A CASE STUDY :

Synthetic life

VISHAKHA A. MAHAJAN, B.A. AGLAVE AND M.O.LOKHANDE

Asian Journal of Environmental Science (June to November, 2009) Vol. 4 No. 1 : 104-105

See end of the article for authors' affiliations

Correspondence to :
B.A. AGLAVE
Department of Biotechnology, Institute of Life Sciences, H.P.T. Arts and R.Y.K. Science College, NASHIK (M.S.) INDIA

Key words : Thermal regimes, Thermal sensitivity, Index, Tomato, Genotypes.

Accepted : ***February, 2009***

Evolution is a wellspring of creativity; 3.6 billion years of mutation and competition have endowed living things with an impressive range of useful skills. But there is still plenty of room for improvement. Scientists are setting in recent years to buttress the foundation of genetic engineering with what they call synthetic biology.

Synthetic biology is a new area of biological research that combines science and engineering in order to design and build ("synthesize") novel biological functions and systems. We will then devise new control elements and add these new modules to the existing genomes or build up wholly new genomes. This would be a field with the unlimited expansion potential and hardly any limitations to building "new better control circuits" and..... finally other "synthetic" organisms.

The work on restriction nucleases not only permits us easily to construct recombinant DNA molecules and to analyze individual genes, but also has led us into the new era of synthetic biology where not only existing genes are described and analyzed but also new gene arrangements can be constructed and evaluated. (First International Meeting on Synthetic biology was held in 2004).

Synthetic biology includes the broad redefinition and expansion of biotechnology, with the ultimate goals of being able to design and build engineered biological systems that process information, manipulate chemicals, fabricate materials and structures, produce energy, provide food, and maintain and enhance human health and our environment. One aspect of Synthetic biology which distinguishes it from conventional genetic engineering is a heavy emphasis on developing foundational technologies that make the engineering of biology easier and more reliable.

It allows inexpensive large-scale changes of codons in genetic systems to improve gene expression or incorporate novel amino-acids. Synthetic biology is greatly aided by basic technologies of reading and writing of DNA (sequencing and fabrication) Synthetic biologists make use of DNA sequencing in their work in several ways. First, large-scale genome sequencing efforts continue to provide a wealth of information on naturally occurring organisms. This information provides a rich substrate from which synthetic biologists can construct parts and devices. Second, synthetic biologists use sequencing to verify that they fabricated their engineered system as intended. Third, fast, cheap and reliable sequencing can also facilitate rapid detection and identification of synthetic systems and organisms.

With synthetic life, we're re-designing the cell chromosomes; we're not creating a whole new artificial life system. They must transplant the synthetic genome into another cell so that it can use the existing machinery to "boot up" and start growing and reproducing. We're simply re-writing the operating software for cells - we're not designing a genome from the bottom up - you can't drop a genome into a test tube and expect it to come to life.

Steps to synthetic life:

2002: synthetic virus created- a lab version of polio.

2007: A genome from one cell is placed in another.

2008: Publication of synthetic genome study.

Creating a synthetic genome:

Small blocks of DNA were chemically synthesized. These were grown up in a bacterium, and knitted together into bigger pieces, so-called "cassettes" of genes. Several large chunks of DNA that were joined to make the circular genome of a synthetic version of *Mycoplasma genitalium.*

– In 2007, scientists put genome from one organism into cell of another, taking over cell's machinery.