



Paper by J. Craig Venter, *Creation of a Bacterial Cell Controlled by a Chemically Synthesized Genome*

Evgenii Rudnyi, Discussion at Embryo Physics Course
30 June 2010

<http://blog.rudnyi.ru>

Original Paper

- ▶ <http://www.sciencemag.org/cgi/content/abstract/science.1190719>
- ▶ 12 pages,
 - ▶ I could download for free in June 2010
- ▶ Supporting Material, 29 pages
- ▶ Podcast Interview with J Craig Venter



ScienceExpress Research Article

Creation of a Bacterial Cell Controlled by a Chemically Synthesized Genome

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www.sciencemag.org/cgi/content/full/science.1190719/DC1

Supporting Online Material for

Creation of a Bacterial Cell Controlled by a Chemically Synthesized Genome

Information from J. Craig Venter Institute

- ▶ <http://www.jcvi.org/cms/research/projects/first-self-replicating-synthetic-bacterial-cell/>

The screenshot shows the J. Craig Venter Institute website. At the top is the logo and a search bar. Below is a navigation menu with links: Home, About, Research, Publications, Education, Giving, Press, Careers, and Contact. The main content area features a large blue banner with a blurred image of green cells. Below the banner, the page title is 'FIRST SELF-REPLICATING SYNTHETIC BACTERIAL CELL'. To the left of the main text is a sidebar with a table of contents: Overview (selected), Frequently Asked Questions, Photos, Video, and Publications. Below the sidebar are social media icons for Facebook, Twitter, and LinkedIn, followed by a 'ShareThis' button. The main text begins with 'Genomic science has greatly enhanced our understanding of the biological world...' and continues with a paragraph about digitizing biology. To the right of the main text is a 'RELATED LINKS' section with several PDF links, a 'VIDEO' section with a link to a press conference recording, and a 'FOLLOW US' section with links to the JCVI Facebook Page and JCVI Blog.

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FIRST SELF-REPLICATING SYNTHETIC BACTERIAL CELL

Overview

Genomic science has greatly enhanced our understanding of the biological world. It is enabling researchers to "read" the genetic code of organisms from all branches of life by sequencing the four letters that make up DNA. Sequencing genomes has now become routine, giving rise to thousands of genomes in the public databases. In essence, scientists are digitizing biology by converting the A, C, T, and G's of the chemical makeup of DNA into 1's and 0's in a computer. But can one reverse the process and start with 1's and 0's in a computer to define the characteristics of a living cell? We set out to answer this question.

In the field of chemistry, once the structure of a new chemical compound is determined by chemists, the next critical step is to attempt to synthesize the chemical. This would prove that the synthetic structure had the same function of the starting material. Until now, this has not been possible in the field of genomics. Structures have been determined by reading the genetic code, but they

RELATED LINKS

- Press Release ([Web](#) | [PDF](#))
- Frequently Asked Questions ([Web](#) | [PDF](#))
- Fact Sheet: Ethical and Societal Implications/Policy Discussions about Synthetic Genomics Research ([PDF](#))
- Fact Sheet: Background/ Rationale for Creation of a Synthetic Bacterial Cell ([PDF](#))

VIDEO

[A recording of the May 20, 2010 press conference can be viewed here.](#)

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My main source of information in plain German

- ▶ <http://www.zeit.de/2010/22/N-Biologie>
- ▶ Act of Creation
 - ▶ Next slides are short summary of this paper.

ZEIT  ONLINE | WISSEN

SYNTHETISCHES BAKTERIUM

Ein Schöpfungsakt

Wissenschaftler erzeugten Zellen mit synthetischem Erbgut. Kann die Biologie nun klären, was die Natur des Lebens ist?

von Ulrich Bahnsen | 27. Mai 2010 - 08:00 Uhr

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A substance from retorts and machines produces life for the first time

- ▶ Where is the difference between life and death?
- ▶ Synthetic biology
- ▶ Venter's bacteria



Four spectacular experiments by Venter's team

- ▶ The transfer DNA from one bacteria species to another.
- ▶ 2006, Definition of the genetic minimum for *Mycoplasma genitalum*.
- ▶ 2008, Production of DNA from the digital information.
- ▶ 2010, Transfer of the artificial DNA to the living bacteria cells.

Is life a fundamental property of matter?

- ▶ 1774, Friedrich Casimir Medicus: Vital force
 - ▶ *vis vitalis*
- ▶ Christian De Duve, 1995, *Vital dust: life as a cosmic imperative*
- ▶ Can we say now that vitalism was defeated?
- ▶ Can we make life as radio from individual parts?

Leroy Hood: Life is information

- ▶ Tremendous amount of information collected. Databases grow exponentially.
- ▶ Mel Greaves
 - ▶ We thought that the genome is a transparent blueprint of life. However it did not happen this way.
- ▶ Jennifer Doudna
 - ▶ It is similar when one climbs a mountain that steady grows.
 - ▶ The more we know, the more we recognize what we do not understand.

Conclusion in Die Zeit

- ▶ **David Baltimore:**
 - ▶ He has not created life, only mimicked it.

20 comments from scientists

- ▶ <http://journalofcosmology.com/ArtificialLife100.html>
- ▶ Journal of Cosmology, June 2010, Vol 8

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