

# Microbiology (2) (205 M)

## Bacteria

by

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At the end of this lecture the student must be able to:

- Describe the binary fission of bacteria.
- Describe the sexual reproduction (conjugation) of some bacteria.

# Lecture 7

## The contents

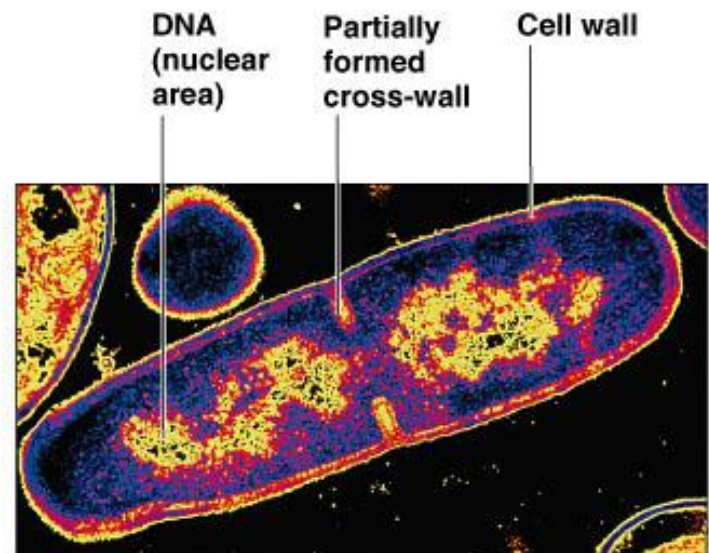
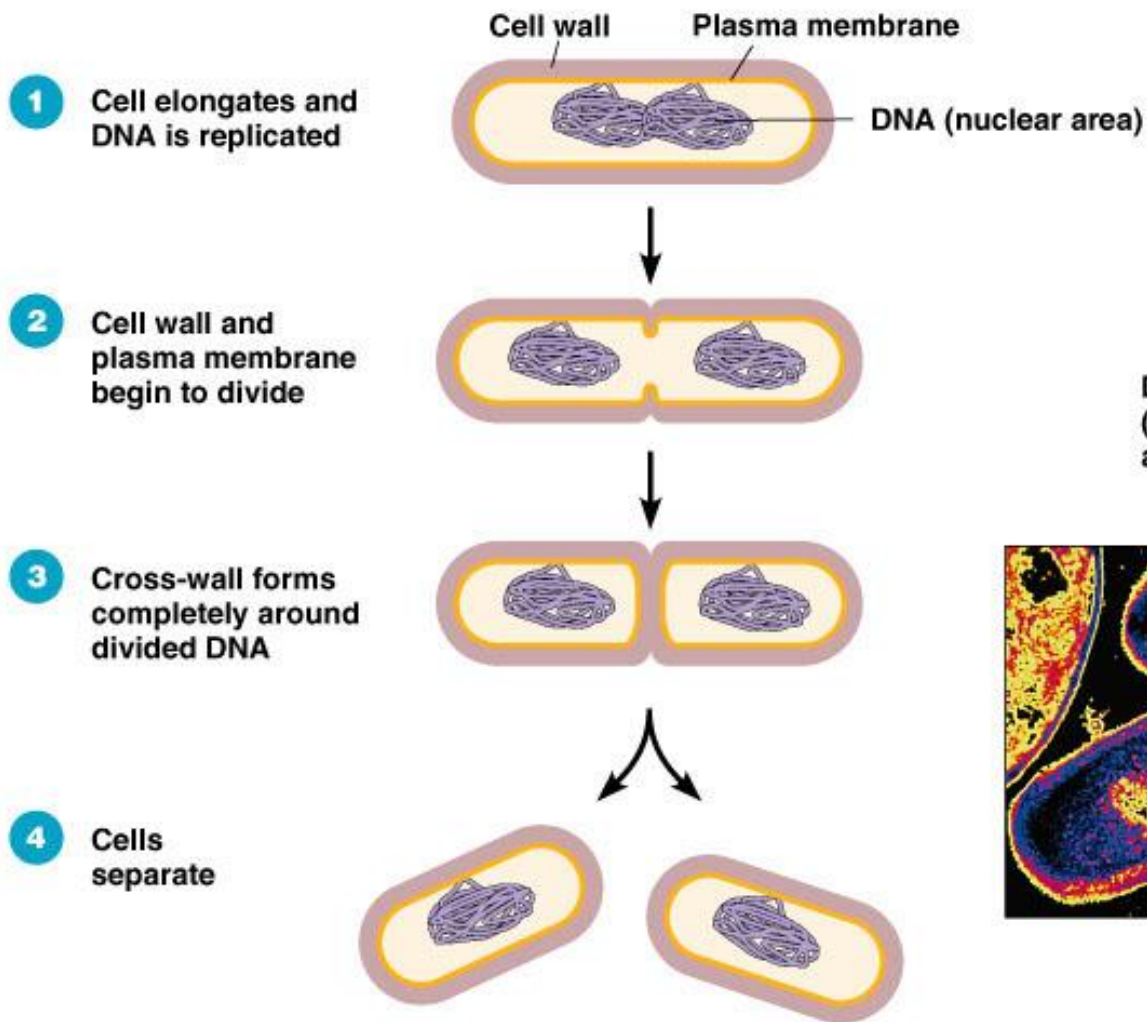
- The binary fission of bacteria.
- The sexual reproduction (conjugation) of some bacteria.

# **Reproduction of bacteria**

- **1- Binary Fission:**
- **It is still the only process through which bacteria are known to reproduce.**
- **This method of reproduction is characteristic and consequently bacteria are referred to as Schizomycetes.**

- **Binary (or transverse) fission begins with the accumulation of cell materials as a result of enzymatic transference of nutrients.**
- **The nuclear materials are increased followed by cell elongation.**
- **The contents of the cell are then reorganized and equally distributed in the two sides of the cell.**

- **The two cells are formed after the formation of a transverse wall.**
- **The latter is formed as a result of the invagination of the plasma membrane.**
- **In spite of the similarities between binary fission and the mitotic cell division in higher forms of life, no spindle can be detected during the bacterial division.**
- **The following figure shows binary fission in bacteria.**



**(a)** A diagram of the sequence of cell division.

**(b)** A thin section of a cell of *Bacillus licheniformis* starting to divide.

## **2- Sexual Reproduction (or Conjugation):**

- **Certain groups of bacteria reproduce in other ways besides binary fission.**
- **Two types of parent cells of the same species are grown in the same tube of medium.**
- **Each of the two parents possesses stable but slightly different characters.**



- **After a suitable period of time, it was noticed that the majority of the individual cells resemble one or the other parent.**
- **However, few individual cells were found to possess the characters of both parents.**
- **It was, thus believed that the latter cells are the result of a kind of conjugation occurred between some of the parent cells.**

- **The most important step of conjugation is the fusion of nuclei. The star-shaped aggregation of 4-6 cells observed in the bacteria such as *Phytomonas* spp. were suggested to be a type of bacteria conjugation.**
- **The attraction between these bacteria is not due to flagella, since they are present in the free end.**

- **This attraction can never be separated by any vigorous mean.**
- **Feulgen stain (stain used specially for DNA) reveals that DNA of the aggregated cells is a most aggregated at the center of the star.**
- **After several days, the cells of the star separate spontaneously.**

- Under the electron microscope, it was noticed that certain cell of *Escherichia coli* from a conjugation tube across which, the genetic characters are transferred from one cell to another.
- This transfer is unidirectional.
- The cell which donates the genome (set of genes) is considered the male, while the recipient is the female cell.

# Questions

- 1- complete:
- (a) Binary fission begins with..... as a result of enzymatic transference of nutrients.
- (b) The most important step of conjugation is .....
- (c) The star-shaped aggregation of 4-6 cells observed in the bacteria such as *Phytomonas* spp. were suggested to be a type of .....

# References

- 1- Mansour, F.A. Principle of bacteriology. Mansoura University.
- 2-<http://www.google.com> (search for binary fission and conjugation of bacteria).