

Advanced Marine Biotechnology toolbox for accessing the uncultivated marine microbial biodiversity and its novel biomolecules

-MarBioTech-

Consortium

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Background: Organisms in the **marine environment** represent a largely unexploited **source of highly valuable biomolecules**. Due to the development of sequencing technologies in the last few decades, we are now able to access a vast amount of sequence information of metagenomes of **cultivable and non-cultivable marine organisms**. Unfortunately, our abilities to link such sequence information with function lags completely behind. The conventional system to annotate protein functions, e.g., annotation based on BLAST homology search, is very poor and often provides false predictions, in particular for classes of proteins for which biochemical characterization data has not been accumulated. Consequently, it is virtually impossible to identify novel proteins and enzymes based on sequence based screenings, only.

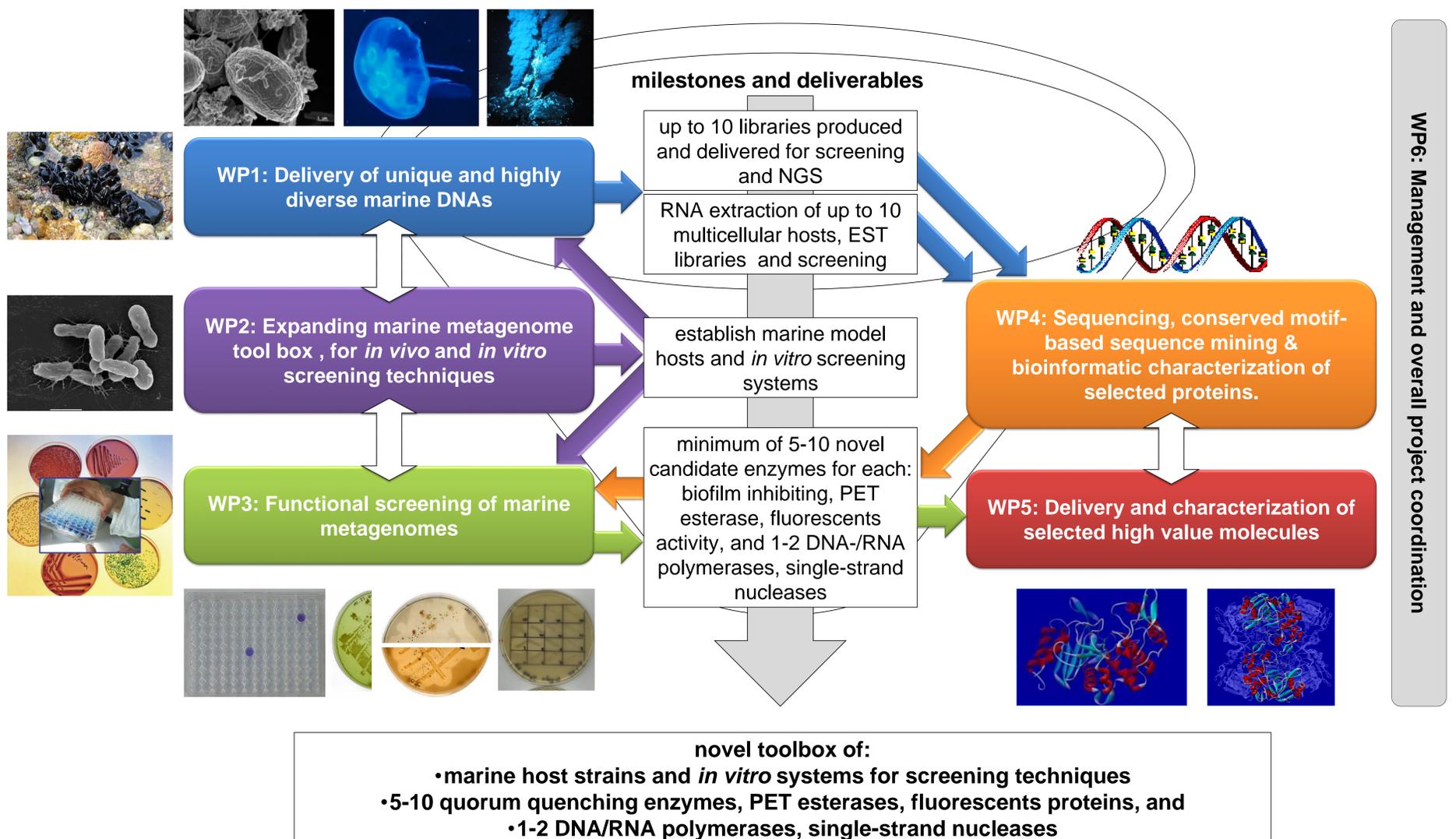


Figure 1: Workflow within the MarBioTech consortium and interactions between work packages. The high number of novel enzymes that will be identified with new screening strategies will be reduced to a selection of most versatile and promiscuous enzymes forming the biocatalyst collection of quorum quenching proteins, PET esterases, fluorescent proteins, 1-2 DNA-/RNA polymerases, and single-strand nucleases.

Goals: MarBioTech will develop innovative tools and technologies to advance function-based searches in combination with sequence-based searches and deliver valuable biomolecules of marine origin. Together with the innovative technology advancement, a wide range of existing marine resources including microbiomes of marine algae, jelly fish, and marine fish farms, among others, will be exploited by combining innovative function-, sequence-based and *in vitro* screenings for the identification of novel active high-value marine biomolecules. The target molecules will include enzymes involved in marine plastic degradation (PET esterases), fluorescent proteins for molecular medicine, novel highly active RNA polymerases as well as DNA nucleases for metagenome mining and molecular biology and quorum quenching (QQ) proteins to prevent biofilm formation.