# فسيولوجيا الأحياء الدقيقة
# Microbial Physiology

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مكتب ٢ ب ٤٥

## مقدمة
## Introduction-L6

# The Motility of Flagellated Bacteria

- Flagella can be positioned varyingly around the cell.
- The position of flagella can be:
    - **Polar:**
        - Monotrichous- Single polar flagellum.
        - Lophotrichous- Single flagellum at both ends.
        - Amphitrichous- Tuft of flagella at one or both ends.
    - **Periphery:**
        - Peritrichous- Flagella surrounding the bacterial cell.
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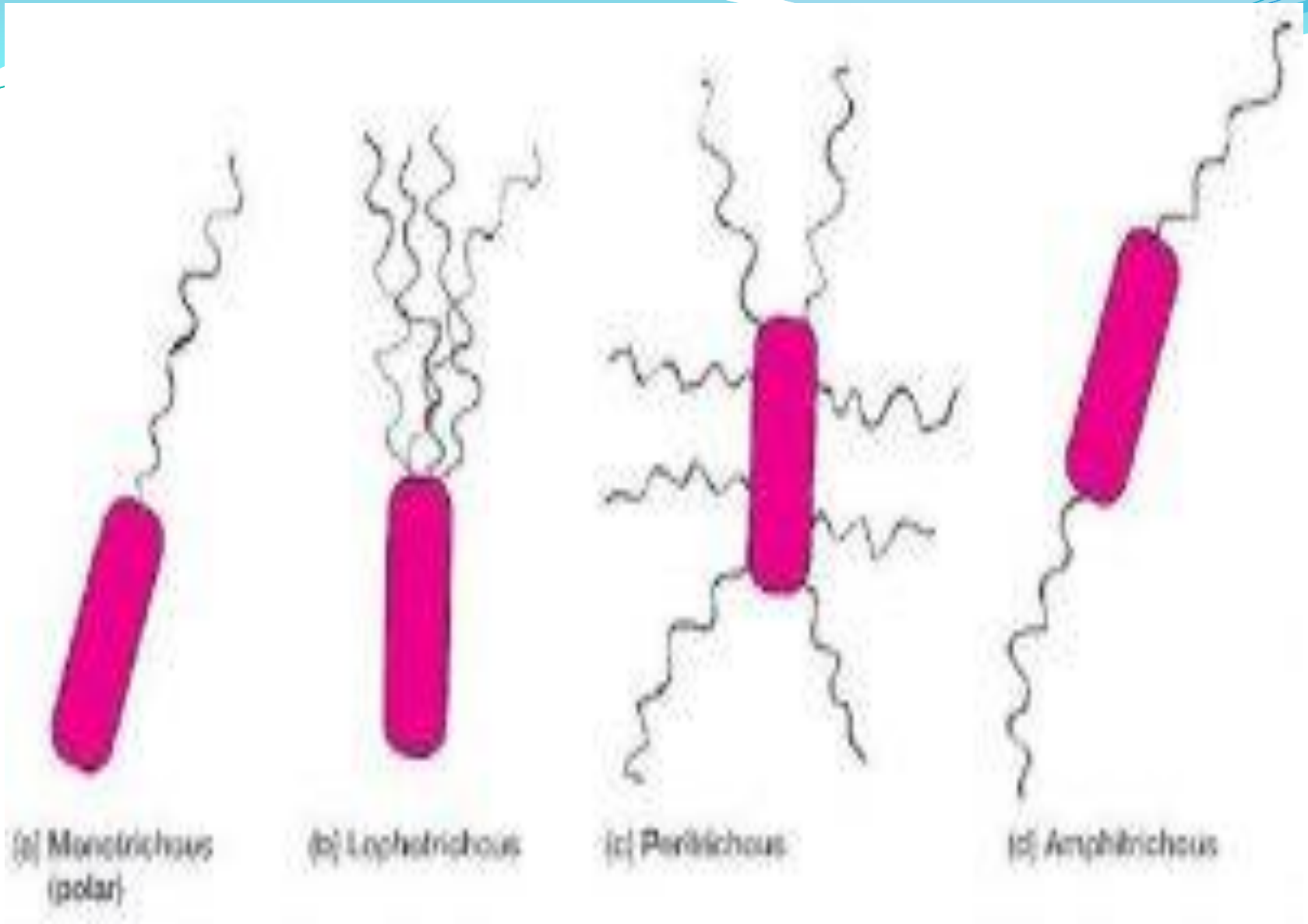

(a) Monotrichous (polar)
(b) Lophotrichous
(c) Peritrichous
(d) Amphitrichous

# The Motility of Flagellated Bacteria

- Two types of motion associated with the flagella:
  - **The run**:
    - Flagella are rotating counter-clockwise.
    - The cell moves in a single straight direction.
    - Duratiom 1-2 Seconds.
  - **The tumble**:
    - Occurs when the cell quickly and randomly changes directions.
    - Turns the flagella clockwise.
    - Duration is usually 0.1 seconds.

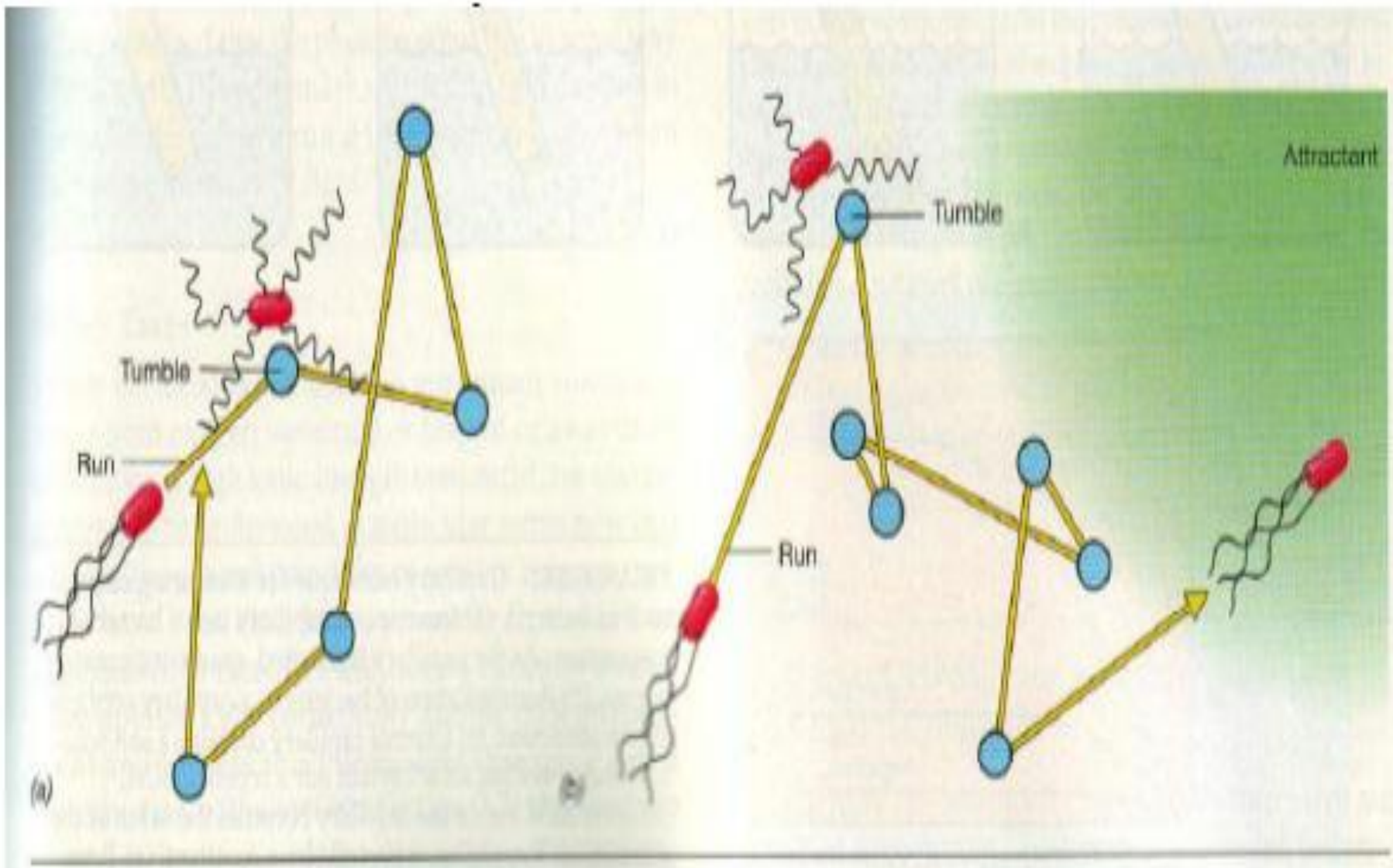



**FIGURE 3.50** Chemotaxis. (a) In the absence of a chemical attractant the cell swims randomly in runs, changing direction during tumbles. (b) In the presence of an attractant runs become biased, and the cell moves up the gradient of the attractant.

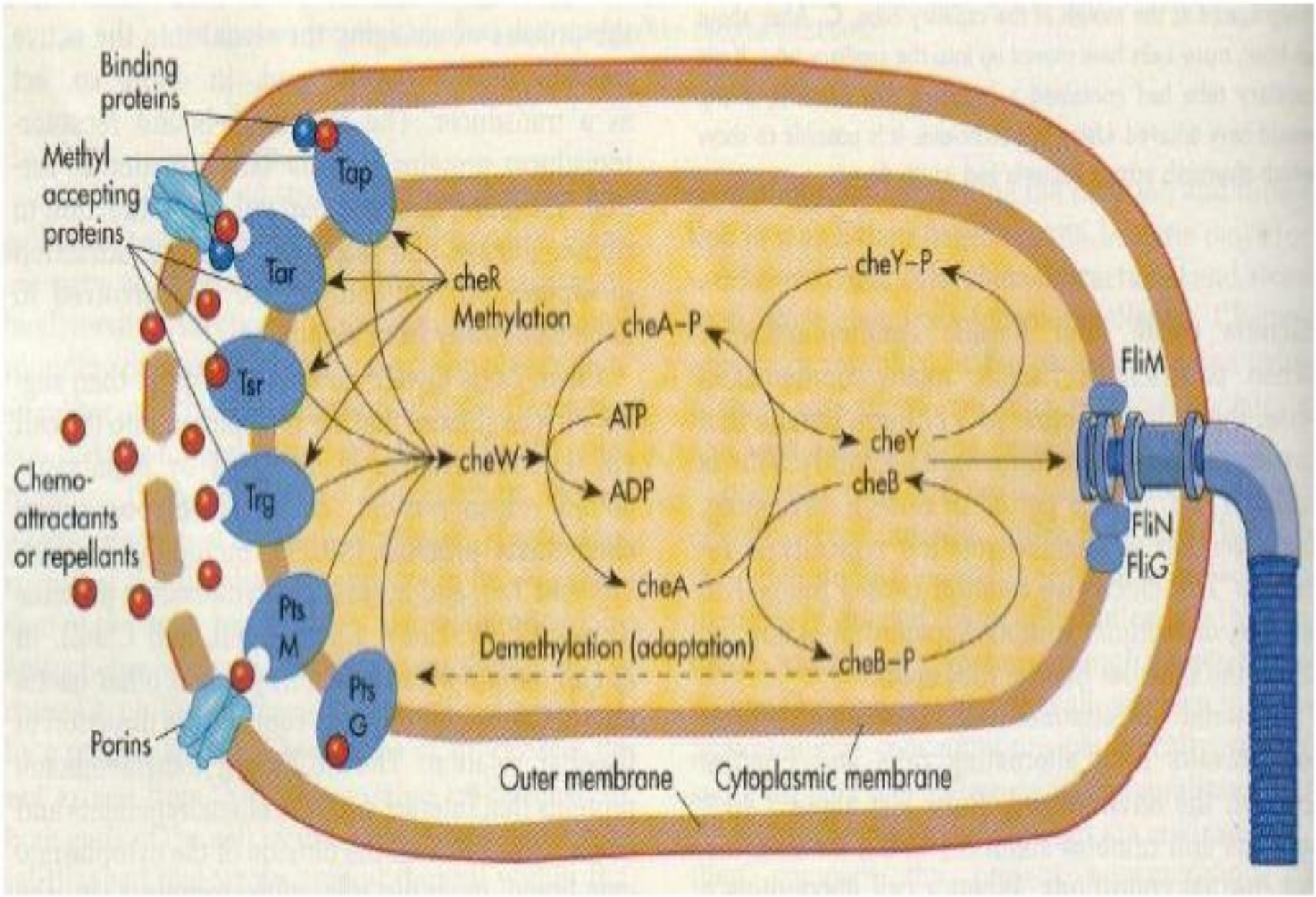
# Chemotaxis

- Movement either towards or away from chemical attractants or repellents.
- Signalled through receptors in the periplasmic or cytoplasmic membrane.
- Results in signals are sent to the flagellum.

- Major Components:
  - **Flagella**.
  - **Attractants-** substances beneficial to the cell.
  - **Repellents-** substances harmful to the cell.
  - **Methyl-accepting chemotaxis proteins** (MCPs).
    - ✓ Tap: Galactose-galactose binding protein.
    - ✓ Tar: Aspartate.
    - ✓ Tsr: Serine.
    - ✓ Trg: Ribose-ribose binding protein.

# Chemotaxis

- Major Components Cont:
  - **Che proteins**:
    - ✓ CheA- histadine kinase.
    - ✓ CheW- involve in autophosphorlation of CheA.
    - ✓ CheR- Methyl transfease & $CH_3$ group addition to MCPs.
    - ✓ CheB- Methyl esterase & $CH_3$ group removal from MCPs.
    - ✓ CheZ- De-phosphorlates CheY.
    - ✓ CheY- Interacts with flagella motor switch proteins FliG, FliN and FliM.


Binding proteins
Methyl accepting proteins
Tap
Tar
Tsr
Trg
Pts M
Pts G
Porins
Chemo-attractants or repellants
cheR
Methylation
cheW
ATP
ADP
cheA-P
cheA
cheY-P
cheY
cheB
cheB-P
Demethylation (adaptation)
FliM
FliN
FliG
Outer membrane
Cytoplasmic membrane

# QUESTIONS??