

# 2 Cells and their membranes – Part 1

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

## Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

| English                      | 中文      | Write it 3 times (English) |
|------------------------------|---------|----------------------------|
| organelles                   | 细胞器     | _____                      |
| nucleus                      | 细胞核     | _____                      |
| mitochondria                 | 线粒体     | _____                      |
| chloroplasts                 | 叶绿体     | _____                      |
| surface-area-to-volume ratio | 表面积与体积比 | _____                      |
| phospholipid bilayer         | 磷脂双分子层  | _____                      |
| fluid mosaic model           | 流动镶嵌模型  | _____                      |
| selectively permeable        | 选择透过性   | _____                      |

## Recall

You already know that cells are the building blocks of life:

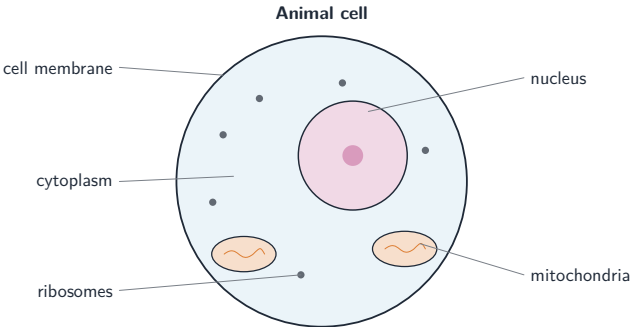
- You have seen animal and plant cells and named their parts.
- A **nucleus** holds the DNA; **mitochondria** release energy; plant cells have **chloroplasts**.
- A membrane surrounds every cell.

This sheet lines up cell structure for AP. Each idea has a short worked example.

## New ideas

### ■ 1 Organelles

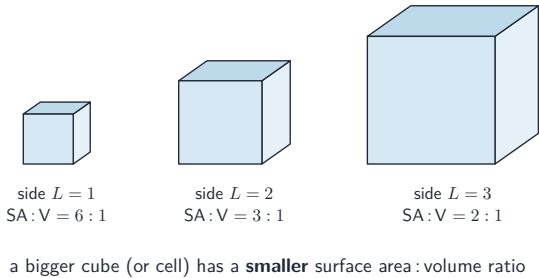
A cell divides its work among **organelles** 细胞器:



- the **nucleus** 细胞核 holds the DNA,
- **mitochondria** 线粒体 carry out respiration (release energy),
- **chloroplasts** 叶绿体 carry out photosynthesis (in plants).

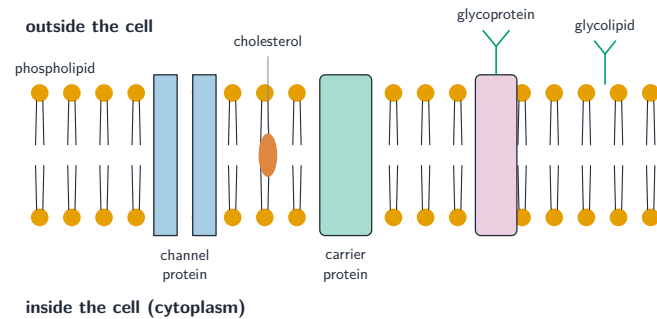
### ■ 2 Why cells stay small

As a cell grows, its volume rises faster than its surface area, so its **surface-area-to-volume ratio** 表面积与体积比 falls. A small cell has enough surface to exchange materials fast enough for its inside.



### ■ 3 The cell membrane

The membrane is a **phospholipid bilayer** 磷脂双分子层 – a double sheet with water-loving heads outside and water-hating tails inside – studded with proteins. This **fluid mosaic model** 流动镶嵌模型 pictures it as a fluid sheet in which the parts drift.



#### ■ 4 A selective barrier

The membrane is **selectively permeable** 选择透过性: small non-polar molecules pass easily, but large or charged particles need help. This lets the cell control what goes in and out.

**Watch out:** a bigger cell is worse at exchange, not better – its volume grows faster than its surface, so the surface-area-to-volume ratio drops and it cannot supply its interior fast enough.

### Practice

Try these in order. The methods are all above.

2.1 State the job of (a) the nucleus, (b) the mitochondria. [2]

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2.2 Explain why cells stay small, using the surface-area-to-volume ratio. [2]

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2.3 Name the type of molecule that makes up most of the cell membrane. [1]

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2.4 State what “selectively permeable” means. [2]

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2.5 Name one organelle found in a plant cell but not an animal cell, and state its job.[2]

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