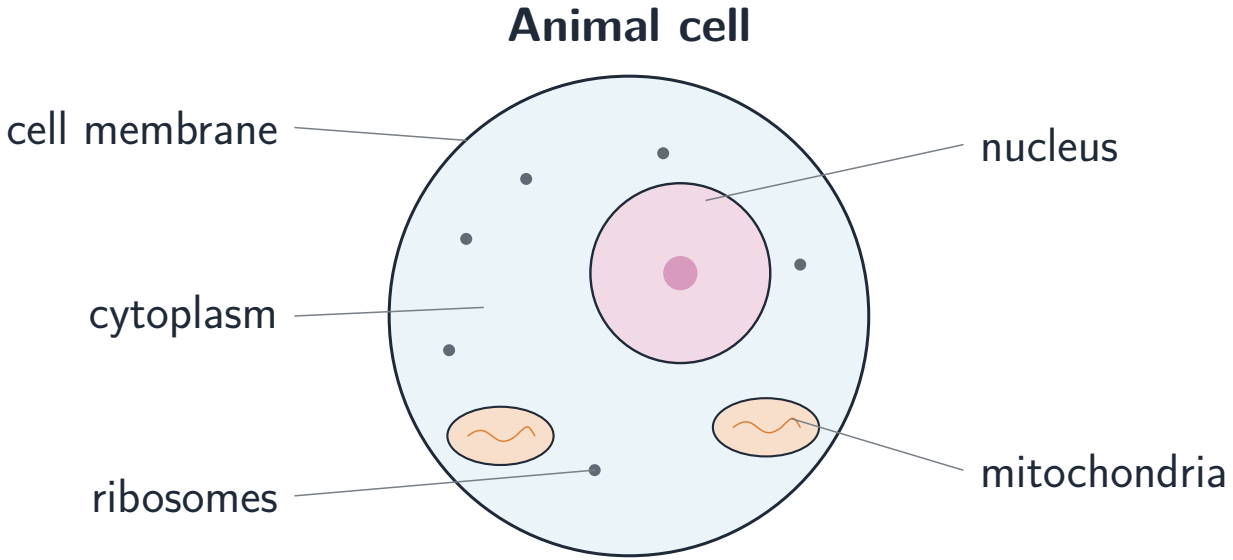
Exercise walk-through

2.10 Origins of Cell Compartmentalization

AP Biology

An animal cell and its organelles



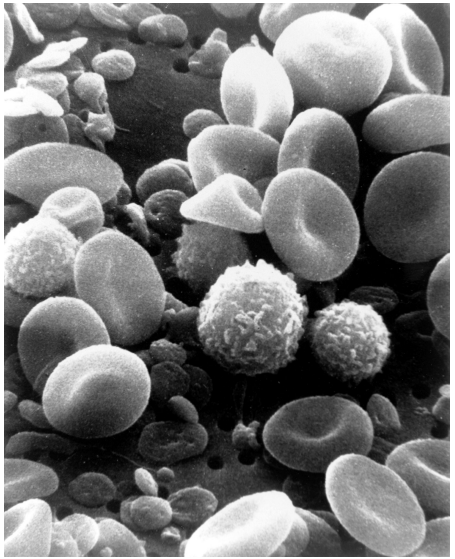
Membrane-bound organelles (nucleus, mitochondria, ER, Golgi) mark it as eukaryotic; unlike a plant cell it has no cell wall, no chloroplasts and no large central vacuole.

The fluid mosaic membrane

The **fluid mosaic model** : a **phospholipid bilayer** (hydrophilic heads out, hydrophobic tails in) with drifting proteins.

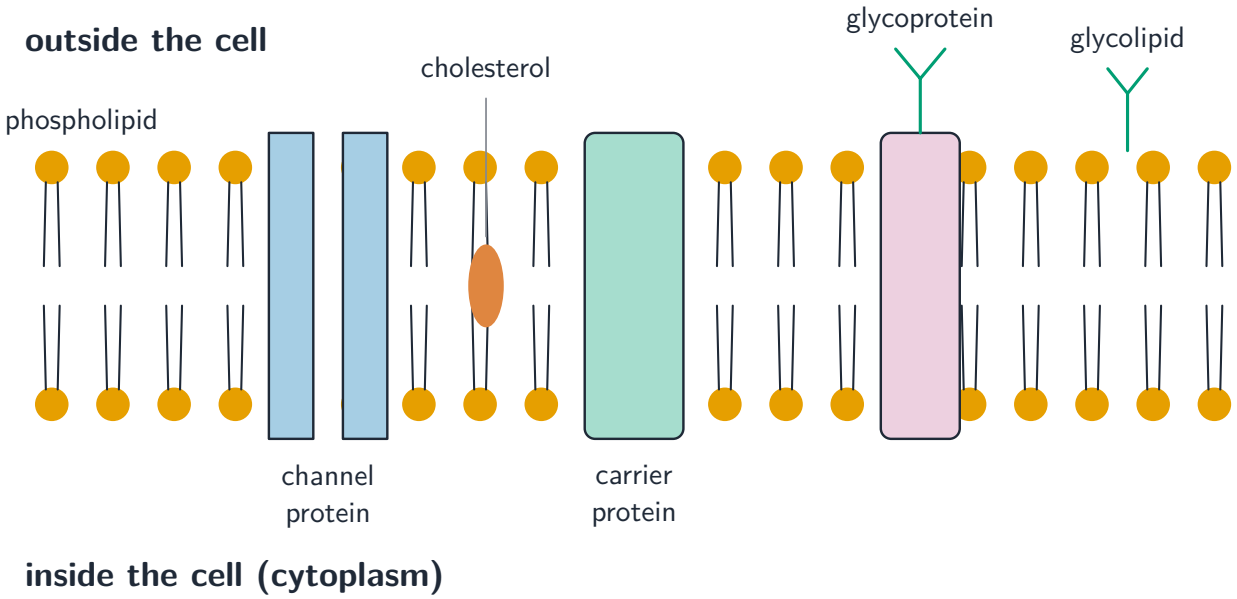
- **membrane proteins** – channels, pumps, receptors
- **cholesterol** – steadies the fluidity

Selectively permeable – it maintains **homeostasis** .



Red blood cells bend through capillaries because the membrane is fluid

The fluid mosaic model of the cell membrane



Phospholipids drift sideways and proteins float among them; cholesterol keeps the membrane's fluidity steady across temperatures.

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Exercises 2.1·2.3

2.1 Which two organelles does the endosymbiotic theory explain? [2]

2.2 State one piece of evidence for the theory. [1]

2.3 How do mitochondria reproduce? [1]

Exercises 2.1–2.3

2.1 Which two organelles does the endosymbiotic theory explain? [2]

2.1

- Mitochondria and chloroplasts

2.2 State one piece of evidence for the theory. [1]

2.2

- Any one: own (circular) DNA, own ribosomes, double membrane, reproduce by binary fission

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2.3 How do mitochondria reproduce? [1]

2.3

- By binary fission (dividing like bacteria)

Exercise 3.1

3.1 Evidence that mitochondria were once free-living bacteria includes that they have [1]

- **A** no DNA
- **B** their own circular DNA and ribosomes
- **C** a single membrane only
- **D** the same DNA as the nucleus

Exercise 3.1

3.1 Evidence that mitochondria were once free-living bacteria includes that they have [1]

- [ ] **A** no DNA
- [ ] **B** their own circular DNA and ribosomes
- [ ] **C** a single membrane only
- [ ] **D** the same DNA as the nucleus

3.1 B

- their own circular DNA and ribosomes

Exercise 3.2 (a)

3.2 A student examines a chloroplast.

(a) State two features that support the endosymbiotic theory. [2]

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(a)

- Any two: own DNA, own ribosomes, double membrane, binary fission

Exercise 3.2 (b)

3.2 A student examines a chloroplast.

(b) Explain what the theory proposes about the chloroplast's origin. [2]

Exercise 3.2 (b)

3.2 A student examines a chloroplast.

(b) Explain what the theory proposes about the chloroplast's origin. [2]

(b)

- It proposes the chloroplast arose when a cell engulfed a photosynthetic bacterium that survived and lived inside it

Exercise 3.3

3.3 Explain why having its own DNA and dividing by binary fission suggests a mitochondrion had a bacterial ancestor. [2]

Exercise 3.3

3.3 Explain why having its own DNA and dividing by binary fission suggests a mitochondrion had a bacterial ancestor. [2]

3.3

- These are bacterial traits – free-living bacteria have their own DNA and reproduce by binary fission – so their presence in mitochondria points to a bacterial ancestor