

CeBiTec – Quarterly

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iGEM Team Bielefeld–CeBiTec 2017 wins gold medal and two special prizes at the Giant Jamboree in Boston!

On November 13, 2017, the iGEM team Bielefeld–CeBiTec was awarded with a gold medal and two special prizes for 'Best Foundational Advance Project' and 'Best New Basic Part' for their project 'eXpand – Expanding the Genetic Code'. The team also received four nominations for 'Best Software', 'Best Hardware', 'Best New Composite Part' and 'Best Part Collection'. Additionally, Dr. Christian Rückert received the Judge's Prize as 'Best Veteran Judge'. The team, comprised of 14 students from Bielefeld, participated in the renowned iGEM (international Genetically Engineered Machine) competition, which took place at the Hynes Convention Center in Boston. Their project 'eXpand – Expanding the Genetic Code' aimed at the expansion of the genetic code with unnatural base pairs and non-canonical amino acids. The team succeeded with the incorporation of the unnatural bases isoC and isoG and developed a toolbox for the incorporation of five different non-canonical amino acids into proteins. Furthermore, new methods were developed, such as an adaptation of Oxford Nanopore Sequencing. By doing so, the team was the very first to ever sequence unnatural base pairs using this sequencing technology.

The iGEM competition, which started out as an internal competition at the Massachusetts Institute of Technology (MIT), is growing bigger each year so that the venue has moved to the larger Hynes Convention Center. Teams from Bielefeld University have been successfully participating for eight years.





Team Bielefeld-CeBiTec 2017 after the Awards Ceremony: From left to right: (front row) Lennard Karsten, Laura Schlüter, Michelle Liebers, Daniel Bergen, Dr. Christian Rückert (adviser and 'Best Veteran Judge'); (back row) Denise Kerkhoff, Boas Pucker (adviser), Christopher Whitford, Markus Haak, Yannic Kernkoff, Svenja Vinke, Christina Drake, Olga Schmidt, Max Edich, Saskia Dymek, Julian Droste (adviser), Camilla März.

The team of 2017 comprised 14 students enrolled in Bachelor and Master programs, including Molecular Biotechnology, Bioinformatics and Genome Research, Biochemistry, Methods and Evaluation as well as Molecular Cell Biology. Special thanks go out to the team's advisers, Boas Pucker, Julian Droste, Dr. Christian Rückert, Prof. Dr. Kristian M. Müller and Prof. Dr. Jörn Kalinowski, as well as other members of the CeBiTec and Bielefeld University who helped the team at different points during their project. The project of team Bielefeld-CeBiTec and its success in the iGEM competition underline the strong position of the CeBiTec in research and education in the Life Sciences.

Combining lab experiments and mathematical modelling in the 2nd *teutolab*-Academy Systems Biology

After a successful systems biology project week in autumn 2016, the 2nd *teutolab*-Academy Systems Biology was held at the students-lab *teutolab*-biotechnology at the CeBiTec from October 23 to 27, 2017. High school students with special interests and high competences in natural sciences from Ostwestfalen-Lippe (a region of the state of North Rhine-Westphalia) had the opportunity to apply for this one-week course in the students' autumn holidays.

Twenty two students from 18 different schools participated in the academy which aims at the combining of lab experiments and mathematical modelling. The course consisted of a theoretical and a practical part. In the latter, the *lac* operon served as a model for a complex biological system. The participants learned how bacterial growth, gene expression and enzyme activity is affected by the presence or absence of different sugars by performing growth experiments, enzyme activity measurements and promoter activity analyses.



In the theoretical part the students visited lectures, participated in lab tours or worked on the evaluation of the experiments' results. After understanding gene regulation and enzyme activity, it is a further role of systems biology to illustrate the determined biochemical network graphically and to use this model for biosynthesis predictions. To reach this aim the students performed a model of the *lac* operon using the freeware modelling tool CellDesigner.

This *teutolab*-Academy Systems Biology was the second course during the three year funding period by the Joachim Herz Stiftung, Hamburg. The 3rd academy will take place from October 15 to 19, 2018.



International Collaborative Research Projects on methanol-based biotechnology: ERA-CoBioTech project C1Pro follows ERASysAPP project MetApp

Prof. Dr. Volker F. Wendisch (CeBiTec and Faculty of Biology) is principal investigator (PI) in the European collaborative research projects MetApp and C1Pro. In the project ERASysAPP MetApp, which will end in February 2018, Prof. Dr. Julia Vorholt (ETH Zurich, Switzerland), Prof. Dr. Jean-Charles Portais (Toulouse, France), Prof. Dr. Trygve Brautaset (Trondheim, Norway), who coordinates this project, and Volker Wendisch developed the first application of a differential concept of systems biology to bacterial methylotrophy in order to gain systems-level understanding of evolutionary alternatives of a key metabolic trait. These alternatives of methylotrophy are represented by the two facultative methylotrophic model bacteria *Methylobacterium extorquens* and *Bacillus methanolicus*. The insight gained in this project was applied for methanol-based production of the sought-after chemicals cadaverine and γ -amino butyric acid (GABA).

Since methanol is an attractive non-feed raw material used for microbial fermentation, these results initiated the new ERA CoBioTech project C1Pro, which focusses on *B. methanolicus* as overproducer of amino acids and derived fine chemicals. C1Pro is one of the 22 projects funded in ERA CoBioTech's first call 'Biotechnology for a sustainable bioeconomy' (co-funded by the EC), with a total budget of 31 M€. The C1Pro project aims to establish a sustainable platform for methanol-based production of value-added products with proven industrial applications. The Gram-positive, methylotrophic and thermophilic bacterium



Project meeting at ETH Zürich in December 2017 (from left: Luciana Fernandes de Brito, Pierre Kugler, Guido Hennig, Marina Gil López, Patrick Kiefer, Trygve Brautaset, Jean-Charles Portais, Philipp Keller, Andrea Ochsner, Fabian Meyer, Stéphanie Heux, Volker Wendisch, Tonje Heggest, Ingemar Nærdal and Julia Vorholt)

B. methanolicus was chosen as model organism in this project for several reasons: it utilizes methanol as raw material for growth and energy, it grows at elevated temperatures (50–55 °C), it naturally overproduces L-glutamate, and its classical mutants have demonstrated a high potential to overproduce L-lysine. C1Pro will apply innovative technologies in the fields of modelling, development of genetic tools, strain engineering, fermentation technology and downstream processing to establish and develop methanol-based production. Trygve Brautaset (NTNU, Trondheim, Norway) coordinates C1Pro. Additional academic PIs are Volker Wendisch, Dr. Stéphanie Heux (INSA, Toulouse, France), Prof. Dr. Erhard Bremer (Marburg, Germany, as subcontractors of BASF) and Dr. Ingemar Nærdal (SINTEF, Trondheim, Norway). The participation of the industrial partners BASF SE, Ludwigshafen, Germany, (Prof. Dr. Oskar Zelder) and Acies Bio d.o.o., Ljubljana, Slovenia, (Dr. Gregor Kosec) documents the applied potential of the project C1Pro.

www.cobiotech.eu/index.php?index=9&news=Outcome_of_ERA_CoBioTech_&rsquo_s_co_funded_call

Bicomer – Producing Ingredients with a Twist

Bicomer is the business idea of two PhD students and one master student from the CeBiTec. With its business plan they won the German final of the 'Global Biobased Business Competition' (G-BIB) in Düsseldorf on July 6, 2017, and became vice world champion at the final in Brazil on October 19, 2017. The team members Nadja Henke, Tatjana Walter, and Boas Pucker were supported by Dr. Petra Peters-Wendisch.

G-BIB is an international competition for life science students from Brazil, the Netherlands and Germany which aims on stimulating entrepreneurship. The CeBiTec students develop their own business on the basis of their own

research and scientific background. By attending dedicated events for start-ups the team members collect valuable know-how about industry trends, business models, funding and sales strategies.

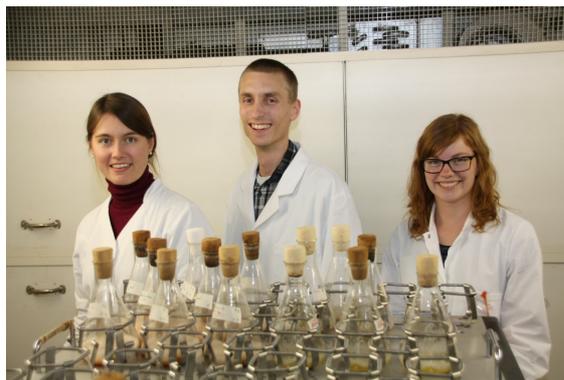
Bicomer is the business idea for the fermentative production of Astaxanthin with *Corynebacterium glutamicum*. During the last year Bicomer talked to several market experts and potential investors. Astaxanthin is a potent antioxidant that is added to cosmetic products and is used as a feed colorant e.g. in aquaculture. The replacement of synthetic Astaxanthin by Bicomer's natural Astaxanthin is of interest to many companies. Due to the ecofriendly and sustainable production mode, Bicomer got a lot of attention by the media. At the moment, the team is acquiring funding to start the business. Bicomer would like to support the biotech society of Ostwestfalen-Lippe (a region of the state of North Rhine-Westphalia).

www.bicomer.de

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

www.facebook.com/bicomer2017

twitter.com/bicomer_microbe



left to right: Nadja Henke (Wendisch lab), Boas Pucker (Weisshaar lab), Tatjana Walter (Wendisch lab)

Alumni Meeting of the Chair of Genetics and the GRIM research group

On Saturday, November 18, 2017, more than 130 former members of the Chair of Genetics and the Genome Research of Industrial Microorganisms (GRIM) Group convened for an Alumni Meeting at Bielefeld University. The meeting was organized by Prof. Dr. Alfred Pühler, head of the Chair of Genetics from 1980 until 2008, and from 2008 on Senior Research Professor of the GRIM Group at the CeBiTec.

In the afternoon of the Alumni Day the meeting was started with a get-together in the main hall of the university building. For participants interested in ongoing research, Prof. Dr. Jörn Kalinowski organized visits to the CeBiTec omics laboratories. The get-together was followed by a festive symposium in lecture hall H7. Prof. Dr. Volker F. Wendisch, Dean of the Faculty of Biology, and Prof. Dr. Olaf Kruse, Director of the CeBiTec, presented introductions to former and recent developments in biology and biotechnology at Bielefeld University. Highlights of the symposium were presentations of former members, now professors at universities located in Hamburg, Heidelberg, Lübeck, Luxembourg, Marburg, München, Rostock, Tübingen and Würzburg. In a further session, former members, now employed in larger industrial companies, reported on their daily job. The last session finally focused on technical staff members who gave insights into the different phases of their employment.

The Alumni Meeting was terminated with a festive dinner at the restaurant Wirtshaus 1802 im Bültmannshof close to the University building. This dinner was intensively used to remember old stories and to exchange actual information between former members who have not met for decades. There is a strong wish from most of the participants to repeat such an Alumni Meeting in one of the coming years.



Digital teaching project at the CeBiTec awarded with fellowship



The development of novel courses utilizing digital teaching methods is the intention of a program started by the Stifterverband in 2016. Up to 50,000 € are provided per project. This year, Boas Pucker was awarded with one Fellowship for his project proposal 'Digital report facilitates cooperative learning'. The exchange, interaction, and feedback between students should be increased to achieve cooperative learning. A typical situation in the life sciences is writing a report about lab experiments. Students will acquire knowledge regarding molecular biology methods, writing skills and basic awareness about website design – all integrated in a single practical course. Students from all life science programs are invited to attend this course. The block course is scheduled to the next summer and will be offered for up to 12 participants. Since the proposed digital reporting method facilitates initial quality control as well as possibilities for evaluation based on peer-reviews, scalability to large practical courses seems likely. Supported by the Bioinformatics Resource Facility, the CeBiTec is exactly the right place to initiate the described course.

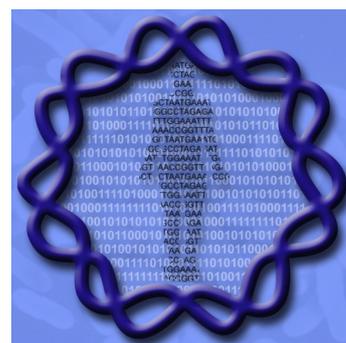
www.stifterverband.org/digital-lehrfellows/2017/pucker (in German)

Announcement of the 12th CeBiTec Symposium Big Data in Medicine and Biotechnology

The 12th CeBiTec Symposium scheduled for March 19 to 21, 2018, will focus on big data in medicine and biotechnology. It is organized as a joint conference of the CeBiTec, the German Network for Bioinformatics Infrastructure (de.NBI), and the Bielefeld Center for Data Science (BiCDaS). The CeBiTec is responsible for organizing the basic sessions of the big data symposium. The de.NBI network will organize the second day which is focused on the presentation of 12 use cases which are currently discussed in the ELIXIR organization. BiCDaS finally contributes to the round table discussion at the end of the conference which will deal with ethical and legal aspects of big data in medicine and biotechnology. The title of the symposium is well chosen since the CeBiTec is deeply involved in the production and the analysis of big data sets. On the other hand, the actual plan to establish a Faculty of Medicine at Bielefeld University underlines the goal of the symposium to discuss medical data problems.

The 12th CeBiTec Symposium will follow a well established programme structure. At the end of the first day, a session with short contributions of young scientists is planned, followed by a poster session. Concerning the second day, the detailed presentation of ELIXIR use cases will be followed by two Distinguished Symposium Lectures informing on ethical and legal considerations of medical data. At the end of the second day the symposium dinner in a nearby restaurant is on the agenda. The third day of the symposium, finally, is reserved for presentations on the role of big data in biotechnology, but also on the role of cloud computing in the age of big data science. The organizers of the 12th CeBiTec Symposium look forward very much to interest many scientists from Bielefeld University, from the de.NBI network, but also from abroad.

www.cebitec.uni-bielefeld.de/12th-symposium-2018



Upcoming Events

- 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
- August 20 – 24, 2018 | CeBiTec, Bielefeld University
7th CeBiTec Students Academy Synthetic Biology/Biotechnology
- September 10–11, 2018 | Landwirtschaftszentrum Haus Düsse, Bad Sassendorf
4th CeBiTec Retreat
- October 15–19, 2018 | CeBiTec, Bielefeld University
3rd *teutolab*-Academy Systems Biology
- further events are announced on the [CeBiTec web page](#)