

# CeBiTec – Quarterly

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## CeBiTec General Meeting and Elections

On March 26, 2019, the 10<sup>th</sup> General Assembly of the CeBiTec has been organized and included an overview report by myself as the Scientific Director, as well as the regular election for a new CeBiTec Executive Board. As a result of these elections, the new representatives of the professorate have been identified as Prof. Dr. Andrea Bräutigam, apl. Prof. Dr. Jörn Kalinowski, Prof. Dr. Olaf Kruse, Prof. Dr. Thomas Noll, Prof. Dr. Norbert Sewald, Prof. Dr. Jens Stoye and Prof. Dr. Volker F. Wendisch. Andrea Bräutigam was only recently affiliated with the CeBiTec as a new principal investigator (see separate article in this issue) and takes over the seat from Prof. Dr. Bernd Weisshaar who served as a member of the Executive Board since 2004. Let me point out that these 15 years of service as a Scientific Board Member are characterized by a tremendous personal engagement. Bernd Weisshaar is now seeking for new challenges as Chair of the Plant Genetics and Crop Genomics Group within the CeBiTec and I wish him all the best for the coming years.



The academic staff within the CeBiTec Executive Board will be represented by three newly elected scientists: Dr. Almut Mentz, Dr. Vera Ortseifen and Dr. Petra Peters-Wendisch. In addition, Ms. Marga Ferrari and Ms. Susanne Konermann have been re-elected as representatives of the non-scientific staff members and students will be represented by Mr. Lars Wollenschläger.

Overall, this newly elected CeBiTec Executive Board now fulfils for the first time the demand of equal gender proportion when taking the complete group or representatives into account (6 female and 7 male members). In this context, the General Assembly also elected for the first time a CeBiTec Equal Opportunities Officer and her deputy. Almut Mentz and Vera Ortseifen will take over these tasks.

During the constituent meeting of the newly elected Executive Board on April 8, 2019, I have been now re-elected as Scientific Director for a second period of 4 years and at the same time Volker Wendisch took over the responsibility as Deputy Director from Thomas Noll. Additionally, Dr. Stefan Weidner has been confirmed as Executive Secretary.

The new CeBiTec Executive Board is characterized by very high competency and I am confident that the future challenges the CeBiTec is facing over the next 4 years can and will be successfully managed by this Board.

## The Computational Biology group is a new CeBiTec member

The Computational Biology group researches metabolic and regulatory networks. Our group started at Bielefeld University in the Faculty of Biology in October 2017. We use next generation sequencing for RNA and DNA to understand networks within plants. During 2018, we finished a projects in which we studied the transcriptional landscape of bread wheat, contributed to the discovery of a new metabolite involved in signaling during pathogen attacks, and sequenced and analyzed the first fern genome. The initial time at Bielefeld University was filled with establishing a new research field, machine learning based regulatory network construction, which we have deployed to generate and study networks in several plant species including *Marchantia polymorpha*, the liverwort and *Brassica napus*, oilseed rape. Our group focuses on understanding the evolutionary trajectories of transcriptional networks in particular those which control photosynthesis. We consider ourselves a beach lab, a place where dry lab, i.e. work at the computer, and wet lab, i.e. work in the lab, meet to generate new hypotheses and test exciting new methods. Machine learning, motif prediction, next generation sequencing, Crispr/Cas9, and disarmed Cas9 and Cpf1 peacefully coexist with classic methods of plant physiology and molecular biology.

Many collaborations at Bielefeld University widen our horizon towards new ideas and new organisms. We study regulatory events in *Chlamydomonas reinhardtii* in a collaboration with the group of Dr. Lutz Wobbe and *Botryococcus braunii* with the group of Prof. Dr. Olaf Kruse. We analyze the transcriptional response to and recovery from drought in *Arabidopsis thaliana* with the group of Prof. Dr. Bernd Weisshaar. A collaboration with Dr. Vera Ortseifen in the group of Prof. Dr. Karsten Niehaus analyzes regulatory networks in *Xanthomonas campestris*. Together with the group of Prof. Dr. Karl-Josef Dietz we reviewed the role of redox regulation in C<sub>4</sub> photosynthesis. A collaboration with the group of Prof. Dr. Caroline Müller and the group of Dr. Elisabeth Eilers allowed us to study the specialized metabolism of *Tanacetum vulgare* using RNA-seq. The Collaborative Research Centre (SFB) initiative has facilitated close interactions with organic chemists, biotechnologists and biologists at Bielefeld University while a Research Unit (*Forschungsgruppe*) initiative has forged links to the ecologists and evolutionary biologists.

Our group currently consists of two postdoctoral fellows, Dr. Elisabeth Fitzek and (soon to be Dr.) Bart Verwaaijen. Four Master students, in order of appearance, Wiebke Halpape (Molecular Cell Biology, MCB), Donat Wulf, Janik Sielemann and Katharina Schiller (all Genome-based Systems Biology, GBSB) study CAM photosynthesis, photosynthesis, motif prediction and regulatory networks. They are joined by two technicians who support the work in the lab, Ulrike Harke and Christine Schlüter. Patricia Möller-Reusch manages the office. Students from Biology, Bioinformatics, Bioinformatics and Genome Reserach, GBSB, MCB and Molecular Biology have joined us for research modules conducted in the lab, at the computer, or both.

As members of the CeBiTec, we hope to strengthen our connection to other groups in the CeBiTec, to continue use and development of the excellent equipment available and contribute to the further development of the institute.



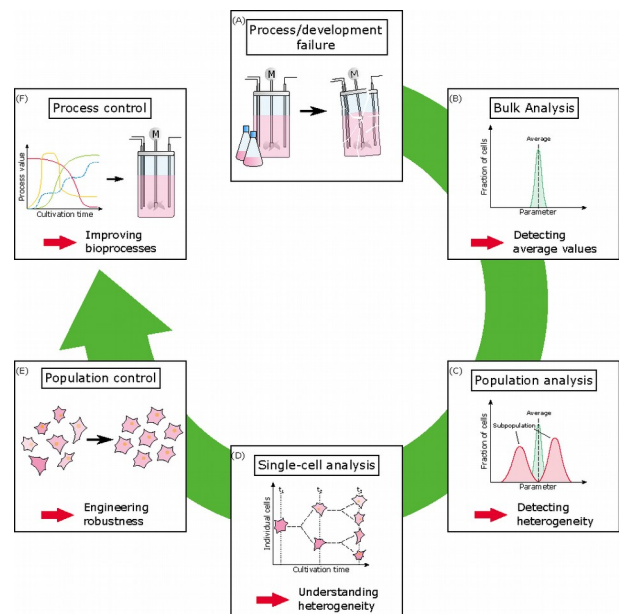
## Heterogeneity studies of mammalian cells for bioproduction: From tools to application

Jun.-Prof. Dr. Alexander Grünberger and Julian Schmitz (both research group Multiscale Bioengineering, Faculty of Technology) and Prof. Dr. Thomas Noll (research group Cell Culture Technology, Faculty of Technology) published a review article on the topic “Heterogeneity studies of mammalian cells for bioproduction: From tools to application” in the journal *Trends in Biotechnology*. The article summarizes and discusses novel single-cell tools and strategies for the investigation and quantification of cell-to-cell heterogeneity of industrially relevant mammalian cell-lines. To date, process parameters quantitatively analysed in mammalian cell culture for production of biopharmaceuticals represent only culture average values neglecting the heterogeneity and the individual behaviour of single cells.

First studies using well-established techniques like flow cytometry or novel “lab-on-a-chip” systems such as droplet microfluidics or microfluidic single-cell cultivation indicate a substantial level of cell-to-cell heterogeneity with important implications for biotechnological processes. Exploring and understanding the reasons, degree and dynamics of cell-to-cell heterogeneity within bioprocesses will pave the way to developing more stable cell lines and more reproducible bioprocesses.

Julian Schmitz, the first author of the study, started his PhD in 2018 and will focus on the development and application of microfluidic single-cell tools for the investigation of cell-to-cell heterogeneity of industrially relevant mammalian cell lines.

Schmitz J, Noll T, Grünberger A. Available (2019) *Trends in Biotechnology*, <https://doi.org/10.1016/j.tibtech.2018.11.007>



## Inauguration of a strategical partnership with a University in Brasil

In the context of a granted German Academic Exchange Service (DAAD) and *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES)* project between members of the CeBiTec and partners in Brazil, the CeBiTec Scientific Director Prof. Dr. Olaf Kruse visited the Federal University of Rio Grande (FURG) in February this year and recently in March, a return visit was made by the Head of the Biochemical Engineering Department at FURG, Prof. Dr. Jorge Alberto Costa. The visit of Prof. Costa at the CeBiTec was used as an opportunity to exchange contracts for a strategical partnership between Bielefeld University and the Federal University of Rio Grande (FURG). “This partnership has already turned into reality by the successful exchange of scientists between CeBiTec and FURG”, Olaf Kruse highlighted the importance of such a strategical collaboration for both academic institutions.



## Upcoming Events

- September 9 – 10, 2019 | Landwirtschaftszentrum Haus Düsse, Bad Sassendorf  
5<sup>th</sup> CeBiTec Retreat
- September 23 – 25, 2019 | Center for Interdisciplinary Research (ZiF), Bielefeld University  
9<sup>th</sup> International CeBiTec Research Conference Bielefeld: Renewable feedstocks and synthetic pathways for production of fine chemicals
- September 30 – October 02, 2019 | Center for Interdisciplinary Research (ZiF), Bielefeld University  
ZiF Workshop: Computational Pan-Genomics
- further events are announced on the [CeBiTec web page](#)