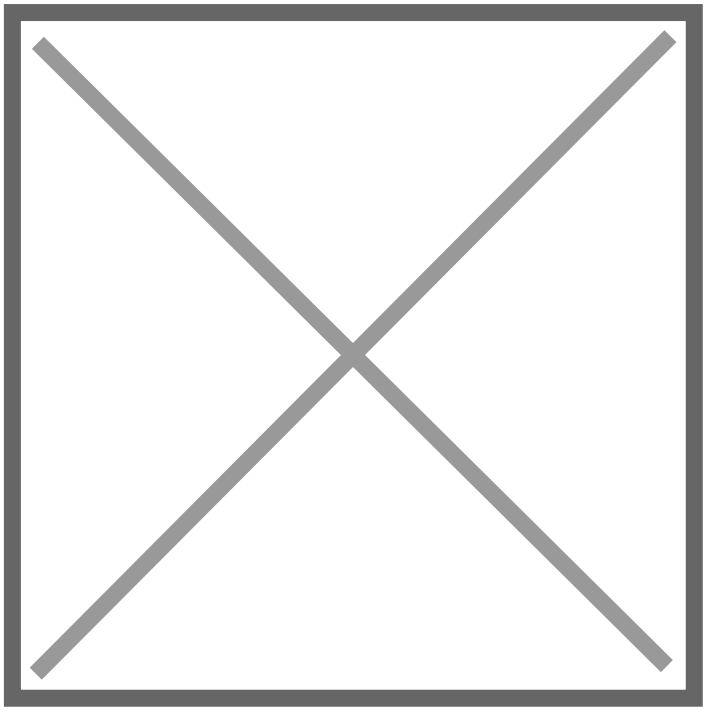
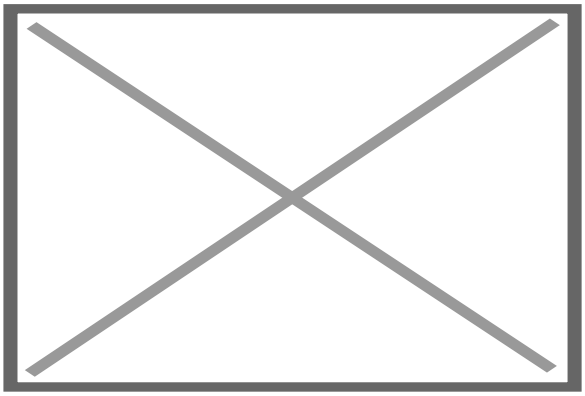
BioSpectrum
the business of Bi
24 years of leveraging the business of Bio
www.biospectrumindia.co

The grand old innovation engine

08 November 2012 | News





While the nation's premier scientific agency, Council of Scientific and Industrial Research (CSIR) celebrated its 70th foundation day, BioSpectrum takes a look at its relevance in the bioscience industry

Ã¢â?¬Å?India matters to us, we want to matter to India, more,Ã¢â?¬? summed up the Bangalore declaration of CSIR director's meeting in the year 1998. True to the statement, the organization today features among the world's top most publicly funded international research and development (R&D) organizations.

Established in 1942 as an autonomous society and with 37 state-of-the-art institutes, CSIR holds the highest number of the US patents among all the publicly funded Indian R&D organization. Protecting intellectual property is a part of the DNA of CSIR. Its founder, Dr Shanti Swarup Bhatnagar was the first person to be granted an Indian patent during the second world war in 1941. As of January, 2012, CSIR holds 2831 foreign patents and 997 US patents granted between 2002-2011. As on March 01, 2012, the number of patents that were in force in India and abroad were 2350 and 3250 respectively.

- Centre for Cellular and Molecular Biology, Hyderabad
- Central Drug Research Institute, Lucknow
- Central Food Technological Research Institute, Mysore
- Central Institute of Medicinal and Aromatic Plants, Lucknow
- Institute of Genomics and Integrative Biology, New Delhi
- Institute of Himalayan Bioresource Technology, Palampur

- Indian Institute of Chemical Biology, Kolkata
- Indian Institute of Toxicology Research, Lucknow
- Indian Institute of Toxicology Research, Lucknow
- Institute of Microbial Technology, Chandigarh
- Indian Institute of Integrative Medicine, Jammu
- National Botanical Research Institute, Lucknow
- National Chemical Laboratory, Pune

- Pioneered DNA fingerprinting in the country
- Cybrids facility for the study of neurodegenerative diseases, with special reference to Parkinson's disease
- Advanced facility for safety evaluation of genetically engineered drugs
- Isolation of active compounds from native plants for the treatment of chronic myeloid leukemia and peptic ulcer
- The genotype 'CIM-Arogya' of Artemisia annua for higher artemisinin yield
- Use of recombinant viruses harbouring an RNAi construct as sensor to screen the function of each open reading frame (ORF) of viral genome
- An efficient method to isolate and prepare large quantities of RNAsin, an enzyme inhibitor from discarded human placenta

It is interesting to know that, while CSIR constitutes only three percent of the India's scientific manpower, it still contributes about 10-11 percent of India's scientific outputs. CSIR performs research that leads in many frontiers. This is evidenced by its presence in leading journals of the world. CSIR's science also has produced new concepts that have been translated into technologies for the benefit of India.

The prime minister of India, Dr Manmohan Singh in his speech on the 70th foundation day rightly called it as the flag bearer of the intellectual property movement in India. Ã¢â?¬Å?After India introduced economic reforms and joined the world trade organization (WTO), the CSIR quickly emerged as a single largest holder of US and European patents. The Council, in recent years, has also become a world leader in specific domains of biotechnology and recombinant DNA products,Ã¢â?¬? said Dr Singh.

CSIR conducts research in frontier and multidisciplinary areas of modern biology and translates these concepts into commercially viable technologies. The thrust areas include rDNA technology, proteomics, biomarkers, nanobiotechnology, novel agro-technologies, and structural biology. The organization has played a leading role in developing the country's pharma industry by introducing innovative process technologies and new drugs.

Over a dozen CSIR institutes are participating under public-private partnerships and in-house projects. The key areas of focus include studying molecular mechanisms and genetic factors of diabetes, nanomaterials and devices for health, diagnostics and target based molecular medicines, anticancer therapeutics. Through its open source drug discovery (OSDD) program, the council has made its unique attempt to make healthcare affordable and drug discovery for neglected diseases like tuberculosis malaria and leishmaniasis.

In agriculture and food processing sectors, CSIR has developed globally competitive pre and post harvesting technologies for optimal production and devising necessary machinery besides enhancing the science of nutraceuticals. Major areas of research include the health foods, energy saving process and pest resistant crops. CSIR in an ongoing collaborative project with Department of Ayush is trying to document and digitize the traditional knowledge of ayurveda, unani, siddha and yoga. Known as Traditional Knowledge Digital Library (TKDL), it is expected to protect indigenous patent rights.

According to Dr Samir K Brahmachari, director general CSIR, Ã¢â?¬Å?The organization will continue to

look at bioscience as not only a profit making sector but a pathway towards improving human life and affordable healthcare.Ã¢â?¬?

For the next century, CSIR is expected to play a pivotal role for science in the country and be a guiding light for the bio scientists as well.

1	Boswellic acid-anti Inflammatory, anti arthritic	5
2	Ablaquin/Mefloquin/Arteether and Artemisinin/other antimalarials	15
3	Gugulipid-Hypolipidaemic	3
4	Bacosides-Memory Plus	1
5	Vincristine/Taxol/other anti cancer agents	18
6	Saheli and other contraceptive products	5
7	Drugs and intermediates	40
8	Bio-enhancers	6
9	Anti leishmaniasis	3
10	Streptokinase	9
11	Amlodipne	5
12	Sevelamer	1
13	Salt-inducible expression vector for genetically engineered proteins	2
14	Novel cationic amphiles as transfection agents	5
15	Super oxide dismutase	3
16	DNA fingerprinting	2
17	HPLC fingerprinting	3
18	Diagnostics of eye and central nervous system	3
19	Biomaterials (Hydroxy Apetite Prosthesis Implants)	4
20	Customized Drug Response	1
21	In-silico drug target identification	1
22	Disease resistant rice variety	1

? Strive for global scientific impact

? Cybrids facility for the study of neurodegenerative diseases, with special reference to Parkinson's disease

? Advanced facility for safety evaluation of genetically engineered drugs

? Isolation of active compounds from native plants for the treatment of chronic myeloid leukemia and peptic ulcer

? The genotype 'CIM-Arogya' of Artemisia annua for higher artemisinin yield

? Use of recombinant viruses harbouring an RNAi construct as sensor to screen the function of each open reading frame (ORF) of viral genome

? An efficient method to isolate and prepare large quantities of RNAsin, an enzyme inhibitor from discarded human placenta

Dr Manmohan Singh, Prime Minister of India
I compliment CSIR for breakthroughs in advanced scientific areas that have the potential to meet the basic needs of our people

Dr Girish Sahni, director, IMTECH, Chandigarh
CSIR's relevance on the national scene has become even more pronounced as it is perhaps the only institution that so successfully straddles both fundamental and applications aspects of science. This is particularly so in the transformation of biological principles into biotechnology, where CSIR has already made major outstanding contributions.

Mr Vayalar Ravi, former S&T minister, India
CSIR has transformed itself many times; yet its all pervading spirit remains unchanged. Dedicated service to the nation and the amelioration of the conditions of citizens remains its guiding light. Young at seventy, CSIR is pursuing the quest for inclusivity in many innovative and novel ways.

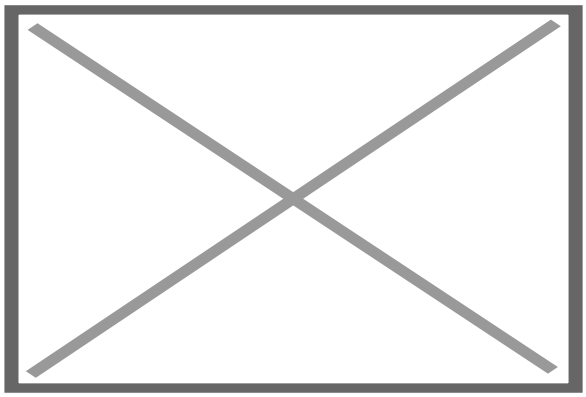
Dr Ch Mohan Rao, director, CCMB, Hyderabad
CSIR has outstanding laboratories for chemical synthesis of new molecular entities. Our biology laboratories working with the chemical laboratories should be able to meet the challenge. However, future medicine would be largely based on cells rather than molecules. CCMB and a few other biology laboratories of CSIR are working on cell-based therapies important to our country.

Dr Rajesh Gokhale, director, IGIB, New Delhi
Ã¢â?¬Å?While CSIR has supported the generic industry in past with great success and few biotech products have reached market, in this open market era CSIR is dedicated towards innovation. This includes developing New Chemical Entities (NCE), establishing novel therapeutic pipelines and setting up Biotech startups.

Dr Prabuddha Kundu, executive director, Premas Biotech
We at Premas, have had a very fruitful and stimulating relationship with OSDD and CSIR. The journey has been educative and interesting.

Dr YK Hamied, chairman, Cipla
The joint useful and productive partnership between CSIR and the pharmaceutical industry in the post India Patent Act 1970 era has laid foundation on which was built the API manufacturing industry as it exists today.

Ã¢â?¬Å?Regulatory infrastructure needs to be revampedÃ¢â?¬?



Dr Samir K Brahmachari, director general CSIR and secretary, Department of Scientific and Industrial Research (DSIR)

How relevant is CSIR for bioscience industry? Are you satisfied with the progress that has been achieved?

Dr Brahmachari: When CSIR began its journey 70 years ago, the focus at time was on chemicals, glass, minerals and steel. The first batch of CSIR labs were dedicated to chemicals. You have to accept that 50 years back biology was not considered to be a science with industrial value. It was known more as a science of intellectual pursuit. The only biology related institute founded 60 years back was Central Drug Research Institute (CDRI) Lucknow in 1951. Therefore at CSIR, it all started in 70s. It was clear that drug research has to be part of industrial value. That was echoed by Mrs Indira Gandhi's statement at World Health Organization (WHO), which mentioned healthcare research as not for profit but as a matter of life and death. After the patent regime changed, the focus shifted from product to process patents. It gave major boost to the institutes such as Indian Institute of Chemical Technology (Hyderabad), CDRI and National Chemical Laboratory (NCL), Pune. These labs played a key role in creating genesis buzz. Out of 70 drugs created, 30 came from CDRI. The areas such as family planning were prioritized when they were considered taboo. You can see that it was the genesis from chemistry to biotech. Subsequently bio related institutes got their due in 1980s. The Centre for Cellular and Molecular Biology

(CCMB), Hyderabad, Institute of Microbial Technology (IMTECH), Chandigarh, and Centre for Biochemical Technology (CBT now Institute of Genomics & Integrative Biology (IGIB) started in 1977. After building expertise in toxicology, bichemstry and drugs, CSIR institutes moved towards genomics and recombinant DNA technology. The bottomline is that the CSIR has remained relevant by constantly reinventing itself to suit the nation's interest from time to time.

I would say that over the period of 25 years, it has been phenomenal. We have had so many great experiences during this time and that also resulted into many products. From copying, better copying, from invention to, patented products to global best products, has been our journey.

Are our research institutes innovating enough?

Dr Brahmachari: If it is about innovating, I would say yes. We are doing it in enough quantity. But I would like to turn the question and ask whether we are inventing enough? Then answer would be in negative. Basically our inventiveness is low but our innovativeness is enough. Therefore, we have to make our science more inventive. We have to look at the situation today. Among the US patents granted today, CSIR holds 90 percent share while the other academia, industry and R&D labs have 10 percent. This is serious because CSIR has at the same time only three percent of the overall manpower. Hence, technically other should be coming up with more patents. Yet on a positive note, while our share earlier was 95 percent, it got reduced to 90 percent and then come down to 85 percent in future. With time, awareness is coming and others are catching up.

How do you perceive the growth of biotech industry? How has CSIR contributed to it?

Dr Brahmachari: The industry definitely has moved forward but I wish there would have been pure biotech companies in true sense. We don't have a single billion dollar company. Most of the biotech industry we see today is into instrument service, contract research and clinical trials. We had best examples in form of Shantha Biotech and Bharat Biotech but then these too followed similar kind of portfolios for vaccines. The diversification of portfolios should get due attention from the companies. Mere following each other won't help. Getting into new areas of technology space and development of instrumentation and high value research must be prioritized. Also the dependence on government for funding must be slowly reduced. New avenues to generate funds must be explored. Moreover, there is something amiss in our biotech education policy too. Every year we are churning our MSc graduates in large numbers without even proper knowledge of basic fundamental principles of biotech. The importance of mathematics is crucial for higher research and needs to be incorporated right from the basic level.

In affordable healthcare, the entire thrombolytics drugs (which help dissolve blood clots) is an area of our research. Cardiovascular medicines are expensive and some of our innovations have helped bring down prices of injections from ₹8,000 to ₹1,000. Now we have come up with new generation drugs that only destroy the clot and do not touch anything else. That is the new bio-therapeutic that has moved to clinical trials and all that work has happened at CSIR's Chandigarh-based Institute of Microbial Technology. There are plenty of other examples to share that make CSIR's contribution to the industry a phenomenal one.

How can the industry and academia be self reliant?

Dr Brahmachari: I think the government funding has been reasonable enough but we in fact sometimes have less absorption capacity. Both academia and industry must build its capacity to survive on own and reduce dependency over the period of time. The potential philanthropic funding, new sources of foreign funding need to be explored. I think with lesser government funding, the scientist will have to perform more and will be under an obligation to show quick results. I must also add that regulatory infrastructure also needs to be revamped. The quick clearances are very important for fewer hassles in product development. Also the leaderships within academic institutes and industry have to be more dynamic in their attitude.

Which are the next steps for CSIR in the area of bioscience?

Dr Brahmachari: Open Source Drug Discovery (OSDD) has shown tremendous scope for future. The open innovation in a country like India where we have so many young minds, serves as a great platform to express ideas and partner. At present close to 6,000 people across the globe are a part of the project and we are moving towards a new direction. Already clinical trials have been initiated on a TB molecule in partnership with TB Alliance.

We are starting innovation complexes to catalyze ideas. Eight innovation hubs will be located in Kolkata, Mumbai, Chennai, Delhi, Pune, Hyderabad, Ahmedabad and Bangalore. Delhi will focus on affordable healthcare, Kolkata on biomedical instrumentation, areas of surgical equipment and glass fibre technology.

The Micro, Small and Medium Enterprises (MSME) sector being our next focus, the hubs will bring together incubators, entrepreneurs and businesses. Also we are keen on genomic diagnostics. About $210 million has been invested in a project on ayur-genomics. We have also decided to start an institute of synthetic and system biology soon. Apart from that we will have a biostatistics and data quantitfication institute in which one-fourth of the efforts will be on bioscience and healthcare.

In the area of education, we now have CSIR Academy, which has been made functional since April 2012. It will offer 500 courses including life sciences to students across India. The best part would be that for doing an MSc in genomics you will no longer require a degree in same subject. A mathematics graduate is free to do masters in biotechnology. That is the USP of the whole program.

What is the vision for CSIR on its 100th anniversary?

Dr Brahmachari: Six years back, I had a strong doubt whether we would be able to stand relevant by 2012. But now I say this with sense of pride that CSIR has continued to achieve significant results through the research efforts.

Over a period of time, the changes have been surgical and not just theoretical. The innovation spirit is getting very high and the young people in the organization are feeling empowered. There is no place for autocratic leadership in CSIR and as a forward looking organization; it will continue to lead India towards being self reliant in various areas. I think we will not only live 100 years but enjoy them thoroughly.

Rahul Koul