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Microbiology

TD N°. 01: Comparison Between Prokaryotic and Eukaryotic Cells

Part I : Comparative Table: Prokaryotic vs. Eukaryotic Cells

Characteristics	Prokaryotic Cells	Eukaryotic Cells
Size		
Cellular Organization		
Nucleus		
DNA		
Membrane-bound Organelles		
Ribosomes		
Cell Division		
Reproduction		
Cell Wall		
Cellular Respiration		
Photosynthesis		
Examples of Organisms		

Part II : MCQ: Comparison Between Prokaryotic and Eukaryotic Cells

1. What is the main difference between a prokaryotic and a eukaryotic cell?

- A) The presence of a cell wall
- B) The absence of a membrane-bound nucleus
- C) The smaller size of eukaryotic cells
- D) The presence of DNA only in plasmid form

2. Which structure is absent in prokaryotic cells?

- A) Ribosomes
- B) Cell wall
- C) Mitochondria
- D) Plasma membrane

3. What type of ribosomes are found in prokaryotic cells?

- A) 70S
- B) 80S
- C) 60S
- D) 90S

4. What type of cell division do prokaryotic cells use?

- A) Mitosis
- B) Meiosis
- C) Binary fission
- D) Budding

5. Which genetic element is typical of bacteria and may contain antibiotic resistance genes?

- A) Linear chromosome
- B) Plasmid
- C) Ribosomal RNA
- D) Nuclear envelope

6. Which statement is true regarding eukaryotic cells?

- A) They are always unicellular
- B) They contain membrane-bound organelles
- C) Their DNA is circular
- D) They divide only by binary fission

7. Which structure is common to both prokaryotic and eukaryotic cells?

- A) Mitochondria
- B) Nucleus
- C) Ribosomes
- D) Endoplasmic reticulum

8. Which group of organisms is composed exclusively of prokaryotic cells?

- A) Animals
- B) Plants
- C) Fungi
- D) Bacteria

9. Which theory explains the origin of mitochondria and chloroplasts in eukaryotic cells?

- A) Theory of Evolution
- B) Endosymbiotic Theory
- C) Law of Biogenesis
- D) Cell Theory

10. What is the primary role of ribosomes in a cell?

- A) Storing DNA
- B) Producing energy
- C) Synthesizing proteins
- D) Transporting nutrients

Part III : General Information on Endosymbiosis

The endosymbiosis theory explains the origin of mitochondria and chloroplasts in eukaryotic cells. It suggests that a primitive ancestral eukaryotic cell incorporated free-living bacteria by phagocytosis, which, instead of being digested, became specialized organelles. This mutually beneficial relationship is thought to have led to the evolution of modern eukaryotic cells.

❖ Evidence for Endosymbiosis:

1. **Own DNA:** Mitochondria and chloroplasts possess circular DNA, similar to that of bacteria.
2. **Double Membrane:** Their structure suggests ancient phagocytosis.
3. **Autonomous Division:** They divide independently by binary fission.
4. **70S Ribosomes:** Similar to bacterial ribosomes.
5. **Sensitivity to Antibiotics:** Some antibiotics block their function as they do in bacteria.

MCQ on Endosymbiosis

1. What is the principle of the endosymbiotic theory?

- A) The absorption of nutrients by the cell
- B) The incorporation of a prokaryotic cell by another cell, evolving into an organelle
- C) The fusion of several eukaryotic cells to form a larger cell
- D) The exchange of genetic material between eukaryotic cells

2. Which cellular structures are considered evidence for endosymbiosis?

- A) The nucleus and cytoplasm
- B) Mitochondria and chloroplasts
- C) The Golgi apparatus and lysosomes
- D) The plasma membrane and endoplasmic reticulum

3. Which feature of mitochondria and chloroplasts supports the endosymbiotic theory?

- A) Their ability to produce digestive enzymes
- B) Their circular DNA and independent division
- C) Their exclusive presence in animals
- D) Their absence in plant cells

4. What type of division do mitochondria and chloroplasts use to multiply?

- A) Mitosis
- B) Meiosis
- C) Binary fission
- D) Budding

5. What is the probable origin of mitochondria according to the endosymbiotic theory?

- A) A eukaryotic cell that lost its nucleus
- B) An ancient cyanobacterium
- C) An aerobic proteobacterium
- D) A primitive yeast