

AT A GLANCE

TITLE: MACUMBA – Marine Microorganisms: Cultivation Methods for Improving their Biotechnological Applications

PROGRAMME: FP7 Cooperation, KBBE

INSTRUMENT: Collaborative Project

TOTAL BUDGET: €12,015,209

EC CONTRIBUTION: €8,999,948

DURATION: August 2012 – July 2016 (48 months)

COORDINATOR: Stichting Koninklijk Nederlands Instituut voor Onderzoek der Zee (NIOZ), The Netherlands

CONSORTIUM: 23 partners from 11 countries

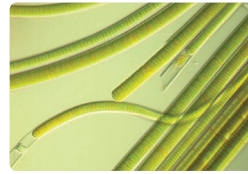
WEB: www.macumbaproject.eu

THE CHALLENGE

Marine microorganisms form an almost untapped resource of biotechnological potential. They could potentially provide clues that will help mitigate climate change, control disease and generate alternative energy sources. However, their use is hindered by the low success rate for isolating novel microorganisms and by poor growth efficiency. Consequently, the vast majority of marine microorganisms have not been cultivated and are often considered as ‘unculturable’. Today, one of the main challenges for microbiologists is to develop strategies to cultivate the uncultured majority of marine microorganisms.

PROJECT OBJECTIVE

The objective of the **MaCuMBA** (Marine Microorganisms: Cultivation Methods for Improving their Biotechnological Applications) project is to uncover the untold diversity of marine microbes using cultivation-dependent strategies. **MaCuMBA** aims to improve the isolation rate and growth efficiency of marine microorganisms from conventional and extreme habitats by applying innovative methods and using automated high-throughput procedures. The study of these unidentified microorganisms could also potentially help mitigate climate change and control disease.



METHODOLOGY

All organisms could in principle be cultivated in a laboratory environment, provided the right growth medium and conditions are present. However, the possibilities to vary medium composition and growth conditions are infinite. A solution to this potentially endless dilemma is to refine the process by applying automated high-throughput techniques to increase the rate of isolation as well as using intelligent, nature-mimicking cultivation approaches to optimise growth. The project will also utilise genomic and metagenomic information in order to find clues that could help improve cultivation. The **MaCuMBA**

project will employ a variety of such techniques which will be applied for the first time on a large scale and to a variety of different environments and types of microorganisms.

MaCuMBA targets two main oceanic areas, **(i)** the photic zone with their highly diverse microbial communities, and **(ii)** deep extreme ecosystems in which it is expected that due to extreme environmental conditions many new molecules and enzymes with unusual properties will be discovered.

RESULTS

- Increased success rate of isolation of marine microbes.
- Isolation of numerous novel marine Bacteria, Archaea, and Eukarya.
- Improved cultivation efficiency of biotechnological relevant marine microorganisms.
- Increased production rate of new biomolecules with high added value.
- High-throughput culturing methods that mimic natural conditions.
- Improved understanding on how cell-to-cell communication, chemical inducers, stress factors

and other regulatory system alterations could affect the isolation and cultivation efficiency of marine microorganisms as well as the production of bioactive molecules from already cultured organisms.

- Specific devices and robotics for high-throughput isolation and cultivation of marine microorganisms.
- Cultivation and genetic strategies to enhance bio-prospecting (lab scale).
- Integration of bio-prospecting strategies towards industrial applications (full scale).

PROJECT PARTNERS

BELGIUM

eCOAST Marine Research
(eCOAST)

DENMARK

Danmarks Tekniske Universitet
(DTU)

FRANCE

Centre National de la Recherche
Scientifique (CNRS)

Fermentalg SA (FERM)

Polymaris Biotechnology
(Polymaris)

Universite de Bretagne
Occidentale (UBO)

GERMANY

Albert-Ludwigs-Universitaet
Freiburg (UF)

Cyano Biotech GmbH (CBT)

Leibniz-Institut DSMZ-Deutsche
Sammlung von Mikroorganismen
und Zellkulturen GmbH (DSMZ)

Ribocon GmbH (RIBO)

ICELAND

Matis (MATIS)

IRELAND

AquaTT UETP Ltd. (AquaTT)

University College Cork, National
University of Ireland (UCC)

ITALY

Università degli Studi di Milano
(UMIL)

NETHERLANDS

MicroDish BV (MD)

Stichting Koninklijk Nederlands
Instituut voor Zeeonderzoek
(NIOZ)

Universiteit van Amsterdam (UvA)

PORTUGAL

Bioalvo S.A. (BLV)

SPAIN

Universidad Miguel Hernández de
Elche (UMH)

PharmaMar S.A.U.

UNITED KINGDOM

Aquapharm Biodiscovery Ltd (AQP)

Heriot-Watt University (HWU)

University of Warwick (UW)

CONTACT US

PROJECT COORDINATOR

Prof. Lucas J. Stal

lucas.stal@nioz.nl

telephone: +31 (0)113 – 577 497

email: lucas.stal@nioz.nl

**Stichting Koninklijk Nederlands
Instituut voor Onderzoek
der Zee (NIOZ)**

**Korringaweg 7
4401 NT Yerseke
The Netherlands**