

MINISTRY OF SCIENCE AND TECHNOLOGY

DEMAND NO. 83

Department of Biotechnology

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

		(In crores of Rupees)									
Major Head		Budget 2006-2007			Revised 2006-2007			Budget 2007-2008			
		Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	
	Revenue	521.00	13.60	534.60	496.00	14.00	510.00	675.00	19.70	694.70	
	Capital	...	...	...	...	...	...	...	...	...
	Total	521.00	13.60	534.60	496.00	14.00	510.00	675.00	19.70	694.70	
1.	Secretariat - Economic Services	3451	...	5.05	5.05	...	5.45	5.45	...	5.96	5.96
	Other Scientific Research										
2.	<i>Assistance to Scientific Institutions/Professional Bodies</i>										
2.01	National Institute of Immunology	3425	36.00	0.70	36.70	36.00	0.70	36.70	...	...	...
2.02	National Centre for Cell Science	3425	30.00	0.35	30.35	30.00	0.35	30.35	...	...	...
2.03	Centre for DNA Finger printing and Diagnostics	3425	28.00	...	28.00	21.00	...	21.00	...	...	...
2.04	National Brain Research Centre	3425	14.00	...	14.00	14.00	...	14.00	...	...	...
2.05	National Centre for Plant Genome Research	3425	12.00	...	12.00	12.00	...	12.00	...	...	...
2.06	Institute of Bioresources and Sustainable Development	3425	3.00	...	3.00	3.00	...	3.00	...	...	...
2.07	Institute of Life Sciences	3425	10.00	...	10.00	10.00	...	10.00	...	...	...
	<i>Total</i>		<i>133.00</i>	<i>1.05</i>	<i>134.05</i>	<i>126.00</i>	<i>1.05</i>	<i>127.05</i>	...	...	...
3.	Autonomous R&D Institutions	3425	...	...	...	...	...	...	133.20	0.94	134.14
4.	<i>Assistance to Other Scientific Bodies</i>										
4.01	Human Resource Development	3425	28.00	...	28.00	28.00	...	28.00	30.60	...	30.60
4.02	Bioinformatics	3425	22.00	...	22.00	22.00	...	22.00	22.50	...	22.50
4.03	Biotech Facilities, Centres of Excellence and Programme Support	3425	62.00	...	62.00	59.00	...	59.00	...	...	...
4.04	Research and Development	3425	193.00	...	193.00	193.00	...	193.00	216.00	...	216.00
4.05	Biotechnology for Societal Development	3425	12.00	...	12.00	12.00	...	12.00	13.50	...	13.50
4.06	Bio-Process and Product Development	3425	20.00	...	20.00	20.00	...	20.00	...	...	...
4.07	Grand Challenge Programmes	3425	...	...	...	...	...	...	45.00	...	45.00
4.08	Programme for Promotion of Excellence and Innovation	3425	...	...	...	...	...	...	47.70	...	47.70
4.09	Biotech Facilities	3425	...	...	...	...	...	...	22.50	...	22.50
	<i>Total</i>		<i>337.00</i>	...	<i>337.00</i>	<i>334.00</i>	...	<i>334.00</i>	<i>397.80</i>	...	<i>397.80</i>
5.	I&M Sector										
5.01	Assistance for Technology Incubators, Pilot Projects, Biotechnology Parks and Biotech Development Fund	3425	15.00	...	15.00	10.00	...	10.00	9.00	...	9.00
5.02	Public Private Partnership	3425	30.00	...	30.00	16.00	...	16.00	54.00	...	54.00
	<i>Total</i>		<i>45.00</i>	...	<i>45.00</i>	<i>26.00</i>	...	<i>26.00</i>	<i>63.00</i>	...	<i>63.00</i>
6.	International Cooperation	3425	6.00	...	6.00	10.00	...	10.00	13.50	...	13.50
7.	International Centre for Genetic Engineering & Biotechnology	3425	...	7.50	7.50	...	7.50	7.50	...	12.80	12.80
8.	Lumpsum provision for projects/schemes for the benefit of North Eastern Region and Sikkim	2552	...	...	...	...	...	...	67.50	...	67.50
	Grand Total		521.00	13.60	534.60	496.00	14.00	510.00	675.00	19.70	694.70
	C. Plan Outlay	Head of Dev	Budget Support	IEBR	Total	Budget Support	IEBR	Total	Budget Support	IEBR	Total
1.	Other Scientific Research	13425	521.00	...	521.00	496.00	...	496.00	607.50	...	607.50
2.	North Eastern Areas	22552	...	...	...	...	...	...	67.50	...	67.50
	Total		521.00	...	521.00	496.00	...	496.00	675.00	...	675.00

No.83/Department of BioTechnology

1. **SECRETARIAT - ECONOMIC SERVICE:** Provides for Expenditure on the Secretariat of the Department.

3. **AUTONOMOUS R&D INSTITUTIONS:** Under the administrative control of the department, there are 7 Autonomous Institutions; the institution-wise activities are given below

National Institute of Immunology (NII), New Delhi: It is proposed to continue research in various major on-going areas of interest. Initial work on Incubator laboratory facility to be taken up in the second campus of the Institute and develop Campus II at Faridabad. To build minimum essential staff quarters in Dwarka, New Delhi and construction of additional research scholar home/guest house for the main campus. Beside the core support, an innovation foundation through public private partnerships for public goods and for genetically defined MACAQUE primate animal strain facility shall be undertaken.

National Centre for Cell Science, Pune: Besides, continuation of existing R&D programmes and services, it is proposed to launch two major programmes are Diabetes and Identification of anti-viral compounds with potential for development of microbicides to prevent HIV infection and transmission. Network programmes on systems Biology of Global Regulatory Networks: Unraveling Sequence Features in Promoters that Dictate Tissue-Specificity of Gene Expression shall be initiated. It is also proposed to establish centers for cell and tissue engineering and immuno-therapeutics.

Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad: It is proposed to improvise methodologies for high throughput STR based DNA fingerprinting and new diagnostics tools development. New activities such as National Facility for Training in DNA Profiling (NFTDP), Disaster Victim Identification Cell (DVIC), Secretariat for DNA Profiling Advisory Board and Creation of National DNA Database, Quality control and accreditation, and Other DNA profiling services will be initiated.

National Brain Research Centre (NBRC), Manesar: The on-going research activities would be continued and the following new activities will be initiated namely, evaluation of the pharmacological potential of traditional medicinal preparations used in the treatment of dementia including Alzheimer's disease and proteasomal dysfunction and Parkinson's disease and identification of the modulators of ubiquitin proteasome system. The neural stem cell research programme comprising of both basic and translational components including understanding the basic biology of *neural stem cells* and the use of stem cells to treat disorders relating to the nervous system will be initiated. Beside the core grant, Clinical Research Centre for Brain Disorders and Brain Machine Interface, and network programme on genetics and pathogenesis of neurological and psychiatric disorders will be priorities.

National Centre for Plant Genome Research, New Delhi: Research would be continuing the research programmes on transgenics, genomics, genome diversity. In addition, transgenic testing and evaluation facility will be established.

Institute of Bioresources and Sustainable Development (IBSD), Imphal: The following areas of research shall be continued on Medicinal and Horticultural Plant Bioresources Programme; Microbial Resources Programme; Aquatic bioresources programme; Insect bioresources programme and Bioinformatics.

It is proposed to establish a Genome Club for regular interaction between bio-entrepreneurs, graduate students and researchers on biodiversity conservation and bioresources management.

Institute of Life Sciences, Bhubaneswar: The new activities include: construction of Director's residence & Modification of boundary wall; construction of faculty quarters and to undertake vertical translational activities such as Development of DNA chip based diagnostics, nanomedicine alongwith establishment of National Repository of *C.elegans*, a model genome for all fundamental biological studies.

4. ASSISTANCE TO OTHER SCIENTIFIC BODIES:

4.01 **Human Resource Development:** A National Biotechnology Council will be created to formulate model undergraduate and postgraduate curricula in life sciences and in translational science keeping in view, future needs. New PG teaching programmes in the areas of food and nutrition biology, clinical pharmacology, bioenterprise management, biofinancing and regulatory efforts shall be initiative. M.D/Ph.D. programmes will be supported in some medical colleges/institutions. At least five star under graduate colleges in biotechnologies/ life sciences will be in place. Few teacher and technician training centers will be setup. The existing programmes like Ph.D., Post-doctoral Fellowships and others will be scaled up. All awards instituted during the 10th plan will continue besides some new fellowships and awards as proposed in the 11th plan will start

4.02. **Bioinformatics:** Support to ongoing activities shall be continued. Enrolment will be enhanced by introducing 25 special fellowships so as to attract non biology students to undertake research in Bioinformatics. Bioinformatics elective course as part of all biology courses shall be introduced. Specialized training programs to meet the needs of interface between Biology and Bioinformatics will be started.

The other activities includes subscription to E-journals in Bioinformatics for access to national users; network projects on application of Biotechnology in Rice Genome Research; consortium projects involving experimentalist and the theoreticians, for motive finding, method sequencing, sequence analysis, structure prediction of Proteins and finding the functions of unknown genes in application to major areas like Agriculture, Medical and Environment; testing of public domain resources will be put in a place for testing public domain databases and software packages and for making them available to the users from the academia and the industry; global partnership projects in Bioinformatics; human resource development in bioinformatics to strengthen to special fellowships and programmes in computational biology; and establishment of institute of bioinformatics.

4.04 **Research & Development:** Besides the ongoing programmes following areas will be taken up. In agriculture biotechnology, a network of interdisciplinary programme on molecular characterization of genes involved in apomixes, fine mapping of crops, transgenic for pest and disease resistance, drought will be supported alongwith development of RNAi technology applications. State Agriculture University will be supported to start interdisciplinary translational research centers. A major programme on nutritional quality improvement of vegetable crops with special emphasis of underutilized crop. R&D

projects in the area of plant development, host pathogens interaction, chemicals from plant cultures, apomixis, transformation systems and genetic events. SOL genome initiative would be strengthened and continued. A network programme on biotechnology for improvement of conservation and utilization of forest resources will be taken up.

In animal biotechnology, multi-centric programmes on animal nutrition and development of buffalo pox in animal biotechnology will be initiated. In aquaculture, functional genomics of native freshwater and brackish water species and frontline demonstrations to prove techno-economic viability of aquaculture of non-traditional species for diversification in aquaculture are priorities.

Under the national bioresources board, new programmes proposed relate to bar coding of selected species, programmes on bioprospecting of bioresources for gene and molecules and centers of bioprospecting for screening characterization and validation. Genomics resources, cell culture production of therapeutic agents and chemical/genetic profiling of selected medicinal and aromatic plant will be undertaken. An institute of seri biotechnology will be setup by taking over centre for seri biotechnology currently with central silk board. New programmes on basic and translational research programmes in nano- science and nano-biotechnology for potential application in agriculture, medicine and environment will be initiated.

In medial biotechnology, new programmes include pathogen biology, host genetics, vector biology, drug development for HIV, tuberculosis, malaria. Specilised virus research centers to address viral biology, pathogenesis, biomarkers etc. will be established. A nation wide network of centers are proposed for development of simple low cost diagnostics for infectious and others diseases. 5-6 clinical research centers, biobanks, biomedical research and schools, transgenic animal facility are certain infrastructure proposals for vaccine and diagnostics development. Development of novel platform technologies for vaccines delivery systems will be established. Besides continuation of genetic counseling centers, new facilities. R&D programmes in genomics of diseases, pathogens shall be taken up. The department will participate in international initiative on human cancer genome project- the cancer genome atlas. Stem cell and bioengineering programmes and R&D projects in network mode for clinical trials, biodesign and development will be undertaken.

New initiatives in environmental biotechnology include multi-institutional networks for biodegradation of xenobiotics, bioremediation, biodiversity conservation and bio-polymers. In food and nutritional science technology, multi-institutional network R&D programmes would be generated for understanding the role of nutrition in chronic diseases like cardiovascular diseases. Major programmes would be initiated on fortification of foods specially to address the incidence of malnutrition in school going children. Efforts will be made to setup Agri-food institute and central bioprocessing unit in Punjab. Centre for translational research in public health and UNESCO centre for education and research will be started. Similarly, it is proposed to initiate setting up of other proposed institutions in the areas of animal biotechnology, stem cell biology, marine biotechnology and applications, and seri biotechnology.

4.05 Biotechnology for Societal Development: It is proposed to : promote new agrofarming practices, health, sanitation and entrepreneurship development activities to benefit rural population; initiate projects on various income generation activities through integrated approach with new interventions like forest produce, product development and value addition etc.; promote new hybrid varieties, disease and pest resistance crops to ensure better returns; encourage complexes for rural and tribal community; initiate new programmes on product and process development; establish three Biotech Complex for Women; and focus on development of entrepreneurship among women.

4.07 Grand Challenge Programmes : Interdisciplinary grand challenge projects as suggested by the working group of the steering committee in the areas of national importance where biotechnology interventions can bring about significant value addition, cost effectiveness and competitiveness in product and process diversity will be taken up. These projects could be of three types such as knowledge creation (research and development), knowledge diffusion (education and training), and knowledge application (product development, validation, and commercialization). It will be implemented through special management, administrative and organization streamlined for time bound results. The areas are : food and nutrition science and technology; molecular breeding of agricultural crops; molecular breeding of silk worm; microbial prospecting of microbes for industrial, agricultural, environmental, medical and therapeutic purposes; integrated Tuberculosis Research; and Health Science Technology Mission with projects on new generation human and animal vaccines and delivery systems; diagnostics for health care; stem cell biology and regenerative medicine and bio-design: Implants and Medical Devices.

4.08 Programmes for Promotion of Excellence and Innovation: Besides, continuation of support to existing centers, more centers of excellence and programmes support in priority areas for promotion of innovation in biotechnology across disciplines will be supported as per the principals of guidelines envisaged. Few translational centers especially designed for technology development in Health, Agriculture and Food sectors with effective industry linkages will be established. Molecular Medicine Centers will be started atleast in two medical colleges. The scheme for Creation of pool of contract jobs for scientists in biotech centers and programme will be implemented. Technology Management System for biotechnology with national and local centers will be established for technology transfer, licensing and IPR management.

4.09 Biotech facilities: Besides continuation of support to some existing facilities, new animal house facilities with GMP for testing candidate vaccines and biotherapeutics, DNA and stem cell banking facilities, depositories of biological materials, facilities for testing and validation of GM plants, drugs and pharmaceuticals will be taken up. Remodeling and upgradation of existing life science departments and department of food science and nutrition in few universities, institutions and medical colleges will be supported.

5. I & M SECTOR:

5.01 Biotech Parks and Incubators: Existing biotechnology parks shall be made operational with collaboration with the state governments. The Lucknow biotechnology parks

will be augmented. It is proposed to establish a biotechnology park consortium involving the parks managed in different states for promoting best practices. The proposal to establish Agri-food Park in the agri-food cluster in Punjab will be supported which would house start-up companies. The park will be closely linked with National Agri-food Biotechnology Institute and Bioprocessing Unit. Regional Biotech Innovation Clusters in different areas like stem cell biology, bioengineering, vaccines & diagnostics, agribiotechnology will be promoted with active participation of industry.

5.02 Public-Private partnership: SMALL BUSINESS INNOVATION RESEARCH INITIATIVE (SBIRI): The Small Business Innovation Research Initiative (SBIRI) programme will be expanded. To support this activity and other public private partnerships, efforts will be made to establish Biotechnology Industry Research Assistance Centre (BIRAC). A new programme in partnership with large industries for product and process development on national importance is also part of this line of expenditure.

6. International Cooperation: The broad areas of collaboration would be human resource development, agriculture and food, medical and healthcare, molecular biology, bioinformatics and computational biology, industrial collaboration. Focus would be on strengthening the capabilities of the country capabilities in the area of systems biology, stem cell research and vaccines and diagnostics.

Besides ongoing programmes, new projects will be undertaken with Canada, Germany, Norway and also other developing countries. The programmes will be chosen on priority matching national needs of biotechnology development. New programmes involving private sector partners will be evolved. The Indo-Swiss programme in biotechnology will be continued with new thrust for product development.

8. Lumpsum provision has been kept for projects/schemes for the benefit of North Eastern Region and Sikkim.