



UMR 5244 Université de Montpellier-CNRS-IFREMER- Université de Perpignan via Domitia
Interactions Hôtes-Pathogènes-Environnements (IHPE)
Université de Perpignan via Domitia
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Postdoctoral position

Epigenetic support of innate immune memory in the Pacific oyster

Where :

- Laboratoire Interactions Hôtes-Pathogènes-Environnements (IHPE), UMR5244 Université de Perpignan Via Domitia (<http://ihpe.univ-perp.fr/>)

Key words :

Immune priming, Epigenetic, Histones post translationnal modifications, *Magallana gigas*

Period : 20 to 24 months from June 1st of 2025 to May 31st of 2027

Context :

The project will be developed within the UMR IHPE, which uses multi-scale approaches (from molecules to natural populations) to study the molecular and evolutionary mechanisms governing interactions between hosts, their pathogens, and their environments. Our goal is to achieve an integrated understanding of the emergence of infectious agents, their evolutionary dynamics, emergence, and extinction in natural environments, contributing to the development of a global health approach summarized by "One Planet – One Health – One Ocean."

Our unit is internationally and nationally recognized for its contributions to the fields of aquaculture, coral reefs, and neglected tropical diseases. We pay particular attention to fostering synergies among all actors within the UMR and with our national and international collaborators (in South America, Africa, and Oceania/Pacific). Additionally, we emphasize Quality of Life and Working Conditions (QVCT) as well as equal opportunities. Our unit operates across two sites: Perpignan and Montpellier. We also conduct research at Ifremer facilities in Sète and Palavas. The recruited researcher's activities will primarily be based in Perpignan, with travel to Montpellier.

This project is part of the ANR PRIMoyster project (<https://anr.fr/Projet-ANR-22-CE20-0017>), which aims to develop an innovative method for preventing a viral disease in the Pacific oyster *Crassostrea gigas*, leveraging the properties of immune priming (IP), a phenomenon of innate immune memory.

Immune priming, also known as trained immunity, has been demonstrated over the past two decades in various invertebrate and vertebrate species. It can be described as the ability of the innate immune system to generate antigen-independent immune memory, resulting in an enhanced response upon a second encounter with a pathogen or its components. While an increasing number



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of studies explore immune priming, our understanding of its underlying mechanisms remains highly fragmented in invertebrates.

Furthermore, numerous studies in vertebrates, invertebrates, and plants highlight the key role of long-term epigenetic and metabolic reprogramming of innate immune cells, which appears to be a common denominator of innate immune memory across species. The project builds on the latest advances developed in our laboratory on innate immune memory in mollusks and integrates multi-omics approaches to explore the cellular, molecular, epigenetic, and metabolic foundations of immune priming. This offers a new perspective on understanding the immune response of bivalves.

This approach could provide a sustainable and ethical alternative to current prophylactic methods, which are often ineffective against the proliferation of pathogens exacerbated by climate change.

Task description :

The recruited person will lead a research project aimed at exploring the epigenetic mechanisms involved in the innate immune memory of the oyster. More specifically, their responsibilities will include:

- Developing and optimizing analytical approaches to study epigenetic marks (histone modifications, DNA methylation, chromatin structure) in hemocytes, the immune cells of the oyster.
- Investigating the short- and long-term evolution of these epigenetic marks in individuals that have undergone stimulation of their innate immune memory.
- Analyzing the generated data using appropriate bioinformatics and statistical approaches.
- Integrating the obtained results into multi-omics approaches developed within the ANR PRIMoyster project (notably transcriptomics and metabolomics) to explore the links between epigenetics, gene expression, and metabolism.
- Writing scientific articles and presenting results at national and international conferences.
- Exploring potential applications in aquaculture and animal health, particularly in relation to improving oyster health management strategies.
- Assessing to what extent current epigenetic concepts can shed light on the interactions between innate immune memory and gene expression.

In addition to these research activities, the recruited person will actively participate in the unit's collective activities, including seminars, work meetings, and scientific discussions within the laboratory.

Desired skills :

The candidate must hold a PhD in molecular biology with relevant experience in immunology, multi-omics analysis, or a related field. Experience in data processing for high-throughput sequencing analysis is required. A strong conceptual background in invertebrate immunity and an interest in epigenetics will be appreciated.





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The candidate should have a strong ability to work in a team and interact with collaborators within the framework of a national project. Experience in writing scientific articles and delivering oral scientific presentations is necessary.

Framework :

The postdoctoral fellow will participate in the ANR Primoyster project, led by Dr. Caroline Montagnani (IHPE). She/He will be involved in Work Package 2, titled " *Molecular and Cellular supports of IP* ". The generation of biological samples will be conducted under the supervision of Caroline Montagnani and in collaboration with other ANR partners. The experience of molecular biology and data treatments will be performed under the supervision of Céline Cosseau. The IHPE laboratory, from both site Perpignan and Montpellier, will provide the most suitable conditions for bench experiments and data processing.

The postdoctoral fellow will be primarily based in Perpignan (IHPE). He/She will need to regularly travel and spend time in Montpellier for the generation of biological samples and to exchange with the ANR and IHPE partners.

Remuneration :

2900 to 3400 euros gross depending on experience

Contact:

- ▶ Scientific leader of the project -> Caroline Montagnani : caroline.montagnani@ifremer.fr
- ▶ Scientific responsible for the WP2 -> Céline Cosseau : celine.cosseau@univ-perp.fr
- ▶ Laboratory director IHPE :-> Christoph GRUNAU : christoph.grunau@univ-perp.fr

How to apply :

Application link will be open really soon. Please, contact the people in charge with the project before applying.