

CeBiTec – Quarterly

Summer 2017

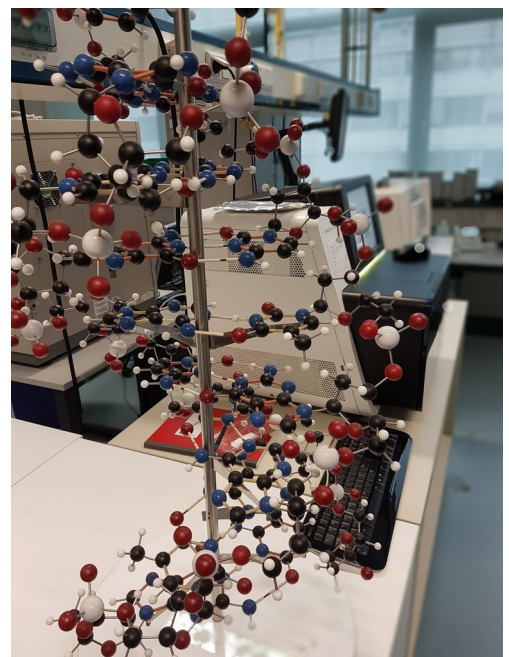
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Culture meets Science – Visit of members of the Bielefeld Theatre at the CeBiTec

The Theatre in Bielefeld launched a Science dominated Musical premiere in mid-May on the discovery of the molecular structure of the DNA molecule in the 1950ies. The story *Das Molekül* also includes the race for the complete sequencing of the human genome between a private US company and a research team authorized by the US government, forty years after the discovery of the DNA. In this context, the art director Jón Philipp von Linden and members of the theatre ensemble visited the CeBiTec in order to get a deeper and realistic impression about the scientific life in genome laboratories in the 21st century. This unusual but very successful coming together between experts in Culture and Science resulted in commitments for further follow-up activities as part of the town Science festival GENIALE 2017 in August this year. Parts of the musical *Das Molekül* will be presented at the opening ceremony of the GENIALE at the Stadthalle Bielefeld (Bielefeld Convention Center) on August 18, 2017, followed by a panel discussion consisting of town and university representatives including the Scientific Director of the CeBiTec. During the GENIALE week, the CeBiTec will furthermore offer courses and activities around the topic 'DNA molecule' at the university campus and in the CeBiTec entrance hall.

www.uni-bielefeld.de/geniale/2017/dna.html



Distinguished Lecture about plant immunity by Prof. Dr. Dierk Scheel



'Molecular mechanisms of plant immunity' was the title of Prof. Dr. Dierk Scheel's talk in the CeBiTec Distinguished Lecture Series. On the invitation of Prof. Dr. Bernd Weisshaar, Prof. Scheel visited the CeBiTec on June 12, 2017. He is director of the Leibniz Institute of Plant Biochemistry in Halle (Saale) since 1994. His research focuses on plant/pathogen interactions and defence mechanisms of plants against diseases. In the plenary hall of the Centre for Interdisciplinary Research (ZiF) of Bielefeld University he reported about plant mechanisms to detect and recognize potential pathogens in their environment via pathogen-associated molecular patterns. The signalling network of the plant results in a defence responses, which in turn can be attenuated by effectors of the pathogen. After

the lecture, Prof. Scheel answered questions of attendees and colleagues during the reception organised by students of the iGEM team of the CeBiTec.

Application of the sugar beet genome sequence for identification of a rhizomania resistance gene in a crop wild relative population of the wild beet *Beta vulgaris* spp. *maritima*

In a paper published recently in Nature Communications, we described the use of a crop wild relative (CWR) population of less than 200 wild beets (*B. vulgaris* ssp. *maritima*) to identify the sugar beet (*B. vulgaris* ssp. *vulgaris*) resistance gene *Rz2*. The genotypes of the CWR population were sampled in their natural habitat, and phenotyped for rhizomania resistance. The causal gene, which encodes a CC-NB-LRR protein, was identified by combining a modified version of mapping-by-sequencing (MBS) with direct mapping and a candidate gene approach. For that, we generated a draft genome sequence of the wild beet. Correct identification of the *Rz2* gene was corroborated via RNA interference. Our results show the importance of preserving CWR *in situ* and demonstrate the great potential of CWR for discovery of causal genes relevant for crop improvement.



Rhizomania infected (left and middle) compared to control sugar beet (right)

Rapid identification of resistance genes as well as other agronomically important genes is of pivotal interest for crop breeding. Access to the DNA sequence of *Rz2* opens the path to improvement of resistance towards rhizomania not only by marker-assisted breeding but also by genome editing. The results were produced in a collaborative research project that involved the colleagues from the Christian-Albrechts-Universität at Kiel as well as other academic and industrial partners. The contribution from CeBiTec was focussed on MBS, optimization of the wild beet genome sequence as a basis for mapping, and bioinformatics.

Capistrano-Gossmann et al., Nat Commun. (2017) 8:15708
Universität Bielefeld uni.aktuell (in German)

A new research project started: Multi-resistant *Vitis* rootstocks – development of innovative and internationally competitive rootstocks for northern wine growing regions (MureViU)

Grapevine is grown in Europe on rootstocks to which the variety of interest is grafted. Grafting is required because European varieties are all derived from *Vitis vinifera* which is highly susceptible to phylloxera. Aims of the project are to improve rootstocks with respect to biotic and abiotic stresses, and to implement new breeding methods into German rootstock breeding programs. These innovations should secure and support viticulture in the traditional German wine producing areas.

The genotypes for molecular studies, i.e. mapping populations and selected rootstock varieties, are provided to the group of Prof. Dr. Bernd Weisshaar, which is partner with the MureViU cooperation project, by the Institut für Rebenzucht. The material will be characterised at the DNA sequence level. High throughput technologies as well as bioinformatic analyses will be applied to generate sets of SSR (simple sequence repeat) and SNP (single nucleotide polymorphism) markers for marker assisted breeding. The goal of the project part carried out at CeBiTec is to develop traits like new phylloxera or nematode resistance traits as well as draught tolerance towards an application in breeding with relevant loci and genes.

Cosmetic Ingredients with a Twist – Team Bicomer from Bielefeld wins German final of business plan competition

Biology students from Bielefeld University and CeBiTec won the German final of the international business competition 'Global Biobased Business Competition' (G-BiB) held in Düsseldorf, July 6, 2017. This international competition invited life science students from Germany, the Netherlands and Brazil to write a business plan for the production of an innovative biorenewable chemical or material and to increase their entrepreneurship skills. G-BiB is an initiative of the international BioInnovation Growth mega-Cluster (BIG-Cluster), a cross-border 'Smart Specialisation Initiative' aiming to transform Europe's industrial mega cluster in the Flanders region of Belgium, The Netherlands and the German state of North Rhine-Westphalia into the global leader of bio-based innovation growth. BIG-Cluster has been established by the three cluster organizations BE-Basic (NL), CLIB2021 (DE), and Catalisti (BE).

The Bicomer team of students from the faculty of biology and the CeBiTec accepted this challenge and developed a business model for a biotech start-up. 'We will produce biobased novel components for the cosmetic industry, which are distinguished due to their novel properties in anti-aging and UV protection' describes Nadja Henke (PhD candidate in Industrial Biotechnology) the concept of Bicomer. 'Our high performance substances like Astaxanthin will be produced in fermentation with *Corynebacterium glutamicum*. These compounds will lead to a next generation of novel cosmetic products, e.g. for facial skincare' adds Tatjana Walter (MSc candidate in Genome-based Systems Biology). Besides the scientific development of the technology, economic aspects are essential for success. 'Using our platform technology we aim at a long-term analysis of the market to deploy new products' explains Boas Pucker (PhD candidate in Genome Research and Bioinformatics).



Team Bicomer (left to right): Dr. Petra Peters-Wendisch, Jannik Jilg, Tatjana Walter, Nadja Henke, Boas Pucker and Christopher Henke.

Dr. Petra Peters-Wendisch from the chair of Genetics of Prokaryotes at Bielefeld University is mentoring this business project. Various market experts and potential investors were contacted during business plan development. Supported by the G-BIB competition, Bicomer will attend dedicated events for start-ups adding to their business experiences and will present the product idea during biotech events such as the CLIB2021 Forum on High performance Ingredients, where the team already introduced Bicomer to a broader biotech community.

Bicomer aims to support biotechnology in Bielefeld, Germany, and beyond. The international final of the G-BIB competition will be held in Campos do Jordão, São Paulo, Brazil during the BBEST 2017 conference and will provide Bicomer and the finalists from the Netherlands and Brazil the opportunity to present their business plans to an international audience and an international expert jury.

www.bicomer.de

www.facebook.com/bicomer2017

twitter.com/bicomer_microbe

www.be-basic.org/g-bib.html

The Familie-Osthushenrich-Stiftung supports a follow-up project of the CeBiTec Students Academy Synthetic Biology/Biotechnology for a further three years funding period

During the years 2012 through 2017 the CeBiTec organized a total of six one-week courses of the CeBiTec Students Academy Synthetic Biology/Biotechnology. This students academy is a joint project of the CeBiTec, the District Council Detmold as well as the Familie-Osthushenrich-Stiftung which provides the essential financial support. The course consists of a theoretical and an experimental part and is held at the CeBiTec. The theoretical part is composed of lectures presented by members of the CeBiTec, the Faculty of Biology as well as the Faculty of Technology. The practical part focuses on experiments dealing with bacterial taxonomy, the bioinformatics interpretation of genome sequences, the analysis of proteins in proteomics experiments as well as synthetic biology. The academy is directed towards gifted and talented students from Ostwestfalen-Lippe of Northrhine-Westfalia preparing their graduation in a secondary school, the general qualification for university entrance. The organizers Honorary Prof. Dr. Walter Arnold, Prof. Dr. Alfred Pühler, and Dr. Werner Selbitschka are happy to announce that the academy will be continued by a follow-up project entitled CeBiTec Students Academy 'The Role of Genome Sequencing and Bioinformatics in Biotechnology/Synthetic Biology'. The Familie-Osthushenrich-Stiftung provides the financial support necessary to run the students academy in the years 2018, 2019 and 2020. The theoretical part of the follow-up project is largely similar to the previous students academy. As a major change in the experimental part however, the focus of the experimental work will be the molecular characterization of skin bacteria. The format of the new course resembles the former students academy in that it consists of a one-week course. In addition, the new course is extended for another two days. During two subsequent Saturdays the data produced during the week will be evaluated by the students under supervision by CeBiTec members. Thus, by engaging a specific group of citizens, namely students in scientific experiments, the new course establishes a Scholar Science.

Science can be fun (sometimes)

In the frame of the European Union Horizon 2020 funding, the CeBiTec takes part in the Virus-X project (principal investigators: Prof. Dr. Jörn Kalinowski, Dr. Alexander Sczyrba), aiming at exploring and exploiting the biological diversity at extreme places, namely on Iceland and in the North Atlantic. Since archaeal viruses make up a largely unexplored field in biology and biotechnology and there is hope that they encode novel enzymes with applications in industry or the molecular biology lab, the subprojects range from bioprospection and ecological studies up to meta-

genome analysis, gene expression, protein structure and function characterization as well as to industrial prototyping. The annual project meeting was held in Iceland at this year's Summer Solstice (June 20 to 23, 2017) and did not only include indoor seminars but also a real sampling excursion. Although we had some patchy weather, this reminded us 'genome guys' what biology is all about!



(A) The Virus-X 'Boy Band' (left to right) Tobias Luttermann, Christian Henke, Dr. Alexander Szcyrba, David Brandt (B) Midnight Sun at Snæfellsjökull (where Jules Verne placed the entry to the 'Centre of the Earth') and (C) sampling of archaeal viruses at Icelandic hot springs.

CeBiTec Summer Party 2017

In best summer weather the members of the CeBiTec and friends enjoyed this year's Summer Party on July 6, 2017. A plenty of cold drinks, barbecue food, salads and deserts added much to the good mood. The guests were entertained until far into the night by the DJs Silvia and Daniel with a variety of musical styles. This time the summer party was organized by the CeBiTec management and the team of the Teutolab Biotechnology with energetic support of further members of Biology Didactics.



Upcoming Events

- July 24–28, 2017 | CeBiTec building
6th CeBiTec Students Academy – Synthetic Biology/Biotechnology
- August 22, 23, 2017 | CeBiTec building
GENIALE 2017, DNA – ein GENIALEs Molekül
- September 11–12, 2017 | Landwirtschaftszentrum Haus Düsse, Bad Sassendorf
4th CeBiTec Retreat
- September 24–27, 2017 | Center for Interdisciplinary Research (ZiF), Bielefeld University
7th International CeBiTec Research Conference Bielefeld – Advances in Industrial Biotechnology: Prospects and challenges for the development of algal biotechnology
- October 23–25, 2017 | Center for Interdisciplinary Research (ZiF), Bielefeld University
de.NBI Symposium – The Collaboration of the de.NBI and ELIXIR Networks
- March 19–21, 2018 | Center for Interdisciplinary Research (ZiF), Bielefeld University
12th CeBiTec Symposium – Big Data in Medicine and Biotechnology
- April 9–11, 2018 | Center for Interdisciplinary Research (ZiF), Bielefeld University
8th International CeBiTec Research Conference Bielefeld – Reaction concepts for industrial biocatalysis
- further events are announced on the [CeBiTec web page](#)