UNIVERSITÄT BIELEFELD

CeBiTec Center for Biotechnology

CeBiTec – Quarterly

Autumn 2019

Advisory Board Meeting 2019 and Extension of the CeBiTec as a Central Academic Institute of Bielefeld University

The Advisory Board of the CeBiTec gathered for its 2019 meeting from July 10 to 11, 2019, at the CeBiTec. During this assembly, the Scientific Director, Prof. Dr. Olaf Kruse, summarized recent achievements as well as future activities and strategies of the CeBiTec, followed by intense discussions with the board members and the principal investigators. In presence of the Vice-Rector of Bielefeld University, Prof. Dr. Martin Egelhaaf, a particular focus within these discussions was set on activities in the fields of medical research in the frame of the establishment of a new Medical Faculty as well as preparations for a Collaborative Research Centre (SFB) initiative in the area of biocatalysis. During this meeting, the Advisory Board also re-evaluated recent achievements regarding grant applications, publications and future strategies of the CeBiTec and as a result strongly recommended a continuation of the CeBiTec as a central academic institute of Bielefeld University to the rectorate. Consequently, the rectorate followed this recommendation and recently announced the continuation for another 4 years until 2023. “This was again an excellent meeting of the CeBiTec Advisory Board, clearly underlining the overall importance of this Board for our work at the CeBiTec and I am delighted about the

recommendation of the rectorate to continue the success story of the CeBiTec as one of Bielefeld University's light towers in Science", Olaf Kruse, resumed at the end of the meeting.

(O. Kruse, S. Weidner)

8th CeBiTec Students Academy in Summer Holidays

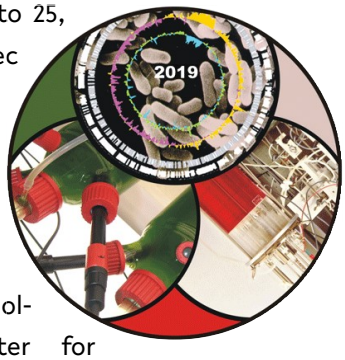
From August 19 to 23, 2019, the 8th CeBiTec Students Academy was held with 16 particularly talented high school students. Like every year, these interested adolescents learned about biotechnology and synthetic biology in theory and practice. The event was hosted by Prof. Dr. Alfred Pühler, Prof. Dr. Norbert Grotjohann and Prof. Dr. Jörn Kalinowski and was organised by the *teutolab*-biotechnology. The student lab performed experiments with the students to analyse soil bacteria. They identified bacterial strains performing PCR with 16S rDNA primers. The microbiological analysis covered different essays like Gram stain, the presence of the enzymes catalase, oxidase and lactase, the ability to utilize citrate and urea, and the resistance to different antibiotics. Together with the iGEM team the students isolated plasmid DNA and transformed it into competent cells of *E. coli*. In addition to the laboratory work, the students carried out bioinformatic examinations of bacterial genomes and were supported by the bioinformatics group with Dr. Stefan Albaum and his team. In addition, a selection of different lectures highlighted the diversity and breadth of biotechnological/bioinformatical applications. The topics were industrial biotechnology, modern plant breeding, medical genomic, industrial production of pharmaceuticals, and synthetic biology on the way to technical sciences. Finally, there was a discussion about CRISPR/Cas, and a demonstration of Nanopore sequencing.

The students were accommodated in the *Kolpinghaus* youth hostel in Bielefeld. In the evenings, there were joint dinners where the young people had the opportunity to meet university students and scientists. The evaluation of the Students Academy showed that the interaction within the group and with the CeBiTec members was one of the highlights during the week. The students reported a well balanced programme of high quality. Many took the opportunity to question their study wishes.

The CeBiTec Students Academy is funded by the *Osthushenrich-Stiftung* – a foundation for the promotion of education for children and adolescents. In 2020 the foundation will support the academy for the 9th time.

(K. Röllke, N. Grotjohann)

9th ICRC on Renewable Feedstocks and Synthetic Pathways for Production of Fine Chemicals



From September 23 to 25, 2019, the CeBiTec organized the 9th International CeBiTec Research Conference (ICRC) on Advances in Industrial Biotechnology at the Center for Interdisciplinary Research (ZiF) of Bielefeld University which was chaired by Prof. Volker F. Wendisch (CeBiTec & Biology). The ICRC started as a series of annual alternating conferences on industrial biotechnology in 2010 focusing on important research areas in the life science fields of Microbes and Industrial Biotechnology, Biocatalysis and Microalgae Biotechnology.

Industrial biotechnology is firmly established in several industries such as food and feed, and is a central pillar of the knowledge based bio-economy.

This year's conference was part of the European Biotech Week and addressed Aroma Biotechnology, Synthetic Pathways, Alternative Feedstocks and C1 Utilization as key topics. The Scientific Committee consisting of the conference chair, Dr. Katarina Cankar (Wageningen Plant Research, NL), Dr. Peter van der Schaft (Axxence Aromatic, DE), Prof. Dr. Trygve Brautaset (NTNU Trondheim, NO) and Prof. Dr. Oskar Zelder (BASF, DE) recruited itself from partners of two ERA CoBioTech projects in which CeBiTec is involved: INDIE and C1Pro.

The opening session discussed research and new opportunities for the production of aromatic compounds to be used in the flavour and fragrance industries. To leverage their full potential the subsequent session highlighted novel approaches to the design, rearrangement, implementation and extension of synthetic metabolic pathways. The session Alternative Feedstocks laid out examples of shifting the substrate base from fossil oil to renewables ranging from concept studies to successful industrial realization. The conference concluded with a session dedicated specifically to the C1 compounds methanol, formate and carbon dioxide as carbon and energy sources for microbial biotech processes.

A podium discussion on networking between academia and biotech companies and the Asian dimension of White Biotechnology, that was organized by CKB – CLIB Competence Center Biotechnology and CLIB-Cluster with representatives of AciesBio, Axxence Aromatic, b.value and Evonik, was attended by the 75 academic and industrial scientists from 11 countries that also discussed the newest developments in all covered thematic subjects as poster presentations.

(V.F. Wendisch)

Jörg Schwarzbich Inventor Award to two CeBiTec Teams

For the first time, the University Society Bielefeld (UGBi) has awarded a prize for outstanding inventions – the Inventor Award by Jörg Schwarzbich – to researchers at Bielefeld University. The debut featured two teams of inventors, both of whom have developed environmentally friendly manufacturing processes: On the one hand for nitriles which are used in pharmaceutical and plastics chemistry (Faculty of Chemistry), on the other hand for a natural dye with applications in cosmetics and animal nutrition (Faculty of Biology). Both teams conduct research at the CeBiTec and they share the prize money of 40,000 euros.

Dr. Nadja A. Henke, Dr. Petra Peters-Wendisch and Prof. Dr. Volker F. Wendisch (Genetics of Prokaryotes & CeBiTec) received the award for developing and patenting of a manufacturing process for the production of the red pigment astaxanthin. The pigment is primarily used as a colourant in the feed industry, but also has applications in cosmetics due to its antioxidant properties. The team's invention comprises a

coproduction process with the microorganism *Corynebacterium glutamicum.* In this process astaxanthin is produced as a cell-bound product whereas lysine – an essential amino acid in animal feed – is secreted to the culture medium. This coproduction is based on renewable resources including agricultural waste streams. In this process two products are gained in one fermentation with good volumetric productivities. With their start-up Bicomer, the inventors and two co-founders aim on marketing the process as an alternative to petroleum- and algae-based production. Bicomer receives funding from the European Regional Development Fund (ERDF) and the Ministry of Economic Affairs, Innovation, Digitalisation and Energy of North Rhine-Westphalia.

(N.A. Henke, P. Peters-Wendisch, V.F. Wendisch)

PhD Students Presented Their Work at the 6th CeBiTec Retreat

This year's CeBiTec Retreat was the biggest retreat so far. On September 9 and 10, 2019, more than 80 participants met again at *Haus Düsse,* the seat of the *Landwirtschaftskammer NRW* (Chamber of Agriculture of North Rhine-Westphalia). During the two-day meeting 24 PhD students presented their results and progress followed by fruitful discussions. Additionally, Prof. Dr. Andrea Bräutigam gave an exciting overview talk about the research topics of her group. A get-together on Monday night with cold drinks and salty snacks was the pleasant environment for networking. Next year's retreat will take place at the same location.

(S. Weidner)

Participation of CeBiTec at the 50th Anniversary Uni.Stadt.Fest

On September 15, 2019, on the occasion of the 50th anniversary of Bielefeld University, citizens got to know the multifaceted university life. Under the motto *Drei Orte, eine Linie* (three locations, one line) the anniversary celebration took place simultaneously on the university campus, in the *Bürgerpark* and at the *Alter Markt.* The CeBiTec participated with three different interactive offerings on the topic *Biotechnologie im Alltag* (biotechnology in everyday life). Together with the iGEM team, citizens isolated DNA from fruits using household items. Right next to it, the team from *teutolab*-biotechnology explained the biological background for creating DNA profiles to identify different sausages. Numerous visitors deciphered which animal species had been processed in samples of chicken, pork, horse, and beef sausages.

A real eye-catcher was a vintage transporter car from 1969, in which the CeBiTec technology platform genomics demonstrated the Nanopore sequencing. The successful combination of a

historical frame with state-of-the-art sequencing technology was as well attended by the public as the interactive offerings.

(K. Röllke, N. Grotjohann)

CeBiTec Summer Festival

150 liters of draft beer, 100 bottles of wheat beer (including nonalcoholic), 200 sausages, 13 kg of barbecue meat, 20 corn on the cob, 24 pieces of grill cheese and quite a lot of fun – this is the balance of an entertaining and enjoyable CeBiTec summer festival. In beautiful sunshine and at midsummer temperatures, the members of the CeBiTec and their families celebrated until late into the night.

Also in this year DJ Daniel Wibberg entertained the guests again with an outstanding performance convincing one or the other to shake a leg and hit the dance floor. This years summer festival was organized by CeBiTec administration in cooperation with the Bioinformatics Resource Facility (BRF) and the Bielefeld University Bioinformatics Services (BiBiServ), who would like to use this opportunity to thank all participants for their food donations and especially coming – you made this summer festival to an unforgettable event!

(S. Albaum)

Small Molecule Drug Conjugates for Targeted Tumor Therapy – Bielefeld University Coordinates the European Training Network Magicbullet::Reloaded

Despite the continuing development of new and more efficient treatments, cancer remains the second cause of premature death worldwide. Currently used anticancer drugs are highly cytotoxic and therapies are often associated with multiple, severe side effects. A medication that specifically targets cancer cells and delivers its active agent without harming surrounding healthy cells – this is the ambitious goal of Magicbullet::Reloaded. Prof. Dr. Norbert Sewald is coordinating the European Training Network (ETN) with 15 partner organisations from academia and industry for the development of a 'gentle' cancer treatment. The programme is supported by the European Union with over 3.9 million euros in funding for 4 years starting in November 2019.

Paul Ehrlich, the Nobel laureate in Physiology of 1908, had the early vision that a compound could be made to selectively target a disease-causing organism or a tumor. Such an ideal therapeutic agent would be a 'magic bullet' that killed only the target cells. Magicbullet::Reloaded refers to Ehrlich's bold idea and builds on the experience of the previous ETN Magicbullet (2015–2018). The surface of tumor cells is often characterized by distinct abundance of specific receptors, enzymes, or cell-surface proteins that may qualify as target structures in directed therapy. The corresponding binding partners, e.g. small molecule ligands, peptide hormones or substrate

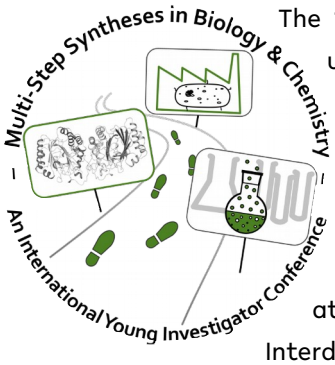
analogues, can be covalently linked to cytotoxic drugs to yield drug-conjugates that recognize such tumor-associated target structures. As a result, the attached therapeutic agent is directed to cancer cells selectively. Due to this molecular address label, healthy cells will be less effected by the drug, thereby lowering side effects. Magicbullet::Reloaded will focus on peptide-drug conjugates and small molecule-drug conjugates with a special focus on drugs capable to stimulate immune responses against tumors and overcome resistance to immuno-therapy.

The ETN brings together leading scientists from nine universities from Germany (Bielefeld, Cologne, Darmstadt), Italy (Como, Milan), Hungary (Budapest), Finland (Helsinki), Switzerland (Zurich) and UK (Newcastle), two research institutes (Fraunhofer-Institute for Toxicology and Experimental Medicine (DE), National Institute of Oncology (HU)) and four companies (Exiris (IT), Heidelberg Pharma Research (DE), Philochem (CH), Takis Biotech (IT)). The consortium is supported by three associate partners from the industrial sector (Bayer Pharma (DE), Italfarmaco (IT), Kineto Lab (HU)). The ETN combines interdisciplinary expert knowledge in Organic, Peptide and Medicinal Chemistry, Drug Discovery, Biochemistry, Pharmacology and Cell Biology from academia and industry. This high complementarity is required for the different scientific tasks in the drug development pipeline. Vice versa, the 15 recruited Early-Stage Researchers (ESRs) will be exposed to a challenging research environment leading to a broad range of scientific competences to be acquired.

The ETN Magicbullet::Reloaded will receive funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 861316.

(M. Frese, N. Sewald)

13th CeBiTec Symposium: Multi-Step Syntheses in Biology & Chemistry – An International Young Investigator Conference



The 13th CeBiTec Symposium "Synthetic Pathways in Biology & Chemistry – An International Young Investigator Conference", will take place at the Center for Interdisciplinary Research (ZiF), Bielefeld University, from December 2 to 4, 2019. This symposium will focus on the fields of tailor-made biocatalyst design and applications thereof, combination of biocatalysis and chemocatalysis as well as synthetic biology towards multi-step syntheses from both, an academic and industrial perspective. In addition, emerging trends in chemistry and biotechnology with relevance also for the field biocatalysis, for example, flow-chemistry, machine learning and self-automatization will be addressed. This symposium is dedicated to young scientists and is intended to provide them with a platform to present their latest results in form of invited lectures, oral presentations and posters, respectively.

https://www.cebitec.uni-bielefeld.de/events/conferences/566-2019-12-02-13th-cebitec-symposium-multi-step-syntheses-in-biology-chemistry-an-international-young-investigator-conference

(H. Gröger, M. Stricker)

Upcoming Events

- October 14 –18, 2019 | CeBiTec
  teutolab-Akademie Systembiologie
- December 02 – 04, 2019 | Center for Interdisciplinary Research (ZiF), Bielefeld University
  13th CeBiTec Symposium: Multi-Step Syntheses in Biology & Chemistry – An International Young Investigator Conference
- January 13, 2019 | Center for Interdisciplinary Research (ZiF), Bielefeld University
  CeBiTec Distinguished Lecture, Prof. Dr. Bärbel Friedrich
- September 14 – 15, 2020 | Landwirtschaftszentrum Haus Düsse, Bad Sassendorf
  7th CeBiTec Retreat
- September 21 – 23, 2020 | Center for Interdisciplinary Research (ZiF), Bielefeld University
  10th International CeBiTec Research Conference (ICRC) on Advances in Industrial Biotechnology
- further events are announced on the CeBiTec web page

Universität Bielefeld
Centrum für Biotechnologie

Concept and Realisation:
Dr. Stefan Weidner

Dr. Stefan Weidner
Universitätsstr. 27
33615 Bielefeld
Germany
info@cebitec.uni-bielefeld.de

Photos:
p 3 right column: © Universität Bielefeld / Mike Dennis Müller
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www.uni-bielefeld.de