Staff exchange 2

From November 2 to November 4, 2022, Tomáš Grivalský from the Institute of Microbiology of the Academy of Sciences of the Czech Republic, Algatech Center (MBÚ), participated in an exchange stay in the partner organization of the University of Applied Sciences in Wels (FH OO). During a short internship, he worked on the detection of the degree of segregation process in transformants of the Synechocystis Mt_a24 strain and also on the optimization of the protocol for determining β-galactosidase activity in an improved strain capable of processing lactose.

Synechocystis is a single-cell organism with multiple genome copies per cell. After transformation, the foreign DNA must be integrated into all copies of the genome by a homologous recombination process to ensure the integrated DNA's stability. However, the DNA cannot segregate into all copies in certain cases. The PCR determines the degree of segregation and, thus, the presence of foreign DNA. During this staff exchange, the employee mastered the PCR method of detecting the presence of genes for PHB overproduction, and he will be able to apply this method at the Czech workplace (MBÚ). This technique will need to be used prior to pilot-scale cultivation to avoid the loss of improved properties of the transformed strain. In addition, he worked with an employee of project partner 2 - Kevin Trenzinger, on the optimization of the protocol for measuring beta-galactosidase activity in transformants capable of using lactose as a substrate. This protocol is essential for selecting the most suitable strain for growth in dairy wastewater. Based on this protocol, strains capable of beta-galactosidase production were screened (Table 1), and the selected strains were transferred to the Czech workplace for further testing.

Kevin Trenzinger guided the MBÚ employee through the entire FH OO workplace, which has a lot of modern laboratory equipment with well-established operating procedures. This can have a positive effect on building further cooperation.

The goal and result of this internship were to deepen cooperation and transfer know-how of detecting the presence of genes for PHB overproduction and lactose processing using PCR protocol.

Tab. 1: Fluorescence measurements for determining beta-galactosidase activity in selected transformants of Synechocystis Mt_a24. Fluorescence was measured from both the pellet and the supernatant. A UV mutant without the β-galactosidase gene is a control (blank).

Strain / Fluorescence values	#56	#67	#75	#86	#79	#39	Mt_a24 (blank)
Pellet	13911	17559	109753	16221	72194	9984	261
Supernatant	303	434	697	418	560	392	338