What Is the Difference Between Prokaryotic and Eukaryotic Cells?

Worksheet

Prokaryotic cells lack a nucleus and membrane-bound organelles (found in bacteria and archaea), while eukaryotic cells have a true nucleus and membrane-bound organelles (found in plants, animals, fungi, and protists).

Questions

1. What is the key difference between prokaryotic and eukaryotic cells?

A) Cell wall presence
B) Presence of a true nucleus
C) Cell color
D) Ability to move

2. Which organism has prokaryotic cells?

A) Human
B) Mushroom
C) Bacteria
D) Plant

3. Which structure is found only in eukaryotic cells?

A) Cytoplasm
B) Cell membrane
C) Mitochondria
D) DNA

4. How does eukaryotic DNA differ from prokaryotic DNA?

A) Eukaryotic DNA is circular
B) Eukaryotic DNA is enclosed in a nucleus and organized into chromosomes
C) Prokaryotic DNA is enclosed in a nucleus
D) There is no difference

5. A biologist examines a cell under a microscope and finds no nucleus, no mitochondria, and DNA floating freely in a single circular loop. What type of cell is this, and what organism might it belong to?

6. A plant cell is examined and found to contain a nucleus, mitochondria, chloroplasts, and a cell wall. Is this prokaryotic or eukaryotic, and why?

7. Why can a eukaryotic cell (about 10-100 micrometers) be up to 1000 times larger in volume than a typical prokaryotic cell (about 1-5 micrometers)?

8. Define: What defines a prokaryotic cell?

9. Define: What defines a eukaryotic cell?

10. Define: Give an example of a prokaryotic organism.

Answer Key

1. B) Presence of a true nucleus - Eukaryotic cells have a nucleus enclosing their DNA; prokaryotic cells do not.

2. C) Bacteria - Bacteria and archaea are prokaryotes; the others are eukaryotes.

3. C) Mitochondria - Membrane-bound organelles like mitochondria only exist in eukaryotic cells.

4. B) Eukaryotic DNA is enclosed in a nucleus and organized into chromosomes - Eukaryotic DNA is linear and packaged in chromosomes inside a nucleus; prokaryotic DNA is circular and free in the cytoplasm.

5. No nucleus and no membrane-bound organelles are the defining traits of a prokaryotic cell Circular DNA without a nuclear envelope confirms this This matches bacteria, such as E. coli Eukaryotic cells, by contrast, would show a nucleus and organelles

6. The presence of a nucleus and membrane-bound organelles (mitochondria, chloroplasts) indicates a eukaryotic cell Only eukaryotic cells like plants have chloroplasts for photosynthesis The cell wall is also present, but that alone doesn't determine prokaryotic vs eukaryotic (bacteria have cell walls too) The organelles are the deciding factor: this is a eukaryotic plant cell

7. Prokaryotic cells rely on simple diffusion, limiting their size for efficient nutrient exchange Eukaryotic cells use internal membranes and organelles to organize functions across a larger volume This compartmentalization allows eukaryotic cells to grow much larger while staying efficient Size difference: (100/1) = 1,000,000, though real cells vary, so 'up to 1000x' is commonly cited for typical average sizes

8. No true nucleus and no membrane-bound organelles; DNA floats freely in the cytoplasm.

9. A true nucleus enclosing DNA, plus membrane-bound organelles like mitochondria and the ER.

10. Bacteria (e.g., E. coli) and archaea.