

**Internship project Master 2
Year 2017-2018**

Laboratory/Institute: Institut de Biologie Structurale
Team: Pneumococcus group

Director: Winfried Weissenhorn
Head of the team: Thierry Vernet

Name and status of the scientist in charge of the project: Cecile MORLOT, CR1

HDR: not yet (HDR defense planned for June 30th, 2017)

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Program the Master's degree in Biology:

- Neurosciences and Neurobiology Immunology, Microbiology, Infectious Diseases
 Integrative Structural Biology Physiology, Epigenetics, Development, Differentiation

**Title of the project: Functional and structural studies of a macromolecular complex
involved in bacterial sporulation**

Objectives (up to 3 lines):

Get insights into the function and structure of GerM, a protein that was recently shown to be involved in *B. subtilis* sporulation.

Abstract (up to 10 lines):

Bacterial sporulation is a fascinating development process with many implications in industry and medicine. Our project focuses on the SpoIIIA-SpoIIQ multiprotein membrane complex (the **A-Q complex**) that is essential for spore development. This complex displays similarities to endotoxin secretion systems and we showed that it contains an oligomeric ring with architecture and dimensions similar to those found in type III secretion systems, providing direct evidence for a **channel** connecting mother cell and developing spore. In parallel, the **GerM** lipoprotein was shown to be required for the localization of the A-Q complex around the developing spore and we recently obtained crystals of GerM. We propose a M2 project aiming at solving the structure of GerM to search for potential resemblance with proteins from endotoxin secretion systems, and at investigating the function of GerM in the assembly of the A-Q complex.

Methods (up to 3 lines):

Purification and crystallization of recombinant constructs of GerM, structure determination using X-ray crystallography, test of GerM interaction with components of the A-Q complex using microscale thermophoresis (*in vitro*), cellular localization of GerM using super-resolution microscopy (*in vivo*).

Up to 3 relevant publications of the team:

Rodrigues*, Henry*, Neumann, Kurauskas, Bellard, Fichou, Schanda, Schoehn, Rudner, **Morlot**⁺ (2016). A ring-shaped conduit connects the mother cell and forespore during sporulation in *B. subtilis*. *Proc. Natl. Acad. Sci. USA* 113(41):11585.

Jacq, Adam, Bourgeois, Moriscot, Di Guilmi, Vernet, **Morlot**⁺ (2015). Remodeling of the Z-ring nanostructure during the *S. pneumoniae* cell cycle revealed by PhotoActivated Localization Microscopy. *mBio* 6(4). pii: e01108-15. doi: 10.1128/mBio.01108-15

Peters*, **Morlot**^{**}, Yang, Uehara, Vernet, Bernhardt (2013). Structure-function analysis of the LytM domain of EnvC, an activator of cell wall remodelling at the *E. coli* division site. *Mol. Microbiol.* 89(4):690. doi: 10.1111/mmi.12304

* *Equal contribution*

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Requested domains of expertise (up to 5 keywords):

Recombinant proteins, chromatography, protein-protein interaction techniques, fluorescence microscopy