

Clue: A major city



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I am creating artificial life, declares US gene pioneer

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Ed Pilkington in New York

The Guardian Saturday October 6 2007

Craig Venter, the controversial DNA researcher involved in the race to decipher the human genetic code, has built a synthetic chromosome out of laboratory chemicals and is poised to announce the creation of the first new artificial life form on Earth.

The announcement, which is expected within weeks and could come as early as Monday at the annual meeting of his scientific institute in San Diego, California, will herald a giant leap forward in the development of designer genomes. It is certain to provoke heated debate about the ethics of creating new species and could unlock the door to new energy sources and techniques to combat global warming.

Mr Venter told the Guardian he thought this landmark would be "a very important philosophical step in the history of our species. We are going from reading our genetic code to the ability to write it. That gives us the hypothetical ability to do things never contemplated before".

The Guardian can reveal that a team of 20 top scientists assembled by Mr Venter, led by the Nobel laureate Hamilton Smith, has already constructed a synthetic chromosome, a feat of virtuoso bio-engineering never previously achieved. Using lab-made chemicals, they have painstakingly stitched together a chromosome that is 381 genes long and contains 580,000 base pairs of genetic code.

The DNA sequence is based on the bacterium *Mycoplasma genitalium* which the team pared down to the bare essentials needed to support life, removing a fifth of its genetic make-up. The wholly synthetically reconstructed chromosome, which the team have christened *Mycoplasma laboratorium*, has been watermarked with inks for easy recognition.

It is then transplanted into a living bacterial cell and in the final stage of the process it is expected to take control of the cell and in effect become a new life form. The team of scientists has already successfully transplanted the genome of one type of bacterium into the cell of another, effectively changing the cell's species. Mr Venter said he was "100% confident" the same technique would work for the artificially created chromosome.

The new life form will depend for its ability to replicate itself and metabolise on the molecular machinery of the cell into which it has been injected, and in that sense it will not be a wholly synthetic life form. However, its DNA will be artificial, and it is the DNA that controls the cell and is credited with being the building block of life.

Mr Venter said he had carried out an ethical review before completing the experiment. "We feel that this is good science," he said. He has further heightened the controversy surrounding his potential breakthrough by applying for a patent for the synthetic bacterium.

Pat Mooney, director of a Canadian bioethics organisation, ETC group, said the move was an enormous challenge to society to debate the risks involved. "Governments, and society in general, is way behind the ball. This is a wake-up call - what does it mean to create new life forms in a test-tube?"

He said Mr Venter was creating a "chassis on which you could build almost anything. It could be a contribution to humanity such as new drugs or a huge threat to humanity such as bio-weapons".

Mr Venter believes designer genomes have enormous positive potential if properly regulated. In the long-term, he hopes they could lead to alternative energy sources previously unthinkable. Bacteria could be created, he speculates, that could help mop up excessive carbon dioxide, thus contributing to the solution to global warming, or produce fuels such as butane or propane made entirely from sugar.

"We are not afraid to take on things that are important just because they stimulate thinking," he said. "We are dealing in big ideas. We are trying to create a new value system for life. When dealing at this scale, you can't expect everybody to be happy."

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