

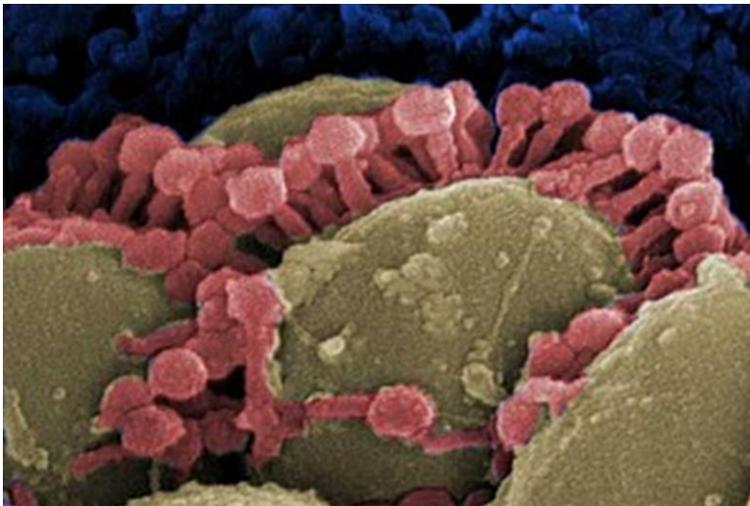
Press Release

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NEW INSIGHTS INTO THE MECHANISM OF THE CRISPR-CAS9 SYSTEM THREE-DIMENSIONAL STRUCTURE OF THE GENETIC ENGINEERING TOOL CLARIFIED / HZI SCIENTIST EMMANUELLE CHARPENTIER INVOLVED

The CRISPR-Cas9 system is one of the most important discoveries in molecular biology in recent years. Description and exploitation of RNA-programmable CRISPR-Cas9 as a genetic tool was first published in 2012, it is based on the immune system of bacteria and archaea. Still young, it is already considered a ground-breaking technology. Thanks to the CRISPR-Cas9 system scientists can now edit the genetic material of a cell easier, cheaper and more precisely than before. Researchers are hoping that it will help them in the fight against human diseases.



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Bacteria (in yellow) use the CRISPR-Cas-System to protect themselves against foreign DNA, for instance from phages (shown in red).

While the general principle of the molecular mechanism used by CRISPR-Cas is known, the structural conformations were still missing. In *Science Express*, which provides articles to be published in *Science* ahead of print, an international team of researchers including scientists of the University of Berkeley has now described the three-dimensional structure of the complex for the first time. This provides indicators about the way the system works: A so-called guide RNA acts as the decisive switch to trigger conformational rearrangement of the Cas9 enzyme and targeting of the genetic material. HZI researcher Prof Emmanuelle Charpentier is one of the co-authors of the article.

Charpentier started her research on CRISPR-Cas in Vienna, Austria and in Umeå, Sweden, before joining the HZI in Braunschweig in December 2012. She is head of the department "Regulation in Infection Biology" and holds a chair at Hannover Medical School. In 2014 she received the Humboldt Professorship, one of Germany's most highly coveted research awards. Born in France, Charpentier is regarded as a pioneer in the field of CRISPR-Cas research.

Original publication:

Martin Jinek, Fuguo Jiang, David W. Taylor, Samuel H. Sternberg, Emine Kaya, Enbo Ma, Carolin Anders, Michael Hauer, Kaihong Zhou, Steven Lin, Matias Kaplan, Anthony T. Iavarone, Emmanuelle Charpentier, Eva Nogales, Jennifer A. Doudna

Structures of Cas9 endonucleases reveal RNA-mediated conformational activation
Science, 2014, DOI: 10.1126/science.1247997

The department “**Regulation in Infection Biology**” studies how the expression of bacterial RNA and bacterial proteins is controlled. Both factors contribute to the establishment and the course of an infection.

The Helmholtz Centre for Infection Research:

At the Helmholtz Centre for Infection Research (HZI) in Braunschweig, scientists are studying microbial virulence factors, host-pathogen interactions and immunity. The goal is to develop strategies for the diagnosis, prevention and therapy of human infectious diseases.

www.helmholtz-hzi.de/en