

Post-doctoral fellowship “Combining Fluorescence Microscopy and Solid State NMR to study the effect of antimicrobial peptides on living bacteria”

(24 months, FRANCE)

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Keywords: Alternatives to Antibiotics, Antimicrobial Peptides (AMPs), Mechanism of action, Biophysics, Microbiology, Fluorescence microscopy, solid-state NMR

We are currently looking for a highly skilled and motivated candidate with demonstrated expertise in Fluorescence microscopy (essential skills) and NMR spectroscopy on biological samples, with a strong desire to expand their competences to in vivo biophysics techniques. Skills in cell culture or microbiology are necessary.

PROJECT'S DESCRIPTION:

Context: There is an urgent need of new generations of antimicrobial compounds, to counteract microbial resistance. AntiMicrobial Peptides (AMPs), essential effectors of the immunity of all living organisms, are recognized as a promising alternative against resistance to antibiotics. Understanding, at the molecular level, how AMPs work in nature is the first essential step towards rational engineering of highly effective compounds.

The ANR ANTARBioTic project "Deciphering the mechanisms of action of the salt-insensitive king penguin defensins to fulfill the Global One Health Needs" is focused on the determination of the mechanism of action of a promising disulfide-rich antimicrobial peptide from the penguin.

In this project, we are developing two biophysical techniques to work with living bacteria: real-time Fluorescence spectroscopy (1), and solid-state NMR (2). Céline Landon has brought a brand new in vivo real-time Fluorescence spectroscopy experiment to Orléans, while Dror Warschawski has extended the deuterium solid-state NMR approach of Sorbonne University's NMR platform to the study of living cells.

- (1) C. Landon, Y. Zhu, M. Mustafi, J.-B. Madinier, D. Lelièvre, V. Aucagne, A. F. Delmas, J. C. Weisshaar "Real-Time Fluorescence Microscopy on Living E. coli Sheds New Light on the Antibacterial Effects of the King Penguin beta-Defensin AvBD103b". *Int. J. Mol. Sci.*,23:2057 (2022)
(2) V. Booth, D. E. Warschawski, N. P. Santisteban, M. Laadhari and I. Marcotte "Recent progress on the application of 2H solid-state NMR to probe the interaction of antimicrobial peptides with intact bacteria". *Biochim. Biophys. Acta* 1865:1500-1511 (2017)

CONTEXT OF WORK

The post-doc fellow will be supervised by Dr. Céline Landon, leader of the "NMR of Biomolecules: antimicrobials, toxins and metabolites" team at the Centre de Biophysique Moléculaire. Solid-state NMR experiments will be carried out at the LBM (Paris) under the supervision of Dr. Dror Warschawski. The post-doctoral fellow's missions will be carried out mainly at the CBM in Orléans (around 2/3 of the time), with assignments at the LBM in Paris, 1 hour away by train.

Centre for Molecular Biophysics, CNRS, Orléans, France



The Center for Molecular Biophysics (CBM) develops research at the interface of chemistry, biology and physics to study the molecular mechanisms that sustain life or dysfunctions leading to diseases.

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Laboratory of Biomolecules, Sorbonne University, Paris, France



The Laboratory of Biomolecules (LBM) projects are essentially devoted to the design of new strategies and/or tools in analytical chemistry, organic, inorganic, bio-organic, bio-inorganic, biophysics, biochemistry, biology and physiopathology, in order to observe, understand and even control the fundamental mechanisms of living organisms, and to analyze at the molecular level the specific dysfunctions associated with human pathologies.

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