



Functional and Structural Census of Enzymes Acting on Algal Polysaccharides

Following the sequencing of two bacterial genomes (*Rhodospirellula baltica* and *Zobellia galactanivorans*), we identified genes involved in algal polysaccharides degradation. We also expressed and purified recombinant proteins to study their function, their structure and their activity.

Using an *in silico* approach we identified 144 genes coding for putative polysaccharidases (96 from *R. baltica* and 48 from *Z. galactanivorans*). Of those, 50 genes were cloned and expressed soluble recombinant proteins, which are useful for further experiments in the field of glycomics.

Our Findings

Polysaccharidase activity was confirmed for six of these proteins. Furthermore, new functions and new structures (crystallography) were described. For example, the first porphyranase, active on the sulphated polysaccharide porphyran from marine red algae, was characterized as well as the enzyme GH117, which catalyses the last step of agar degradation to simple sugars.

CNRS offers collaboration for further studies on elucidation of the functions of these proteins and enzymes.

Furthermore, a lateral gene transfer between environmental and gut Bacteroidetes bacteria was identified. For the two enzymes listed above, this transfer occurred between marine and human gut bacteria, in persons who regularly consume seafood, possibly improving the digestibility of marine algae, for example through new probiotics.

Knowledge Outputs

- Plasmid bank for the expression of soluble polysaccharidases
- Activity, function and structure studies for putative polysaccharidases
- Identification of enzymes function involved in polysaccharide degradation
- Diverging evolution: lateral gene transfer between marine and human gut bacteria associated to sea food consumption

Potential Fields of Application

- Food and pharmaceutical industry, agriculture – polysaccharide modification
- Cosmetics, biomaterials, biofuels – high added-value molecule
- Biotech – improvement of activity of proteins
- Prediction of enzymes activity coming from different resources by comparison with the recombinant enzymes
- Human health – intestinal flora, probiotics

Principal Investigator of this French Project

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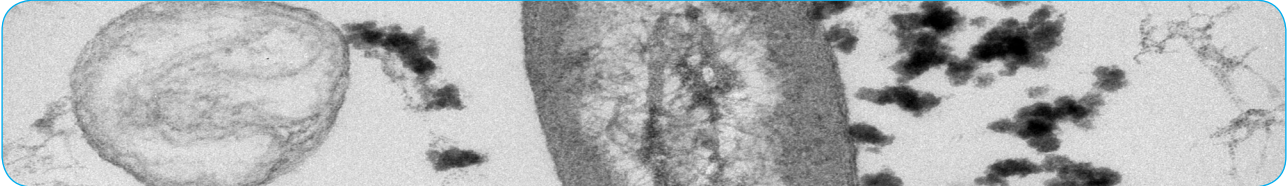
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Title: Marine Genomics for Users

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Partners: 7 partners from 6 countries

Abstract: Marine genomics knowledge is a vital part of 'blue biotechnology'.
MG4U will facilitate knowledge and technology transfer of
high-throughput marine genomics results to industry and society.



Knowledge Transfer to Industry

To ease the uptake of research results on marine genomics we have developed several tools and offers for business:

- A database on knowledge outputs of several hundred national and international research projects as a first step for a quick overview on what is available and whom to contact for more detailed information. This includes references to publications, patents, accession numbers, as well as indications for areas of application;
(The example overleaf comes from this database)
- Face-to-face contacts between academia and industry, facilitated through partnering and dedicated sessions at industry conventions;
- Workshops to exchange information, train in the use and application of genomic and bioinformatics methods, and for networking.

For each partner country a member of MG4U can help you to establish a direct contact to a scientist of your choice.

Just go to www.mg4u.eu for dates, contacts and access to the knowledge output database.

Partners for Collaboration

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The research leading to these results has received funding from the European Union's Seventh Framework Programme (FP7/2007-2013) under grant agreement no 266055. This publication reflects the views only of the author, and the European Union cannot be held responsible for any use which may be made of the information contained therein.