

## Modern biotech research hub

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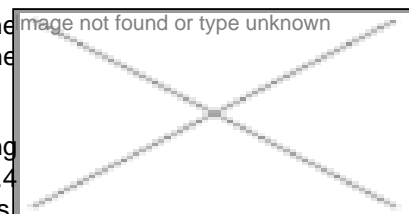


### CCMB

State-of-the-art facilities, a talent pool comprising some of the very best scientists and freedom to work 24/7, at CCMB you are in the exosphere of cutting edge research in modern biology.

Twenty-five eventful years after it was founded as a semi-autonomous center with the biochemistry division of Indian Institute of Chemical Technology (IICT) as its nucleus, the Centre for Cellular and Molecular Biology (CCMB) needs little introduction.

Located in Hyderabad, the quiet environs of the campus has 78 scientists leading cutting edge research in the frontier areas of biotechnology. And in a campus spread over 6.4 hectares a team of 585 including research staff, post doctoral fellows, PhD students, project staff, technical support and administration untiringly works 24/7.



When Lalji Singh entered the campus as CCMB director in 1998 he encountered CCTVs flashing the message: "No water supply after 6 pm". He recounted by saying that no water supply means we are asking the scientists to stop work and go home at 6 pm. Water is critical to research labs. Singh on his first day at CCMB called the maintenance department meeting to figure out where all the water was going when there has been no cause for additional water requirement. In the days to follow the culprit, a leakage in the supply, was discovered and fixed resolving a long-standing problem.

Singh believes that making the best of the research facilities available to scientists is 50 percent insurance that we will be in the forefront of emerging research areas in biotechnology. And his efforts to provide that 50 percent have continued till date.

Said Singh, "There was a time when scientific research used to drive new technologies but today it is new technologies that are driving science. It is important to upgrade the infrastructure to be in tune with the latest developments. This allows the scientist to carry out research in the new areas and at the scale unthinkable before."

He went on to create national level infrastructure facilities including a transgenic gene knockout mice facility at the cost of Rs 5.76 crore. CCMB today boasts of in-house facilities for digital imaging, DNA microarray, proteomics, X-ray crystallography, high throughput DNA sequencer and analyzer and fluorescence activated cell sorter among others.

The future of research in biotechnology is beyond imagination. However, according to Singh there is no reason why India cannot be in the forefront. "Given our biodiversity we have everything right from infectious diseases to diverse human genes. We need to give our scientists a chance," he said.

High quality research relevant to society and oriented towards commercialization has been the clear objective set by the institute's founding-director Dr PM Bhargava. Singh has accelerated the momentum. National and international collaborations have been forged. Research institutions, universities, hospitals, pharmaceuticals, biotech and IT companies along with organizations and institutes such as NIH, USA and Pasteur Institute, Paris, all form a part of this collaborative arrangement.

However, in a scientific institution the real challenge lies in providing leadership and guidance in the emerging research areas. Singh took the challenge head-on. When CSIR refused the Rs 2 crore requested for Singh's research project, "Human Genome Diversity", it increased his determination to go ahead with the project sans financial support from the government. His creative approach to the problem saw CCMB enter into MoUs with the universities and academic institutions. The MoUs ensured that each student who comes over to CCMB for a post graduate program brings 100 blood samples from the tribal population of his/her geographical area and the work carried out on these samples becomes a part of the student's post graduate program. Today, this initiative for research on population genetics has taken a life of its own. The number of universities CCMB has signed MoUs with has gone up to 12 and the prohibitive cost of collecting blood samples have been brought down to nearly nothing.

"We also took up new areas of research such as drosophila genetics and developmental biology, gene silencing, molecular analysis of human genetic disorders and protein secondary structure prediction along with participating in the CSIR network projects," said Singh.

According to Singh, the publication record of CCMB is on an upswing and the institute's record of international patents has also improved. "Ninety percent of the 75 research papers written every year are accepted in international journals such as *Lancet*, *Journal of Cell Science* and *Journal of Medical Genetics*. And in 2002-2003 we filed for three Indian and 10 foreign patents," informed Singh.

He added, "It won't be long before another two CCMB facilities will go functional." The Laboratory for the Conservation of Endangered Species (LaCONES) is 90 percent complete. This seven acre satellite facility of CCMB is conveniently located near Nehru Zoological Park in Attapur village and a five acre facility for Cell and Tissue Engineering is coming up barely 2 km from CCMB premises. However, one facility which CCMB needs badly is a multi-purpose seminar complex. "The hall which we use for seminars and meetings with a seating capacity of 80 is inadequate as CCMB has grown manifold and in various dimensions since we moved into our campus 16 years ago. Its time we should get that too," said Singh.

## What the CCMB scientists sayâ€¦!

*Dr N Madhusudhana Rao*

Research area: Novel cationic amphiphiles as transfection agents; hybrid biological agents

"I have been here for last one-and-a-half decades and enjoy my work here because of the permissiveness the organization allows. As far as the support from the government in the areas of my work, everybody is learning on how to realize the potential of the work in the market place. But today the ride to a commercial house for a working scientist is rough. CCMB is a great place for a scientist.

*Dr Ramesh K Aggarwal*

Research area: Genetics. He is exploiting the power of advanced DNA marker tools in the area of agriculture, wildlife conservation, germplasm characterization, and crop improvement and medical diagnostics; and basic research to understand the molecular basis of temperature dependent sex determination.

"I cherish my 16 years at CCMB. I feel proud of the fact that I was part of the research team that developed the first DNA fingerprinting technology of the country, which has now revolutionized the forensic work and has led to the creation of a separate center for DNA fingerprinting technology. In fact, the best thing that happened to me after my doctoral work at HAU, Haryana is CCMB."

*Dr Ch Mohan Rao, deputy director, CCMB*

Research area: Protein folding in health and disease; biophysical studies on intact biological systems

"It is one of the finest research institutes. I was trained in chemistry and did my PhD on Photoacoustic Spectroscopy, which included modification, fabrication, and software writing for the spectrometer. Over the years, my research work has moved from spectroscopy to biophysical chemistry, molecular biology and medicine. I was able to do it because of the intellectual and cordial interpersonal interaction at CCMB. CCMB is also unique in its centralized instrument facility that offers all the advanced technology to every scientist in the institute."

*Dr R Sankaranarayanan*

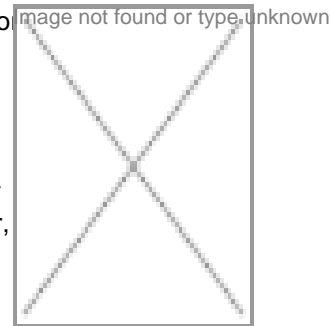
Research area: Structural basis of the editing mechanism in a class II tRNA-synthetase

"As CCMB is a modern biology lab it lacked the structural biology component. It was decided that this area be strengthened, hence I joined in March 2002. The thing that impressed me most in CCMB in the recent past is setting up of the X-ray facility. It was done in a record time of a few months with a very good coordination from administration, purchase and instrumentation. We have already solved a couple of structures using this facility. I would say, our facility is on par with facilities in western countries and it is only a matter of time that our laboratory becomes a significant contributor in the field."

*Nandita Singh (CyberMedia News Service)*

"Biotech should go mission mode"

Dr Lalji Singh, director, CCMB in an exclusive interview to Nandita Singh comments on the need for India to realize its potential in biotechnology.



### ***Where does India stand in the field of biotechnology?***

India has an inherent strength in its biodiversity. We have it all—be it plant diversity, animal diversity or human genome diversity. India can be in the forefront of biotechnology. We have the potential. However, we need to work on that potential. We lost out on the genome sequencing project. Now, the next challenge is how to determine the function of genes. Out of the 40,000 genes we know the function of barely 1,000. To be in the reckoning in delineating the gene functions we need to be in tune with the R&D worldwide.

### ***How do you think India can realize its potential in biotechnology?***

We need to go mission mode. The way we took space program on mission mode, the way we took nuclear defense on mission mode. We need to make the latest technology and research facilities available to our scientists. We need to designate some of CSIR labs as national levels research facilities and bring it on par with the best in the world. Having one CCMB is not enough. We need to have an integrated research grant system for our scientists where they can send in proposals as if all the technology in the world is available to them and then they should be assigned to the most appropriate lab for their research. We need to create a strong resource centre tree structure in the country, which reaches out up to the village level. These days technology drives science, not the other way round. So we must acquire new technologies at an early stage. This is an investment we need to make. A concerted effort is must. One has to realize the value of biotechnology. IT (Information Technology) is India today and BT (BioTechnology) is Bharat Tomorrow.

### ***To be in the reckoning what research areas we need to strengthen?***

There is so much of interesting development happening and we need to be there in all of the areas. Our ultimate objective is to make use of the knowledge to reduce human suffering. Bioinformatics, Microarray, Proteomics, Nanotubes—it pays great dividends if we acquire new technologies in their developing phase and capitalize on them. Also, we need to look at our research grant system and integrate it instead of putting our resources in small projects. Unless we come up with a system to tap excellence from the remote corners of the country we are not utilizing the potential of the country.

### ***At CCMB what are the areas that you think will pay good dividends in the near future?***

All that I have mentioned so far and a few more. Since the time I have taken over from Dr PM Bhargava I have concentrated on building up the momentum. Today, you just have to take a look at the facilities that we have at CCMB. In the near future and far future too, biology as a science will get its rightful due and will not be limited to drug discovery. I have concentrated on making CCMB future compatible. However, still there is lot to be done. For example, currently we are struggling to create a 600 mega hertz nuclear resonance micro imaging facility so you don't have to kill the mouse. This will help us follow the impact of the drug every hour and the resolution can go up to single cell. I am hopeful that in the next financial year we will be able to create the facility.

### ***What are the other things in pipeline at CCMB?***

We want to create a biological level 4 containment facility. It is Rs 62 crore project yet to be passed by the planning commission. We also need a sophisticated microscope facility—an atomic force microscope to determine the structure of the nanotube. This is an emerging area with a great future impact. Today's research is more of a collaborative effort it requires physicists, chemists, engineers and biologists to come together on a platform.

### ***What are your expectations?***

After creating the facilities that are now a part of CCMB I expect a number of breakthroughs from our labs. I have focused on creating a lot of networking within CCMB in terms of interaction between scientists from various disciplines. We are already getting representation in better journals. We continue to retain our focus on socially relevant research. We will also step up efforts to patent the research outcome from our labs. We want more scientists to work in the area of infectious diseases. And of course, the ultimate for any institute would be to produce a Nobel laureate.

### ***What is that one thing in biotechnology, which has the power to change the face of the country?***

Genotyping. The future medicine will be based on individual genotypes. And the big question is how will this medicine be delivered to each and every citizen in this country? We need to reach out to the gram panchayat level and create a gene database. The very thought that what all we can do with that information is so overpoweringâ€”right from disease distribution to effect of food habits to environmental impact will all be available and health management for us as a nation will take on a different meaning altogether. But of course all of it won't just happen on its own. It requires large scale planning and good execution. I think Andhra Pradesh will lead the way here too, an exercise to the effect is on in the state.