Synbio4Flav Press Release 2
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Multicultural microbial factories

For the production of flavonoids and other natural substances of high complexity

The European research project SynBio4Flav is delivering a groundbreaking shift in the way we can obtain flavonoids, valuable substances that are naturally produced by plants. Flavonoids protect plants from environmental hazards such as ultraviolet radiation, harmful bacteria, viruses and fungi, and are important for attracting pollinators. These remarkable natural substances prove to be highly valuable for humans in medical applications and cosmetics, and as flavouring components for food and beverages. Flavonoids have been traditionally obtained through extraction from plants, a production process that requires plant cultivation, involving substantial land and water resources for an insignificant yield of flavonoids.

Building a multicultural microbial factory

SynBio4Flav develops a much more resource-efficient way of producing these complex natural substances by establishing synthetic microbial communities that mimic the way in which plants produce flavonoids. The production method uses the great potential of microbes for biochemical synthesis along with their ability to coexist in synergy within microbial communities. Instead of engineering a single microbial species to produce flavonoids, the production steps are distributed between several microbial species. This alternative way of production builds on complementary characteristics within microbial communities where the output of one species serves as resource for another. Essentially, SynBio4Flav has built a multicultural microbial factory where bacteria produce the precursor building blocks and other microbes - such as yeasts - transform them into flavonoids. Recent experiments have demonstrated a substantial boost in productivity when compared to flavonoid production within microbial monocultures. The speed and robustness of the production process increases significantly within the SynBio4Flav microbial factory, and undesired by-products are largely avoided.

Using Synthetic Biology to produce flavonoids

The driving power behind SynBio4Flav is synthetic biology, a cutting-edge bioscience that deals with the molecular setups at the heart of the microbial factories. The project has succeeded in unravelling the intricate bundle of biochemical processes involved in natural flavonoid synthesis and geared up its microbial communities with the enzymatic activity required to navigate them.

Smart support technologies

Computer-assisted simulations of functioning microbial communities and biosensors (cellular systems hardwired to trigger a signal in the presence of a specific chemical) are just some of the smart technologies supporting the process.

Beyond flavonoid production

Grant agreement 814650, funded under EU-H2020, Industrial Leadership grant for R&D activities in the field of Biotechnology.

The possible combinations of microbial communities and their corresponding enzymatic activities are virtually endless. Therefore, SynBio4Flav's pioneering approach has the potential for the sustainable production of almost any complex organic substance.

Powering local microbial factories by organic waste from human settlements and agriculture

In fact, the project's vision is to develop high-performing, locally operating, microbial factories powered by organic waste from human settlements and agriculture. The potential environmental and economic benefits are numerous, as it will allow for currently rare and expensive natural products to become affordable, as well as avoiding the further depletion of natural resources.

Applying multi-disciplinary expertise and communicating with the public

During the course of the project, SynBio4Flav has been nurturing a dialogue on the implications of emerging biotechnologies in our everyday life. World class experts in synthetic biology discuss its future potential with experts from a wide range of other fields, including philosophers, artists, architects, as well as journalists in 'Conversations on Metabolic Engineering', complemented by the podcast series 'Made by Microbes', and a virtual exhibition available at the project website https://synbio4flav.eu/.

Collaboration of diverse entities across Europe

The SynBio4Flav project involves research institutions, academia, small enterprises and leading industries from Spain, Germany, Sweden, Poland, France, Italy and Austria, who are combining their wide range of expertise.

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Image credit: Bruno Stubenrauch

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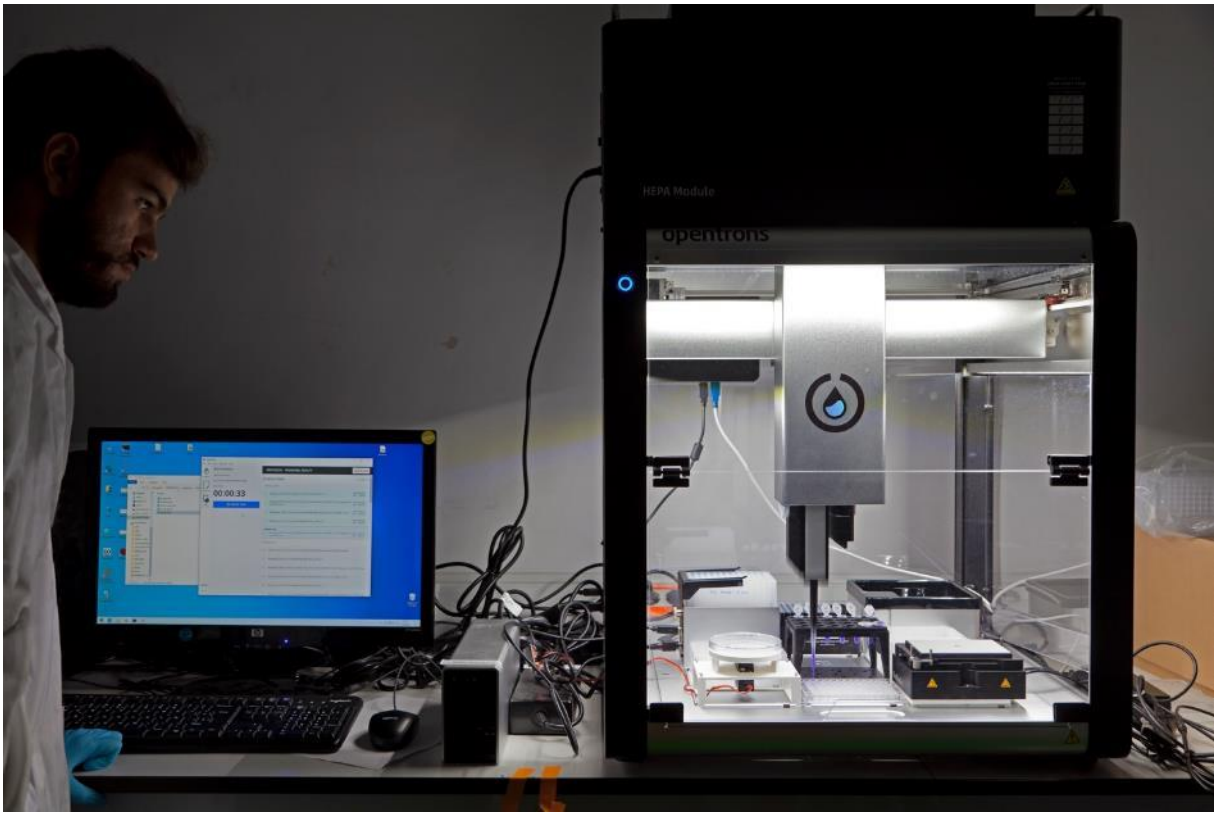

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