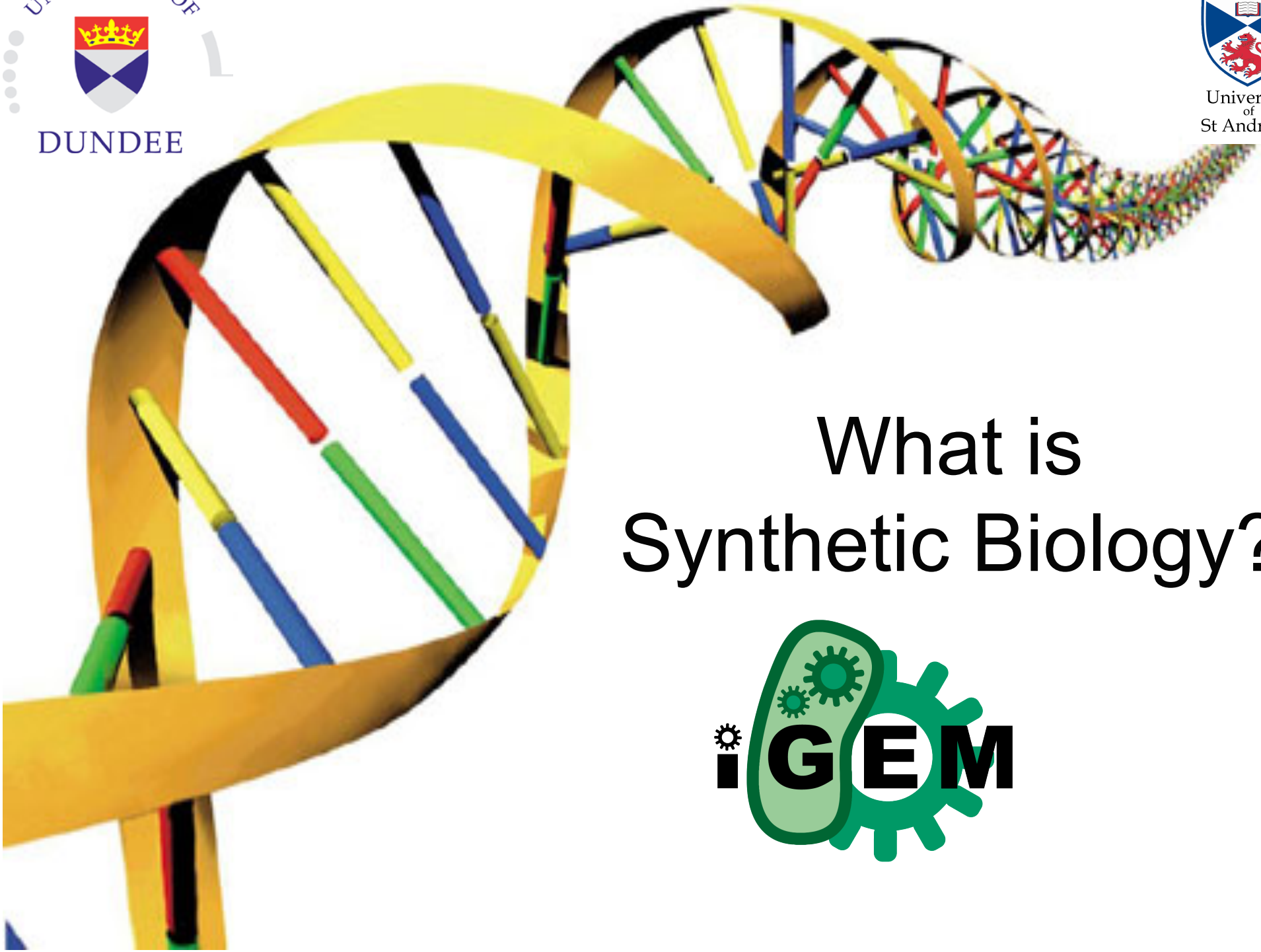


What is Synthetic Biology?

Not just one definition…

- "The design and fabrication of biological components and systems that do not already exist in the natural world"
- "The re-design and fabrication of existing biological systems"

(source:http://syntheticbiology.org/FAQ.html)

- Engineering?

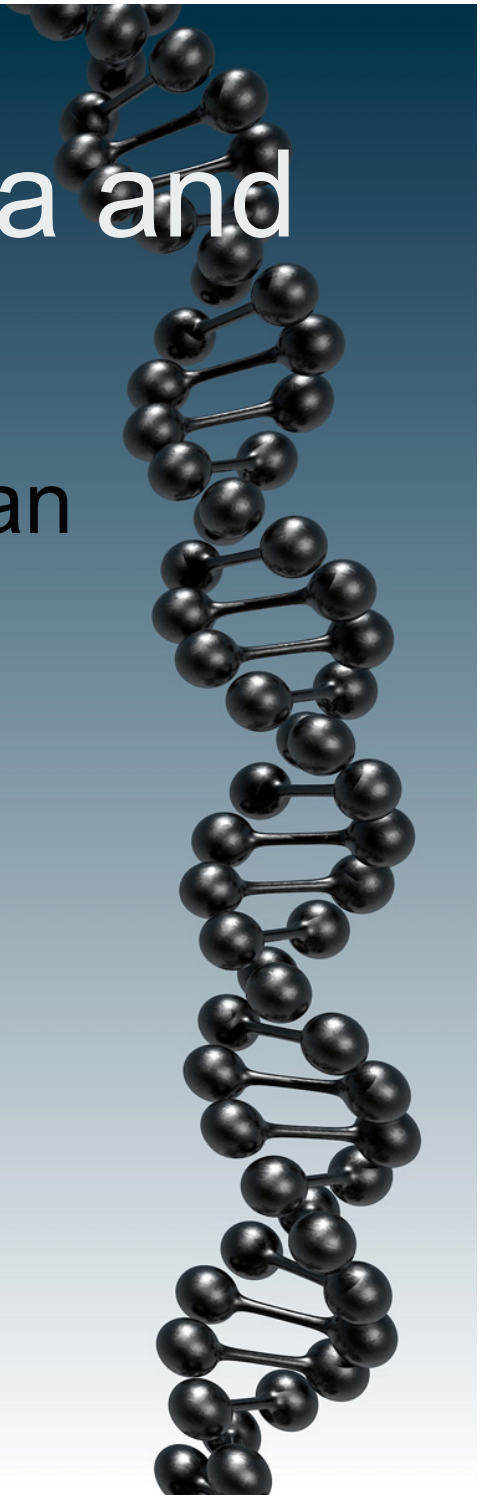
International Genetically Engineered machine (iGEM)

- Dundee 2011- The micro-compartment
- St Andrews team 2011
- The arsenic biosensor
- Smelly bacteria
- The Coliroid

iGEM 2004 UT Austin/UCSF Team. Hello World bacterial photograph. 2005. Photograph by Aaron A. Chevalier.

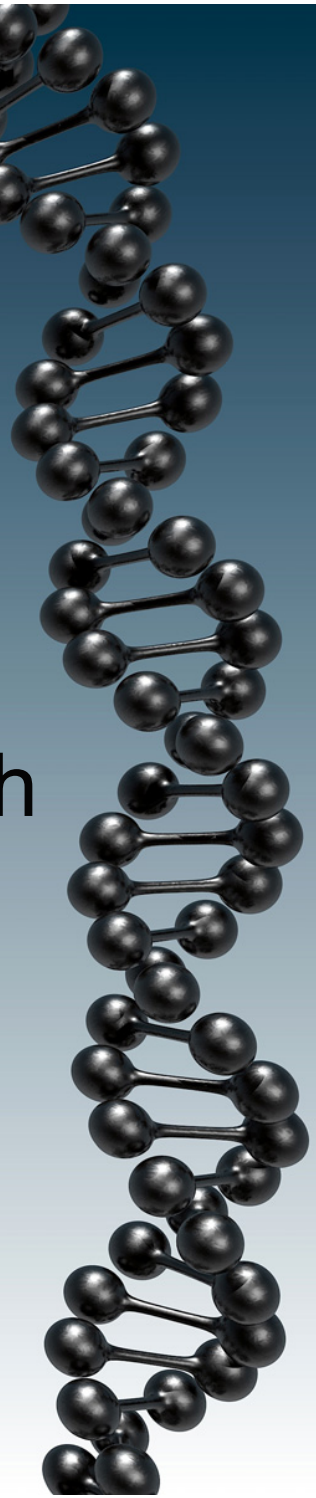
Breakthroughs, the Media and the public opinion

- The race to map the whole human genome sequence
- Craig Venter- the first organism designed from scratch



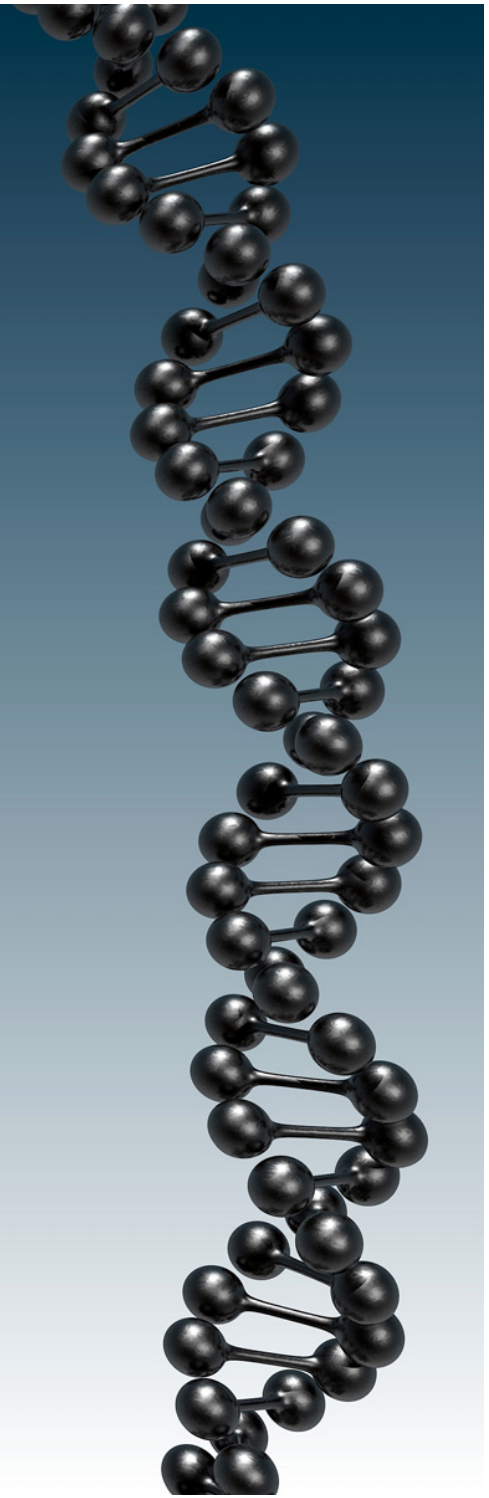
What are the potential benefits?

- Short term: better drugs, greener fuels, readily available crops, a “new” chemical industry
- Climate change and pollution: Research into oil-eating microbes
- We can design organisms to suit our specific needs



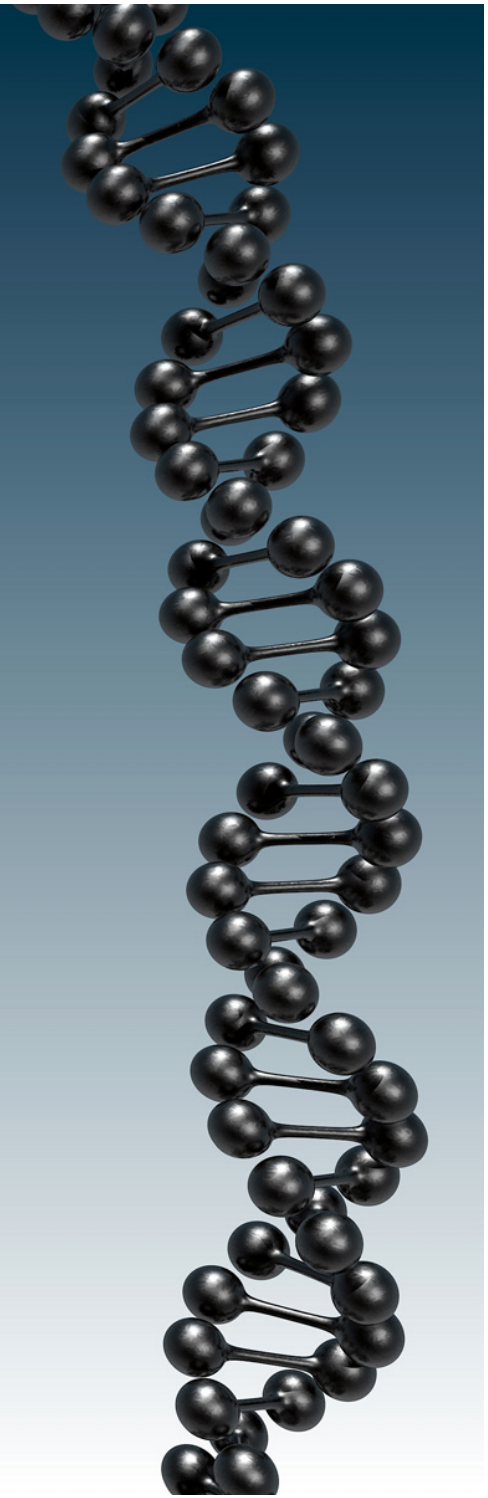
Renewable energy applications

- Bioalcohols
- Photosynthetic algae
- Hydrogen fuel



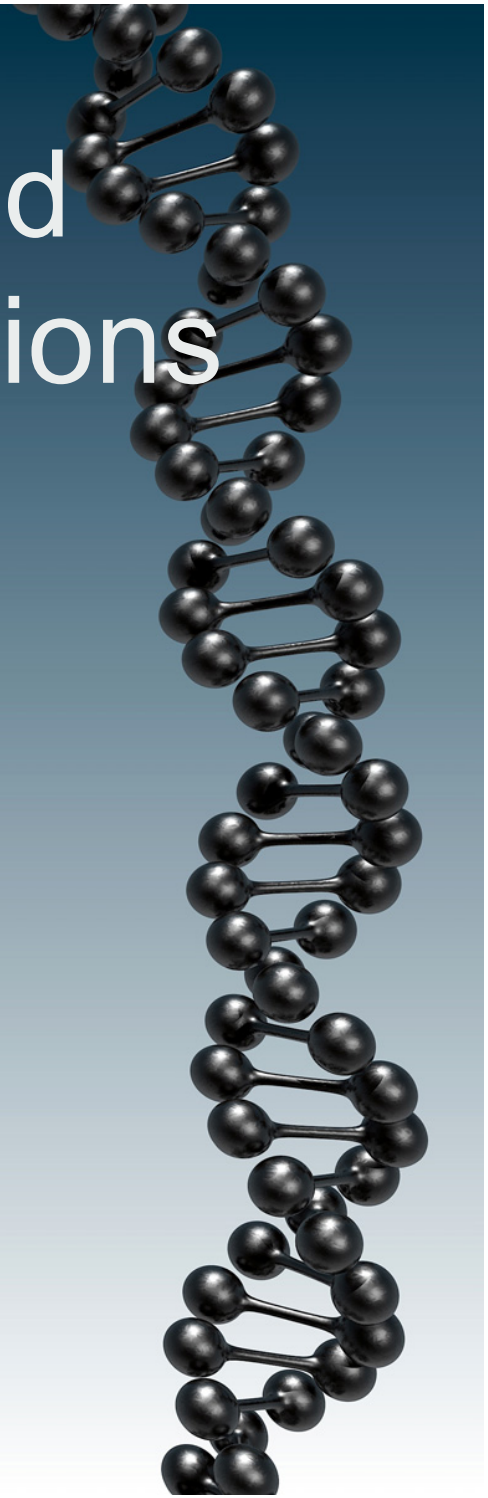
Better Medicines

- Cheaper drugs- ex for malaria
- Personalized Medicine
- Insulin



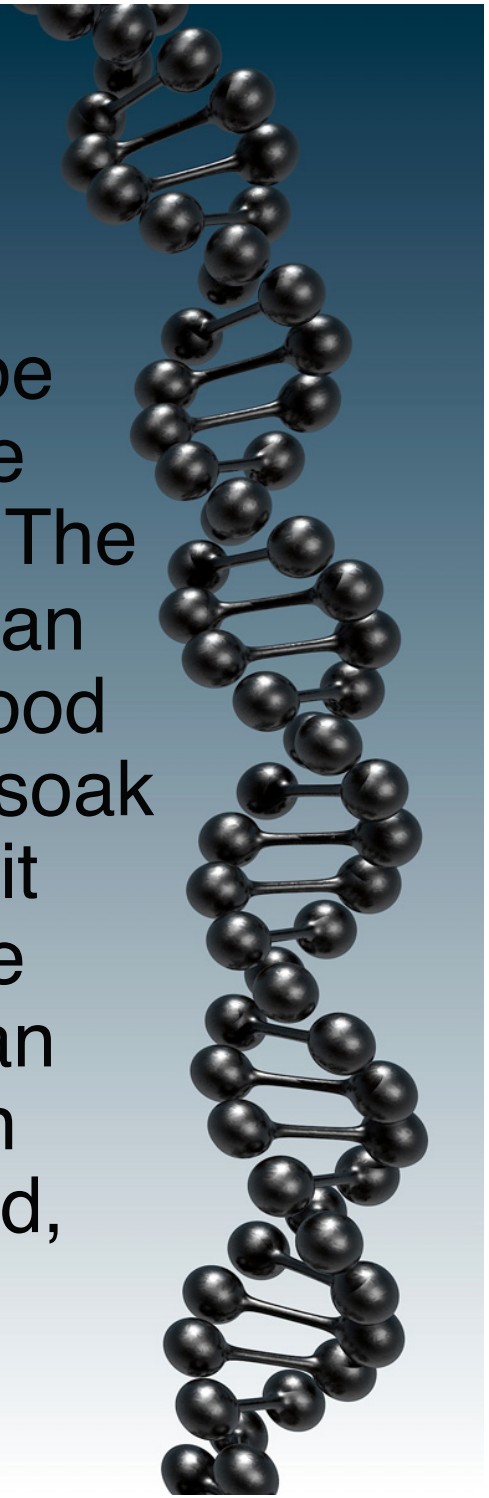
Agriculture, Food and Environmental Applications

- More efficient crop yields
- Ecological protection and Pollution control: Oil Spills
- Biofilms as biosensors to monitor for example, soil for nutrient quality or environmental degradation
- Biosurfactants for bioremediation



“It is envisaged that synthetic biology may be able to contribute to resolving many of the challenges facing us in the 21st Century. The potential applications are immense. We can make devices to produce fuel or animal food from our waste; we can make devices to soak up carbon from the atmosphere and lock it away; we can make devices to synthesise plastics without the need to use oil; we can make devices to sense pollutants; we can make devices to create new drugs. Indeed, synthetic biology holds huge potential to impact positively on our daily lives.”

Alistair Elfick, The University of Edinburgh, http://www.synbiostandards.co.uk/about_synbio.php



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