

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

(Deadline Friday 18th December 2020)

Laboratory Address and Affiliation:

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

Laboratory/Team Research area (Keyword)

Institut de Biologie Structurale - Pneumococcus group (Headed by T. Vernet)
Bacterial sporulation. Specialized secretion systems. Macromolecular protein complexes. SpoIIIA-SpoIIQ complex. Structural and cellular biology.

Summary of the Proposed Internship Project (10 lines)

Title: Study of a new secretion system involved in *Bacillus subtilis* sporulation
DESCRIPTION:

Bacterial sporulation is a differentiation process leading to the development of a highly resistant spore (temperature, antibiotics). Spore development requires the assembly of the A-Q membrane complex, which is a new secretion system that transports yet-to-be discovered molecules between the mother cell and the developing spore (see Figure) (Morlot and Rodrigues, 2018). We have identified the main component of the transport channel and solved its structure by cryo-electron microscopy (Rodrigues et al., 2016). Recently, we have also identified the components (called AC, AD and AE) that could constitute the export machinery, or in other words the protein sub-complex that would load the putative substrate(s) into the secretion channel. During this internship, the student will produce and purify recombinant forms of AC, AD and AE, and perform preliminary electron microscopy analyses to characterize the structure of the reconstituted AC-AD-AE sub-complex.

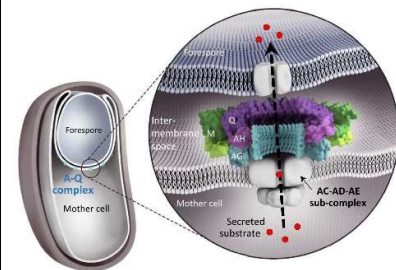


Fig. Model of the A-Q secretion system involved in bacterial sporulation. The AC-AD-AE sub-complex (unknown structure) would load substrates (red circles) into the transport channel formed by AG, AH, M and Q.

- Morlot, Rodrigues (2018). The new kid on the block: a specialized secretion system during bacterial sporulation. *Trends Microbiol.* pii: S0966-842X(18)30001-5
- Rodrigues, ..., 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

Methodologies and/or Techniques to be used

Production and purification of recombinant proteins (membrane and soluble forms).
Affinity and size-exclusion chromatography. Western blots.
SEC-MALLS. Protein-protein interaction assays.
Single-particle electron microscopy.

Person to contact:

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E-mail: andre.zapun@ibs.fr

Additional information

We are looking for highly motivated students who would ideally want to continue their studies with a M2 and a thesis. Candidates for this internship should send a CV, a motivation letter, their L3 grades and first M1 grades if available.

Proposal Form send as a PDF fil to: mohamed.benharouga@cea.fr

File has to be named as: name-Internship-M1-MCB-2019.pdf