# Cells Under Comparison

Use cell structures to compare samples from a garden and kitchen

**BIO.1C.2** "Investigate to compare and contrast prokaryotic cells and eukaryotic cells, and plant, animal, and fungal cells."

NAME _____ DATE _____

## 1 READ AND MARK

Read it twice

**YOUR JOB** Underline features shared by all four cell types, circle statements about nuclei, and number the three cell-wall materials 1 for plant, 2 for fungus, and 3 for bacterium so you can compare the groups.

### Four Samples, Different Cells

1. Four labeled slides arrive from a school garden and kitchen: a spinach leaf, a cheek swab, a mushroom, and plain yogurt. Each sample contains cells, but the cells do not share the same internal layout. The yogurt contains bacteria, which are prokaryotes. A bacterial cell has DNA in a region without a surrounding membrane, rather than inside a nucleus. It also lacks membrane-bound organelles. Spinach, cheek, and mushroom cells are eukaryotes: their DNA is enclosed in a nucleus, and they have membrane-bound organelles. All four cell types have a cell membrane, cytoplasm, DNA, and ribosomes.

2. On the spinach slide, leaf cells have a stiff cell wall made mainly of cellulose. Many leaf cells also have chloroplasts, where light energy helps make sugars, and a large central vacuole that stores water and helps support the cell. Cheek cells have no cell wall or chloroplasts, so their flexible outer boundary is the cell membrane. Both spinach and cheek cells contain mitochondria, organelles that release usable energy from food. The leaf and cheek cells each have a nucleus, yet only the leaf cells shown have chloroplasts. The different structures suit a leaf exposed to light and a cheek's flexible surface.

3. Mushroom cells form branching threads that absorb nutrients from their surroundings. Like spinach cells, they have a cell wall, but fungal walls contain chitin rather than cellulose. Like cheek cells, mushroom cells lack chloroplasts and cannot make sugars using light. Mushroom cells have nuclei and mitochondria, while yogurt bacteria have neither of these structures. Many yogurt bacteria have a cell wall made of peptidoglycan, unlike the walls of spinach or mushroom cells. Cell walls alone cannot identify a cell as plant, fungal, or bacterial. Comparing the wall material with the presence of a nucleus gives stronger evidence about the cell's group.

## 2 ANSWER WITH EVIDENCE

Use the passage

1. Both a yogurt bacterium and a mushroom cell can have a cell wall. How do their nuclei and wall materials differ?

2. Compare a spinach leaf cell with a mushroom cell. Name two structures they share and one structure that differs.

3. How are cheek cells and mushroom cells alike, and how does their outer boundary differ?

4. An unknown cell has a nucleus and a cell wall but no chloroplasts. Which sample is the closest match? Explain why the other three are poorer matches.

## 3 YOUR TURN

Your own words

Imagine three unlabeled samples, one from a spinach leaf, one from a mushroom, and one from yogurt. Write a short plan for sorting them by checking for a nucleus, a cell wall, and chloroplasts. Predict what you would find in each sample and explain why a wall alone is not enough.

ANSWER KEY

# Cells Under Comparison

HIGH SCHOOL · BIO.1C.2

## PART 1 · READ AND MARK

Underline features shared by all four cell types, circle statements about nuclei, and number the three cell-wall materials 1 for plant, 2 for fungus, and 3 for bacterium so you can compare the groups. Accept any marking that follows this job and points at the right text.

## PART 2 · ANSWERS

| # | QUESTION | ANSWER |
|---|---|---|
| 1 | Both a yogurt bacterium and a mushroom cell can have a cell wall. How do their nuclei and wall materials differ? | **The mushroom cell has a nucleus and a chitin wall. The bacterium has no nucleus and has a peptidoglycan wall.** |
| 2 | Compare a spinach leaf cell with a mushroom cell. Name two structures they share and one structure that differs. | **Both have a nucleus and a cell wall. The leaf cells shown have chloroplasts, but mushroom cells do not.** |
| 3 | How are cheek cells and mushroom cells alike, and how does their outer boundary differ? | **Both have nuclei and mitochondria and lack chloroplasts. Mushroom cells have a cell wall outside the membrane, while cheek cells have no cell wall.** |
| 4 | An unknown cell has a nucleus and a cell wall but no chloroplasts. Which sample is the closest match? Explain why the other three are poorer matches. | **The mushroom is the closest match. The spinach leaf cells shown have chloroplasts, cheek cells lack walls, and yogurt bacteria lack nuclei.** |

## PART 3 · YOUR TURN (SAMPLE ANSWER)

I would check cells from each sample for a nucleus, a wall, and chloroplasts. The yogurt bacteria would have no nucleus, but many would have a wall. The mushroom cells would have nuclei and walls but no chloroplasts. The spinach leaf cells shown would have all three structures. A wall alone would not sort the samples because cells from all three can have one.

Accept any two accurate shared structures for question 2, including mitochondria, cell membranes, DNA, or ribosomes. For the open task, look for a sorting plan that uses all three requested structures and recognizes that a wall is not unique to one group.