Regional Centre for Biotechnology & Translational Health Science and Technology Institute

Twin institutions in the Biotech Science Cluster, NCR Delhi, the Regional Centre for Biotechnology (RCB) and the Translational Health Science & Technology Institute (THSTI) are complementary yet independent and are designed to synergize the growth of biotechnology through proactive and collegial interactions. While RCB will work on the development of human resources in biotechnology in an interdisciplinary research milieu, THSTI is envisaged to focus on science for human health covering mechanistic approaches as well as broad questions in niche domains.

It is understood that increasing the number of skilled scientists raises the benchmark for scientific discourses as well as technological innovations. Indeed, scientific skills and innovation are enhanced by the interactions that come from proximity. It is through such interactions that exponential growth can be triggered. However, much of our visible growth in research in the recent past has been in small institutions in dispersed locations. Combining the advantages of large and small is possible by having small autonomous institutions co-located in a cluster. It is important however, that each of the components of such an interactive science cluster develop its own optimally designed processes that must be nurtured without interference. Such bottom-up approach with organically developed collegiality that empowers the participating scientific communities is likely to prove durable. This is the conceptual foundation for clustering major institutions with related yet distinct missions and mandates.

A major beginning in this direction has been recently made with the establishment of the Regional Centre for Biotechnology (RCB) and the Translational Health Science and Technology Institute (THSTI) within the Biotech Science Cluster in the National Capital Region (NCR) by the Department of Biotechnology, Govt. of India. The RCB will work on the development of human resources through education and mentoring in a globally competitive research milieu. It will provide a platform for interdisciplinary research & education at the biotech interface of engineering & medicine, chemistry & physics, agriculture & climate science to empower human resources to drive biotech innovations. The THSTI is envisaged as a group of autonomous centres focused on science for human health ranging from a mechanistic approach to broad questions to specific domains such as pediatric biology, vaccine design, health technologies, molecular diagnostics and bio-imaging.

The twin institutions will create core technology resources using an innovative and efficient management structure allowing effective cluster-wide access to technologies such as stringent containment facilities for bio-hazardous work, engineered laboratory animal resources,

ARCHITECT'S DESIGN OF PROPOSED CAMPUS OF RCB AND THSTI AT FARIDABAD

high-end imaging, modalities for collection of large data sets such as proteomics, genomics and metabolomics, the maintenance of large bio-library and high-throughput screening resources. Further, the cluster will eventually develop a clinical research centre as well as a network of off-campus partner institutional resources for clinical as well as population studies. The other institutions presently associated with the cluster are the National Institute of Immunology , New Delhi, National Institute of Plant Genome Research, New Delhi and National Brain Research Centre, Manesar. Downstream technology development will be nurtured within the cluster by the creation of incubator resources for participatory product and business development efforts.

REGIONAL CENTRE FOR BIOTECHNOLOGY (RCB)

The Regional Centre for Biotechnology, an institution of education, training and research was established by the Department of Biotechnology, Government of India under the auspices of UNESCO as a category II institution. The Centre is aimed at focussing on multi-disciplinarity to germinate innovation in Biotechnology. It is earnestly hoped that the international nature of this Institute and the partnership with UNESCO will create opportunities for new ideas in education and training on a worldwide basis.

GENESIS: The Government of India and the UNESCO fully realizing the need of research, training and education for generating interdisciplinary human resource relevant to biotechnology, took a joint decision to establish the Regional Centre for Biotechnology (RCB). Accordingly, an Agreement was signed dated 14th July 2006 for the establishment and the operation of this Centre for creating world class education and research in biotechnology through global cooperation.

This Centre would be beneficial to all countries in the region including India in developing knowledge-rich highly skilled human resource, harmonization of policies & procedures in biotechnology and indirectly promoting trade. Biotechnology being essential globally, the partnerships are being visualized as much within as across countries. RCB will create a platform from which many such partnerships will emerge. In other words, RCB is envisioned as a Centre of education, training and research in biotechnology with intimate contributions from countries of the region and academic institutions from the rest of the world and provides a meeting place where innovation, enterprise, and industrial development will germinate.

MISSION: Providing a platform for biotechnology education, training and research at the interface of multiple disciplines is the RCB's mandate. The programmes of the Centre are designed to create opportunities for students to engage in multi-disciplinary research where they learn biotech science while integrating engineering, medicine and science, to provide solutions for human and animal health, agriculture and environmental technologies. The vision is to produce human resource tailored to drive innovation in biotechnology, particularly in areas of new opportunities and also to fill talent gap in deficient areas. The mission is to provide high quality human resource in disciplinary and interdisciplinary areas. This will also create amazing opportunities for students to engage in research by integrating science, engineering and medicine so as to provide health care solutions for human

and animal sector, for agriculture and environment technologies. The Centre will also liaison with other Indian Universities for entertaining students from this region for Masters programme in Biotechnology.

RESEARCH AND ACADEMIC PROGRAMMES:

The Centre will promote multi-disciplinary innovative research in biotech sciences. Contemporary research at the interface of disciplines and emphasis on the relevance to regional societies is being undertaken. Broad range of areas synergising with biotech science will be pursued:

- Biomedical Science
- Bioengineering & Devices
- Chemical and Physical Approaches
- Climate Science, Agriculture and Environment
- Biotechnology Regulatory Affairs, IPR and Policy

Areas within the above domains being currently initiated include analyses of complex diseases for identification of intervention points and development of knowledge-based drug discovery approaches. A contemporary activity that fits well in the context of bioengineering and devices is tissue engineering & regenerative medicine. Nano-science for biotechnology, wherein the emphasis would be on design of novel nano-devices for bio-sensing, diagnostic and therapeutic utility is among the priority areas. Integration of climate models with design strategies for transgenic crops and environmental impact of climate change using mathematical as well as physical approaches are also being envisioned to be priority areas. A major aspect of biotech revolution concerns addressing regulatory and IPR issues as well.

The design and process of the education at this Centre will be such that it will generate technology savvy solution finders/ creators, science entrepreneurs/ knowledge economy entrepreneurs and R&D leaders. RCB is set out to be a Biotechnology University with unique canvas of specialized doctoral and masters programmes, domain specific training programmes and high quality research and development in priority areas aimed at producing a highly specialized cadre of scientists capable of translating laboratory research to actual practice for societal benefit. Purpose of such interdisciplinary programmes is to educate students at the interface of engineering, agriculture, medicine and physical sciences via a flexible structure that permits explorations at the intersections of these disciplines. The Centre has begun to provide disciplinary as well as interdisciplinary short term training programmes by networking through diverse institutions.

The Centre will be open to industry for enhancing their skills in specific areas. Domain-specific programmes will also be designed in order to create a cadre of highly specialized scientists for technology development in the relevant areas. An important focus of expertise building will be regulation, product development, scale up, manufacturing sciences and bio-entrepreneurship.

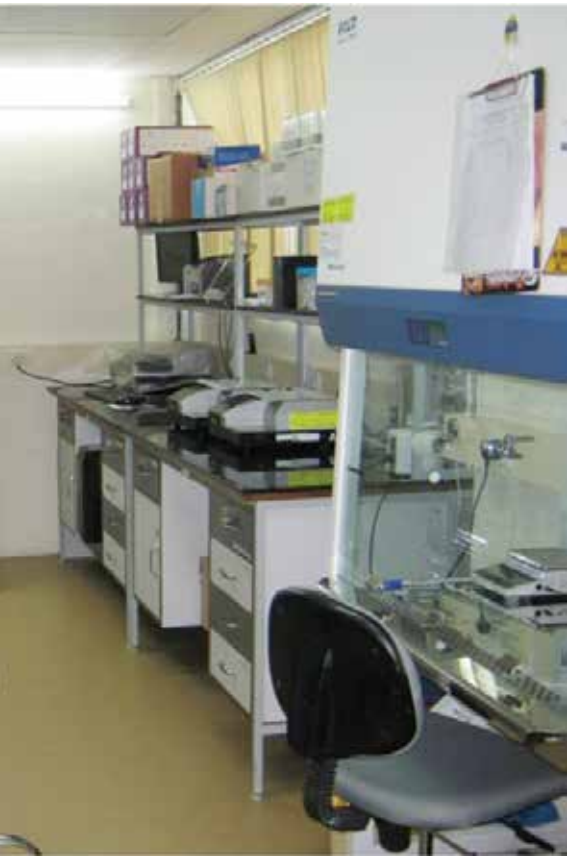
CAREER OPPORTUNITIES : The centre is recruiting as faculty, scientists with potential for intellectual leadership and passion for both research and teaching in all cutting-edge areas of biotechnology and life sciences. The research and education programmes of RCB are being designed to create innovative opportunities to engage in research breakthroughs of relevance to India and the region. The Centre recognises that the expertise and innovation in diverse domains is critical for the development of novel perspectives in biotechnology, and invites scientists, engineers and medical professionals of the highest calibre and credibility to participate in this shared adventure to transform the biotech sciences.

INSIDE VIEW OF A TYPICAL LABORATOR

The Centre also has the provisions for Visiting Professorship, Adjunct Professorships, Re-entry Grants and Young Investigator Awards. Scientists working in other national/international institutes and universities will be selected for a

period of five years to contribute to the mission of the Centre as adjunct faculty. Limited visiting faculty positions are also available for Indian as well as foreign nationals. Selection will be carried out by a high level committee of global experts.

Post-doctoral training opportunities are available for young scientists from the region to work under the mentorship of senior faculty of RCB. Post-graduate candidates from this region will be admitted for the inter-disciplinary Ph D programme of the Centre. RCB is working in close co-operation with several prominent Indian Universities to facilitate admission of international students within the region, for the post-graduate courses in biotechnology, sponsored by the Department of Biotechnology, Government of India.



Y AT THE INTERIM CAMPUS IN GURGAON

TRANSLATIONAL HEALTH SCIENCE & TECHNOLOGY INSTITUTE (THSTI)

THSTI is an autonomous institution established by the Department of Biotechnology, Govt. of India under the Societies Registration Act of 1860 on 15th July, 2009. The THSTI is designed to be a dynamic and interactive organization with a mission to conduct innovative translational research and develop research collaborations across disciplines and professions to accelerate the development of concepts into tangible products to improve human health.

BACKGROUND: India has made major progress over recent years in acquiring competence and credibility in using most sophisticated cutting edge biotechnology tools to understand disease pathogenesis at molecular level. The country is today experiencing difficulty in translating the available domain knowledge in science and biomedicine to usable products because of lack of facilities where basic scientists, physician scientists, technologists, epidemiologists along with innovative companies will work together to facilitate development, optimization and evaluation of technologies for health.

Translational and clinical research is critical for creating innovative technologies, since basic research without this does not usually lead to creation of useable products. The initial process of converting scientific knowledge into a health technology requires an interdisciplinary effort in which engineers, biologists, chemists and clinical scientists, physicists material scientists work together as a team, a situation that is often difficult to create in our existing department based university and individualised science institute work environment. Translation research follows a comprehensive set of steps including identification of socially or market relevant product related research needs, product characteristics suitable for diffusion, translational phase including animal research to generate proof of principle that may eventually lead to possible product development and clinical evaluation. The insights for translational science arise from background science knowledge, disease epidemiology and disease pathogenesis and through commissioned analysis of technology and product needs, product design, policy, economic analysis, knowledge of regulatory requirements, scale up facilities, the marketability and public health diffusion. This requires institutional structures with so called 'cradle to grave' abilities and facilities and an interdisciplinary work force.

MISSION: The THSTI is designed to be a dynamic and interactive organization with a mission to conduct innovative translational research and develop research collaborations across disciplines and professions to accelerate the development of concepts into tangible products to improve human health. The THSTI will facilitate development, optimization and evaluation of technologies for public health and individual health as an independent interdisciplinary centre where basic scientists, physician scientists, technologists and epidemiologists would work together. The key feature of THSTI would be a dynamic inter-

BUILDING OF THE RCB INTERIM LABORATORIES AT 180, UDYOG VIHAR, PHASE-I, GURGAON

relationship of health, science and technology sectors and with small and medium biotech industry pursuing great challenges in public health to produce affordable technologies through group excellence.

The mission of the THSTI is to integrate the fields of medicine, science, engineering and technology into translational knowledge, and making the biomedical innovations accessible to public health, to improve the health of the most disadvantaged people in India and throughout the world. As a networked organization linking many centers of excellence, THSTI is envisioned as a collegieum of scientists, engineers and physicians that will effectively enhance the quality of human life through integrating a culture of shared excellence in research, education and translational knowledge with the entrepreneurial spirit to take technologies into the public sphere.

RESEARCH, ACADEMIC AND TRANSLATIONAL PROGRAMMES: Presently, THSTI's research activities are focused in three broad areas, namely, vaccine and infectious diseases, paediatric biology, and bio design and diagnostics development. A Clinical Services Development Agency (CDSA) has been established as an extra-mural Centre of THSTI. Thus the activities of THSTI are focussed through following Centres:

- Vaccine and Infectious Disease Research Centre (VIDRC),
- Paediatric Biology Centre (PBC)
- Centre for Bio design and Diagnostics (CBDD)
- Clinical Development Services Agency (CDSA)

Vaccine and Infectious Disease Research Centre (VIDRC) conducts basic and clinical research to advance translatable knowledge to develop novel vaccines and biologics. The Centre would develop novel vaccine technologies in the form of new adjuvants and vaccine delivery systems. VIDRC research would have focus on infectious disease biology, development of animal models, natural history of disease in population giving new insight into protective host responses and biomarker discovery for screening vaccine candidates, thus fulfilling the requirement of a scientific milieu for novel vaccine development.

The overall goals and objectives of the Paediatric Biology Centre (PBC) is to translate mechanistic & causal understanding into development of robust sustainable interventions critical for public health policies in reducing neonatal & child morbidity & mortality. This will be achieved by bridging the gap between clinical and population epidemiology and mechanistic biology in a targeted approach to child health solutions. The unique mandate of the Center will be that biologists, physician scientists, epidemiologists and technologists will work together to evolve these innovative intervention strategies on a sound, more rigorous understanding of underlying biology. The immediate core domains of the research program will try to understand the complex molecular cellular causality of childhood infections particularly with reference to host responses, and other childhood diseases, and generate hypotheses that will be tested rigorously.

The overall mission of the Centre for Bio design and Diagnostics (CBDD) is to create medical technology innovation in India for affordable health care & to support services that extend from strategic bench work to commercialization. The overall objectives are to promote science and application related to affordable implants, devices, in-vitro diagnostics and imaging. The Center will develop world class quality science in platform technologies

Dr. Dinakar M. Salunke is the Executive Director of Regional Centre for Biotechnology since 2010 and holding additional charge as Executive Director of Translational Health Science and Technology Institute both currently located in Gurgaon, NCR, Delhi. He completed his Ph.D. (1983) from Indian Institute of Science (IISc), Bangalore and was a Postdoctoral Fellow at Brandeis University, Waltham, USA (1984-88). He had worked for National Institute of Immunology (1992-2010) in various capacities. He has received many awards viz. G. N. Ramachandran Gold Medal for Excellence in Biological Science & Technology (2010), JC Bose National Fellowship Award (2007), Ranbaxy Research Award for Basic Research in Medical Science (2002), Shanti Swarup Bhatnagar Prize (2000) and National Bioscience Award (1999).

Dr. Salunke has about 90 published research articles in the biotechnology sphere. His areas of specialization are Immunology & Structural Biology

BIOTECH NEWS (BTN) : WHY ARE RCB AND THSTI LOCATED TOGETHER?

The main philosophy of co-developing the two inter-linked independent institutions is to bring together advantages of small institutions which are highly efficient and large institutions that provide higher bench mark for interactive cross-talks and innovation possibilities. Besides, the mandates of the two institution, one being primarily academic and other, translational, are truly complementary and could synergize the biotechnology growth through proactive and collegial interactions.

BTN : WHAT ARE THE MAJOR AREAS OF ACTIVITY IN THE TWO INSTITUTIONS? HOW ARE THEY INTER-RELATED?

The major areas of activity in the two institutions are indeed complementary. RCB is focussing on the development of human resources through education and mentoring in a globally competitive milieu. It will provide a platform for interdisciplinary research, education and training at the biotech interface of multiple disciplines that encompasses engineering & medicine, agriculture & climate science on a biology platform hoping to drive biotech innovations. RCB's mandate also includes policy, IPR and regulatory issues. The THSTI is envisaged as a group of autonomous centres focused on science for human health ranging from a mechanistic approach to broad questions to specific domains such as pediatric biology, vaccine design, health technologies, molecular diagnostics and bio-imaging. THSTI, in harmony with RCB will enrich the multi-disciplinary educational programmes.

BTN : HOW ARE RCB & THSTI PROMOTING INNOVATION?

RCB & THSTI must carry out and promote interdisciplinary innovative research in biotech science. Strategically, it would be most optimal to establish such interdisciplinary research programmes so as to take full operational advantage of the synergy implicit in the campus ambience of the Biotech Science Cluster. Unique multi-disciplinary educational programmes in the twin institutions will create a new breed of young innovators who would have been provided opportunity for learning otherwise unavailable skill sets through novel teaching and training programmes. The two institutions together provide a broad canvas for fundamental research to translational activities that will make new knowledge creation faster.

BTN : WHAT ARE THE OTHER SUPPORT SERVICES THAT ARE ENVISAGED IN THE NEIGHBOURHOOD OF THESE INSTITUTIONS?

The twin institutions will create core technology resources using an innovative and efficient management structure allowing effective cluster-wide access to technologies such as stringent containment facilities for biohazardous work, engineered laboratory animal resources, high-end imaging, modalities for collection of large data sets such as proteomics, genomics and metabolomics, the maintenance of large bio- library and high-throughput screening resources. Further, the cluster will eventually develop a clinical research centre as well as a network of off-campus partner institutional resources for clinical as well as population studies. Downstream technology development will be nurtured within the cluster by the creation of incubator resources for participatory product- and business development efforts.

BTN : WHAT MEASURES ARE RCB AND THSTI TAKING TO ATTRACT FIRST-RATE HUMAN RESOURCES?

The most critical component of the research and educational programme is its faculty. Attempt will be made to attract globally competitive young faculty, which is possible if conducive environment and world class infrastructural resources are provided. I envisage faculty covering a broad canvas of natural sciences, technology and medicine organized into loosely-coupled teams through common interests and needs. Each faculty member may have a niche domain of expertise of his own yet will seek out intra-mural collaborations to adopt multi-pronged strategies so that critical unsolved problems in biotechnology could be avidly attacked. RCB & THSTI recognise that the expertise and innovation in diverse domains is critical for the development of novel perspectives in biotechnology, and invites scientists, engineers and medical professionals of the highest calibre and credibility to participate in this shared adventure to transform the biotech sciences.

There will be provisions for Visiting Professorship for Indian Nationals and International Scientists, Adjunct Professorships, Re-entry Grants and Young Investigator Awards. Scientists working in other national/international institutes and universities will be selected for a period of five years to contribute to the mission of the Centre as adjunct faculty. Limited visiting faculty positions are also available for Indian as well as foreign nationals. Selection will be carried out by a high level committee of global experts.

for use in in-vitro diagnosis and for implants and devices and the major emphasis will be to develop low cost, high quality indigenous implants and devices.

Clinical Development Services Agency (CDSA) is established as an extra mural unit of THSTI. The primary objective is to develop a cadre of investigators of global standard in regulatory product evaluations through a comprehensive & sustained training program. It will create a support system for biotech product evaluation for those developed in India or licensed to India & being developed by public institutions or companies. This will be achieved by establishing a National Network of Centres of Excellence (CoE) for conducting clinical trials for regulatory submissions and for assisting in the training program. CDSA will function as an anchor for this network.

CAREER OPPORTUNITIES: The THSTI is presently recruiting as faculty, scientists with potential for intellectual leadership and passion for both research and teaching in cutting-edge areas of biotechnology and health sciences. Additionally, a wide range of scientific positions with domain-specific skills are also available. The THSTI has developed several training and educational programs for the purpose of human resource development. THSTI has begun to accept Junior Research Fellows (JRF) of the DBT, CSIR, ICMR and UGC to undertake research work leading to the Ph D degree. THSTI has created 'Vaccine Research Innovation (VRI) Awards' for young investigators having brilliant research accomplishments. It is a career-oriented scheme to identify and mentor outstanding young scientists with innovative ideas and desirous of pursuing research in areas related to vaccine and infectious diseases.

INTERIM FACILITIES AND THE PERMANENT CAMPUS

The interim laboratories of both the institutions are currently set up in Gurgaon within the National Capital Region (NCR) Delhi adjacent to the South Delhi area at 180, Udyog Vihar, Phase-I, Gurgaon (RCB) and 496, Udyog Vihar, Phase III, Gurgaon (THSTI).

The permanent campus of both the Institutions is coming up in the twin buildings within the Biotech Science Cluster (BSC) being set up by the Department of Biotechnology (DBT), Govt. of India in the NCR Delhi at Faridabad (Haryana) on a 200 acre plot of land. A number of other related Institutions and Biotech park and incubator are planned to be co-located in the cluster. The Cluster will facilitate synergizing high value resources and infrastructure, coordinated development and maximize societal benefits. ■

BUILDING OF THE THSTI INTERIM LABORATORIES AT 496, UDYOG VIHAR, PHASE-III, GURGAON