META-MINE

Mining the microbiomes from marine wood-digesting bivalves for novel lignocellulose depolymerizing enzymes

MarineBiotech

PROJECT FACTSHEET

CALL 3 | AUGUST 2017

ABSTRACT

Lignocellulose is a greatly undervalorized biomass and methodologies to convert it to high-value products needs fortification. A critical step in biorefining is the enzymatic conversion of lignocellulose to soluble sugars and lignin. The cost and the efficiency of enzymes is far from optimal and new enzymes are needed to improve the efficiency and sustainability of lignocellulose depolymerization. Through META-MINE, we will exploit the process strategies of nature's own micro-biorefinery, the shipworm. Shipworms are voracious animals with respect to their appetite for wood. Their digestive system is especially intriguing. Wood engulfed by mechanical rasping is digested by enzymes secreted by a community of symbiotic bacteria located in the gill tissue. Current model systems for the study of cellulose degradation are highly complex (e.g. community driven anaerobe systems in ruminants and the intricate secreted enzyme systems of aerobic fungi), and challenging to analyze. The shipworm gill symbionts are specialists in lignocellulose degradation and perform this task by applying a perfected enzyme cocktail in a defined and physiochemically stable environment. Thus, by unravelling the contributions of the individual enzymes in the shipworm cocktail, we have the opportunity to take a leap forward in understanding the fundamental properties of enzymatic lignocellulose degradation. META-MINE will use the shipworms as a model system for a holistic study of marine lignocellulose degradation and mine the metagenomes for novel lignocellulose depolymerizing enzymes.

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Topic:

- Lignocellulose degradation

Marine biomass:

- Symbiotic bacteria in shipworms

Source of marine biomass:

- Gill tissue of shipworms

Keywords:

Shipworm, lignocellulose-depolymerization, metagenomics

Total costs*: € 1.882..000

Funding granted*: € 1.711.000

Duration: 3 years (2018-2020)

** Exact amount may change after completion of national contracts*

CONSORTIUM

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Marine Biotechnology ERA-NET (ERA-MBT) is funded under the European Commission's Seventh Framework Programme. | Grant Agreement Number 604814
December 2013 - November 2017