

3. Modern Biology and Biotechnology

Japanese Coordinator:

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Modern Biology and Biotechnology

【 Coordinators 】

Japanese Coordinator	Indian Coordinator
Prof. Akira Ishihama Director and Head Nippon Institute of Biological Science Professor Faculty of Engineering, Hosei University	Prof. MRS Rao President JNCASR, Bangalore

Overviews and Future Plan

【 FY2002-2003 Overview 】

The priority area “Modern Biology and Biotechnology” of the Japan-India Cooperative Science Programme was initiated in FY1993. Three previous coordinators (Drs. Tokindo OKADA, Ikuo TAKEUCHI and Norio MURATA) from Japan devoted their efforts to develop fruitful collaborations between two countries in three subareas, bacterial molecular genetics, animal developmental biology, and plant stress biology. In FY2002, Dr. Akira ISHIHAMA took over the coordinator task and have organized new collaborative teams in subareas, ocean microbiology, insect genome biology, and eukaryotic molecular genetics.

In FY2002, a total of 7 joint research projects have been accepted as listed below. Three groups (Murata-Shivaji group [plant stress biology, #14], Asashima-Modak group [animal developmental biology, #10], and Ishihama-Chatterji group [bacterial molecular genetics, #11]) carried out the extension of their collaborations, while three newly organized groups (ocean microbiology, Kogure-Karunasagar group [#16], Shimada-Nagaraju group [insect genome biology, #12], and Horikoshi-Kundu group [eukaryotic molecular biology, #16]) initiated new projects.

In FY2003, all the on-going collaborative projects were extended. In addition, a new collaborative research between Kazufumi Shimizu (Nihon University School of Medicine) and Chattopadhyay Dhruvajyoti (Calcutta University) was included in the area of viral molecular biology.

【 FY2004-2005 Future Plan 】

In FY 2004, all the on-going collaborative researches are being carried out. In addition, we have accepted three new proposals. Due to the limitation of available budgets, these proposals are added into the waiting list. Besides the collaborative research, a workshop on will be held this year at Bangalore, India. The joint research group #13 (Masami Horikoshi [University of Tokyo] and Tapus Kundu [JNCASR, Bangalore]) organizes this workshop focusing on “Understanding of Chromatin Structure and Functions”

【 Summary 】

In FY2004, the priority area of modern biology and biotechnology includes seven collaborative researches on the major topics from most of the modern biology areas, keeping a good balance of the target organism from bacteria, viruses, insects, animals to plants. Due to the budget limitation, a new rule of the financial support to each project is introduced, in order to support as many collaborations as possible, *e.g.*, one exchange to each research group, and the maximum duration of stay for one month. However, the demand for the collaborative research is further increasing in this priority area. At present, the waiting list includes three new proposals, all preparing for initiation at FY2005. To encourage the scientific exchange between two countries, the increase in budget is needed in this priority area.

FY	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Seminar		1. India-Japan Seminar on Morphogens, Genes and Development, Feb. 18-21, Mysore J:7m/53md										
		2. The 1st India-Japan Molecular Biology Workshop on Gene Transcription in Prokaryotes, Mar.27-Apr.2, Hyderabad J:4m/28md										
				3. The 2nd India-Japan Molecular Biology Workshop on Gene Expression, Apr.1-4, Hayama I:6m/31md								
				4. The 3rd India-Japan Molecular Biology Workshop on DNA and Protein Footprinting, Mar.26-31, Hyderabad J:5m/35md								
				5. Stress Tolerance in Plants-impairment and Repair, Feb. 5-7, New Delhi J:10m/69md								
					6. Concepts and Models in Developmental Biology, Apr. 5-12, Naini Tal J:2m/24md							
									7. Fundamental Mechanisms of Stress Response J:10m/53md			
										8. Understanding of Chromatin Structure Function		
Visiting Scientists		J:2m/20md			I:1m/29md	I:1m/6md	I:1m/20md			I:2m/36md	I:1m/7md	
Total		J:14m/115md		J:5m/35md	J:10m/69md	J:2m/24md		J:2m/14md	J:10m/53md	J:2m/14md	J:4m/41md	
			I:3m/125md	I:11m/291md	I:1m/30md	I:1m/6md	I:1m/20md	I:5m/138md	I:4m/142md	I:8m/173md	I:8m/195md	

Report

1. Joint Research Projects

1-1 Project 6			
Title		Polyunsaturated Fatty Acids and Desaturases in Antarctic Cyanobacteria	
Principal Investigator	Japan	Prof. Norio Murata, Professor, National Institute of Basic Biology, Okazaki	
	India	Dr. Sisinty Shivaji, Deputy Director, Center for Cellular and Molecular Biology	
Period		From 1999 to 2001	
No. of Exchange	FY2001	Japan to India	India to Japan 1m/61md
	FY2002	J to I	I to J
	FY2003	J to I	I to J
	FY2004	J to I	I to J
Objectives : Poikilothermic organisms including cyanobacteria respond to low temperature by desaturating (conversion from a single C-C bond to a double C=C bond) fatty acids in membrane lipids, and desaturases catalyze these reactions. This phenomenon is regarded to compensate a decrease in membrane fluidity at low temperature by fluidization of membranes. The objective of this research is to study such a phenomenon in cryophilic cyanobacteria in Antarctic which have been adapted to extremely low temperature.			
Accomplishment Status : The major findings of the joint study using psychrophilic cyanobacterium <i>Nostoc</i> from Antarctica were: <ol style="list-style-type: none">1. Increase in the concentration of unsaturated fatty acids was observed in the four lipid fractions of <i>Nostoc</i> when grown at 9 °C compared to 25 °C.2. The desaturase genes (<i>desA</i>, <i>desB</i> and <i>desC</i>) exhibited > 95% homology with the respective <i>des</i> genes of mesophilic <i>Nostoc punctiforme</i>.3. The <i>des</i> genes are constitutive in their expression.4. The desaturase enzymes did not exhibit any characteristic features of cold active enzymes.5. Phylogenetically psychrophilic <i>Nostoc</i> was similar to mesophilic <i>Nostoc</i>.			

1-2 Project 10																			
Title		Molecular Approaches of Organogenesis in vitro in Animal Development																	
Principal Investigator	Japan	Prof. Makoto Asashima, Professor, University of Tokyo																	
	India	Prof. Sophan P. Modek, Professor, Karnatak University																	
Period		From 2001 to 2004																	
No. of Exchange	FY2001	Japan to India	India to Japan 1m/30md																
	FY2002	J to I	I to J 2m/49md																
	FY2003	J to I	I to J 1m/32md																
	FY2004	J to I	I to J																
Objectives :																			
<p>1. To study the role of cell cycle in defining the induced organogenesis in vitro.</p> <p>2. To examine by quantitative Real-time Polymerase Chain Reaction the chronological relationship for the expression of genes specific for Activin-A induced organogenesis in <i>Xenopus laevis</i> animal caps in vitro.</p>																			
Accomplishment Status :																			
<p>1. Eight experiments were set up to promote hormonally induced ovulation and fertilization in <i>Xenopus laevis</i>. <i>Xenopus laevis</i> females and males were injected intradermally 0.4ml and 0.2ml, respectively, of Progesterone and animal left in pairs in boxes at 20 . Next day, 7 gave fertilized eggs with embryos undergoing early embryonic development</p> <p>2. Four experiments were conducted to learn the Animal Cap extirpation technique on stages 8.5 and 9 of <i>Xenopus laevis</i>. In these, a total of 25, 50, 60, and 65 caps were isolated and treated with low (1ng/ml), medium (10ng/ml) and high (100ng/ml) Activin A and survivals were examined. With these experiments, Prof. Modak has learnt the Animal Cap model and mastered the surgical technique.</p> <p>3. In Two more experiments Animal caps were treated with 10ng/ml dose of Activin A</p> <table border="1"> <thead> <tr> <th>Expt. no.</th> <th>Total no of caps</th> <th>Activin A Treatment</th> <th>Chase schedule</th> </tr> </thead> <tbody> <tr> <td>I</td> <td>60</td> <td>10ng/ml for 1h</td> <td>1h, 3h, 6h, 9h 21h, Control 0h & 21h</td> </tr> <tr> <td>II</td> <td>70</td> <td>10ng/ml for 1h</td> <td>0.5, 1,2,3,4,6h</td> </tr> <tr> <td></td> <td></td> <td>Control</td> <td>0h, 6h</td> </tr> </tbody> </table> <p>Total RNA is extracted by Isogen protocol and quantified on UV spectrophotometer. RNA was reverse transcribed to obtain single stranded cDNA using oligo-dT primer, treated with RNase I (DNase-free) and readied for Polymerase chain reaction.</p> <p>We will use as probes cyclin B1, Cyclin E2, cdc2 kinase)cell cycle specific, X-bra (mesoderma), N-CAM, goosecoid (neural cell lineage specific and Ornithine decarboxylase gene (internal control). The real-time PCR allows quantifying the number of gene-specific transcripts represented in the cells which would reflect the relationship between cell cycle and expression of mesodermal or neural cell lineages induced by activin A.</p>				Expt. no.	Total no of caps	Activin A Treatment	Chase schedule	I	60	10ng/ml for 1h	1h, 3h, 6h, 9h 21h, Control 0h & 21h	II	70	10ng/ml for 1h	0.5, 1,2,3,4,6h			Control	0h, 6h
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		Control	0h, 6h																

1-3 Project 11 and Project 15 (extension of project 11)			
Title		Global Regulation of Gene Transcription in Bacteria Growing under Various Environments	
Principal Investigator	Japan	Prof. Akira Ishihama, Director and Head, Nippon Institute of Biological Science	
	India	Prof. Dipankar Chatterji, Professor, Indian Institute of Science	
Period		From 2001 to 2003	
No. of Exchange	FY2001	Japan to India	I to J (Chatterji/15 days) I to J (Gowrishankar/36 days)
	FY2002	J to I	I to J (Chatterji/17 days)
	FY2003	J to I (Ishihama/12 days)	I to J (Dasgupta/29 days) I to J (Chatterji/17 days)
	FY2004	J to I	I to J
<p>Objectives : Global regulation of gene transcription is the research subject of this collaborative research team between Japan and India, headed by Prof. Akira ISHIHAMA, Nippon Institute for Biological Science (NIBS), Ome, Tokyo, Japan and Prof. Dipankar CHATTERJI, Indian Institute of Science (IIS), Bangalore, India. The research team includes Dr. J. Gowrishankar from Centre for DNA Fingerprinting & Diagnostics (CDFD), Hyderabad, India and Dr. Dipak Dugupta, from Saha Institute of Nuclear Physics, Kolukata. The research aim of this group is to reveal the molecular mechanisms underlying the global regulation of gene transcription in bacteria during growth phase or in response to changes in environment such as nutrient starvation, osmolarity change, and heat- or cold-shock.</p> <p>Accomplishment Status : The Ishihama lab at Nippon Institute for is one of the international centers for <i>E. coli</i> research, and maintains various experimental systems including the microarray system for transcriptome analysis using genome DNA chips, and various useful materials including collections of the expression vectors for all <i>E. coli</i> proteins, more than 1,000 promoters, and purified RNA polymerase and transcription factors. The collaborators from India often came to this lab to use these systems and materials, and performed fruitful collaborations. Ishihama often visit India to set up new collaborative teams between two countries in the field of molecular biology, and to provide young Indian scientists with new information related to global transcription regulation of the <i>E. coli</i> genome. During this period, a total of five joint papers have been published from this collaborative research team.</p> <p>Future Plan : Molecular biological studies of prokaryotes in two countries expanded from the model bacterium <i>Escherichia coli</i> to various bacteria isolated from natural fields, including pathogenic bacteria. In response to the increased demand from Indian scientists to perform collaborative studies with Japanese scientists using useful resources and modern facilities that are maintained in Japan, Akira Ishihama and Dipankar Chatterji plan to set up a network of molecular biologists from two countries, working with transcriptional response of bacteria to environment. Using this network, they attempt to provide support to as many scientists as possible. They also plan to connect this network to Asian Conference on Transcription (ACT) for further expansion of the collaboration to neighboring countries.</p>			

1-3 Project 12			
Title		Identification, Characterization and Physical Mapping of Z-chromosome Linked Genes of The Silkworm <i>Bombyx mori</i>	
Principal Investigator	Japan	Prof. Toru Shimada, Associate Professor, University of Tokyo	
	India	Dr. J. Nagaraju, Staff Scientist and Chief, Centre for DNA Fingerprinting and Diagnostics	
Period		From 1 June 2002 to 31 March 2005	
No. of Exchange	FY2001	Japan to India	India to Japan
	FY2002	J to I 1m/7md	I to J 1m/7md
	FY2003	J to I 1m/7md	I to J 1m/17md
	FY2004	J to I	I to J
<p>Objectives: The chromosome constitution of the silkworm, <i>Bombyx mori</i>, is ZW in females and ZZ in males. Although the Z chromosome has important function in development and cocoon production, only very little information about the molecular structure of the Z chromosome is available. We planned to determine a several portion of the Z chromosome and apply the information for the genotyping and breeding of Indian races.</p> <p>Accomplish Status: We determined approximately 1.0 Mbp nucleotide sequence of the Z chromosome, and found approx. 30 novel protein-coding genes. We obtained a surprising result that the Z-linked genes generally did not show dosage compensation. The results were partially published in the following papers:</p> <ol style="list-style-type: none"> 1. Yoshiko Koike, Kazuei Mita, Masataka G. Suzuki, Susumu Maeda, Hiroaki Abe, Kazutoyo Osoegawa, Pieter J. deJong, Toru Shimada (2003) Genomic sequence of 320 kb containing a kettin orthologue on the Z chromosome in <i>Bombyx mori</i>. <i>Molecular Genetics and Genomics</i>, in press. 2. Fumi Ohbayashi, Masataka G. Suzuki and Toru Shimada (Sep. 2002) Sex determination in <i>Bombyx mori</i>. <i>Current Science (Bangalore)</i> 83 (4): 466-471. <p>Furthermore, we are collaborating for developing microsatellite DNA markers, which are useful for analysis of the Z chromosome. The results were published in the following paper:</p> <ol style="list-style-type: none"> 1. M. D. Prasad, M. Muthulakshmi, M. Madhu, K. P. Arunkumar, V. B. Sreenu, V. Pavithra, B. Bose, H. A. Nagarajaram, K. Mita, T. Shimada and J. Nagaraju (2005) SilkSatDb: A microsatellite database of the silkworm, <i>Bombyx mori</i>. <i>Nucleic Acids Research</i> (in press). <p>Future Plan: Dr. Nagaraju and Shimada are planning to construct a more precise molecular linkage map to understand the overall structure of the Z chromosome. Since more than 10 sex-linked DNA markers have been already found in Dr. Nagaraju's lab, we will be able to extend the physical map of the Z chromosome drastically by our intimate collaboration. In this year, Dr. Nagaraju will visit Japan as an official collaboration supported by JSPS-DST.</p>			

1-4 Project 13			
Title		Chromatin-mediated transcriptional regulation	
Principal Investigator	Japan	Prof. Masami Horikoshi, Associate Professor, The University of Tokyo	
	India	Prof. Tapas K. Kundu, Assistant Professor, JNCASR, Bangalore	
Period		From 2002 to 2005	
No. of Exchange	FY2001	Japan to India	India to Japan
	FY2002	J to I	I to J 1m/21md
	FY2003	J to I	I to J 1m/31md
	FY2004	J to I	I to J
Objectives :			
<p>Eukaryotic genome is organized in a highly complex nucleoprotein structure, the unit of which is nucleosome. Nucleosome is composed of core histone containing eight molecules of four different histones, and 146 bp of DNA wrapped around it. The beads-on-a-string structure of nucleosome are organized in a 10nm filament, which is further packed into 30nm filament and finally the chromatin loop structure. Significantly this structural organization of chromatin is highly dynamic. Apart from core histones, histone H1, several non-histone proteins and histone chaperones, and chromatin remodeling system are involved in the structural and functional organization of chromatin. In the present project we will address the role of three different histone chaperones in chromatin organization and function.</p>			
Accomplishment Status :			
<ol style="list-style-type: none"> 1. Technology of yeast two-hybrid binding assay has been accomplished by Kundu with help from Horikoshi's group. 2. Yeast two-hybrid screening has been under way to identify the interacting proteins for these chaperones. 3. Several new ideas have been brought about as a result of discussion between both coordinators. 			
Future Plan :			
<ol style="list-style-type: none"> 1. Interactions of histone chaperones NAP1, CIA and Nucleophosmin (B23) with mono- and oligo-nucleosomes will be studied. Their role in the structural change of nucleosome and transcription factor binding to nucleosome will be investigated. 2. Yeast two hybrid system will be used to identify interacting proteins for these chaperones. 3. Yeast homolog of nucleophosmin will be used for some comparative studies, and to find out the role of it in transcription regulation (in vivo). 4. The promoter specificity of this chaperones will be studied by Chromatin immunoprecipitation (Chip) assay. 5. Mechanism of transcriptional activation by these proteins will be elucidated using in vitro reconstituted chromatin transcription system. 			

1-5 Project 14			
Title		Molecular Basis of Cold Acclimation	
Principal Investigator	Japan	Prof. Norio Murata, Professor, National Institute of Basic Biology, Okazaki	
	India	Dr. Sisinty Shivaji, Deputy Director, Center for Cellular and Molecular Biology	
Period		From 2002 to 2005	
No. of Exchange	FY2001	Japan to India	India to Japan
	FY2002	J to I 1m/7md	I to J 1m/43md
	FY2003	J to I	I to J 1m/25md
	FY2004	J to I	I to J
Objectives :			
<p>Poikilothermic organisms including bacteria and Cyanobacteria respond to changes in temperature by regulating the level and the quality of unsaturation of fatty acids in membrane lipids. The objective of this research is to investigate the molecular mechanisms for the regulation of desaturation and <i>cis-trans</i> isomerization of fatty acids in Antarctic bacteria and cyanobacteria, as model systems.</p>			
Accomplishment Status :			
<ol style="list-style-type: none"> 1. We isolated <i>cti</i> gene for <i>cis-trans</i> isomerase from the Antarctic bacterium <i>Pseudomonas syringae</i>, and mutated this gene in this bacterium. Biochemical and physiological examination of the <i>cti</i> mutant cells indicated that they did not produce <i>trans</i>-unsaturated fatty acids under any growth conditions and were sensitive to high temperature. 2. We isolated from the Antarctic cyanobacterium <i>Nostoc</i> species the <i>desC1</i> and <i>desC2</i> genes for 9-desaturases at the <i>sn-1</i> and <i>sn-2</i> positions, respectively, of the glycerol moiety of polar glycerolipids. We characterized differences in the amino acid sequence between the DesC1 and DesC2 desaturases. 			

1-6 Project 16			
Title		Microbial Study on Mortality of Natural Zooplankton	
Principal Investigator	Japan	Prof. Kazuhiro Kogure, Professor, University of Tokyo	
	India	Prof. Iddya Karunasagar, Professor, University of Agricultural Science	
Period		From 2002 to 2005	
No. of Exchange	FY2001	Japan to India	India to Japan
	FY2002	J to I	I to J
	FY2003	J to I 1m/12md	I to J 1m/12md
	FY2004	J to I	I to J
Objectives:			
<p>Most marine organisms are healthy. This is because weak or unhealthy individuals are easily trapped and eaten by predators. The exceptions are the last stage of red tide or cultured marine organisms. The fishes or shrimps in the culture ponds are quite often suffered from appearance of mass death due to pathogenic microorganisms and viruses.</p> <p>Recent observation on zooplankton in the deep sea, however, indicates that some natural zooplankton seem to be not healthy. This suggests that the general idea stated above may not be true and/or influence of human activities may be expanding to natural environments. The objective of the present projects is to clarify the cause of mortality of natural zooplankton with special emphasis on the contribution of bacteria and viruses.</p>			
Accomplishment Status:			
<p>Unfortunately, Dr. A. S. Pradeep RAM was not able to come to Japan in 2002, because he has to be in the US from Dec. 2002 to Feb. 2003. Therefore, we could not exchange people.</p> <p>The works are summerized as follows:</p> <p>As a typical pathogenic bacterial group, we have concentrated on luminescent bacteria. During two cruises by R/V Tansei-maru, Ocean Research Institute, The University of Tokyo (ORI-UT) and several field surveys, about 100 luminescent bacteria were isolated from the seawater, zooplankton and fishes. Some zooplankton samples have been treated individually and preserved in the deep freezer for further work on attached microbes and viruses at genetic level. Dr. Nayak, ORI-UT also isolated about 10 luminescent bacteria from West coast of India in Feb. 03.</p> <p>We are analyzing their physiological characteristics and 16S rDNA sequences for identification. As for <i>Photobacterium leiognathi</i>, we have also sequenced lux a gene to characterize their taxonomical positions and functional differences. In order to specifically identify pathogenic strains, we are currently trying to sequence the 23S-16S intergenic spacer region (ISR).</p>			
Future Plan:			
<p>From the works accomplished in 2002, we realized that there may be various types of strains to each luminescent bacterial species. The presence of such variants seems to be dependent on geographical regions and the host, i.e., zooplankton or fish. It is necessary to clarify such factors before the work of particular pathogenic strains.</p> <p>Our future plan is as follows:</p> <ol style="list-style-type: none"> 1. Isolate luminscent bacteria from coastal environments near Japan and also India. In addition to the water samples, the zooplankton or fishes samples will be collected and treated individually to see the specific association of particular luminescent strains. 2. Characterization of luminescent bacteria by sequencings of 16S rDNA, lux a and ISR. After that, some genes possibly involved in the pathogenicity and association with zooplankton will be further analyzed. 3. The presence WSSV (White spot syndrom virus) in zooplankton samples will be also examined at genetic level to clarify their possible role in mortality of natural zooplankton populations. 			

1-7 Project 17			
Title		The Relationship between Structure and Function of Influenza virus RNA Polymerase	
Principal Investigator	Japan	Prof. Kazufumi Shimizu, Professor, Nihon University	
	India	Prof. C. Dhrubajyoti, Professor, Calcutta University	
Period		From 2003 to 2007	
No. of Exchange	FY2001	Japan to India	India to Japan
	FY2002	J to I	I to J
	FY2003	J to I 1m/10md	I to J 1m/32md
	FY2004	J to I	I to J
<p>Objectives: Identification of function-structure relationship of influenza virus RNA polymerase. Influenza virus RNA polymerase is composed of three viral proteins (PB1, B2 and PA) and is involved in both transcription and replication. The mechanism of functional interconversion between transcriptase and replicase is not known. The objective of this study is to reveal the molecular mechanism of the functional modification of influenza virus RNA polymerase.</p> <p>Accomplishment Status : Function of influenza virus RNA polymerase is considered to be modulated by protein phosphorylation. We tried to identify the phosphohrylated subunit of influenza virus RNA polymerase. For this purpose, we constructed the expression vector of three polymerase subunits in <i>E. coli</i> and purified each protein to homogeneity. The purified subunts were subjected to <i>in vitro</i> phosphorylation using various protein kinases. We found that the PB2 subunit was phosphorylated by protein kinase-C.</p> <p>Future Plan : The PB2 subunit of influenza virus RNA polymerase is phosphorylated <i>in vitro</i> by protein kinase-C. To confirm our finding of PB2 phosphorylation, we will check whether this subunit is phosphorylated <i>in vivo</i> in influenza virus-infected cells using two-dimensional gel electrophoresis system. We will also identify the phosphorylation site within the PB2 subunit. To reveal the role of PB2 phosphorylation in virus growth, we will construct the mutant PB2 subunit, which lacks the phosphorylation site, and then check the growth of mutant viruses.</p>			

*** Exchange Visits Undertaken**

Japan to India

No. of Project	Name & Affiliation	Research Subject	Main Host Researcher	Period
Project 12 (FY2002)	Prof. Toru Shimada Associate Professor University of Tokyo	Identification, characterization and physical mapping of Z-chromosome linked genes of the silkworm, <i>Bombyx mori</i> .	Dr. J.G. Nagaraju Staff Scientist and Chief Centre for DNA Fingerprinting and Diagnostics	9 Sep 2003 - 13 Sep 2003 (7 days)
Project 14 (FY2002)	Prof. Hidetoshi Okuyama Associate Professor Hokkaido University	Experiment on Expression of Active Cti Protein in <i>E. Coli</i> Cells	Dr. Sisinty Shivaji Deputy Director Center for Cellular and Molecular Biology	19 Mar 2003- 25 Mar 2003 (7 days)
Project 12 (FY2003)	Dr. Michiyoshi Takahashi Research Associate University of Tokyo	Identification, characterization and physical mapping of Z-chromosome linked genes of the silkworm, <i>Bombyx mori</i> .	Dr. J.G. Nagaraju Staff Scientist and Chief Centre for DNA Fingerprinting and Diagnostics	7 Feb 2004- 13 Feb 2004 (7 days)
Project 15 (FY2003)	Prof. Akira Ishihama Director and Head Nippon Institute of Biological Science Professor Hosei University	Global Regulation of Gene Transcription in Bacteria Growing under Various Environments	Prof. Dipankar Chatterji Professor Indian Institute of Science	1 Dec 2003 - 12 Dec 2003 (12 days)
Project 16 (FY2003)	Dr. Minoru Wada Research Associate The University of Tokyo	Microbial Study on Mortality of Natural Zooplankton	Prof. Iddya Karunasagar Professor University of Agricultural Science	7 Mar 2004- 18 Mar 2004 (12 days)
Project 17 (FY2003)	Dr. Ayae Honda Researcher Nippon Institute for Biological Science	The Relationship between Structure and Function of Influenza virus RNA Polymerase	Prof. Chattopadhyay Dhrubajyoti Professor Calcutta University	27 Nov 2003 - 7 Dec 2003 (10 days)

India to Japan

No. of Project	Name & Affiliation	Research Subject	Main Host Researcher	Period
Project 6 (FY2001)	Dr. Sisinty Shivaji Deputy Director Center for Cellular and Molecular Biology	Polyunsaturated Fatty Acids and Acyl-Liquid Desaturases of Psychrotropic Cyanobacteria from Antarctica	Prof. Norio Murata Professor National Institute of Basic Biology, Okazaki	20 Nov.2001- 19 Jan.2002 (61 days)
Project 10 (FY2001)	Dr. Surendra Ghaskadbi Scientist E1 Agharkar Research Institute	In Vitro Control of Cell Differentiation Using <i>Xenopus</i> <i>Laevis</i> Embryos	Prof. Makoto Asashima Professor University of Tokyo	25 Feb.2002- 26 Mar.2002 (30 days)
Project 10 (FY2002)	Dr. Surendra Ghaskadbi Scientist E1 Agharkar Research Institute	Modulation of Gene Expression in <i>Xenopus</i> Embryos Developing under Conditions of Altered Salinity	Prof. Makoto Asashima Professor University of Tokyo	22 Jan.2003- 19 Feb.2003 (29 days)
Project 10 (FY2002)	Prof. Sohan P. Modak Professor Karnatak University	Molecular Signals Responsible for Transfer of Inductive Stimulus during the Establishment of Neural Cell Lineage and the Body Axis in Chick Embryos and Amphibian Animal Caps	Prof. Makoto Asashima Professor University of Tokyo	12 Feb.2003- 3 Mar.2003 (20 days)
Project 11 (FY2001)	Prof. Dipankar Chatterji Professor and Head Indian Institute of Science, Bangalore	Subunits of <i>E. coli</i> RNA Polymerase and Their Function	Prof. Akira Ishihama Director and Head Nippon Institute of Biological Science Professor Hosei University	20 Feb.2002- 6 Mar.2002 (15 days)
Project 11 (FY2001)	Dr. J. Gowrishankar Staff Scientist Centre for DNA Fingerprinting and Diagnostics	In vitro Studies on Functional Activity of Sigma S Proteins with N- and C- terminal Deletions	Prof. Akira Ishihama Director and Head Nippon Institute of Biological Science Professor Hosei University	10 Jan.2002- 14 Feb.2002 (36 days)
Project 12 (FY2002)	Dr. J.G. Nagaraju Staff Scientist and Chief Centre for DNA Fingerprinting and Diagnostics	Identification, characterization and physical mapping of Z-chromosome linked genes of the silkworm, <i>Bombyx</i> <i>mori</i> .	Prof. Toru Shimada Associate Professor University of Tokyo	1 Mar. 2003 - 8 Mar. 2003 (8 days)

Project 13 (FY2002)	Prof. T. K. Kundu Assistant Professor Jawaharlal Nehru Center Advanced Scientific Research, Bangalore	Role of Histone Chaperones in Structural Organization of Chromatin and its Functional Significances	Prof. Masami Horikoshi Associate Professor Institute of Molecular and Cellular Biosciences The University of Tokyo	16 Jan. 2003- 5 Feb.2003 (21 days)
Project 14 (FY2002)	Dr. Sisinty Shivaji Deputy Director Center for Cellular and Molecular Biology	Molecular Basis of Cold Adaptation: Antarctic Cyanobacteria and Bacteria as Model Systems	Prof. Norio Murata Professor National Institute of Basic Biology, Okazaki	1 Feb. 2003 – 15 Mar.2003 (43 days)
Project 15 (FY2002)	Prof. Dipankar Chatterji Professor and Head Indian Institute of Science	Microchip Analysis of Transcription Regulation in Escherichia coli	Prof. Akira Ishihama Director and Head Nippon Institute of Biological Science Professor Hosei University	12 Mar.2003- 28 Mar.2003 (17 days)
Project 10 (FY2003)	Prof. Surendra Ghaskadbi Scientist E1 Agharkar Research Institute	Molecular Analysis of Early Animal Morphogenesis and Cell Differentiation	Prof. Makoto Asashima Professor University of Tokyo	29 Feb.2004- 31.Mar.2004 (32 days)
Project 12 (FY2003)	Dr. G. Mahesh Postdoctoral fellow Centre for DNA Fingerprinting and Diagnostics	Physical Mapping and Nucleotide Sequencing of the Z Chromosome in the Silkworm, Bombyx mori	Prof. Toru Shimada Associate Professor University of Tokyo	11 Sep. 2004- 27 Sep. 2004 (17 days)
Project 13 (FY2003)	Prof. T.K.Kundu, Assistant Professor Jawaharlal Nehru Center Advanced Scientific Research, Bangalore	Chromatin Remodeling and Transcription	Prof. Masami Horikoshi Associate Professor Institute of Molecular and Cellular Biosciences The University of Tokyo	27 Feb.2004- 28 Mar. 2004 (31 days)
Project 14 (FY2003)	Dr. Sisinty Shivaji Deputy Director Center for Cellular and Molecular Biology	Molecular Bases of Cold Acclimation	Prof. Norio Murata Professor National Institute of Basic Biology, Okazaki	7 Mar,2004- 31 Mar. 2004 (25 days)
Project 15 (FY2003)	Prof. Dipak Dusgupta Professor Saha Institute of Nuclear Physics	Global Regulation of Gene Transcription in Bacteria Growing under Various Environments	Prof. Akira Ishihama Director and Head Nippon Institute of Biological Science Professor Hosei University	22 Feb. 2004- 21 Mar. 2004 (29 days)

Project 15 (FY2003)	Prof. Dipankar Chatterji Professor and Head Indian Institute of Science	Global Regulation of Gene Transcription in Bacteria Growing under Various Environments	Prof. Akira Ishihama Director and Head Nippon Institute of Biological Science Professor Hosei University	11 Mar. 2004- 27 Mar. 2004 (17 days)
Project 16 (FY2003)	Prof. Iddya Karunasagar Professor University of Agricultural Sciences	Organization	Prof. Kazuhiro Kogure Professor University of Tokyo	22 Sep. 2003- 4 Oct. 2003 (13 days)
Project 17 (FY2003)	Prof. Dhruvajyoti Chattopadhyay Professor Calcutta University	The Relation between the Function and the Structure of Influenza Virus RNA Polymerase	Prof. Kazufumi Shimizu Professor Nihon University	12 Oct. 2003- 12 Nov. 2003 (32 days)

2. Seminars

2-1 Seminar 1	
Title	Fundamental Mechanisms of Stress Response
Japanese Organizer	Prof. Akira Ishihama, Nippon Institute of Biological Science
Indian Organizer	Dr. Sisinty Shivaji, Center for Cellular and Molecular Biology
Period & Place	From 8-10 November 2001, Hyderabad, India
<p>Objectives : Fundamental mechanisms of the stress response in biological systems have been the common and major target in the Modern Biology and Biotechnology Area of Japan-India Co-operative Science Program. One group headed by Drs. Norio Murata (Nat. Inst. Biol., Japan) and Shishinty Shivaji (CCMB, India) has focussed on the stress response in plants and cyanobacteria with photosynthesis activity while another group organized by Drs. Akira Ishihama (Nat. Inst. Genet. And Nippon Inst. Biol. Sci., Japan) and Dipankar Chatterji (Ind. Inst. Sci., India) has analyzed the molecular mechanisms of stress response in bacteria. In order to exchange the accumulated data in these two groups and to exchange the knowledge of the fundamental mechanisms of the stress response between plants and bacteria, two groups gathered together to have a discussion meeting.</p>	
<p>Accomplishment Status : Research of the fundamental mechanisms underlying stress responses in biological systems is a frontier in the modern biology. From the beginning of the Modern Biology and Biotechnology Area of the Japan-India Co-operative Science Program, collaborative studies related to the stress response have always been the major target, but using different organisms from bacteria to plants. The research on the stress response should be supported continuously, because the knowledge obtained in these studies will be useful to solve increasing disorders in the ecosystem. For instance, the expression of virulence genes is now known to be one type of stress response of pathogenic bacteria.</p>	
<p>Program</p> <p><u>9 November</u></p> <p>9:00-9:20 Opening Remarks</p> <p>9:20-11:00 Session 1 3 presenters</p> <p>11:05-11:35 Tea Break</p> <p>11:35-12:45 Session 2 2 presenters</p> <p>12:45-13:20 Collection of TA and DA forms and Confirmation of Travel Plans</p> <p>13:20-14:30 Lunch</p> <p>14:30-15:40 Session 3 2 presenters</p> <p>15:40-16:40 Tea Break</p> <p>16:10-18:15 Session 4 2 presenters</p> <p>18:15-23:00 Dinner</p> <p><u>10 November</u></p> <p>9:00-10:45 Session 1 3 presenters</p> <p>10:45-11:15 Tea Break</p> <p>11:15-13:00 Session 2 3 presenters</p> <p>13:00-14:10 Lunch</p> <p>14:10-15:20 Session 3 2 presenters</p> <p>15:20-15:50 Tea Break</p> <p>15:50-17:35 Session 4 3 presenters</p> <p>19:30- Dinner</p>	

List of Participants

From Japan

H. Aiba,	Professor, Nagoya University
K. Igarashi	Professor, Chiba University
Kan. Tanaka,	Associate Professor, University of Tokyo
Takeshi Mizuno,	Professor, Nagoya University
Norio Murata,	Professor, National Institute for Basic Biology
H. Okuyama,	Associate Professor, Hokkaido University
Toshio Sakamoto,	Assistant Professor, Kanazawa University
Iwane Suzuki,	Assistant Professor, National Institute for Basic Biology
N. Sato,	Professor, Saitama University

From India

J. Gowrishankar,	Scientist E, Centre for Cellular and Molecular Biology, Hyderabad
Parag Sadhale,	Associate Professor, Indian Institute of Science, Bangalore
Tapas K. Kundu,	Lab Chief, JN Centre for Advanced Scientific Research, Bangalore
D. Chatterji,	Professor, Indian Institute of Science, Bangalore
M.K. Ray,	Scientist C, Centre for Cellular and Molecular Biology, Hyderabad
V. Nagaraja,	Professor, Indian Institute of Science, Bangalore
A. Ballal,	Researcher, Bhabha Atomic Research Centre, Bombay
S.E. Hasnain,	Director, Centre for DNA Fingerprinting and Diagnostics, Hyderabad
Prasanna Mohanty,	Professor, Jawaharlal Nehru University

2-2 Seminar 2	
Title	Understanding of Chromatin Structure Functions - a workshop and discussion
Japanese Organizer	Prof. Masami Horikoshi, The University of Tokyo
Indian Organizer	Prof. Tapas K. Kundu, JNCASR, Bangalore
Period & Place	From 20-23 January 2005, Bangalore, India
<p>Objectives : Rapid understanding of chromatin function reveal that it is not merely a structural component to pack the eukaryotic genome, rather play a significant regulatory role in all the DNA templated phenomenon. In order to update us for the huge technical advancement of this field, this workshop cum discussion meeting is essential at this juncture.</p>	
Program	
List of Participants	
<u>From Japan</u>	
Masami Horikoshi,	Associate Professor, The University of Tokyo
Akira Ishihama,	Director and Head, Nippon Institute for Biological Science
Ayae Honda,	Researcher, Nippon Institute for Biological Science
Kyosuke Nagata,	Professor, Tsukuba University
Kunio Takeyasui,	Professor, Kyoto University
Hiroki Fukuda,	Ph.D student, Graduate School The University of Tokyo
<u>From India</u>	
Tapas K. Kundu,	Assistant Professor, MBGU, JNCASR, Bangalore
MRS Rao,	President/Director, MBGU, JNCASR, Bangalore
Parag Sadhale,	Associate Professor, MCBL, IISc, Bangalore
Rakesh Mishra,	Scientist, CCMB, Hyderabad
Madan Chaturbedi,	Associate Professor, Zoology, Delhi University, New Delhi
Dipak Dasgupta,	Professor, Biophysics, Saha Institute of Nuclear Physics, Kolkata
Jagmohan Singh,	Scientist, IMTECH, Chandigarh

3. Visiting Scientists for Information Exchange

India to Japan

Name & Affiliation	Research Subject	Main Host Researcher	Period
Prof. P. T. Manoharan Institute Emeritus Professor Indian Institute of Technology Chennai	Collaborative Research for Bioinorganic Chemistry	Prof. Teizo Kitagawa Professor Institute for Molecular Science, Okazaki	2 Mar. 2003- 29 Mar. 2003 (28 days)
Prof. Shyamalava Mazumdar Associate Professor Department of Chemical Sciences	Resonance Raman Studies of Metalloproteins	Prof. Teizo Kitagawa Professor Institute for Molecular Science, Okazaki	4 Mar. 2003- 11 Mar. 2003 (8 days)
Prof. D. Balasubramanian Director L.V. Prasad Eye Institute	Molecular and Cell Biology of Eye Diseases	Prof. Akira Ishihama Director and Head Nippon Institute of Biological Science Professor Hosei University	11Mar. 2004- 17 Mar. 2004 (7 days)