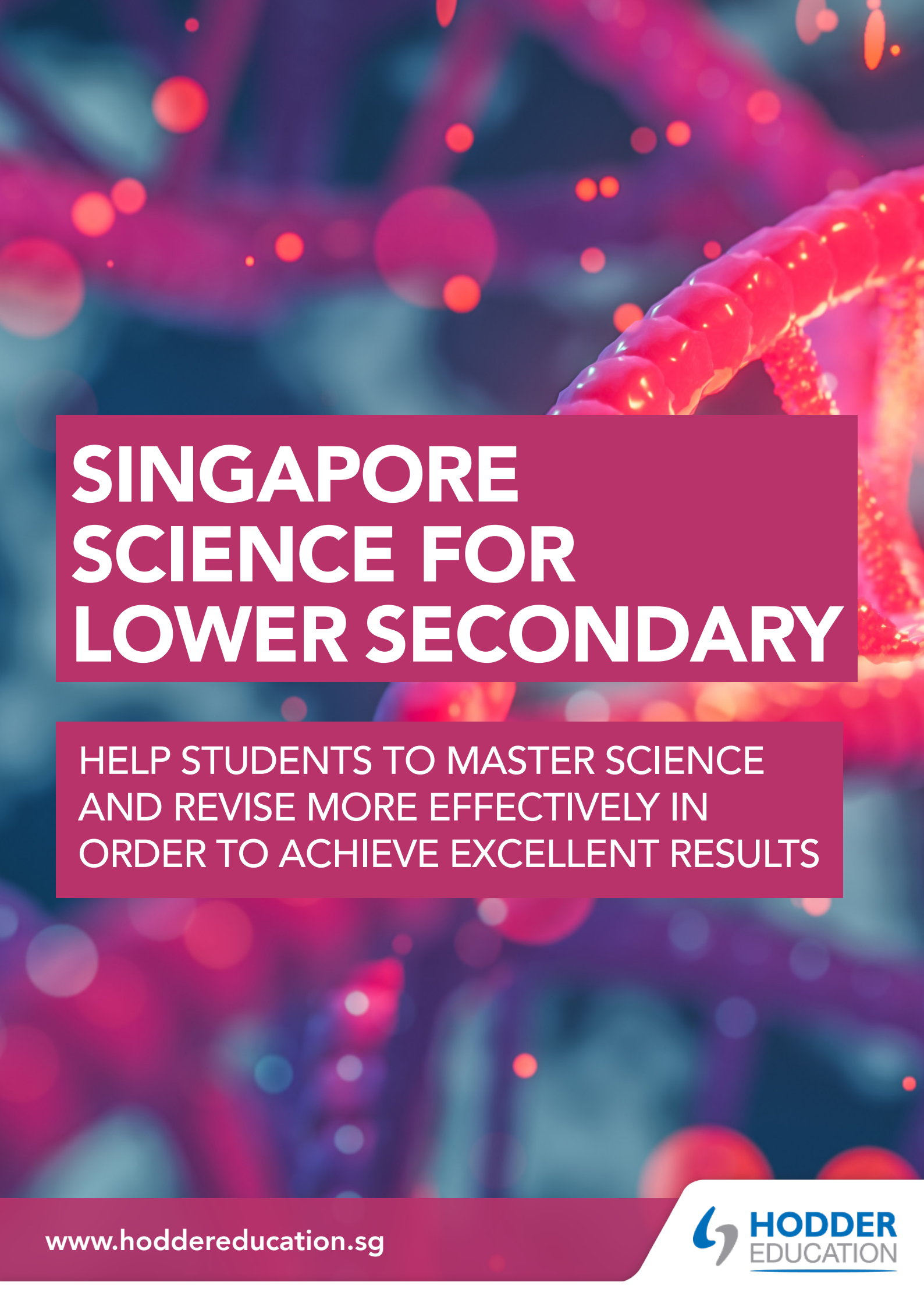

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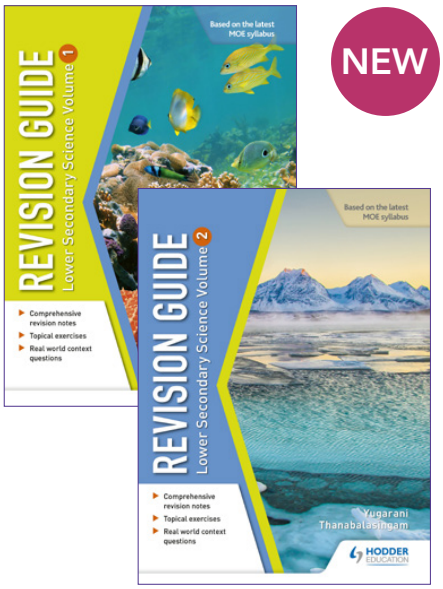


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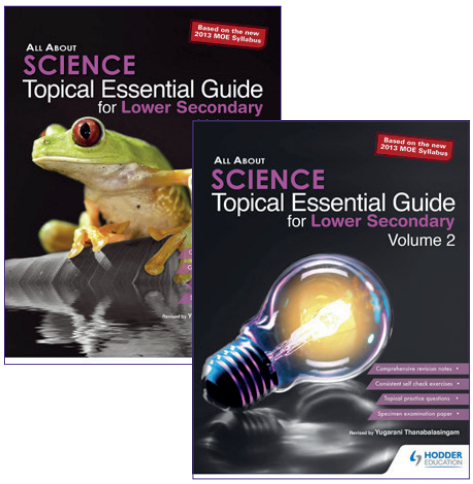


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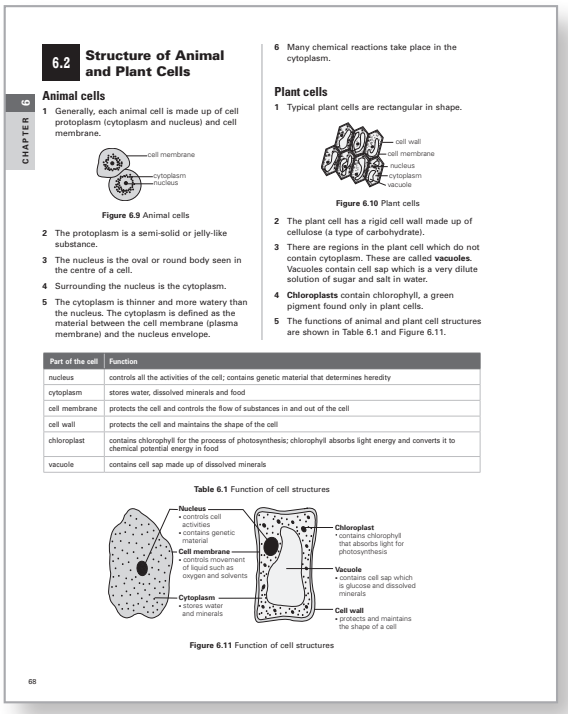


## 6.2 Structure of Animal and Plant Cells

CHAPTER 6

### Animal cells

1 Generally, each animal cell is made up of cell protoplasm (cytoplasm and nucleus) and cell membrane.




**Figure 6.9** Animal cells

2 The protoplasm is a semi-solid or jelly-like substance.

3 The nucleus is the oval or round body seen in the centre of a cell.

4 Surrounding the nucleus is the cytoplasm.

5 The cytoplasm is thinner and more watery than the nucleus. The cytoplasm is defined as the material between the cell membrane (plasma membrane) and the nucleus envelope.

6 Many chemical reactions take place in the cytoplasm.

### Plant cells

1 Typical plant cells are rectangular in shape.




**Figure 6.10** Plant cells

2 The plant cell has a rigid cell wall made up of cellulose (a type of carbohydrate).

3 There are regions in the plant cell which do not contain cytoplasm. These are called **vacuoles**. Vacuoles contain cell sap which is a very dilute solution of sugar and salt in water.

4 **Chloroplasts** contain chlorophyll, a green pigment found only in plant cells.

5 The functions of animal and plant cell structures are shown in Table 6.1 and Figure 6.11.

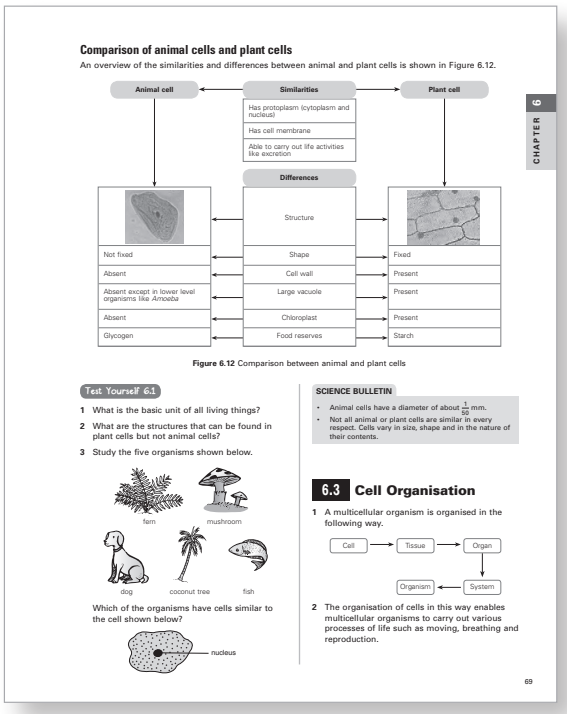
| Part of the cell | Function |
|---|---|
| nucleus | controls all the activities of the cell; contains genetic material that determines heredity |
| cytoplasm | stores water, dissolved minerals and food |
| cell membrane | protects the cell and controls the flow of substances in and out of the cell |
| cell wall | protects the cell and maintains the shape of the cell |
| chloroplast | contains chlorophyll for the process of photosynthesis; chlorophyll absorbs light energy and converts it to chemical potential energy in food |
| vacuole | contains cell sap made up of dissolved minerals |

**Table 6.1** Function of cell structures




**Figure 6.11** Function of cell structures





### Comparison of animal cells and plant cells

An overview of the similarities and differences between animal and plant cells is shown in Figure 6.12.




**Figure 6.12** Comparison between animal and plant cells

**Test Yourself 6.1**

1 What is the basic unit of all living things?

2 What are the structures that can be found in plant cells but not animal cells?

3 Study the five organisms shown below.




Which of the organisms have cells similar to the cell shown below?




**SCIENCE BULLETIN**

- Animal cells have a diameter of about $\frac{1}{50}$ mm.
- Not all animal or plant cells are similar in every respect. Cells vary in size, shape and in the nature of their contents.

## 6.3 Cell Organisation

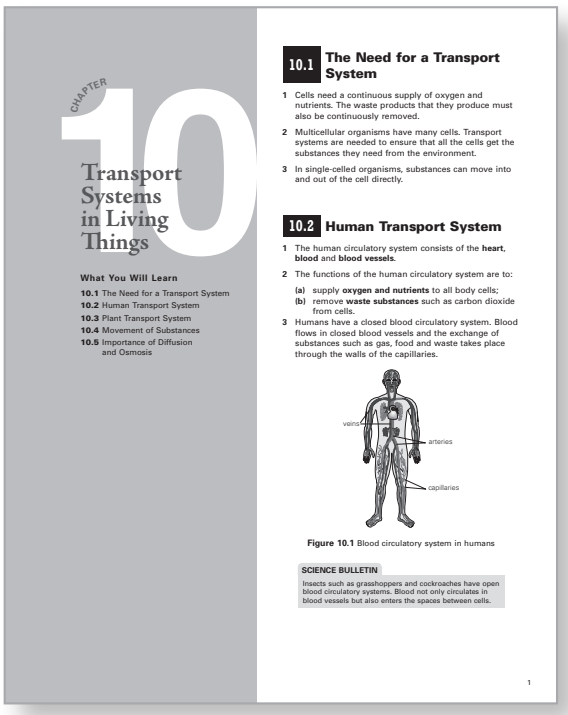
1 A multicellular organism is organised in the following way.




2 The organisation of cells in this way enables multicellular organisms to carry out various processes of life such as moving, breathing and reproduction.



Taken from **All About Science: Topical Essential Guide Volume 1**



CHAPTER 10

# Transport Systems in Living Things

**What You Will Learn**

**10.1** The Need for a Transport System
**10.2** Human Transport System
**10.3** Plant Transport System
**10.4** Movement of Substances
**10.5** Importance of Diffusion and Osmosis

## 10.1 The Need for a Transport System

1 Cells need a continuous supply of oxygen and nutrients. The waste products that they produce must also be continuously removed.

2 Multicellular organisms have many cells. Transport systems are needed to ensure that all the cells get the substances they need from the environment.

3 In single-celled organisms, substances can move into and out of the cell directly.

## 10.2 Human Transport System

1 The human circulatory system consists of the **heart**, **blood** and **blood vessels**.

2 The functions of the human circulatory system are to:

**(a)** supply **oxygen and nutrients** to all body cells;
**(b)** remove **waste substances** such as carbon dioxide from cells.

3 Humans have a closed blood circulatory system. Blood flows in closed blood vessels and the exchange of substances such as gas, food and waste takes place through the walls of the capillaries.

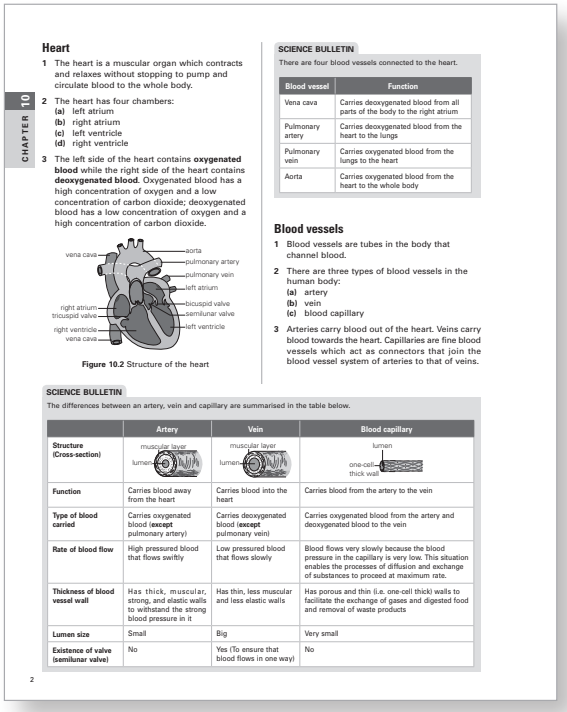



**Figure 10.1** Blood circulatory system in humans

**SCIENCE BULLETIN**

Insects such as grasshoppers and cockroaches have open blood circulatory systems. Blood not only circulates in blood vessels but also enters the spaces between cells.





CHAPTER 10

### Heart

1 The heart is a muscular organ which contracts and relaxes without stopping to pump and circulate blood to the whole body.

2 The heart has four chambers:
**(a)** left atrium
**(b)** right atrium
**(c)** left ventricle
**(d)** right ventricle

3 The left side of the heart contains **oxygenated blood** while the right side of the heart contains **deoxygenated blood**. Oxygenated blood has a high concentration of oxygen and a low concentration of carbon dioxide; deoxygenated blood has a low concentration of oxygen and a high concentration of carbon dioxide.




**Figure 10.2** Structure of the heart

**SCIENCE BULLETIN**

There are four blood vessels connected to the heart.

| Blood vessel | Function |
|---|---|
| Vena cava | Carries deoxygenated blood from all parts of the body to the right atrium |
| Pulmonary artery | Carries deoxygenated blood from the heart to the lungs |
| Pulmonary vein | Carries oxygenated blood from the lungs to the heart |
| Aorta | Carries oxygenated blood from the heart to the whole body |

### Blood vessels

1 Blood vessels are tubes in the body that channel blood.

2 There are three types of blood vessels in the human body:
**(a)** artery
**(b)** vein
**(c)** blood capillary

3 Arteries carry blood out of the heart. Veins carry blood towards the heart. Capillaries are fine blood vessels which act as connectors that join the blood vessel system of arteries to that of veins.

**SCIENCE BULLETIN**

The differences between an artery, vein and capillary are summarised in the table below.

| | Artery | Vein | Blood capillary |
|---|---|---|---|
| **Structure (Cross-section)** |   |   |   |
| **Function** | Carries blood away from the heart | Carries blood into the heart | Carries blood from the artery to the vein |
| **Type of blood carried** | Carries oxygenated blood (**except** pulmonary artery) | Carries deoxygenated blood (**except** pulmonary vein) | Carries oxygenated blood from the artery and deoxygenated blood to the vein |
| **Rate of blood flow** | High pressured blood that flows swiftly | Low pressured blood that flows slowly | Blood flows very slowly because the blood pressure in the capillary is very low. This situation enables the processes of diffusion and exchange of substances to proceed at maximum rate. |
| **Thickness of blood vessel wall** | Has thick, muscular, strong, and elastic walls to withstand the strong blood pressure in it | Has thin, less muscular and less elastic walls | Has porous and thin (i.e. one-cell thick) walls to facilitate the exchange of gases and digested food and removal of waste products |
| **Lumen size** | Small | Big | Very small |
| **Existence of valve (semilunar valve)** | No | Yes (To ensure that blood flows in one way) | No |



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