

# DOCTORAL NETWORK

European  
Commission

Marie  
Skłodowska-Curie  
Actions

Grant agreement  
101119261



## PhD POSITION N°9

### Project title

Effect Directed Analysis on microbial communities as indicators of chemical and ecotoxicological quality status of the aquatic environment

### Recruiting institution

Institute of Environmental Assessment and Water Research-National Spanish Research Council (IDAEA-CSIC), Barcelona, Spain

## BACKGROUND

This doctoral position is 1 of 10 doctoral positions offered within the [HORIZON Marie Skłodowska-Curie Action \(MSCA\) Doctoral Network Pharm-ERA: "Improving monitoring and Environmental Risk Assessment of PHARMaceuticals, antimicrobial resistance and pathogens from terrestrial to aquatic environments"](#).

Global contamination of soil and aquatic ecosystems by pharmaceutical and microbiological pollutants (such as antimicrobial-resistant microorganisms and/or pathogens) raises severe concerns about impacts on ecosystem health and repercussions on humans and animals. Preserving ecosystems from adverse ecotoxicological effects of pharmaceuticals and their transformation products, and limiting the environmental spread of antimicrobial resistance and pathogens is imperative to reach several UN Sustainable Development Goals as well as the European Green Deal, Water Framework Directive and Biodiversity Strategy for 2030. In this context, the main scientific objective of Pharm-ERA is to develop and implement innovative concepts, methods and strategies to improve the monitoring and assessment of the environmental effects and risks of pharmaceuticals, their transformation products, antimicrobial resistances and pathogens from terrestrial to aquatic environments. The ultimate goal is to provide scientific evidence and expertise to contribute to reducing the environmental spread and impact of these chemical and microbiological contaminants and to preserve microbial diversity and functions across the soil-water-sediment continuum.

By joining Pharm-ERA, you will integrate a high-level interdisciplinary and intersectoral research and training network based on 10 doctoral projects covering scientific disciplines including environmental and analytical chemistry, microbial ecology, ecotoxicology, molecular biology (incl. multi-omics approaches) and chemical fate/effect modelling. Pharm-ERA involves 9 Beneficiaries (including 2 non-academics) and 6 Associated Partners (including 5 non-academics), committed to contribute to research, training, dissemination, communication and exploitation of results targeting end-users such as environmental consultancies and agencies.

# DESCRIPTION OF THE PhD PROJECT

Aquatic ecosystems are continuously exposed to complex mixtures of organic contaminants, such as pharmaceuticals, which gives rise to concern for potential risks for ecological and human health even at the trace level. To address the complexity of mixtures of Contaminants of Emerging Concern (CECs) present in environmental waters, Effect-Directed Analysis (EDA) is a cutting-edge approach. EDA combines biological activity testing and stepwise fractionation with chemical analysis to prioritize biologically active CECs in environmental matrices. Despite its broad use in environmental monitoring, such an approach still lacks ecological relevance since most of bioassays focus on specific *in vitro* endpoints. To tackle this gap, aquatic microbial communities (i.e. biofilms) are a complex consortium of autotrophic and heterotrophic organisms, particularly sensitive to multiple environmental stressors and chemical contamination. In particular periphytic biofilms are widely used in ecotoxicological assessment as biomonitoring systems for detection of exposure to toxicants and associated ecological effects on aquatic ecosystems. A multi-biomarker approach can be used for the detection of effects of chemicals -or mixtures of them- on biofilms, ranging from structural to functional-based descriptors.

In this context, this PhD project aims to develop and validate an innovative approach for Effect Directed Analysis (EDA) based on responses of natural freshwater biofilms for the identification of CECs potentially leading to ecological impairment. The PhD student will join the Environmental and Water Chemistry for Human Health (ONHEALTH) Research group at the IDAEA-CSIC (Spain). The fellow will develop and implement:

- (i) Solid Phase Extraction (SPE) vs (Ultra)High-Performance Liquid Chromatography (UHPLC) based Fractionation
- (ii) miniaturized periphyton-based bioassays to assess structural and functional response,
- (iii) UHPLC coupled to High Resolution Mass Spectrometry (UHPLC-HRMS). In addition, the PhD student will have a hand-on cutting-edge HRMS-based untargeted metabolomics approach and will get experience on regulatory bioassay testing on single organisms including bacteria and algae.

## PRACTICAL INFORMATION

Recruiting institution	Institute of Environmental Assessment and Water Research–National Spanish Research Council (IDAEA-CSIC), Barcelona, Spain
Doctoral school	University of Barcelona (UB), Spain
Supervisors	Dr. Victoria Osorio (IDAEA-CSIC, Spain), Dr. Nicolas Creusot (INRAE, France), Dr. Sandra Pérez (IDAEA-CSIC, Spain)
Non-academic mentor	Dr. Adrian C. Love (ABT, Malta)
Main host laboratory	IDAEA-CSIC, Spain, Dr. Victoria Osorio and Dr. Sandra Pérez to implement EDA approaches on periphyton
Secondments (1 to 6 hosting months)	<p>1) INRAE, France, to perform metabolomics analyses of periphytic biofilms exposed to the different surface water and/or wastewater effluent EDA fractions to explore the potential application of metabolomics on EDA procedures, under the supervision of Nicolas Creusot ;</p> <p>2) ABT, Malta, to perform lab exposure of surface water and/or wastewater effluent EDA fractions on periphytic biofilms and single organisms including bacteria and algae in order to compare sensitivity of measured responses for quality assurance of the EDA approach developed, under the supervision of Dr. Adrian Love;</p> <p>3) BETA-UVic-UCC, Spain, to further validate the framework through its implementation on biofilm from natural environment and/or ex situ conditions (e.g. artificial channels downstream wastewater effluents), under the supervision of Dr. Lorenzo Proia.</p>

## RECRUITMENT CRITERIA

### General criteria

- MSCA Mobility Rule: researchers 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
- All researchers recruited in a DN must be doctoral candidates (i.e. not already in possession of a doctoral degree at the date of the recruitment)
- Scientific excellence to fit the PhD project
- Fluent (oral and written) English skills as the project operates in English language
- Knowledge of the language of the host country may be considered a merit
- Team-mindedness
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## Criteria specific for PhD9

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- Knowledge in environmental analytical chemistry, Chromatography, Mass Spectrometry, ecotoxicology, microbial and aquatic ecology, academic writing, and data analysis
- Master degree in environmental analytical chemistry, ecotoxicology, environmental sciences or similar programs

## APPLICATION

### Documentation to be sent in by the applicants

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- Application form completed
- CV + Letter of motivation
- Contact of two reference persons to be contacted by the selection committee (name, relation to the candidate, e-mail address and phone number)
- Complete list of publications and academic works
- Proof of language proficiencies
- Proof of master diploma or 2024 registration to master degree

### How to apply?

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- Download application form and fill it indicating all the offers you wish to apply for
- Send your application by email to pharm-era@inrae.fr. **The title of your email MUST be : Pharm-ERA PhD x, x, x application** (x, x, x being the number(s) of the PhD position(s) you want to apply for)
- **Be careful to join all documentation required** (see list above)

### Deadline for application

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April 2024, 14<sup>th</sup> - 6:00 pm French time

### Contact

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pharm-era@inrae.fr