



PRESS RELEASE

CRISPR DFG research group visits BRAIN

Scientists are informed about BRAIN research programmes

Zwingenberg, March 10, 2015: Biotechnology company BRAIN has exchanged ideas and expertise with the leading research scientists involved in CRISPR. Researchers from the Universities of Ulm, Kiel, Würzburg, Freiburg and Copenhagen, as well as the Max Planck Institutes for Terrestrial Microbiology in Marburg and for Biophysical Chemistry in Göttingen and the Helmholtz Centre for Infection Research in Braunschweig, are investigating CRISPR-Cas systems in bacteria and archaea since 2012. These research projects receive financial support from the German Research Foundation (DFG), as part of the research group "FOR 1680: Unravelling the Prokaryotic Immune System". A former member of the research group, Dr. Ümit Pul, formerly at the University of Düsseldorf, is now responsible for the industrial implementation of the CRISPR-Cas systems through his position as Project Leader at BRAIN, and he remains an associate member of the academic research group.

The research group held its annual meeting in Bensheim and took the opportunity to visit BRAIN AG, thus gaining an insight into the company's current research activities. The visit was initiated by Prof. Dr. Anita Marchfelder of the University of Ulm (spokesperson for the research group) and Dr. Ümit Pul, Project Manager at BRAIN. The visitors were introduced to the company and its various research units, resulting in the identification of some potential for cooperation and synergy. After a guided tour of the BRAIN Technology Campus, the attendees have continued with professional discussions and networking in smaller groups.

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The CRISPR (Clustered Regularly Spaced Short Interspaced Palindromic Repeats) prokaryotic immune system is one of the biggest biotechnological discoveries of the century. It has been recognized that prokaryotes have developed exactly that which scientists had been trying to produce synthetically in the laboratory for decades: a programmable DNA-cutting enzyme that can be used as a molecular scalpel in genome engineering in higher eukaryotic cells.

Since 2007 it is known that prokaryotes have an adaptive defense mechanism against viruses and other parasitic DNA elements, known as the CRISPR-Cas system. During the infection with a virus, the prokaryotic cells cut small DNA fragments of the infecting viral DNA, with the help of CRISPR-associated (Cas) proteins, and store these sequences in their own genome, which marks the invader as a target.

"The trick behind is that the stored sequence information is transcribed into a short RNA molecule that binds to a DNA-cutting enzyme in order to direct it to the complementary sequence of the viral DNA," says Dr. Ümit Pul, Project Leader at BRAIN AG. "Once the target site is found, the enzyme gets activated and introduces an incision into the DNA. Such a programmable enzyme is the Cas9 protein, which is currently revolutionizing biological and medical research. It is possible to reprogramme the Cas9 protein via small synthetic RNA molecules, and thus to route Cas9 to any DNA sequence in the cell." Dr. Ümit Pul has examined the basic mechanisms of CRISPR-Cas systems since 2008, and continues his work at BRAIN since October 2014. Within just a few weeks, several genes in various cell systems could be inactivated and modified using the CRISPR technology at BRAIN. The technology has become an indispensable part of BRAIN's daily laboratory routine and its relevance will further increase in the near future.

The technology is also fascinating to Dr. Michael Krohn, Head of the "BioActive Molecules" Unit at BRAIN: "The potential for biotechnology is immense, particularly since cell biologists have searched for years for molecular tools that enable genome editing in human somatic cells. With CRISPR technology in the hands, we are now able to do this successfully."

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About BRAIN

BRAIN AG is one of Europe's technology leaders in the field of industrial 'white' biotechnology. Within strategic alliances, BRAIN AG has identified and developed numerous innovative products and solutions for companies in the chemical, pharmaceutical, cosmetic and food industries by harnessing nature's untapped biodiversity. These active product components are identified by BRAIN AG and contained in the company's "BioArchive", one of the most comprehensive archives of its kind. Since its foundation in 1993, BRAIN has entered into over 99 strategic cooperations with nearly every prominent company in the chemical industry. Cooperation partners include BASF, Bayer Schering, Clariant, DSM, Emscher Genossenschaft, Evonik Degussa, Fuchs, Henkel, Nutrinova, RWE, Sandoz, Südzucker and Symrise. The company currently employs 116 highly skilled personnel.

For his groundbreaking activities in research towards a sustainable "biologisation of the chemical industry" using "nature's toolbox for industrial processes", CEO of BRAIN AG Holger Zinke was awarded the 2008 German Environmental Award from the German Federal Environmental Foundation (DBU).

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Photos:



"Fluorescence microscopy image of human cells expressing the bacterial CRISPR components (red-orange)."

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