

Organizers and background information

 In January 2010, the Philipps-Universität Marburg and the Max Planck Institute for Terrestrial Microbiology established the Center for Synthetic Microbiology (SYNMIKRO) in Marburg, promoted by the Excellence Program of the state of Hesse (LOEWE). Today SYNMIKRO employs over 100 scientists in more than 30 groups who conduct its research in the rapidly growing field of synthetic biology.

 The FutureAgriculture consortium is funded with five million EUR by the Horizon 2020 FET Open Program of the EU. The consortium aims at increasing photosynthetic productivity with synthetic biology. The interdisciplinary project started in January 2016 and involves laboratories at the Max Planck Institutes in Golm and Marburg, the Imperial College London (UK), the Weizmann Institute of Science (Israel), as well as two companies, Evogene Inc. (Israel) and IN S.r.l. (Italy).

 Horizon 2020 is the biggest EU Framework Program for Research and Innovation, providing nearly 80 billion EUR of funding from 2014 to 2020. It promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market. The FET Open program supports early-stages of science and technology research around new ideas towards radically new future technologies. It also funds coordination and supports actions for such high-risk forward looking research to prosper in Europe.



Venue



Public transportation (recommended):

Step out of the main train station, cross the road and walk over the bridge that crosses the river Lahn. Follow the street "Bahnhofstraße" for 250 m to arrive at the venue which is on the left side of the street.

By car:

Coming from the north, exit the freeway ("Bundesstraße 3") at "Marburg Bahnhofstraße" and turn right at the first traffic light to enter the street "Bahnhofstraße", where the Chemikum Marburg is located. You will find a charged parking deck in walking distance located at the street "Furtstraße 6". Take a right turn at the first traffic light of Bahnhofstraße into the street "Rosenstraße" to access the parking deck.

Coming from the south, exit the freeway ("Bundesstraße 3") at "Marburg Mitte", turn left immediately to enter the street "Wilhelm-Röpke-Straße", which will automatically turn into the street "Krummbogen". Follow the street and turn left on the traffic light which is located under the freeway. Cross the river Lahn to enter the street "Bahnhofstraße", where the Chemikum Marburg is located. You will find a charged parking deck in walking distance located at the street "Furtstraße 6". Take a right turn at the first traffic light in Bahnhofstraße to access the parking deck.

Address of the nearest parking garage for navigation devices:
Furtstrasse 6, 35037 Marburg

Registration

Participation is free but registration is required.
Deadline for the registration is August 20, 2017.
Please register online at:

www.synmikro.de

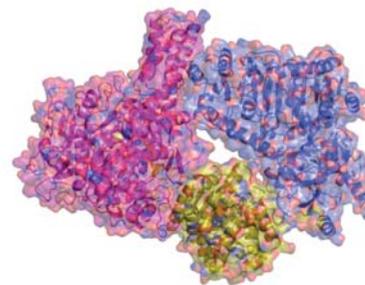
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Workshop



Synthetic Metabolism: Designing Photosynthesis 2.0



Wednesday, September 6, 2017

Philipps-Universität Marburg
LOEWE Center for Synthetic Microbiology

Venue:

Chemikum Marburg
Bahnhofstrasse 7, 35037 Marburg



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European Union
Horizon 2020 program

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Designing Photosynthesis 2.0

Photosynthesis is a fundamental process in the global carbon cycle that sustains our every day's food and energy supply. Although photosynthesis has evolved over billions of years, it is still not perfect. Plants and other photosynthetic organisms still waste 30% of their photosynthetic energy due to inefficient carbon assimilation, which strongly limits their growth.

An improved photosynthesis would be of immediate benefit. Today, already one in seven people is malnourished. This situation is expected to worsen as human population keeps increasing at a staggering rate. Feeding 10-15 billion people at the year 2100 is a tremendously challenging task that will only be met by the implementation of new measures to increase agricultural productivity.

A fundamental new way to improve plant productivity and performance is the engineering of highly efficient carbon assimilation routes with synthetic biology. Rather than reshuffling and grafting existing natural components, modern metabolic and enzyme engineering techniques enable us to design completely novel pathways for an improved carbon assimilation that were not explored by nature.

When combined in an interdisciplinary approach that spans computational biology, biochemistry, enzymology, metabolic engineering, and plant physiology, such efforts have a real chance to fundamentally transform carbon fixation and enhance plant productivity.

At the workshop *Designing Photosynthesis 2.0*, leading scientists from the fields of enzyme engineering, metabolic retrosynthesis, cyanobacteria physiology and plant genetics will come together to discuss the limits of natural photosynthesis and devise a roadmap towards a synthetically enhanced photosynthesis.

The participation in the symposium is free but a registration is required. Please use the link below for registration:

www.synmikro.de

Organizers:

Arren Bar-Even and Tobias J. Erb

Program

09:15 - 09:20 **Welcome:**
Michael Bölker
Vice President for Research, University Marburg

09:20 - 09:30 **Opening remarks:**
Arren Bar-Even, *MPI Golm*
and FutureAgriculture Coordinator

Session 1 The limitations of natural photosynthesis

Chair: Erhard Bremer
(SFB 987 Coordinator & SYNMIKRO)

09:30 - 10:00 **Martin Hagemann**
(University of Rostock)
Photorespiration: evolution & attempts of engineering cyanobacterial CO₂-acclimation

10:00 - 10:30 **Nir Keren**
(Hebrew University Jerusalem)
Control over photosynthetic energy transfer by rearrangements of its basic building blocks

10:30 - 11:00 Coffee break

Session 2 From natural to synthetic metabolism

Chair: Hannes Link
(MPI Marburg & SYNMIKRO)

11:00 - 11:30 **Georg Sprenger**
(University of Stuttgart)
Recruiting a swiss army knife enzyme of *Escherichia coli*, FSA, for novel roles in metabolic bypass pathways

11:30 - 12:00 **Jean-Loup Faulon**
(INRA Micalis & University of Manchester)
Synthetic pathways design for biosensor and metabolic engineering

12:00 - 12:30 **Jean-Christophe Baret**
(University of Bordeaux)
Droplet-based microfluidics for synthetic biology

12:30 - 14:00 Lunch break

Session 3 Redesigning photosynthetic carbon fixation

Chair: Lars-Oliver Essen
(University Marburg & SYNMIKRO)

14:00 - 14:30 **Christian Edlich-Muth**
(MPI for Molecular Plant Physiology, Golm)
Designing and evolving novel photorespiration pathways in *Escherichia coli*

14:30 - 15:00 **Dan Tawfik / Devin Trudeau**
(Weizmann Institute of Sciences, Rehovot)
Protein engineering a new carbon-neutral photorespiration pathway

15:00 - 15:30 **Jan Zarzycki**
(MPI for Terrestrial Microbiology, Marburg)
Fixing the Calvin cycle - CO₂-fixation with designer pathways build from non-natural reactions

15:30 - 16:00 Coffee break

Session 4 Engineering cyanobacteria & plants

Chair: Alfred Batschauer
(University Marburg & SYNMIKRO)

16:00 - 16:30 **Patrik R. Jones**
(Imperial College London)
Tools and understanding towards enabling commercial algal biotechnology using genetically optimised strains

16:30 - 17:00 **Michal Shoshit**
(Evogene Inc., Israel)
Strategies for plant trait engineering at Evogene

17:00 - 17:15 **Closing remarks:**
Tobias J. Erb
(MPI Marburg & SYNMIKRO)



Venue of the workshop:
Chemikum Marburg
Bahnhofstrasse 7
35037 Marburg