PROMICON

www.promicon.eu

@PromiconH2020

@PromiconH2020

Harnessing the power of nature through PROductive MIcrobial CONsortia in biotechnology – measure, model, master

June 2021 - June 2025

Background

Microbiomes occur in nature in all different habitats and are controlling the global biogeochemical cycles.

In anthropogenic systems, they are mainly used for the degradation of organic waste in anaerobic digesters or wastewater treatment. The use of microbiomes for the production is currently mainly limited to specialized communities in feed and food applications (e.g. ensiling, cheese, wine, bread). Research focussing on specific chemicals on the other hand circles around production of complex mixtures of chemicals from anaerobic processes, for instance the so called carboxylate platform and the chain elongation process that exploits reverse β–oxidation.

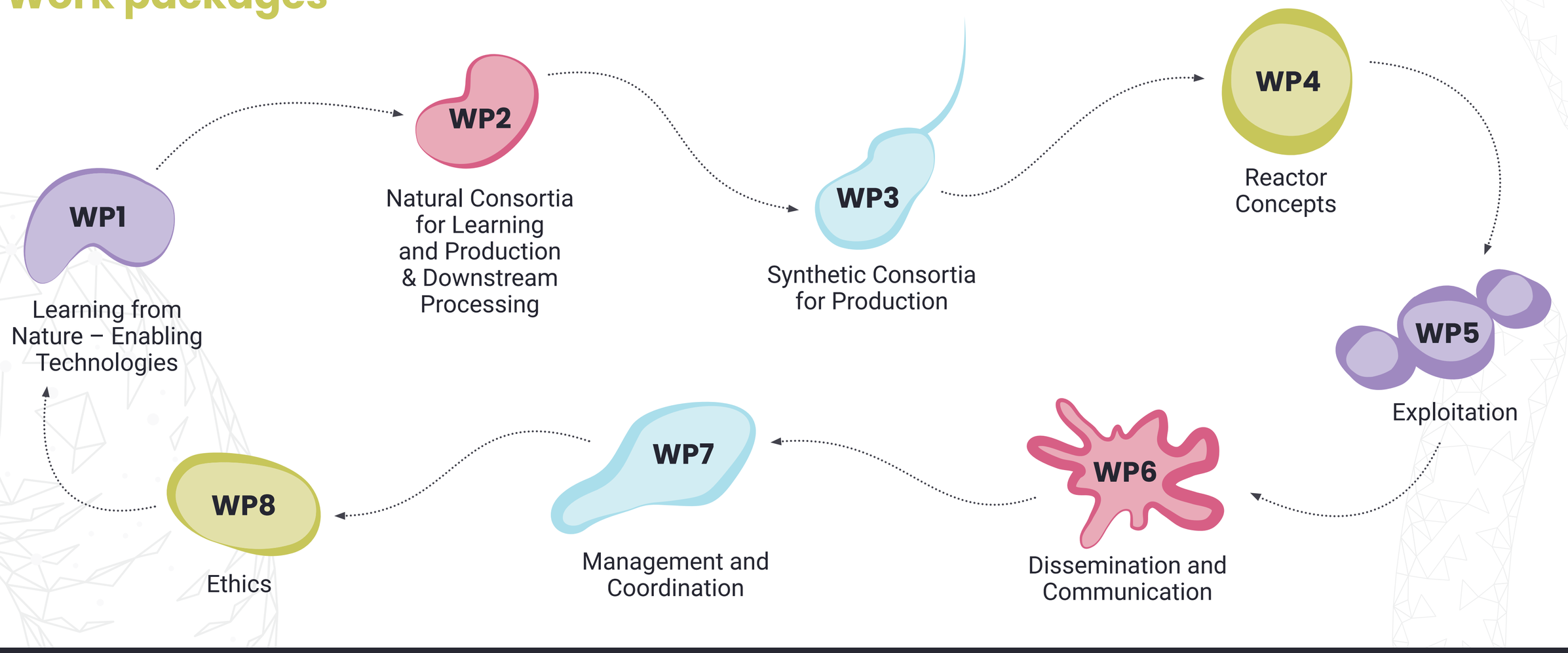
The aim of the PROMICON project is to learn from nature how microbiomes function through latest and novel methods in order to steer their growth towards production of biopolymers, energy carriers, drop-in feedstocks and antimicrobial molecules. PROMICON will use the existing microbiomes in top-down and bottom-up approaches for industrial application.

Objectives

The overall aim of the PROMICON project is the development of an efficient biotechnological production platform that creates a synergy between strain engineering strategies with the robustness of microbiomes and their metabolic plasticity in organic conversions. This main overarching aim will be pursued by four ambitious research objectives:

1. **Develop rapid high-resolution data analysis methodologies based on online single cell analysis and multi/hyper-spectral imaging analysis in combination with Meta-OMICS technologies and novel systems biology modelling of the consortia.**
   This will grant predictive power and deliver actionable knowledge for the successful setup and perpetuation of natural and synthetic consortia.
2. **Top-down engineering of natural microbiomes into stable and highly productive consortia for the production of biopolymers.**
   This will inform the reactor strategies to select and make the microbiomes of interest competitive using the novel analysis methodologies.
3. **Assemble and develop new synthetic consortia using systems metabolic engineering to create stable and highly productive microbiomes for energy carriers, drop-in feedstocks and antimicrobial molecules.**
   The novel analysis methodologies will be used for this bottom-up strategy.
4. **Design, construct and operate new types of reactors to increase biomass concentration and productivity.**
   PROMICON will test multi-chamber reactors with ceramic membranes for sub-compartmentalisation and capillary biofilm reactors for co-cultivation of chemoheterotrophic strains with photoautotrophic Cyanobacteria.

Work packages



This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101000733.