DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

Bdellovibrio bacteriovorus is a small (0.2-0.5 μm wide and 0.5-2.5 μm long) Gram-negative bacterium which inhabits a wide range of environments, including fresh water, sewage, soil and even mammalian intestines. A characteristic feature of this bacterium is its predatory lifestyle – it develops in other Gram-negative bacterial periplasms. *B. bacteriovorus* exhibits a biphasic lifestyle: in the free-living attack phase this highly motile bacterium encounters prey and enters to the cell periplasm; in the growth phase *B. bacteriovorus* degrades the host's macromolecules using different types of hydrolytic enzymes and uses reaction products to form its own cell structures. When the resources of the host cell are exhausted, the elongated filament synchronously septates to form usually three to six *B. bacteriovorus* progeny cells. These progeny cells become motile, and then are released into the environment through lysis of the remaining dead host cell.

This unusual *B. bacteriovorus* life cycle is strictly related with a basic and key cellular process – chromosome replication. Only *B. bacteriovorus* cells at the growth phase in the host periplasm are able to actively replicate their genetic material. Research conducted by our team led to identification and characterization the key elements of this process in *B. bacteriovorus* cell – region of initiation of chromosomal replication (*oriC*, *origin of chromosomal replication*) and the initiator protein DnaA We also analysed their interactions *in vivo* and *in vitro*. When chromosome replication had initiated in *oriC* region the multiprotein replication complex (replisome) is formed to replicate cellular DNA. Our project involve creating system for replisome observation in a single *B. bacteriovorus* cell inside other Gram-negative bacterium periplasm in real time. Using *B. bacteriovorus* strains constructed by us wherein one of the key replisome proteins is fused with a fluorescent protein, we are able to analyze replisome dynamics in *B. bacteriovorus* filament as several progeny cells arise from it. We will attempt to elucidate how DNA replication is correlated with formation of an odd number of *B. bacteriovorus* progeny cells.

Predatory life cycle of *B. bacteriovorus* leads to killing the host bacterium, which can be also pathogenic bacteria such as *Escherichia coli*, *Salmonella typhimurium*, *Pseudomonas aeruginosa* or *Helicobacter pylori*. For this reason *B. bacteriovorus* is seen as a living antibiotic which may provide an alternative to existing antibacterial agents. However, to fully exploit the potential of this bacterium for use in industry or medicine, it is necessary to improve our understanding of its life cycle at the single cell level. The microscopic system designed by us will allow to describe a novel variation on DNA replication dynamics – one of the key cellular process. The obtained results will significantly expand our knowledge on the bacterial chromosome replication and bring us closer to the use of *B. bacteriovorus* as an alternative to existing antibiotics.