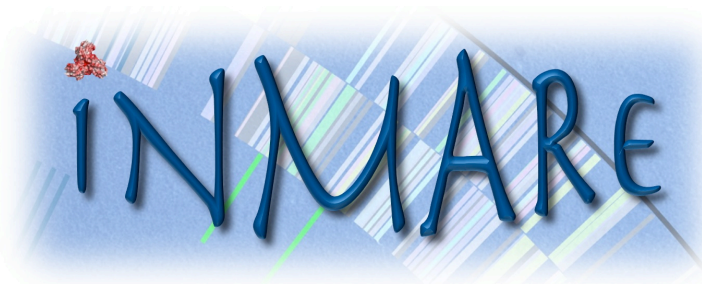


Researchers to trawl ocean 'biodiversity hot-spots' for new biotechnology resources



We frequently hear that global resources are being used up and that we need several 'earths' if we are to keep on consuming at the same rate. One area that remains 'un-tapped', however, is the range of microbiological resources in our oceans. These could be providing us with new resources from which to produce safer, cheaper and greener products.

Most industrial biotechnology processes are microbial-based, and it is anticipated that new biotech processes and applications will emerge from the yet unknown microbial biodiversity or so-called "microbial dark matter".

Marine environments represent the largest diversity of untapped genes, enzymes and natural products which could be of use to industry. Of a special interest are the microbes which survive in extreme conditions such as extreme pressure, salinity or temperature and hence could provide enzymes which are able to perform in industrial settings under harsh physical and chemical conditions.

A new international consortium of more than 20 partners from academia and industry from 12 countries, including leading multinational industrial partners, funded by the EU Horizon 2020 Program and led by Prof Peter Golyshin and Dr Olga Golyshina from Bangor University, will work on a four year EUR 6M collaborative project. The project will mine for and use newly discovered microbial enzymes and metabolites, in particular for the targeted production of fine chemicals, environmental clean-up technologies and anti-cancer drugs.

The Project INMARE (Industrial Applications of Marine Enzymes: Innovative screening and expression platforms to discover and use the functional protein diversity from the sea") stands on the shoulders of previous and on-going national research initiatives and projects supported by previous European Framework Programs for exploration of genomic and biochemical diversity of marine microorganisms.

INMARE's industrial focus comes via the innovative screening programs for enzymes, and bioinformatics-based gene discovery, and will include both development and demonstration of innovative technologies.

Already, the consortium have over 100 'gene libraries' from a variety of environments that can be subjected to screening, but the consortium will also construct more libraries from the DNA from yet unstudied extreme environments.

Addressing some of the major challenges that lie ahead, Prof Peter Golyshin, Bangor University explains: *"An important bottleneck in industrial applications of enzymes is the laborious and costly (and rarely successful) enzyme optimization process which seeks to make enzymes more stable and perform better in the harsh environment of industrial processes. The solution may be to finding better natural enzyme variants: after 4 billion years of evolution, nature has established a vast diversity of enzymes, some of which may fit perfectly well to the industrial demand. Our task will be to identify them using corresponding screening conditions, at the very early stages."*

INMARE project participants

Participant	Participant organisation	Country
1 (Coordinator)	School of Biological Sciences, Bangor University	GB
2	Biozentrum Klein Flottbeck, University of Hamburg	DE
3	Institute of Molecular Enzyme Technology, Heinrich Heine University of Düsseldorf	DE
4	Consiglio Nazionale delle Ricerche (CNR): <i>-Institute of Experimental Oceanography, Messina</i> <i>-Institute of Bioenergetics and Biomembranes, Bari</i>	IT
5	Agencia Estatal Consejo Superior de Investigaciones Científicas (CSIC): <i>-Institute of Catalysis, Madrid</i> <i>-Institute of Agrochemistry and Food Technology, Valencia</i> <i>-Centre of Molecular Biology Severo Ochoa, Madrid</i>	ES
6	Bayer Technology Services GmbH	DE
7	Novozymes A/S	DK
8	Centre for Geobiology, University of Bergen	NO
9	BIOMERIT Research Centre, National University of Ireland, Cork	IE
10	Institute of Biochemistry, Vilnius University	LT
11	Jacobs University, Bremen	DE
12	Pharma Mar S.A.	ES
13	School of Environmental Engineering, Technical University of Crete	GR
14	Alma Mater Studiorum Università di Bologna	IT
15	Institute of Biotechnology and Bioengineering, Associação do Instituto Superior Técnico para a Investigação e Desenvolvimento, Lisbon	PT
16	evocatal GmbH	DE
17*	INOFEA Ltd.	CH
18*	University of Applied Sciences and Arts, Northwestern Switzerland	CH
19	London School of Economics, London	GB
20	Cluster Industrial Biotechnology CLIB ²⁰²¹	DE
21	Faculty of Chemical Engineering, University of Toronto	CA
22	Seascope Consultants Ltd.	GB
23	Uni Research Centre for Applied Biology, Bergen	NO