

Tutorial session 4: Bacterial cell structure (Part III)

Learning objectives:

- Distinguish between different bacterial surface appendages (pili, flagella) and their functions.
- Understand the role of the capsule in virulence and adaptation.
- Analyze the structure and formation mechanism of the endospore.

Exercise I: Surface appendages – pili and flagella

Complete the comparative table:

Characteristic	Common pili (Fimbriae)	Sex pili
Number per bacterium		
Length		
Location		
Composition		
Main function		

Exercise II: Flagella

1. Identify and name the different types of flagellar arrangements

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2. Explain the difference in basal body structure between Gram+ and Gram- bacteria.

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3. Why flagella are considered antigenic structures?

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Exercise III: The capsule

1. Describe the appearance of the bacterial capsule when observed under light microscopy after India ink staining. Explain why it appears this way.

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2. List the main functions of the capsule.

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3. Two strains of *Streptococcus pneumoniae* are available:

- Strain S: smooth form, mucoid colonies
- Strain R: rough form, dry colonies
 - ✓ Which strain possesses a capsule?
 - ✓ Which strain is virulent? Why?

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Exercise IV: The Endospore

1. Describe the possible positions of the spore within the vegetative cell.

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2. Explain the phrase "the spore may or may not deform the vegetative cell".

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3. Explain the role of dipicolinic acid (DPA) in spore resistance.

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4. What conditions trigger germination?

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5. What are the methods for destroying spores?

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6. Explain the principle of tyndallization in relation to germination.

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7. Complete the comparative table:

Characteristic	Vegetative Cell	Endospore
Metabolism		
Water content		
Presence of DPA		
Heat resistance		
UV resistance		