

**M1-Molecular and Cellular Biology (MCB)
Internship Proposal Form
Chemistry-Biology Department**

(Deadline Friday 15th December 2023)

Laboratory Address and Affiliation:

Institut de Biologie Structurale - CNRS/CEA/UGA (UMR5075)
71, avenue des Martyrs - CS10090
38044 Grenoble Cedex 9, France

Laboratory/Team Research area (Keyword)

Institut de Biologie Structurale - Pneumococcus group (Headed by C. Morlot)
Bacterial division and sporulation. Cell wall, macromolecular protein complexes. Structural and cellular microbiology. Fluorescence microscopy (including super-resolution microscopy), click chemistry, electron microscopy, protein-protein interaction assays.

Summary of the Proposed Internship Project (10 lines)

Title: Study of the bacterial cell envelope by cellular electron microscopy

DESCRIPTION:

During vegetative growth, the bacterial cell envelope, made of a lipidic membrane and complex sugar polymers, protects them from various stresses. Some bacteria, including species that cause diseases in humans, are able to form spores, which are dormant cells insensitive to most antibacterial treatments. Among the determinants of spore resistance is an extremely robust cell envelope containing a multi-protein shell called the coat. The structures of the bacterial cell envelope and spore coat are not yet fully elucidated, mainly because they involve macromolecular complexes of nanometric dimensions. During the internship, the student will culture vegetative *Streptococcus pneumoniae* and/or sporulating *Bacillus subtilis* cells and analyze their growth state by optical (fluorescence) microscopy. She/he will prepare samples for cell envelope analysis by polyacrylamide gel electrophoresis (SDS-PAGE) and cellular electron microscopy (EM). The student will contribute to the acquisition and analysis of data on various mutant strains to provide insights into the architecture of the vegetative cell envelope and/or spore coat.

Methodologies and/or Techniques to be used

Bacterial cell cultures. Fluorescence microscopy (phase contrast, fluorescence microscopy). Cellular electron microscopy. SDS-PAGE analysis. Statistical analysis.

Person to contact:

Name: Cecile MORLOT
Phone: 04 57 42 86 55
E-mail: cecile.morlot@ibs.fr

Additional information

Please provide your grade records and ranking in your class.

Bibliography to prepare the application:

Vollmer W, Massidda O, Tomasz A (2019). The cell wall of *Streptococcus pneumoniae*. Microbiol Spectr. 7(3). doi: 10.1128/microbiolspec.GPP3-0018-2018

Higgins D, Dworkin J (2012). Recent progress in *Bacillus subtilis* sporulation. FEMS Microbiol Rev. 36(1):131-48. doi: 10.1111/j.1574-6976.2011.00310.x.

Proposal Form send as a PDF file to: sabrina.boulet@univ-grenoble-alpes.fr

File has to be named as: name-Internship-M1-MCB-2023-2024.pdf