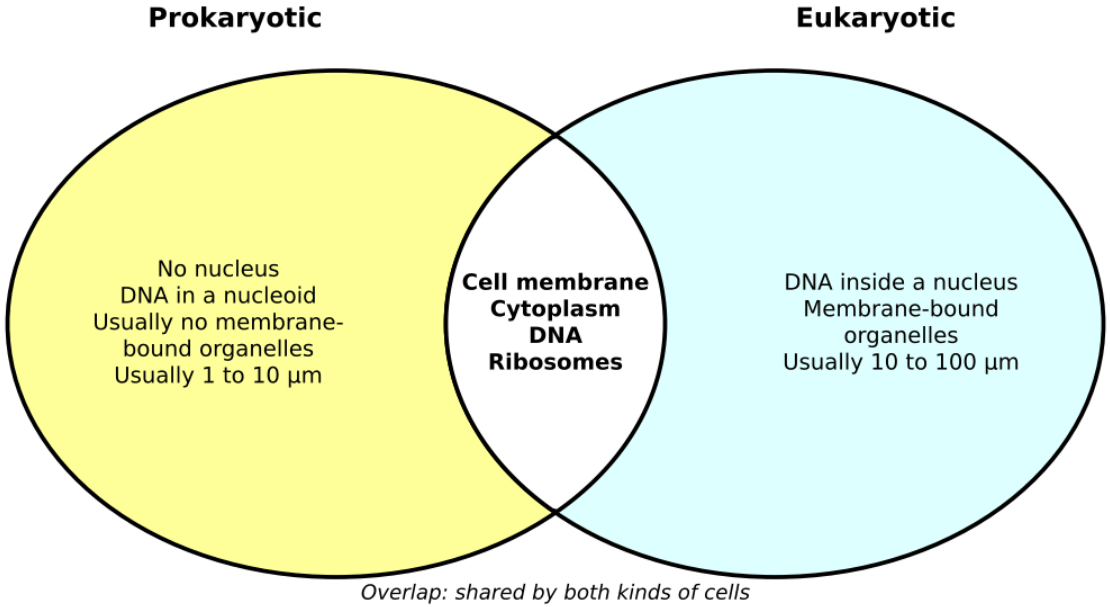
Essential Question

How are bacterial cells different from plant and animal cells?

Prokaryotic and Eukaryotic Cells

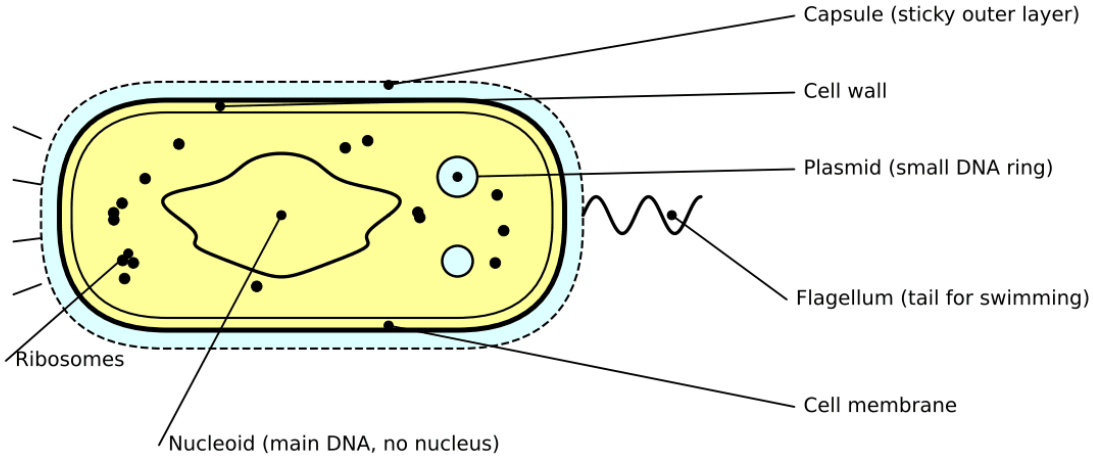
Two Kinds of Cells

- Prokaryotic cells have no nucleus
- Eukaryotic cells have DNA inside a nucleus
- Eukaryotic cells have membrane-bound organelles
- Both have a membrane, cytoplasm, DNA, and ribosomes



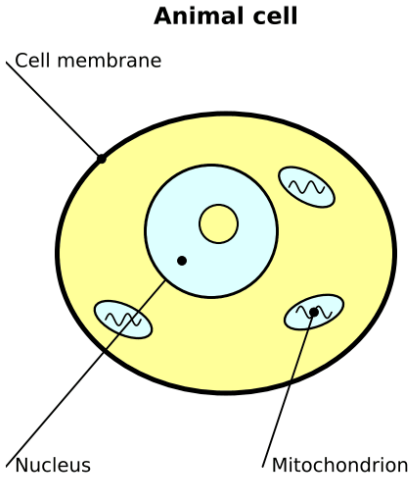
Inside a Prokaryotic Cell

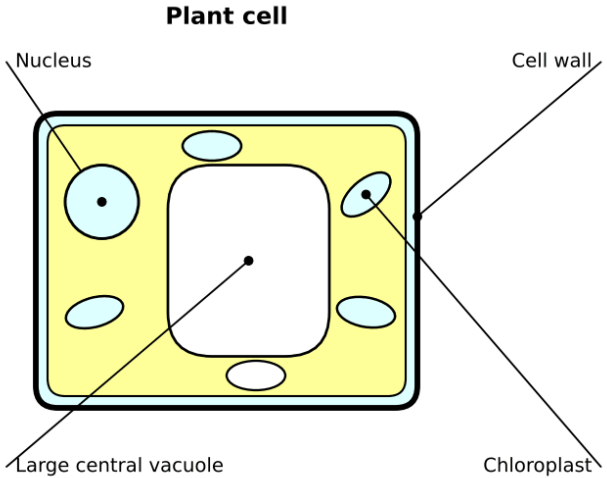
- Cell wall gives shape and protection
- DNA is a loop in the nucleoid
- Small DNA rings called plasmids
- Many bacteria have a flagellum to swim



Inside Eukaryotic Cells

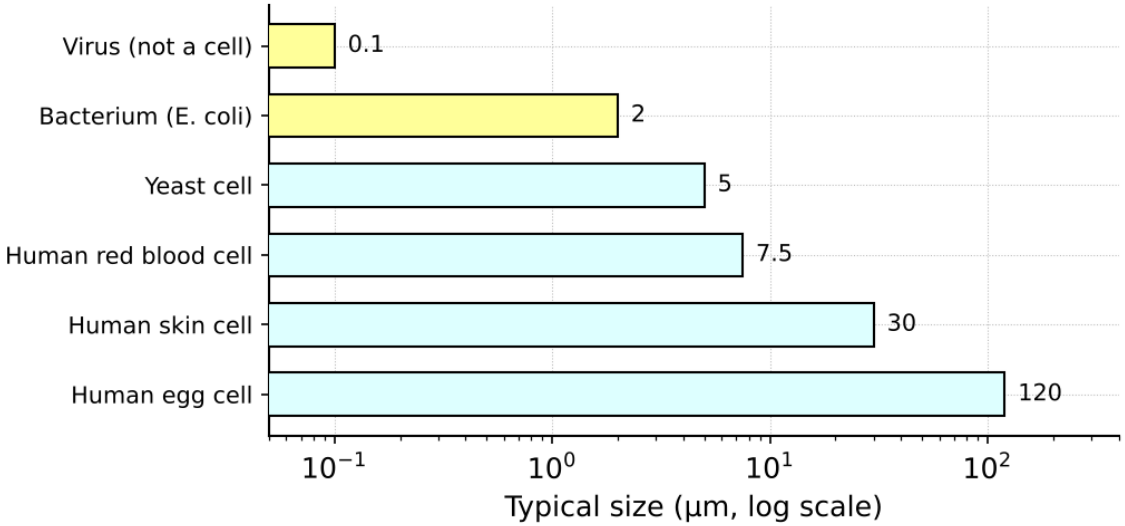
- Nucleus holds the DNA
- Mitochondria are in animal and plant cells
- Plant cells also have a cell wall
- Plant cells have chloroplasts and a large vacuole





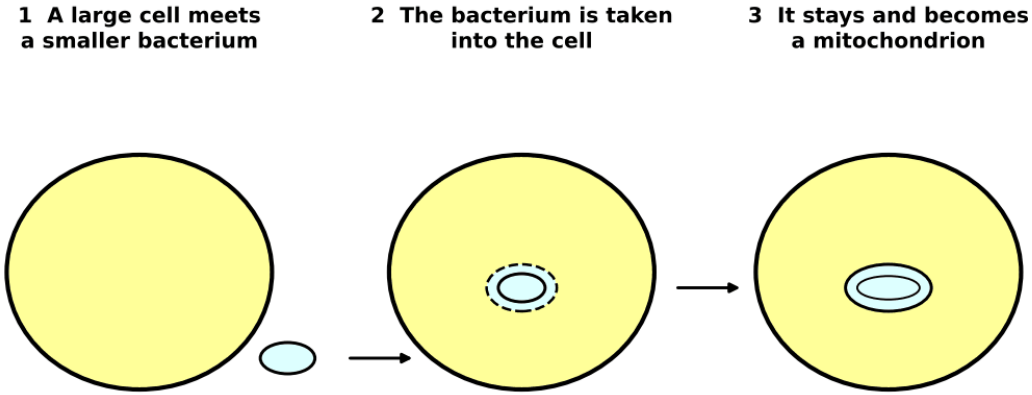
How Big Are Cells?

- Most cells are too small to see without a microscope
- Bacteria are usually about 1 to 10 µm
- Many eukaryotic cells are 10 to 100 µm
- 1 mm = 1,000 µm



Where Eukaryotic Cells Came From

- The endosymbiotic theory explains mitochondria
- A large cell took in a bacterium
- The bacterium stayed and became a mitochondrion
- DNA, ribosomes, and membranes support the theory



Evidence: mitochondria have a double membrane, their own circular DNA, and ribosomes like those of bacteria. They also divide on their own inside the cell.

Example: Finding Actual Size

A micrograph taken at ×5,000 shows a bacterium that measures 10 mm long. Find its actual length in micrometers. A typical animal cell is about 30 µm across. How many of these bacteria, placed end to end, would fit across the animal cell?

Quantity	Value
Image length	10 mm
Magnification	×5,000
Animal cell width	30 µm

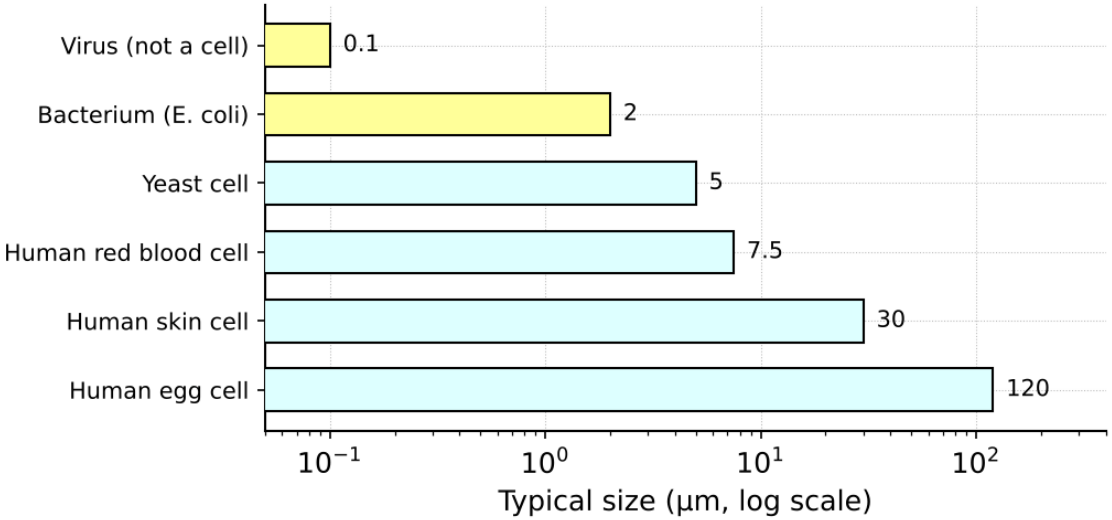
Example: Classify the Cell

A student studies three unknown cells. Use the table to classify each cell as prokaryotic, plant, or animal, and give the evidence.

Cell	Nucleus	Cell wall	Chloroplasts	Size
X	No	Yes	No	2 µm
Y	Yes	Yes	Yes	40 µm
Z	Yes	No	No	20 µm

Example: Are Eukaryotic Cells Bigger?

A student claims, "Eukaryotic cells are larger than prokaryotic cells." Use the graph to decide whether it supports the claim. Write a claim, evidence, and reasoning.



Prokaryotic and Eukaryotic Cells

Big Ideas

- Prokaryotic cells have no nucleus; eukaryotic cells do
- Eukaryotic cells have membrane-bound organelles
- Plant cells also have a cell wall, chloroplasts, and a large vacuole
- Actual size = image size ÷ magnification
- Mitochondria probably began as bacteria taken into a larger cell