

Synthetic Biology

Background

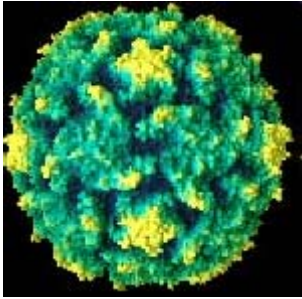
Brian Johnson
Chair of BBSRC/EPSRC steering
group

“Synthetic biology aims to design and engineer biologically based parts, novel devices and systems as well as redesigning existing, natural biological systems.”

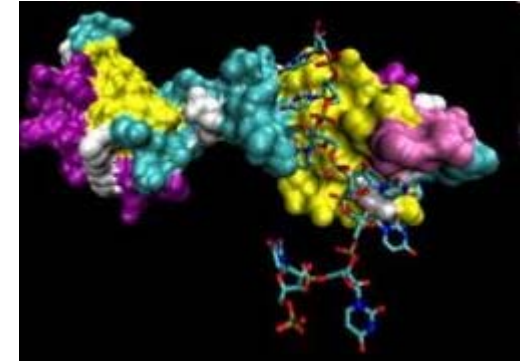
http://www.raeng.org.uk/news/publications/list/reports/Synthetic_biology.pdf

SynBio Science

- ***Emerging culture*** bringing together biologists, physicists, chemists, engineers and computer scientists – aspirational science
- Pursuing the “ultimate goal of biological sciences” – the ***creation of ‘designer’ biologically based systems***
- Aspiration made possible by ***bringing together a wide range of existing techniques*** - cheap and quick DNA sequencing, synthesis and assembly



Some Highlights



Viruses made from scratch

- Polio – Wimmer team NY 2002
- Phi-X174 Venter lab 2003
- Spanish flu – Tumpey team NCID 2005

First attempts at **minimal artificial chromosome** 2007 and **protocells** 2008

Artemisinin production from yeast – Gates funding

Biosensors produced e.g. for arsenic – Edinburgh

Engineered **ribosomes** – Chin et al (UK), Church (US), Yomo (Japan) – new EPSRC funding at York

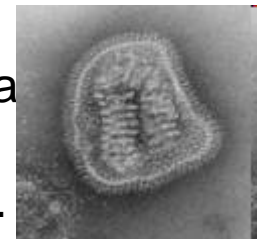
Biofuels – major research effort at Univ of California

Biodegradation of organophosphates using engineered *Pseudomonas* - Berkeley

Creation of huge '**Biobricks**' and **gene sequence libraries** – global data

New centre at ICL - CSynBi

BBSRC/EPSRC **networks** established at 6 leading research institutions.



Projected areas of application include:

- Novel and improved diagnostics, vaccines and biopharmaceutical drugs
- Biosensors
- Hydrogen fuel cells
- New cell-biofactories
- Microbial communities for environmental clean-up
- New biomaterials
- Programmable cells for use in gene therapy
- New biofuels
- New food ingredients