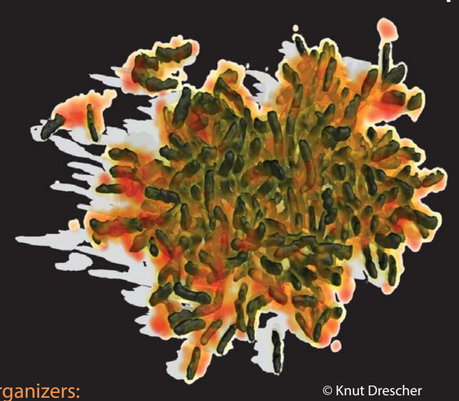
# How microorganisms view their world

September 23 - 25, 2018
Marburg, Germany



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Special sessions on celebrating 25 years of ECF sigma factors: from discovery to SynBio applications


Organizers:
Anke Becker, Marburg
Erhard Bremer, Marburg
Thorsten Mascher, Dresden


## Information

For registration please visit: www.sfb987.de

Accomodation: www.marburg-tourismus.de/SFB987-ERA

Venue: Erwin-Piscator-Haus, Biegenstraße 15, 35037 Marburg, Germany


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Microorganisms are omnipresent in the biosphere and provide the greatest diversity of life on Earth. They successfully colonize almost every possible habitat. A key factor for the ecological success of microorganisms is their enormous biochemical, physiological, genetic and cellular adaptation potential that allows them to respond to countless challenging environmental conditions and cellular cues. For most microorganisms, there is only one certainty: change! As a consequence, microorganisms have developed specialized mechanisms that enable both individual cells and cellular communities to recognize and to respond to environmental changes with high sensitivity and specificity. Within the framework of the SFB 987, research teams at the Philipps-University and the Max Planck Institute for terrestrial Microbiology jointly focus on “Microbial Diversity in Environmental Signal Response”. The SFB 987 research consortium aims at significantly advancing the current knowledge about the ability of microorganisms to react to environmental and cellular cues with situation- conforming adaptive responses.

ERASynBio is a transnational initiative to promote the robust development of Synthetic Biology (SynBio) and to structure and coordinate national efforts and funding programs. Under this umbrella, the ECF*express* consortium – which includes research groups from Germany, the UK and the US – aims at developing a SynBio design framework based on ExtraCytoplasmic Function σfactors (ECFs) to implement highly orthogonal regulatory switches and circuits. ECFs, which are typically non-essential and stress-inducible, were discovered 25 years ago and represent the most minimalistic and diverse group of the $\sigma^{70}$ protein family that also includes the essential primary (or housekeeping) σfactors. ECFs represent ideal building blocks for SynBio applications, because they are modular, inherently orthogonal, universal, and scalable. By combining theoretical and experimental approaches, the ECFexpress consortium aims at implementing novel ECF-based switches and circuits in four phylo- genetically diverse microorganisms to benchmark their orthogonality and to explore the ECF-based circuit design space.

## How microorganisms view their world

### Sunday, September 23rd, 2018

16:50 – 16:55 Erhard Bremer, SFB 987, Philipps-Universität Marburg
Welcome from the SFB 987 consortium

16:55 – 17:00 Thorsten Mascher, ERA-SynBio, TU Dresden
Welcome from the ERA-SynBio consortium „ECF*express*“

**Session 1 Microorganisms in their world**

Chair: Erhard Bremer, Marburg
17:00 – 18:00 Pascale Cossart, Institute Pasteur, Paris
*Listeria monocytogenes*: towards a complete picture of its physiology and its virulence

Chair: Timothy J. Donohue, Wisconsin
18:00 – 19:00 Carol A. Gross, University of California, San Francisco
An idiosyncratic view of ECF sigmas: past, present and future

Chair: Knut Drescher, Marburg
19:00 – 20:00 Bonnie L. Bassler, Princeton University, New Jersey
Bacterial quorum sensing and its control

**20:00 – 22:00 Get together**

### Monday, September 24th, 2018

**Session 2 - Metabolic Networks and their regulators**
Chair: Hannes Link, Marburg

08:30 – 09:00
Markus Ralser, University of Cambridge
From its evolutionary origins to the modern metabolic network

09:00 – 09:30
Dirk Bumann, Biozentrum Basel
*Salmonella* single-cell physiology in infected host tissues

09:30 – 10:00
Uwe Sauer, ETH Zurich
Viewing the outside from changes within

10:00 – 10:30
Julia Vorholt, ETH Zurich
Turning over the metabolome:
linking identity, frequency and timing

10:30 – 11:00 Coffee break

**Session 3 - Paradigms of ECF-dependent regulation**

Chair: Thorsten Mascher, Dresden

11:00 – 11:30
Mark Buttner, John Innes Centre, Norwich
The SigR-directed oxidative stress response in *Streptomyces*

11:30 – 12:00
John D. Helmann, Cornell University, Ithaca
The *Bacillus subtilis* SigM regulon and peptidoglycan homeostasis

12:00 – 12:30
Craig D. Ellermeier, University of Iowa
The anti-sigma factor RsiV is a receptor for lysozyme

12:30 – 12:45 Short talk
Rute Oliveira, Porto, Portugal
Role and molecular mechanism of an ECF56 sigma factor

12:45 – 13:00 Short talk
Simon Ringgard, MPI Marburg
A mechanism of bacterial transcriptional regulation by σ factor phosphorylation

**Directions to the castle (Conference Dinner on Sept. 25th)**

Coming out of the Erwin-Piscator-Haus, turn left and cross the street at the traffic lights. Go straight forward into the street called “Biegenstrasse”, you will pass the underground carpark of the Welcome Hotel, turn left again at the end of the short street and cross the street at the traffic lights that are near the entrance of the Welcome Hotel. You will see two elevators. You can use both of them to go up. Coming out of the elevator and passing the long corridor, turn right, go up the hill a little and turn left at the restraurant called “Paprika”. After a few meters you will see the marketplace of Marburg. Go up the hill that is behind the fountain until you can turn left again. You will many steps leading to the castle, if you prefer a way without steps, stay a few meters on the street “Ritterstraße” and you will see the way leading up on your right. Both ways will join at some point and lead directly to the castle.

13:00 – 15:30 Lunch & Poster

The workshop about BacStalk software will take place during the lunch break at the lounge area on the 2nd floor

**Session 4 - Microorganisms in an oxidative world**

Chair: Roland Lill, Marburg

15:30 – 16:00
Ruma Banerjee, University of Michigan, Ann Arbor
Sulfide signaling at the host-microbiome interface

16:00 – 16:30
Chris Grant, University of Manchester
Posttranscriptional regulation of gene expression during adaptation to oxidative stress conditions

16:30 – 17:00
Johannes Herrmann, TU Kaiserslautern
Mitochondria – Deep in their heart still bacteria?

17:00 – 17:15 Short talk
Kai Thormann, Justus-Liebig-Universität Gießen
Got stuck, feel cramped, suffer from slow advancement? Screw out!

17:15 – 17:30 Short talk
Ruchira Mukherji, HKI Jena
Color me purple: An unusual alliance between a social amoeba and a violacein producing soil bacterium

17:30 – 19:30 Poster Session

**Tuesday, September 25th, 2018**

**Session 5 - A structural view on ECF sigma factors**
Chair: Carol A. Gross

08:30 – 09:00
Elizabeth Campbell, Rockefeller University, New York
Structural insights on ECF sigma factors

09:00 – 09:30
Richard H. Ebright, Waksman University, New Jersey
Structural basis of primary sigma factor- and ECF sigma factor-dependent transcription initiation

09:30 – 10:00
Sean Crosson, University of Chicago
EcfG regulatory networks in alphaproteobacteria

10:00 – 10:15 Short talk
Marian Llamas, Granada, Spain
Sensing and responding to the host by *Pseudomonas aeruginosa* through σ-ECF factors

10:15 – 10:30 Short talk
Hans-Martin Fischer, Zürich, Schweiz
Function and regulation of ECF σ factor σEcfG in the nitrogen-fixing soybean symbiont *Bradyrhizobium diazoefficiens*

10:30 – 11:00 Coffee break

**Session 6 - Information processing systems in bacteria**
Chair: Lotte Søgaard-Andersen, Marburg

11:00 – 11:30
Eduardo A. Groisman, Yale University, New Haven
Bacterial responses to magnesium limitation

11:30 – 12:00
Susanne Gebhard, University of Bath
Flux sensing by transporter/kinase pairs – need-based activation of antibiotic resistance

12:00 – 12:30
Anne Galinier, CNRS, Marseille
Exploring the relationship between a protein YvcK and nutrient utilization, call wall and morphogenesis in *Bacillus subtilis*

12:30 – 12:45 Short talk
Gerald Larrouy-Maumus, London
NaCl triggers the CRP-dependant increase of cAMP in pathogenic mycobacteria

12:45 – 13:00 Short talk
Simone Eckstein, LMU München
From the host to soil - Regulation of phenotypic switching in insect pathogenic *P. luminescens* via two novel XRE-transcriptional regulators

13:00 – 14:30 Lunch break

**Session 7 - From comparative genomics to applications of ECF sigma factors**
Chair: Julia Vorholt, Zürich

14:30 – 15:00
Thorsten Mascher, TU Dresden, Dresden
The road less traveled by: from ECF classification to novel mechanisms of ECF-dependent signal transduction

15:00 – 15:30
Georg Fritz, Philipps-Universität Marburg
Comprehensive re-classification and computational analysis of the ECF sigma factor family

15:30 – 16:00
Anke Becker, Philipps-Universität Marburg
Building a toolbox of orthogonal ECF sigma factor-based regulatory switches in the alpha-proteobacterium *Sinorhizobium meliloti*

16:00 – 16:15 Short talk
Horia Todor, San Francisco, US
The role of Extracytoplasmic Function (ECF) sigma factors across the bacterial domain

16:15 – 16:30 Short talk
Akos Kovacs, Lyngby, Denmark
Cheating promotes evolution of hyper-cooperators in biofilms by shifting phenotypic heterogeneity due to altered ECF-type sigma factor network

16:30 – 17:00 Coffee break

**Session 8 - Microorganisms in their world**

17:00 – 17:45
Chair: Anke Becker, Marburg

Wolfgang R. Hess, Albert-Ludwigs-Universität, Freiburg
Small RNAs reaching far: acclimation to low iron and high light in Cyanobacteria

17:45 – 18:30
Chair: Mark Buttner, Norwich

Timothy J. Donohue, University of Wisconsin
A 25 year journey from an early ECF to light stress and to fuels and chemicals

18:30 – 19:15
Chair: Gerhard Braus, Göttingen

Regine Kahmann, Max Planck Institute Marburg
*Ustilago maydis*: from the field to the lab – and back to the field!

19:15 – 19:20
Erhard Bremer, Philipps-Universität Marburg
Closing remarks

20:00 Conference Dinner at the castle of Marburg