Build a boundary

Year 11 Biology · ordinary

Card A · From a cell to its boundary

A typical cell has a plasma membrane separating its inside from its surroundings. The membrane is not the same as a cell wall. In a typical plant-cell model a wall lies outside the membrane. Typical prokaryotic and eukaryotic models both have membrane, cytoplasm, DNA and ribosomes; DNA location and internal organisation differ. Specialised mature cells may not fit every typical inventory.

An organelle has a function within a cell. A tissue is a group of cells and associated material organised for a function; multiple tissues contribute to an organ. A membrane's transport properties help a cell exchange materials, but one membrane drawing does not explain an entire organ or body system. If a sketch leaves a structure unlabelled, say “not shown” unless its stated inventory permits a claim of absence.

Bridge case: the complete comparison inventory of Model Leaf L states membrane, wall, cytoplasm, nucleus, mitochondria, chloroplasts and ribosomes. Model Bacterium B states membrane, wall, cytoplasm, DNA in a nucleoid region and ribosomes, with no membrane-bound nucleus. These are limited comparison inventories, not exhaustive descriptions of real specimens.

Slot 11 · Place the boundary

Read Cards A and B. Name three features shared by Leaf L and Bacterium B and one difference in DNA organisation. Describe where a plant cell wall sits relative to its membrane. On a two-line membrane sketch, place heads and tails and explain one placement. Finish: “This model shows …; it does not tell me …”.

Build a boundary · continued

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Your explanation · words, directed marks or a sketch

Shared features
DNA difference
Placement reason / limit

Build a boundary

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Card B · A fluid mosaic

A simplified typical animal plasma membrane model has a phospholipid bilayer. Each phospholipid has a water-interacting head and water-avoiding tails. Heads face the watery spaces on both sides; tails face inward toward other tails. Many lipids and proteins can move laterally, although not every component moves freely. “Fluid” describes molecular mobility, not a hole or a flowing river.

Proteins have several roles. A channel can provide a selective hydrophilic route across the membrane. A carrier binds and changes shape to move a substance; its mechanism may be passive or energy coupled. A glycoprotein has an attached carbohydrate chain and can contribute to recognition, adhesion or signalling. Not every protein is a channel. Cholesterol lies among phospholipids in this animal model and helps regulate fluidity and permeability; its effects depend on conditions. Do not claim that all cells have the same cholesterol content or that cholesterol always makes a membrane more fluid.

Our word map, from outside to inside: watery outside; outward-facing carbohydrate on a glycoprotein; heads; inward tails with cholesterol; heads; watery cytoplasm. A channel spans the bilayer. This is a simplified model, with no scale and no full inventory of membrane components.

Slot 12 · Give a component a job

Use Card B. Explain how a channel, a glycoprotein and cholesterol contribute to this animal membrane model. Add a carrier's possible role. Correct this caption: “Every protein is a pump, and cholesterol always increases fluidity.” Keep a specific limit beside your correction.

Build a boundary · continued

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Your explanation · words, directed marks or a sketch

Outside water

Cytoplasm · add labels and explain one placement

Component / function / corrected caption / model limit