The replication of DNA is one of the fundamental metabolic processes of the all living cells. In bacteria, duplication of the genetic material is crucial for survival. *Escherichia coli*, a Gram-negative bacterium, is one of the best known organisms studied so far. In our studies we found that in cells devoid of specific cellular factor – the Hfq protein, the DNA replication of some plasmids is stimulated (plasmids are the specific circular DNA fragments). However, some plasmid revealed unusual replication patterns. Those plasmid originate from specific bacteria-attacking viruses, lambdoid phages. We plan to use many advanced techniques (for example electron microscopy and molecular magnetic tweezers and several others) to determine the role of Hfq protein in lambdoid DNA propagation. This will help in understanding not only the details about the DNA regulation but also reveal some knowledge about the biology of lambdoid bacteriophages which attack *E. coli* cells. Moreover, on one hand, it will be possible to perfom advanced studies at the molecular level on this model prokaryotic organism, and on the other hand, results obtained in such studies may be considered as those of general biological meaning.