

RIBO-PAUSE: Ribosomes and Translation.

Pausing of protein biosynthesis in bacteria.

Protein synthesis (translation) is an essential process in every living cell. Translation machinery can adapt to various environmental conditions such as lack of nutrients or presence of antibiotics. Organisms like bacteria have developed various strategies for how to process translation in such adverse condition, for example with specialised translation factors that interact with the ribosomes (protein factories) to aid protein synthesis.

Bacillus subtilis is a commonly used laboratory strain which can undergo a process of spore formation (sporulation) when it meets harsh environmental conditions. The bacterium decides to stop dividing and to start producing spores, dormant and tough structures, resistant to unfavourable environmental conditions. The process of sporulation is well characterised, especially regarding morphological changes and the control of gene expression. However, protein biosynthesis and how it is regulated during sporulation is not as well-investigated, and has only recently become the research focus for scientists.

In this project, we will investigate how protein biosynthesis is regulated during sporulation, especially at the early stages of spore formation. We have already discovered that at the time of early sporulation, protein biosynthesis in *B. subtilis* pauses and then, when the early spore is formed, protein biosynthesis resumes. Here, we will examine the role and mechanism of such ribosomal pausing by addressing three scientific goals: (1) identification of specialised translation factor(s) called hibernation factor(s) that can aid in translation pausing, (2) characterisation of the identified hibernation factor(s), (3) elucidation of how the hibernation factor(s) interact with the ribosome and what role it plays during spore formation. By learning about the biological processes essential for bacterial survival we will not only broaden our current knowledge but also expand our arsenal in the fight against antibiotic-resistant microbes.