Soutenance

THESE

Vendredi 08 Février 2019 à 14h

Salle des séminaires

Institut de biologie structurale - 71 avenue des Martyrs CS 10090 38044 Grenoble Cedex 9 - T.+33 (0)4 57 42 85 00

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Dynamique et Cinétique des processus moléculaires (DYNAMOP)

Deinococcus radiodurans cell morphology and nucleoid organisation & dynamics

Thèse de Doctorat de l'Université de Grenoble

During this PhD work, we have studied on *D. radiodurans*, a coccus, known for its intriguing outstanding resistance to different stress factors. Studies on *D. radiodurans* have been mainly focusing on its tremendous radioresistance. 52 years after its discovery, its nucleoid organization/segregation as well as its cell morphology during its cell cycle still remain elusive. Most of our knowledge on the bacteria shape during division and on the nucleoid organization/segregation arises from the study of a small number of "model bacteria", that are mainly rod-shaped or ovoid. In contrast, little is known on the nucleoid organization/segregation of cocci. Moreover, the small relative size of bacteria and of their nucleoids (<1µm3) has limited their studies by conventional microscopy.

One of the aims of this PhD project is to contribute to a better understanding of the cell morphology and the nucleoid organization/segregation in *cocci.* For that matter, we explored the 4D organization and the dynamics of *D. radiodurans* nucleoids, as a function of the cell cycle progression and growth phase. Several strategies were undertaken: (i) timelapse 3D stacks by spinning confocal microscopy (ii) dynamics studies with FRAP analysis and SptPALM acquisitions, and (iii) cartographies of nucleoid associated proteins using super-resolution microscopy (PALM). We were thus able to show that the multiple copies of the 4 replicons that possess *D. radiodurans* are grouped into a single nucleoid, which adopts distinct shapes throughout the cell cycle: a toroid shape in new-born cell, a square shape or a crescent shape in the next phases of the cycle, a rod shape at the beginning of septation, a branched shape during later stage of septation and a double ring shape at the end of cytokinesis. These observations will be the basis of future works on the dynamics of DNA repair machineries and also bring new perspective on DNA organization and segregation in *cocci*.