



## Synthetic Biology: Life 2.0



As an experiment, some of our SciBar participants prepared this glossary, independently of Dr Martyn Amos. You may find it informative to consider these concepts and visit the websites. Your comments on this experiment are most welcome.

**Artificial genome** A string of DNA sequences stitched together to build a genome for a new organism, as announced by the Venter Institute in May 2010.

**Biobrick** Engineered DNA parts, available off the shelf, for example molecular equivalents of logic gates, which can be used as modular parts in a biocircuit.

**Biocircuit** Engineered genetic regulatory circuit that is inserted in a cell. The circuit is designed to 'program' the cell to perform a specific task such as the periodic production of a protein of interest, or to release molecules that signal another cell.

**Biological engineering** The attempt to engineer living cells for environmental and biomedical applications.

**Cell-free synthetic biology** *In vitro* methods, since cell membranes can be a barrier to freeing the gene products.

**Chassis** A minimal 'host' organism, cell or genome into which new biocircuits are implanted. *E. coli* is the most common chassis.

**DNA sequence** The order or sequence of all the bases in a gene or genome, using the letters A, C, G, T.

**Genetic engineering** Changes to an existing organism by modifying individual genes. In contrast, in synthetic biology hundreds or thousands of genes can be transferred from different

donor organisms.

**Genome** The complete genetic information (DNA) of a particular organism, as a list in order of every base.

**Minimal genome** The smallest possible genome that can 'run' a cell.

**Pathway** A series of chemical reactions occurring within a cell, which modifies an initial molecule to form another product.

**'Suicide genes'** A gene that would cause a synthetic cell to kill itself if the organism was accidentally released, such as a dependence on certain nutrients supplied in the laboratory.

**Synthetic biology** The attempt to design and create new biological systems not found in nature, and the redesign of existing biological systems for useful purposes. This could be by producing unnatural amino acids that would produce new proteins with new functions, or entirely synthetic cells.

**Synthetic life** The Venter Institute announced in May 2010 they had created a 'synthetic living cell'. However only the chromosome was synthetic, made by cutting down and reconstructing an existing bacterial genome as a template (bacteria cells have only one chromosome). This synthetic chromosome was inserted into an existing cell whose DNA had been removed.

### Useful weblinks:

<http://www.jcvi.org/cms/research/projects/first-self-replicating-synthetic-bacterial-cell/overview/> From the team that produced the first synthetic living cell; includes fact sheets and a FAQ.

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