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Assembly of synthetic microbial communities for the valorization of recovered nutrients into biomass

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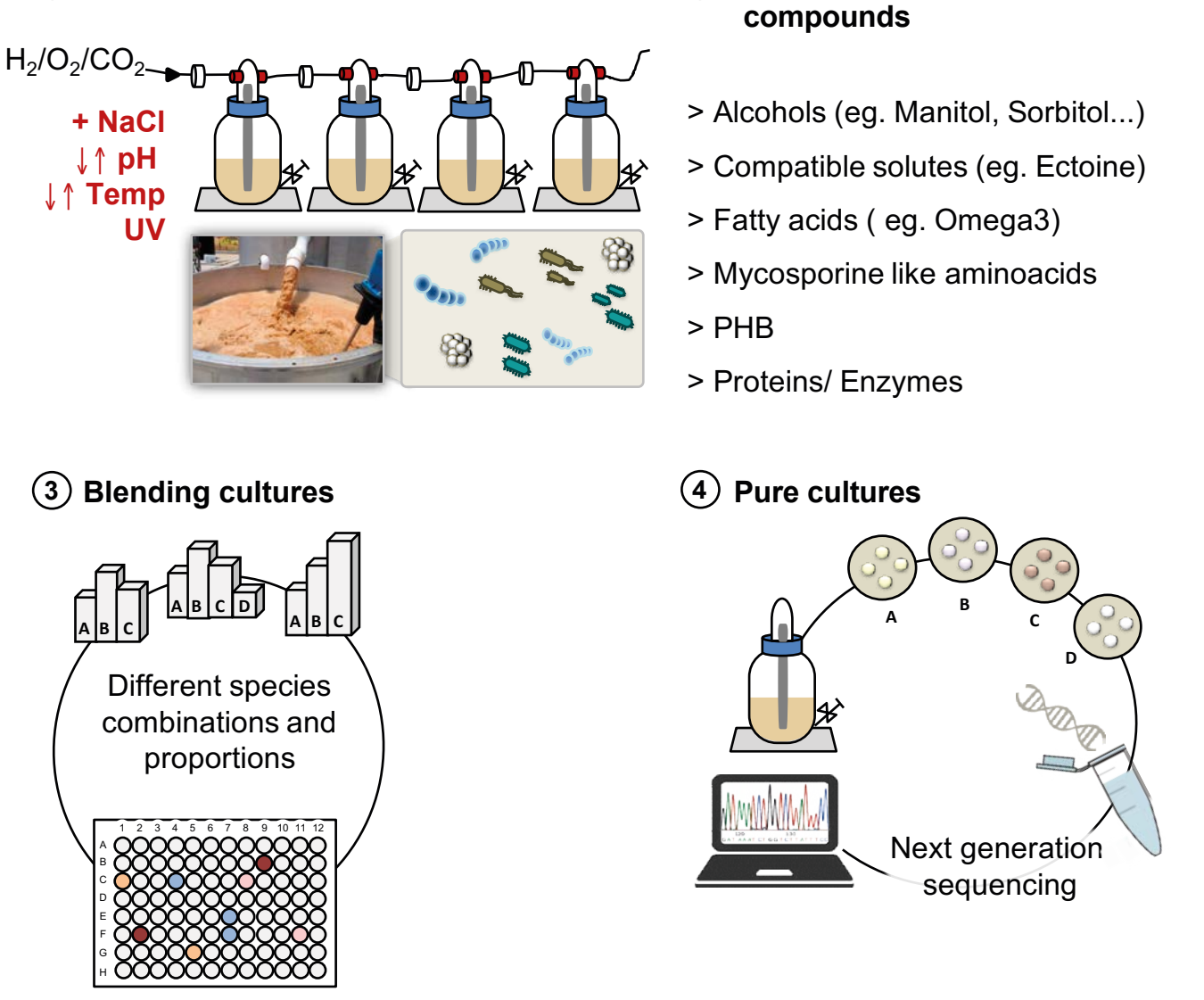
Motivation

The increase in the world population and improving standards of living, together with the continuous urbanization, are rising the pressure on available nutrient resources. In order to help address this issue, domestic wastewater is now being looked at as a resource rather than waste. By upgrading treatment plants to factories in which the incoming materials are first deconstructed into elemental units such as ammonia, carbon dioxide and clean minerals, one can implement a highly intensive and efficient microbial resynthesis process in which the used nutrients are harvested as microbial protein or other interesting compounds.



Research goals

- Compose in vitro synthetic communities consisting of hydrogen oxidizing bacteria (HOB, primary producers) and heterotrophic bacteria (secondary consumers).
- Select the communities towards interesting biotechnological endpoints (2).
- Elucidate the crucial members and interaction mechanisms.

Technological challenge

Within this project, we will use the end products of water electrolysis, hydrogen and oxygen, to upgrade the recovered nutrients into biomass. Initially, isolation will be used to dissect various mixed microbial communities, each of them enriched from different environmental samples (1), into culture collections of heterotrophs and hydrogen oxidizing bacteria (3). Subsequently, different sets of isolates will be assembled and the best performing community will be selected by evaluating its performance (specific metabolite production) in high-throughput essays (4).

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