

Bacterial chromosomes are highly organised and well compacted in the limited space of cells, but formation of spores requires even more extensive compaction of DNA. Until now, chromosome organisation during this process was only studied in *Bacillus* spp, rod shaped bacteria that produce endospores. Our project focuses on the chromosome compaction during sporulation of *Streptomyces*, mycelial producers of numerous secondary metabolites such as antibiotics and cytostatics. During sporulation, *Streptomyces* multigenomic hyphal cells are converted into chains of exospores. Our aim is to investigate the chromosome organisation during *Streptomyces* sporulation and during their spore germination. We expect that a set of DNA organising proteins that includes nucleoid associated proteins and condensins cooperates to execute the DNA compaction and we assume that elimination of these proteins will impair chromosome segregation and cell division that are associated with sporulation. We hypothesize that the aberrant chromosome compaction will also modify the genes expression during sporulation and during germination, influencing spores dormancy and their viability.

We will apply the time lapse fluorescence microscopy to analyse the details of the chromosome organisation in the wild type and mutant strains in real time at the single cell level. To describe the chromosome organisation during sporulation and germination we will use the strains with specific chromosomal regions marked. To address the role of chromosome organising proteins during *Streptomyces* sporulation we will construct the mutant strains with the genes encoding chromosome organising proteins deleted. Using segregation and cell division proteins fused to fluorescent proteins we will elucidate how the chromosome organisation affects the processes associated with sporulation. To address the question how disturbances of the chromosome compaction affect gene expression, we will use the reporter genes fused to late sporulation genes or early germination genes.

Our studies will give us an unprecedented insight into the chromosome organisation in bacteria during the spore formation and their germination. They are also expected to confirm the existence of epigenetic -like mechanism of gene expression regulation by the chromosome compaction in bacteria that are producers of highly valued secondary metabolites.