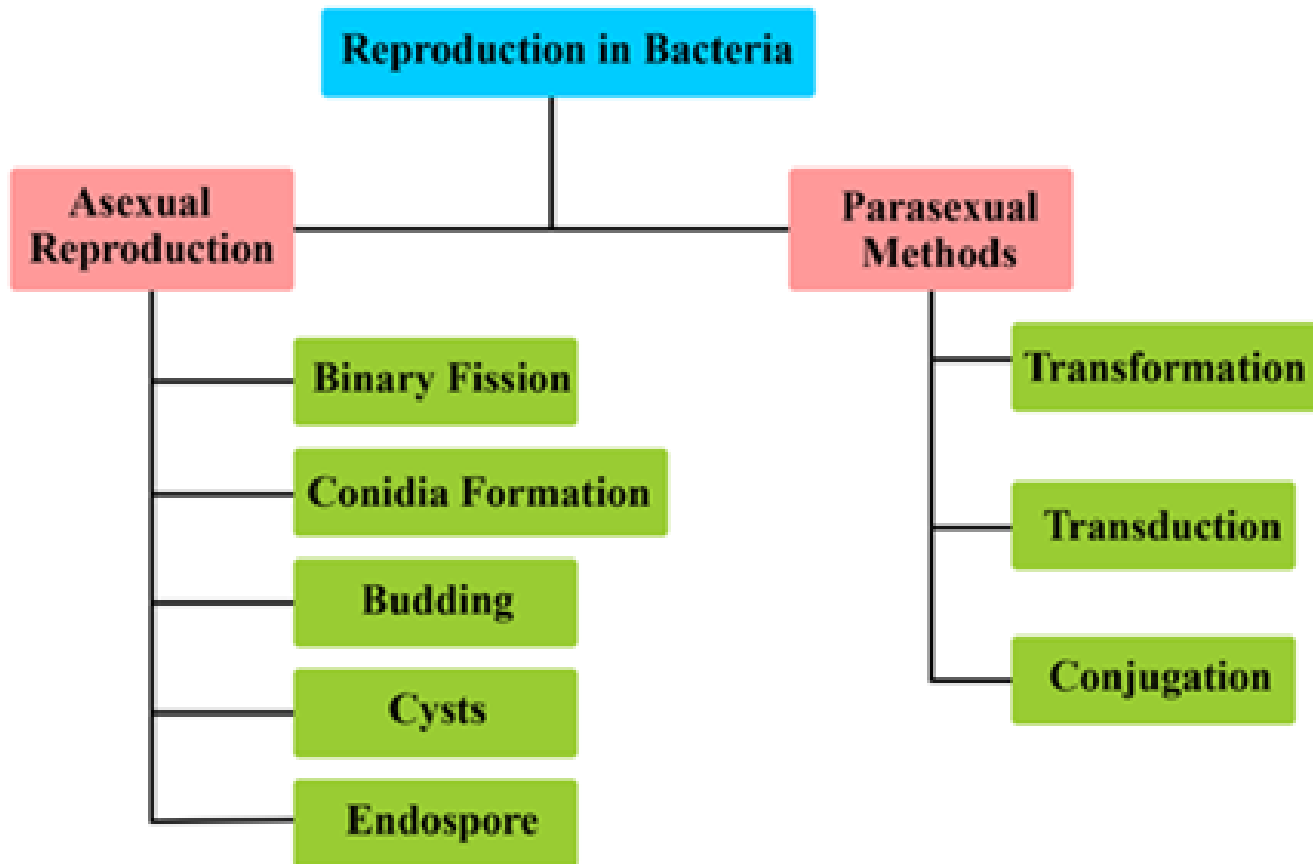


Asexual Reproduction in Bacteria

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Types of Reproduction in Bacteria

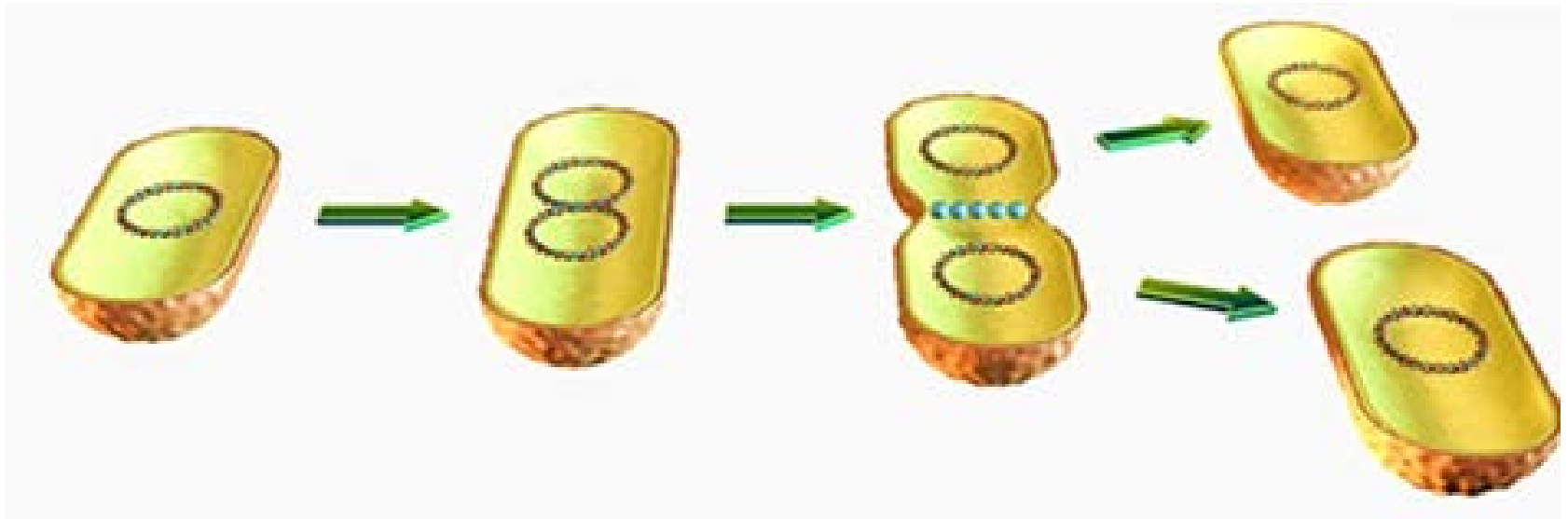


Asexual methods in Bacteria

1. Binary Fission

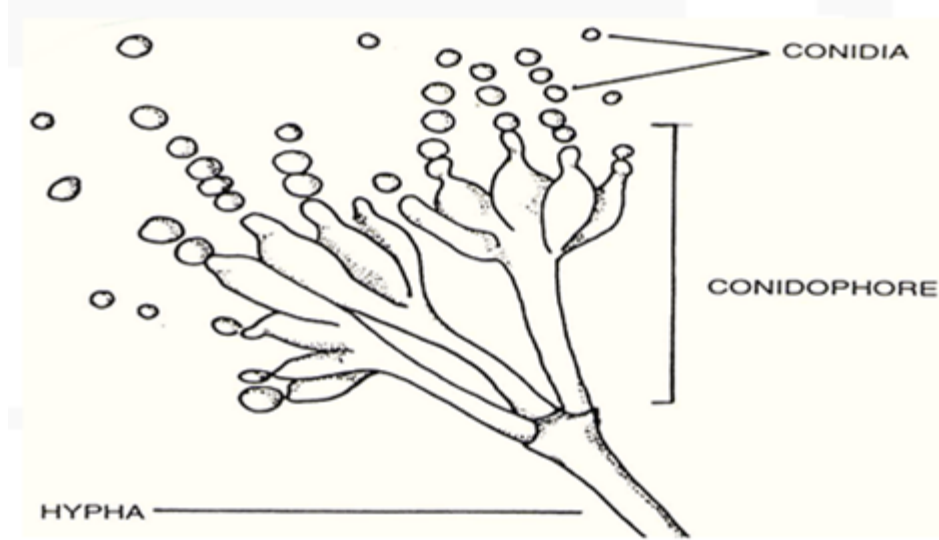
- i. Binary fission is the simplest asexual reproduction process in which a single bacterial cell divides into two.
- ii. In this process, the bacterium first copies its DNA by replication enzymes that begin at a point of origin on the chromosome then continue separating the strand in two.
- iii. After duplication of the chromosome, the bacterial cell grows in size and prepares itself for binary fission. In this stage, the cytoplasmic content of the cell and the cell organelles increases. The two chromosome strands move away to the opposite poles of the cell.
- iv. The plasma membrane invaginates and forms a transverse septum in the middle of the cell, which divides the parent cell into two new identical daughter cells.
- v. Each of the daughter cells contains the genetic material and all required cell organelles.
- vi. Binary fission is a rapid process, and it divides into daughter cells within 30 minutes. In this process, single bacteria can grow a bacteria colony within 4-5 hours.

Binary fission



Conidia Formation

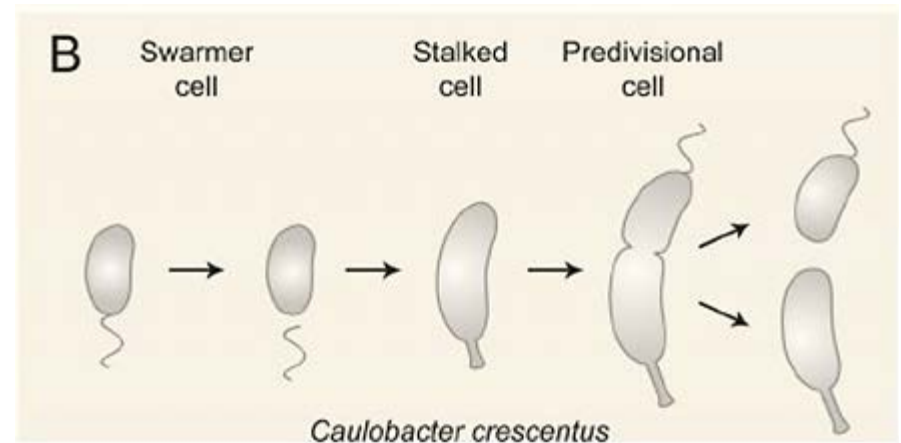
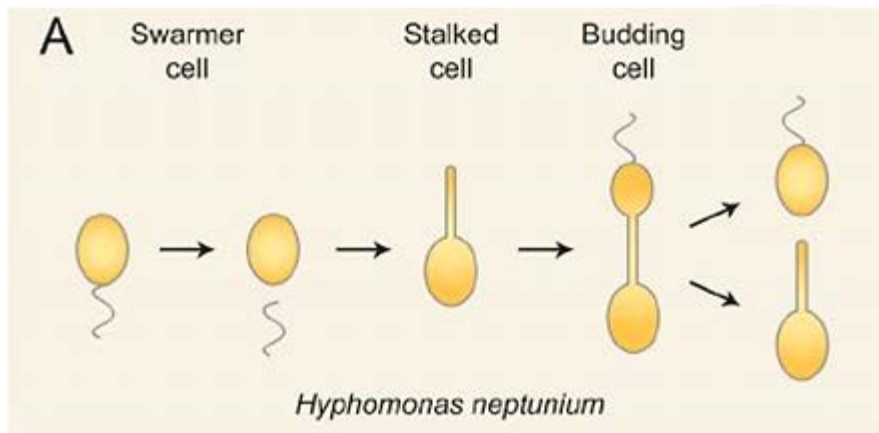
- i. In some types of filamentous bacteria like *Streptomyces*, conidia formation can be seen.
- ii. Conidia are small, chain-like, spherical, spore-like structures formed at the tips of the filaments by a transverse wall.
- iii. The part of the filament which has conidia is known as conidiophore.
- iv. After detachment of each conidium from the mother in a suitable substratum, it germinates, giving rise to a new mycelium.



Budding

- Budding is a type of asexual reproduction in which bacterial cell develops small outgrowth or bud due to a cell division at one particular site.
- These buds develop into tiny individual; simultaneously, the genetic material also undergo replication. Genetic material with some part of cytoplasm enters the bud.
- Bud will detach from the parent cell by a partition wall when it get fully mature.

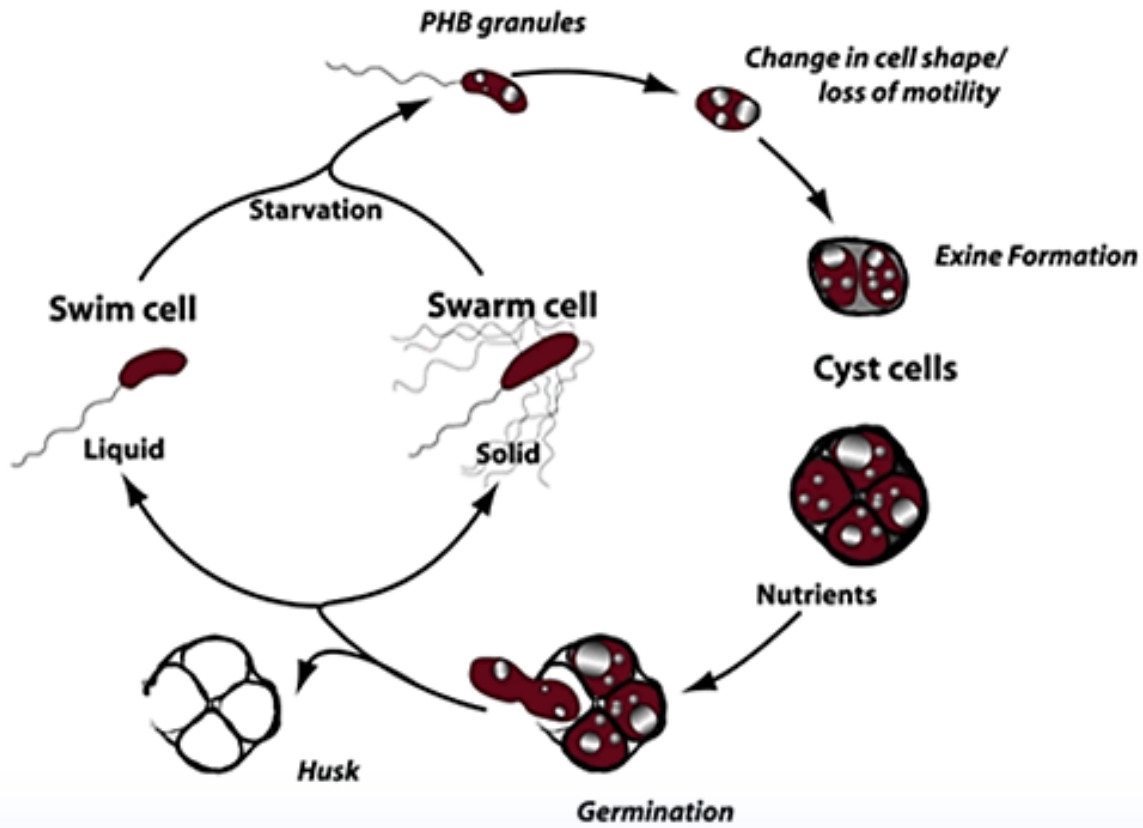
Example: Hyphomicrobium, Caulobacter, Rhodospirillum rubrum, Hyphomicrobiales, etc.



Cysts

- i. In some bacteria, cyst formation occurs.
- ii. Cysts are the resting or dormant stage of the mother bacteria cell.
- iii. Cysts are formed by the deposition of an additional layer around the mother wall.
- iv. In this stage, the metabolic process of the cell is slowed.
- v. When bacteria get a favourable environment, they break down the cyst's wall by the process called excystation and germinate to form a new bacterium.
- vi. The main function of cysts is to protect against adverse changes in the environment.
- vii. Examples found in certain species of *Azotobacter*.

Cyst formation



Endospore

- i. Spores are found to form inside the vegetative cell. Therefore, they are also known as endospores.
- ii. Endospores are perennial, tough, resistant, dormant, and specialised spores formed to overcome unfavourable conditions.
- iii. The sporangium is the endospore-producing mother cell.
- iv. A single spore is established inside a bacteria cell.
- v. In endospore, the bacteria can withstand exceedingly high and low temperatures, acidic and basic conditions, and large amounts of radiation.
- vi. For example: In *Clostridium* and *Bacillus*, the endospore has many wall layers containing heat-resistant chemicals such as sialic acid and dipicolinic acid.
- vii. These can easily be dispersed through wind, water, and the gut of animals.
- viii. On obtaining favourable climatic conditions, endospores break to release a bacteria cell.

Endospore

