

## Postdoctoral research position in biological chemistry/chemical biology 18 months, starting July 2023

*Laboratoire des Biomolécules, Sorbonne Université, CNRS, ENS, Paris, France*

*Funding source: CNRS, EMERGENCE@INC 2023*

### Identification of structural patterns for antimicrobial peptides recognition at the bacterial cell-wall level

#### About the project:

**Antimicrobial peptides** (AMPs) are a broad class of peptides with promising activity against bacteria or fungi and represent interesting starting points for the development of new therapeutic approaches to treat bacterial infections. Many AMPs act by interacting with **bacterial lipid membranes and potentially cell-wall components** such as peptidoglycan (PGN) or lipoteichoic acid (LTA), although there are very few direct pieces of evidence of the latter. We recently isolated **DMS-DA6, an AMP showing a specific activity towards Gram-positive bacteria**. Gram-negative and Gram-positive cell walls differ greatly in terms of surface glycoconjugates. In the case of Gram-positive bacteria, a very thick layer of PGN and negatively charged LTA are found in the most outer part of the bacteria. We believe DMS-DA6 interacts with PGN but so far, we only have indirect evidence for this interaction.

The objective of the project is to obtain direct evidence of DMS-DA6/PGN/LTA/lipids interactions and identify the structural patterns involved in these interactions using **affinity photocrosslinking coupled to mass spectrometry** on reconstituted models and live bacteria, and characterise these interactions by **calorimetry**.

Two complementary affinity photocrosslinking approaches in **model systems or live bacteria** will be used, with the photolabel being carried either by the peptide, or by fatty acids which can be metabolically incorporated in the membranes of live bacteria.

Affinity photocrosslinking strategies have never been applied to membrane-targeted AMPs partner identification and photocrosslinking on live cells is challenging. These approaches should yield very valuable and novel information on AMPs modes of action and give molecular insight for the design of new efficient sequences.

#### About the team:

The project will be conducted at the **Laboratoire des Biomolécules** (Sorbonne Université, CNRS, ENS) Paris, France, under the supervision of Dr. Astrid Walrant, and in close collaboration with Dr. Emmanuelle Sachon.

The Laboratoire des Biomolécules is a laboratory of the CNRS and the Chemistry Departments of Sorbonne Université and the Ecole Normale Supérieure, and gathers roughly 40 permanent researchers and research assistants and 50 PhD students and postdoctoral researchers. The host team, **Biomolecules: Analysis, Molecular and Cellular Interactions** is a multidisciplinary team, with expertise in biology, chemistry and physics and offers a stimulating and friendly working environment.

More information about the lab is available here:

<https://www.chimie.ens.fr/recherche/laboratoire-lbm/>

### About the candidate:

For this project, we are looking for a highly motivated candidate, **with a chemical biology/biological chemistry background**, and preferably with a prior experience with **peptide synthesis and/or lipids**. Experience in **mass spectrometry, affinity photolabeling and/or microbiology** would be a plus. The candidate should be willing to work in a **highly interdisciplinary environment** and should be able to **work independently**.

### About the application process:

Applications should be sent by email to Astrid Walrant ([astrid.walrant@sorbonne-universite.fr](mailto:astrid.walrant@sorbonne-universite.fr)) and Emmanuelle Sachon ([emmanuelle.sachon@sorbonne-universite.fr](mailto:emmanuelle.sachon@sorbonne-universite.fr)). **Applications must include a CV, a cover letter and a support letter from the PhD supervisor or equivalent, before Friday 3 March 2023.** Applications received after this date will not be considered.

A **first round of interviews** will take place from **Monday 13 to Friday 17 March, on Zoom**. Candidates will present their academic background and main results in a PowerPoint presentation, followed by a discussion.

A **second round of interviews** for shortlisted candidates will take place from Monday 20 to Friday 24 March. Final decision will be communicated early April and **the position will start Monday 3 July 2023.**

For further enquiries, please contact Astrid Walrant ([astrid.walrant@sorbonne-universite.fr](mailto:astrid.walrant@sorbonne-universite.fr)).