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A Network of Sophisticated Labs

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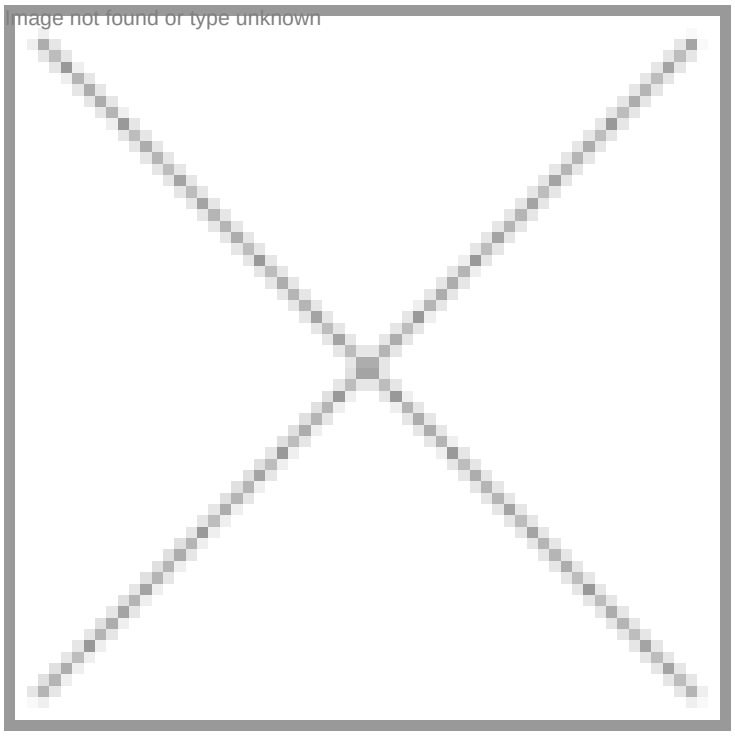

A Network of Sophisticated Labs

A Cut Above

The Council of Scientific and Industrial Research (CSIR) with its 38 laboratories and 39 field stations spread across the country is among the world's largest publicly funded R&D organizations. Manned by around 8000 scientists and engineers, the various CSIR research labs provide globally competitive R&D inputs and high quality science based services. Nineteen CSIR labs have a special focus on biotechnology and provide excellent research opportunities for students post their education. These institutes are:

â€¢ Institute of Genomics and Integrative Biology (IGIB), Delhi

â€¢ Centre for Cellular and Molecular Biology (CCMB), Hyderabad

â€¢ Central Drug Research Institute (CDRI), Lucknow

â€¢ Central Food Technological Research Institute (CFTRI), Mysore

â€¢ Central Institute of Me dicinal and Aromatic Plants (CIMAP), Lucknow

â€¢ Institute of Himalayan Bioresource Technology (IHBT), Palampur

â€¢ Indian Institute of Chemical Biology (IICB), Kolkata

â€¢ Institute of Microbial Technology (IMT), Chandigarh

â€¢ Industrial Toxicology Research Centre (ITRC), Lucknow

â€¢ National Botanical Research Institute (NBRI), Lucknow

â€¢ Regional Research Laboratory (RRL), Jammu

â€¢ Central Leather Research Institute (CLRI), Chennai

â€¢ Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar

â€¢ National Chemical Laboratory (NCL), Pune

â€¢ National Environmental Engineering Research Institute (NEERI), Nagpur

â€¢ National Institute of Oceanography (NIO), Goa

â€¢ Regional Research Laboratory (RRL), Jorhat

â€¢ Regional Research laboratory (RRL), Thiruvananthapuram

â€¢ Indian Institute of Chemical Technology (IICT), Hyderabad

A brief snapshot of these institutes is presented here.

Central Food Technological Research Institute (CFTRI), Mysore

CFTRI Mysore is an ISO 9001 and NABL accredited CSIR laboratory. The institute is engaged in innovative food research. Its infant food formulation using buffalo milk during the 1960s helped establish the present day's flourishing indigenous baby food industry. And most of the present brands of the ready-to-eat and convenience foods utilize CFTRI's know-how of food science.

The institute has close to 350 processes ranging from controlled atmosphere packaging to manufacturing plant growth hormones from agricultural wastes to energy foods for children and weaning mothers-the list is long. And significantly about 70 percent of the export units also use technology developed by CFTRI.

The institute has 16 research departments, which focus on the different aspects of food science. The protein chemistry and technology department has developed processes for energy foods. The plant cell biotechnology department focuses on plant biotechnology in the specialized areas of algal biotechnology and tissue/cell culture of plants as also molecular biology and genetic engineering. The fruit and vegetable technology department is working on pre- and post-harvest technologies for extension of storage life and better handling and transportation of fresh fruits and vegetables, low-temperature and modified atmosphere storage of minimally processed vegetables to reduce bulk, minimize spoilage. It also has a strong R&D focus on fermentation through its fermentation technology and bioengineering department.

Central Drug Research Institute (CDRI), Lucknow

The Central Drug Research Institute (CDRI) is considered to be a pioneer research organization in the field of biomedical research where all the infrastructure and expertise are available to develop a drug right from its concept to market. Latest techniques and methodologies are employed for developing drugs, diagnostics and vaccines to combat diseases prevalent among mankind in general and Indian population in particular. The CDRI is a multidisciplinary research laboratory consisting of scientific personnel from various areas of biomedical sciences.

The CDRI has been working on many projects related to the development of new drugs and diagnostics, cellular and molecular studies to understand disease processes and reproductive physiology, development of contraceptive agents and devices, systematic evaluation of medicinal properties of natural products, development of technology for drugs, intermediates and biologicals, dissemination of information in the field of drug research, development and production. To

carry out these activities the CDRI has, in recent years, acquired and established best possible technological capabilities and facilities for drug research. The modern facilities are at par, if not superior, to the technologies available at best of the R&D laboratories all over the world. The CDRI focuses on developing new drugs, diagnostics and vaccines and state-of-the-art technologies for clients in India and abroad and associated fundamental research.

Industrial Toxicology Research Centre (ITRC), Lucknow

Established in 1965, the Industrial Toxicology Research Centre (ITRC), Lucknow, is dedicated to provide health safeguards to industrial and agricultural workers through its rich knowledgebase, created painstakingly over the years. The business of ITRC is to create new knowledge about health and chemicals. It is a unique and important scientific resource in toxicology safety research and testing.

The strength of the Centre lies in the knowledgebase and analytical as well as experimental skills built over the last three decades in the areas of health risk assessment, preventive toxicology, predictive toxicology, environmental toxicology, inhalation toxicology and analytical toxicology.

The Centre is equipped with state-of-the-art facilities in the field of molecular toxicology and regulatory toxicology and has contributions significant in elucidating the mechanisms by which pesticides, heavy metals, monomers, plasticizers and other plastic additives, solvents, food colours and dye intermediates act and elicit deleterious effects on human health.

The laboratory, through its scientific expertise, provides complete facilities for toxicological research, environmental and health risk assessment and analysis and toxicity testing services conforming to Good Laboratory Practices using national and international guidelines employing latest test systems, biomarkers, analytical instruments and mathematical models.

Centre for Cellular and Molecular Biology, Hyderabad

The Centre for Cellular and Molecular Biology (CCMB) has ongoing research programs in three major categories - high quality basic research in modern biology, research relevant to societal needs, and application-oriented research towards commercialization. These include the areas of biomedicine and diagnostics, evolution and development, gene regulation in prokaryotes and eukaryotes, host-parasite interactions, membrane biology, protein structure, bioinformatics, functional genomics, theoretical biology, etc.

The CCMB has established very good industry rapport. It played a key role in the development of the country's first recombinant DNA-based Hepatitis-B vaccine for human use by Shantha Biotechnics. It also helped Dr Reddy's Research Foundation through specific technology tie-ups. A technology about RNasin - an enzyme-inhibitor - was successfully transferred to Bangalore Genei. The CCMB has helped EID Parry by developing a protocol for standardization of PCR-based markers to distinguish the parental and hybrid seed varieties of rice. It has undertaken a collaborative research project with the Dabur Research Foundation and the IICT to develop a new therapeutic agent for the treatment of cancer.

In recognition of its contribution to modern biology, the CCMB has been chosen as a Center of Excellence by UNESCO's Global Network for Molecular and Cell Biology, MCBN and has been designated as a South Center for Excellence for Research and Training by the Third World Academy of Sciences (TWAS), Italy.

Institute of Genomics and Integrative Biology, New Delhi

IGIB is dedicated to frontier areas of genomics. It was established in 1966, as the Center for Biochemical Technology (CBT). To reinforce the efforts to place India on the world map by carrying out cutting edge research, some strategic changes were made by CBT. An important step in this direction was to change the name of the institute to the Institute of Genomics and Integrative Biology (IGIB). This change was in line with the distinctive image of the institute with its new R&D programs such as comparative genomics, proteome analysis, in-silico drug target discovery, novel screens for drug target development, SNP analysis for predictive medicine to develop effective, competitive and commercializable technologies for new drug discovery.

The laboratory is working on major projects related to immunology and molecular genetics of respiratory disorders including allergy, fungal infections and predisposition to asthma, molecular genetics of neuro-psycho disorders and functional significance of repetitive sequences in the genome, genome informatics and drug target identification. IGIB is also working on the development of molecular markers for pathogenic organisms, including Mycobacterium tuberculosis, molecular recognition/interaction studies, design and synthesis of modified oligonucleotides for antisense and gene targets and design, synthesis and structural studies of peptides with a role in neurological function and dysfunctions.

National Botanical Research Institute (NBRI), Lucknow

NBRI has produced innumerable varieties in horticulture, products as functional foods and filed almost 30 patents in India and abroad. Today, it is an internationally known research center that focuses on both basic and applied research in various aspects of plant sciences for the conservation and sustainable utilization of plant genetic resources for human welfare.

Offering consultancy and technology, today, it caters to the needs of every aspect of plant research in the South Asian region in general and India in particular. In that mission, its practices encompass biodiversity, bioinformatics, biomass biology, biotechnology, conservation, ethnopharmacology, floriculture, plant physiology, genetics and plant breeding, molecular biology and genetic engineering, natural product development, etc.

NBRI is rich in scientists and knowledge base. For instance, Dr Rakesh Tulli and his group work in the area of plant molecular biology. Dr Tulli commented, "The main objective of our work is to develop transgenic plants improved for agronomically important characters. Characterization and designing of genes for toxicity to insects is also a part of our research. Apart from these, we also offer consultation and contract research for the biotech industry."

NBRI is actively involved in making a "Passport Data of Important Wild Genetic Resources" with reference to their aromatic and herbal values.

Central Institute of Aromatic and Medicinal Plants, Lucknow

Cutting edge technologies, innovative ideas and societal needs are the priority focus areas at CIMAP. Broadly the research areas at CIMAP pertain to scientific and industrial facets of medicinal, aromatic and other important natural product yielding plants-right from development of new varieties to processing and marketing thereof. Development of agro technologies and chemical and processing technologies for economically important medicinal and aromatic plants, both indigenous and exotic, is an important goal of the institute. Basic research in the areas of genetic resources, biotechnology, cytogenetics, phytochemistry, plant physiology, biochemistry, plant protection, pharmacognosy and molecular biology forms an important and integral part of the overall R&D program of the institute.

CIMAP's "Plant Geranium project" is one of its most important ongoing activities. Experiments conducted by CIMAP have suggested that it can be successfully cultivated in Uttranchal on an economical basis. Further, CIMAP is proud of its national gene bank for medicinal and aromatic plants, which comprises medicinal and aromatic plants herbarium, conservatory, gene banking and repositories of extracts and chemicals supported by the CSIR and DBT.

National Chemical Laboratory (NCL), Pune

NCL started five decades ago with the purpose to advance knowledge and to apply chemical sciences for the good of people. The laboratory over the years has forged strong industrial and academic collaborations in pursuit of its objectives. It works closely with many international companies and over 50 Indian companies. The biotechnology group at the laboratory is a multidisciplinary and multi-skill R&D group with interest in the area of biochemistry, molecular biology, microbiology, botany, and biochemical engineering. It is supported by the state-of-the-art experimental facilities, large-scale pilot plants for plant tissue culture, and scaled up facilities for microbial processes and downstream separation.

The laboratory's strong knowledge base has established its competency in taking up projects in the areas like plant molecular biology and agricultural biotechnology, plant tissue culture and microbiology, and enzyme technology. In addition to taking up the projects, its process development and design activity provides the vital link for translating a laboratory process to a commercial plant. A team of chemists, technologists, and engineers work together in achieving this task.

The process technologies developed and implemented encompass a variety of areas like catalytic and non-catalytic processes involving esterification, hydrogenation, oxidation, acylation, chlorination, fermentation as well as polymerization.

National Environmental Engineering Research Institute (NEERI), Nagpur

The focus of research at NEERI is on environmental biotechnology and genomics for designing user-friendly products/technologies to control pollution. It was established in 1958, as Central Public Health Engineering Research Institute (CPHERI) and was renamed in 1974 as National Environmental Engineering Research Institute (NEERI). The main campus at Nagpur is spread over 108 acres where the laboratory buildings and demonstration plants are located. Green stretches of land are liberally scattered over the campus and nearly 40 percent of the land is under forest cover.

The institute has made significant contributions in identified thrust areas of R&D, viz. environmental monitoring, environmental biotechnology, hazardous waste management, environmental systems design, modeling and optimization,

environmental impact and risk assessment and audit and environmental policy analysis. The mix of activities includes sponsored research projects, developmental projects and in-house research projects. The institute has a library and documentation division, which is an established specialized information resource centre for environmental science and engineering in the country. It provides vital scientific information support to the R&D activities of the Institute.

Institute of Microbial Technology (IMT), Chandigarh

IMT, Chandigarh carries out focused R&D programs in four broad areas of microbial biotechnology: molecular biology and microbial genetics; protein science and engineering; fermentation technology and applied microbiology; and cell biology and immunology. The institute has an International Depository Authority (IDA) facility and has a collection of 10,000 microbes and more than 13,500 cultures have been supplied to the academic and research institutes and the industry. Its Microbial Type Culture Collection holds 70 cultures for IDA deposit, 96 for filing national patents and 9 under safe deposit. The Institute has collaborative research programs with several institutions both at national and international levels and several of its process technologies have been commercialized. The most successful of them is a branded Natural Streptokinase product, 'STPase'. The other know-hows commercialized are: Energy Efficient Alcohol Technology and a vaccine prediction software tool 'Vaxipred'. Speaking about the future technology pipeline at the institute, Dr Girish Sahni, director IMTECH, said, "In the future one of our technologies on the production of Recombinant Streptokinase and the other on Clot Specific Streptokinase are expected to be launched soon. We plan to commercialize an immunodiagnostic technology and an oral recombinant cholera vaccine as well. We have an ongoing program on generating more efficient strains of yeast, which would incorporate properties of flocculation, thermo- and osmotolerance. This is an ongoing program wherein several yeast strains with improved properties have been designed and patented."