* effect for *free particles* – an effect which has hitherto remained unexplored. This striking effect arises essentially from relativistic quantum dynamics, but persists *even* in the *nonrelativistic regime*.

Applications of the above discovered effect in the context of quantum entanglement and other foundational issues of quantum mechanics give rise to challenging issues which are now being extensively studied. The question of *empirically testing* this newly discovered effect is also under investigation in collaboration with the relevant experimental group of Atminstitut, Vienna, Austria.

Astrophysics & Cosmology (*Prof. Sibaji Raha, Dr. Swapan K. Saha and Dr. Sanjay K. Ghosh*)

In the Universe, the usual matter, mainly baryons, contributes only a small fraction (3 – 10%) of

the total energy density; the cold dark matter (CDM) is about 30% and the rest is accounted for by the so-called dark energy (DE), responsible for an accelerated expansion of the universe. We have shown that the CDM and DE can both arise entirely from the standard principles of strong interaction physics, in quantitative agreement with present data, without the need for any adjustable parameters. We have studied the quark-hadron phase transition in a rotating compact star. A "backbending" in the moment of inertia is observed in the supermassive rest mass sequence. We have found that contrary to popular belief, the "backbending" is actually related to the amount of quark core present in the star, so that for a star without a pure quark phase, there is no backbending.

Starting from a relativistic model we have found that the presence of spin polarization induces a deformation of the Fermi surface. More importantly, the directionality of spin breaks the discrete symmetries like parity and time reversal symmetry. This might have a profound effect on the properties of the compact stars, which is being explored now.

We continued the characterization of OHPT as a detector of heavy ions. Data were taken with ^{16}O beam using the accelerator at the Nuclear Science Centre, New Delhi. We also analyzed data of ^{58}Ni and ^{238}U beam taken at GSI, Darmstadt, Germany.

Intermediate Energy Physics (*Dr. Swapan K. Saha)*

We have been studying the role of three-nucleon force (3NF), for the past couple of years, using the storage ring facility at the Indiana University Cyclotron Facility, Bloomington, USA. The data analysis for the nuclear reaction pd à tp^+ at 250 and 275 MeV was completed and analyzing powers and other polarization observables were extracted. A major issue was the elimination and estimation of the remaining background especially at the lower beam energy.

In-medium properties of Hadrons (*Dr. Sanjay K. Ghosh*)

We have studied the effect of in-medium hadronic properties in photon nucleus interactions in the context of shadowing as well as the dilepton spectrum for incident photon energies in the range 1.1- 3 GeV. We have shown that the distinguishable features for in-medium changes of the hadronic properties can be observed experimentally through the dilepton spectrum by judicious choice of target nuclei and incident energy of photons.

Characterization of ferroelectric relaxors *(Dr. Tripurari Prasad Sinha)*

Barium aluminium niobate (BAN), a ferroelectric relaxor, has been synthesized by a solid-state reaction technique. The temperature-dependent frequency of BAN has been analyzed using impedance spectroscopy. The magnitude of the impedance at low frequency decreases with increasing temperature and that a strong frequency dispersion of impedance exists similar to what is known for relaxational system.

AC conductivity of conducting polymers *(Dr. Tripurari Prasad Sinha)*

The polyaniline family of polymers has recently been the subject of intensive study because of the ease of synthesis, doping with a range of dopants, good stability and high level of electrical conductivity. The study of AC conductivity of polyaniline, a conducting polymer prepared with the use of water-soluble support polymer polyvinyl alcohol has been performed. The temperature-

dependent audiofrequency conductivity varies with dopant concentrations. At lower frequencies and high temperatures, the dielectric constant increases. A Cole-Cole analysis shows the presence of primarily a single thermally activated relaxation process in these materials with a dispersion in relaxation rates.

Animal Physiology

Animal Physiology was established as a separate entity as early as 1930 by the eminent naturalist Sri Gopal Chandra Bhattacharya. Sri Gopal Chandra was actively engaged in the study of natural behavior of some insects and fish, the research findings of which were published in Royal Society Journal and Journal of Natural History. Thereafter, during 1970s, research in Animal Physiology were conducted in various fundamental and applied fields in piscine Physiology, Amphibian Physiology, Gerontology, Insect Physiology, etc. From 1990 onwards the research programs were further modified and focussed in applied and medical oriented themes with a fundamental focus. At present, Animal Physiology Section is mainly engaged in applied research in the fields of (a) animal biotechnology (aquaculture and sericulture) and (b) medical biotechnology (cancer chemoprevention and thyroid hormone–brain relationship) as well as in basic research in the fields of cell cycle regulation and immunology.

Endocrine manipulation for better production of commercially important small animals (*Prof. Arun Kumar Ray*)

Estradiol-17beta (E2), a vertebrate female sex steroid is naturally present and metabolically active in commercially important silkworm. We have recently identified its specific binding protein (putative receptors) in cells of different important organs. Specific E2-receptor binding expresses many physiological phenomenons. Probably E2 is going to be a new insect hormone in the near future related to the improvement of many commercial parameters of silk production. The triploid catfish (3n), Singi (*H. fossilis*) first produced in this laboratory has a significantly better growth rate than the normal diploid (2n) fish. Further studies have focussed on the higher metabolic efficiency in induced triploid (3n) than the normal diploid (2n) fish.

Immunopharmacologic maneuver of host response by curcumin to ameliorate tumor-induced toxicity (*Dr. Gaurisankar Sa*)

The immunomodulatory property of curcumin suggests that, besides acting as an anti-tumor agent, curcumin also plays a role in immunopotentiation of the cancer-bearer and would therefore be worthwhile for investigation. Developing tumor caused immunosuppression of the host, as was evidenced from the decrease in $CD34^+$ positive bone marrow progenitor as well as $CD4^+/CD8^+$ positive thymic and $CD19^+$ positive splenic cell numbers. Curcumin could ameliorate such immunsuppression by inhibiting apoptosis of all the lymphocytes and as a result, immune cell numbers were restored to normal level. Interestingly, curcumin itself was not toxic to the host; rather in, tumor-bearer, it inhibited hematopoietic toxicity, acted as hepatoprotective agent and activated depressed anti-oxidant and detoxification systems. The ability of curcumin to regress

tumor as well as to protect the host from tumor-induced immunosuppression and toxicity strongly supports the candidature of curcumin as a potential agent for the dietary therapy of cancer.

Mechanisms of cancer cell apoptosis and immunorestoration by black tea and its lyphenols (*Dr. Tanya Das*)

During black tea/theaflavin-induced apoptosis, death signals converged in mitochondria resulting in ROS generation and translocation of pro-apoptotic protein Bax from cytosol to mitochondria. As a result, cytochrome c was released from mitochondria and caspase cascade was initiated by two pathways (1) independent of, and (2) dependent on loss in mitochondrial membrane integrity. Interestingly, in a feed-back amplification loop, caspase-3 induced mitochondrial membrane disruption. In contrast, black tea protected the tumor-bearer from tumor-induced thymic involution. It also increased intracellular Th1 cytokines, e.g., IL-2 and IFN-ã, which were otherwise down regulated in tumor bearers, keeping Th2 cytokine IL-10 and immunosuppressive cytokine TGF-â almost similar to normal. Thus, black tea can evolve not only as a potent anti-tumor agent but also as an immunorestorer in cancer bearers.

Environmental Science Section

The section was created in 1992. During last few years this section played a major role in monitoring and Physico Chemical analysis of various environmental pollutants.

Studies of environmental pollution samples (*Prof. Maqsood Siddiqi*)

Environmental Sciences Section has carried out consultancy work regarding Quality Control, Monitoring and Control of Environmental Pollution at the local and national level. The section also carried out quality controls of different industrial products, measurement of toxicants of health effected patients coming from different Hospitals of West Bengal and analysis of different samples coming from different Academic Institute and Universities. Environmental Sciences Section earned Rs.25,000.00 in the last financial year as revenue.

Plant Molecular & Cellular Genetics

Plant Tissue Culture Section was established in the year 1976 by late Dr. V. N. Gadgil and renamed as PMCG Section in the year 1989 with specific focus on researches on the plant genetic engineering towards improvement of plant productivity. In the last few years, the major emphasis has been given to identify the basic genomic components coding for desirable phenotypes through genetical and molecular approaches and their subsequent applications using genetic engineering technology.

L-myo-inositol 1-phosphate synthase: Biochemistry, evolution and regulatory properties in relation to abiotic stress (*Prof. A. N. Lahiri Majumder*)

Bioinformatic analysis of the 65 identified Ino1 genes coding for L-myo-inositol 1-phosphate

synthase (MIPS) revealed presence of a "core catalytic structure" conserved among evolutionary divergent pro- and eukaryotic taxa, thus establishing the antiquity of the gene/protein. An as yet unassigned ORF, sll1722 has been identified as the gene coding for the MIPS protein in *Synechocystis* by bioinformatic, molecular and biochemical experiments. The salt-tolerance domain in the gene for the salt-tolerant MIPS from *Porteresia* (PINO1) has been identified by in vitro mutagenesis, subsequent biochemical and biophysical experiments and growth analysis of the transformed *E. coli, Schizosaccharomyces pombe* and tobacco plants.

Cloning and characterization of 'R' gene candidates from *Vigna radiata* and *V. mungo* and their possible role in conferring yellow mosaic resistance (*Prof. Amita Pal*)

We have achieved targeted isolation of a 'R' gene candidate (*MYR1*, GeneBank Accession no. AY301990) from the yellow mosaic resistant *Vigna radiata* showing perfect homology with another YMV-resistance linked candidate gene '*VMYR1*' in *V. mungo*. The predicted protein (Accession no. AAP 57566) shows a NB-ARC domain, a major component of plant disease resistant proteins. While executing genetical approach, one polymorphic marker linked with YMV-resistance phenotype was cloned and sequenced, referred to as '*YRR-1*' (Accession No. AY634621) that encoded an amino acid permease domain. This is the first report showing involvement of a member of amino acid transporter super family in biotic stress responses in any plant species.

Development of insect resistant plants : A crop management strategy (*Dr. Sampa Das*)

A number of transgenic mustard plants has been developed with chimeric *Allium sativum* leaf lectin (*ASAL*) gene constructs. The molecular analyses of transgenic mustard plant samples confirmed the integration and single, dual or multiple copies of the transgene insertion. The bioassay with the transgenic mustard sample on *Lipaphis erysimi* is underway. Likewise, transformation experiments of chickpea and rice with chimeric *ASAL* gene under the control of phloem specific promoter are also underway to protect them from the attack of *Aphis craccivora* and *Nephotettix sps*. A 56kDa brush border membrane vesicle protein has been identified from the gut of *Lipaphis erysimi* and characterized using LC-MS-MS as Symbionin group of GroEL homolog protein termed as "SymL".

Towards improvement of oil yielding *Brassica* and edible mushrooms (Dr. Samir R. Sikdar)

S1 seeds of *Rorippobrassica* (selfed seeds of somatic hybrid between *Rorippa indica* + *Brassica juncea*) were sown in the field and S1 plants were raised. Agro-morphological, biochemical and molecular characterization and chromosome analysis of S1 plants have been studied. Selfing and backcrossing of S1 plants with *Brassica juncea* parent and reciprocal crossing have been done and S2 and BC1 seeds have been raised. The S1 plants showed aphid tolerance and some degree of summer tolerance. Protoplasts of different oyster mushroom strains like *Pleurotus florida, P. sapidus, P. djamour* and *P. flabellatus* have been treated with different doses of ā-radiation and chemical mutagen to raise mutant strains. Two auxotropic mutants and one fruit body mutant have been developed.

PUBLICATIONS

BIOCHEMISTRY DEPARTMENT

1. Gupta, S and Bhattacharyya, B (2003) Antimicrotubular drugs binding to vinca domain of tubulin. *Mol Cell Biochem.* 253, 41-47.

2. Sarkar, T, Mitra, G, Gupta, S, Manna, T, Poddar, A, Panda, D, Das, K P and Bhattacharyya, B (2004) MAP2 prevents protein aggregation and facilitates reactivation of unfolded enzymes, *Eur. J Biochem.* 271, 1488-1496.

3. Bhattacharyya, R and Chakrabarti, P (2003) Stereospecific interactions of proline residues in protein structures and complexes, *J. Mol. Biol.* 331, 925-940.

4. Bahadur, R P, Chakrabarti, P, Rodier, F and Janin, J (2003) Dissecting subunit interfaces in homodimeric proteins, *Proteins*, 53, 708-719.

5. Bhattacharyya, R, Saha, R, Samanta, U and Chakrabarti, P (2003) Geometry of interaction of histidine ring with other planar and basic residues, *J. Proteome Res.*, 2, 255-263.

6. Pal, L, Chakrabarti, P and Basu, G (2003) Sequence and structure patterns in proteins from an analysis of the shortest helices: implications for helix nucleation, *J. Mol. Biol.* 326, 273-291.

7. Lohia, A (2003) The cell cycle of *Entamoeba histolytica*, *Mol. Cell Biochem.*, 253, 217-222

8. Kumar, C G & Parrack, P (2003) Arrowroot (Marantha arundinacea) starch as a new low-cost substrate for alkaline protease production, *World Jl. Microbiol. Biotech.*, 19, 757-762.

9. Datta, A B, Roy, S & Parrack, P (2003) Disorder-Order Transition of I CII Promoted by Low Concentrations of Guanidine Hydrochloride Suggests a Stable Core and a flexible C-terminus, *Eur. J. Biochem.*, 270, 4439-4446.

10. Chattopadhyay, C, Sau, S and Mandal, N C (2003). Cloning and Characterization of the Promoters of Temperate Mycobacteriophage L1. *Journal of Biochemistry and Molecular Biology* 36 (6) 586-592.

11. Sau, S, Chattoraj, P, Ganguly, T, Lee, C.Y. and Mandal, N C (2004). Cloning and Sequencing Analysis of the Repressor Gene of Temperate Mycobacteriophage L1. *Journal of Biochemistry and Molecular Biology* 37 (2) 254-259.

BIOPHYSICS DEPARTMENT

1. Basu, G., Allen, M., Willits, D., Young, M. & Douglas, T. (2003) "Metal Binding to Cowpea Mottle Virus Using Tb(III) Fluorescence", *J. Biol. Inorg. Chem.* 8, 721-725.

2. Amitabha Majumder, Raja Bhattacharya, Soumen Basak, M.S. Shaila, Dhrubajyoti Chattopadhyay and Siddhartha Roy (2004) P-protein of Chandipura virus is a N-specific chaperone that act at the nucleation stage. *Biochemistry*. Mar 16; 43(10):2863-70.

3. Siddhartha Roy, Heon Man Lim and Sankar Adhya (2004) Asynchronous multi-step basepair openings in transcription initiation: regulation by enhancing the rate limiting step. *EMBO J*. Feb 25; 23(4) : 869-75.

4. Rajat Banerjee, Daniel Y. Dubois, Joelle Gauthier, Sheng-Xiang Lin, Siddhartha Roy and Jacques Lapointe (2004) The zinc-binding site of a class I aminoacyl-tRNA synthetase is a SWIM domain which modulates amino acid binding via the tRNA acceptor arm. *Eur J Biochem.* 271(4):724-33.

5. J. Chakrabarti and S. Roy Simulation of the Cross-over Behaviour of the Dynaimes of a Sphere Attached to a Fluctuating Polymer *Phys Rev E* Stat Nonlin Soft Matter Phys. Feb;69(2 Pt 1):021904

6. Partha Dutta, Pratik Sen, Saptarshi Mukherjee, Arnab Halder, Debabrata Mandal,Rajat Banerjee, Siddhartha Roy*, and Kankan Bhattacharyya* (2004) Solvation Dynamics in the Molten Globule State of a Protein *J.Phys.Chem* (2003) in press.

7. Liu M, Gupte G, Roy S, Bandwar RP, Patel SS, Garges S. (2003) Kinetics of transcription initiation at lacP1. Multiple roles of cyclic AMP receptor protein. *J Biol Chem.* Oct 10; 278(41):39755-61.

8. Ajit B. Datta, Siddhartha Roy and Pradeep Parrack (2003) Disorder–order transition of k CII promoted by low concentrations of guanidine hydrochloride suggests a stable core and a flexible C-terminus. *Eur. J. Biochem.* 270, 1-8.

9. Banerjee R, Mandal AK, Saha R, Guha S, Samaddar S, Bhattacharyya A, Roy S*. (2003) Solvation change and ion release during aminoacylation by aminoacyl-tRNA synthetases. *Nucleic Acids Res.* Oct 15; 31(20):6035-42.

10. Mandal AK, Samaddar S, Banerjee R, Lahiri S, Bhattacharyya A, Roy S.* (2003) Glutamate counteracts the denaturing effect of urea through its effect on the denatured state. *J Biol Chem.* Sep 19; 278(38) : 36077-84.

11. Roy, S. (2003) Use of 2-AP in assaying DNA strand separation by RNA polymerase. *Methods in Enzymology*, RNA polymerase and Associated Factors. (Ed. Adhya and Garges), Academic Press, USA.

12. Roy, S. (2003) Abortive Initiation and determination of binding and isomerization *Methods in Enzymology*, RNA polymerase and Associated Factors. (Ed. Adhya and Garges), Academic Press, USA.

BOTANY DEPARTMENT

1. Adhikari, A, Sen, M, Gupta-Bhattacharya, S. & Chanda, S. (2004) Airborne viable, non-viable and allergenic fungi in a rural agricultural area of India: a 2-year study at five outdoor sampling stations. *Science of the Total Environment*, 326,121-139.

2. Adhikari, A, Sen, M, Gupta-Bhattacharya, S & Chanda, S (2004) Volumetric assessment of airborne fungi in two sections of a rural indoor dairy cattle Shed, *Environment International*, 29, 1071-1078.

3. Roy, D, Ghosh, D & Gupta-Bhattacharya, S. (2003) Homology modeling of allergenic cyclophilins : IgE binding site and structural basis of cross reactivity. *Biochem Biophys Res Comm*, 307, 422-429.

4. Chakraborty, P, Gupta-Bhattacharya, S & Chanda S. (2003). Aeromycoflora of an agricultural farm in West Bengal, India. A five year study (1994-1999), *Grana*, 42 (4), 248-54.

5. Sen, M, Adhikari,A, Gupta-Bhattacharya, S & Chanda, S (2003). Airborne rice pollen and pollen allergen in an agricultural field : aerobiological and immunochemical evidence. *Journal of Environment Monitoring*, 5, 959 – 962.

6. Targeted Activation Tagging of the *Arabidopsis* NBS-LRR gene, *ADR1* Conveys Resistance to Virulent Pathogens. John J. Grant, Andrea Chini, Debrabata Basu and Gary J. Loake (2003) Molecular Plant-Microbe Interaction.16 (8): 669-680.

7. Alam, R., Mafizur Rahman, A.B. M. and Gupta, S. (2002). *In vitro* plant regeneration from leaf sheath cultures of sugarcane via organogenesis. *Plant Cell Biotechnology and Molecular Biology* 3 , 131 - 136.

8. Ruhul Baksha, A.K.M., Alam, R., Karim, Z., Mannan, S. K., Mafizur Rahman, A.B. M. and Gupta, S. (2003). Anther culture and plant regeneration in sugarcane (*Saccharum officinarum*). *Plant Cell Biotechnology and Molecular Biology* 4, 179 184.

9. S. K. Das, S. Biswas, A. Bhattacharya and P. K. Saha, 2003. SEM studies and water uptake patterns in the seeds of *Bauhinia variegata* Linn. : Environ. & Ecol. 21 : 317 – 320.

10. S. K. Das, C. K. Pati, A. Bhattacharya and P. K. Saha, 2003. Effect of some plant extracts on maintenance on viability of Indian bean seeds under artificial stress storage environment : Environ. & Ecol. 21 : 780 – 786.

11. Gangopadhyay, G., Bandyopadhyay, T., Datta, S., Basu, D. and Mukherjee, K.K. *Agrobacterium* mediated genetic transformation in Indian spinach (*Beta palonga*). (2003) Plant Cell Biotechnology and Molecular Biology. 4(3&4): 193-196.

12. Gangopadhyay, G., Poddar, R., Mukherjee, K.K., Gupta, S. (2002). Varietal and Species-Interrelationship between Cultivated and Wild Sesamum. *Indian Journal of Plant Genetic Resources* 15(1), 23 – 27.

13. Gangopadhyay, G., Basu Gangopadhyay, S., Poddar, R., Gupta, S. and Mukherjee, K.K. (2003) Micropropagation of *Tectona grandis* L. – assessment of genetic fidelity. *Biologia Plantarum* 46 (3) , 459 – 461.

14. Gangopadhyay, G., Bandyopadhyay, T., Basu Gangopadhyay, S. and Mukherjee, K.K. (2004) *Luffa* sponge – a unique matrix for tissue culture of *Philodendron*. *Current Science* 86(2), 315 – 319.

CHEMISTRY DEPARTMENT

1. Sánchez-Luengo S, Aumüller G, Sen P C, Röhm K & Wilhelm B (2004) Interaction of PDC-109, the major secretory protein from bull seminal vesicles, with bovine sperm membrane ATPase. *J. Androl.* 25, 234-244.

2. Chakrabarty M, Basak R & Harigaya Y (2003) Concise synthesis of coscinamide B, a bisindolic enamide from marine sponge, *Synthesis* 2011-2014.

3. Chakrabarty M, Sarkar S & Harigaya, Y (2003) An expedient synthesis of benzo[*h*]quinazolin-4(3*H*)-one: structure of samoquasine A revisited. *Synthesis* 2292-2294.

4. Chakrabarty M & Sarkar S (2003) A clay-mediated eco-friendly thiocyanation of indoles and carbazoles. *Tetrahedron Lett.* 44, 8131-8133.

5. Chakrabarty M, Sarkar S & Basak R (2003) Reaction of indole and alkylindoles with ceric ammonium nitrate on silica gel. *J. Chem. Res. (S)* 664-665.

6. Banerjee S, Sarkar S, Basak R & Chakrabarty M (2004) Conversion of indoline-2-thione and oxindole to isatin - some new observations, *J. Indian Chem. Soc.* 81, 169-170.

7. Chatterjee S, Basu S, Ghosh N & Chakrabarty M (2004) Unique behavior of DMF as solvent in fluorescence quenching process. *Chem. Phys. Lett.* 388, 79-83.

8. Chakrabarty M, Ghosh N, Basak R & Harigaya Y (2004) A facile and efficient synthesis of 2,2-bis(3'/2'-indolyl)ethylamines and three bisindolic natural products, *Synth. Commun.* 34, 421-434.

9. Chakrabarty M, Basak R, Ghosh N & Harigaya Y (2004) Michael reaction of indoles with 3-(2'-nitrovinyl)indole under solvent-free conditions and in solution. An efficient synthesis of 2,2-bis(indolyl)nitroethanes and studies on their reduction, *Tetrahedron* 60, 1941-1949.

10. Chatterjee S, Choudhury S D, Basu S, Ghosh N & Chakrabarty M (2004) Influence of steric factors on exciplex energy and magnetic field effect, *Spectrochim. Acta. Part A* 60, 97-102.

11. Sarkar T, Manna T, Mitra G, Poddar A, Panda D, Das K P & Bhattacharyya B (2004) MAP2 prevents protein aggregation and facilitates reactivation of unfolded enzymes: implications for the chaperone-like activity of MAP2, *Eur. J. Biochem.* 271, 1488-1496.

12. Ghosh N, Dutta P, Das K P & Chattoraj D K (2003) Thermodynamics of adsorption of L-amino acids at oil-water interfaces, *J. Solution Chem.* 32, 1045-1064.

13. Ghosh N, Dutta P, Mahapatra P, Das K P & Chattoraj D K (2003) Interaction of water vapour with twenty different poly-L-amino acids and their excess hydration in presence of sodium chloride, *Indian J. Biochem. Biophys.* 40, 122-130.

14. Bhattacharyya A, Pathak S, Basak C, Law S, Basu J & Kundu M (2003) Execution of macrophage apoptosis by *Mycobacterium avium* through apoptosis signal-regulating kinase 1/p38 mitogen-activated kinase signaling and caspase 8 activation, *J. Biol. Chem.* 278, 26517-26525.

15. Mandal D, Baudin-Creuza V, Bhattacharyya A, Pathak S, Delaunay J, Kundu M & Basu J (2003) Caspase 3-mediated proteolysis of the N-terminal cytoplasmic domain of the human erythroid anion exchanger 1 (band 3), *J. Biol. Chem.* 278, 52551-52558.

16. Basu J (2004) Mycobacteria within its intracellular niche: survival of the pathogen or its host, *Current Science* 86, 103-110.

MICROBIOLOGY DEPARTMENT

1. De M, Basu M & Chakrabartty PK (2003) Increased synthesis of dibydroxybenzoic acid in the presence of aluminium by Rhizobium MO1. *Acta Microbiologica Polonica*, 52, 195-199.

2. Mookerjee A, Sen PC & Ghose AC (2003) Immunosuppression in hamsters with progressive visceral leishmaniasis is associated with an impairment of protein kinase C activity in their lymphocytes that can be partially reversed by okadaic acid or anti-transforming growth factor â antibody, *Infection & Immunity*, 71, 2439-2446.

3. Basu A, Chatterjee S, & Das Gupta S. K. (2004) Translational coupling to an upstream gene promotes folding of the mycobacterial plasmid pAL5000 replication protein RepB and thereby its origin binding activity. *J. Bacteriol*, 186, 335-342.

4. Deb C, Chakraborty R, Ghosh AN, Mandal NC, Mukherjee T & Roy P (2003) A generalized transducing thiophage (TPC-1) of a facultative sulfur chemolithotrophic bacterium, *Bosea thiooxidans* CT5, of a-Proteobcteria, isolated from Indian soil. *FEMS Microbiology Letters*, 227, 87-92.

5. Chatterjee S & Dutta TK (2003) Metabolism of butyl benzyl phthalate by *Gordonia* sp. strain MTCC 4818. *Biochem. Biophys. Res. Commun*, 309, 36-43.

6. Dutta TK (2003) My association with Dr. Gunsalus in the EPA Lab and Beyond. *Biochem. Biophys. Res. Commun.* 312, 241-244 (Invited article).

7. Samanta TB, Das N, Das M & Marik R (2003) Mechanism of impairment of cytochrome P450-dependent metabolism in hamster during leishmaniasis, *Biochem. Biophys. Res. Commun.*, 312, 75-79.

PHYSICS DEPARTMENT

1. Das, M, Roy, B, Chatterjee, B K & Roy, S C (2003) Use of basic principle of nucleation in determining temperature-threshold neutron energy relationship in superheated emulsions, *Rad. Phys. Chem.* 66 , 323-328.

2. Roy, S C & Pratt R H. (2004) Need for further inelastic scattering measurements at x-ray energies, *Rad. Phys. Chem.* 69, 193-197.

3. Roy, S C & Young Linda (2004) Foreword: Indo-US workshop on radiation physics with synchrotron and other new sources, *Rad. Phys. Chem.* 70, 465-467.

4. Bajpai, P K, Ratre, K, Pastor, M & Sinha, T P (2003) Preparation, characterization and dielectric behaviour of some yttrium doped strontium stannates, *Bulletin of Materials Science*, 26, 461-464.

5. Ray, D K, Chaudhury, P, Ray, P, Das, R & Sinha, T P (2003) Dosimetric analysis of measured, derived and BJR published tissue maximum ratios of high energy photon beam, *Journal of Medical Physics*, 28, 119-120.

6. Ray, D K, Maji T, Ray, P, Sinha, T P, Pal, S & Muthukrishnan, G (2003) Characteristic parameter of 6-18 MeV electron beam from KB-2 linac, *Journal of Medical Physics*, 28, 164-166.

7. Bose, I & Karmakar, R (2003) Simple models of plant learning and memory, *Physica Scripta*, T 106, 9-12.

8. Home, D, Ali, M, Majumdar, A S & Sengupta, S (2003) Spin-dependent observable effect for Free Particles using the Arrival Time Distribution, *Physical Review A* 68, 042105.

9. Bhattacharyya, A, Banerjee, S, Ghosh, S K, Raha, S, Sinha, B & Toki, H (2003) Quantum chromodynamics, phase transition in the early universe and quark nuggets, *Pramana J. Phys.* 60, *909-919*

10. Banerjee, S, Bhattacharyya, A, Ghosh, S K, Raha, S, Sinha, B & Toki, H (2003) Some aspects of strangeness in Astrophysics and cosmology, *Nuclear Physics A715 827c-830c.*

11. von Przewoski, B, Meyer, H O, Balewski, J, Daehnick, W W, Doskow, J, Haeberli, W, Ibald, R, Lorentz, B, Pancella, P V, Pollock, R E, Rathmann, F, Rinckel, T, Saha, Swapan K, Schwartz, B, Thorngren-Engblom, P, Wellinghausen, A, Whitaker, T J & Wise, T (2003) Spin exchange in polarized deuterium, *Physical Review* A68, 042705(1-4).

BOOK CHAPTER

Bose I (2003) The physical basis of integrable spin models, pp 182-203, in Classical and Quantum Nonlinear Integrable Systems, edited by A. Kundu, *Institute of Physics Publishing, Bristol and Philadelphia*.

ANIMAL PHYSIOLOGY

1. Chakrabarti, N, & Ray, A K (2003) Stimulation of AChE activity in relation to changes in electronmicroscopic structure of adult rat cerebrocortical synaptosomes pretreated with 3-5-3'-triiodo-L-thyronine, *Neuroreport*, 14, 1497-1501.

2. Sarkar, P K, Dey, S S , Koley, B, Koley, J, & Ray, A K (2004) Putative L-triodothyronine receptors in the liver nuclei of mature tropical toad, *Bufo melanostictus*, *Zeitschrift fur Naturforschung*, 59c, 123-126.

3. Tiwary, B K & Ray A K (2004) Alterations in air sac and skeleton of triploid *Heteropneustes fossilis, Journal of Fish Biology*, 64, 268-272.

4. Molto L, Rayman P, Paszkiewicz-Kozik E, Thronton M, Reese L, Thomas JC, Das T, Kudo D, Bukowski R, Finke J & Tannenbaum C. (2003) The Bcl-2 transgene protects T cells from renal cell carcinoma-mediated apoptosis. *Clin. Cancer Res*. 9, 4060-4068.

PLANT MOLECULAR & CELLULAR GENETICS

1. Mandal, P and Sikdar, S.R. (2003) Plant regeneration from mesophyll protoplasts of *Rorippa indica* (L.) Hiern, a wild crucifer. *Curr. Sci.* 85, 1451-1454.

2. Lahiri Majumder, A, Chatterjee, A., Ghosedastidar, K. and Majee, M. (2003) Diversification and evolution of L-myo-inositol 1-phosphate synthase. *FEBS Letts*, 553, 3-10.

3. Chatterjee, A. Majee, M., Ghosh, S, Lahiri Majumder, A. (2004) sll1722, an unassigned ORF of *Synechocystis* PCC6803 codes for L-myo-inositol 1-phosphate synthase . *Planta* 218, 989-998.

DISTRIBUTED INFORMATION CENTRE

1. S.K. Gupta, T.K. Bhattacharyya and T.C. Ghosh. (2004) Synonymous codon usage in *Lactococcus lactis:* Mutational Bias Versus Translational Selection. *J Biomol Struct & Dynamics.* 21, 527-535.

2. D. Roy, D. Ghosh and S. Gupta-Bhattacharya. (2003). Homology modeling of allergenic cyclophilins: IgE-binding site and structural basis of cross-reactivity. *Biochem Biophys Res Commun.* 307, 422-429

LIBRARY

1. Chakraborty, A K (2003) Knowledge, Information and Scholarly Journals : Role In Academic Library Environment ((Rabindra Bharati University : Journal of Library and Information Science, Vol.6, 2003).

2. Chakraborty, A K (2003) Building Digital Information Resources : Challenges and pportunities. Horizon of Information Technology : New age, New Ways – Trends and Impact of Library Sciences : A Festschrift Volume in the honor of Dr. R.P. Kumar, Chief Librarian, AIIMS, New Delhi published during MALAI-2003 Conference).

3. Chakraborty, A K and Das, P G (2003) Building e-Resources for Dissemination of Traditional Biomedical Knowledge Content. (MALAI-2003 : National Convention "Medical Library Association of India (MLAI-2003) from3-5th December, 2003 in Pune.)

4. Chakraborty, A K, Das, P G and Chaudhuri, B S, (2003). Science Digital Library at Bose Institute: Challenges and Opportunities (NACLIN-2003, Organized by Delnet, Delhi and Jadavpur University, Kolkata during 14-17 October, 2003).

SOPHISTICATED ANALYTICAL INSTRUMENT CENTRE

1. Bhattacharya R., Ghosh A., Sinha Ray M., Righi L., Bocelli G., Chaudhuri S., Willet R.D., Clemente-Juan J.M., Coronado E. and Goméz-Garcia (2003) Synthesis, crystal structure, thermal analysis and magnetic behavior of a novel one-dimensional polymeric pyridium chlorocuprate(II): (Hpy)2[Cu3Cl8(H2O)2] *Eur. J. Inorg. Chem.*, 4253-4259.

2. Sinha Ray M., Mukhopadhyay G., Drew M.G.B., Lu T.-H., Chaudhuri S. and Ghosh A. (2003) A diphenoxo bridged antiferromagnetically coupled dimer of copper(II) having bridging methanol. *Inorg. Chem. Commun.*, 6, 961-965.

3. Sau D.K., Saha N., Butcher R.J. and Chaudhuri S. (2003b) Synthesis, spectroscopic and cyclic voltametry of cobalt(III) complexes with 5-methyl-3-formylpyrazole N(4)-cyclohexylthiosemicarbozone (HMPz4Cy): X-ray crystal structure of [Co(MPz4Cy)2]Cl.2.75H2O. *Trans. Met. Chem.*, D. Roy, D. Ghosh and S. Gupta-Bhattacharya. (2003)., 229-234.

4. Sau D.K., Saha N., Butcher R.J. and Chaudhuri S. (2003c) Spectroscopic, structural and antibacterial properties of copper(II) complexes with bio-relevant 5-methyl-3-formylpyrazole N(4)-benzyl-N(4)-methylthiosemicarbazone. *Mol. Cellular Biochem.*, 253, 21-29.

5. Sau D.K., Butcher R.J., Chaudhuri S. and Saha N., (2004) Synthesis and spectroscopic characterization of new cobalt(III) complexes with 5-methyl-3-formyl pyrazole 3-hexamethyleneiminyl thiosemicarbazone (HMPz3Hex): X-ray crystalographic identification of HMPz3Hex and [Co(HMPz3Hex)2]Br.H2O with evidence for unusual rotation about the azomethine double bond of the ligand on complexation with cobalt(III). *Polyhedron*, 23, 5-14.

STUDENTS AWARDED WITH A PH. D. DEGREE

Name of Student (University, Year)	Department / Title of Thesis	Supervisor
	Biochemistry Department	
Taradas Sarkar (J.U., 2003)	Spectroscopic studies on structure-function relationship of tubulin and the role of its carboxy-termini	Prof. B. Bhattacharyya
Tapas Kumar Manna (J.U., 2004)	Studies on the chaperone-like Activity of tubulin	Prof. B. Bhattacharyya
Anasuya Ganguly (J.U., 2003)	Regulation of cell division in *E. histolytica*	Dr. Anuradha Lohia
	Biophysics Department	
Rajat Bandyopadhay (C.U., 2003)	Structure & function studies of Glutamyl-tRNA synthetase (GluRS) from *Escherichia coli.*	Prof. S. Roy
Amit Kumar Mandal (J.U., 2003)	Structure & thermodynamic studies of Aminoacyl-tRNA synthetase-cognate and Noncognate tRNA Interaction.	Prof. S. Roy
Sumana Chattopadhyay (C.U., 2003)	Structural Study of Prokaryotic Refressors.	Prof. S. Roy
	Chemistry Department	
Baishakhee Saha Chowdhury (J.U., 2003)	Molecular mechanism of drug resistance in mycobacteria	Prof. Parul Chakrabarti Dr. Joyoti Basu
Sanjib Bhakta (J.U., 2003)	Structural and functional analyses of high molecular mass penicillin-binding proteins (PBPs) in mycobacteria	Dr. Joyoti Basu

Name of Student (University, Year)	Department / Title of Thesis	Supervisor
	Microbiology Department	
Chrajyoti Deb. (C.U., 2004)	Characterization of novel thibacterio-phage and its application in the study of genetic of new sulfur chemolithotrophs.	Dr. Pradosh Roy
	Animal Physiology Department	
Tathagata Choudhuri (J.U.)	Mechanisms of curcumin induced tumor cell cycle regulation and apoptosis.	Dr. Gaurisankar Sa & Dr. Tanya Das

GRANTS-IN-AID SCHEMES

Schemes Founder by CSIR

Investigator / Co-investigator	Title of schemes	Name of the Dept./Section
Prof. Nitai C. Mandal	Characterisation of operators and promoters of the temperate mycobacterio-phage and construction of inducible expression vectors for mycobacteria. (terminated on 31/07/03)	Biochemistry
Dr. Pinakpani Chakrabarti	Analysis of interactions in helices in proteins and their use in the design of helical peptides (terminated on 30.4.03)	Biochemistry
Dr. Pradeep Parrack	Structural and thermodynamics studies on the interaction of cII protein of bacteriophage lambda with cII dependent promoters	Biochemistry
Dr. Subrata Sau	Studies on the host lethal gene of the temperate mycobacteriophage L1	Biochemistry
Prof. B. Bhattacharyya	Biochemical & Biophysical Studies to establish tubulin as a molecular chaperon	Biochemistry
Prof. Pratima Sinha	Identification of novel components of the budding yeast kinetochore and determi nation of the roles of MCM mitotic kinetochore proteins in meiosis	Biochemistry
Dr. R. Chattopadhyaya	Autodigestion & proteolysis studies of the lambda cI repressor & investigation of its RecA-mediat cleavage	Biochemistry
Prof. S. Roy	A study of tRNA recognition and Discrimination by glutamyl and Glytaminyl t-rna synthetases from *E. coli.*	Biophysics
Prof. S. Roy	New Millennium Indian Technology Leadership Initiative (NMITLI) project on Latent tuberculosis, New Targets, drug Delivery systems and bioenhancers and Therapeutics (Multi centric project).	Biophysics

Investigator / Co-investigator	Title of scheme	Name of the Dept./Section
Prof. A. Banerjee	Design and development of protease Inhibitors: A practical approach to blunt the protease, the Nature's Swiss Knife.	Biophysics
Prof. Parimal C. Sen	Further characterization of protein kinase x (PKx) from goat spermatozoa.	Chemistry
Dr. K. P. Das	Insight into the structure, folding and molecular chaperone function of α-crystallin.	Chemistry
Dr. J. Basu / Dr. M. Kundu	Structure, function and regulation of high-molecular mass penicillin-binding proteins of *Mycobacterium tuberculosis.*	Chemistry
Dr. M. Kundu/ Dr. J. Basu	Mechanisms of antibiotic resistance in enteric bacteria.	Chemistry
Dr. Parames C. Sil	Purification and Characterization of a hepato-protective protein from the Herb *Phyllanthus niruri.*	Chemistry
Dr. Pradosh Roy	Identification of genetic loci involved in Sulfur oxidation in sulfur lithotrophic bacterium : Genomics of sulfur lithotrophy.	Microbiology
Dr. Subrata Majumder	Role of chemokines in host signal transduction and immunotherapy in experimental visceral leishmaniasis.	Microbiology
Dr. Sujoy Das Gupta	Investigation into the developmental expression of mycobacteriophage L1/L5 genes during their latent phase of growth esing proteome analysis tools.	Microbiology
Dr. Tapan K. Datta	Microbial management of environmental Carcinogens : High molecular weight polycyclic aromatic hydrocarbons (from 01.02.04).	Microbiology
Prof. Arun K. Ray	Identification of estradiol-17-â-specific Binding Protein (receptor) in different organs of *Bombyx mori* L and study of its Physiological significance.	Animal Physiology
Prof. Amita Pal	DNA fingerprinting for the identification of bamboo species and genotypes for IPR protection and conservation.	PMCG
Dr. Samir R. Sikdar	Development and characterization of somatic hydrid plants between *Brasica juncea* and *Rorippa indica.*	PMCG

Investigator / Co-investigator	Title of schemes	Name of the Dept./Section
	Schemes funded by DBT	
Dr. Anuradha Lohia	Analysis of genome organization in *E. histolytica.*	Biochemistry
Dr. Anuradha Lohia	Identification of medicinal plant extracts for anti-proliferative property against *E. histolytica.*	Biochemistry
Dr. Subrata Sau	Molecular cloning & Characterization of the antibiotic inducible cisacting gene regulatory elements of Staphylococcus aureus and development of biological Assay systems (started on 19/8/03).	Biochemistry
Prof. K.K.Mukherjee	Understanding of molecular factors behind sex expression in plants.	Botany
Dr. Debabrata Basu	Functional genomics approaches for identification of the gene(s), expressed differentially in *Arabidopsis* and *Sinapis* alba as a part of resistance mechanism against *Alternaria brassicicola* through cDNA AFLP and cDNA subtraction.	Botany
Dr. D.N. Sengupta	Evaluation of Transgenic Tomato and Banana Plants and search for Fruit Ripening specific genes from Mango.	Botany
Dr. D.N. Sengupta	Post-Harvest Biotechnology For Improved Shelf life of Tomato (Inter-Institutional Collaboration With Dr. K.C. Bansal at NRCPB, IARI, New Delhi).	Botany
Prof. Swati Sen Mandi	Characterization and Improvement of Tea through biotechnological tools (a national network programme).	Botany
Prof.Parul Chakrabarti / Dr. Joyoti Basu	The DrrA-B efflux system of *Mycobacterium tuberculosis.*	Chemistry
Prof. Parimal C. Sen / Dr. R. Bhadra (IICB)	Development of highly unsaturated marine lipids and ester and specific bioactive analogues for the treatment of some prevailing chronic disorder.	Chemistry
Dr. J. Basu / Dr. M. Kundu	Regulation of the functions of the human anion exchanger AE1 by phosphorylation and proteolysis.	Chemistry
Dr. J. Basu	Role of lipoarabinomannan of *Mycobacterium tuberculosis* as a modulator of macrophage cell signaling. (Started on 08.07.2003).	Chemistry
Prof. A.N.Lahiri Majumder	Engineering inositol metabolic pathway for raising salt tolerant rice plants.	PMCG
Prof. A.N.Lahiri Majumder	Identification and charcterization of genes/proteins regulated in abiotic stress in *porteresia.*	PMCG
Dr. Samir Sikdar	Generation of spawn and fruiting body of edible mushrooms and demonstration of the technology to the rural SC/ST population	PMCG
	Schemes funded by DST	
Dr. Subrata Sau	A global study to identify, clone and characterize the essential genes affecting the growth of *M. smegmatis* and development assay.	Biochemistry
Prof. Pratima Sinha	Cloning of yeast minichromosome maintenance genes MCM11, MCM12 and MCM13 and a characterization of their roles in high fidelity chromosome transmission.	Biochemistry
Prof. S. Roy	Spectroscopic studies of transcription initiation and regulation.	Biophysics
Dr. J. Basu / Dr. M. Kundu	Proteins of the cell wall synthesis and cell division machinery of mycobacteria: potential drug target sites.	Chemistry
Prof. A.C. Ghose Prof. P.C. Sen (Chemistry)	Cellular and molecular mechanisms of immunosuppression in visceral Leishmaniasis (terminated on August, 03).	Microbiology
Prof. Timir B. Samanta	Enzyme reaction engineering : Synthesis of penicillins by immobilized â-lactamase-free penicillin amidase.	Microbiology

Investigator / Co-investigator	Title of schemes	Name of the Dept./Section
Prof. A.N.Lahiri Majumder	Identification of active site amino acid residues of eukaryotic L-myo-inositol 1-phosphate synthase- A biochemical and molecular approach	PMCG
Prof. Amita Pal / Dr. D.N.Sengupta (Botany)	Molecular analysis of differentiation in two cotyledons of *Vigna radiata.*	PMCG

Scheme funded by DST-DAAD

Prof.A.N.Lahiri Majumder	Matrix assisted laser desorption ionization- time of flight analysis of mammalian brain Fructose-1,6 bisphosphatase.	PMCG

Scheme funded by Indo Swiss Collaboration in Biotechnology

Dr. Sampa Das	Development of transgenic insect resistant Indian cultivar of chickpea	PMCG
Dr. Sampa Das	Effects of transgenic insect resistant chickpea plants on non target insects.	PMCG

Schemes funded by IFCPAR

Dr. P. Chakrabarti	Analysis of protein-protein association in crystals and Complexes (terminated on 31/7/03)	Biochemistry

Schemes funded by NMITLI, CSIR

Dr. P. Chakrabarti	Development of a versatile portable software suite for Bioinformatics.	Biochemistry
Dr. Sujoy Das Gupta P. Chakrabarti, B. Bhattacharyya, S. Roy	New Millennium Indian Technology Leadership Initiative (NMITLI) project on Latent tuberculosis, new targets, drug delivery system and bioenhancers and bioenhancers and therapeutics.	Microbiology

Investigator / Co-investigator	Title of schemes	Name of the Dept./Section

Scheme funded by ICMR

Dr. Anuradha Lohia	Functional genomics of *Entamoeba histolytica to* Identify genes controlling growth and proliferation (Started on March 2003).	Biochemistry
Prof.Parul Chakrabarti / Dr. Joyoti Basu / Dr. M. Kundu	Antigens and Immune response in tuberculous infections.	Chemistry
Dr. Joyoti Basu / Prof.Parul Chakrabarti / Dr. M. Kundu / Prof. Manas Chakrabarty	Genomics, proteomics and bioinformatics of some target genes of *Mycobacterium tuberculosis* for drug development.	Chemistry
Dr. M. Kundu / Dr. J. Basu	Host cell signaling in relation to *Helicobacter pylori* pathogenesis.	Chemistry
Dr. Pradip Das	Experimental determination of suitability of cholesteryl oleyl carbonate in fluidizing cholesteryl oleate in atherosclerotic plaque	Chemistry
Dr. Sujoy Das Gupta	Generation of peptide mimics against The immunodominant lipoglycan/ Lipopolysaccharide antigens of Mycobacterium tuberculosis and *Vibrio Cholarae* using phage display libraries and their evaluation as diagnostic and prophylactic agents.	Microbiology

Scheme funded by DRDO

Prof. S. Roy	Drug design against Glu-tRNA^{Gln} amidotransferase from *M. tuberculosis.*	Biophysics

Scheme funded by DAE

Prof. S. Roy	A study of structural effects of Phosphorylation on the N-terminal Domain of p53.	Biophysics
Dr. J. Basu / Dr. M. Kundu	Modulation of host cell signal transduction by lipoarabinomannan from *Mycobacterium tuberculosis.*	Chemistry

Investigator / Co-investigator	Title of schemes	Name of the Dept./Section
Dr. Parames C. Sil	Functional characterization of a hepatoprotective protein from the herb *Cajanus indicus* L: Signal transduction mechanism.	Chemistry
Dr. Subrata Majumder	Modulation and intracellular mechanism Of action of chemokines during Leishmaniasis.	Microbiology

Scheme funded by ISRO (RESPOND programme)

Dr. Swapan K. Saha/ Prof. Sibaji Raha	Identification and characterization of passive detection materials for heavy ion detection.	Physics

Indo-US Scheme funded by DST (India) & NSF (USA)

Dr. Barun K. Chatterjee Prof. Suprakash C. Roy	Investigation on theoretical aspects of Compoton scattering.	Physics

Scheme funded by NTRF

Dr. Tanya Das Dr. G. Sa	An approach to induce selective apoptosis in tumor cells without harming the normal Cells of the host by black tea extract.	Animal Physiology

participation in Conferences/Symposia/Workshops

Prof. P. Sinha (Biochemistry) attended FAOBMB Congress, 2003 at Bangalore from Dec. 7-11, 2003 and acted as a member of the Scientific Program Committee on behalf of SBC.

Dr. P. Chakrabarti (Biochemistry) (i) Attended the 69th Annual Meeting of Indian Academy of Sciences, Guwahati, November 21-23, 2003. (ii) Presented a talk at the Discussion Meeting of Indian Academy of Sciences on Intermolecular Interactions at Orange Country, Karnataka, November 30 – December 3, 2003. (iii) Presented a talk at the XXXIII National Seminar on Crystallography, Pune, January 7-9, 2004. (iv) Presented a talk at the International Symposium on "Frontiers in Bioinformatics : Structure, Interaction and Function", Kyoto, Japan, February 10, 2004. (v) Presented a talk at "NMRS 2004: Symposium on NMR, Drug Design and Bioinformatics", Kolkata February 17-20, 2004. (vi) Presented a talk at IETE Annual Seminar on Bioinformatics and its prospect in India, Kolkata, March 13, 2004.

Dr. A. Lohia (Biochemistry) (i) Invited talk at EMBO workshop, Pasteur Institut, Paris. Genomics and Pathogenesis of *E. histolytica* (ii) Regulation of cell division in *E. histolytica*. Guha Research Conference, Chalsa, North Bengal, 2003 (iii) Analysis of cell cycle genes in *E. histolytica*. International symposium on 'Bioinformatics for genome analysis' Bose Institute, 2004.

Dr. P. Parrack (Biochemistry) attended and delivered invited talks at the VIIth Transcription Meeting at Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore (Dec 5th – 8th 2003) and at the FAOBMB Congress 2003, IISc, Bangalore (Dec 8th –12th , 2003).

Mr. Ajit Bikram Datta spent eight weeks at EMBL Outstation, Hamburg, to collect synchrotron data on CII crystals, supported by a UNESCO-ICSU-TWAS short term fellowship, Nov - Dec., 2003. Mr. A.B. Datta also attended the symposium "NMRS 2004: Symposium on NMR, Drug Design and Bioinformatics" at SINP, Kolkata, Feb 17th – 20th , 2004. Ajit B. Datta made an oral presentation at the XXXIII National Seminar on Crystallography, Pune, January 7-9, 2004.

Prof. Asok Banerjee (Biophysics) attended the 13th International Conversation meeting June 17-21, 2003, Albany, New York, USA for deliberation on his current scientific work. The topic of the talk was "Insight to structural sub-site recognition in plant thiol protease-inhibitor complexes: Understanding the basis of differential inhibition and the role of water". The trip was sponsored by INSA.

Prof. Asok Banerjee (Biophysics) chaired a session of the 33rd National Seminar on Crystallography at Pune 8th-10th January 2004.

Prof. S. Roy Chaired a session in FAOBMB congress and also delivered an invited lecture in FAOBMB congress.

Dr. Sabita Bhattachary (Botany) was invited to chair the session "Agriculture, Biotechnology and Medical Science" in the 11th West Bengal State Science and Technology Congress held on 28-29 February, 2004, at Bidhan Nagar College, Salt Lake, Kolkata.

Rajasri Bhattacharyya (Botany) participated and presented a poster on " Current need for generation of database on medicinal plant biotechnology" in the National Seminar on Bioinformatics and Biodiversity Data Management held on 17-19th of May, 2003 at Tropical Botanic Garden and Research Institute (TBGRI), Palode, Thiruvananthapuram, Kerala.She also participated and delivered a lecture on "Importance of computerized data-base for managing information on medicinal plant genebank" in the National Seminar on "Recent trends in Plant Biotechnology" held on 22-23 March, 2004 at Department of Plant Science, Bharathidasan University, Tiruchirappalli, Tamil Nadu.

Avik Ray (Botany) participated and presented a poster "Generation of *in vitro* source of *Rauvolfia serpentina* and conservation of its germplasm by encapsulation" in the National seminar on "Recent trends in Plant Biotechnology" held on 22-23 March, 2004 at the Department of Plant Science, Bharathidasan University, Tiruchirappalli, Tamil Nadu.

Dr. Dibyendu N. Sengupta (Botany) was selected by DST, New Delhi, as one of the delegates of 5 member team and went to Tunis (Tunisia) to attend a bilateral workshop on biotechnology in Agriculture(24-26th April,2003).Dr. Sengupta and his students have attended 10th FAOBMB conference held at IISC, Bangalore from 7-11th Dec, 2003 with 4 posters: Sudip Sinha (Delay of Fruit ripening in Tomato), Bhaskar Gupta(ABRE- binding factor in different rice cultivars), Sujit Roy(DNA polymerase b from plants) and Kamala Niyogi (Mechanism of Polyamine actions) have presented their work in poster session. Poster on Delay in Fruit ripening received the best poster award.

Dr. Swati Gupta Bhattacharya (Botany) attended and chaired a session in the National Aerobiological Conference held in Visva–Bharati, Shantiniketan from November 9-11,2003. Pampa Chakraborty, D. Ghosh , S. Das also attended the National Aerobiological Conference held in Visva–Bharati, Shantiniketan from November 9-11,2003.

D. Ghosh (Botany) attended the 37th National Convention of Indian College of Allergy, Asthma and Applied Immunology in Bangalore from 12th-14th December 2003. He presented a paper on Production & Characterization of allergic Cyclophilin, derived from recombinant source.

Dr. Swati Gupta Bhattacharya, Pampa Chakraborty, D.Ghosh , S.Das and J.Mandal (Botany) attended International Symposium on "Acharya J.C. Bose : The Scientific Legacy" held in Bose Institute Main Campus from March 29-31, 2004

Prof. Prabir K. Saha (Botany) participated the National Workshop on "Seed Sector Perspective on Jute and Allied Fibre Crops-cum-Seed Day 2003" on 23rd and 24th September, 2003 at Central Research Institute For Jute and Allied Fibres, Barrackpore, West Bengal, India and presented a paper. Prof. Saha and Bratati Mukherjee participated in the Workshop on Electron Microscope, X-ray diffractometer and their applications in material science and Biological Science organized by University Science Instrumentation Centre (USIC) of Jadavpur University, Jadavpur during January 14-16, 2004.

Prof. P. K. Saha (Botany) participated and Chaired a Session on Physiology and Productivity of Plants and Microbes: Impact of Environmental Stress in the National Conference on Plants, Microbes and Environment: Issues and Challenges organized by Department of Botany in the UGC Programme, University of Burdwan, Burdwan, West Bengal during March 21-22, 2004. Sri S. Das presented a paper in the said Conference.

Prof. P. K. Saha also attended International Symposium on "Acharya J.C. Bose : The Scientific Legacy" held in Bose Institute Main Campus from March 29-31, 2004. Miss B. Mukherjee, Sri S. Das and Mrs. J. Bhar also attended the said Symposium.

Dr. Tapas Kumar Ghose, Narottam Dey, Sudarsana Biswas, Tathagata Raychaudhuri, Mitu De, Santi Ranjan Dey, Manoj Prasad (Botany) attended The National Conference on Plants, Microbes and Environment: Issues and Challenges, Department of Botany, University of Burdwan, March 20-21,2004 and presented a paper.

Sudarsana Biswas, Narottam Dey, Tathagata Raychaudhuri, Shantiranjan Dey, Mitu Dey, Manoj Prasad and Tapas Kumar Ghose (Botany) attended 8th ADNAT Symposium on Comparative and Functional Genomics, Centre for Cellular and Molecular Biology, Hyderabad, February 23-24, 2004 and presented a poster.

Prof. Swati Sen-Mandi (Botany) was Invited as Discussant at the Roundtable Meeting on Biodiversity Conservation held at Paribesh Bhawan, Kolkata, sponsored by Department of Environment, Government of West Bengal & West Bengal Pollution Control Board, December 11, 2003. She also participated in the FAOBMB Satellite Symposium on Regulation of Gene Expression, Society of Biological Chemists (India), Kolkata, December 5-6, 2003. "UV signaled regulation of Acetyl Co A Carboxylase Gene related to vigour and storability of rice seed", by Sudeshna Bhattachrya, Subhra Talai, and Swati Sen-Mandi, in a FAOBMB Satellite Symposium on Regulation of Gene Expression , Society of Biological Chemists (India), Kolkata, December 5-6, 2003.

Sandeep Chand Chaudhary (Botany) attended a workshop in a FAOBMB Satellite Symposium on Regulation of Gene Expression, Society of Biological Chemists (India), Kolkata, December 5-6, 2003.

Sudeshna Bhattacharya (Botany) attended a workshop on "DNA based Marker Technologies and its Application" from 21-31st July 2003, New Delhi sponsored by Department of Biotechnology, Govt. of India, organized by the Energy and Resources Institute, (TERI) New Delhi.

Sudeshna Bhattacharya (Botany) participated in a training programme on "Introduction to Bioinformatics: Principles & Applications' sponsored by Department Of Biotechnology, Govt. Of India, organized by Industrial Toxicological Research Centre, Lucknow at Biotech Park In Biotechnology City, Lucknow on 27-29th August 2003.

Prof. Parul Chakrabarti (Chemistry) was the Convenor of the Sectional Committee IX on Biochemistry and Biophysics of the West Bengal Academy of Science & Technology; chaired

a session in the 8th seminar on Biochemistry and Biophysics: Genomics, proteomics & Bioinformatics organized jointly by the West Bengal Academy of Science & Technology and Indian Institute of Technology, Kharagpur on April 12, 2003; delivered an invited talk in the 9Ist session of Indian National Science Congress, Chandigarh in January, 2004 on "TB- a global emergency"; served as one of the panel of judges for the National Creativity Olympiad, NCO-2003 at Jamshedpur in February, 2004.

Prof. Parimal C. Sen (Chemistry) served as Convener of the Scientific Committee in the FAOBMB Satellite Symposium on Regulation of Gene Expression held at IICB, Kolkata during December 5 – 6, 2003; chaired a session on Cell Signaling in the Symposium; Dr. Dipankar Bhattacharyya, Ms Tanusree Sengupta and Ms Srabasti Ghosal attended the above symposium; Ms Madhumouli Chatterjee and Ms Madhuchhanda Kundu presented papers at 10th FAOBMB Conference at Bangalore during December 7 –11, 2003.

Prof. Manas Chakrabarty (Chemistry) presented a paper entitled "Novel solvent-free reactions of indoles on silica gel and clay" in the "International Conference on Biodiversity and Natural Products: Chemistry and Medical Applications", held at New Delhi during January 26-31, 2004; participated in the Symposium on NMR: Drug Design and Bioinformatics (NMRS 2004), organized by Bose Institute and S.N. Bose National Centre for Basic Sciences and held at SINP, Kolkata during February 17-20, 2004; participated along with his students N. Ghosh, R. Basak, S. Sarkar (presented a poster), T. Kundu and S. Karmakar in the National Symposium on Organic Chemistry: Current Trends and Prospects, held in the Dept. of Chemistry, Jadavpur University on December 17, 2003 and in the 18th National Symposium on Organic Chemistry, held on March 16 in the Department of Chemistry, Calcutta University, where N. Ghosh also presented a poster.

Dr. K.P. Das (Chemistry) gave an invited lecture on "Molecular Chaperone Function of a-Crystallin: A Possible Mechanism of Differentiation Between Natural and Non-natural Substrates" at the Annual meeting of the Indian Photobiology Society held at Jadavpur University on 30th January, 2004; delivered a lecture at Refreshers Course at Jadavpur University on "Recent advances in the study of proteomics" on 20th January, 2004; attended CSIR project monitoring workshop at CSIR headquarter at New Delhi on 18th November, 2003.

Dr. Joyoti Basu (Chemistry) delivered a talk in the FEBS Special meeting on Signal Transduction held in Brussels, Belgium from July 3-8, 2003; delivered a lecture in the INDO-UK Tuberculosis meeting held in CDFD, Hyderabad, from January 12-13, 2004; delivered a lecture in Annual meeting of the Immunology Study Group–West Bengal, held in Chittaranjan National Cancer Institute, Kolkata on January 16, 2004; delivered a lecture in the conference "Deep roots, open skies: new biology in India" held in National Institute of Immunology, Delhi on February 25, 2004; presented a paper in the Gordon Research Conference on "Red Cells" held in Il Ciocco, Italy from May 25-30, 2003; visited the laboratory of Prof. Jean Delaunay in the Hospital Kremlin Bicetre, Paris, France and delivered a lecture in connection with a collaborative Indo-French project; participated in the Guha Research Conference held in Chalsa from December 25 –29, 2003; participated in the XXVII All India Cell Biology Conference held in University of Pune from January 7-10, 2004.

Dr. Manikuntala Kundu (Chemistry) delivered a lecture in the ICMR-INSERM workshop on Tuberculosis, held in Central Jalma Institute for Leprosy, Agra from December 12-14, 2003. Ms. Chaitali Basak (JRF) delivered a talk and Mr. Shresh Pathak (JRF) participated in the XXVII All India Cell Biology Conference held in Pune from January 7-10,2004.

Mrs. Sharmila Basu (SRF), Mr. Randhir K. Sinha (JRF) and Mr. Bidyadhar Mandal (JRF) participated in the Symposium on NMR: Drug Design and Bioinformatics (NMRS 2004), organized by Bose Institute and S.N. Bose National Centre for Basic Sciences and held at SINP, Kolkata during February 17-20, 2004.

Prof. A. C. Ghose (Microbiology) chaired a session in the National seminar on "Recent advances in stress physiology, toxicology & immunology" organized by the University of Kalyani at Kalyani on 27-28 November, 2003.

Prof. A. C. Ghose (Microbiology) chaired a session in the "FAOBMB satellite symposium on regulation of gene expression" held at the IICB, Kolkata on December 5-6, 2003. He delivered two lectures in the Refresher's Course for College Teachers at the Department of Chemistry, Calcutta University.

Prof. Timir B Samanta (Microbiology) delivered an invited talk entitled "Biotransformation, an Excellent Tool for Drug Design and Detoxification of Xenobiotics" at the 7th National conference of the Indian Society of Chemists and Biologists held at Agra university during December 26-28, 2003; attended DBT task Force Committee meeting held on December 30, 2003.

Dr. Subrata Majumdar (Microbiology) delivered an invited talk at the International Symposium on "Bilateral Seminar on Leishmaniasis : epidemiology, population dynamics, immunology and immune system" organized by Humboldt University, Germany and IICB, Kolkata on Dec 10-13, 2003 at IICB, Kolkata.

Dr. Subrata Majumdar (Microbiology) was elected as a member of the Molecular Immunology Forum, India, Feb., 2004.

Prof. S.C. Roy (Physics) organised an Indo-US Workshop on Radiation Physics with Synchrotrons and other New Sources jointly with Dr. Linda Young of Argonne National Laboratory (ANL) held on May 14-16, 2003 at ANL, USA. This was sponsored by the Indo-US Technology Forum; was appointed Guest-Editor of the Special Issue of Radiation Physics and Chemistry to publish the review talks delivered at the Indo-US Workshop at ANL; participated and chaired one technical session in the Indo-US Workshop on Radiation Physics with Synchrotrons and other New Sources held at ANL, USA during May 14-16, 2003; attended DAMOP (2003) to present one paper held at Boulder, Colorado, USA during May 20-24, 2003; participated 9th International Symposium on Radiation Physics (ISRP-9) to present three papers held at Cape Town, South Africa during October 24-31, 2003. He also chaired one Technical Session in the symposium; he attended Workshop on Biomedical Optics and Related Topics at S.N. Bose National Centre For Basic Sciences, Kolkata during February 23-25, 2004. He delivered an invited lecture on "Investigations on Compton Scattering: New

Directions" at Indo-US workshop in Radiation Physics at Loreto College (University of North Bengal), Darjeeling during March 22-27, 2004.

Prof. Sibaji Raha (Physics) chaired a session at the DAE-BRNS QGP Meet '03 held at Variable Energy Cyclotron Centre, Kolkata, May 5-7, 2003.; also participated and delivered an invited talk at the National Seminar on Recent Advances in Physics, Berhampur University and Institute of Physics Bhubaneswar, held at Gopalpur-on-Sea, September 9-20, 2003; delivered an invited talk at the 3rd National Conference on Contemporary issues on Nuclear and Particle Physics, Jadavpur University, Kolkata, February 16-17, 2004.

Prof. Indrani Bose (Physics) delivered invited talks at the 8th Seminar on Biochemistry and Biophysics (Theme: Genomics, Proteomics and Bioinformatics) held at the Department of Biotechnology, I.I.T., Kharagpur on 12.4.03; National Symposium on Recent Trends in Biophysical Research held at the Indian Institute of Chemical Biology on 19.11.03; Workshop on Physics at the Interface of Chemistry and Biology held at the S.N. Bose National Centre for Basic Sciences on 8.12.03; Conference on Physics of Novel Materials – Electronic and Magnetic Properties held at the S. N. Bose National Centre for Basic sciences during January 12 –14, 2004; delivered six lectures on Exactly-solved lattice models at the SERC School on Statistical Physics held at T.I.F.R., Mumbai during Feb. 16-28, 2004.

Prof. Dipankar Home (Physics) delivered invited talk on the "Quantum Measurement Problem: Present Status and Outlook" at the three-day Workshop on "Foundations of Sciences" held at the National Institute of Advanced Studies, Bangalore during 23-25 February, 2004.

Dr. Barun K. Chatterjee (Physics) attended Workshop on Biomedical Optics and Related Topics at S.N. Bose National Centre For Basic Sciences, Kolkata during February 23-25, 2004; he delivered a lecture "High voltage insulation breakdown in partially enclosed structures in nitrogen" at Condensed Matter Days Symposium (CMDAYS03) held at Department of Physics, Jadavpur University, Kolkata on August 27-29, 2003; he delivered an invited lecture on "Radiation detection by using superheated droplets" at Indo-US workshop in Radiation Physics at Loreto College (University of North Bengal), Darjeeling during March 22-27, 2004.

Dr. Tripurari Prasad Sinha (Physics) presented two papers in the symposium Condensed Matter Days-2003 held at Jadavpur University, Kolkata during August 27-29, 2003; delivered an invited lecture entitled "Complex impedance analysis of relaxor barium aluminium niobate" in the national symposium Recent Trends in Materials Science-2004 held at University Department of Physics, T. M. Bhagalpur University, Bhagalpur from 29th to 30th March 2004.

Dr. Sanjay K. Ghosh (Physics) delivered an invited talk in DAE-BRNS QGP Meet '03 held at Variable Energy Cyclotron Centre, Kolkata, May 5-7, 2003; participated in the "Children's outreach Programme" held at Bose Institute, Darjeeling on the occasion of Foundation Day celebration of Bose Institute during December 5, 2003; delivered an invited talk in National Workshop on Astroparticle Physics & Space Science held at Bose Institute, Darjeeling, April 6 – 8, 2003.

Prof. Arun K. Ray (Animal Physiology) attended "XXII Annual Symposium on Reproductive Biology and Comparative Endocrinology" held in University of Madras, Chennai during January

25-27, 2004, for presentation of posters. Prof. Ray also attended "National Symposium on Zoology- A Neorealistic Approach" held in University of Calcutta, during 26-27 March, 2004, for deliberation of an invited talk.

Dr. Gaurisankar Sa (Animal Physiology) delivered invited lecture in the "Symposium for Recent Trends in Biotechnology" at University of Kalyani in November 2003. Dr. Sa was invited to deliver a talk in the 9th annual conference of Indian Association of Cancer Research at Mumbai in January 2004.

Dr. Tanya Das (Animal Physiology) delivered invited lectures in "3rd International Conference on Global Advances in Tea science" held at Kolkata, and in "Symposium for Recent Trends in Biotechnology" at University of Kalyani, in November 2003. Dr. Das also attended 9th annual conference of Indian Association of Cancer Research at Mumbai in January 2004, for deliberation of an invited talk.

Prof A.N. Lahiri Majumder (PMCG) participated in (i) the International Indo-US Agricultural Biotechnology Conference organized by DBT and USAID at Delhi in May,2003 as an invited speaker; (ii) in the brain storm session entitled "Plant Genome Research Strategy-a ten year perspective for the country", organized by the National Centre for Plant genome research on June 20,2003 (iii) delivered an invited talk in the International Conference on "Bioinformatics in Genomics and Proteomics "organized by DIC, Bose Institute at Kolkata during January 29-30,2004 (iv) Chaired a session on "Bioinformatics in Agricultural Biotechnology" organized by the BTIS at Chennai during February 5-6, 2004; (v) delivered plenary lecture in the National Conference on "Current perspective in Stress Biology" in February 6-8, 2004 at the North Bengal University (vi) delivered invited talk in the brain-storm meeting for "Agricultural Biotechnology-a road map for the future" at DBT on February 13,2004; (vii) delivered invited talk on National Symposium on "Abiotic stress in agriculture" at the Visva Bharati University on February 22, 2004.

Prof. Amita Pal (PMCG) attended and presented two papers on "Validation of DNA-based markers for critical assessment of bamboo- diversity" and on "Yellow mosaic virus disease of *Vigna mungo*: Development of PCR-based YMV-tolerance linked DNA-marker" in the International Congress of Plant Molecular Biology at Barcelona, Spain from 23rd to 28th June, 2003. She has chaired and delivered an invited talk on "Molecular characterization of bamboo species and its application in *ex situ* conservation" in the National Symposium on "Biotechnology for a better future", in the 26th Annual Meeting of the Plant Tissue Culture Association of India at Mangalore from 15th –17th January, 2004.

Ms. Jolly Basak (PMCG) presented a poster on "Divergent evolution of NBS-LRR resistant genes within the Fabaceae" in the Symposium on Bioinformatics for Genome Analysis", organized by the Bioinformatic Centre, Bose Institute, Kolkata on 29th and 30th January, 2004.

Dr. Sampa Das (PMCG) attended and presented paper on " Characterisation of receptor proteins of gut epithelial membranes of homopteran pests capable of binding to insecticidal plant lectins " in the International Congress of Plant Molecular Biology at Barcelona, Spain

from 23rd to 28th June, 2003. She also delivered talk in FMI, Basel and Federal research Station at Zurich during her visit from 29th June to 15th July,2003.

Dr. Sampa Das, (PMCG) Mr. Santanu Banerjee and Mr. Pralay Majumder (PMCG) had attended and presented poster and talk in 6th ISCSM at IICB during January, 2003 on "Identification of receptors responsible for binding of the lectin to the gut epithelial membrane of the target insects".

Dr. T.C. Ghosh (DIC) delivered a talk on the symposium on "Bioinformatics For Genome Analysis" organized by Bioinformatics Centre, Bose Institute on January 30, 2004.

Dr. T.C. Ghosh (DIC) delivered invited talk on a workshop on "Medi-informatics" organized by Indian Institute of Information Technology (IIIT), Allahabad on 9th February 2004.

Dr. T.C. Ghosh (DIC) delivered two lectures in the workshop on "Bioinformatics Tools Genomics and Proteomics" organized by Institute of Life Sciences, Bhubaneswar during March 16 –18, 2004.

Mr. Joydeb Chatterjee (SAIF) attended a two day Workshop on NABLAA cereditation exclusively for Sophiscitated Analytical Instrument Facility (SAIF) organized by D.S.T. at New Delhi on 9–10 April, 2003.

Invited talks delivered at various organizations

Dr. P. Chakrabarti (Biochemistry) delivered talk on the Stereospecific interactions of proline residues in protein structures and complexes on June 9, 2003 at Laboratoire d'Enzymologie et de Biochemie Sturcturales, CNRS, Gif-sur-Yvette, France; delivered talk on The physicochemical features of protein-protein interfaces on June 23, 2003 at EMBL, Hamburg, Germany; delivered talk on Features of protein-protein interactions on 29.10.03 at Goa University (Council Meeting of the Indo-French Centre for the Promotion of Advanced Research)

Dr. Sabita Bhattacharya (Botany) was invited as a resource person in a National Seminar on "Recent trends in Plant Biotechnology" held at Institute of Life Sciences, Bhubaneswar on March 11-13, 2004 and delivered a talk on "New approaches for plant germplasm conservation using *in vitro* techniques".

Prof. Sen-Mandi (Botany) is Guest Lecturer for M.Sc (Agriculture) , Calcutta University

Prof. Swati Sen-Mandi (Botany) was invited as a resource person: at workshop on Biodiversity for generating wealth with Biotechnological Intervention; Institute of Life Science, Bhubaneswar, March 11-13,2004.

Prof. Swati Sen-Mandi (Botany) was invited as resource person at Dept. Of Life Science, Manipur University, 2003-2004.

Prof. Manas Chakrabarty (Chemistry) delivered Invited Talks on "Combinatorial Chemistry" as a Resource Person in the Refresher Course in Jadavpur University on the 14th January, 2004 and in the Department of Chemistry, Vidyasagar University, Midnapore on the 12th March, 2004.

Prof. A. C. Ghose (Microbiology) delivered the 4th Prof. P. C. Sengupta Memorial Oration Award lecture at the School of Tropical Medicine, Kolkata on July 5, 2003.

Prof. Sibaji Raha (Physics) on August 19, 2003 Institute Colloquium at the Institute for Plasma Research, Gandhinagar, Gujrat. "Cosmological consequences of the quark-hadron phase transtition".

Prof. Indrani Bose (Physics) delivered an invited talk on High Temperature Superconductivity at the Physics Department, Lady Brabourne College on 7.4.03.

Dr. Sanjay K. Ghosh (Physics) delivered an invited talk on January 23, 2004, Tata Institute of Fundamental Research, Mumbai, "Cosmic Strangelet: Propagation and Detection"; delivered an invited talk on February 1, 2004, Indian Institute of Astrophysics, Bangalore, "Cosmological Dark Matter and Dark Energy from Cosmic QCD phase transition"; delivered an invited talk on February 4, 2004, Cosmic Ray Laboratory, Tata Institute of Fundamental Research, Ooty, "Detection of Cosmic Strangelets" delivered an invited talk February 12, 2004, Institute of Physics, Bhubaneswar, "In-medium hadrons in Photon- nucleus interactions".

Dr. Gaurisankar Sa (Animal Physiology) visited Cleveland Clinic Foundation, USA and delivered invited talk at the Department of Molecular Biology on 20th October 2003.

Dr. Tanya Das (Animal Physiology) delivered invited talk at the Department of Immunology, Cleveland Clinic Foundation, USA, in August 2003.

Prof. A.N.Lahiri Majumder (PMCG) delivered invited talk on "50 years of double helix" at the Vidyasagar University on January 7, 2004 on invitation from the Paschim Banga Bigyan Mancha.

Dr. Sampa Das (PMCG) was invited by Indian Society of Agricultural Biochemists to deliver a talk on "Developing Insect Resistance in Plants : A Part of The Crop Management Programme." at Department of Agricultural Biochemistry at Assam Agricultural University, Jorhat during 12-14th November, 2003.

Dr. T.C. Ghosh (DIC) was invited by UNESCO, European Office to give a series of lectures in a course on Bioinformatics for East-European students from 20th to 24 th October, 2003. Dr. Ghosh delivered two lectures in that course work.

Honours received

Prof. Parul Chakrabarti (Chemistry) has been nominated as member of DBT Task Force committee on Basic Sciences.

Dr. Joyoti Basu (Chemistry) has been elected a Fellow of the West Bengal Academy of Science and Technology.

The Biography of **Dr. Pradip Das** (Chemistry) has been included in Who's Who in Science and Engineering, 7th edn., New Jersey, USA (2003).

Service Departments

Distributed Information Centre

The Bioinformatics Centre, of Bose institute was formed in 1988 as one of the ten nodal centres under the programme, Biotechnology Information System (BTIS) of the Department of Biotechnology, Government of India, with genetic engineering and molecular modelling as the two major research areas. Based on the activities of research works since the inception Bioinformatics Centre at Bose Institute it has recently been declared as the "Centre of Excellence".

Studies on synonymous codon and DNA base composition in relation to the dynamics of genome evolution *(Dr. T.C. Ghosh).*

Different genome projects are producing a large number of genomic sequences that are available in the public domain. These genomic sequences actually represent molecular information constructing the current day organisms. They are the results of long molecular evolution since the origin of life. Therefore, these genomic sequences can be used efficiently to study the dynamics of genome evolution. Synonymous codon usage and DNA base composition are the two simplest parameters that can easily be obtained from genomic sequence data.

Genetic code is degenerate in nature. In absence of any evolutionary force in selecting the synonymous codon usage one can reasonably expect that any of the synonymous codons for a given amino acid would be equally good and all such codons would be found in approximately in equal numbers. Until the availability of complete genomes it was generally accepted that for unicellular organisms codon usage were mainly governed by a balance between mutational bias and translational selection. Moreover, data analyses with the completed genomes showed that mutational bias is not so simple as believed earlier. We analyzed the synonymous codon usage in *Lactococcus lactis* which is an AT rich non-pathogenic Gram-positive bacterium and has been widely used in milk fermentation. In this study we analyzed the sequences of experimentally known coding sequences. Our results suggest that codon usage of *L. lactis* is determined by compositional constraints however, translational selection is also operating in shaping the codon usage variation among the genes in this organism and it was also observed that C-ending codons are always preferred in duets whereas T ending codons are preferred in quartets of highly expressed genes. Hydrophobicity of genes is the second major factor in differentiating the codon usage variation among the genes in this organism. Length of the genes and the positions of the genes in the leading and lagging strand of replication have practically no influence in the codon usage variation among the genes in this organism.

J.C. Bose Unit and Museum

As in previous years, numerous scientists, school and college students as well as members of the general public visited the J.C. Bose museum at the Main Campus of Bose Institute during the

current year. Visitors from USA, Australia, UK, Italy, Czech Republic, Germany and Bangladesh and some other countries also visited the museum and many of them expressed their appreciation in the Visitors' Book. It deserves to be especially mentioned that Barry R. Masters, a Fellow of the Optical Society of America, paid a visit to the J.C. Bose Museum as part of his trip to India funded by the US Advisory Committee to the International Commission for Optics (USAC-ICO) and wrote about it in the Optics and Photonics News, May 2004 issue.

During the current year, the long-standing proposal of upgrading and modernizing the J.C. Bose Museum was finally taken up in earnest. On the occasion of the event *Acharya J.C. Bose:The Scientific Legacy* during March 29-31,2004 to commemorate the centenary of J.C.Bose's US patent on *Detector for Electrical Disturbances*, a permanent exhibition with duraprint panels, simulations and audio-visual exhibits highlighting the life, works and times of J.C. Bose was prepared and opened to the participants of the event as well as the general public. Prof. V. S. Ramamurthy, Secretary to the Govt. of India, Department of Science & Technology, New Delhi inaugurated the exhibition. This constituted part of the first phase of the modernization planned for the museum. The rest of the first phase renovation is in progress and expected to be completed shortly.

Library

The Institute Library system is one of the best Science Reference Libraries in Eastern India, set up in the main campus in 1917 and a wing at the Centenary building opened in 1983. It is being upgraded / equipped with state-of-the-art facilities and technology infrastructure. It endeavours to provide latest information to the BI faculty, researchers and staff in their day-to-day research and development work and also to extend its facilities to other Institutions / universities in and around Kolkata and as well as West Bengal. Faculty / researchers from Eastern India use the library extensively for reference. The library contains 35,712 [24,346 Bound journals + 11,042 Books + 324 Theses] volumes of Books / Journals / Theses] upto 31.03.2004. Total number of periodicals subscribed {foreign + Indian} were 175 during this year. During the year, 890 readers used the Library for their reference work, 35 permission cards were issued to the outside readers. Under Inter Library Loan system book / journals were issued to other institutions and also books / journals were taken on loan. Photocopy services are provided to outside users. A total 1,47,820 pages of photocopying (Xerox) services were given to our faculty and outside users. Some 984 bound volumes of book / journals and 2497 loose periodicals were issued by our research scholars and faculty members throughout the year for their reference work.

This year the library extended a scanning facility to faculty and researchers of the Institute. More than 450 documents were scanned for faculty members as well as research scholars. The Library has started online service for the faculty members and research scholars. This year library has subscribed to more than 100 journals Full Text online. Network access is possible from 10 nodes is centralized access area of both campus Library. Access is also available from faculty

members' desktop computers. The activities towards automation of library have been continued from previous years. 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. The journal database is up-to-date. All new books are searchable from Book database, old books data entry are also in process. Library has engaged project staff for computerization and automation. A complete and up-to-date "Periodicals Holdings of BI Library-2002" was compiled and sent to all the leading National and International organizations for effective resource sharing. Library has joined with consortia Forum for Resources Sharing in Astronomy and Astrophysics (FORSA), Bangalore. Through consortia library has subscribed online Nature journal. It is expected to have more journal purchase through consortia from next year. Library has purchased one digital networked Xerox machine of Toshiba brand and one analog Xerox machine of Canon.

Madhyamgram Experimental Farm

Appropos of the decission of the Task Force for Madhyam development the 1st floor of the laboratory building has been completed. However, in the absence of uninterpted power supply at Madhyamgram Farm the electrical connection is yet to be completed. WBSEB has been approached and it is expected that they will provide the same after completion of the necessary paper works on their side. The internal partition of the laboratory and procurement of lab equipment and fixture will be undertaken in the coming financial year. Initiative has taken to procure a new tractor for the farm. In view of the ensuing training programme for Mushroom cultivation and spwan production the existing facilities has been strengthened. These are in addition to the normal requirement of the scientists utilizing the fecilities of the Experimental Farm.

Publication

Since its inception in 1980 the Publication Section has been doing all sorts of publications from institute, i.e. Annual Report (both English & Hindi versions); Technical Report; BI News; Memorial Lecture, Director's Report; Folders; Posters and Leaflets of different Symposia, Seminars and Training programmes and works of Sir J.C. Bose. Soft copy of Technical Report and BI News and Annual Report are now available in the net (www.boseinstitute.org) . On the occasion of the Centenary Celebration of Sir J.C. Bose's Patent on Detector for Electrical Disturbances held on March 29 – 31, 2004 this section published five sets of picture post cards entitled i) *Institutions of Acharya Jagadis Chandra Bose,* ii) *Personal Associations of Acharya Jagadis Chanddra Bose,* iii) *Instruments of Acharya Jagadis Chanddra Bose,* iv) *Letters and Writtings,* v) *Art Works at Bose Institute* and these are also available for sale at the cost of Rs.125.00 for five sets.

The following books are now available for sale :

J.C. Bose and Microwaves – A collection	Rs.	200.00
Science and Society – Reflections	Rs.	1050.00
J.C. Bose A Scientiest 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 (Bengali)	Rs.	150.00
Acharya Jagadis Chandra Bose (Bengali)	Rs.	12.00
Picture Post Cards (five sets)	Rs.	125.00

Sophisticated Analytical Instrument Facility (SAIF)

Introduction

The Sophisticated Analytical Instrument Facility (SAIF) (formerly known as Regional Sophisticated Instrumentation Centre), at Bose Institute is now 28 years old and is one of the first four such facilities set up by the Department of Science and Technology, Government of India, in the 1970s. Over the years this facility has been providing instrumental analyses and consultancy to the R&D personnel from academia and industry. The mandate of the facility also includes organising workshops and in-house training programmes on the use of sophisticated instruments and the interpretation of data. Major funds for acquiring new instruments and accessories are provided for by the Steering Committee set up by DST for this purpose while all infrastructural and manpower support are provided by the host institution.

Highlights

With considerable support from the host institution in the way of improving the infrastructure and providing funds for the maintenance of some of the major instruments, it has been possible to improve the performance of the facility significantly during the year. But with many of the instruments having outlived their utility in today's perspective, it is imperative to procure some new sophisticated instruments for which there is a strong demand from the prospective users. It is

hoped that the Steering Committee, together with adequate support from the host institution, will grant funds in order to gradually phase out the obsolete instruments, which have now become extremely difficult to maintain primarily because of the non-availability of spare parts.

There has been a long standing demand from the Steering Committee to set up a web page for the Kolkata SAIF with links from the Bose Institute and DST web sites. With this in view a web page has been developed and it is now awaiting server space to be provided by the Internet Committee for uploading.

During the year a project for developing a comprehensive and user friendly computer database on the conservation of high priority medicinal plants of India was taken up in collaboration with the research group of Dr Sabita Bhattacharya, Botany Department, Bose Institute. The database is now in the testing phase and the b version should be ready very soon.

SAIF, Kolkata, collaborated with the University Science Instrumentation Centre, Jadavpur University, in organising a three-day Workshop on Electron Microscopy & X-Ray Diffractometry and their Applications in Material Science & the Biological Sciences, held in January, 2004.

Instrument Utilisation

Name of Instrument	No. of samples		Revenue earned (Rs)
	External	Internal	
Atomic Absorption Spectrometer	592	30	28,700
Spectrofluorimeter	34	0	1,360
EPR Spectrometer	86	4	4,500
Transmission Electron Microscope	107	0	23,120
Mass Spectrometer	1	18	2,280
Gas Liquid Chromatograph	27	0	2,650
HPLC (housed in ESS)	9	123	0
XRD (Single Crystal)	14	2	10,600

Workshop

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

Units	Requisition receipts	Job discharged	Continuing job
Mechanical	128	95%	5%
Electrical	1007	95%	5%
Carpentry	74	100%	Nil
Refrigeration	176	95%	5%
Drafting	50	100%	Nil
Lecture & seminars attended	350	100%	Nil
EPABX Unit	85%	100%	Nil

Social Relevance of Research Performed at Bose Institute

In India, 11-12% of people suffer from respiratory allergic disorders like allergic rhinitis and asthma. Airborne pollen grains and spores are the most common inhalant allergens, whose exposure is almost unavoidable for susceptible patients. In the Division of Palynology and Environmental Biology of Botany Department, studies are conducted on monitoring of common aeroallergens from West Bengal and the identification, isolation & characterization of allergenic components present in pollen/spores. In case of periwinkle pollen, its major allergen had been successfully cloned and sequenced in prokaryotic system. The use of the naturally purified/ recombinant allergen as vaccine in allergen immunotherapy can definitely improve the pain, reduce the symptom score and side effects in susceptible individuals. On the other hand, aero-pollen/ spore calendar prepared from the data of regular monitoring, help the clinicians to forecast the risk of allergen exposure to patients in pollen/sore season.

Chemokine receptors are essential for the entry of leishmania parasite into the cellular environment of the host. Regulation of these chemokine receptors is approached for the therapeutic purpose in addition, chemokines useful in regulating the elevated level of ceramide increased during leishmaniasis, may open-up a route to restrict the pathogenesis.

Successful outcome of the project will have a impact on the industrial and governmental sectors that release phthalate esters and polycyclic aromatic hydrocarbons due to non-availability of suitable treatment process, particularly in industrial effluents and municipal waste treatment plants.

Haploinsufficiency (HI) is a well-known genetic disorder the biomedical aspects of which have been extensively studied. More than 30 different human maladies have been attributed to HI. The theoretical studies carried out on HI provide insight on the possible origins of the disorder and offer clues for remedial measures. The work is appearing as an invited Chapter in the book the Biology of Genetic Dominance ed. by Reiner Veitia, Landes Bioscience (USA), 2004

In Animal Physiology Section, research in the fields of **Sericulture** has achieved an improvement of silk fiber quality and quantity from the silkworm, *Bombyx mori* L. Furthermore, in the field of **Aquaculture**, with the application of endocrine biotechnology, the seasonal barrier for breeding in catfish singi, the nutritionally rich fish, *Heteropneustes fossilis* Bloch has been overcome.

Research in the field of **Cancer chemoprevention** by diet-derived substances, e.g., turmeric, black tea etc, is expected to generate high impact in our country since these plant products can be cheap, non-toxic, immunoprotective and viable alternatives to existing costly, immunosuppressive and highly toxic modalities of cancer treatment. A patent has been accepted for a process for producing therapeutically active pure curcumin from *Curcuma longa* Linn (turmeric).

About 1800 packets of oyster and milky mushroom spawn have been handed over to the NGO (South Asia Research Society) for cultivation of mushroom through their SC/ST beneficiaries for income generation. Demonstration of cultivation of different mushroom strains like button, oyster,

milky and paddy straw have been done in the Madhyamgram Experimental Farm throughout the year that creates lot of enthusiasm to the local people about edible mushroom. Mushroom spawns have been distributed to the local growers in nominal rate for popularization of mushroom. Backcrossing of *Rorippobrassica*, the somatic hybrid between *Rorippa indica* and *Brassica juncea* with *Brassica juncea* and reciprocal cross have been done that is a step towards development of aphid tolerant stable *Brassica juncea* line.

List of personnel

Administration

Prof. Maqsood A. Siddiqi (Director)

Birendra N. Singh (Registrar)

T. K. Ghorui (Dy. Registrar)

Kajal Chaudhuri (Asstt. Registrar I), R. K. Kundu(Asstt. Registrar II), Debidas Saha (Asstt. Registrar III); Satyananda Pal (Accounts Officer), Saktipada Shit (Audit & Finance Officer).

Supporting Staff, Centenary Campus: PAs to Director: Arup K. Sengupta, Sankar Nath Sinha ; 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 Kr. Ghosh, Nikhilesh Roy Ghatak; Others: E. Pal, Swapan Kr. Sinha, Dhrubajyoti Sen, Sujit Kr. Ghosh, B. K. Mondal, M. C. Das, Rita Nath, Sisir Chakraborty, Baladeb Goswami, Rubi Sarkar, Sudam Jana, Rina Das, Somnath Das, Sujata Roy, S. Chatterjee, R. C. Sarkar, Dipak Dutta, C. Rangwa, K. Sur, T. K. Banerjee, K. Turi, S. Turi, K. Basar Molla, N. Yadav, K. Ansari, Kanai Hazra, Prafulla Bhunya, 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, Thakur Gond, Rajbrat Ram, R. R. Pandey, P. K. Mullick, R. Chakraborty, S. K. Chaki, D. Koley, A. Bhowmik, Sanjib Kr. Das, Biplab Malakar.

Supporting Staff, Main Campus: Office Superintendent: Arun Kr. Dasgupta, Others: Dibakar Sen, Rina Roy, Rabindra Nath Karmakar, 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, Rajkumari Balmiki.

Animal Physiology Section

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

Students*: Dr. Mitali Pramanik (upto May 26, 2003), Suman Pal (upto May 30, 2003), Shreya Chattopadhyaya, Sumedha Roy, Angshuman Biswas, Jhuma Dey, Arindam Bhattacharya, Samita Kundu, Debaprasad Mondal, Laksmishri Lahiri, Sankar Bhattacharyya, Gaurisankar Sen, Suman Patel and Sushila Patel (upto January 20, 2004).

Supporting Staff: Indrajit Ray, Sujit Kumar Ghosh, Uttam Kumar Ghosh.

Biochemistry Department

Faculty : Prof. B. Bhattacharyya (Chairman), Prof. Pratima Sinha, Prof. Nitai C. Mandal (Emeritus Scientist, upto 31/7/03), Dr. Pinakpani Chakrabarti, Dr. Anuradha Lohia, Dr. Rajagopal Chattopadhyaya, Dr. Pradeep Parrack, Dr. Subrata Sau.

Students : Sujata Hazra (till 19/7/03), Rima Chattopadhyaya, Subhra Majumdar, Malabika Das, Atasi Pal, Mainak Guha Roy (from 30/9/03), Sourav Sarkar (from 10/10/03), Rajasri Bhattacharyya, Gursaran Kaur, Rudra

*Faculty : a collective term for Lecturers, Senior Lecturers, Readers and Professors.
**Students : includes Research Scientists/Research Assoicates/Post Docoral Fellows/Pool officers/Senior Research Fellows/Junior Research Fellows.

Prasad Saha, Dipak Dutta, Gopa Mitra, Sudeshna Lahiri, Mithu Banerjee, Promita Ghosh Dastidar, Bhaskar Dasgupta, Sankar Prasad Das, Sumit Biswas, Lalita Das, Sabyasachi Halder, Atanu Banerjee (from 01/7/03), Pabitra Kr. Parua (from 16.7.03), Anirban Gupta (till 30/6/03), Suchismita Das, Sulagna Banerjee, Suvroma Gupta, Ranjit Prasad Bahadur, Partho Chattoraj, Chandrama Mukherjee, Phuljhuri Chakraborty (till 31.7.03), Tridib Ganguly, Soumitra Sau, Santanu Kr. Ghosh (till 31/7/03), Manjusha Sarkar, Suparna Laha (from 27/6/03), Sanjukta Mallick (till 19/12/03), Palas Kr. Chanda (from 16/7/03) Hem Ch. Jha (from 18/7/03), Saptarshi Mandal, Tarun Kanti Mandal, (Arumay Pal (from 8/9/03), Somasri Pal (from 18/9/03), Krishnendu Chakrabarti (from 24/9/03), Ajit Bikram Dutta (from 11/9/03), Dipak Manna (from 5/11/03).

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, Asraf Ali Molla, Sudhangsu S. Maity, Basudeb Ghorui, Dulal Chandra Mandal, Ranubala Das

Biophysics Department

Faculty: Prof. A. Banerjee, Prof. S. Roy and Dr. G. Basu.

Students : Nilanjana Banerjee, Ruchira Chattopadhyay, Dr. Rajat Banerjee, Dr. Tanaya Chatterjee, Atanu Maity, Amlanjyoti Dhar, Rajesh Saha, Smarajit Polley, Soma Sammadar, Suranjana Chattopadhyay, Soumi Guha, Srijata Mukherjee, Asit Manna, Subrata Debnath, Paromita Raha.

Supporting Staffs: Basudeb Marick, Amitabha Bhattacharyya, Barun Mazumdar, Swapan Jogsharma and Bijoy Munshi.

Botany Department

Faculty: Prof. Sukumar Gupta(up to Sept., 2003), Prof. Kalyan K. Mukherjee, Prof. Swati Sen-Mandi (Chairperson upto 17.12.03), Prof. Prabir Kr. Saha (Chairman from 18.12.03), Dr. Dibeyndu N. Sengupta, Dr. Swati Gupta-Bhattacharya, Dr. Sabita Bhattacharya, Dr. Tapas K. Ghose, Dr. Debabrata Basu.

Students : Sm. Rituparna Kundu Choudhury (resigned 7.4.03), Sm. Rupa Banerjee (resigned 9.4.03), Mr. Sarat Kr. Raj (terminated 30.4.03), Sm. Rohini Trivedi (terminated 20.10.03), Sm. Mousumi Sengupta (terminated 30.9.03), Sm. Saswati Laha (terminated 31.12.03), Sm. Sudarsana Biswas (31.12.03), Dr. Gourab Gangopadhyay (terminated 31.12.03 and joined on 8.4.04 as PDF Institute), Sri Siraj Dutta (resigned 12.8.03), Sm. Shaonli Das (resigned 18.12.03 as UGC fellow and joined on CSIR adhoc on 18.12.03), Sm. Suptothita Choudhury (joined on 23.6.03 and resigned on 30.9.03), Dr. Tanay Bandopadhyay (terminated on 31.3.03 and joined on 14.5.03), Mr. Koushik Ghosh (joined on 14.5.03), Mr. Sandeep Chand Choudhury (joined on 24.6.03), Sm. Kamala Niyogi (joined on 6.4.03 and terminated on 20.4.04), Sm. Jyostna Mondal (joined on 29.1.04), Mr. Avik Roy (joined on 4.2.04), Mr. Debojyoti Ghosh, Mr. Sujit Roy, Sm. Sudeshna Bhattacharya, Sm. Sanjukta Dey, Sm. Bratati Mukherjee, Dr. Pampa Chakraborty, Dr. Malay Kr. Adak, Mr. Sudip Kr. Sinha, Mr. Narrottam Dey, Mr. Bhaskar Gupta, Mr. Subhrajit Banerjee, Mr. Swarup Roy Choudhury, Sm. Pragya Paromita Saha, Sm. Saptadwipa Mukherjee, Sm. Pinki Choudhury, Mr. Aryadeep Roychoudhury (terminated on 30.9.03 and joined on 3.11.03), Sm. Kakali Mukherjee (joined on 3.11.03).

Supporting staff : Dr. Romit Poddar , Sukumar Majumdar, Shyamal Kr. Ghosh, Chanchal Chakraborty, Jadab Kumar Ghosh, Binoy Krishna Modak, Chaitali Roy, Kaberi Ghosh, Dilip Kr. Chakraborty, Sasanka Sekhar Bera, Sambhunath Debnath, Bipul Kr. Nag, Kanan Singh, Jagannath Das, Sarama Pradhan, Monimohon Ghosh.

Central Instrumentation Facility

Faculty : Prof. B. Bhattacharyya (Chairman)

Supporting Stuff : Jaganmoy Guin, Ranjan Kr. Dutta, Smriti Ranjan Maji, Mrinal Das, Alpana Bhattacharyya.

Chemistry Department

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

Students : Sandipan Sarkar, Madhumouli Chatterjee, Ramkrishna Basak, Nandita Ghosh, Sudipa Saha, Ashima Bhattacharyya, Bhaswati Samanta, Debabrata Mandal, Shresh Pathak, Kasturi Sarkar, Arunava Dasgupta, Ashis Biswas, Pratik Datta, Rajesh Bhattacharyya, Dr. Dipankar Bhattacharyya, Dr. Sujata Law, Madhuchhanda Kundu, Rajib Barik, Taraknath Kundu, Randhir Sinha, Sharmila Basu, Tanusree Sengupta, Srabasti Ghoshal, Chaitali Basak, Anil Kumar Singh, Mary Chatterjee, Saurabh Acharyya, Dr. Sandip Ghosh, Kamakshi Sureka, Monali Banerjee, Rajen Halder, Sushil K. Pathak, Dr. Meghamala Dutta, Satarupa Banerjee, Bidhyadhar Mandal, Ayantika Ghosh, Partha Mukherjee, Tushar K. Dhara, Sulakshana Karmakar.

Supporting staffs : Prasanta Kumar Pal, Aniruddha Aich, Sukumar Maitra, 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, Sachchidanand Ram, Kalyan Das.

Distributed Information Centre

Faculty : A. Lohia (Scientist-in-Charge), T.C. Ghosh (Lecturer)

Supporting staff: Mr. V.S. Sundararajan, Mr. T.K. Bhattacharyya, Mr. S.K. Gupta, Ms. S.Roy, Mr. J. Mandal.

Students : Dr. D. Roy, Dr. L. Pal, Dr. B. Medya, A. Bagchi, T. Banerjee, S. Basak.

Environmental Science Section

Faculty: Prof. Maqsood Siddiqi

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

Library

Dr. Arun Kumar Chakraborty (Librarian), Dr.(Mrs.) Rukmini Mitra, Mr. Panchugopal Das, Mr. Kalipada Hait, Mr. Samir Kumar Pal, Mr. Pradip Kumar Sarker, Dr.(Mrs.) Banhisikha Chaudhuri, Mrs. Gopa Dasgupta, Mr. Ajit Kolay, Mr. Gautam Mukherjee, Mr. Sarat Chandra Bhuiyan, Mr. Mritunjoy Jogsharma, Mr. Arun Nandi, Mr. Dinanath Das.

Madhyamgram Experimental Farm

Prof. P.K. Saha (Professor-in-Charge)

Supporting Staff : Puluk Kumar Roy, Subhash Senapati, Rakhal Ch. Jana, Dilip Pramanik, Chittaranjan Mallik, Sukumar Das, Sabita Baisya, Jagabandhu Nayak, Robin Talukdar, Laxmikanta Pradhan, Inal Ali, Bhanu Kisku, Mahesh Dasgupta, Rajkishore Lenka, Tapas Chamraborty.

Microbiology Department

Faculty : Prof. Pran K. Chakrabartty (Chairman), Prof. Asoke C. Ghose (upto 31st December 2003), Prof. Timir B. Samanta, Dr. Pradosh Roy, Dr. Subrata Majumdar, Dr. Sujoy K. Dasgupta, Dr. Tapan K. Dutta

Students : Dr. Madhumita Sirkar, Dr. Sovan Roy (upto 30.09.03), Sandip Bhattacharya, Sanjukta Ghosh, Chandrajit Lahiri (upto 21.10.03), Abhijit Basu (upto 30.09.03), Mahashweta Mitra, Mithu De (upto 23.04.03), Amit Sarkar, Anasuya Ray, Piyali Mukherjee, Avik Saha, Archna Sharma, Sujoy Chatterjee, Jiaur Rahaman Gayen, Sutapa Biswas Majee, Ranjana Roy (upto 08.03.03), Wriddhiman Ghosh, Ranadhir Dey, Subhankar Chatterjee, Nivedita Majumdar, Moumita Roy, Bejoy Sekhar Datta, Twishasri Das Gupta, Dr. Dola Boral.

Supporting Staff : Salil K. Das (II), Biswanath De Sarkar, Barindranath Mandal, Provat K. Chattopadhyay, Prabal Gupta, Saifulla Gazi, Debashis. Sarkar, Babli Marrick, Prabir Halder, Debashis Majumdar, Nityananda Patra, Jamuna Prasad, Dilip Bhattacharyya, Ramesh Prasad, Birendra K. Bari, Saral Das, Robin Paul, Sankar Bari, Purnendu Manna, Narayan Patali.

Physics Department

Faculty : Prof. Dipankar Home (Chairman), Prof. Suprakash C. Roy, Prof. Sibaji Raha, Prof. Indrani Bose, Prof. (Mrs.) Biva Roy, Dr. Satya Narayan Changdar (up to 30.11.2003), Dr. Barun K. Chatterjee, Dr. Swapan K. Saha, Dr. Tripurari Prasad Sinha, Dr. Sanjay K. Ghosh

Students : Dr. Basudhara Basu Nandi, Rajesh Karmakar, Tamal K. Mukherjee, Alok Kumar Pan, Bhaswar Ghosh, Rupa Sarkar, Alo Dutta.

Supporting Staff : Narayan C Dey, Amit K Ganguly, Kamal C Das, Sankar P Singha, Shyamsundar Mallick, Subhasis Banerjee, Manas Datta, Subrata Das, Tarun K Maji, Bharat P Ram, Bansi Dutta, Dayakant. Thakur, Sujit K Basu, Rajkumar Mourya, Prabir Halder.

Plant Molecular & Cellular Genetics Section

Faculty: Prof. Amita Pal (Head), Prof. A.N. Lahiri Majumder, Dr. Sampa Das and Dr. Samir Ranjan Sikdar.

Students: Dr. Biswajit Das, Dr. Sanghamitra Bhattacharyya, Dr. Jyotirmay Bhattacharyya, Palash Mondal, Santanu Banerjee, Manoj Majee, Anirban Chatterjee, Aparajita Das, Krishnarup Ghosh Dostidar, Susmita Maitra, Lily Goswami, Sudipta Ray, Barunava Patra, Jolly Basak, Malay Das, Shamik Bhattacharya, Sabiha Khan, Indrajit Chowdhury, Indrajit Dutta, Pralay Majumder, Anindya Sarkar, Dipankar Chakrabarty, Prasenjit Saha, Ritu Kapoor, Uttara Bhattacharya, Sruti Dutta, Sonali SenGupta, Hossain Ali Mondal, Samayeeta Sarkar.

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

Publication

Arun Kumar Das Gupta (Superintendent)

Supporting Stuff : Chandra Kanta Sasmol

Sophisticated Analytical Instrument Facility (SAIF)

Faculty : Dr Dilip K Mukherjee (Scientist-in-Charge), Dr Siddhartha Chaudhuri.

Supporting staff : Mr Tapan Datta, Mr Shyam S Kundu, Mr Gobinda Das, Mr Amit K Mahindar, Mr Jaideb K Chattopadhyay, Mr Pathik R Ray, Mr Alokananda Sarkar, Mr Arup K Sen, Mr Samir K Mukherjee, Mr Pradip K Karmakar, Mr Subhas C Maikap, Mr Jaganmoy Guin (deputed to PD laboratory), Ms Tanima Modak Dhar, Ms Manisha Banerjee, Mr Ranjit K Ghosh, Mr Debabrata Polley, Mr Sankar Santra, Ms Saraswati Sarkar (Sen).

Workshop

A.K. Mukherjee – Workshop Superintendent

Supporting Staffs : (Main Campus) Dipak Dutta, Asutosh Sarkar,Samar Dutta, Sithil Mukherjee, Sisir Ghosal, Tarapada Das, Dipen Sen Bankim Dutta, Sk. Md. Ehia Hossain, Basanta Kr. Shit, Bholanath Saren, Abdul Rahaman Molla, Panchanan Santra, Panchugopal Karak, Goplal Ch. Das, Sairoon Begum, Sk. Md. Farruck, Kishori Mohan Saha, W.D. Rozario, Kalachand Sen, Rajkumar Das, Pranab Banerjee, Brahmdeo Prasad, Subrata Basak, Sanjoy Santra.

(New Campus) Alok Kundu, Anil Sengupta, Jogendra Nath Das, Tapan Mondal, Ashit Bsnrejee, Md. Raffick, Murari Mohan Shee, Baidya Nath Murmu.

Statement of Accounts for the year 2003-2004

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

AUDITOR'S REPORT

We have audited the atached Balance Sheet of the BOSE INSTITUTE as at 31st March 2004, and also the Income and Expenditure Account for the year ended on that date, annexed thereto. The accounts of the Council and the Governing Body audited by a separate auditors are incorporated in these financial statements. These 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.

2. 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.

3. Further to our comments referred to above, we report that :
   a. We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purposes of our audit;
   b. 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;
   c. The Balance Sheet and Income & Expenditure Account dealt with by this report are in agreement with the Books of Account.

4. In our opinion and to the best of our information and according to the explanations given to us, the said account together with the NOTES and OBSERVATIONS annexed thereto 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 of the Institute as at 31st March, 2004, and
   b. in the case of the Income & Expenditure Account of the Surplus (Plan Account), for the year ended on that date.

For Nundi & Associates
Chartered Accountants

Sd/.
(M. Nandi)
Partner
Membership No. 16369

7C, Kiran Shankar Roy Road
Kolkata-700001
Dated 15th December, 2004

Bose
93/1, Acharya Prafulla Chandra Road
Balance Sheet

As at 31st March 2003 Rs. P.	Funds and Liabilities	Schedule No.	As at 31st March 2004 Rs. P.
15,87,50,874.95	**CAPITAL FUND**	I	17,48,03,610.00
	DEVELOPMENT FUND		
8,15,94,474.00	Institute Development & Modernisation Fund created with the Grant in aid sanctioned by the Planning Commission, Govt. of India and received through Govt. of W. Bengal during 1995-96 – Rs. 8,00,00,000.00		
	ii) Other resources 16,25,974.00		8,16,25,974.00
2,20,56,851.78	Fund for other Development work		2,35,80,373.78
8,84,12,612.09	**OTHER FUNDS**	II	9,54,31,234.68
2,13,61,538.17	**CURRENT LIABILITIES**	III	1,12,27,609.94
2,03,45,600.59	Excess of Income over Expenditure in respect of Grant-in-Aid Schemes	IV	1,65,65,045.77
39,25,21,951.58			**40,32,33,849.12**

Institute
Kolkata-700 009
as at 31st March, 2004

As at 31st March 2003 Rs. P.	Properties and Assets	Schedule No.	As at 31st March 2004 Rs. P.
15,87,83,335.44	**FIXED ASSETS**	V	17,47,74,874.44
15,750.00	**WORK IN PROGRESS (Other than Modernisation)**	VI	15,750.00
32,31,173.38	**INVESTMENTS**	VII	39,21,910.69
	INSTITUTE DEVELOPMENT AND MODERNISATION FUND INVESTMENT		
6,14,41,498.15	i) In Fixed Assests Rs. 6,14,71,876.15		
54,81,466.00	ii) Work in Progress Rs. 59,51,088.00		
1,27,96,033.00	iii) In Fixed deposits Rs. 1,34,22,259.00		8,08,45,223.15
1,89,13,241.00	Fund for other Development work investment in Fixed Deposit		1,97,60,441.00
	CURRENT ASSETS, LOANS & ADVANCES	VIII	
2,44,35,860.98	A. CURRENT ASSETS Rs. 2,20,19,865.26		
2,05,03,985.00	B. LOANS & ADVANCES		
	Secured : Rs. 1,41,87,960.00		
	Unsecured : Considered Good Rs. 22,95,801.00		
	Considered bad or doubtful not provided for Rs. 1,64,83,761.00		3,85,03,626.26
74,98,848.13	Excess of Expenditure over Receipts in respect of Grant-in-Aid Schemes	IV	76,10,778.31
1,55,79,144.05	Employees Pension Fund Investment etc. (As per Balance Sheet attached)		1,41,29,481.05
5,81,94,829.50	Employees General Provident Fund Investment etc. (As per Balance Sheet attached)		6,68,78,983.90
42,16,614.70	Employees Contributory Provident Fund Investment etc. (As per Balance Sheet attached)		36,13,300.38
39,10,91,779.33			**41,00,54,369.18**

Contd.

Bose

93/1, Acharya Prafulla Chandra Road

Balance Sheet

As at 31st March 2003 Rs. P.	Funds and Liabilities	Schedule No.	As at 31st March 2004 Rs. P.
B/F 39,25,21,951.58			40,32,33,849.12
	Excess of Income over Expenditure during the year (PLAN)		76,91,563.80
39,25,21,951.58			41,09,25,412.92

Notes on Accounts — IX A
Significant Accounting policies — IX B

Place : Kolkata
Date : 15th December 2004

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
Actg. Registrar
Bose Institute

Institute

Kolkata-700 009

as at 31st March, 2004

As at 31st March 2003 Rs. P.	Properties and Assets		Schedule No.	As at 31st March 2004 Rs. P.
				41,00,54,369.18
39,10,91,779.33	**MISCELLANEOUS EXPENDITURE :**			
	Excess of Expenditere over Income (Nonplan)			
6,50,049.00	As per last Account	Rs. 6,50,049.25		
	Council :			
	Less : Expenditure written off	Rs. 6,50,049.25		
7,80,123.25	Excess of Expenditure over Income as per last Account			
	Governing Body	Rs. 7,80,123.25		
	Add : Excess of Expenditure over Income during the year	Rs. 90,920.49		8,71,043.74
39,25,21,951.58				41,09,25,412.92

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

Sd/-
Prof. M. Siddiqi
Director
Bose Institute

Sd/-
(M. Nandi)
Partner
Nundi & Associates
Chartered Accountants
M. No. 16369

Dated : 15th December, 2004

Bose

93/1, Acharya Prafulla Chandra Road

Income and Expenditure Account

2002-2003 Rs. P.	Expenditure	Non-Plan Rs. P.	Plan Rs. P.	Total Rs. P.
To				
A. Pay & Allowances etc. :-				
69,70,171.00	Director and Administration	54,61,011.00	14,70,260.00	69,31,271.00
2,10,76,331.00	Research Staff	95,97,375.00	1,08,81,163.00	2,04,78,538.00
32,17,155.00	Workshop	28,52,962.00	2,05,160.00	30,58,122.00
10,99,452.00	Library	7,60,910.00	3,32,635.00	10,93,545.00
1,58,08,270.00	Dearness Allowances	1,08,07,384.00	67,48,587.00	1,75,55,971.00
9,34,473.00	City Compensatory Allowances	5,59,777.00	3,43,021.00	9,02,798.00
91,72,758.00	House Rent Allowance	55,56,058.00	35,18,913.00	90,74,971.00
12,88,726.00	Transport Allowances	7,11,759.00	5,20,753.00	12,32,512.00
80,013.00	Institute Contribution to P.F.	—	15,911.00	15,911.00
43,820.00	Small Family Incentive	—	49,902.00	49,902.00
6,28,692.00	Ad-hoc Bonus	3,36,921.00	3,43,644.00	6,80,565.00
2,12,99,989.66	Institute's Contribution to Pension Fund for Gratuity Commution & Pension	—	1,27,89,954.77	1,27,89,954.77
8,12,828.00	Arrear Dues (Promotion)	—	—	—
24,79,758.00	Leave Encashment	—	6,63,481.00	6,63,481.00
13,04,209.00	Medical Benefit	—	14,14,418.00	14,14,418.00
12,480.00	Children Education Assistance	—	14,760.00	14,760.00
—	Subsistence Allowance	—	1,54,329.00	1,54,329.00
9,180.00	Leave Travelling Concession	—	3,71,089.00	3,71,089.00
8,62,38,305.66		**3,66,44,157.00**	**3,98,37,980.77**	**7,64,82,137.77**

Contd....

Institute

Kolkata-700 009

for the year ended 31st March, 2004

2002-2003 Rs. P.	Income	Non-Plan Rs. P.	Plan Rs. P.	Total Rs. P.
By				
A. Grants and other Receipts :-				
13,55,00,000.00	Grant from Govt. of India (DST)	2,85,00,000.00	10,40,00,000.00	13,25,00,000.00
	Service Charges :			
3,34,402.00	Hostel & Guest House	5,01,193.00	---	5,01,193.00
72,288.00	Pick-up Service Charges	90,487.00	---	90,487.00
13,13,925.00	Over-head Charges	19,61,000.00	---	19,61,000.00
11,39,714.79	Interest from Bank : S.B. A/c. : 3,10,609.45 On F.D. : —	3,10,609.45	---	3,10,609.45
26,438.29	Interest on Security Deposit :	76,197.58	---	76,197.58
1,54,670.00	Miscellaneous Receipts	1,24,098.00	---	1,24,098.00
3,000.00	Income from Institute Vehicle	—	---	—
44,850.00	Sample Testing FTNNR	2,31,700.00	---	2,31,700.00
60,455.00	Sample Testing (RSIC)	68,460.00	---	68,460.00
2,04,663.00	Bid Fees/Tender Fees	49,461.00	---	49,461.00
36,870.00	Instrument usages	78,541.00	---	78,541.00
80,54,877.94	Deficit meet up Fund (2003-04)	1,28,11,049.97	---	1,28,11,049.97
14,69,46,154.02		**4,48,02,797.00**	**10,40,00,000.00**	**14,88,02,797.00**

Contd....

Bose Institute

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

Income and Expenditure Account for the year ended 31st March, 2004

2002-2003 Rs. P.	Expenditure	Non-Plan Rs. P.	Plan Rs. P.	Total Rs. P.
	To			
	B. Office Maintenance & Other Establishment Expenses:-			
9,34,780.57	Office Expenses including General Maintenance and Stationery	5,00,068.00	5,15,791.75	10,15,859.75
64,127.00	Postage	51,720.00	---	51,720.00
95,692.00	Advertisement	99,774.00	---	99,774.00
15,750.00	Audit Fees (for 2002-2003)	16,200.00	---	16,200.00
5,75,216.00	Telephone, Telex, EPABX	3,60,690.00	3,70,998.00	7,31,688.00
85,00,767.17	Electric Bill	38,87,000.00	60,00,665.00	98,87,665.00
7,01,137.00	Travelling Expenses	3,40,371.00	3,69,479.00	7,09,850.00
20,47,983.00	Building Repair and Maintenance	1,87,859.00	18,94,251.00	20,82,110.00
7,21,725.00	Car Repair and Maintenance	8,65,865.00	---	8,65,865.00
66,158.00	Garden Maintenance	81,250.00	---	81,250.00
—	Legal Expenses	5,35,810.00	---	5,35,810.00
11,60,772.00	Security Guard	12,32,033.00	---	12,32,033.00
1,84,914.00	National Science Day	---	1,96,215.00	1,96,215.00
	Foundation Day Celebration			
18,000.00	Assistance for Hindi Language Education	---	32,000.00	32,000.00
78,145.00	Liveries	---	---	---
2,49,029.00	SAC/RAP meeting	---	---	---
2,37,600.00	Asistance for Staff Canteen	---	2,29,800.00	2,29,800.00
1,56,51,795.74		**81,58,640.00**	**96,09,199.75**	**1,77,67,839.75**

Contd....

2002-2003 Rs. P.	Income	Non-Plan Rs. P.	Plan Rs. P.	Total Rs. P.

Contd....

Bose Institute

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

Income and Expenditure Account for the year ended 31st March, 2004

2002-2003 Rs. P.	Expenditure	Non-Plan Rs. P.	Plan Rs. P.	Total Rs. P.
	To,			
	C. Laboratory Expenses :-			
9,13,913.50	Physics	—	7,67,000.00	7,67,000.00
14,18,853.00	Chemistry	—	16,70,510.50	16,70,510.50
14,36,243.00	Botany	—	21,34,702.00	21,34,702.00
12,45,095.00	Microbiology	—	12,84,964.50	12,84,964.50
18,84,412.50	Bio-Chemistry	—	16,43,172.50	16,43,172.50
8,34,774.00	Bio-Physics	—	7,74,860.00	7,74,860.00
5,46,525.00	Animal Physiology	—	8,81,055.50	8,81,055.50
2,94,267.00	Library	—	4,44,167.00	4,44,167.00
8,58,460.00	P.M.C.G.	—	13,51,291.00	13,51,291.00
2,17,984.50	Immunotech Lab.	—	4,63,743.00	4,63,743.00
1,27,581.00	Environment Science Section	—	1,16,309.00	1,16,309.00
2,84,980.58	Workshop	—	4,51,888.00	4,51,888.00
2,18,196.00	Experimental Farms	—	1,58,080.00	1,58,080.00
2,08,393.00	Publication	—	2,84,986.00	2,84,986.00
4,15.570.00	Scholar's Hostel	—	6,00,602.00	6,00,602.00
1,24,823.00	Assistance to Institute Scientific Symposium/ Seminar/Exhibition etc.	—	2,12,524.00	2,12,524.00
53,606.50	R. S. I. C.	—	5,19,987.73	5,19,987.73
11,07,502.00	Central Instrumentation Lab.	—	10,26,038.00	10,26,038.00
3,12,769.00	F.T.N.M.R Maintenance	—	7,54,929.00	7,54,929.00
9,89,362.00	Internet/Website Facility Maintenance	—	13,20,729.00	13,20,729.00
51,991.91	Darjeeling Exp. Firm (High altitude Research Centre)	—	3,69,899.48	3,69,899.48
1,35,45,302.49		**—**	**1,72,31,438.71**	**1,72,31,438.71**

Contd....

2002-2003 Rs. P.	Income	Non-Plan Rs. P.	Plan Rs. P.	Total Rs. P.

Contd....

Bose Institute

93/1, Acharya Prafulla Chandra Road Kalkata-700 009

Income and Expenditure Account *for the year ended 31st March, 2004*

2002-2003 Rs. P.	Expenditure	Non-Plan Rs. P.	Plan Rs. P.	Total Rs. P.
	To			
	D. Transfer to Fund for Capital Expenditure :-			
89,61,918.00	Books and Journals	—	74,11,062.00	74,11,062.00
34,95,587.00	**APPARATUS & EQUIPMENT**	—	75,53,475.00	75,53,475.00
2,70,969.00	FURNITURE & FITTINGS	—	2,77,159.00	2,77,159.00
1,89,204.00	Air Conditioners	—	5,37,977.00	5,37,977.00
1,825.00	Electric Installation	—	77,645.00	77,645.00
2,60,000.00	Internet/Website Facility	—	3,11,400.00	3,11,400.00
27,348.00	Metal Road at Madhyagram	—	—	—
4,30,125.00	Motor Car	—	—	—
80,54,877.94	Deficit meetup Fund	—	1,28,11,049.97	1,28,11,049.97
—	Miscelleneous Expenditure Written off	—	6,50,049.00	6,50,049.00
98,54,426.19	Excess of Income over Expenditure Transferred to Balance Sheet	—	76,91,563.80	76,91,563.80
3,15,46,280.13		—	**3,73,21,380.77**	**3,73,21,380.77**
14,69,81,684.02	Total (**A + B + C + D**)	4,48,02,797.00	10,40,00,000.00	14,88,02,797.00

2002-2003 Rs. P.	Income	Non-Plan Rs. P.	Plan Rs. P.	Total Rs. P.
	By			
35,530.00	Fund Provision for Calibnet (1991-92) no longer required, now written back	—	—	—
35,530.00		—	—	—
14,69,81,684.02		4,48,02,797.00	10,40,00,000.00	14,88,02,797.00

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

Nundi & Associates
Chartered Accountants

Sd/-
P. Barman
Accountant
Bose Institute

Sd/-
S.P. Sit
A & F.O
Bose Institute

Sd/-
S. Pal
Accounts Officer
Bose Institute

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

Sd/-
Prof. M. Siddiqi
Director
Bose Institute

The 15th December 2004

Sd/-
(M. NANDI)
PARTNER
M. No. 16369

Bust of Acharya Jagadis Chandra Bose by Deviprasad Roychoudhury