

## Post-doctoral Fellow

### Antibiotic resistance reactor: the role of bivalves in the production, dissemination and monitoring of antibiotic resistance in the aquatic environment.

<b>Starting date:</b> September 2024
<b>Funding:</b> French Agency for Food, Environmental and Occupational Health & Safety (ANSES)
<b>Research program:</b> ANSES 2023-EST-108 VENDETTA
<b>Keywords:</b> antibiotic resistance, bivalve, bioreactor, sentinel

#### Offered post-doctoral position:

Antibiotic resistance (ATBr) is a growing public health concern that is becoming the leading cause of death worldwide. ATBr genes and ATBr bacteria of human origin are often released into aquatic environments with urban or agricultural effluents and subsequently, can recontaminate humans and animals through aquatic recreational activities, livestock watering, or crop irrigation. The environment is thus thought to play a key role in the emergence and dissemination of ATBr, but the phenomena and actors involved remain poorly understood. At the same time, the release of antibiotics (ATB) into aquatic systems contributes to the development and dissemination of ATBr. Globally, consumed ATB and/or their metabolites are continuously released into natural ecosystems. Thus, many classes of ATB (i.e. diaminopyrimidines, lincosamides, macrolides,  $\beta$ -lactams, glycopeptides, nitroimidazoles, quinolones) are commonly found in various water bodies, including surface waters.

The ATBr genes are frequently clustered within mobile genetic elements (MGEs) such as transposons, plasmids or integrons. Horizontal transfer of MGEs and ATBr genes is a major factor in the emergence of ATBr pathogenic bacteria. Some studies have illustrated that the abundances of ATBr and MGEs in water bodies correlate with the level of anthropogenic pressure. All of the actors involved in ATBr dissemination processes interact with other components of aquatic ecosystems, particularly bivalve molluscs, which are known for their bioaccumulation capacity of chemicals and microorganisms and are proposed as a model for biomonitoring. In addition to the health challenges highlighted by the bioaccumulation of ATBr by aquatic organisms, the role of these bioaccumulators in promoting the dissemination of ATBr remains to be elucidated.

The VENDETTA project aims to study the interactions between a bivalve mollusc, *Dreissena polymorpha*, and ATBr actors (ATBr bacteria, ATBr genes, MGEs). The objective of the post-doctoral fellow is to determine not only whether and under which conditions MGEs/ATBr genes are bioaccumulated by mussels but also to what extent these animals can enrich environmental microbial communities with bacteria carrying EGM/ATBr genes, whether they are exposed to ATB stress. Through *in vivo* experiments in the laboratory, the candidate will study various responses linked to ATBr bacteria (survival, MGE transfer) as well as to bivalves (bioaccumulation, immune responses) in the presence or absence of antibiotics.

**Required profile:**

- PhD in microbiology / bacteriology, ideally related to the environment
- Good experience and knowledge of molecular biology (qPCR, dPCR) will be an important asset
- Knowledge in physiology, ecology and biology of aquatic organisms, especially invertebrates, will be appreciated
- This position requires frequent interactions with colleagues and other partners: communication skills will be essential
- Organized, highly motivated, autonomous and able to integrate into the multidisciplinary staff of the VENDETTA project

**Duration:** 18 months.

**Location:**

The position will be based at UMR 7564 LCPME (Campus Brabois Santé, 9, Avenue de la Forêt de Haye, 54505 Vandoeuvre-les-Nancy).

Short-term assignments will be required at UMR-I 02 SEBIO (Campus Moulin de la Housse, 51000 Reims, France) to carry out experiments.

**Deadline for application:** June, 5th 2024.

**Application:**

The application may be written in English or French and must contain the following elements:

1. CV which includes a brief summary of past scientific achievements and the list of publications;
2. A plan for the research during the postdoctoral fellowship (max 3 pages);
3. Names of two referees, with email-addresses and telephone numbers.

**Application should be compiled in one single pdf file and sent by email to:**

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