Bacteria: structure and roles

Student activity • observation and reasoning

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The question

How can a cell function without a nucleus?

Model a typical bacterial cell and distinguish its circular chromosome from plasmids. Use named examples without inferring identity from colony shape.

Equipment

- Student booklet, pencil, ruler and coloured pencils
- Blank paper cards or reusable modelling pieces

Use paper or clean reusable models. No body samples, microbial cultures or unknown biological material are handled.

Course coverage: Shared Biology / Double Award: 1.3. Prokaryotic cells and bacterial examples.

Plan, model or apparatus sketch

Draw a labelled model that explains the evidence; state what the model cannot show.

Method and reasoning

Read the whole sequence before starting

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1. Draw a typical bacterium with cell wall, membrane, cytoplasm and ribosomes.

2. Add the main circular chromosome in the cytoplasm without a surrounding nuclear membrane.

3. Add a plasmid as a separate small circular DNA molecule; label that plasmids are not present in every bacterium.

4. Compare this model with a plant cell: both have membranes, cytoplasm, ribosomes and DNA, but their organisation differs.

5. Discuss Lactobacillus bulgaricus in yoghurt production and pneumococcus as a disease-causing example. Do not identify samples or handle cultures.

6. Explain why bacteria are organisms although they have no nucleus, and why not all bacteria are pathogens.

Cleanup

- Return reusable materials and retain your corrected reasoning.

Record your evidence

Blank spaces are for your own work

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Reference and task data

Typical bacterial cell: no nucleus or mitochondria; DNA is present as a chromosome and sometimes plasmids. Bacterial walls are not plant cellulose walls. Some bacteria have capsules or flagella; these are not universal. The examples are supplied facts, not identifications from classroom cultures.

Example / task	Evidence / drawing	Reason / limitation
Bacterial model		
Eukaryote comparison		
Roles and limits		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Define prokaryotic.

2. Where is the main bacterial chromosome?

3. How does a plasmid differ from the chromosome?

4. Name two structures shared with eukaryotic cells.

5. Give a useful and a pathogenic bacterial example.

6. Does no nucleus mean no DNA or no metabolism?