

Biotech

NEWS

Newsletter of the Department of
Biotechnology, Government of India

<http://www.biotechnews.dbt.nic.in>



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विज्ञान एवं प्रौद्योगिकी तथा महासागर विकास मंत्री
भारत सरकार, नई दिल्ली
Minister for Science & Technology and Ocean Development
Government of India, New Delhi

M E S S A G E

Biotechnology is a fast emerging sector in the country and Biotech Industry is experiencing a tremendous growth rate of nearly 40% with the annual turnover in 2005 being \$US 1.07 billion. The consumption of biotech products in India is expected to grow to the tune of \$US 4270 million by 2010. India is today perceived as a country that has the potential of becoming a global player in the biotechnology area. In order to achieve this a major thrust is necessary for promoting innovation and commercialization. We have natural strengths to help us to take this sector forward, such as a large pool of manpower, well-developed scientific infrastructure, diverse agro climate and bioresources, a large diverse heterogeneous human population and above all a well regarded brand value in the knowledge sector.

Knowledge driven biotechnology based economy requires specific human resource and technological interventions. We must not only have the required quantities, but thrust should also be on quality improvement to cater to the specialized requirements of the sector both for research and the industry. Technology innovation in biotechnology requires a multidisciplinary approach, public private partnership needs to be encouraged for commercialization of knowledge. Ways must be found to promote effective interaction across disciplines. A National Biotechnology Development Strategy has been formulated keeping in mind the challenges and opportunities offered by this growing sector vis-à-vis the global context.

Knowledge and information dissemination is an important step in achieving the desired results and helps in creating an awareness of opportunities, building partnerships, and forging the necessary linkages. I am happy that the Department of Biotechnology is bringing out a Biotech News Letter, which would help in taking the fruits of this cutting edge technology to the doorstep of the common man, students, researchers and policy makers. ■

Kapil Sibal
(KAPIL SIBAL)

To the readers

The Department of Biotechnology is relaunching Biotech News - its official newsletter - with reorganized content, fresh attire and with increased periodicity. The earlier version, you may recall, was published twice a year at six-monthly intervals. We have felt that in order to maintain currency, and bring to its readers a flavour of the various developments in biotechnology as seen from DBT, the Newsletter ought to be brought out at more frequent and regular intervals. Commencing from this issue (June 2006), it will now appear six times a year at 2-monthly intervals, both in hard copy version and the e-format.

As mentioned earlier, we have reorganized the content to make it more informative and user friendly. Each issue will have one or more 'Feature' articles written by eminent life science experts. 'Cutting Edge' will focus on critical analysis of a frontier area of life sciences/biotechnology. 'Tech Update' will highlight recent developments from institutions and industry. 'News Desk' will bring you a round up of various scientific meetings, brain-stormings, international collaborations etc. 'Tech Transfer' will keep you informed of latest technology transfers to industry and other user groups of biotech products, processes and as well as launch of these in the market. 'Profile' seeks to provide snapshots of an institution active in biotechnology. Finally, 'Notice Board' will alert you to DBT's call for proposals, forthcoming meetings, positions vacant at DBT and its autonomous institutions, recent publications etc. From the next issue onwards, we will set aside space under 'Mail Box' to interact with our readers.

In order to ensure timely publication and distribution to readers, we have decided to outsource the publication of Biotech News to Ashoka Trust for Research in Ecology and the Environment (ATREE), a reputed NGO established in 1996 with head quarters at Bangalore and regional centres at Delhi and Guwahati.

With all these changes, we aim to reach out to a larger section of the society, particularly, schools, colleges and post-graduate institutions, as well as industry and voluntary organizations interested in life sciences and biotechnology. Please write or e-mail to me whether you find these changes useful and what other modifications you would like to see in Biotech News. ■

S. Natesh
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DBT: An enabler of innovation and innovators



Dr. M.K. Bhan

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A key event of the 20th Century was the emergence of a global consensus that we must cater to the needs of the entire society and not only for the needs of the elite. This emanates from the recognition of the inalienable rights of individuals as the fundamental basis for development, and expands the responsibility of all in society. Since scientists are an integral part of the society, they must use the tools of science to address the most pressing problems related to health care, food, nutritional security, environmental sustainability and opportunities for gainful employment.

Biotechnology offers unique opportunity to India's young to join the mission of finding ways to predict, detect and cure many 'incurable' diseases, improving food productivity and quality and enhancing the livelihood security as well as ushering in an era of sustainable development. The current developments in platform technologies, new materials, nanoscience, informatics and an increasing knowledge of human, microbial and plant genomes makes a career in biotechnology both fascinating, socially relevant and financially rewarding. The biotechnologist of tomorrow will be a great problem solver, working in partnership with a number of other relevant disciplines.

The challenges are at many levels. Our education system needs reform so that we not only produce biologists, medical or agricultural specialists or engineers and a multitude of others, but in all these categories, we also produce innovators. Problem-solving is interdisciplinary. Our work culture needs radical changes to create inter-disciplinary individuals and teams with people not only specializing in designing of products and processes but also in evaluating their safety and performance. This requires professionals of many types and shortages in any one or more of these may weaken the mission of finding solutions to difficult problems.

Innovation does not flow unidirectionally from basic science to application. Opportunities emerge bidirectionally. Hence, balanced development of both basic science and translational science is a pre-requisite to sustainable innovation. A seamless flow of ideas and building of partnerships across institutes, individuals and between academia and industry has to be ensured. New and creative models of public-private partnership need to be explored. Biotechnology requires an understanding of intellectual property issues as well as a science-based regulatory system. It is very important that the regulatory system is of world class so as to inspire confidence among consumers, farmers and the general public.

Biotechnology also requires a culture of risk taking. Currently, institutions and industry tend to operate in the low risk space. We have to develop the strength to move into the discovery and innovation mode. Much of the innovation typically occurs in the small and medium enterprises. Our challenge is to support them with an enabling environment, improve angel and early stage funding, facilitate generation of a pipeline of ideas, make the scientists working in these companies an integral part of the R&D enterprise, to provide tailor-made solutions to problems uniquely faced by them and to encourage them to form effective biotech clusters so that they can nourish and be nourished by each other. DBT will increasingly treat small and medium enterprises as a part of its concern just as public sector institutions.

We have replaced utopian visions with practical ambitions to solving big problems. To be practical does not mean that we address only those goals that are easy to accomplish, but to identify and undertake grand challenges at the right scale, with the right kind of resources, and for the most relevant of the problems. We all need to grow by learning and evolving pathways underlying innovation. DBT is a willing partner of all those who want to travel on this path as a true friend and enabler. ■



M.K.Bhan

Indian Biotech: Today and Tomorrow

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Feature

"There is an optimistic assessment that the country will soon be reaching a billion dollar turnover in biogenics."

"India can offer a holistic, cheaper, global alternative to the treatment of life style diseases like asthma, diabetes, arthritis etc."

Biotechnology is a knowledge-based industry relying heavily on basic research and development (R&D). Significant enhancement in the quality of research publications from India in international journals is a striking result of sustained support to R&D in Life Sciences by the Department of Biotechnology and other agencies. Systematic inputs over the years have led to the emergence of strong research groups with specialized skills in areas like, recombinant DNA manipulations, genome and proteome analysis, structural elucidation of biomolecules, various techniques of cell biology, downstream processing and application of bioinformatics tools. While all this expertise help in tackling a wide range of questions in life sciences, there is also realization that we need to look at disease processes, infectious or systemic, at various levels to eventually find strategies to control and treat the same. Similarly, ongoing efforts at understanding the basis of plant responses to biotic and abiotic stresses, would guide in increasing agricultural productivity. The initiative of mapping bioethnicity and biodiversity features of the country in gross and molecular terms is important.

Where are we in terms of technology? In the area of medical biotechnology, the country has come up with a few molecular diagnostic tools (eg. for HIV, hepatitis, some cancers etc) and 7 or 8 biogenics (eg. recombinant hepatitis B vaccine, interferons, streptokinase, G-CSF, insulin etc). The biotech companies are evolving and upgrading themselves to meet international standards. In the plant area, the only commercial product Bt cotton is also an imported technology. The commercial use of plant tissue culture, micro-propagation etc is also limited. However, there is an optimistic assessment that the country will soon be reaching a billion dollar turnover in biogenics. While this is an encouraging sign, we are yet to generate innovative products based on new knowledge, although a few are in the pipeline (eg. a live recombinant cholera vaccine, a natural reassortant rota viral vaccine, a rabies DNA vaccine, low erusic/glucosinilate mustard, genetically engineered potato and tomato etc). The products now in the market are essentially through reverse engineering or technology acquisitions from abroad. While this approach is important as a starter in technological innovations, India will have to create a niche for itself in the global scenario. At the same time, the social commitment of offering a better quality of life to the poor cannot be forgotten.

India has the potential to assume global leadership in the area of vaccines and biopharmaceuticals. Vaccines, both conventional and modern, especially for children, are an urgent need, which the MNCs are not too keen on. It is my perception that developing these products is less complex



Needle-less Injection of Vaccine

than developing a successful drug. However, vaccine technology and delivery systems are changing rapidly and research needs to focus on these areas in addition to discovering new disease-specific antigens as candidate vaccines. Despite the tardy steps taken to introduce and propagate Bt cotton, I feel there is tremendous potential in developing crops resistant to abiotic stresses (eg. salinity) and food resources with enhanced nutritional value. Significant basic and developmental research has been carried out in these areas and it would be a pity if we fail to exploit these indigenous leads. Another niche area in my opinion relates to traditional medicine. If only a few of these preparations can be standardized through marker analysis and finger printing and efficacy validated through the tools of modern science and publications in peer-reviewed international journals, India can offer a holistic, cheaper, global alternative to the treatment of life style diseases like asthma, diabetes, arthritis etc. This would also call for vigorous mapping and propagation of the plant and marine wealth of this country.

Two decades of sustained support has created a solid platform for embarking on newer initiatives and converting ideas into products. Initiatives taken to strengthen translational research will help in generating expertise for converting a candidate molecule into a product (eg. diagnostic, drug or vaccine). This will also help in making India a favored destination for conducting clinical trials without



New vaccine initiatives in India

LEPROSY	LIVE VACCINE	Commercial
HEPATITIS B	RECOMBINANT	Commercial
CHOLERA	LIVE	Development
RABIES	DNA VACCINE	Development
ROTAVIRUS	LIVE VACCINE	Development
ANTHRAX	RECOMBINANT	Development
JEV	LIVE VACCINE	Development
HIV	RECOMBINANT / DNA VACCINE	Research Trials
TB	RECOMBINANT / DNA VACCINE	Research Trials
MALARIA	RECOMBINANT	Research Trials

compromising on ethical standards. Recent initiatives like supporting Centre for Stem Cell Research, Centres of Excellence in Academia, combining innovation in science with applications and R & D in budding industries (SBIRI) are ingenious and in the right direction. These will help to create a new knowledge base that nation can bank upon.

Our regulatory systems are not geared towards absorbing the rapidly evolving and changing biotechnology scenario in a global context. It is a big challenge to keep the ethical standards of research high, especially when involving human beings and the habitat, and still exploit the new knowledge for the welfare of the earth. Finally, we need to strengthen the human resource base. There are good national programmes for generating skilled human resources. It is also encouraging to note qualified Indians from abroad opting to return home. However the mushrooming of private institutions offering degrees in biotechnology and related areas is a matter of deep

concern. The threat to this exciting new field is from the so called 'payment seats' or 'self financing courses' which are essentially looked upon as lucrative business in education and result in generation of poorly trained students in large numbers without clear career goals. DBT and UGC together will need to evolve some kind of accreditation/monitoring mechanism to ensure quality. Newer initiatives to start Model Life Science Colleges and Masters/Doctoral programmes would also help. Much of the basic research in the country is carried out in national laboratories and the contribution of universities, barring a few, is very little. Given the magnitude of the problems facing universities, especially state universities, the only way to promote good research would be to identify select groups built around promising scientists and insulate them from the vagaries of university politics and archaic administration. It needs to be realized that biotechnology has deeper penetration potential into the society than IT and India in this area has a tremendous potential to harness. ■

“The only way to promote good research would be to identify select groups and build around promising scientists and insulate them.”

Have an interesting thought? Share it with Biotech News!

Biotech News invites crisp write-ups (not exceeding 250 words) outlining your thoughts on education, innovation, commercialization and other related issues in life sciences and biotechnology. Every writeup selected for publication will get the author an honorarium of Rs. 1000/-.

So what are you waiting for? Pick up your pen and get cracking!!

Email your write-up to biotechnews@dbt.nic.in



The Promise of Indian Biotechnology

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Feature

“As a business proposition, Biotechnology in India has the potential of generating revenues of about \$ 5 Billion and creating one million skilled jobs in the next five years...”

- 40 National Research Laboratories employing 15,000 Scientists
- 300 College Level Educational and Training Institutes offering Degrees and Diplomas in Biotechnology, Bio-informatics and Biological sciences, producing 300,000 Students annually
- 100 Medical Colleges qualifying 17000 Medical Practitioners per year
- 100,000 postgraduates and 1500 PhDs qualify in Biosciences and Engineering each Year

The Government of India identified biotechnology as a thrust area for development in 1986 when it set up a dedicated Department of Biotechnology (DBT). DBT has well-defined objectives of establishing several centers of excellence, conducting research and promoting academic institutions focused on biotechnology based programs. In addition, universities have also been encouraged to introduce both graduate and post-graduate level biotechnology courses. These initiatives have provided a strong foundation and the skilled resource pool vital for creating a sustainable biotechnology based businesses.

As a business proposition, biotechnology in India has the potential of generating revenues of about \$ 5 Billion and creating one million skilled jobs in the next five years through products & services. This can propel India into a significant position in the global biotech sweepstakes.

Despite the potential, financing handicaps forced early biotech companies to adopt services or generic products as a business strategy. Biocon for example, started with a strong R&D focus on enzymes, leveraging India's low cost advantage. Shantha Biotech opted for generic Hepatitis B vaccines. From this modest base, the sector has gradually built the critical mass both in terms of infrastructure as well as markets. India is also rapidly gaining a global vantage position

in Biogenetics. Biocon and Wockhardt, between them, can address Asia's insulin requirements.

In agri-biotech, India has the potential to be a leading supplier of Genetically Modified (GM) seeds to the world. Pharmacogenomics is another rapidly growing segment that provides a wealth of information

pertaining to defective or missing genes that call for differentiated medicine, a new avenue for drug research. This emerging discipline combines both infotech and biotech skills in augmenting high-speed data mining of genotypic and phenotypic information with a view to evolving new forms of

medical diagnostics and therapies. Genomics and Proteomics are churning out endless reams of data, which need to be statistically evaluated and harnessed for commercial end use. The new medicinal approach to disease management looks at disease as a process and not as a state, where tracking



disease progression will allow for therapy. Gene regulation and other bio-algorithms will form the core of a new wave of diagnostics that are now being referred to as 'theranostics'.

India can today position itself as the hub for differentiated medicine as the country offers one of the most affordable development bases for personalized medicines. Personalized therapies will demand extensive clinical data generated from well-differentiated patient populations. India and China are the two countries with extensive disease and patient profiles that can enable such studies. Coupled with this is the need for a large number of novel diagnostics based on gene and non-gene based platforms. These are definite opportunities for Indian biotech companies to pursue. Personalized drugs also address the affordability factor for expensive therapies such as those that are involved with cancer.

Bioinformatics is another segment that offers the most attractive innovation and discovery opportunities for Indian biotech companies. This includes designing new drug molecules, mining novel bio markers, generating new pharmaco-genomic data and generating high value medical wisdom.

Custom research is a services model that most Indian biotech companies have opted for at their start-up stage in order to earn early revenues with which to fund infrastructure and scientist salaries. These companies harbour ambitions of original R&D once they reach a certain profit level.



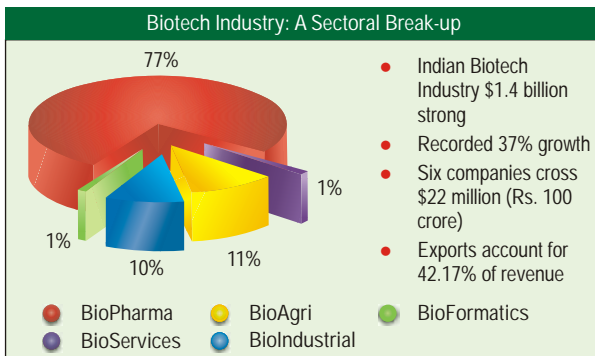
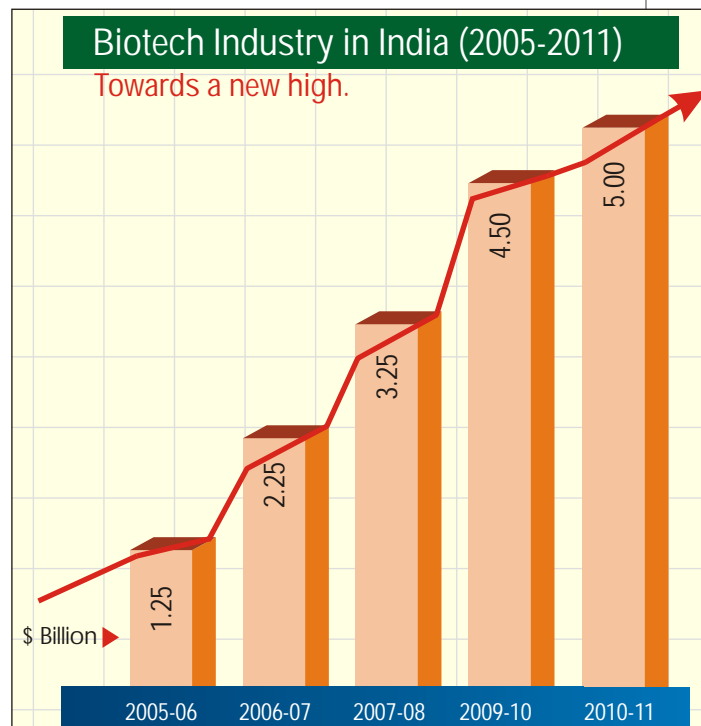
The opportunity for international bio-partnering is a fallout of the trend of declining risk capital in the West for companies engaged in early-stage discovery work. Venture Capitalists (VCs) seem willing to fund only those companies that have reached the *post proof-of-concept* stage. Therefore there exists a large number of companies whose resources are simply too frugal to take their ideas to the next stage. Indian companies would be their natural collaborators to reduce burn out rate, optimize R&D spending and extend survival time lines. An *"India Strategy"* offers an effective de-risked model for VCs who are in a dire need for exit or survival strategies for their investors. Whereas for the biotech companies, an *"India Strategy"* offers a lifeline for product development and the most affordable and effective way to move up the value as well as valuation curve.

International bio-partnering has already gained visibility in India where several collaborative partnerships have been initiated such as Biocon's Joint Venture with Cuba's CIMAB and its investment cum co-development programs with Nobex & Vaccinex to develop proprietary products. Chiron's recent predicament with respect to the acute shortage of Flu vaccine, has prompted alliances with Panacea Biotech and others. Serum Institute, Bharat Biotech and others already have on-going arrangements with Wyeth.

Although Indian biotechnology has received global recognition for its biotech capabilities. This success has now been recognized and Department of Biotechnology has now been mandated with the task of drawing up a pragmatic policy for realizing India's potential in the field of biotechnology with a sense of urgency. The proposed *National Biotechnology Policy* is expected to provide the much needed funding for incubating start-ups and supporting product development. Given the right impetus, Indian companies could easily rank among the top ten biotech companies globally by 2015 with India positioning itself as the preferred global destination for biotechnology. ■

Indian biotech companies - The top 20

Rank	Company	Biotech Turnover (\$ Million)		Growth (% age)
		2003-04	2004-5	
1	Biocon	114.04 (502)	146.90 (646.36)	28.76
2	Serum Institute of India	111.59 (491)	114.77 (505)	2.85
3	Panacea Biotec	33.86 (149)	49.38 (217.29)	45.83
4	Venkateshware Hatcheries	12.27 (54)	37.82 (166.4)	208.15
5	Mahyco Monsanto	12.27 (54)	37.82 (166.4)	208.15
6	Rasi Seeds	-	19.74 (86.87)	-
7	Bharat Serums	18.11 (79.68)	18.41 (81)	1.66
8	Indian Immunologicals	12.88 (56.69)	16.45 (72.38)	27.68
9	Shantha Biotechnics	9.09 (40)	15.91 (70)	75
10	Wockhardt	9.09 (40)	15.23 (67)	67.5
11	Serum International	14.55 (64)	13.64 (60)	-6.25
12	Bharat Immunologicals & Biologicals	4.91 (21.59)	12.10 (53.25)	146.64
13	Bharat Biotech International	8.18 (36)	9.32 (41)	13.89
14	Advanced Biochemicals	6.84 (30.1)	8.99 (39.55)	31.4
15	Biological E	8.72 (38.37)	8.24 (36.25)	-5.53
16	Haffkine Bio-Pharmaceuticals	6.80 (29.90)	7.61 (35.5)	12.04
17	Rossari Biotech	5.45 (24)	7.50 (33)	37.5
18	Dr. Reddy's	5.23 (23)	6.82 (30)	30.43
19	Krebs Biochemicals	19.93 (56.88)	6.82 (30)	-47.26
20	Maps India	3.79 (16.66)	5.00 (22)	32.05
Total Top 20		418.38 (1840.87)	563.38 (2478.85)	34.66





Systems Biology: The Next Frontier in Biological Research

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Cutting Edge

"Systems Biology is the study of the behaviour of complex biological processes in terms of the molecular constituents."

"Biological response is the integrated output of oscillations in the properties of a large number of molecules, all acting in an inter-dependent fashion to form a highly connected network."

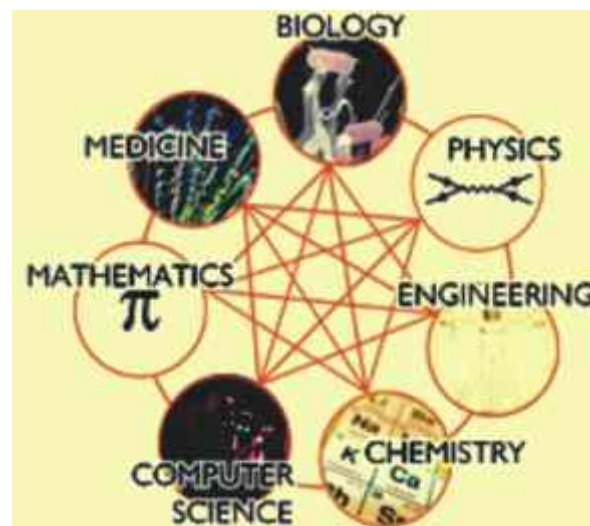
Traditionally, research in Biology has often been inclined to take the reductionist route. Given the myriad of molecules that perform diverse functions, the biologist was faced with the onerous task of characterizing and detailing the properties of as many of these individual molecules as possible. Investigations over decades of such nature have proven to be fruitful, giving us today a 'snapshot' of the various molecular components that comprise diverse biological systems. In addition, they have also provided insights into various jobs that these components perform.

The recent explosion in technologies yielding 'high-throughput' information, however, is in the process of enforcing a paradigm-shift in the way we approach the study of biological mechanisms. At one level, the ability to simultaneously derive information on thousands of bio-molecules has called for new methodologies for analysis of such 'data-rich' results. As is the case in any dialectical process, even a preliminary analysis of such kind of data has brought us to a new level of realization, much like an individual in a society, no individual bio-molecule behaves in a truly independent fashion with a discrete biological function. Most, if not all, biological phenomena are now recognized to represent the integrated outcome of a complex interplay between the individual constituents of the machinery. In other words, a biological response is the integrated output of oscillations in the properties of a large number of molecules, all acting in an inter-dependent fashion to form a highly connected network. The realization that the etiology of biological responses lies in the aggregate properties of underlying molecular networks is now leading to a more 'holistic' approach for study commonly being termed as 'Systems Biology'.

What is Systems Biology?

There is as yet no consensus on what systems biology should truly represent, and many aficionados claim that this term is more often abused than used. Given that it is still an emerging area, this is perhaps not unexpected and it may be a while before different perspectives eventually crystallize in favour of a mutually accepted point of view. Until then the definition of Marc Kirschner that: "Systems Biology is the study of the behaviour of complex biological processes in terms of

the molecular constituents" should perhaps suffice. Although broad in scope, it nonetheless expresses the spirit that underlies this area. It is important to note that the systems biology perspective brings into focus several additional dimensions of biological processes that have hitherto escaped our attention. This includes the need for a comprehensive and quantitative analysis of molecular functions and interactions in a manner that accommodates its spatial, temporal and sequential dimensions. The consequent fall-out of this requirement is the need to bring together scientists from diverse disciplines viz. molecular biology, biochemistry, proteomics and genomics, physiology, physics, mathematics, statistics and computer sciences among many others. This



Systems Biology needs an interdisciplinary network

synthesis is required for combining experiment with analytical methodologies, eventually leading to development of models simulating a given biological system.

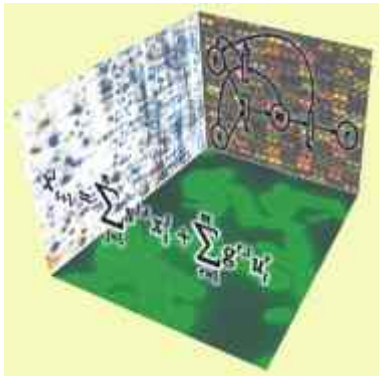
Why Systems Biology?

It is now recognized that biological systems are extremely complex and that they show emergent behaviour. In layman's term, emergent behaviour implies that $2 + 2$ need not always be 4. Rather the sum could range anywhere from 1 to 9 depending upon the context in which the calculation is made. Similarly, biological responses are rarely ever all or none but are frequently modulated in a context-specific manner. And such context-modulated behaviour can never be rationalized



by detailing the properties of individual molecular constituents. Rather, it requires a global understanding of the structure and dynamics of the molecular networks that control such behaviour.

Given its potential in complementing our current reductionist approach by providing a 'holistic' perspective, systems biology is rapidly being applied to virtually every important aspect of biology, be it cell division, inter- and intra-cellular communication, cell differentiation, cancer biology, infection systems, drug discovery, population studies etc. Its



*The integrated approach:
Arms of Systems Biology Proteomics, Transcriptomics,
Whole Cell Assays, Mathematical Models and Simulations*

strength lies in the fact that it can accommodate 'context' into analysis and can be applied to both, approaches that aim to understand the basic functioning of biological systems, as well as those that attempt to arrive at 'deliverables.' Since the goal of the systems biology approach is to understand the properties of the system and that of its components, the long-term hope is that one will be able to manipulate the system in specific ways. Every biological process is complex, be it cell cycle regulation, signal transduction, cell motility, regulation of gene expression, metabolism, or the cellular response to an external perturbation. These processes are governed by mutually redundant subsets of bio-molecules that, nonetheless, continue to process information in a precise manner under a given set of circumstances. The remarkable aspect of biological systems is that these overlapping sets of molecules maintain functional segregation which systems biology approach endeavours to address.

Another important feature of systems biology-based approach is that it permits an exploration of biological processes at different scales simultaneously. Scales are of great relevance for any complex system. What normally

constitutes a dynamic, ever-changing organizational array at the component level nonetheless appears as a single functional entity when viewed from a higher scale. Systems biology permits an understanding of the properties of such systems at both levels.

An important 'utilitarian' area where systems biology is likely to find application is in the development of new drugs. Here it is anticipated that deciphering of cellular networks will help to identify the key 'hubs' that are responsible for its aberrant function. Similarly, community biology is yet another area where exciting applications for systems biology are emerging. An important facet here is the ability to predict the rate and direction of spread of infectious diseases in a population, thus facilitating a more efficient response from public health agencies. In short, systems biology aims to transform biology, generally regarded as a non-predictable science, into a predictive one. And its beauty lies in the fact that this can be applied at all levels of resolution of biological systems.

Systems Biology in India

One of the foremost challenges for an initiative in Systems Biology is to bring together experts from diverse disciplines viz. computer scientist, physicist, mathematician and biologist to interact and synthesize views in a productive manner. More often, progress in this area is iterative, thus mandating a patient exchange of ideas and views within the interdisciplinary group.

Biologists in India are consciously aware of lagging behind the developing world, and the overall tenor of science in India today is to catch up with the rest. The field of systems biology, however, offers us with a unique opportunity to outshine, as research in experimental biology is beginning to acquire maturity coupled with the traditional strength in the areas of theoretical physics and mathematics, and the recently acquired vigor in computational sciences. The foundation seems to exist, what is now required is to integrate these components together for the leap forward in terms of value-addition to biological research in India. There is no doubt that Systems Biology represents the next frontier in biology. There is also no doubt that India can make a very healthy contribution in this area, provided our approach is based on creativity and imagination and we learn to ignore the numerous traditional 'nay-sayers' that we have too frequently been burdened with! ■

"Systems biology-based approaches is that it permits an exploration of biological processes at different scales simultaneously."



National Institute of Immunology

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Profile

The National Institute of Immunology (NII) was established in 1981 as an autonomous institution supported by the Department of Biotechnology, Government of India. Mandate of NII is *"to undertake, aid, promote, guide and coordinate research of high caliber in basic and applied immunology"*.

Driven by the principal that *"excellent basic research is the best motor of innovation"*, the professional and other staff of NII are keenly conscious of their role in creating a strong scientific base for innovations that are directly relevant to the development of India. NII has identified four thrust areas of

research to better focus and channelise its energy and resources. These four areas are:

- Immunity and Infection
- Gene Regulation
- Molecular Design, and
- Reproduction and Development

It is not that things happened overnight for NII. In the first decade of its existence, NII primarily focused its energies to address practical problems germane to a developing country like India like control of fertility and infections. In times that



A Ph.D. in Biochemistry from Madras University, Dr. Avadesh Surolia took over as the Director of National Institute of Immunology, New Delhi only recently. Dr. Surolia's pioneering contributions have strongly influenced research on structure and function of lectins, orientation and dynamics of cell surface carbohydrate receptors as well as drug and molecular design and their biotechnological applications. A winner of the prestigious S.S. Bhagnagar Award (1987), Dr. Surolia spoke to Biotech News about his vision for NII.

How do you perceive NII's role in India's development?

India has institutes like Indian Institute of Technology, Indian Institute of Science (I.I.Sc.), good universities but their mandate is very broad. For example I.I.Sc. works in every area of technology from IT to Aviation. Whereas, NII is a pioneering institute focusing its activities in immunology and its allied areas in modern biology. NII's research focus is on:

- Understanding immunity
- How to modulate and respond to infectious disease (viral, bacterial or fungal)
- Development of vaccine or technology for better delivery

Understanding of immune systems is far from incomplete. Infact, modern immunology as a subject is only 50 years old. And unless understanding about human immunological system takes a quantum jump, it will be difficult to find cure of many a disease. NII aims to pursue research that helps us to fill these critical knowledge gaps.

What are NII's core areas of strength?

NII has come a long way since it started in its mission in 1981. NII today has the ability to excel and compete globally in the areas of both basic and applied immunology. It is considered as one of the pioneering institutes of South Asia which is to compete with the best across the world. The more than 40 scientific professional staff that form the core of NII, are perhaps the one of the most potent concentration of scientific talent anywhere in the world.

What is your vision for NII's future?

NII has to address problems that are directly relevant to the challenges faced by India as a developing country. We have been able to develop a good understanding of the immune system. Having traveled so far, NII now is poised to take a shot at challenges of the future like:

- Evolving newer strategies for diagnosis of cancer and infectious diseases
 - Developing novel vaccine using recombinant DNA vaccine
 - Development of certain molecules as potential drug candidates
 - Identifying issues related to fertility control, develop immunological approaches to control reproductive processes.



followed the first decade of consolidation, NII widened its horizons to take on newer and more complicated challenges. These included,

- Research in basic and applied immunology
 - Development of new vaccines
 - Development of immunological kits and reagents
 - Interaction with industry for manufacture of products developed from the research leads
 - Serve as a national reference centre for immunology
 - Provide and promote linkages and collaborate with various scientific research agencies/laboratories in the field of immunology

NII is committed to advanced research addressing the basic mechanisms involved in body defence, host-pathogen interactions and related areas with a view to contribute to the creation of an internationally competitive intellectual knowledge base as a sustainable source of innovative futuristic modalities of potential use in health care. To this end, the institute follows a two-pronged strategy of linking excellence in rigorous fundamental research with the pragmatic pursuit of emerging application possibilities in entrepreneurial partnerships. The doctoral (Ph. D) program at NII draws highly talented students in a nationwide entrance process. The degree for the Ph. D is awarded through Jawaharlal Nehru University. The institute has intense research collaboration with various laboratories both, overseas and within the country.

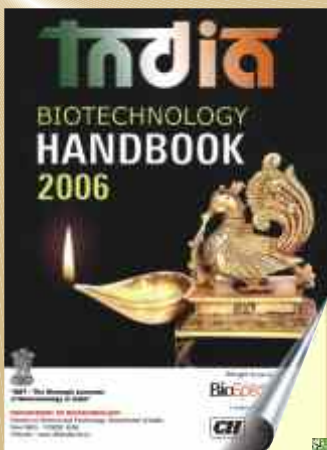
Today, over thirty independent research groups work at NII in a broad range of modern biological disciplines to understand the molecular mechanisms of interaction between the biological systems and their environment.

Over the years, the quality of publications in highly competitive peer-reviewed international journals has considerably improved, so has the technological competence. NII hold 29 international and 16 national patents. Papers of NII Scientists are published time and again in prestigious journals like Nature, Nature Structural Biology, Molecular Cell, Blood, EMBO and JBC Journals.

With its well equipped laboratories, crystallography and computational units, bio-informatics lab, NMR facility, mass spectroscopy, a confocal microscope, a well laid-out small animal facility and a primate house, NII is ready to face the challenges that it mandated to address. The scientific infrastructure of NII is well complimented by a serene campus with in-house residential accommodation and recreational facilities that provide NII staff an ideal environment to pursue their professional objectives.

NII visualizes its future as a leader not only in the field of scientific excellence but also in forging new relationships for collaborative work. While primary mission of NII would continue to be basic research relevant to understanding diseases and immunogenic mechanisms involved therein, NII also seeks to sharpen its focus on transforming discoveries and inventions into intellectual property and products that are useful to the society. The institute emphasizes, "excellent basic research is the best motor of innovation". ■

Useful Publications by Department of Biotechnology





Breakthroughs in Health Sector

Tech Update

"First rotaviral diarrhoea vaccine specific to India has already completed the first phase of human clinical trial."

Resisting Rotaviral diarrhoea

Rotaviral diarrhoea contributes to 40% of the total dehydrating diarrhoea disease in young children, causing 150,000 deaths per year in India.

The first rotaviral diarrhoea vaccine specific to India has now completed the first phase of human clinical trial. Two candidate vaccines 116E and I1321 were developed under the Indo-US Vaccine Program. 116E was developed by Dr. M K Bhan and Dr. Pratima Ray (All India Institute of Medical Sciences, New Delhi) & Dr. Nita Bhandari (Society of Applied Studies, New Delhi) in collaboration with Dr. Roger I Glass, Center for Disease Control and Prevention, Atlanta, USA. I1321 was developed by Dr. C. Durga Rao (Indian Institute of Science, Bangalore) in collaboration with Dr. Harry Greenberg (Stanford University, USA).

According to results of recent infant trials both candidate vaccines have been deemed safe and well tolerated. Vaccine take was reported in 74% of the recipients of candidate vaccine 116E while in case of I1321 the same was 40%. M/s. Bharat Biotech International Ltd., Hyderabad has produced a



Human Rotavirus Vaccine

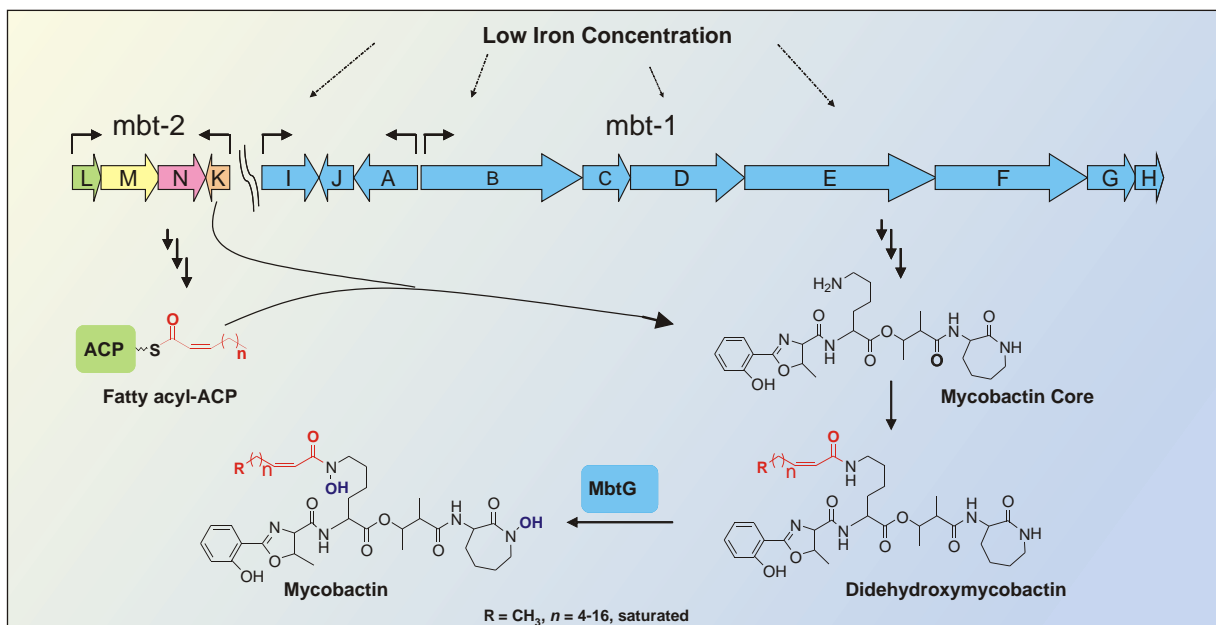
prototype vaccine of 116E, the most promising candidate under cGMP conditions. This will be followed by larger clinical trials. A double-blind, randomized placebo, controlled dose, escalating phase Ib/IIa study has been planned to evaluate the safety and immunogenicity of live attenuated rotavirus vaccine 116E in healthy, non-malnourished infants, 8-20 weeks of age.



Indigenous Rota Virus Vaccine being administered to a infant

New pathway for combating Tuberculosis

Tuberculosis affects more than one third of the world's population and is a leading cause of morbidity and mortality across the globe. When *Mycobacterium tuberculosis* infects humans, it takes refuge in immune cells called macrophages. To survive, mycobacterium requires iron for sustenance. As free iron is not readily found in an intracellular environment, most bacteria manufacture and secrete chemical compounds called siderophores that scavenge iron from the environment. Although siderophores were



Biosynthetic Pathway for Mycobactin Biosynthesis



discovered over fifty years ago, the genes involved in adding the long lipid chain anchor that enables *M. tuberculosis* to do so more efficiently remained a mystery till now.

Mycobacteria evolve siderophores with lipid-chain tails that enable them to exploit the macrophage's lipid-trafficking system to capture iron more efficiently. Instead of using siderophores that diffuse freely, mycobacteria anchor siderophores to lipid membranes by means of a long fatty acid tail. After these siderophores bind to iron within the macrophage, the lipid tail makes the iron *sticky* enough to permit delivery to the very compartment in macrophages where the mycobacterium are lurking.

A team led by Dr. Rajesh S Gokhale from the National Institute of Immunology, New Delhi has identified five key

genes that enable *M. Tuberculosis* to acquire the iron it needs for sustaining and promoting infection. They identified the location of four genes that produce the lipid tail. Since the gene required for the synthesis of siderophore core called mbt-1 functions the same way, the new locus and genes were named mbt-2 and mbt K, mbt L, mbt M and mbt N.

Targeting these genes is a good strategy for preventing tuberculosis and other mycobacterial infections, because some of these genes are conserved across a number of related bacterial families, and are promising targets for drugs to treat tuberculosis and other bacterial diseases. ■

"SIGNAL-KA
can detect Kala-azar in just 8-10 minutes without any surgical procedure and can be used in the remotest area at a very economical price of about Rs.60-70/- per test."

Technology Transfer

Technology for anti-malarial compound transferred to industry

The Indian green mussel (*Perna viridis*) is valued as a delicious and rich source of proteins. The National Institute of Oceanography, Goa jointly with the National Centre for Cell Science, Pune and the International Centre for Genetic Engineering and Biotechnology, New Delhi have enhanced its value further. Two compounds derived from the mussel have shown antimicrobial activity in mice. Interestingly, the biological activity is not lost when delivered through the oral route. More importantly, the compounds isolated from the mussel are non-toxic to host cells but kill malarial parasite (*Plasmodium falciparum*) in red blood cells. One of the compounds appears to be active against the chloroquine-resistant strain of the parasite.

A US patent (USP Appl 20050090480, 28 Apr 2005) has been obtained for the discovery and the same has been assigned to Shreya Life Sciences, Mumbai-based company, for commercialising this drug. The commercialisation agreement is worth Rs 1.75 crores (US \$ 0.4 million). The company has now initiated work on pre-clinical toxicity trials which will be followed by human clinical trials.

Technology diagnostic kit for Kala-azar transferred for commercial production

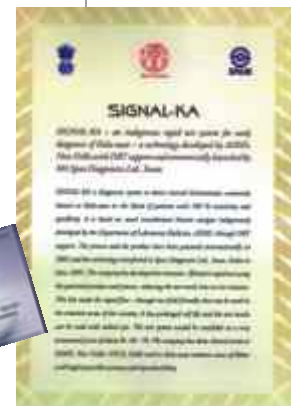
Kala-azar or *Visceral leishmaniasis* is caused by the protozoan parasite *Leishmania donovani* transmitted by the sand fly bite. Immediate symptoms are fever, weakness, anemia and swelling of the liver and spleen. Kala-azar can be

fatal if not diagnosed and treated in its early stages. Each year more than 60,000 of the approximately five million victims in India succumb to Kala-azar due to non-diagnosis or lack of timely treatment. *Kala-azar* is conventionally diagnosed using the bone marrow or spleen biopsy, which is often difficult to conduct in remote areas of a country like India.

With the support of Department of Biotechnology the scientists of All India Institute of Medical Sciences (AIIMS) under the leadership of Dr. Sarman Singh have developed a diagnostic kit, "SIGNAL-KA" that can detect Kala-azar in just 8-10 minutes. Given its simplicity "SIGNAL-KA" can be used in remotest areas and that too at a very economical cost of Rs. 60-70 per test. The kit has a long shelf life and can detect the disease 15 days before the symptoms set in which are usually seen after the 3 months incubation period of the parasite. Clinical evaluations have been conducted with highest possible accuracy and reproducibility at AIIMS, New Delhi; National Institute of Communicable Diseases (NICD), New Delhi and in areas of the state of Bihar where Kala-azar is endemic.

In 2003, an international patent for the process and product had been obtained. The kit is now being commercialized by Span Diagnostics, a firm based in Surat, Gujrat.

This new kit is indeed a boon for millions of people because it enables an early and easy detection of Kala-azar at an affordable cost. ■





News and Happenings

News Desk

“Mr. Sibal emphasized the importance of a single regulatory authority for ensuring safer agriculture and therapeutic products.”

Celebrating the beginning: DBT Foundation Day

The Department of Biotechnology celebrated its 20th Foundation Day on 13th March, 2006. The Hon'ble Minister for Science and Technology and Ocean Development, Mr. Kapil Sibal was the Chief guest at an elegant inaugural function held at NII Auditorium in New Delhi. The function was attended by eminent scientists and prominent members of the civil society. In his keynote address, Mr. Sibal recalled the contributions of Dr. S. Ramachandran, the first Secretary of DBT and his successor Dr. Manju Sharma in the establishment and consolidation of DBT as a result oriented organization, a process that now continues under the leadership of Dr. M.K.

scientists in basic and applied research covering all areas of biosciences and biotechnology. For the year, 2005-06, the awards were presented to:

- Dr. Apurva Sarin, National Centre for Biological Sciences, Bangalore for mechanism of apoptosis in *T. lymphocytes* of mammalian origin.
- Dr. Dulal Panda, Indian Institute of Technology, Mumbai for molecular mechanism of regulation of microtubule assembly dynamics and mechanism of action of microtubule-targeted anti-cancer drugs.
- Dr. GPS Raghava, Institute of Microbial Technology, Chandigarh for Bioinformatics and Computational Biology.



(LtoR): Mr. U.N. Behera; Dr. M.K. Bhan; Mr. Kapil Sibal and Dr. S. Natesh

Bhan. The minister underlined that biotechnology enterprise today is a sunrise area. He promised to provide all the help, support and facilitation for its rapid growth in the country. On the occasion Mr. Sibal also announced plans regarding setting up of the Institute of Seribiotechnology as well as Institute of Animal Biotechnology in the near future in India. The minister also stressed upon the need and importance of having a single regulatory authority for ensuring safer, biotech based agricultural and therapeutic products. The glittering ceremony was also an occasion to present the following awards instituted by DBT to honour achievers in various categories.

National Bioscience Award for Career Development was initiated to recognize outstanding contributions of young

- Dr. Rajinder Prasad Roy, National Institute of Immunology, New Delhi for basic mechanism of protease mediated peptide ligation which is potentially useful in synthetic design strategies.
- Dr. Saumitra Das, Indian Institute of Science, Bangalore for ribosome assembly on hepatitis C virus RNA and drug development.
- Dr. Sudip Chattopadhyay, Nation Centre for Plant Genome Research, New Delhi for role of transcription factors in light mediated signal transduction pathway controlling seedling development in plants.

The Innovative Young Bio-technologist Award is given to outstanding young scientists (less than 35 years of age) with



Dr. Saumitra Das (I.I.Sc., Bangalore) receiving the National Bioscience Award for Career Development from the Hon'ble Minister

innovative ideas and desirous of pursuing research in frontier areas of biotechnology. Awardees for the year 2005-06 were:

- Dr. Amita Gupta from the Department of Bio Chemistry, University of Delhi South Campus.
- Dr. Samir V Sawant, National Botanical Research Institute, Lucknow.
- Dr. D. Sunder from School of Life Sciences, Pondicherry University, Pondicherry.
- Dr. Gitanjali Yadav, National Institute of Immunology, New Delhi.

The National Award for Women Bio-scientists that is awarded to outstanding women bio-scientists contributing in the field of biology and biotechnology was given to the following.

- Lifetime contribution Award was presented to Dr. A. Radha Rama Devi from the Centre for DNA Finger Printing and Diagnostics for her work on inborn errors of metabolism and genetics.



A young scholar receiving the Biology Scholarship from the Minister

- The award in the Young Scientist Category was awarded to Dr. Suparna Sengupta, Rajiv Gandhi Centre for Biotechnology, Thiruvanthapuram, for her work on anti-cancer agents, and to Dr. Kusum Arunachalam, North Eastern Regional Institute of Science and Technology for work on

ecosystem dynamics of wetlands, forests and agricultural systems.

Small Business Innovation Research Initiative: Boosting Small and Medium Enterprises(SMEs)

Innovative capacity determines the ability of a system to create a continuing pipeline of new products and processes. Innovation encompasses knowledge creation (R&D), knowledge diffusion (education & training) and knowledge application (commercialization). However, there is often no continuity between these components of innovation and that is one major reason why leads from the lab do not often get translated into usable products/processes. It is a fact that much of the innovation in the field of biotechnology is driven by small and medium enterprises (SMEs). However, most SMEs operate on shoe-string budgets lacking the working capital required to dabble in R&D, especially for early and late stage development. Recognizing this debilitating constraint faced by SMEs, the Department of Biotechnology launched the Small Business Innovation Research Initiative (SBIRI) in September 2005. SBIRI aims to support novel, high risk pre-proof-of-concept research and late stage development in small and medium biotech companies led by innovators with science background and to engage them in development of products and processes of high social relevance. SBIRI seeks to bring users and private sector producers of technology together to hasten the process of converting new technology into newer products with a sense of urgency.

The SBIRI aims to:

- strengthen in-house R&D of private industrial units
- create opportunities for new technology-based or knowledge-based enterprises;
- stimulate technological innovation;
- enhance public-private partnerships, and
- increase product commercialization in public-private sector derived from Government funded R&D.

A typical project under SBIRI is supported in two phases. In the first phase, highly innovative, early stage, pre-proof-of-concept research proposals, which address important national needs are supported. In the second phase, funding is provided in the form of a soft loan for upto Rs.100 crores for late development and commercialization of innovative research leads wherein proof-of-concept is already established.

The core objectives of SBIRI is to nurture the development of indigenous technologies and biotech enterprises that address

“Support nurturing of indigenous technologies and enterprises especially addressing societal needs.”



critical societal needs in areas like healthcare, food, nutrition and agriculture. In the year 2005-06, 10 applications out of a total of 71 received support. Calls for fresh proposals for the current year has already been announced in major newspapers. For more details please visit <http://www.dbtindia.gov.in>

Indo-Finnish Workshop on Plant and Food Biotechnology held at Helsinki

Indo-Finnish Workshop on Modern Plant and Food Biotechnology was held at Helsinki, Finland from April 3-5, 2006. The objective of the workshop was to strengthen communication between Finnish and Indian research scientists. The focus of deliberations during the workshop were the following three thematic areas:

- Plant and Crop Biotechnology
- Food and Industry Biotechnology
- Biotechnology for a Sustainable Bio-future.

Representatives of several renowned Indian research and academic institutions associated with biotechnology participated in the workshop. The highlight of the workshop was a visit to Helsinki University and VTT Technical Centre. It is expected that the deliberations and contacts established at the workshop will lead to 8-10 collaborative projects involving Indian and Finnish institutions.

Indo-US Workshop on Clinical Trials and Clinical Research held at Mumbai

An Indo-US Workshop on Clinical Trials and Clinical Research was held in Mumbai from April 4-6, 2006. The workshop was sponsored by the Department of Biotechnology; Indian Council of Medical Research; Drugs Controller General of India and the U.S. Department of Health and Human Services. The workshop focused on various aspects related to clinical trials and research and was attended by eminent experts from USA and India.

Meetings held on biotechnology for improvement of pulses and oilseeds

The Department of Biotechnology organised two meetings with institutions engaged in biotech research on oilseeds, pulses, fodder and fibre crops. The purpose behind these meetings was to generate research ideas pertaining to use of biotechnological tools for genetic improvement of these crops. The first meeting was held on 3rd April 2006, at the Directorate of Oilseed Research, Hyderabad. Indian Grassland and Fodder Research Institute, Jhansi was the venue for the



second meeting held on 10th April 2006.

The meeting focused on research and development priorities for these major crops including improvement of pulses through transgenesis and marker-aided selection.

A Think Tank Chaired by Dr. C.R. Bhatia, former Secretary DBT has also been constituted to deliberate upon and suggest an action plan for improving food, fodder and fibre crops through application of biotechnology. The first meeting of the this newly constituted consultative group is scheduled in June 2006.

DBT-IAVI collaborate for HIV vaccine research

Department of Biotechnology and International AIDS Vaccine Initiative (IAVI) have signed a Memorandum of Understanding to cooperate in the areas of R & D and evaluation of HIV/AIDS Vaccine in India. The broad areas identified for collaboration are:

- Basic and applied research on HIV/AIDS Vaccine Development
- Exchange of information
- Capacity building for conducting clinical testing of HIV/AIDS vaccine(s) in India and
- Identification of Intellectual Property Rights issues for facilitating licensing of technology transfer agreements.

As a follow up to the MoU an expert consultation was held on February 20-21, 2006 at International Centre for Genetic Engineering and Biotechnology (ICGEB), New Delhi to define the challenges in the way of developing HIV/AIDS vaccines and also to identify key R & D needs in this context.

Partnership in Stem Cell Research

Department of Biotechnology and Christian Medical College (CMC), Vellore have joined hands to setup the "CMC-DBT



Centre for Stem Cell Research" at Vellore, Tamil Nadu. Funded by the Department of Biotechnology the centre aims to promote basic and translational stem cell research in the country. Initial focus of the team of the scientists of the centre



Harvest of Peripheral Blood Stem Cells at CMC, Vellore

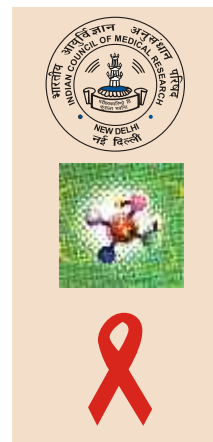
will be on cardiac disorders. Projects are also being developed for application of stem cell or other cell therapies for treatment of damaged articular cartilage and physeal plate, muscular dystrophy and immuno-modulation for treatment of systemic sclerosis.

The Centre has state-of-the art infrastructure to conduct research and production of cellular products for human use. A Scientific Advisory Committee has been constituted for providing direction to the centre and monitoring its activities.

Breaking barriers and building partnerships: DBT and ICMR to jointly fund projects on HIV/AIDS and microbicides

Department of Biotechnology and Indian Council of Medical Research(ICMR) have decided to jointly invite and fund collaborative research proposals in the area of HIV/AIDS and

microbicides. The objective of this collaborative programme is to augment advanced scientific R & D through a shared strategic plan and financial resource mobilization and also to promote greater collaboration among HIV/AIDS researchers in the country. In the meetings held with leading HIV/AIDS researchers and planners, the areas identified to be focused upon include, understanding the pathogenesis of HIV/AIDS, designing novel vaccines and microbicides concepts, curtail HIV replication etc. The letters of intent (LoI's) received from various research institutions, universities, private companies and NGOs, are now being reviewed by an Expert Committee. The criteria for determining eligibility for support are scientific merit, priority of the proposed area, expertise and leadership qualities of principal investigator(s) and the team, collaborative abilities, core infrastructure and support facilities.



Creating "Centres of Excellence" in biotechnology

The Department of Biotechnology launched its "Centres of Excellence" scheme in year 2005-06 for augmenting and strengthening institutional research capacity in areas of biotechnology. Under this scheme, flexible support is provided to expand and develop faculty research capabilities and enhance research infrastructure. Each centre created under the scheme is expected to have a specific and sharp thematic focus with multi-disciplinary approach for achieving end goals. The thematic focus must use a mix of product-relevant discovery science and aim at innovation in agriculture, environment, health and industrial sectors. Addressing emerging technologies with inter-disciplinary cross talk is a priority and openness to collaborate with industry is viewed positively.

Announced last year, the scheme has elicited a very encouraging response. Proposals received from various institutions for consideration are peer-reviewed and placed before the Programme Advisory Committee (PAC) for its final recommendations. In the first year, Centre for DNA Fingerprinting and Diagnostics, Hyderabad has been supported as a Centre of Excellence for work on 'Genetics and Genomics of Silk Moths'. In addition, the following institutions have been supported under the programme support mode:



1. Indian Institute of Science, Bangalore (Research on cancer biology and therapeutics) / Research on Industrially Important Non-Conventional Yeasts.
3. University of Agricultural Sciences, Bangalore and International Centre for Genetic Engineering & Biotechnology, New Delhi (Development of drought tolerant rice varieties by biotechnological approaches)
4. M.S. Swaminathan Research Foundation, Chennai (Characterization and validation of the mangrove genes in transgenic rice systems for abiotic stress tolerance)
5. Institute of Microbial Technology, Chandigarh (Development of technologies for therapeutic proteins)

The proposals received for the financial year 2006-07 are now under various stages of review.

Bio-2006 Convention, Chicago, USA: The flying colours of India

Mr. Kapil Sibal, Hon'ble Minister of Science & Technology and Ocean Development led from the front for India at BIO-2006 Convention held at Chicago, U.S.A from 10-12, April 2006.



Dr. Kiran Mazumdar-Shaw CMD Biocon Ltd. In conversation with the Hon'ble Minister at BIO-2006, Chicago, U.S.A.

Nearly 20,000 participants from more than 60 countries attended the convention.

At the International Ministerial Seminar, Mr. Sibal was very articulate in highlighting the strengths of India as an emerging biotech destination. This, he underlined, is reflected in India's regulatory procedures, TRIPs compliant intellectual property



Members of the delegations of India and the United States of America with the Hon'ble Minister.

regime, qualified and high-skilled work force, rich biodiversity, vast market and the pro-active government policies. Besides India, ministers from Germany, European Union, Malaysia and Taiwan also addressed the seminar. Dr. M. K. Bhan, Secretary, Department of Biotechnology chaired the International Food and Agriculture Seminar held during the convention. A large number of Indian biotech companies led by CII and ABLE, DBT as well as several state governments made their presence felt at the three day long BIO 2006 exhibition.

In New York, on April 5th, Mr. Sibal launched the India-US Biotech Working Group of the High Technology Co-operation Group (HTCG) coordinated by Federation of Indian Chambers of Commerce and Industry (FICCI). Addressing the members of the Business Council for International Understanding



L to R: Dr. M. K. Bhan (Secretary, DBT); Dr. Y. P. Kumar (Director, International Cooperation, DST); Dr. Elias A. Zerhouni (Director National Institutes of Health U.S.A.) and Dr. Kapil Sibal, (Hon'ble Minister for S & T and Ocean Development) in discussion at the Mark O. Hatfield Clinical Research Center

Reach out to a broader constituency

Planning a meeting?!! Biotech News would be happy to publish news/announcements about forthcoming national / international seminars, symposia and conferences etc. on subjects related to biotechnology. Please send your emails detailing title of the event; date (s); venue; contact details etc. to: biotechnews@dbt.nic.in

<http://www.biotechnews.dbt.nic.in>



(BCIU) and the United States India Business Council, the minister identified high technology as one of the key elements of Indo-US partnership. He also highlighted the opportunities that India presents in the fields of biotechnology, pharmaceuticals, agriculture, food processing, alternate energy sources, health sector including medical devices and clean technologies besides infrastructure and power. A Joint Science and Technology Commission to oversee the bilateral cooperation matters in the field of science between India and USA, was a welcome result of Mr. Sibal's meetings with senior US officials, that included Dr. Jack Marburger, Science Advisor to President Bush. The joint commission would be co-chaired by Minister, Science and Technology from the Indian side and the Science Advisor to US President from the US side.

During his visit to Washington D.C., Mr. Sibal's gave a talk on "Science and Technology for Development: The Indian



Mr. Kapil Sibal making his point at the roundtable discussion with members of Pan IIT, TIE-DC and CII Indian American Council at Washington DC, U.S.A.

Experience". His roundtable discussion with members of Pan IIT, TIE-DC and CII Indian American Council had more than 150 US based IIT alumni attending and interacting with the delegation. The delegation led by Mr. Sibal also visited the Mark O. Hatfield Clinical Research Center of the National Institutes of Health (NIH). Dr. Elias A Zerhouni, Director, NIH and Mr. Sibal deliberated upon various possibilities of cooperation between Indian institutions and NIH. The Indian delegation also interacted with scientists, professors and students at the George Washington University Law School, University of Iowa, and the Ohio State University. ■

Let's get in touch!

DBT has launched the "Small Business Innovation Research Initiative (SBIRI)". We are in the process of preparing a general mailing list of target organizations to keep them informed about the SBIRI scheme and provide to them information on development, discussion meetings, etc. from time to time. Small sector industries, small medium entrepreneurs and other private organizations engaged in modern biotech activities like research and development, production and commercialization, etc are encouraged to provide their contact details where this information can be sent. Mail your contact details to Editor, Biotech News.



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Call for Proposals

Clinical Research Training Centres

Proposals are invited from Public and other DSIR recognized institutions to establish programs for clinical research training related to biotechnology products. The expected role of a Clinical Training Centre is to conduct Short Term Training for physicians working in public institutions and in small and medium size industry on Clinical Research as relevant to development and evaluation of diagnostic, predictive and therapeutic modalities, implants and devices.

Last date for submission of final proposals: 30th June, 2006.

For more details, visit: www.dbtindia.gov.in

Masters Course/ Fellowship in Translational Health Science/Masters in Clinical Science

The Department of Biotechnology, invites letters of intent/ preliminary concept proposals from institutions interested in initiating a planning process leading to the introduction of a Masters Course/ Fellowship in Translational Health Science or Masters/Fellowship in Clinical Science. Institutions can create programs that are implementable and sustainable through their system. Planning grants are available for consultation and preparatory work to develop broad concept and structure of the program, specific learning materials and precise agenda for hands-on work.

Last date for submission of proposals: August 15, 2006

For more details, visit: www.dbtindia.gov.in

Animal Vaccine and Animal Nutrition

Proposals are invited from scientists, groups / individuals for providing program support for development of animal vaccines for following animal diseases:

- a. Foot and Mouth Disease - Cattle, Buffalo, Sheep, Goat & Pig
- b. Peste des petis ruminants - Sheep & Goat
- c. Blue tongue - Cattle & Sheep
- d. New Castle Disease - Poultry
- e. Infectious Bursal Disease - Poultry
- f. Marek's Disease (T-cell lymphoma) – Poultry

The objective of the program is to develop newer/ improved vaccines (heat stable, broad spectrum, longer immune response, better adjuvants, less side effects and residues).

Proposals are also invited R&D projects in the area of Animal Nutrition. The broad areas identified for exploring use of biotechnological tools for efficient utilization of feed and fodder are:

- a) Genetic manipulation of rumen microbial ecosystem for improving productivity and protecting environment,
- b) Identification of genes for better feed conversion of agro-byproducts,
- c) Microbial feed additives (Probiotics) for enrichment of feed quality,
- d) Use of fibrolytic enzymes in feed to improve digestability and nutritive value, and
- e) Genetically modified silage bacteria

For more details, visit: www.dbtindia.gov.in

Short-term Training Courses in Life Sciences and Biotechnology

Applications are invited from leading research institutions and universities for conducting short term training courses for mid career scientists and college teachers to impart hands-on training in advanced research techniques in biotechnology.

Last date of submission of proposals: June 30, 2006

For more details, visit: www.dbtindia.gov.in

Center for Idea Generation

Under its Small Business Innovation Research Initiative (SBIRI), the Department of Biotechnology intends to establish a centre which would be involved in idea generation for innovation and preparing pre-proof of concepts. Pre-proposals are invited from organizations willing to host and maintain the Centre for Idea Generation. The preferred location of the proposed centre is Delhi even if the head office of the applicant institution is elsewhere. The expected process of functioning of the centre will be :

- i. To undertake consultations/ interactions to identify emerging areas in Biotechnology
- ii. To organize large number of meetings, preparing recommendations for submission to the department
- iii. Identification of experts from private and public set up to develop the project and identified/prioritized ideas

For more details, visit: www.dbtindia.gov.in

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