

1. PHD PROJECT DESCRIPTION (4000 characters max., including the aims and work plan)

Project title: Untapped potential of actinobacteria from aquatic environments as a source of novel bioactive compounds.

1.1. Project goals

The main goal of the project on marine biodiscovery is developing secondary metabolites from marine microorganisms, mainly actinomycetes, into well-characterised compounds that can be applied in medicine, agriculture or aquaculture. This collaborative action comprises a network of leading institutions and offers a first-class research and training program in an international, multidisciplinary environment.

1.2. Outline

Project will include studies on actinomycetes isolated from aquatic environments like deep-sea, hydrothermal vents, Arctic Sea water, and saline lakes. Actinomycetes will be isolated using standard and innovative selective isolation procedures to promote the isolation of targeted and suppress unwanted microorganisms. The isolates will be used to the generation of extracts for chemical analyses. Actinomycetes will be identified based on 16S rRNA sequence and their taxonomic position established using polyphasic approach. Genomic approach - genome sequencing for phylogenomic analyses and genome mining for the biosynthetic gene clusters will be used.

Novel strategies of cultivation to improve the culture and metabolite production of actinomycetes will be used to improve yield bioactivity in the screening program. A selected isolates based on taxonomic novelty or other selection parameters will be provided for chemical extraction of metabolites, dereplication and analysis using the LC-MS. Pure compounds will then be delivered for bioactivity assessments. State of the art spectroscopic methods, such as NMR and MS, will be used to determine the structures of the bioactive compounds, and the pure compounds will be assessed for bioactivity, target elucidation and drug-like properties.

1.3. Work plan

- Isolation of actinomycetes from aquatic environments (1st year)
- Dereplication of actinomycetes and taxonomy (1st year)
- Screening and for natural product biosynthesis using bioprospecting-based procedures (2nd year)
- Molecular studies of the isolates including genome sequencing and genome mining (2nd year)
- Chemical analyses of metabolites extracted from the actinomycetes (3rd and 4th year)
- Determination of biological activity of compounds (4th year)

1.4. Literature (max. 10 listed, as a suggestion for a PhD candidate)

According to candidate own choice

1.5. Required initial knowledge and skills of the PhD candidate

Applicants must be doctoral candidates, i.e. not already in possession of a doctoral degree at the date of the recruitment, and they must not have resided or carried out their main activity (work, studies, etc.) in the country of the recruiting beneficiary for more than 12 months in the 36 months immediately before their date of recruitment.

The applicants must be in the first four years of their research career (measured from the date

they obtained a degree that allows them to enrol in a PhD program).

Position requirements for candidates:

- A Master degree in Life Sciences, preferably in Biology, Biotechnology or similar,
- Experience in microbiology, especially in selective isolation of microorganisms, mainly actinomycetes, molecular studies – identification and taxonomy of bacteria, microorganisms cultivation and screening for bioactivity of bacteria using culture-based bioprospecting strategy.
- Knowledge in basic bioinformatic tools used in bacterial taxonomy studies and genome analyses
- Basic knowledge in HPLC, LC-MS/MS, NMR techniques.
- Ability to work independently on its own initiative and in a team environment.
- Excellent oral and written communication skills in English are expected for an effective interaction with our multidisciplinary research team and other members of the Doctoral Network.
- Experience in paper writing is welcome.

1.6. Expected development of the PhD candidate's knowledge and skills

Project aims to train doctoral fellows in the field of marine biology and pharmacology. The goal of this extensive training program is to complement the day-to-day scientific training with the experiences and tools needed to pursue a future career in any sector of science, both inside and outside academia. Students graduating from HOTBIO will be in a unique position to enter a challenging labour market, as they will have received multidisciplinary training at world-leading research groups in academia and industry partners.