

CeBiTec – Quarterly

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4th International CeBiTec Research Conference on Algal Biotechnology

From September 21 to 24, 2014, the CeBiTec organized the 4th International CeBiTec Research Conference (ICRC) on Prospects and Challenges for the Development of Algal Biotechnology at the Center for Interdisciplinary Research (ZiF) of Bielefeld University. The ICRC started as a series of annual alternating conferences on industrial biotechnology in 2010 focusing on three themes which cover important research areas in the life science fields of Microbes and Industrial Biotechnology, Cell Culture Technology 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. There is currently considerable interest in applying novel technological advances such as 'omics, systems biology or synthetic biology approaches to develop the field further, particularly with a goal of increasing the sustainability of chemical production.

In this respect, the 4th International CeBiTec Research Conference 2014 aimed to give a complete overview of the challenges facing the exploitation of microalgae and cyanobacteria for industrial biotechnology, from biofuels to high value proteins and chemicals. The use of photosynthetic hosts, rather than the traditional heterotrophic bacteria and yeast systems, offers great potential since the former can use sunlight as the energy source for production. 89 scientists from academia and industry from 17 countries not only discussed how knowledge of fundamental algal biology may provide novel insights for algae biotechnology, but also provided latest achievements in the field of exploitation of genome sequence information and genomics, the use of systems biology as well as advances in molecular engineering of microalgae. In addition, newest results regarding the optimization of the entire production process for chemicals from algae were presented. The scientific committee of the conference consisted of Prof. Dr. Olaf Kurse (Bielefeld), Prof. Dr. Alison Smith (Cambridge) and Prof. Dr. Rene Wijffels (Wageningen).



International Bioinformatics Conference at Bielefeld University

From the computational analysis of single genomes of plants, bacteria or humans, to the analysis of metagenomes up to the application in medicine or biotechnology – the German Conference on Bioinformatics (GCB) covers a broad range of topics. About 180 international researchers working in the field of bioinformatics met at Bielefeld University from September 29 to October 1, 2014.

For three days, scientists presented current research findings and discussed about future perspectives. About ninety, mostly young, researchers used the opportunity to present their research questions, first approaches and results as posters. Already on the day before the main conference, workshops on specific topics like the modeling of a virtual cell, the visualization of omics data and the efficient processing of data with cloud computing were offered. Six keynote speakers were invited: Professor Dr. Theodore Alexandrov (University of Bremen) presented the application of imaging mass spectrometry to analyze the molecular composition of mammalian organs. Professor Dr. Rolf Apweiler (EMBL–European Bioinformatics Institute) talked about the bioinformatics infrastructure for life science research at EMBL–EBI. Professor Dr. Ellen Baake (Bielefeld University) gave an overview of modern lines of research regarding probabilistic structures in population genetics. Professor Dr. Cenk Sahinalp (Simon Fraser University, Canada and Indiana University, US) presented new algorithms for big data genomics. Professor Dr. Peter Stadler (Leipzig University) presented recent extensions of the concept of Algebraic Dynamic Programming. Professor Dr. Tanja Woyke (Joint Genome Institute Walnut Creek, US) reported about progress in the analysis of metagenomes.

The meeting was organized by the bioinformatics working groups of Bielefeld University and the German Society for Chemical Engineering and Biotechnology (DECHEMA) with the support of the Special Interest Group on Informatics in Biology of the German Society of Computer Science (GI) and the Society for Biochemistry and Molecular Biology (GBM).



CLIB–Graduate Cluster LabCourse PolyOmics



From August 25 to 27, 2014, the CLIB–Graduate Cluster LabCourse PolyOmics took place at the CeBiTec. The CLIB graduate school allows the PhD students to get an insight into the research key competences of the different member Universities.

This time, 10 students from the University of Düsseldorf, the Forschungszentrum Jülich and the University of Dortmund visited the CeBiTec for learning about genome and transcriptome analysis and high-throughput sequencing. In this lab course they were introduced in the basic approach of performing genome and transcriptome projects. Experimentally they had the chance to prepare DNA and RNA libraries and to use the Generation Sequencing Technology for analysis. Furthermore, apart from wet lab experiments they were also taught to apply bioinformatics tools for *de novo* genome assembly, gene prediction and functional annotation as well as RNAseq data analysis. Of course in the evenings it was taken care of appropriate compensation from an informative day in the laboratories by a fun night at the bowling center or a barbecue in front of the CeBiTec.

3rd CeBiTec Students Academy Synthetic Biology/Biotechnology

The 3rd CeBiTec Students Academy Synthetic Biology/Biotechnology was held at the CeBiTec from July 7 to 11, 2014 and was organized by Honorary Prof. Dr. Walter Arnold, Prof. Dr. Alfred Pühler, and Dr. Werner Selbitschka. The Students Academy is a joint project of the CeBiTec, the District Council Detmold as well as the Familie-Osthushenrich-Stiftung (Gütersloh) which provides the essential financial support. The one-week course was directed towards gifted and talented students originating from Ostwestfalen-Lippe of Northrhine-Westfalia who will finish their Abitur in one-years time, the general qualification for university entrance. From a total of 37 applicants, 20 participants were accepted to the academy. All of the attendees had excellent grades in natural sciences, some of them an average grade of A+. Notably, more than half of the attendees were female. Lectures which were held by members of the Faculty of Biology and the Technical Faculty addressed various aspects of modern biotechnology. Relevant subjects were (i) industrial biotechnology, (ii) modern plant breeding, (iii) industrial production of pharmaceuticals, as well as (iv) synthetic biology. The experimental part was organized by members of the CeBiTec and dealt with the isolation, amplification as well as the sequencing of DNA. The knowledge acquired by the students was used for the (i) taxonomic identification of bacterial communities employing bioinformatics tools, (ii) sex determination of birds, and finally (iii) for the analysis of regulatory networks constructed by synthetic biology approaches. As part of the Students Academy, the Heart and Diabetes Center NRW, Bad Oeynhausen was visited. Since the eligibility period expired in 2014, a follow-up proposal has been submitted to Familie-Osthushenrich-Stiftung. All partners involved have expressed their interest in continuing the Students Academy.



Upcoming Events

- March 23–25, 2015 | Center for interdisciplinary Research (ZiF), Bielefeld University
10th CeBiTec Symposium – Bioinformatics for Biotechnology and Biomedicine

CeBiTec Science Shirts

Aesthetic Illustrations of Bielefeld Biotechnological Science



Recent novelty of this summer were the CeBiTec Science Shirts promoting Bielefeld biotechnological science. Each of the T-shirts shows a scientific illustration. Though drawn for explaining science these figures are such decorative that they may serve as well as a textile design. The 13 motifs of this year come from the areas of metagenomics, metabolomics, RNA bioinformatics, bioimaging, cell visualization, and genome Informatics. The first edition of 60 T-shirts may be continued next year.

Prof. Dr. Robert Giegerich, member of the CeBiTec from the very beginning, had the idea for these shirts. Layout and organization was done by Susanne Konermann, media designer in BiBiServ Group of the CeBiTec. Robert Giegerich retired October 1, 2014, and the T-shirts of this project are kind of a farewell for CeBiTec.



Motif 1–12 from CeBiTec Science Shirts. A bold printed sentence accompanies the design explaining what the figure represents. The first edition of 60 CeBiTec Science Shirts was produced as both male and female cut shirts.

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