genome engineering

PRESS RELEASE

Cellectis has successfully engineered the genome of photosynthetic algae with a view to biofuel production

Paris, June 26, 2013 - Cellectis (Alternext: ALCLS), the genome engineering specialist, announced today that it has successfully used engineered nucleases to genetically reprogram diatoms with a view to producing biofuels. This technological breakthrough was revealed by Dr. Fayza Daboussi, the Cellectis Group's VP of Synthetic Biology and Technology of Cellectis Group on June 26 at the "Molecular Life of Diatoms" meeting in Paris, France.

The results presented at the "Molecular Life of Diatoms" meeting by Dr. Fayza Daboussi, who led the study, demonstrate the strength of Cellectis' engineered nucleases for efficient gene inactivation and/or gene insertion in diatoms. Cellectis has generated a lipid-rich diatom which highlights the significance of this breakthrough. This work will lead to new opportunities in synthetic biology and especially biofuel production from photosynthesis and CO_2.

Cellectis develops and produces engineered site-specific endonucleases such as meganucleases and TALEN™ which have recently emerged as the most powerful approach in genome engineering[1]. By targeting specific sequences within diatoms' genome, these nucleases can be used to accurately insert, correct, or inactivate specific genes. This first step offers a new opportunity for synthetic biology in microorganisms previously inaccessible to rational genome engineering.

With the recent whole genome sequencing of several diatom species such as *Thalassiosira pseudonana* and *Phaeodactylum tricornutum*, a new era of post-genomics research has begun. Full sequencing provides fresh opportunities to improve our fundamental understanding of the biology of diatoms, and to build a molecular foundation for new industrial applications. However the tools available for generating industrial strains are still based on non-targeted over-expression or gene repression using RNA interference ([2&3]). This is where Cellectis' innovations and technologies can offer new perspectives.

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[1] Compact designer TALENs for efficient genome engineering
Marine Beurdeley, Fabian Bietz, Jin Li, Severine Thomas, Thomas Stoddard, Alexandre Juillerat, Feng Zhang, Daniel F. Voytas, Philippe Duchateau & George H. Silva
Nature Communications 4,
Article number: 1762 (2013) doi:10.1038/ncomms2782

[2] De Riso V, *et al.* (2009) Gene silencing in the marine diatom Phaeodactylum tricornutum. *Nucleic Acids Research* 37(14):e96.

[3] Radakovits R, Jinkerson RE, Darzins A, & Posewitz MC (2010) Genetic engineering of algae for enhanced biofuel production. *Eukaryotic Cell* 9(4):486501.

About Cellectis
Founded in France in 1999, the Cellectis Group bases its work on highly specific DNA engineering technologies. Its application sectors are human health, agriculture and bio-energies. Cellectis was co-founded by André Choulika, its Chairman and CEO, and is now one of the world's top companies in the field of genome engineering, with revenue of $27 million in 2012. Leading the field of pluripotent stem cells, Cellectis has developed expertise in drug discovery, toxicity testing, and regenerative medicine. Cellectis has a solid background in the large-scale handling of stem cells up until their maturation and differentiation into functional cell types. We employ a workforce of 230 people at 5 sites worldwide: New Brighton (Minnesota) & Cambridge (Massachusetts) in the United States, Gothenburg in Sweden, and Paris & Evry in France.
The Group has signed more than 100 industry agreements with pharmaceutical, agrochemical, and biotechnology companies. Our clients and partners include University College London (UCL), the National Institutes of Health (NIH), Novo Nordisk, the Center for iPS Cell Research and Application (CiRA) of Kyoto University, AFM, Novartis, BASF, Bayer, and Limagrain. Since 2007, Cellectis has been listed on the NYSE Euronext Alternext market (code: ALCLS) in Paris.
For more information, visit our website: www.cellectis.com.

About the "Molecular life of Diatoms" meeting
The conference in Paris in 2013 will explore research using diatoms as model systems in cell biology, evolution, ecology, nanotechnology and biotechnology that take advantage of sophisticated novel molecular tools to manipulate the diatom cell. It will serve as a platform to share the most recent research findings, establish new collaborations, and open up novel research directions to fully harness the tremendous potential of these fascinating organisms.

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