

8. BIOTECHNOLOGY INFORMATION SYSTEM NETWORK (BTISnet)

8.1. INTRODUCTION:

Research and Development activities in Modern Biology and Biotechnology are very much information-dependent fields. In fact the symbiosis between information technology and Biotechnology today is as intricately entwined as like the two strands of the DNA helix. Various Genome projects including the Human Genome Project (HGP) are producing enormous amounts of Sequences data. The rate of growth of these data has been estimated to be more than 200 million bases per year. The content of the database itself is doubling in size approximately every year. The large amounts of data generated through various forms are serving as a source of knowledge to the scientists engaged in the field of Biotechnology.

The whole paradigm shift in molecular biology towards data-intensive research in search of useful genes is basically due to the fact that the genetic data is becoming the major driving force in drug discovery, protein engineering, design of new molecules and other related areas. The impact of Bioinformatics on Indian Biosciences and Biotechnology can be seen both in tangible and non-tangible terms. R&D activities in these fields grew in quantity as well as quality as can be seen from research papers published from India.

8.2. STRUCTURE OF BIOTECHNOLOGY INFORMATION SYSTEM NETWORK (BTISnet)

Presently the network comprises of fifty-two Bioinformatics Centres and an Apex centre in the Department. The centres are networked through satellite communication system. The initiatives launched by the Government in liberalizing the access to Internet and deciding to establish national networks are expected to benefit the programme significantly in its attempt to disseminate Bioinformatics resources to a large number of scientists in universities and R&D institutions. The network approach has been very useful in the successful implementation of the project, as it has established a link between diverse groups of scientists working in various interdisciplinary areas of biotechnology. The network encouraged sharing of knowledge and greater interaction amongst the scientific community irrespective of their geographical locations.

Apex Biotechnology Information Centre (BTIC): The Apex Centre at DBT is responsible for coordinating, organizing and providing information services at national level covering a wide range of subjects on large sectors of national endeavours in Biotechnology. It is coordinating the activities of BTIS Centres and plans to provide a nation-wide communication network between the DICs and other Sub-Centres. It also coordinates linkages and cooperation with external sources in Bioinformatics including documentation and information centres abroad.

The BTIC has the mandate to continuously assess information requirements in biotechnology and organize creation of necessary computer and communication

infrastructure to provide bioinformatics support to the national community of users spread across the country.

It has endeavored in establishing national databases in the country in collaboration with several national and international agencies and has encouraged bilateral and international collaboration in bioinformatics. It has also initiated major research projects in bioinformatics for creating synergy for developmental activities in bioinformatics. It plans to promote standards for databases, data exchange and nomenclature for molecular biology data in order to facilitate sharing of such data amongst laboratories on a national and international scale.

Distributed Information Centres (DICs): Ten DICs have been established with the task of providing subject/discipline-oriented information to all institutions belonging to the branch and other institutions and individual users interested in particular subject of information related to Biotechnology. These centres are located at IISc, JNU, MKU, Bose Institute, University of Pune, IARI, CCMB, NII, IMTECH and NBRC. The centre at NBRC was sanctioned during this year in view of the growing importance of the neuroinformatics in the Brain Research.

Distributed Information Sub-Centres: A large number of R&D institutions and universities form chains of Distributed Sub-Centres set up in the country. While the Distributed Information Centres act as repository of information in their respective specialized disciplines, the Distributed Information sub-Centres provide an access mechanism for the information to be available at the universities, R&D and manufacturing institutions. Thus, the distributed Sub-Centres provide an added dimension of access and diffusion of information across the network. In addition to the thirty-eight sub-centres already established, the department sanctioned four new sub centres during this year.

8.3. NEW INITIATIVES

Establishment of new Bioinformatics Centres: Five new centres have been added on BTISnet this year. These include a Distributed Information Centre at National Brain Research Centre, New Delhi with specialization in Neuro-Biology and four Sub-DICs at University of Agricultural Sciences, Mangalore; National Research Centre for Spices, Calicut; Barkatullah University, Bhopal and University of Kashmir, Kashmir. With this the network at present comprises of 53 Centres linking the major R&D institutions and Universities in the country.

Post Diploma Course in Bioinformatics: Two more Post diploma courses in Bioinformatics have been initiated at the Calcutta University, Calcutta and the JNU, New Delhi during this year. The other two courses which were started earlier at MKU, Madurai and University of Pune, Pune are continuing with this course and each course is producing approximately 10 candidates per year, which in turn is helping to meet the manpower demand in the multidisciplinary field of Bioinformatics.

Interactive Graphics Facility at IISc. Bangalore: The Interactive Computer facility, which was established in 1991 at IISc, Bangalore, has been augmented with new Graphics system to meet the demand by the users of this facility. The facility was first of its kind established by the department and was expected to provide a focal point for advanced status in computer graphics based molecular modeling in the country. Similar facilities were also established at MKU, Madurai; CCMB, Hyderabad; University of Pune, Pune; Bose Institute, Calcutta and JNU; New Delhi to extend the Graphics based infrastructure support for computational biology. These facilities are now geared up to provide a concept of virtual Laboratories for performing modeling and simulation studies before really moving on to actual experiments. This ultimately saves time on research as well as to determine the anticipated outcomes.

Internet /Firewall Servers: The DICs are the major centres of the BTISnet, which are functioning like R&D units of Bioinformatics in addition to the dissemination of information resources to the users. These centres are in need of a powerful Computer System for Internet browsing as well as to act as data protection Server. In view of this, the department has considered powerful servers for these centres. This will facilitate them to store voluminous amount of data generated through the research and also to protect data from the unauthorized users and computer hackers.

Enhancement of Computer and Communication Facilities for the Sub-DICs established during last year: The new centres, which were set up during the last year, have been provided additional financial support towards establishing the planned facilities such as computers and communication equipment. KU-Band VSAT facilities were also provided to remote centres for networking through satellite communication system of NIC.

8.4. MIRROR SITES OF DATABASES

Setting up of Mirror sites for Genomic Research:

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Recognizing the importance of Genomic Research and its dependence on biological databases, the department has identified four databases for mirroring in India as part of the BTISnet. The establishment of mirror sites in the developing areas of structural biology, Protein Engineering, Plant and Human Genome studies and the availability of all the public domain software for analysis of massive amount of data will facilitate scientists in the country in their present and future requirements. In this process, it may improve our skills for hosting these databases as well as to enhance the basic infrastructure requirements for computers and communication systems. A mirror site on European Molecular Biology network (EMBNET) had also been established earlier at CDFD, Hyderabad and linked with BTISnet.

International Legume Database & Information Service (ILDIS): The national Botanical Research Institute (NBRI), Lucknow was identified to set up ILDIS regional node for India and South East Asia. The database has been hosted in the Bioinformatics center at NBRI, which has been linked, with BTISnet for access (<http://www.ildis.org>).

This site provides documents and catalogue of world's legume species diversity in a readily accessible form. Research groups in many countries are participating on a co-operative basis to pool information in the ILDIS world databases of Legumes which is used to provide a world wide information service through publications, electronic access and inquiry services.

8.5. OTHER ACTIVITIES

(i). **Home page:** BTIC made concerted efforts in designing a very comprehensive Home Page about the activities of the Department of Biotechnology. This Home Page is now available on Internet and it provides detailed information on the programmes and projects supported by the department. It also provides linkages to various other important sites. The Home page is accessible at the address – www.nic.in/dbt. Similarly a Home Page was designed for the Bioinformatics programme of the department. This Home Page gives complete details about the activities carried out under the Bioinformatics programme including all its constituent centres. It is accessible at the address – www.nic.in/btis.

(ii). **Y2K Compliance:** The Department constituted an Action Team to look into the Y2K problems. The Action Team carried out a detailed analysis of the available hardware & software and applications, and took corrective actions well in time to ensure Y2K compliance before the deadline of December 31, 1999. Comprehensive report prepared by the Action Team was submitted to the Planning Commission. The department made a successful transition to the year 2000.

(iii). **E-mail and Internet Connectivity:** The BTIC provided complete e-mail and Internet connectivity to all officers and sections of the department, resulting in a quantum jump in the performance of the officers in discharging of their office work. This connection has also been used for access to scientific information in connection with the review of projects and technical write ups/reports. See Annexure-VI for E-mail addresses.

(iv). Bioinformatics publications:

(a) The Department prepared a Brochure on the Bioinformatics programme highlighting major achievements made under the programme as well as listing the activities of all the constituent centres. This comprehensive booklet was released by Prof. Asis Datta, vice-chancellor, JNU in the presence of Secretary, DBT on the occasion of the Annual Coordinators meeting.

(b) A training calendar was prepared, giving information about all the training activities conducted under the network by various constituent centres. This publication provides entire information at one place for utilizing the training facilities being provided by the Bioinformatics Centres.

(c) A handbook listing important Web sites for information on “Patenting in Biotechnology” as well as a section on the important issues of patenting in biotechnology was published for creating greater awareness about patenting. A flier on the Patent Facilitating Cell was also published.

(v). **Computerization in DBT:** The BTIC continued the development of the Local Area Network into a feasible Intranet so that sharing of information and knowledge amongst the members of the department becomes an effective mechanism in the progress and efficiency of work in the department. The BTIC also coordinated the work of computerization of various activities of the department along with the NIC Cell in DBT in designing management information systems for various Divisions of the Department, in particular, a system designed by NIC Cell for automation of answering of Rajya Sabha questions, was greatly appreciated. The Project Registry database software is being revised to take full advantage of the Network established and the availability of client-server, windows based tools.

(vi). **Project Registry Cell (PRC):** With the efforts of BTIC and NIC cell in DBT, powerful software has been designed and developed for the Project Registry Database for DBT sponsored projects. The PRC acts as a gateway to the project proposals received by the department for considering sponsorship. One can obtain information on any project submitted to the department for financial support at any point of time through this database. This database has been linked with DBT home page for access. (www.nic.in/dbt)

(vii). **Interactive meeting on Biotechnology and Bioinformatics:** Organized a 3-day Interactive meeting on Biotechnology and Bioinformatics for development of Biotechnology projects of relevance to J&K under the BTISnet activity. The proposal of setting up of a Bioinformatics Center at Kashmir University has crystallized through this meeting. Several other areas are also identified for the benefit of J&K State.

(viii). **BTIS Coordinators Meeting 1999:** The Annual BTISnet coordinator meeting was organized in Delhi. The progresses of the centres were reviewed by the task force committee on Bioinformatics by having detailed presentations from the coordinators. It was felt that each centre in addition to providing common services such as access to scientific information through Internet and CD ROM based resources, should also develop expertise in the areas assigned to them, particularly keeping in view the strength of the University or the Institute in which the centre is located. It was agreed that emphasis might be laid on development of software, which may be used for teaching of various inter-disciplinary subjects in biology and Biotechnology. Research activities in Basic R&D in Bioinformatics, Computational Biology, Research activities associated with molecular biology databases, Organizing specialized training on the use of specific databases and Development of a strong network back bone for BTISnet are some of the other areas identified for future activities. It has also been emphasized that all development efforts carried out by various centres such as creating of databases or development of software packages should be properly indexed by making a directory on Bioinformatics products.

(ix). Bioinformatics Training Calendar: It is a mandate to organize at least one training programme in a year by each centre of the net on applications of Bioinformatics in Biotechnology. To strengthen this effort a Training Calendar of BTISnet for the year 1999-2000 was published by the Apex centre drawing input from the BTIS centres. This calendar has been well received by the scientific community and found very useful. More than twenty training activities have been conducted this year as per the schedule given in the calendar. Similar publication for the year 2000-01 with additional features will be released in the beginning of next financial year.

(x). R&D in Bioinformatics: Several R&D Projects in Bioinformatics have been sanctioned in the area of Software developments for Biotechnology applications, Development of Multimedia Databases, mapping of Biotechnology Research in the Country, development of Neural Network Based AI software, Directory of Biotechnology Industries and Institutions in the SAARC countries and so on and so fourth. The DIC at JNU, New Delhi has developed a sequence analysis software package (Gene Scan) which has been released by the Hon'ble Minister (S&T) for the benefit of scientific community.