

MINISTRY OF SCIENCE AND TECHNOLOGY

DEMAND NO. 70

Department of Bio-Technology

A. The Budget allocations, net of recoveries, are given below:

<i>(In crores of Rupees)</i>										
Major Head	Budget , 2000-2001			Revised, 2000-2001			Budget, 2001-2002			
	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	
Revenue	125.00	11.08	136.08	140.00	10.89	150.89	175.00	11.34	186.34	
Capital	...	...	...	...	...	...	...	...	...
Total	125.00	11.08	136.08	140.00	10.89	150.89	175.00	11.34	186.34	
1. Secretariat - Economic Services	3451	1.00	4.53	5.53	1.00	4.38	5.38	1.20	4.64	5.84
Other Scientific Research										
2. Assistance to Scientific Institutions/ Professional Bodies										
2.01 National Institute of Immunology	3425	14.00	1.10	15.10	14.00	1.10	15.10	16.00	1.20	17.20
2.02 National Centre for Cell Sciences	3425	8.00	0.45	8.45	8.00	0.41	8.41	8.50	0.50	9.00
2.03 Centre for DNA Finger printing and Diagnostics	3425	6.00	...	6.00	6.00	...	6.00	10.25	...	10.25
2.04 National Brain Research Centre	3425	5.00	...	5.00	5.00	...	5.00	8.00	...	8.00
2.05. National Centre for Plant Genome Research	3425	3.50	...	3.50	3.50	...	3.50	5.00	...	5.00
<i>Total</i>		<i>36.50</i>	<i>1.55</i>	<i>38.05</i>	<i>36.50</i>	<i>1.51</i>	<i>38.01</i>	<i>47.75</i>	<i>1.70</i>	<i>49.45</i>
3. Assistance to Other Scientific Bodies										
3.01 Human Resource Development	3425	10.00	...	10.00	10.00	...	10.00	10.00	...	10.00
3.02 Centres for Excellence, Facilities, Repositories & Services	3425	10.50	...	10.50	29.50	...	29.50	11.00	...	11.00
3.03 Basic & Product Oriented R&D	3425	43.75	...	43.75	39.35	...	39.35	77.25	...	77.25
3.04 Bio-Tech. Product & Process Development	3425	11.25	...	11.25	11.15	...	11.15	11.00	...	11.00
3.05. Bioinformatics	3425	6.00	...	6.00	6.00	...	6.00	6.30	...	6.30
3.06 National Bioresource Development Board	3425	4.00	...	4.00	4.00	...	4.00	7.00	...	7.00
<i>Total</i>		<i>85.50</i>	<i>...</i>	<i>85.50</i>	<i>100.00</i>	<i>...</i>	<i>100.00</i>	<i>122.55</i>	<i>...</i>	<i>122.55</i>
4. International Cooperation	3425	2.00	...	2.00	2.50	...	2.50	3.50	...	3.50
5. International Centre for Genetic Engineering & Bio- Technology	3425	...	5.00	5.00	...	5.00	5.00	...	5.00	5.00
Grand Total		125.00	11.08	136.08	140.00	10.89	150.89	175.00	11.34	186.34
B. Investment in Public Enterprises	Head of Dev	Budget Support	IEBR	Total	Budget Support	IEBR	Total	Budget Support	IEBR	Total
Joint Venture/PSU										
6.01 Investment in Bharat Immunologicals and Biologicals Corporation Ltd.	13425	...	10.96	10.96	...	...	...	...	...	...
6.02 Indian Vaccines Corporation Ltd.	13425	...	...	...	...	...	...	...	...	...
<i>Total</i>		<i>...</i>	<i>10.96</i>	<i>10.96</i>	<i>...</i>	<i>...</i>	<i>...</i>	<i>...</i>	<i>...</i>	<i>...</i>
C. Plan Outlay										
Other Scientific Research	13425	125.00	10.96	135.96	140.00	...	140.00	175.00	...	175.00

1. Secretariat-Economic Service: provides for expenditure on the secretariat of the department.

2. Assistance to Scientific Institutions/Professional Bodies:

2.01 National Institute of Immunology, New Delhi: The Institute was established to undertake, aid, promote, guide and co-ordinate research of a high calibre in basic and applied immunology, to carry out research for development of new vaccines

and immunologicals for communicable disease; to develop immunological approaches for regulation of male and female fertility; to interact with industry for manufacture of vaccines and immunological reagents; to organise training programmes for techniques in immunological methods and related areas; to establish affiliation with recognised universities and institutions of higher learning for the purpose of enabling research scholars to register for post-graduate degree to serve as a national reference centre for immunology and provide consultancy

services to medical and veterinary institutions, public health agencies and industries in the country; to provide and promote effective linkages between various Scientific and research agencies/laboratories and other organisations in the field of immunology, vaccine development and related areas; to collaborate with foreign organisations in relevant fields. The institute is a collaborating centre for national mission project of cattle herd improvement. The Ph.D. programme of the institute continues. Several technologies related to diagnosis of AIDS virus, anti-leprosy vaccine, and contraceptive vaccines are under trail or transferred to industries. The institute proposes to take several new initiatives viz., examination of chemical biology of mycobacteria, neuro-immune regulation of cellular function, analysis of role of carbohydrates in host pathogen interactions, P4 facility, molecular modeling of peptides and protein-legend complexes using knowledge-based potentials and some new projects in the above areas.

2.02 National Centre for Cell Sciences, Pune: The facility was established to receive, identify, maintain, grow and supply animal and human cell lines, tissues, organs and fertilised eggs and embryos, hybrid-cells including hybridomas, plasmids, genes and genomic libraries; to carry out research and development in these cell lines and related material and products; to develop, prepare, quality control and supply culture media and other reagents and materials independently or in collaboration with industry; to organise training programmes for technical personnel in Tissue Culture Technology, Tissue Banking, Cell products and related areas; to serve as a National Reference Centre for Tissue Culture, Tissue Banking, Cell products and Data Bank, etc. and to provide consultancy services to Medical, Veterinary, Pharmaceutical Institutions, Public Health Services and industries in the country; to provide and promote effective linkages between various scientific and research agencies/laboratories and other organisations including industries; to collaborate with foreign organisations in the relevant areas. The institute will take up new research areas namely: Immuno-suppression during experimental leishmaniasis to establish the role of non-T cell CD28 expression and function, the role of costimulatory molecules and the role of Leishmania receptors on macrophages; Molecular characterization of SMAR 1 protein: to identify DNA binding motifs, protein-protein interaction and construction of knock-out and transgenic mice of this protein; Molecular and cellular basis of HIV pathogenesis: to identify differentially expressed molecules during HIV induced apoptosis and to elucidate the interaction of those molecules in the signaling cascade leading to cell death; Identification and characterization of a novel bone derived factor that regulates breast cancer cell migration and metastasis; Molecular mechanisms of virulence gene expression in *Staphylococcus aureus*. There are several significant scientific leads such as identification of a new gene involved in tumor formation, induction of apoptosis by inhibitors in cancer cell lines which will be pursued by the institute for the development of products and processes through strengthening of technology development programmes.

2.03 Centre for DNA Finger Printing and Diagnostics, Hyderabad: The objective of the Centre is to provide DNA fingerprinting services for crime investigations and for setting paternity dispute and to provide DNA fingerprinting services. The centre is currently functional in rented premises. The building plan has been finalised and construction has begun. The centre is already providing DNA diagnostic services for human genetic disorders and DNA finger printings for use by Indian judiciary in deciding criminal and other forensic cases. It has EMB (European Molecular Biology) Bioinformatics network as a national node. A new learning Centre in finger printing is likely to be set-up. CDFD is the only institution from India to be internationally selected for operation of European Molecular Biology (EMB) net national node.

The centre has already generated 1.5 mega byte sequence data bank. Amongst the research areas, tuberculosis and helico bacter pilory are two diseases being researched upon priority basis.

2.04 The National Brain Research Centre: NBRC has been set-up as an autonomous body of the department and had been registered under the Societies Registration Act. The centre has started its research activities from the campus of International Centre for Genetic Engineering. The centre will undertake research primarily in the areas of neurosciences and basic brain research. A piece of land of 38 acres has been allotted to the Centre at Gurgaon. The construction of the building has been started. An action plan for the research activities during the decade has been drawn out with emphasis on networking of centres/institutes doing neurosciences research, evolving comprehensive neurosciences courses. It will also provide centralized facilities for sophisticated and high value equipments, transgenic animals, laser microscopy etc.

2.05 National Centre for Plant Genome Research (NCPGR): The National Centre for Plant Genome Research has been established as an autonomous institution of the Department. The centre started functioning w.e.f., 1st April, 1998 and was formally registered as a Society on 16th July, 1998. The main objective of the Centre is to take up the research work on structural, functional and application genomics of selective crop plants. In addition the Centre will utilise molecular biology approaches alongwith tissue culture and genetic engineering technology to identify important genes and manipulate these for generating transgenic plants with improved agronomic characters and pathogen/stress resistance. The centre is carrying out its research activities from the building of CPMB of Jawahar Lal Nehru University (JNU). The university has allotted 15 acres of land on its campus and the construction of the building has been started. The centre has taken up on genomics of *Cicer arietinum*, which include collection, and maintenance of germplasm, construction of genetic maps, sequencing of more of ESTs. On-going research activities on chickpea genomics molecular characterisation of calcium mediated abiotic stress signaling pathway with an aim to develop plants tolerant to unfavourable conditions will be vigorously pursued.

3. Assistance to other Scientific Bodies:

3.01 Human Resource Development: An integrated manpower development programme comprising M.Sc./M.Tech./ Post Doctoral course in biotechnology at various Universities/ Institutes of 17 states and union territories; Biotechnology National and overseas associateships, short-term training courses, seminars and symposia popular lectures, publications and other miscellaneous programmes have been implemented. Five Bioscience Career Development Awards were given to eminent scientists.

3.02 Centres for Excellence, Facilities, Repositories & Services: It includes repositories for conservation of plant microbes, specialised biotechnology facilities for advance research, pilot scale manufacturing, centres of excellence and programme support in high priority areas of modern biology. The seven repositories include those on medicinal and aromatic plants, filaria and reagents, cryopreservation of blood cells, tissue culture microorganisms, blue green algae and marine cyanobacteria and drosophila stockcentre. The biotechnology facilities include experimental animal facilities, genetic engineering and strain manipulation unit and biochemical engineering and process development. A major programme support at the Indian Institute of Sciences, Bangalore, in the high priority areas of modern biology was launched w.e.f. October, 1997 for a period of 5 years involving 55 faculty members to carry out research on three sub-programmes: infectious diseases, drug and molecular design as well as genome diversity and genetic disorders. Efforts are under

way to exploit leads in the areas of drug target development in tuberculosis and malaria, DNA vaccine development in the area of TB and rabies, signal transduction mechanisms involving G protein coupled receptors, heat shock proteins in malarial parasite development and molecular studies of cotton leaf curl virus isolates. A National Facility for Virus Diagnosis and Quality Control of Tissue Cultured Raised Plants, a Containment Facility for Transgenic Planting Material and an International Depository Authority of hazardous microorganisms by upgradation of existing facility of Microbial Type Culture Collection (MTCC) at IMTECH, Chandigarh have been setup.

3.03 Basic and Product Oriented R&D Projects: Various projects aim at creation of a strong R&D base and product development; These R&D projects mainly fall under: (i) Basic research; (ii) Crop biotechnology; (iii) Medicinal and Aromatic Plants; (iv) Tree and Woody Species, Tissue Culture; (v) Seribiotechnology; (vi) Bioprospecting of biological Wealth; (vii) Medical Biotechnology; (viii) Human Genetics and Genome Analysis; (ix) Animal Biotechnology; (x) Aquaculture and Marine Biotechnology; (xi) Biodiversity Conservation and Environment. Four National Jai Vigyan S&T Missions in biotechnology are progressing well. Out of the four missions three missions have been undertaken under the Basic Research and Development. These are mission on development of new generation vaccines, coffee development, herbal product development, mirror sites for genomic research. The department will initiate programmes in the areas of functional genomics, proteomics etc.

3.04 Biotech Product and Process Development: Financial support is provided for development of technology packages in the areas where sufficient R&D work has been carried out for transfer to the field and large scale production and manufacturing activities. Areas include: (i) Biofertilisers; (ii) Biological Control of plant pests, diseases and weeds; (iii) Tissue culture pilot plant facility for multiplication of forest trees; (iv) Biotechnology programme for SC/ST population; (v) Tissue cultured elite vanilla & large cardamom; (vi) Micropropagation technology parks; (vii) Special Biotechnology based programmes for rural areas and women; (viii) patenting and monitoring and regulation of biosafety guidelines in R&D; and (ix) Biotech product, process development and technology transfer involving bioindustries and other user agencies. A women's biotechnology park has been established at Chennai for providing employment opportunities to the women in terms of entrepreneurship development.

3.05 Bioinformatics: The plan scheme of bioinformatics envisages providing a National Bioinformatics Network in the country designed to bridge the gaps in Biotechnology information and to establish links among scientists in Biotechnology. The network aims to provide a single reference to various information resources of importance to biotechnology and modern biology including data banks of genetic importance, published literature, patents and other information of scientific and commercial value. It also aims to provide necessary infrastructural support for modern research in biology involving computationally intensive analysis. The network consists of 11 distributed information centres (DICs) and 44 sub-DICs computational facilities at the national level. It has also established linkages with international institutions like

ICCB; a UNESCO based funded bio-informatic programme and is also linked with EMB net, as well as international legume-data base and information services (ILDIS). Educational and training activities in bioinformatics will also form part of the scheme. National Jai Vigyan Mission on Mirror Sites for Genomic Research has been started to establish four major databases at Indian Institute of Science, Bangalore; University of Pune; Jawahar Lal Nehru University and Institute of Microbial Technology, Chandigarh.

3.06 National Bioresource Development Board: The National Bioresource Development Board has been established for development, conservation and utilization of biological resources of the country by using modern biology and biotechnology. The objectives of the board are to decide the broad policy framework for effective application of biotechnological and related scientific approaches for research and development and sustainable utilisation of bioresources specially for development of new product and process; to develop a scientific plan of action for contributing to the economic prosperity of the nation through accelerated research and development using the most modern tools of biosciences. An Institute for Bioresource and Sustainable Development at Imphal, Manipur is also being established.

4. International Cooperation:

(i) International Bilateral Programmes and Scientific Advisory Committee (Overseas): The Department has on-going bilateral cooperation programmes with Federal Republic of Germany, Israel, Switzerland, Sweden, USA, U.K. while such programmes with Japan, Egypt, France, Kazakhstan, Russia, Sri Lanka, Tunisia, China, Cuba, Mongolia, Poland, Vietnam, Brazil, Myanmar and some other countries are being finalised. Interactions have been made with Australia, Brazil, Hungary, Mexico, Norway, Romania and Slovenia. In addition, multilateral co-operations under SAARC and ASEAN countries are being developed. In addition to on going activities, new projects are being finalised/identified for implementation with USA, UK, Switzerland, Germany, China, Japan, Israel, Tunisia, Poland and Kazakhstan and agreement is under consideration with France where specific areas have been identified at Joint meetings.

(ii) Other Programmes: Multilateral cooperation G-15 countries for setting up for Gene banks for medicinal and aromatic plants have progressed well. An UNDP-GOI funded project in jute-biotechnology is also operational for a period of five years.

5. International Centre for Genetic Engineering and Biotechnology: ICGEB has been established with two components one in New Delhi and the other in Trieste, Italy with the objective of bringing the fruits of modern biotechnology to the developing countries. Intensive scientific research is performed in a total of six groups viz., Malaria, virology, immunology, recombinant gene products, plant molecular biology and insect resistance. In addition to research, there are several training and other scheme such as post-doctoral and Ph.D. programmes as well as organisation of training courses and symposia. In addition to the two components, the ICGEB has a network of national regional and international co-operating R&D centres, which endeavour to promote an active programme of research and development towards fulfilling the stated objectives. Government of India is providing assistance for meeting recurring cost for running the Centre in New Delhi.