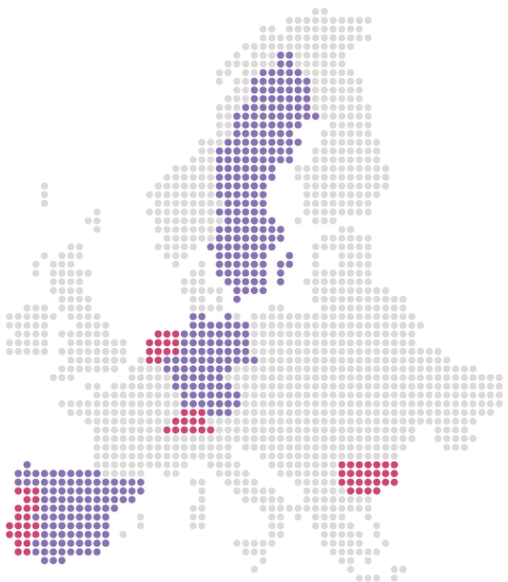
Partners

- Helmholtz Centre for Environmental Research GmbH (UFZ)
- Uppsala University (UU)
- NOVA ID - Association for Innovation and Development of FCT (NOVAID)
- Polytechnic University of Catalonia (UPC)
- AIMEN Technology Centre (AIMEN)
- Spanish National Research Council (CSIC)
- BIOPOLIS, S.L. (BIOPOLIS SL)
- Pensoft Publishers (PENSOFT)
- onCyt Microbiology AG (onCyt)
- Isle Utilities B.V. (ISLE)



PROMICON

DURATION

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PROJECT COORDINATOR

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PROMICON

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PROMICON

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

EU Horizon 2020 Research and Innovation Action

Background

Microbiomes occur in nature in all different habitats and are controlling the global biogeochemical cycles. Their distribution ranges from deep-sea hydrothermal vents to microbial mats; from marshland to the human gut. In anthropogenic systems, microbiomes are mainly used for the degradation of organic waste in anaerobic digesters or in wastewater treatment. In these applications the primary goal is the reduction of nutrient load (water) and volume (sludge), and recovery of energy (methane) and resources (e.g. phosphorous).

Apart from the aforementioned methane, the use of microbiomes for the production of specific chemicals or products is currently limited to very simple specialized communities in food applications or production of complex mixtures of chemicals in highly diluted aqueous systems.

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 focus on microbial communities combining photoautotrophic and chemoheterotrophic strains broadening the application potential of microbiomes in light of a sustainable circular bioeconomy.

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 set up 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 shape 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 the production of hydrogen, butanol and functionalised bio-polyesters.** The synthetic consortia will be build on photoautotrophic primary carbon fixation.

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.

Structure