



## Biologists join the race to create synthetic life

**Robin McKie**, science editor  
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Researchers will gather in London this week to outline plans to promote one of the most audacious, and controversial, scientific ideas of the 21st century - synthetic biology.

The new discipline, established by scientists such as human genome pioneer Craig Venter, involves stripping microbes down to their basic genetic constituents so they can be reassembled and manipulated to create new life forms. These organisms can then be exploited to manufacture drugs and fuels or to act as bio-sensors inside the body.

However, some researchers warn that synthetic biology - which is accelerating at a dramatic pace - also poses dangers. In particular, they fear it may already be possible to create deadly pathogens, such as polio or smallpox viruses, from pieces of synthetic DNA ordered over the internet. In future, completely new - and highly dangerous - microbes could be made this way.

'The major biotechnology companies that sell these DNA segments are careful to try to monitor their sale,' said Dr Philipp Holliger, of Cambridge University's Laboratory of Molecular Biology. 'Nevertheless, it is clear we need to have this field properly monitored.'

The crucial point, said Holliger, who will be speaking at this week's conference, Engineering Life, is that 'scientists are now learning how to design life down to the last letter. We don't know enough to be sophisticated as yet but our knowledge is increasing all the time.'

Most scientists working on synthetic biology projects - including Holliger - say that their research is safe and stress its potential benefits. 'Synthetic biology represents a new approach to engineering,' said Professor Richard Kitney of Imperial College London, another speaker at the meeting, which will debate the risks and ethics of synthetic biology. 'It has brought us to the cusp of a new industrial revolution in which new fuels, drugs, medical treatments and sensors can be created from biological materials.'

One idea is the creation of organisms that could soak up carbon dioxide from the atmosphere and turn it into hydrocarbon biofuels. In this way, synthetic life forms could play a major role in helping in the battle against global warming, it is claimed.

Engineering life is not new, scientists stress. It is the basis of the biotechnology and GM crop industries. But the technology involved in these disciplines is relatively crude. A single gene is inserted into a bacterium or plant which then churns out proteins made by that gene. By contrast, scientists working in synthetic biology strip down a bacterium's central genome - the DNA that directs its growth and development. Then they add new pieces of DNA to produce a microbe that can be tailored to do all sorts of different tasks. 'Essentially we are exploiting the leaps that have been made in understanding the different systems and processes that go inside an individual cell,' said Kitney.

It is a point backed by Professor John McCarthy, director of the Manchester Interdisciplinary Biocentre, at Manchester University. 'Novel circuitry has already been constructed inside a cell to generate biological devices that can act as sensors or which can help in the treatment of diseases such as malaria or the production of biofuels,' he said.