Marine microbiome and drug discovery

Traditionally, higher plants and terrestrial microorganisms have proven to be the richest sources of natural drugs. However, we are living in a planet of oceans. Evolutionary development has equipped many marine organisms with the appropriate mechanisms to survive, developing exquisitely complex biological and chemical mechanisms for defense, attack, signalization and other still unknown purposes. These biological capabilities are clearly revealed by their ability to biosynthesize and release potent chemical weapons that are active per se. Such novel chemical structures often result in new modes of action and open up the potential of new ways to treat cancer and other diseases. Early studies of the marine environment focused on natural products from invertebrates and tunicates have led to the isolation of several classes of bioactive natural products mainly small molecules such as polyketides and non-ribosomal peptides. However, there is an emerging rational suspicion, based on marine sponge/tunicate metagenomics that these compounds originally isolated from metazoan organisms are in fact of bacterial origin. The cases of trabectedin (ET-743), didemnins, kahaladide, onnamides, bryostatin or dolastatin are some examples of the role of marine microbiome as producers of bioactive metabolites with application in oncology. Currently, genomic mining for polyketide synthases (PKS) and non-ribosomal peptide synthetases (NRPS) improves the probability of success in drug discovery using marine microorganisms, both in isolated genomes and metagenomes. Dr. Fernando de la Calle will discuss the state of the art in marine biotechnology applied to drug discovery under the experience of PharmaMar, Spanish company focused on research, development, and commercialization of marine drove drugs for the treatment of cancer.

Biography

Fernando de la Calle is the Head of the Microbiology Department at Pharma Mar where he joined 30 years ago. He received his PhD in Molecular Biology from UAM (Madrid) in 1998. He also completed an Executive-MBA in 2005. He is a Co-author of the current hemisynthetic process for manufacturing the anticancer Yondelis®, the first European marine derived compound approved. He has been member of the International Advisory Group of ERA-MBT and BiodivERsA and Reviewer for H2020, FP7 and ERA-NET projects. He is the Scientific Contact Person from Pharma Mar for FP7/H2020 EU projects related to Marine Biodiversity and Biotechnology such as MAMBA, MaCuMBA, MicroB3 and INMARE.