Vienna, 4 October 2021

From produce bags to animal feed: biotech has potential to supercharge climate protection

Biotech products not only play an essential role in our day-to-day lives. They also have what it takes to help us get to grips with the climate crisis, particularly thanks to recent advances in enzyme technology. With their help, it is now possible to make synthetic materials from renewable resources, as well as biodegradable packaging by transforming lignocellulose into starch-like carbohydrates. Innovative approaches are also available for utilising CO_2 in the production of protein for animal feed. The European Forum for Industrial Biotechnology and the Bioeconomy (EFIB) will bring together biotech researchers and industry representatives at the Austria Center Vienna from 5-7 October. After all, it is only by scaling up that biotechnology will be able to realise its true potential in the fight against climate change.

“Biotech is a key technology of the future. We encounter it in so many aspects of our day-to-day lives. With its help, we will be in a position to make industry more environmentally friendly and make a long-term contribution towards climate protection,” explained Prof. Bernd Nidetzky, Professor of Biotechnology at Graz University of Technology, Research Director of the Austrian Centre of Industrial Biotechnology (ACIB) and speaker at the European Forum for Industrial Biotechnology and the Bioeconomy (EFIB).

From cheese to antibiotics and the “new PET bottle”

Biotechnology taps into biosystems such as cell growth, making use of them on an industrial scale. This applies to cheese, yoghurt and sugar for food manufacturing, as well as tiny molecules such as antibiotics used in pharmaceuticals. Even the new generation of produce bags used by shoppers in supermarkets are the work of biotechnologists – and hold the key to gradually reducing the amount of plastic that enters landfill. Despite improvements in recycling, more than 56 million tonnes of PET are produced worldwide each year. But advances in biotechnology mean that this kind of synthetic packaging can now be replaced with alternatives made from renewable materials.

Enzyme technology the key to success

Enzyme technology has a huge role to play in biotechnology, as it can be used to produce biological catalysers. Something that previously involved numerous steps and created a lot of waste in the chemical industry is now being achieved in a single efficient step through enzymes produced by biotechnologists. One major challenge is to transform the enzymes – which start out in soluble form suspended in liquid – into solids. This is where protein engineering comes in, changing the structural make-up of these enzymes and other proteins, ready for industrial processing. Among other things, this involves replacing individual amino acids with others. This molecular-based method makes it possible to manufacture proteins and enzymes that are more efficient or exhibit enhanced stability, making them better suited for industrial use. “Simply discovering an enzyme is not enough. It is only once enzyme tech-

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nology is used that the potential of an enzyme is unlocked for technical use, and then it is important to apply this biotechnology at an industrial scale and find a way to remain competitive from a pricing perspective," Nidetzky confirmed.

Biotechnology a key factor behind cutting carbon emissions – and delivering on the Green Deal

Products that use biotechnology already have a far smaller ecological footprint than their counterparts manufactured by the chemical industry. Biotechnologies also have superior potential when it comes to recycling and upgrading products. Organic waste containing lignocellulose – such as dry mass from plants and straw – can be transformed into precious sources of starch thanks to enzyme technology. One particularly innovative approach is the use of biotechnology to convert CO_2 into new resources that can be harnessed for the production of animal feed. The underlying principle is that microorganisms can use CO_2 as a substrate to grow and multiply on while producing proteins that can be added to feed instead of soy or fish proteins. If it proves possible to scale up cell engineering to industrial levels, this has the potential to help significantly reduce airborne carbon emissions and bring the EU climate targets into much closer reach.

Solidarity between biotechnology and large-scale industrial operations

To ensure that innovative approaches are not consigned to the realms of science fiction, closer ties with industry are needed as well as investors who are prepared to throw their weight behind high-risk projects. And this is precisely the strength of the European Forum for Industrial Biotechnology and the Bioeconomy (EFIB) as one of the world's leading industrial biotech platforms, with its strong focus on industrial partners. "The goal is to use the EFIB to facilitate fruitful exchange between biotechnology and industry and make a long-term contribution towards achieving the goals set out under the EU's Green Deal," Nidetzky explained.

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