

DOCTORAL NETWORK

European
Commission

Marie
Skłodowska-Curie
Actions

Grant agreement
101119261



PhD POSITION N°6

Project title

Influence of colonizing substrata on the dynamics of antimicrobial resistance and pathogens in fluvial ecosystems

Recruiting institution

Centre d'Estudis Avançats de Blanes, Consejo Superior de Investigaciones científicas, CEAB-CSIC (Blanes, Girona, 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

Existing literature indicates that biofilms developed on anthropogenic litter accumulated on the streambed tend to be richer in antimicrobial resistance (AMR) and pathogens than natural stream substrata. The main objective of this PhD project is to improve our understanding of the role of anthropogenic litter in the formation and fate of antimicrobial resistance (AMR) and pathogen-rich biofilms in stream ecosystems. To achieve this goal, three specific objectives (SOs) will be addressed:

- The first (SO1) focuses on assessing the role of substrate type: anthropogenic litter (plastics and bioplastics) versus natural substrata, on biofilms enriched with AMR and pathogens;
- the second (SO2) will address the temporal and spatial dynamics of these biofilms;
- and the third (SO3) will focus on assessing the effectiveness of nature-based solutions (NBS) in reducing AMR and pathogens in stream ecosystems.

These specific objectives will be addressed through experimental and fieldwork. Thus, a field experiment will be carried out in an urban stream. In the field experiment, the different substrates will be colonised downstream of the confluence of a WWTP effluent input (SO1); and translocated further downstream to follow its dynamics (SO2). Differences between biofilms colonising different substrate types will be assessed by AMR analysis (using qPCR assays), together with analysis of a range of structural (microbial diversity analysis using metabarcoding); and functional (nutrient scavenging and virulence capacities) attributes. The same set of analyses will be carried out on biofilms growing on the different substrata along the study river at restored and non-restored reaches to assess the influence of the NBS implementation on the development and fate of (AMR) and pathogen-rich biofilms (SO1 and SO3).

PRACTICAL INFORMATION

Recruiting institution	Centre d'Estudis Avançats de Blanes, Consejo Superior de Investigaciones científicas, CEAB-CSIC (Blanes, Girona, Spain).
Doctoral school	Universitat de Girona (Girona, Spain)
Supervisors	Dr. Helena Guasch and Dr. Eugènia Martí (CSIC, Blanes, Spain), Dr. Benoît Cournoyer (CNRS, France)
Non-academic mentor	Albert Sorolla (Naturalea, Spain)
Main host laboratory	CEAB-CSIC, Spain, Dr. Helena Guasch and Dr. Eugènia Martí, to perform experimental and fieldwork.
Secondments (1 to 6 hosting months)	<ol style="list-style-type: none">1) CNRS, France, to get training in pathogen analyses under the supervision of Dr. Benoît Cournoyer2) Naturalea, Barcelona, Spain, to perform experiments to assess the effectiveness of habitat & hydro-morphology complexity restoration on the fate and persistence of AMR & pathogens in fluvial ecosystems under the supervision of Albert Sorolla;3) IDAEA, Spain, to get training in chemical analyses of selected PhACs in environmental samples under the supervision of Dr. Victoria Osorio;4) University of Gothenburg, Sweden, to get training in AMR genes identification and quantification under the supervision of Dr. Natalia Corcoll. <p><i>Note that secondments 2 and 3 are located nearby the main host laboratory.</i></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

Criteria specific for PhD6

- Knowledge in biology, microbiology and environmental chemistry, with focus on fluvial ecology, microbial ecology and ecotoxicology
- Master degree in microbiology, aquatic ecology or aquatic ecotoxicology

APPLICATION

Documentation to be sent in by the applicants

- 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?

- 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

April 2024, 14th - 6:00 pm French time

Contact

pharm-era@inrae.fr