



## Activity-based Screening and Data Mining of Marine Mediterranean Bacteria

The focus of our work is on individual enzymes and metabolic pathways from extremophilic marine organisms and on metagenomes. New enzymatic reactions and processes, stable at extreme pH, temperature and/or in polar solutes, are tested for new biotechnological applications. Molecular screening includes a “naive” enzyme screening platform, protein structure elucidation, enzyme engineering and directed evolution.

MPI Bremen developed a comprehensive bioinformatic survey for determining new candidates homologous to the discovered new proteins, to be cloned and assayed. Our conceptual and technical basis enables metagenome data to be translated into both experimental and computational frameworks. This data-mining approach facilitates the analysis of the biocatalysts diversity space.

### Our Findings

Recent advances in molecular microbial ecology are now leading to direct application of this know-how towards a broad range of biotechnological applications. The utility of an annotation pipeline fed with metagenomic sequence data to access novel catalytic activities was successfully demonstrated.

Methods are available to isolate environmental DNA and to establish metagenomic libraries that are used for extensive activity screens, done under the lead of University Bangor. Individual enzymes are identified while interacting with their specific substrates. Several hundred proteins and low-molecular substances were identified and characterized, with high application potential.

### Knowledge Outputs

- Metagenomic library screening for biocatalyst identification
- Methods to isolate environmental DNA
- Reliable solid- and liquid-media activity screens
- Novel hybrid esterase-haloacid dehalogenase
- Novel laccases for diverse applications

### Potential Fields of Application

- Synthesis of fine chemicals
- Enzymes for food and textile processing
- Antioxidants and bio-actives for pharmaceutical industry,
- Production of versatile enzymes like laccases, peroxidases, proteases with improved activity or stability
- Mono-, dioxygenases, dehalogenases for bioremediation

### Principal Investigator/Bioinformatics for the European MAMBA Project

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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](http://www.mg4u.eu) for dates, contacts and access to the knowledge output database.

## Partners for Collaboration

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## Project Partners



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.