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Chapter 5

The Fundamental Unit of Life

Intext Questions

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Question 1: Who discovered cells and how?

Solution: Cell was discovered by Robert Hooke with the help of his self-designed microscope. He examined a thin slice of cork and saw that the cork resembled the structure of a honey comb consisting of many compartments.

Question 2: Why is the cell called the structural and functional unit of life?

Solution: There are various components in the animal and plant cell known as cell organelles. Each kind of cell organelle performs a specific function, such as making new materials in the cells, release of waste, transportation, etc. Thus, a cell can perform all its functions with the help of these organelles. That is why the cells are called structural and functional unit of life.

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Question 1: How do substances like CO₂ and water move in and out of the cell? Discuss.

Solution: Substances like CO₂ accumulate in high concentration inside the cell. There is CO₂ concentration difference in the internal and external environment of a cell. CO₂ moves out of the cell, from a region

of high concentration to a region of low concentration outside the cell by the process of diffusion.

Question 2: Why is the plasma membrane called a selectively permeable membrane?

Solution: The plasma membrane selectively allows the entry and exit of some materials in and out of the cell. It also prevents movement of some other materials. Therefore, it is called a selectively permeable membrane.

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Question 1: Can you name the two organelles we have studied that contain their own genetic material?

Solution: Mitochondria and plastids.

Question 2: If the organisation of a cell is destroyed due to some physical or chemical influence, what will happen?

Solution: The cell will not be able to perform its basic functions and will die after sometime.

Question 3: Why are lysosomes known as suicide bags?

Solution: The lysosomes contain very powerful hydrolytic enzymes which are capable of breaking down organic matter. For example, when a cell gets damaged, then lysosomes burst and enzymes digest their own cell. Hence, the lysosomes are known as 'suicide bags' of cells.

Question 4: Where are proteins synthesised inside the cell?

Solution: Ribosomes are the site of protein synthesis.

Exercises

Question 1: Make a comparison and write down ways in which plant cells are different from animal cells.

Solution: Comparison of plant cell and animal cell

Plant Cell

Cell wall is present outside the plasma membrane.

Generally regular in shape.

Larger in size than animal cells

Plastids are present.

A permanent and large vacuole is present.

Animal Cell

Cell wall is absent.

Generally irregular in shape.

Smaller in size than animal cells.

Plastids are absent except in Euglena.

Vacuoles are many, small and temporary.

Question 2:How is prokaryotic cell different from a eukaryotic cell?

Solution:See the Ans. of Question 1 (Intext Questions Page 63).

Question 3:What would happen if the plasma membrane ruptures or breaks down?

Solution:In case of plasma membrane ruptures or breaks down:

All the useful substances will move out of the cell

There will be no difference between cell content and its external environment.

The cell will lose its normal shape.

Question 4:What would happen to the life of a cell if there was no Golgi apparatus?

Solution:Effect of absence of Golgi apparatus on life of a cell

(i) The packaging and dispatching of different types of proteins to various targets inside and outside the cell will be influenced. (ii) The products of cell cannot be stored and modified later. (iii) There will be effect on lysosomes formation. This will cause accumulation of worn out and dead cell organelles within the cell which may cause cell death.

Question 5:Which organelle is known as the power house of the cell? Why?

Solution:The organelle mitochondria known as the power house of the cell. Process of cellular respiration takes place in mitochondria to generate energy required for various chemical activities in the form of ATP. This is the reason that mitochondria is known as power house of the cell.

Question 8:What is osmosis?

Solution:The movement of solvent from a region of its high concentration to a region of its low concentration through a semipermeable membrane is called osmosis. During osmosis, the water molecules (solvent) are free to cross the plasma membrane in both the directions.

Question 9: Carry out the following osmosis experiments. Take four peeled potato halves and scoop each one out to make potato cups. One of these potato cups should be made from a boiled potato. Put each potato cup in a trough containing water. Now

- a) Keep cup A empty
- (b) Put one tea spoon sugar in cup B.
- (c) Put one tea spoon salt in cup C.
- (d) Put one tea spoon sugar in the boiled potato cup D.

Keep these for two hours. Then observe the four potato cups and answer the following:

- (i) Explain why water gathers in the hollowed portion of B and C?
- (ii) Why is potato A necessary for experiment?
- (iii) Explain why water does not gather in the hollowed out portion of A and D?

Solution: (i) Osmosis is the process responsible for the gathering of water in the hollowed portion of B and C. Since, the concentration of solute (sugar in cup B and salt in cup C) is higher inside the cup as compared to the water, which is outside the cup. Hence, water from its higher concentration (outside the cup) will move towards the lower concentration (inside the cup). This process of osmosis (moving in of solvent) is called endosmosis.

- (ii) Potato A acts as a control for the experiment. This is required for comparing the results of the experiment.

(iii) Water does not gather in the hollowed out portions of A and D because of the following reasons:

- The hollowed portion of potato A is empty. So, because of no concentration difference, no osmosis can occur.
- The hollowed portion of potato D contains sugar in it but it is boiled. So, osmosis cannot occur as its semipermeable membrane is destroyed by boiling.