

Playing God to shape future

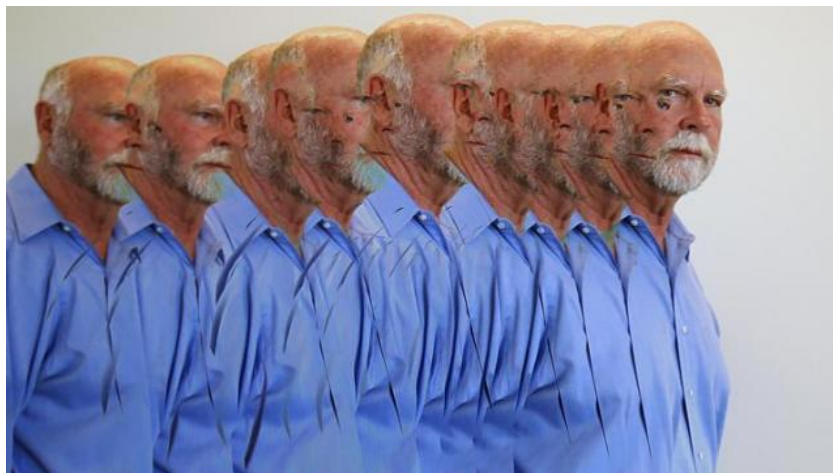
US biologist first person to have chemically copied an existing life form and reproduced it

By *Cheong Suk-wai Senior Writer*

Life at the Speed
of Light: From the
Double Helix to
the Dawn of
Digital Life

By J. Craig Venter

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US genetic researcher John Craig Venter seen in a multiple camera exposure in his office in La Jolla, California. Dr Venter believes that computers are now so powerful that an astronaut landing on a distant planet could send a sample of life back to Earth by using his way to decode the sample's DNA immediately - at the speed of light. -- PHOTO: REUTERS

ABOUT a week ago, Singapore saw the spectre of Mers, a virus similar to Sars that attacks the respiratory system. Sixty-four villagers in Johor had to be quarantined after a neighbour died of the deadly disease. Now, what if someone came up with a faster method of producing a vaccine that would stop a potential pandemic like this in its tracks?

Someone already has. He is the American biologist John Craig Venter. Many readers may know him as simply J. Craig Venter.

If the name rings a bell, that is because Dr Venter is the same person who mapped the entire human genome in 2003, prompting the Financial Times to name him its Man Of The Year. A genome is a complete set of DNA within a cell. DNA (short for deoxyribonucleic acid) is shaped like a spiralling rope ladder and contains all the information needed for the body to develop and maintain itself.

Genes, the units within a cell which pass on a parent's characteristics to his or her child, are made of DNA, and are found on X-shaped spaghetti-like substances called chromosomes. Dr Venter had originally been part of the team working on the US Human Genome Project. But he quibbled with its cautious approach, and set up his own company, Celera Genomics, so that he could map the entire human genome more quickly. He left Celera in 2002 after falling out with its main investor.

Then, in May 2010, he and his team at the J Craig Venter Institute in the United States successfully created a bright blue colony of the bacterium known as mycoplasma mycoides. It was a major advance, surpassing the work of Dr Arthur Kornberg and his team at Stanford University in the late 1960s, who succeeded in replicating the phi X 174 virus genome.

The difference between Dr Kornberg and Dr Venter's achievements is that Dr Kornberg is not regarded as having made a living thing. A virus is not regarded as living, since it is able to come

to life and multiply only when it invades a living cell. Bacteria, on the other hand, are capable of multiplying without the need for a living host.

Dr Venter is therefore the first person in history to have chemically copied an existing life form and reproduced it successfully. In the process, he has also come up with a way of using supercomputers to decode genomes faster than was previously possible. To do so, Dr Venter and his team first deciphered the DNA for a bacterium, that is, all the information that the bacterium needs to grow, copy itself and move about.

After determining what makes up the bacterium's DNA, he and his team then used it to write a code that directed a computer to mix four bottles of chemicals in the proportions that would produce a copy of that bacterium.

They then transplanted that copy into the natural cell of another bacterium. The copy, or synthetic life form, colonised the second bacterium successfully, which meant that the artificial life form was able to reproduce itself. Subsequent tests by his teammates proved beyond doubt that the artificial DNA had indeed been reproduced in the second, or recipient, bacterium.

Dr Venter also claims his faster method of deciphering DNA can also be used on viruses, thus cutting down the production of vaccines from 35 days to about five, a major advance in combating potential pandemics like Mers.

But, as he outlines in this elegantly written book, Dr Venter is most fascinated with the idea of using his technique to test for life on other planets. He believes that computers are now so powerful that an astronaut landing on a distant planet could send a sample of life back to Earth by using his way to decode the sample's DNA immediately - at the speed of light, he claims.

The scientific community has greeted Dr Venter's claims with a curious mixture of admiration and disdain. Weighing in on his achievement, the vaunted physicist Freeman Dyson was reported as saying in *The Guardian* in May 2010: "This experiment is clumsy, tedious, unoriginal... But it is nevertheless a big discovery... The ability to design and create new forms of life marks a turning point in the history of our species and our planet."

The strongest criticism of Dr Venter's success in synthesising life forms is that he cannot claim to be creating life "from scratch". This is because he transplanted his synthetic genome into a naturally created cell. In his book, Dr Venter responds with an illustration: "One could imagine buying a cake and then icing it at home. Or buying cake mix, to which you add only eggs, water and oil. Most consider baking a cake 'from scratch' to involve combining the individual ingredients such as baking powder, sugar, salt, eggs, milk, shortening and so on.

"Using 'scratch' in this context," he adds, "I doubt that anyone would mean formulating his own baking powder by combining sodium, hydrogen, carbon and oxygen to produce sodium bicarbonate or producing homemade corn starch."

So his argument is that his use of a natural, as opposed to artificial, cell to grow his artificial life form - just as one uses baking powder to help a cake rise - does not make his synthesising feat any less ground-breaking.

Dr Venter, who is an atheist, argues that the laws of physics and chemistry can be used to create life, not just understand it.

This, he admits cheerily in the book, is indeed playing God, contrary to the long-held belief that a mysterious life force beyond physics and chemistry creates all living things.

Whatever you make of his rejection of God, readers will likely be interested to learn how scientists like him are shaping the future.

Finding a meaning in life after encounter with shark

IT IS ironic that the man who unlocked the secret to life in 2003 tried to kill himself 35 years earlier.

In 1968, American high school dropout John Craig Venter was a United States Navy medic during the Vietnam War. There, he swam out to sea one day, meaning to end his life.

As he recalls in his 2007 autobiography *A Life Decoded*, he swam back to shore after seeing a shark circling the waters.

"For a moment," he writes in the book, "I was angry that a shark had disrupted my plan."

But the atheist's brush with death actually inspired him: "I wanted my life to mean something. I wanted to make a difference."

He returned to his duties at the battlefield's intensive care unit, which he called "the University of Death".

After pumping the hearts of hundreds of wounded soldiers, he decided to study medicine.

He first got his degree at a community college in California, then went on to higher studies at the University of California at San Diego.

After qualifying as a biologist, he decided to focus on research instead. As he told his brother, "A doctor can save maybe a few hundred lives in a lifetime. A researcher can save the whole world." That led him in 1992 to join the US\$5 billion, 15-year American venture known as the Human Genome Project (HGP), to map the entire genetic code of a human being.

Being very impatient, he found HGP's approach too plodding. He broke away, setting up his own company, Celera Genomics, with private funds and used the powerful computers to speed up, and complete, the mapping.

Dr Venter, who has been married three times, has since ventured into synthesising genomes.

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