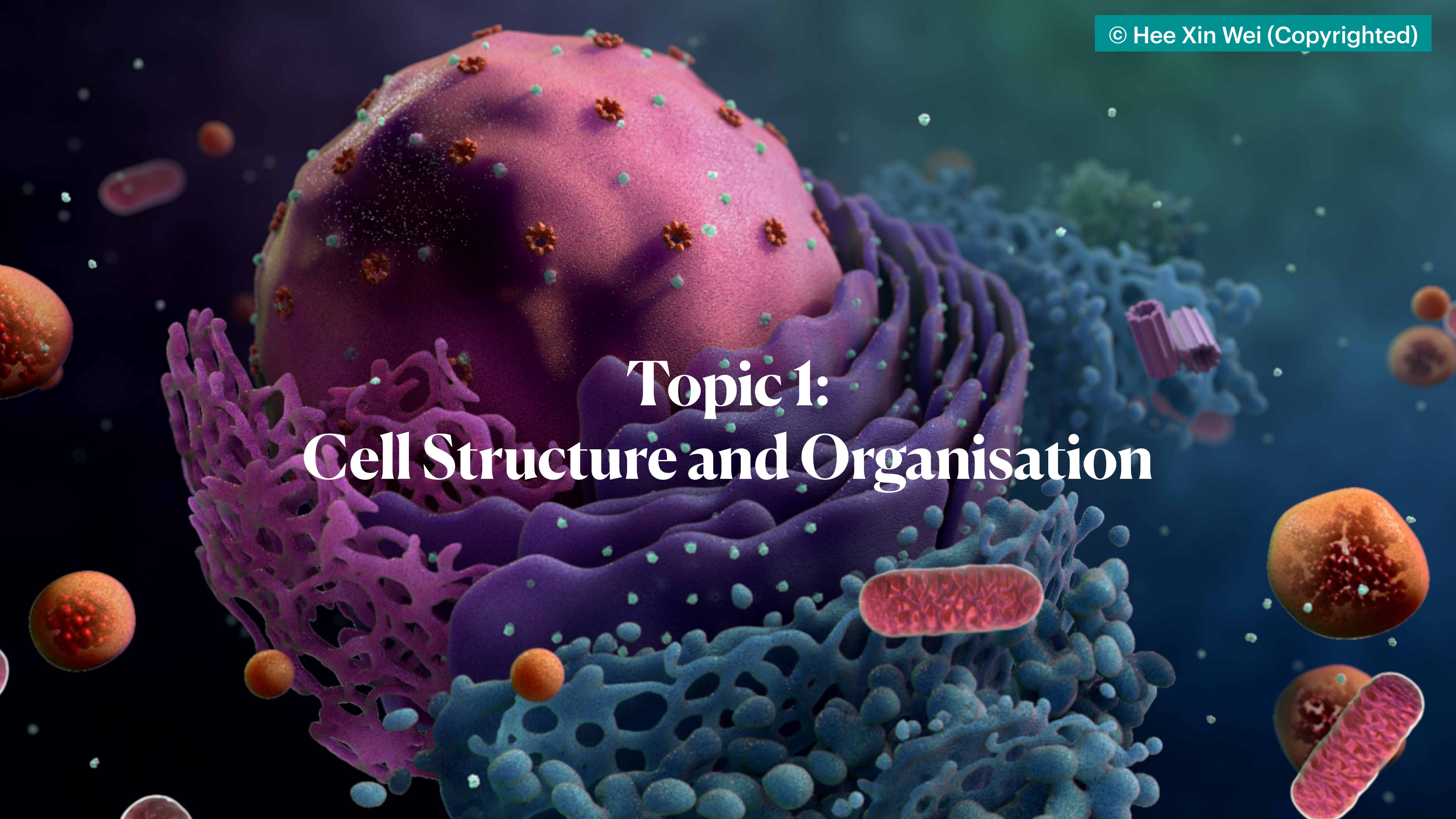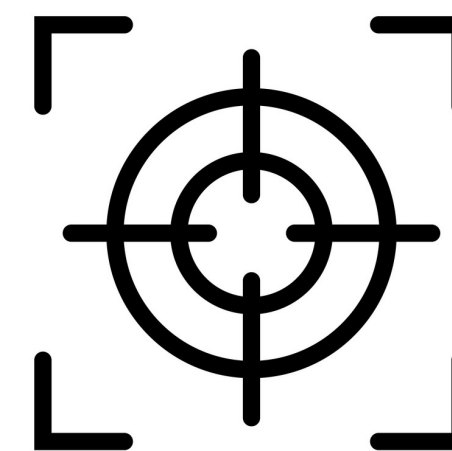# Topic 1:
Cell Structure and Organisation
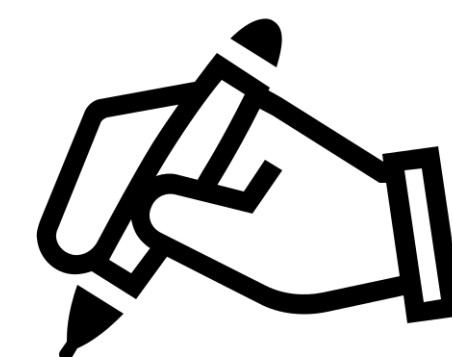
Chapter Analysis

FOCUS
- straightforward chapter
- basis of many other chapters

EXAM
- more often tested in MCQ

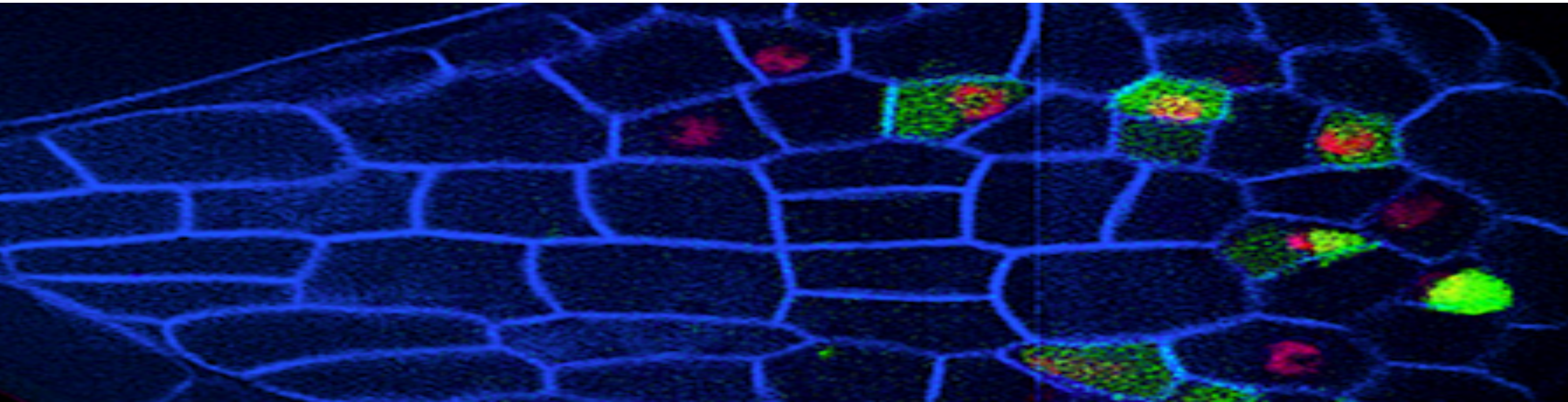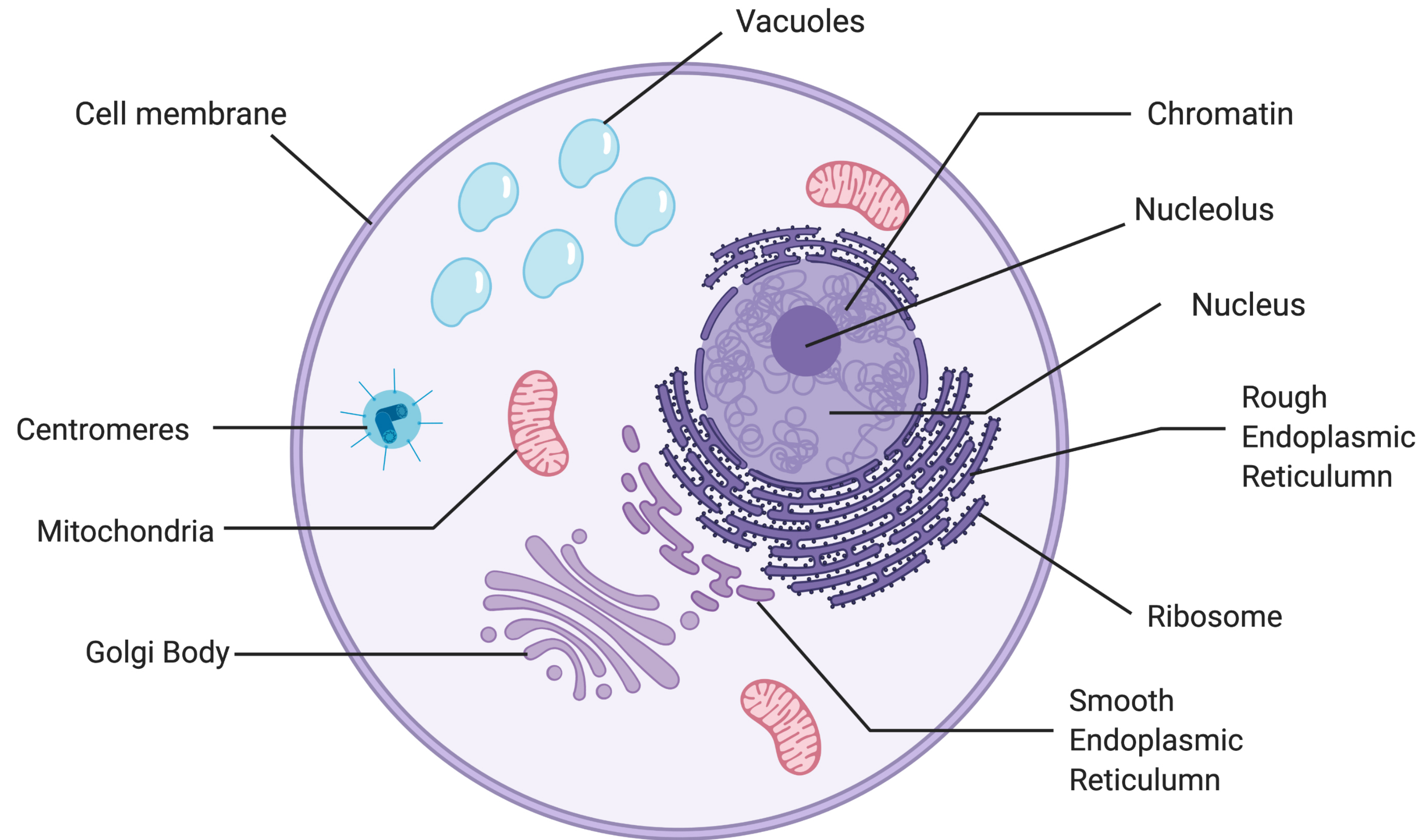**WEIGHTAGE**
- Constitute to around 1% in Paper 2 in the past 5 years
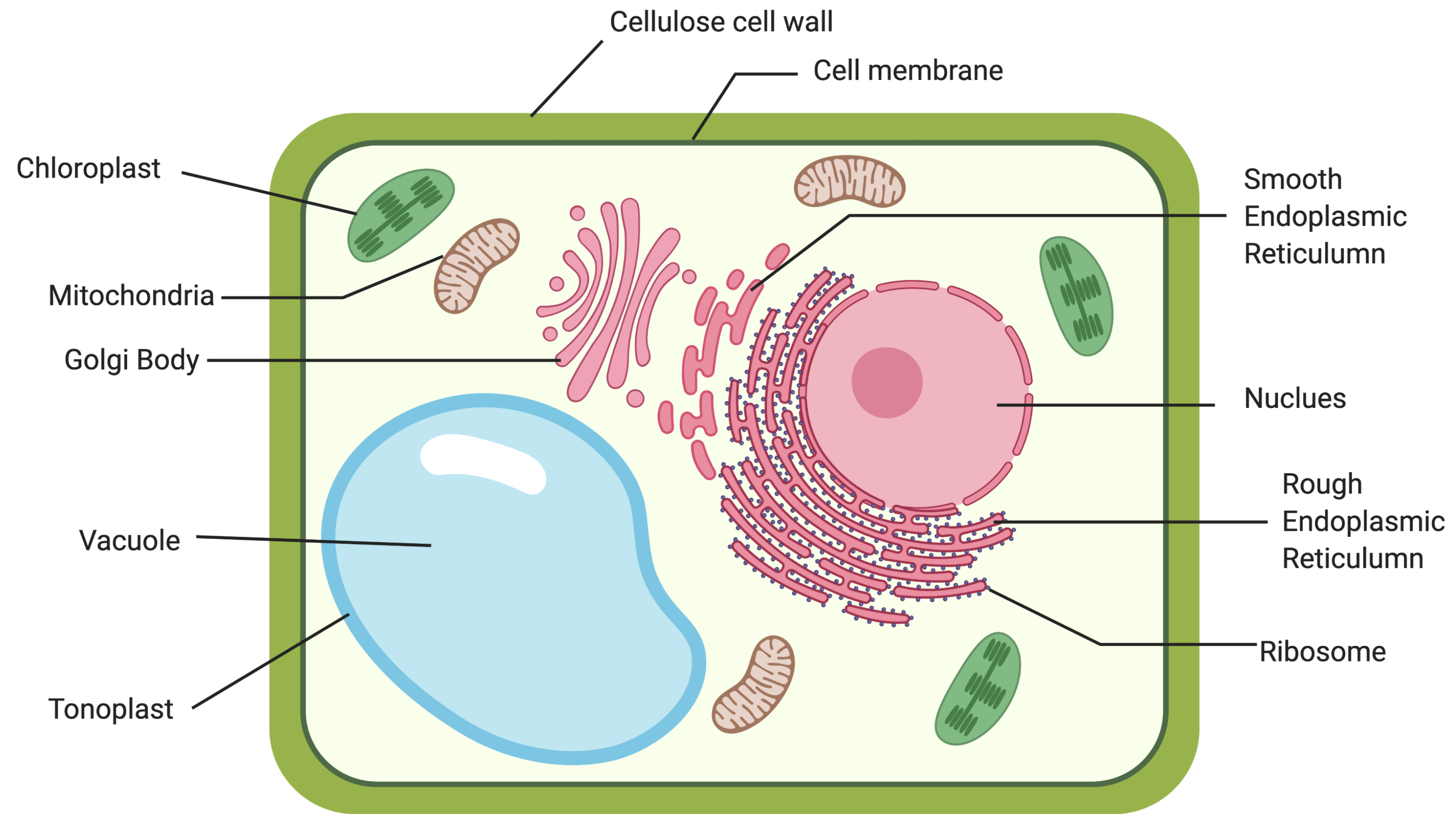
organelle functions
specialised cells

Animal Cell

Plant Cell

Cellulose cell wall

Cell membrane

Chloroplast

Mitochondria

Golgi Body

Vacuole

Tonoplast

Smooth Endoplasmic Reticulumn

Nuclues

Rough Endoplasmic Reticulumn

Ribosome

Organelle Functions

Present in both animal and plant cells

Cell Membrane	**Partially permeable**, controls substances entering or leaving the cells.
Nuclues	Controls **cellular activities** such as growth, repair, and cell division. • Nucleolus: plays a part in the making of proteins in the cell. • Chromatin: long strands of DNA.
Cytoplasm	• Made up of 90% water and contains dissolved protein, sugars, enzymes. • Embedded with organelles (eg mitochondria, RER, SER, Golgi body). • **Sites of most cellular activities.**
Vacuole	• Animal: store water and food substances • Plant: store water, with food substances and mineral salts. also takes in waste products and water.
Mitochondria	Carry out **aerobic respiration** to release **energy**, energy is used to carry out cellular activities
Ribosome	Site of synthesis for protein

Organelle Functions

Present ONLY in plant cells

Organelle	Present only in	Functions
Cellulose cell wall	Plant Cell	Fully permeable, **protects the cell** from injury and **gives the cell its shape.**
Chloroplast	Plant Cell	Contains chlorophyll. They are the **sites of photosynthesis,** which is the process by which plants make food.

Compare the structure of typical animal and plant cells

	Animal Cells	Plants Cells
Cellulose cell wall	Absent	Present
Vacuole	Small and numerous	A large and central vacuole
Chroloplast	Absent	Present
Centriole	Present	Absent generally

Specialised Cells

RED BLOOD CELLS
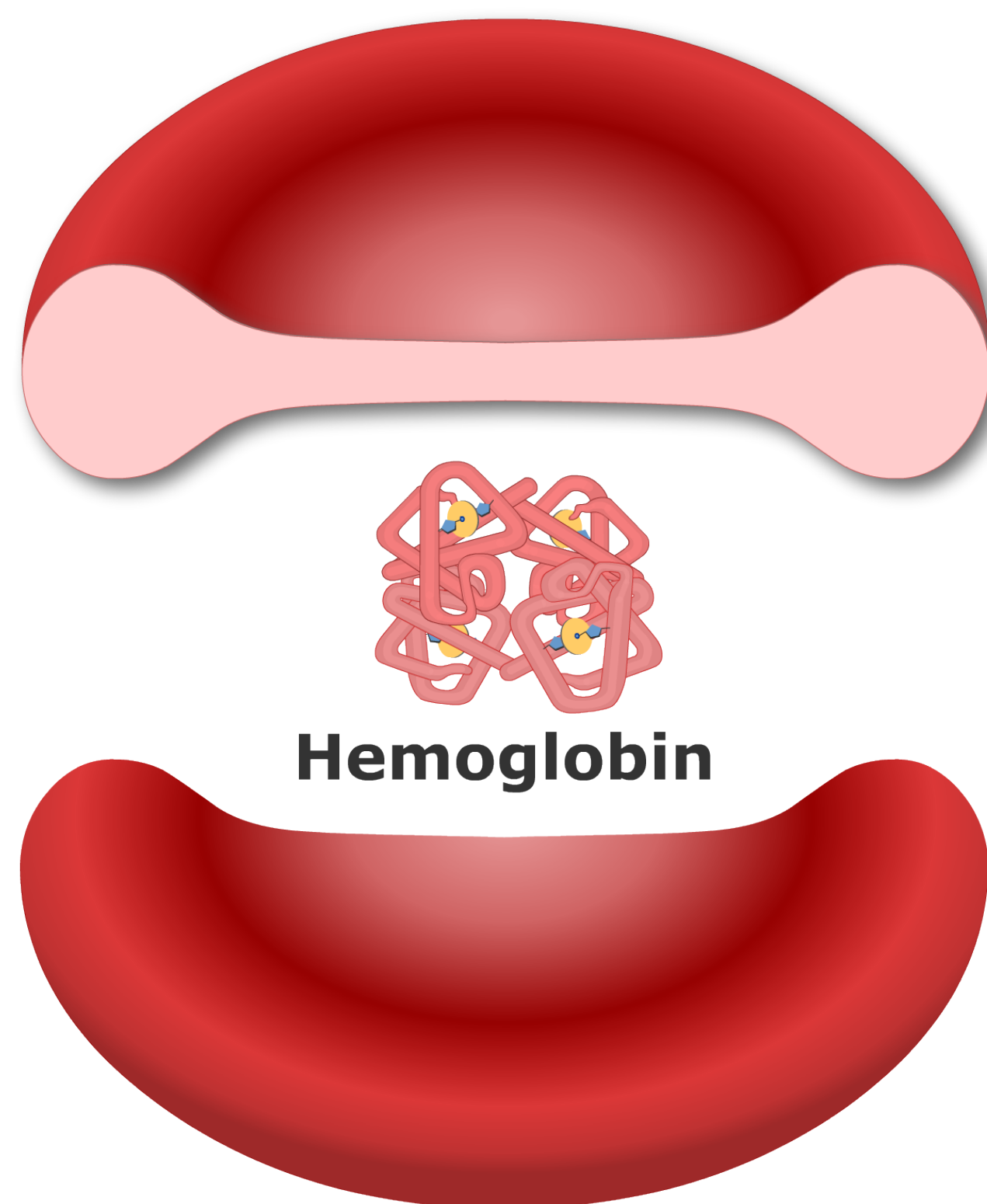
Hemoglobin
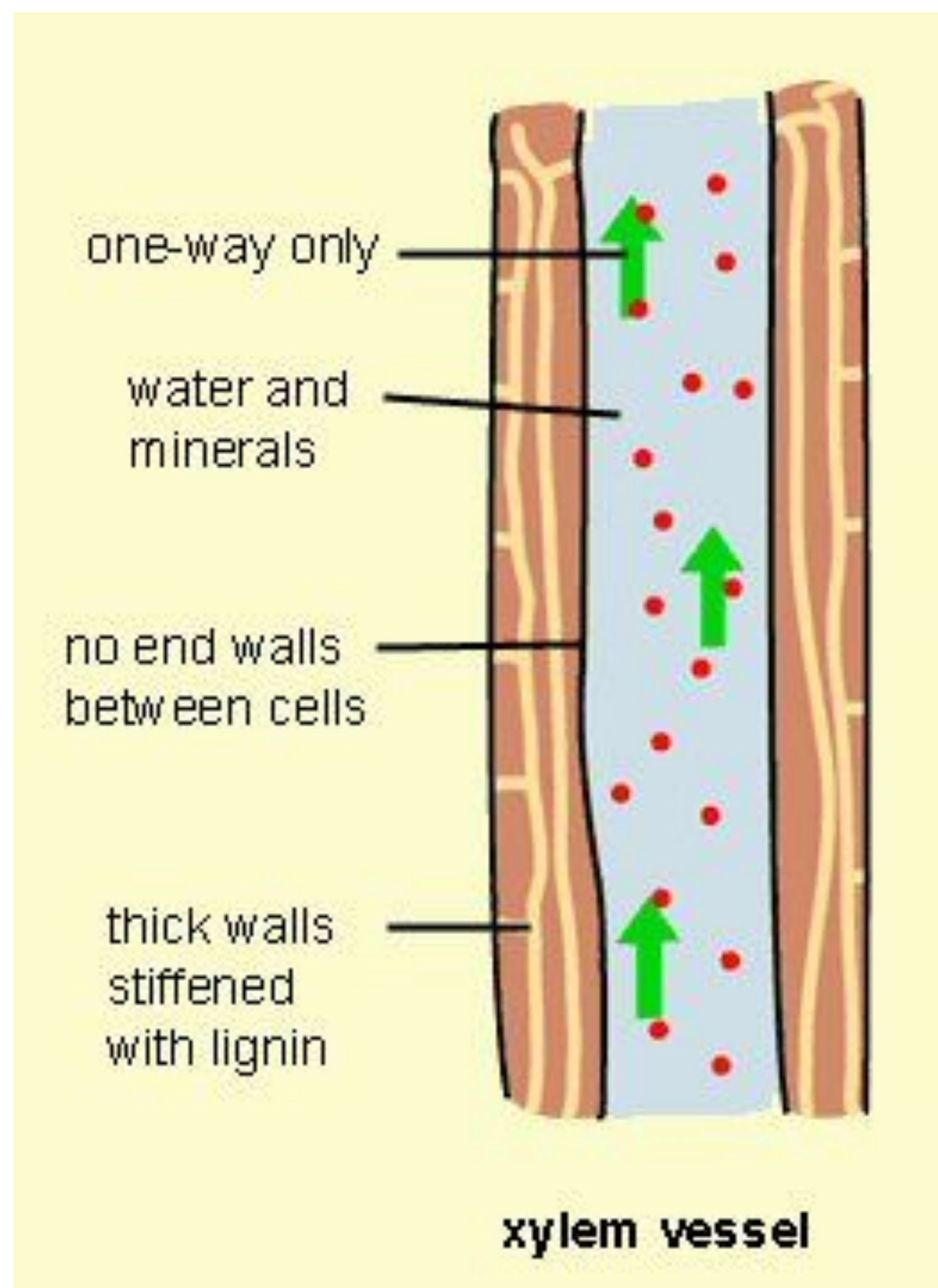
- **Function:** deliver oxygen to the body tissues via the blood.
- Cell structure **adaptations**:
  - RBC contain **haemoglobin** which binds with oxygen and transports it from the lungs to all parts of the body
  - RBCs have **no nucleus,** thus have more capacity for haemoglobin
  - RBCs have a flattened **biconcave shape**. This increases the surface area to volume ratio for faster diffusion of oxygen. It also allows the cell to be more flexible when squeezing through blood capillaries.

Specialised Cells

XYLEM VESSELS

one-way only

water and minerals

no end walls between cells

thick walls stiffened with lignin

xylem vessel

- **Function:**
(1) **Conduct water and mineral salts** from the roots to the leaves of the plant.
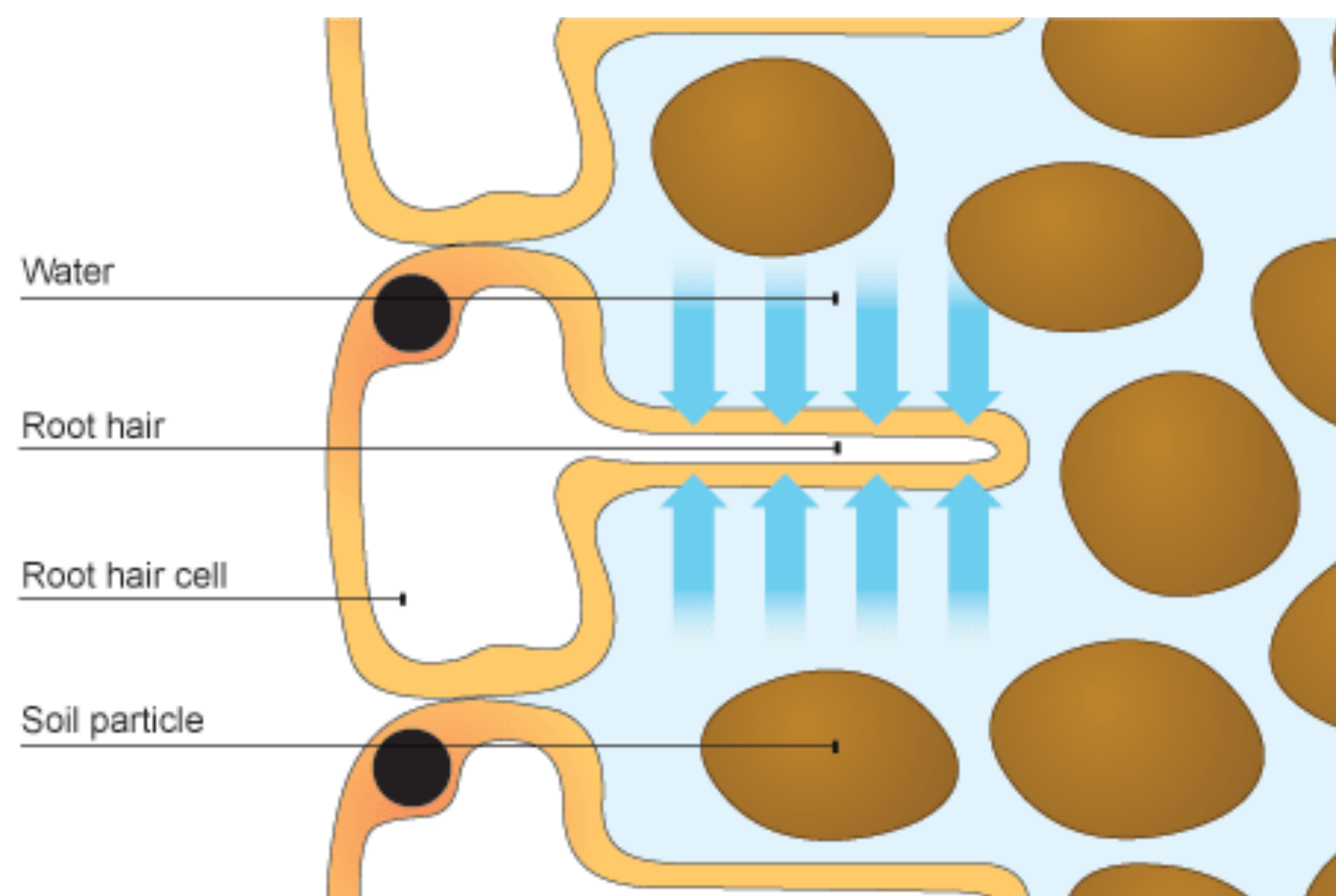(2) **mechanical support** of plants
- Cell structure **adaptations:**
(1) **Absence of protoplasm and cross-walls** which could impede water flow through the lumen
(2) **Deposition of lignin** on the cell walls which strengthens vessel walls, providing support

Specialised Cells

ROOT HAIR CELLS

Water

Root hair

Root hair cell

Soil particle

- **Function:** Extend into the soil to **absorb water and mineral salts.**
- Cell structure **adaptations:** root hair is **long and narrow**, this increases the surface area to volume ratio of the cell, so that water and mineral salts can be efficiently absorbed.

Organ System

cell   tissue   organ   organ system
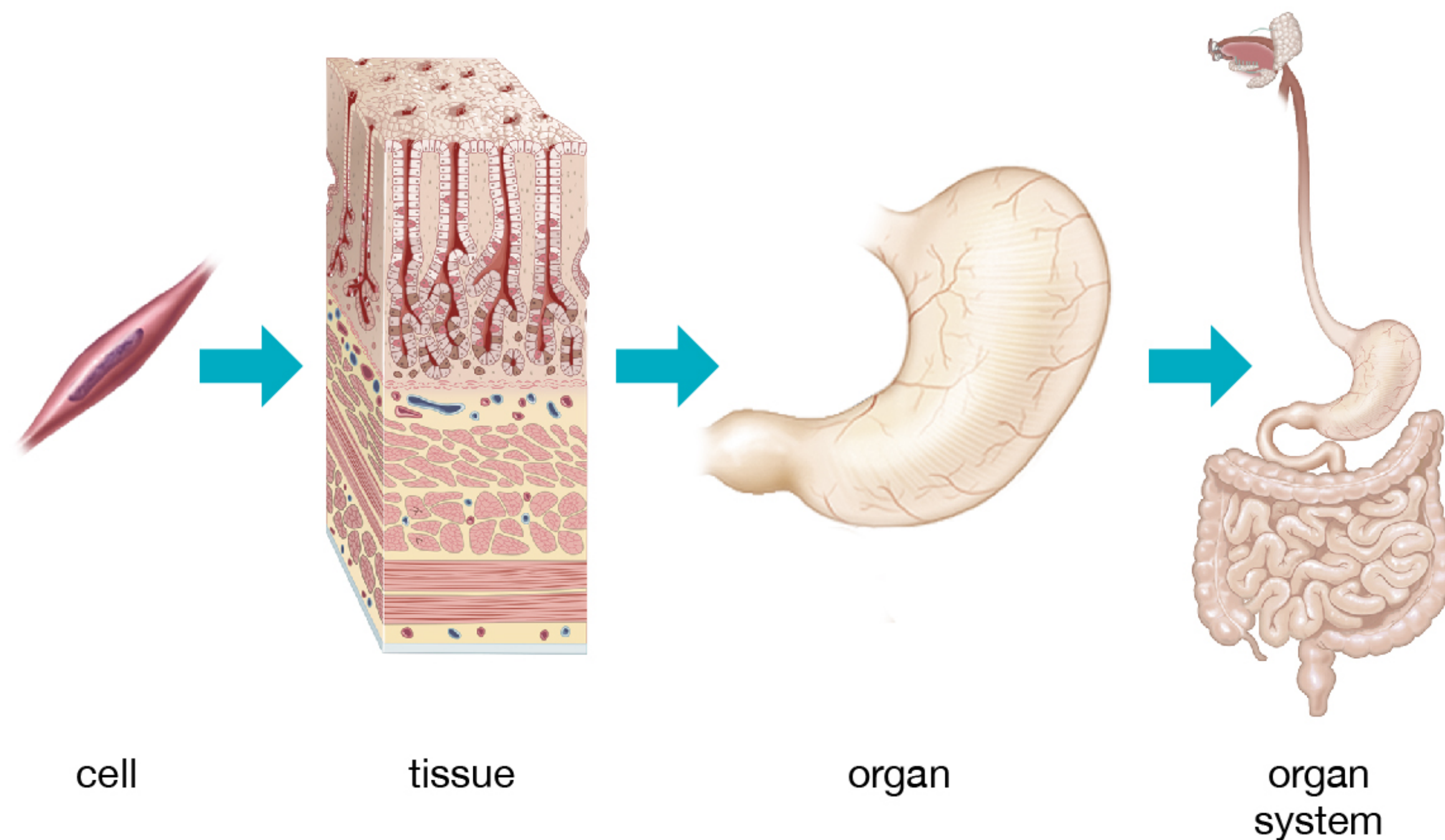
Cell is the most basic unit of a living organism → A group of cells of the same type that are found near each other and carry out the same function form **tissue** → Different tissues working together to perform a specific function or a group of functions form an **organ** → A group of functionally-related organs form an **organ system**

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