MarineBiotech

META-MINE

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

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ERA-MBT 3rd Transnational Joint Call: Metagenomics

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THE CONSORTIUM

PRINCIPAL INVESTIGATOR	INSTITUTION	COUNTRY
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Rolf Daniel	University of Göttingen	DE
Ana-Maria Tanase	University of Bucharest	RO
Raul Bettencourt	University of the Azores	PT

Project period: Spring 2018 to spring 2021

THE CONSORTIUM

Norway Germany Romania Azores

META-MINE

Bjørn Altermark
- Structural biology
- Protein production
- Cold adaptation

Ana-Maria Tanase
- Microbiology
- Bacterial taxonomy
- Genetics

Gustav Vaaje-Kolstad
- Lignocellulose
- Enzyme characterization
- Industrial enzymes

Raul Bettencourt
- Marine biodiversity
- Symbiosis
- Microbiology

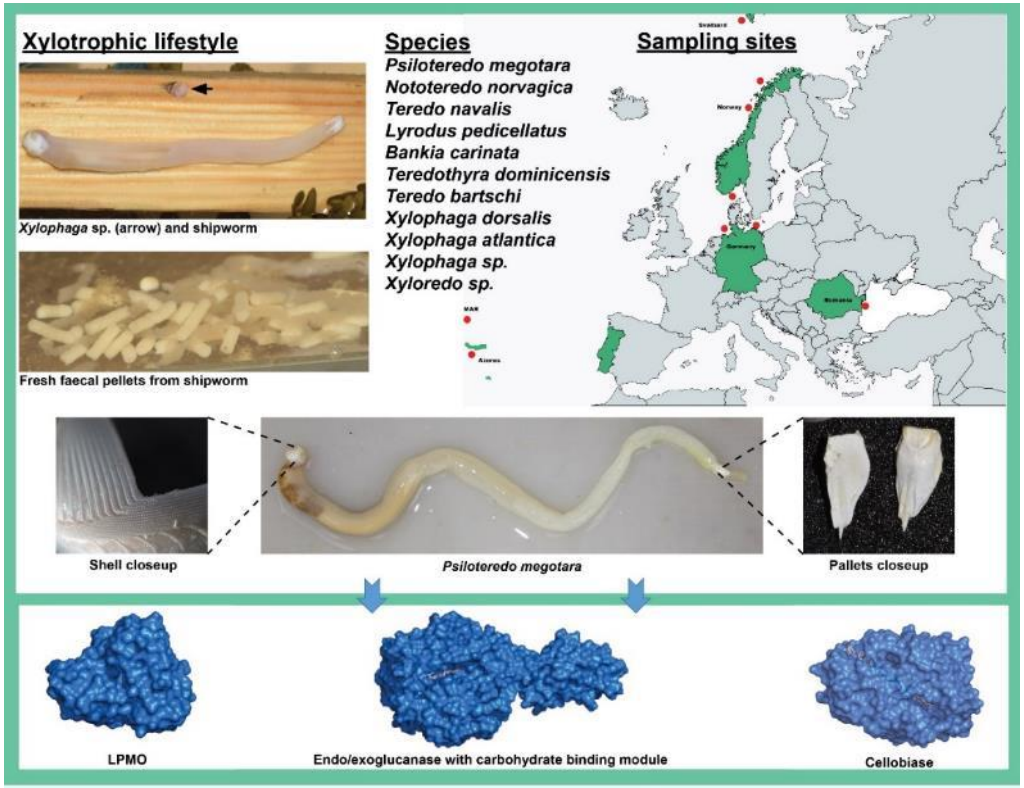
Luisa Borges
- Marine wood-boring organisms
- Taxonomy
- DNA barcoding

Rolf Daniel
- Bioinformatics
- Metagenomics
- Microbiology

RATIONALE

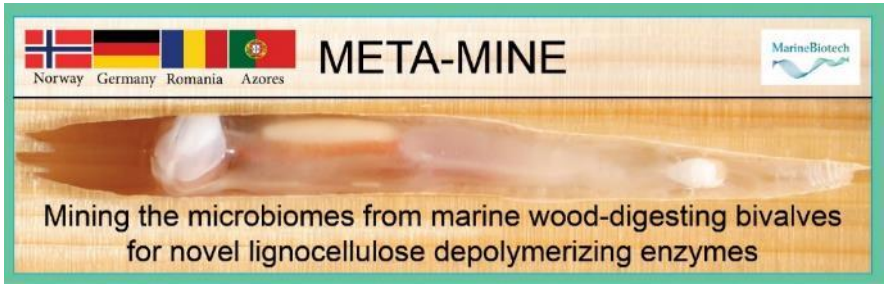
- Today, enzymatic depolymerization of cellulose & lignocellulose is being increasingly studied.
- However, current model-systems are complex (Fungus, cow rumen, termite guts).
- The shipworm-symbiont system is simple, easy to sample, has few players and is cheap to maintain.
- This marine system might outcompete its terrestrial counterparts.

AIMS & OBJECTIVES



- Wood eating bivalves as a model system for lignocellulose depolymerization
- Bacterial symbiosis
- Metagenomics
- Metaproteomics
- Enzyme discovery & characterization
- Industrial enzymes

WORK PACKAGES



- Six partners
- Four countries
- Access to the seas of Europe
- Work is divided into six WPs

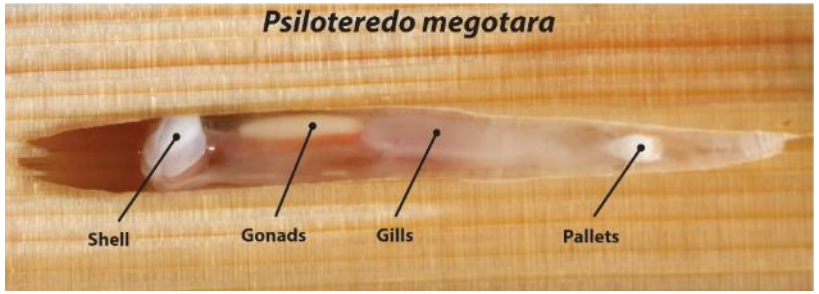
POTENTIAL IMPACTS AND PERSPECTIVES

- A holistic view of lignocellulose depolymerization: – The shipworm gut as an evolutionary perfected bioreactor. (Redox potential, pH, dry matter content, fecal analysis, enzyme blend, etc.)
- Increased knowledge regarding enzymatic depolymerization of lignocellulose.
- New enzymatic tools & solutions for research & industry. New jobs.
- Savings In terms of costs & energy.
- Enzymes contributes to a greener chemistry.
- Improved sustainability and contribute to a circular economy.

Future directions and needs/gaps in this area

- Simpler model-systems for enzymatic biomass degradation in general, are needed.
- Explore enzyme cocktails. Acting together on complex substrates – synergy effects.
- More enzyme tools to diversify the amount of products. Combine enzymes with organic synthesis.
- Understand the industry's needs.
- Fate of lignin in the ocean?

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



- Shipworms as a model system
- Metagenomics & metaproteomics
- Enzyme discovery & characterization

- Improve biomass conversion
- Create new solutions
- Reach out to the industry – new jobs

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