

1)

(a) Complete the following paragraph about cells by using the most appropriate term(s).

Cells that are not specialised but still have the ability to divide are called cells. Such cells can be found in the of the long bones of mammals. These cells can into other types of cell, such as erythrocytes that carry oxygen in the blood. In plants, tissue also contains cells that are not specialised. [4]

(b) Sponges are simple eukaryotic multicellular organisms that live underwater on the surface of rocks.

Sponges have a cellular level of organisation. This means that they have no tissues.

Each cell type is specialised to perform a particular function.

One type of cell found in a sponge is a collar cell. Collar cells are held in position on the inner surface of the body of the sponge.

Fig. 2.1 is a diagram showing a vertical section through the body of a sponge and an enlarged drawing of a collar cell.

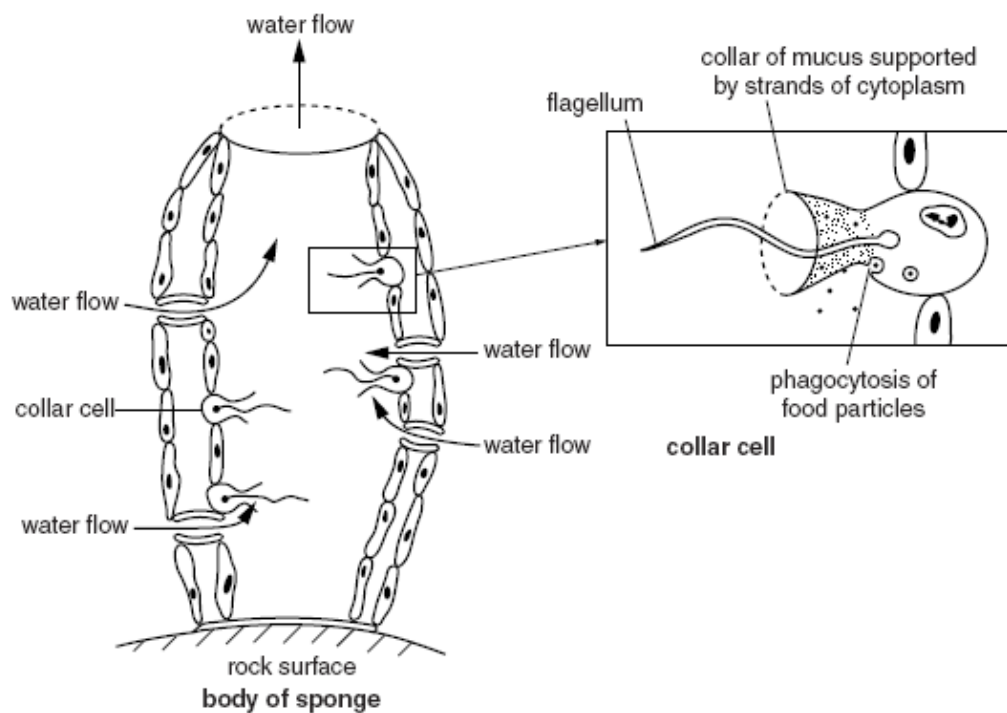


Fig. 2.1

(i) Suggest **one** function of the flagellum in the collar cell.
..... [1]

(ii) Suggest **one** possible role for the collar of mucus in the cell.
..... [1]

(c) In more advanced organisms, cells are organised into tissues consisting of one or more types of specialised cells.

Describe how cells are organised into tissues, using **xylem** and **phloem** as examples.
..... [4]

..... [Total: 10]

2) The use of microscopy has greatly enhanced our knowledge of cell structure.

(a) Explain the difference between *magnification* and *resolution*.
.....
.....
.....
.....
.....
..... [2]

(b) State the resolution that can be achieved by each of the following types of microscope.
light microscope
transmission electron microscope [2]

(c) Fig. 4.1 is an electron micrograph showing part of a nucleus.

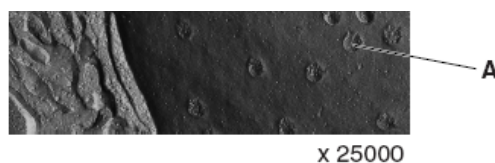


Fig. 4.1

(i) A student stated that Fig. 4.1 was taken using a scanning electron microscope.

What evidence supports the student's statement?

..... [1]

(ii) On Fig. 4.1, the nuclear pore complex, labelled **A**, is 3mm wide.

Calculate the actual diameter of the pore, in nanometres.

Answer = nm [2]

(iii) State the function of the nuclear pores.

..... [1]

(d) State **two** features of a eukaryotic cell, other than nuclear pores, that would **not** be visible using medium power of a light microscope.

..... [2]

..... [Total: 10]

3)

Membranes are a fundamental part of the cell. They are found both at the surface of a cell and inside a cell.

(a) State **three** roles of membranes **inside** cells.

..... [3]

(b) Cells contain a large number of membrane-bound vesicles. Many of these vesicles transport substances between organelles.

(i) Outline how the vesicles are moved from one organelle to another.

..... [2]

(ii) The proteins embedded in the membranes of vesicles have different functions.

- COPI and COPII proteins are known as 'address proteins'.
- Vesicles that transport materials from the Golgi to the rough endoplasmic reticulum (RER) are coated in COPI proteins.
- Vesicles that transport materials to the Golgi from the RER are coated in COPII proteins.

Suggest how these proteins ensure that a vesicle is transported to the correct target organelle.

..... [2]

(c) Cells in the pancreas secrete proteins such as the enzymes pancreatic amylase and protease.

Describe how these extracellular enzymes are secreted from the cells.

..... [2]

..... [Total: 9]

4)

Biological molecules are held together by a variety of bonds.

(a) The diagram in Fig. 1.1 represents an amino acid.

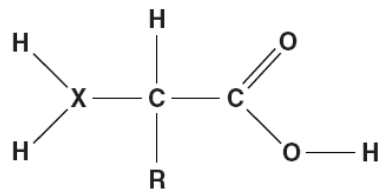


Fig. 1.1

(i) One of the atoms that make up an amino acid has been replaced with the letter **X**.

State the chemical symbol of the atom represented by the letter **X** in Fig. 1.1.

..... [1]

(ii) Name the polymer formed from a chain of amino acids.

..... [1]

(iii) Name the bond that is formed when two amino acids are joined together. Describe the formation of this bond.

name of bond

description of formation [3]

(b) Fig. 1.2 shows a hydrogen bond between two water molecules.

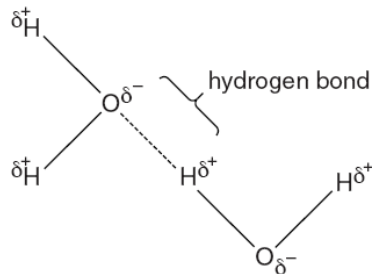


Fig. 1.2

(i) Many of the physical properties of water arise as a result of these hydrogen bonds.

Describe ways in which the physical properties of water allow organisms to survive over a range of temperatures.



In your answer you should make clear links between the properties of water and the survival of organisms.

..... [9]

(ii) List **three other** examples of where hydrogen bonds are found in biological molecules.

..... [3] [Total: 17]

5)

(a) State **two** roles of cholesterol in living organisms.

..... [2]

(b) Fig. 3.1 represents the structure of a cholesterol molecule.

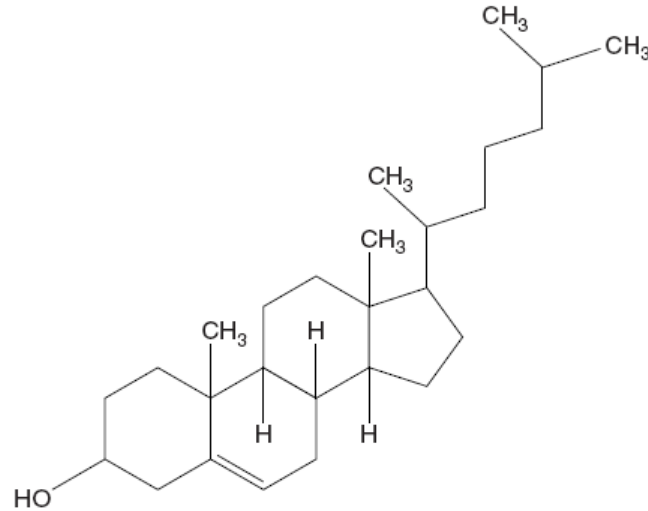


Fig. 3.1

(i) Identify **one** way in which the molecular structure of cholesterol is similar to the molecular structure of a carbohydrate.

..... [1]

(ii) Cholesterol is transported in the blood within molecules of low-density lipoprotein (LDL).

Name **two** molecules that combine with cholesterol to form LDLs.

..... [2]

(iii) LDL and a similar molecule, high-density lipoprotein (HDL), carry cholesterol in the blood. LDL and HDL affect the formation of atheromas in the arteries.

Describe the different ways in which LDLs and HDLs affect the formation of atheromas.



In your answer you should make clear the differences in the involvement of LDL and HDL in the formation of atheromas.

..... [7]