Synthetic biology

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(Not quite a) definition

Synthetic biology is the application of science, technology and engineering to facilitate and accelerate the design, manufacture and/or modification of genetic materials in living organisms (EU Scientific Committees, 2014).

It involves redesigning organisms for useful purposes by engineering them to have new abilities (NIH).

(Not quite a) definition

CBD (COP-13 in 2016) adopted an *operational definition*, as a starting point for facilitating work under the Convention: "**Synthetic biology is a further development and new dimension of modern biotechnology that combines science, technology, and engineering to facilitate and accelerate the understanding, design, redesign, manufacture and/or modification of genetic materials, living organisms and biological systems**"

CBD Technical Series 100

Synthetic Biology

www.cbd.int/ts

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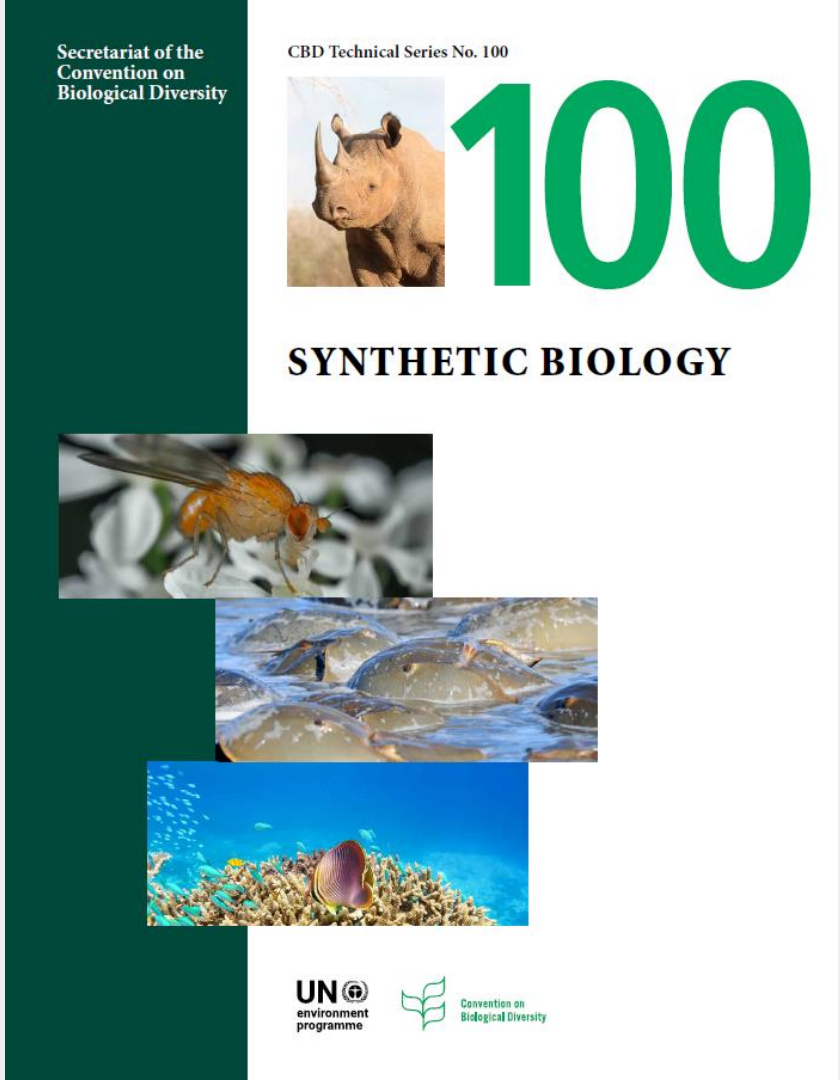

Supporting technologies and tools

- DNA synthesis
- Next-generation / whole-genome sequencing
- Genome editing: CRISPR/Cas
- Engineered gene drives
- AI and machine learning
- Bio-bricks
- ...

Research areas

- DNA- and RNA-based circuits
- Protein engineering
- Metabolic pathway engineering
- Genome-level engineering
- Protocell construction
- Xenobiology
- Cell-free systems

Applications

- Unmanaged or wild
- Semi-managed, managed or urban
- Lab, industry

Applications

Wildlife conservation:

Gene drive control of invasive species

Extinction prevention

De-extinction

- Unmanaged or wild
- Semi-managed, managed or urban
- Lab, industry

Applications

GE plants: heat or drought tolerant, better digestible, disease resistant, herbicide tolerant, decreased plant height

GE animals: hornless cattle, woolly sheep, chickens laying allergen-free eggs

- Unmanaged or wild
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Applications

Gene drive insects: reduction of the population of plant pests or vectors for diseases

Bioremediation: bacteria containing sensors and proteins that bind pollutants

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Applications

Yeast with engineered metabolic pathways producing

- medicines, vaccines
- cosmetics, dyes, fragrances
- wildlife products
- food and ingredients

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- Semi-managed, managed or urban
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Also in the document:

Potential impacts

- Potential impacts on conservation and sustainable use of biodiversity
- Social, economic and cultural concerns
- General biosafety aspects

Also in the document:

Governance and regulatory aspects

- Current regulations
- Self-regulation and moratoria
- IP considerations
- Potential implication of the CBD and Protocols
- Other international processes

Thank you for your attention!

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