Scientists demonstrate synthetic DNA

By Clive Cookson in Chicago
Published: February 15 2009 22:55 | Last updated: February 15 2009 22:55

Scientists have for the first time demonstrated an artificial genetic code in action. A synthetic form of DNA, incorporating new chemical “letters” not present in natural DNA, is replicating itself in a Florida laboratory.

The research, announced at the American Association for the Advancement of Science meeting in Chicago on Sunday, is an important step towards the creation of synthetic organisms with biochemistry that is different from natural life on earth.

It will also give “exobiologists”, who are looking for extraterrestrial life, a view of an alternative system of Darwinian evolution at work.

“This is the first example of an artificial chemical system capable of evolution,” said Steven Benner, who created the specimen in his lab at the Foundation for Applied Molecular Evolution in Gainesville.

Dr Benner’s new genetic code has 12 letters. It includes the four nucleotide units of natural DNA, plus eight extra letters which he created by making small chemical changes in the original units.

DNA with the new 12-letter code has a double-helix structure like the original version. To enable the molecule to unzip itself and replicate, Dr Benner used polymerase chain reaction, which biologists employ routinely to amplify small amounts of genetic material.

The system operates in an emulsion of oil and water in a lab beaker, which is alternately heated and cooled.

“The next step will be to apply natural selection to it,” Dr Benner said. That would involve varying the conditions in the beaker and seeing whether the system evolves in a Darwinian sense to adapt to the changes.

“It is not a self-sustaining system because we still need graduate students to ‘feed’ it with synthetic nucleotides and proteins,” he said.

But Dr Benner hopes to develop a self-sustaining version of the system, which would make its own nucleotides, within a couple of years. It would be like an extremely primitive form of synthetic life.

His approach to synthetic biology is very different from that of Craig Venter, the well-known genomics pioneer who expects soon to recreate an existing microbe from scratch, by synthesising its DNA from laboratory chemicals. While Dr Venter aims to make a complex living system with conventional biochemistry, Dr Benner is working on a simpler system with artificial biochemistry.

Dr Benner said his artificial system could find applications in medicine. But it would also be useful in the search for extraterrestrial life. “If you are looking for alien life, it is helpful to have an alternative system to study,” he said.

Print article Email article Order reprints

Digg reddit LinkedIn Facebook Delicious
Mixx Propeller Yahoo! Buzz stumbleupon

MORE IN THIS SECTION

Space ‘stew’ challenges theory on life
Science briefing: Gestures boost vocabulary
DNA offers clues to primitive humans
How science can prevent the next bubble
Humanity 2.0: downsides of the upgrade
Singular fantasies
Google and Nasa back new school for futurists
Applied Materials warns of loss
Science briefing: Locusts and serotonin link
Study links synthetic chemicals to infertility

SPONSORED LINKS How to advertise here