Guided work: 3

Exercice:

In a hypotonic medium, *B. subtilis* behaves normally, but when lysozyme is added, the bacteria swell and burst due to the degradation of the peptidoglycan. In an isotonic medium with lysozyme, *B. subtilis* forms spherical structures called **protoplasts**, which lose their antigenic properties, cannot divide, fix bacteriophages, or move. Similarly, *E. coli* forms **spheroplasts** in an isotonic medium with lysozyme, but they retain their initial properties. These observations highlight several roles of the bacterial cell wall: maintaining cell shape, providing protection against intracellular osmotic pressure, possessing antigenic properties (e.g., teichoic acids in Gram+ and LPS O-antigens in Gram-), enabling bacteriophage fixation, supporting flagellar mobility, and contributing to Gram- toxicity via the LPS endotoxin. Additionally, the wall allows small molecules to pass while limiting others. The space between membranes in Gram- bacteria, called the periplasmic space, contains enzymes for nutrient processing, unlike Gram+ bacteria, which excrete these enzymes externally.

Questions

1- What is the primary role of the bacterial cell wall demonstrated here?
2- Why do bacteria burst in a hypotonic medium when lysozyme is added?
3- What is the difference between a protoplast and a spheroplast?
4- Why do protoplasts lose their antigenic properties?
5- What are the key antigens in Gram+ and Gram- bacteria?
6- Name at least three roles of the cell wall demonstrated by this experiment.
7- How does the cell wall contribute to bacteriophage fixation and bacterial mobility?
8- Why do Gram+ bacteria excrete enzymes externally while Gram- bacteria retain them in the periplasmic space?