

CeBiTec – Quarterly

Autumn 2020



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Alfred Pühler Appointed Honorary Senator of Bielefeld University

A very special present was given to Alf Pühler on the occasion of his 80th birthday: Bielefeld University honours the well renowned genome researcher by appointing him honorary senator. According to the official press release, he received this honour because of his outstanding achievements in biotechnological research and for his merits as a professor of Bielefeld University. In the certificate, which was handed over by Rector Prof. Dr. Gerhard Sagerer and the Vice President of the senate, Dr. Beate Lingnau, it is stated: “The University honours Alfred Pühler for the untiring commitment to his research field. Early on, he established genome and bio-

technological research as well as the necessary infrastructure at Bielefeld University, thereby increasing its international visibility”. Furthermore, it is highlighted how he integrated his field of research into academies and professional associations and fostered the dialog with society and politics, both with endurance and courage.

Alfred Pühler, whose teaching and research activities at Bielefeld University started in 1979, is one of the founders of the CeBiTec. He is considered a pioneer in the field of Biotechnology and was the vice rector for research between 1992 and 1994. Due to his

engagement, Bielefeld University became one of the first competence centres for bioinformatics and genome research in the year 2000. From 2004 to 2008, when he retired, he was the speaker of the executive board of the CeBiTec.



Rector Prof. Dr. Gerhard Sagerer and the vice president of the senate Dr. Beate Lingnau handed over the certificate appointing Prof. Dr. Alfred Pühler honorary senator.

Since 1993, he is a regular member of the North-Rhine-Westphalian Academy of Sciences, Humanities and Arts. In 1999, he was elected member of the Leopoldina (Deutsche Akademie der Naturforscher) and is a member of the National Academy of Science and Engineering (acatech) since 2004. Besides other achievements, his continuous commitment for an increased societal acceptance of bacterial genome research and emphasis of its great potential for agriculture, pharmacy and environmental protection has been awarded with the “Bundesverdienstkreuz am Bande” in 2009. Today, he is a senior research professor at the CeBiTec and coordinates the German Network for Bioinformatics Infrastructure (de.NBI) and its administration office based at the CeBiTec. Honorary senators appointed by the senate of Bielefeld University have distinguished

themselves by strengthening its national and international visibility.

(L. Wobbe)

Forty Years of Science at Bielefeld University – On the Occasion of Alf Pühler’s 80th Birthday

Alf Pühler studied physics at Nuremberg-Erlangen University. During his Ph.D., he switched to Molecular Biology and Microbial Genetics with a study on the nitrogen-fixing bacterium *Rhizobium lupini*. After his habilitation 1976 in Genetics, he received a call and started the Department of Genetics (Lehrstuhl für Genetik) at Bielefeld University in 1979.



Alf Pühler at the start of his career (1980) in Bielefeld in his office...

He held this chair until his retirement in 2008. During this very successful time, the department grew to a size of more than hundred scientists. The department not only engaged in work but also had a lot of leisure time together, with a regular skiing week in March at Hintermoos (Austria) and several other festivities, such as work excursions (“Betriebsausflüge”) and Christmas parties. Early on, he was also engaged in other sports, e.g. he joined our Squash team. In the university, he took over several duties, among them the position of Vice-Rector for Research (1992-1994). He was a strong

supporter of the concept of the Technical Faculty, a unique combination of Biotechnology and Informatics. This gave birth to the field of bioinformatics, of which Bielefeld University is still a center with worldwide outreach.



...and in the lab.

At the time of retirement, the law had changed and allowed the universities to extend the contracts with officially retired professors (“Hochschul-Freiheits-Gesetz”).

Bielefeld University took the chance and Alf was given the freedom to continue his efforts in the fields of genomics and bioinformatics. Today, he has a leading role as coordinator of the German Network of Bioinformatics Infrastructure (de.NBI).

During his whole career, he also was engaged in many scientific organizations, not the least of which the “Wissenschaftsrat”. Also in these committees, he was very active in converting his visions into reality. His impressive political and organizational skills as well as his exceptional working ethics helped to inspire several funding campaigns of the Federal Ministry of Education and Research (BMBF).

In 1998, he also was instrumental to co-found the Center of Biotechnology at Bielefeld University and headed it from 2004 to 2010 as

Scientific Speaker. During this time, the CeBiTec building was erected and the CeBiTec itself became a well-known brand in science.

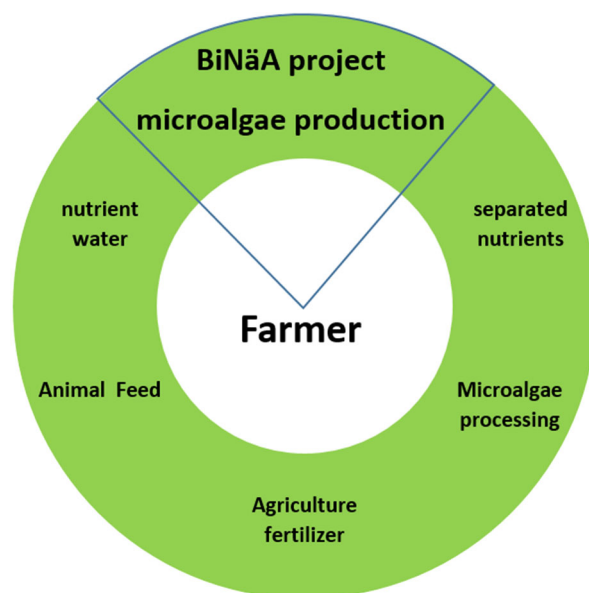
On September 28th, 2020, Alf celebrated his 80th birthday. In these crazy times, the Corona virus prevented the planned “Lehrstuhl”-reunion and also his planned festivities with the colleagues at CeBiTec for the moment. On behalf of the numerous scientists that came out of his research groups and all colleagues that accompanied him during the last forty years, I would like to pass on our best wishes on this occasion:

Lieber Alf, bleibe gesund und so aktiv wie bisher!

(J. Kalinowski (on behalf of many))

Establishing Microalgae as Fertilizers for Agriculture

The Algae Biotechnology & Bioenergy Group of the Center for Biotechnology at Bielefeld University (CeBiTec) in collaboration with the Research Center Jülich and the industrial partner Algrar GbR have successfully acquired a project funded by Europäische Innovationspartnerschaft (EIP).



BiNäA project idea

In this 3-years project, wastewater-based production of microalgae and their application as fertilizer for agriculture will be investigated. Several experimental microalgae production plants will be installed on local farmland, where different wastewaters and cultivation strategies will be tested. Technical and biological know-how from Jülich and Bielefeld will be used to establish an efficient outdoor algae cultivation process. The project leaders Prof. Dr. Olaf Kruse and Dr. Viktor Klassen from the CeBiTec will support the other partners with previously identified and selected robust algae cultures for rapid growth and will be responsible for microbiological aspects of the project, in particular investigations in the composition of microflora in relation to seasonal changes and substrate origin. The whole project aims at improving productivity and sustainability in agriculture through innovation transfer from the Jülich Research Centre and the CeBiTec.

Europäischer Landwirtschaftsfonds für die Entwicklung des ländlichen Raums: Hier investiert Europa in die ländlichen Gebiete unter Beteiligung des Landes Nordrhein-Westfalen



Ministerium für Umwelt, Landwirtschaft, Natur- und Verbraucherschutz des Landes Nordrhein-Westfalen



(V. Klassen)

Foundation of *teutolab*biotechnologie-online - Interactive Online Learning in the Student Lab

Due to the restrictions caused by the corona pandemic, students have no access to experiments in student lab *teutolab*-biotechnologie. In response to this, the student's laboratory *teutolab*-biotechnologie

founded a large online learning platform that supports students and teachers in learning and teaching biological content (www.teutolabbiotechnologie-online.de).



This learning platform offers an attractive combination of theoretical contents and interactive exercises (quizzes, memory, videos...). In self-study programs for lower secondary level (*Klasse 7-9*), students have the opportunity to learn about topics such as “Diagnostics of Bacteria and Viruses” or “The role of DNA in Leukemia and Bone Marrow Donation”, to name just a few. All offers meet the requirement of depicting experimental work and thus guaranteeing an authentic insight into laboratory work (e.g. by displaying virtual laboratories, photo stories or videos).

The offers for upper secondary level (*gymnasiale Oberstufe*) go one step further. These online experimental courses are moderated by employees of the student lab and are webcasted from the laboratory by using a video conference system. Thus, the lab is brought to the school or to the learners' home. In these courses, the high school students learn about lactose intolerance (offer for the EF-students, *Einführungsphase*), the molecular genetic identification of the animal species processed in meat products (offer for Q1-students, *Qualifikationsphase 1*) or the evolution of the coronavirus SARS-CoV-2 (offer for Q2-students, *Qualifikationsphase 2*). The homepage also offers a comprehensive range of information for job orientation by

presenting fields of activity, job profiles and information on apprenticeships and courses of study relevant to work in the field of biotechnology.

The large number of participants in the three teacher training courses held in September to introduce the new online learning platform demonstrated the great interest existing on the teacher`s side.

The online learning platform was created with financial support from the *Europäischer Fonds für Regionale Entwicklung (EFRE)*. Further supporters are the *Doris-Wolff-Stiftung* in Bielefeld, the *Joachim-Herz-Stiftung* in Hamburg, the *Andreas-Mohn-Stiftung* in Bielefeld and *Zukunft durch Innovation (Zdi) NRW*.



(M. Panhorst)

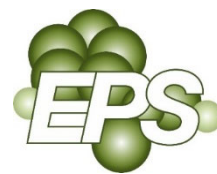
Norbert Sewald Has Been Elected President of the European Peptide Society



In June 2020, the CeBiTec executive board member Prof. Norbert Sewald was elected president of the European Peptide Society (EPS; www.eurpepsoc.com; [@EurPepSoc](https://twitter.com/EurPepSoc)). The EPS is

a non-profit organization registered in Italy and

was founded to foster peptide sciences in Europe and neighbouring countries. The *Journal of Peptide*



Science is the official journal of the EPS and published monthly by John Wiley & Sons. The society has around 1600 members from about 30 distinct countries, mainly from Europe, but also from the Americas and the Asia-Pacific region. It is the most important activity of the EPS to organize an international symposium, which is attended by 800-1000 participants from all over the world and takes place every two years.

At each symposium, three scientific prizes are awarded and the society financially supports also smaller national meetings, specialized workshops and grants EPS Mobility Fellowships to PhD students. The General Assembly of the EPS, which comprises a representative of each constituent European country (currently 25 countries, including Israel) elects the Executive Committee and the president.

(L. Wobbe)

Charting the metabolic landscape of a methylotrophic bacterium



Bacillus methanolicus

is a thermophile able to utilize methanol as the sole carbon source. This trait of methylotrophy is facultative since the bacterium cannot only grow with the single carbon (C1) substrate methanol, but also with the sugar alcohols mannitol and arabitol as well as with glucose. Notably, glucose is not the preferred substrate. Within the ERA-CoBioTech

project C1Pro two teams from INSA Toulouse (Heux Lab) and the CeBiTec (Wendisch Lab) used a ¹³C-fluxomics approach paired with enzyme characterizations to determine the metabolic states when *B. methanolicus* is growing either with methanol, mannitol or arabitol as sole carbon and energy sources.



While steady state fluxomics allowed to unravel *in vivo* activities of the central carbon metabolism during growth with mannitol and arabitol, respectively, the characterization of methylotrophic fluxes during growth with methanol required elaborated instationary fluxomics analysis.

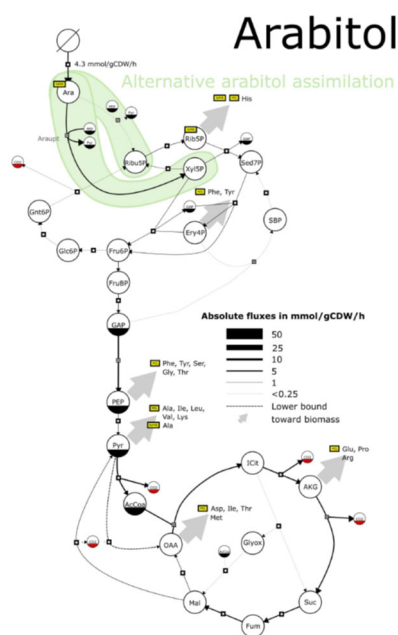
Notably, we identified, for the first time, the metabolic pathway used to assimilate arabitol.

The operon responsible for arabitol assimilation in *B. methanolicus* encodes a PTS system (AtIABC) for arabitol uptake and two arabitol phosphate dehydrogenases (AtID and AtIF). By *in vitro* characterization of the purified enzymes AtIF and AtID, Marina Gil Lopez revealed AtID as major arabitol phosphate dehydrogenase. With the exception of the pentose phosphate pathway, the fluxomics studies demonstrated that non-methylotrophic growth on mannitol and on arabitol share the same features despite their different associated growth rates.

Baudin Delépine demonstrated a clearly different metabolic state for growth on methanol. The cyclic ribulose monophosphate (RuMP) pathway enables growth on methanol by assimilation of the C1 intermediate formaldehyde. The flux analysis provided new insights related to the utilization of cyclic RuMP versus linear dissimilation pathways during growth with methanol. Moreover, different RuMP cycle variants were shown to operate *in vivo*.

Delépine B, Gil Lopez M, Carnicer M, Vicente C, Wendisch VF, Heux S (2020) *mSystems* 5: e00745-20. <https://doi.org/10.1128/mSystems.00745-20>

(S. Heux, V.F. Wendisch)



Flux depiction of the arabitol assimilation pathway

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