Press Release

Research with the Moss Bioreactor

University of Freiburg and greenovation Biotech to cooperate on improved product yields

The Chair of Plant Biotechnology from the University of Freiburg, Germany, and the biopharmaceutical company greenovation Biotech GmbH in Heilbronn, Germany, have started a cooperation to enhance the yield of recombinant proteins from moss. The moss *Physcomitrella patens* can be grown in closed containers such as bioreactors with a volume of up to 500 litres. In these Moss Bioreactors complex proteins can be produced. Such glycoproteins are needed as biopharmaceuticals for the treatment of human diseases. Other products are human growth factors that are required by researchers for tissue culture.

Protein production in moss offers advantages over conventional production systems that are based on animal cells: Moss cultures do not contain animal-derived components, or pathogens that can affect humans, nor antibiotics that may cause resistance. Further, products from moss have a superior purity. Recently, scientists from the University of Freiburgs department of Plant Biotechnology, which is headed by Professor **Ralf Reski**, were able to produce human Factor H, a protein that may help to cure specific kidney diseases. Greenovation has succeeded in the high-level production of several such proteins and will start their first GMP production of a biopharmaceutical for clinical trial studies early in 2014. This technology involves the generation of transgenic moss strains to make them produce and secrete human proteins reliably at high levels over a long period of time.

University of Freiburg

Rectorate

Public Relations

Fahnenbergplatz
D -79085 Freiburg

Phone: +49 (0)761 / 203 - 4302
Fax: +49 (0)761 / 203 - 4278

info@pr.uni-freiburg.de
www.pr.uni-freiburg.de

Contact:
Rudolf-Werner Dreier (Head)
Nicolas Scherger
Rimma Gerenstein
Mathilde Bessert-Nettelbeck
Dr. Anja Biehler
Melanie Hübner
Katrin Albaum

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The biologists in Freiburg are specialists in moss research and helped to establish *Physcomitrella* as a model organism for basic biology, biotechnology, and synthetic biology on a worldwide scale. During their analysis of the *Physcomitrella* genome they discovered novel gene regulatory elements which may help to make protein production in moss even stronger and more reliable. In the new joint project, their know-how will be combined with that of greenovation in the production at large scale. “I am excited that this joint project will allow us to retrieve data from the production process and thus help us to review our results obtained under laboratory conditions”, says Reski. “Such public-private co-operations are at the heart of the bioeconomy and will help in generating new job opportunities.”

“We are pleased about this opportunity to further enhance product yields from the Moss Bioreactor and to make bioproduction even more predictable and stable in the long run”, emphasizes Dr. **Thomas Frischmuth**, the CEO of greenovation. The company has two pre-clinical programs in the areas of oral diseases (growth factors FGF7 and KGF) and enzyme replacement therapies for the diseases Fabry and Gaucher under development. The alpha-Galactosidase replacement clinical trial phase I/II will start early 2014.

Ralf Reski heads the Freiburg Chair of Plant Biotechnology. The biologist is a member of the Cluster of Excellence BIOSS – Centre for Biological Signalling Studies and Senior Fellow at FRIAS, the Freiburg Institute for Advanced Studies of the University of Freiburg. In addition, Reski is co-founder of the Trinational Institute for Plant Research TIP, and, effective from October on, Senior Fellow at USIAS, the University of Strasbourg Institute for Advanced Study, France. Reski is co-inventor of the Moss Bioreactor and co-founder of greenovation Biotech GmbH.

Figure legend: Large scale production in Moss Bioreactors (Source: greenovation Biotech)

Contact:
Prof. Dr. Ralf Reski
Chair Plant Biotechnology
Faculty of Biology
Albert-Ludwigs-University Freiburg, Germany
Tel.: +49-761-203-6969
E-Mail: pbt@biologie.uni-freiburg.de
www.plant-biotech.net