

NCERT solutions for Class 11 Biology Chapter 8 Cell the Unit of Life

Q1. Which of the following is not correct?

(a). Robert Brown discovered the cell.

(b). Schleiden and Schwann formulated the cell theory

(c). Virchow explained that the cells are formed from pre-existing cells.

(d). A unicellular organism carries out its activities within a single cell .

Answer:

(a) is not correct. All the others are correct.

Robert Brown discovered the nucleus and not the cell. Cells were first observed by Robert Hooke when he was studying the cork cells of plants. Metthias Schleiden and Theodore Schwann(1938) proposed the cell theory which was later modified by Rudolf Virchow(1855). The cell theory states that

1. All living organisms are composed of cells and products of cells.
2. All cells arise from pre-existing cells. (This was suggested by Rudolf Virchow)

Q1. Which of the following is not correct?

(b). Schleiden and Schwann formulated the cell theory

Answer:

Correct statement. Metthias Schleiden and Theodore Schwann(1938) proposed the cell theory which was later modified by Rudolf Virchow(1855). The cell theory states that

1. All living organisms are composed of cells and products of cells.
2. All cells arise from pre-existing cells.

Q1. Which of the following is not correct?

(c). Virchow explained that cells are formed from pre-existing cells.

Answer:

Correct statement. Earlier cell theory as proposed by Schleiden and Schwann stated that all organisms are made up of cells. The cells are the basic structural and functional units of life. However, this theory did not explain the origin of cells. Later on, Virchow suggested that all cells arise from pre-existing cells.

CBSE NCERT solutions for class 11 biology chapter 8 cell the unit of life:

Q2. New cells generate from

(a) bacterial fermentation

(b) regeneration of old cells

(c) pre-existing cells

(d) abiotic material

Answer:

(c) . New cells generate from pre-existing cells.

According to Rudolf Virchow, the new cells arise from pre-existing cells by their division.

Q3. Match the following

Column I Column II

- (a) Cristae (i) Flat membranous sacs in stroma
- (b) Cisternae (ii) Infoldings in mitochondria
- (c) Thylakoids (iii) Disc-shaped sacs in Golgi apparatus

Answer:

The correct matching is (a)- (ii), (b)- (iii), (c)- (i)

Column I Column II

- (a) Cristae (ii) Infoldings in mitochondria
- (b) Cisternae (iii) Disc-shaped sacs in Golgi apparatus
- (c) Thylakoids (i) Flat membranous sacs in stroma

Q4. Which of the following is correct:

- (a) Cells of all living organisms have a nucleus.
- (b) Both animal and plant cells have a well defined cell wall.
- (c) In prokaryotes, there are no membrane bound organelles.
- (d) Cells are formed de novo from abiotic materials.

Answer:

The correct statement is (c) In prokaryotes, there are no membrane-bound organelles. All other statements are incorrect as cells of some organism can lack a nucleus (e.g. RBC), animal cells do not possess a cell wall and cells are formed from pre-existing cells.

NCERT solutions for class 11 biology chapter 8 cell the unit of life:

Q5. What is a mesosome in a prokaryotic cell? Mention the functions that it performs.

Answer:

Mesosome is a complex membranous structure formed by the infoldings of the plasma membrane in prokaryotic cells. The functions performed by mesosome are as follows:

1. Mesosomes play important roles in cell wall formation, DNA replication etc.
2. Mesosomes are folded structures, this quality helps to increase the surface area of the plasma membrane to carry out enzymatic activities.
3. Mesosome also helps in cellular respiration and secretion.

Q6. How do neutral solutes move across the plasma membrane? Can the polar molecules also move across it in the same way? If not, then how are these transported across the membrane?

Answer:

Neutral solutes are lipid soluble. These move across the plasma membrane by directly crossing through the lipid bilayer. Their rate of movement across the plasma membrane depends on concentration gradient and lipid solubility of neutral solutes. No polar molecules can not move across the membrane in the same manner as neutral solutes. The polar molecules require carrier proteins in order to pass through the membrane. The carrier proteins are integral membrane proteins that have an affinity for some specific molecules and during transport, these carriers carry these molecules to the other side of the membrane.

Q7. Name two cell-organelles that are double membrane bound. What are the characteristics of these two organelles? State their functions and draw labelled diagrams of both.

Answer:

The two double membrane-bound organelles are mitochondria and chloroplast.

Characteristics of Mitochondria-

1. Mitochondria are cylindrical shaped cell organelles which can be stained by Janus green and observed in the microscope. Mitochondria consists of 60-70% proteins, 25-35 % lipids, 5-7% RNA, DNA etc.
2. Mitochondria are encircled by two membranes i.e. an outer membrane and inner membrane. These two membranes are separated by per-mitochondrial space. The outer membrane is smooth and porous in nature. POrins are present in the outer membrane.
3. The inner membrane of mitochondria is invaginated into folds that are called cristae. Electron transport chain and oxysomes are found in the inner membrane.
4. Inside the mitochondria, a semi-fluid matrix is present which consists of protein particle, ribosomes, RNA, DNA and enzymes that are used in the Krebs cycle, amino acid synthesis etc.
5. Mitochondria are semi-autonomous organelles as they possess their own DNA and protein synthetic machinery. The DNA is of mitochondria is naked and circular.

Functions of mitochondria

1. Mitochondria are the sites of cellular respiration
2. Mitochondria provide important intermediates for the synthesis of several biochemicals like chlorophyll, cytochromes, pyrimidines, steroids etc.
3. Synthesis of many amino acids and fatty acids occur in the mitochondria.
4. Mitochondria may store and release calcium when required
5. Mitochondria are involved in providing maternal inheritance.

Characteristics of chloroplast

The chloroplast is a green coloured plastid which possesses photosynthetic pigments like chlorophyll, carotenoids etc and takes part in photosynthesis.

2. Chloroplasts can be variously shaped i.e. they can be plate-like, ribbon-like, cup-shaped etc.
3. Chloroplast consists of 50-60% protein, 25-30% lipids, 5-10% of chlorophyll, 1-2% carotenoids, up to 0.5% DNA and 2-3% RNA.
4. The structure of chloroplast consists of envelope, matrix and thylakoids.
5. The envelope of the chloroplast is made up of two smooth membranes separated by intermembrane space of 100-200 angstrom width. The outer membrane is more permeable than the inner membrane.
6. The ground substance of a chloroplast is known as matrix or stroma. It is a semi-fluid colloidal complex made up of 50% soluble proteins and RNA, DNA, ribosomes, enzymes etc. Throughout the stroma, membrane-lined flattened sacs are present.

These take part in photosynthesis. Thylakoids are stacked one over the other to form grana. 40-60 grana may occur in 1 chloroplast. Each granum may have 2-100 thylakoids. In thylakoids membranes, photosystems are present.

Functions of chloroplast

1. chloroplasts are the site of photosynthesis.
2. Chloroplasts contain the enzymes for the synthesis of carbohydrates and proteins
3. They temporarily or permanently store starch.

Solutions for NCERT class 11 biology chapter 8 cell: the unit of life:

Q8. What are the characteristics of prokaryotic cells?

Answer:

Characteristics of prokaryotic cells

Prokaryotic cells are those cells which do not have a well-defined nucleus. The most important characteristics of prokaryotic cells are as follows:

1. The nucleus of prokaryotic cells is not well defined i.e. it does not possess a nuclear envelope. The DNA of these cells lies freely in the cytoplasm. The DNA is naked and variously coiled. Extrachromosomal DNA is also found in these cells.
2. Prokaryotic cells are devoid of membrane-bound cell organelles.
3. The cell wall is present in prokaryotic cells of bacteria and cyanobacteria, however, it is absent in mycoplasma.

4. Instead of chloroplasts, chromatophores are present in prokaryotes to carry out photosynthesis.

5. Ribosomes of prokaryotic cells are of 70S type.

Q9. Multicellular organisms have division of labour. Explain.

Answer:

Division of labour refers to the differentiation of certain components or parts to perform specific functions to cause an increase in the efficiency and survival rate of that organism. Multicellular organisms are composed of millions of cells. All these cells are different from each other with respect to their structure and function. These cells together are responsible for the survival of the organism. The various necessary functions are executed via the division of labour. In simple words, we can say that in multicellular organisms the functions essential for the survival of the organism are divided and allotted to different tissues and tissue systems. All these tissues and their systems work in a coordinated manner. For example, every cell of a multicellular organism cannot obtain food from outside. The organism requires a system for obtaining food, its digestion and distribution. Therefore, a digestive system and system of transport are also required. So, there are tissues responsible for digestion and transportation. Similarly, tissues are there for excretion, respiration etc. Similarly, certain cells of the body take over the function of reproduction. Others take part in repair and replacement of worn out or injured portions. Hence, multicellular organisms show the division of labour.

Q10. Cell is the basic unit of life. Discuss in brief.

Answer:

A living organism is composed of various organ and organs systems. These organ systems are made up of tissues that in turn are composed of cells. A cell is the smallest unit of life which can survive on its own and perform all the essential functions necessary for its survival. It not only supports the structure of an organism but its functions also. Due to this reason cell is the basic structural and functional unit of life.

Q11. What are nuclear pores? State their function.

Answer:

Nuclear pores are the areas in the nuclear membrane where two membranes fuse with each other. The nuclear pores allow the transfer of only some specific substances across the nuclear membrane. For example, they allow RNA and proteins to move in and move out of the membrane.

Q12. Both lysosomes and vacuoles are endomembrane structures, yet they differ in terms of their functions. Comment.

Answer:

Both lysosome and vacuole are endomembranous structures with only a single membrane, IN case of vacuoles, the membrane is called tonoplast. Despite being endomembranous structures, the function of lysosome and vacuole differs considerably. The lysosome consists of hydrolytic enzymes that hydrolyze various substances except for cellulose. These can even digest worn contents of their own cell if required. Due to this reason, lysosomes are also called suicidal bags. On the other hand, vacuoles are non-cytoplasmic sacs that store substances. For example, sap vacuole store sap with organic and inorganic substances and by this maintains the osmotic pressure and

turgidity of the cell. Similarly, food vacuole store food and gas vacuoles store metabolic gases.

NCERT solutions for class 11 biology chapter 8 cell the unit of life:

Q13. Describe the structure of the following with the help of labelled diagrams. (i)

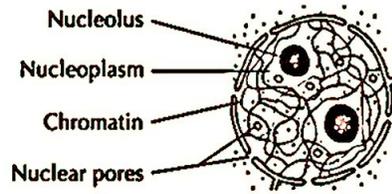
Nucleus

Answer:

The nucleus is the centrally placed, spherical structure found in the cell. It is the primary organelle that controls all the activities of a cell. The structure of the nucleus comprises of nuclear membrane enclosing nucleoplasm or nuclear matrix.

1. Nuclear membrane- The membrane of the nucleus is a double-layered structure consisting of an outer and an inner layer. Both these layers are separated by means of perinuclear space. At some points, the two layers of the nuclear membrane are fused to form nuclear pores. Through these nuclear pores, transport of molecules is allowed.

2. Nucleoplasm/Nuclear matrix- It refers to the homogeneous, granular fluid present inside the nucleus. Nucleoplasm consists of nucleolus and chromatin material. The chromatin material is the DNA present complexed with proteins in the form of a long thread. It is mainly involved in the transmission of characteristics from one generation to another. The nucleolus, on the other hand, is the spherical structure lacking a membrane. It acts as the site of the ribosome formation. Nucleolus mainly consists of RNA and protein.



Q13. Describe the structure of the following with the help of labelled diagrams.

(ii) Centrosome

Answer:

Centrosome

The structure of centrosome is made up of two cylindrical structures called centrioles. These centrioles show a cartwheel like organisation and both lie perpendicular to each other. A centriole is made up of microtubule triplets that are evenly spaced in a ring. The adjacent triplets are linked together. A proteinaceous hub is present in the central part of a centriole. The hub is attached to triplets by means of radial spokes. Centrioles help in the organisation of spindle fibres. It also forms the basal body of cilia and flagella.

Q14. What is a centromere? How does the position of centromere form the basis of classification of chromosomes. Support your answer with a diagram showing the position of centromere on different types of chromosomes.

Answer:

A centromere refers to a non-stainable area that attaches two chromatids of a chromosome. On the basis of the position of the centromere chromosomes can be of following types.

1. Acrocentric chromosomes- Centromere is present sub-terminal regions, chromatids are arranged in J-shaped
2. Metacentric chromosome- Centromere is present in the centre and the chromosome appears V-shaped.
3. Sub-metacentric chromosome- Position of the centromere is sub-median. It appears L-shaped
4. Telocentric chromosome- Centromere is terminally placed. Chromosome appears I-shaped