

Join the team

PhD Studentship

Charting new frontiers in virus-microbiota interactions and glycomic research



Application Deadline: **July 8, 2024**

Interview Period: **July 10-12, 2024**



PhD studentship: Charting new frontiers in virus-microbiota interactions and glycomic research

Introduction to the work environment

As a prospective PhD candidate, you will join the French National Research Institute for Agriculture, Food, and Environment (INRAE) at the Host-pathogens Interaction Unit (IHAP) in the National Veterinary School of Toulouse (ENVT). Collaborating with the Myc and Viremie teams, you will engage in cutting-edge research on host-microbiota and host-virus interactions, contributing to scientific excellence and innovation in a stimulating academic environment.

PhD program objectives

Introduction:

Bovine respiratory infectious diseases are a significant health challenge for cattle. They result from a complex interplay between bacterial and viral pathogens. The respiratory tract's mucus layer in healthy animals is a barrier to preventing pathogen invasion. However, viruses can exploit mucin glycans to infect the host. Current research focuses on the role of the respiratory microbiome-glycome complexes in pathogen colonization.

Thesis Objective:

This research project will help to unravel the intricate interactions among mucin glycans, the respiratory microbiome, infectious agents (including coronavirus (BCoV), influenza D virus (IDB), and *Mycoplasma bovis*), and animal health and welfare.

Techniques:

This research will use state-of-the-art facilities in INRAE, including animal experimentation infrastructure at the ENVT, glycoconjugate analysis equipment at the Platform for Glycoconjugate Analysis (Pagés) in Lille (including NMR and mass spectrometry), and sequencing platforms for microbiome data. Standard microbiology and cellular virology facilities will also be used for culturomics, virus/protein production, and lung explant studies.

Expected Impact:

The outcomes of this research may lead to the development of pro-, post-, and prebiotics aimed at enhancing calf respiratory barriers. Ultimately, this work could revolutionize prevention and management strategies for bovine infectious diseases, improving animal health and welfare.

International framework:

This PhD program is part of the SOA18 internal project of the European Partnership on Animal Health and Welfare and offers a multidisciplinary research opportunity focusing on animal health and welfare. Prospective PhD candidates will engage in diverse research that spans disciplinary boundaries and contributes to the collective mission of advancing animal well-being across borders. As a PhD student, you will be part of a dynamic European network, collaborating with experts from various institutions, sharing knowledge, and actively shaping the future of veterinary science.

Research Responsibilities and Tasks

The research program will focus on three main areas:

- Investigating virus-glycan interactions and their essentiality for other viruses, including those with zoonotic potential, through *in vitro* and *ex vivo* studies and immunohistochemistry of glycans on fixed tissues (lung explants).
- Implementing culturomics on nasal samples to identify bacteria with potential beneficial action against pathogens and obtaining enzymes for *in vitro* testing against the target viruses.
- Studying the role of microbial enzymes in modulating viral infectivity, particularly the cleavage of viral fusion proteins, and their influence on infection.

Contextual Framework for the Position

The candidate will engage in various collaborations during the PhD program, including:

- **Interdisciplinary Collaboration:** Engaging with experts in virology, microbiology, glycomics, and animal health and welfare to work at the intersection of multiple scientific disciplines.
- **Mentorship and Guidance:** Receiving mentorship from co-supervisors, world-leading in their fields.
- **Scientific Network:** Involvement with national and international funding bodies, scientific conferences, and seminars for networking and sharing research findings.
- **Peer Interaction:** Regular engagement with other PhD students, postdocs, and research technicians for peer support.
- **Inter-Institutional Relations:** Cooperation with national and international institutions, involving navigating and maintaining productive relationships across organizational boundaries.

Job-related knowledge and skills

Required background:

- **Interdisciplinary Understanding:** Grasping virology, microbiology, and glycomics to synthesize a cohesive research approach.
- **Theoretical Foundations:** Solid knowledge of bacteriology and virology to inform experimental design and data interpretation.
- **Data Analysis Principles:** Familiarity with bioinformatics, statistical methods, and data analysis for large datasets.

Required techniques:

- **Laboratory Techniques:** Familiarity with molecular techniques and immunohistochemistry.
- **Computational Proficiency:** Skills in managing and analysing large datasets, including programming in R.
- **Collaborative Ability:** Effective communication and teamwork skills for collaboration with diverse research teams.

Additional information

Application Deadline: 8th July 2024

Interview Period: 10th –11th July 2024

Start Date: October 1 2024

Contract Type: Fixed-term contract (CDD) for 36 months, full-time

Remuneration: Gross salary of €2,135 per month

Contact person

To apply, please send a personalized cover letter and CV to Dr. Mach (nuria.mach@inrae.fr)

Application Deadline: 8th July 2024

Contact person: Dr Núria Mach

Charting new frontiers in virus-microbiota interactions and glycomic research

