



भारतीय विज्ञान संस्थान  
Indian Institute of Science  
Bangalore, India

INSTITUTE COLLOQUIUM  
(Biological Sciences)

by  
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## Bits of the central dogma of molecular biology that bit us.

Date: Thursday, 16th June 2011 Time: 4-00 p.m

Venue : Faculty Hall, Main Building

Professor P. Balaram, Director, IISc  
will preside

Tea: 5-00 pm

### ABSTRACT

DNA, the genetic blueprint of the organisms contains crucial information for the cellular identity, and for encoding proteins, the workhorses of a cell. Hence, maintenance of the integrity of DNA and the fidelity of the processes that make proteins are of utmost importance to any organism. However, the DNA is a target for damage by a number of chemical agents of cellular and extracellular origin. If not mended, the accrued DNA damage may result in alterations (mutations) in the genetic blueprint and various diseases including cancer. Thus, to ensure integrity of the genetic blueprint, the organisms have evolved with a number of DNA repair mechanisms. Likewise, a number of mechanisms are at work to ensure fidelity of protein synthesis by ribosomes, the cellular factories that make proteins. Any deficiencies in the fidelity of protein synthesis may result in suboptimal protein function and/or alterations in the cellular protein content (proteome). In extreme cases, deficiencies in ribosome function/biogenesis may lead to ribosomopathies in humans.

We use molecular genetics tools to manipulate the processes that damage or repair DNA with the dual objective of, (i) generating strains of mycobacteria compromised (attenuated) for their survival under conditions commonly encountered by the pathogenic mycobacteria (such as *Mycobacterium tuberculosis*) in host, and (ii) studying the fundamental processes of protein synthesis machinery crucial for the fidelity of its function. For much of our research, we use *Escherichia coli* (*E. coli*) and mycobacterial species as model organisms. Use of multiple organisms and their factors in homologous or heterologous combinations allows us to understand the mechanistic and evolutionary aspects of the biological processes. In my lecture, I will talk of our successes in pursuing both the objectives.