

Indo US workshop on Biocomputing

Calicut, Sept. 12-13, 2011

Title: Building the foundations of a new biology

Abstract: The decade of 1990 was mostly spent in reading DNA. The last decade has seen the emergence of a new field that involved developing long DNA synthesis technologies, building inventory of standard biological parts, composing parts into devices and circuits, designing genetic applets, oscillators and so on. The underlying belief was that if one characterized every genetic part and built a truth table, one could quickly assemble organisms from scratch. To enable this new thinking, a paradigm shift in the mindset was needed i.e., think like an engineer but work as a molecular biologist. In my talk I would like to introduce the origin and evolution of synthetic biology from a biologist perspective. Specifically I shall examine the following questions: how true is truth-table in biology, will custom ordering organisms be a norm in future, is it possible to do biology by synthesis ? The second part of my talk will focus on the question of what makes a gene ? We asked if one could artificially convert a non-coding to a coding sequence ? To answer the question, a simple and scalable method was invented. This has led to the emergence of, what we call 'combinatorial genomics' i.e., the ability to express sequences based on user defined specifications. Given the recent developments in the synthetic biology community, it appears that the rational design and construction of biological parts is a new way of doing biology. Currently, we do not know the rules of biological composition. In my opinion, that is a grand challenge and a grand opportunity.