
#424312

Topic: Eukaryotic cell envelope and cytoplasm

What is the nature of cell walls in diatoms?

Solution

The process of cell walls construction of diatoms is known as Frustule. It has two thin overlapping shells fitting into each other just as a soap-box. Their walls are made up of silica. The dead and decomposed diatoms deposit the silica present in their walls in form of diatomaceous earth. This diatomaceous earth is very soft and quite inert. It is used in filtration of oils, sugars, and for other industrial purposes.

#424417

Topic: Cell introduction and cell theory

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 cells are formed from pre-existing cells.
- (d) A unicellular organism carries out its life activities within a single cell.

Solution

Robert Brown discovered the cell - is a false statement.

The first person to see a cell was Robert Hook. He used a very primitive microscope and observed empty blocks like structure in the cork cells which was named as cell.

#424418

Topic: Cell introduction and cell theory

New cells are generated from

- (a) Bacterial fermentation
- (b) Regeneration of old cells
- (c) Pre-existing cells
- (d) Abiotic materials

Solution

New cells generate from the pre-existing cells.

The cell theory is a widely accepted explanation of the relationship between cells and living things. The cell theory states :

- All living things or organisms are made of cells.
- New cells are created by old cells dividing into two.
- Cells are the basic building units of life.

In 1858, Rudolf Virchow concluded that all cells come from pre-existing cells, thus completing the classical cell theory.

#424419

Topic: Mitochondria and plastids

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 |

Solution

Cristae : The inner membrane of mitochondria folds inward into a finger like projection known as cristae. It increases the surface area for absorption.

Cisternae : A space containing fluid, such as those occurring between the membranes of flattened sacs of the Golgi apparatus and the endoplasmic reticulum, also between the two membranes of the nuclear envelope.

Thylakoids : Thalakoids are disc shaped structure which are arranged in stacks known as grana. These contain the photosynthetic pigments and are site for light reaction during photosynthesis. Hence, the correct answer is as follows :

| 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 |

#424420

Topic: Eukaryotic cell envelope and cytoplasm

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.

Solution

- (a) Only eukaryotic cells have nuclei. They are absent in prokaryotes.
- (b) Cell walls are only present in plant cells. They are absent in all animal cells.
- (c) Membrane-bound organelles are organelles surrounded by a double or a single membrane like nucleus, mitochondria, chloroplasts, lysosomes, ER, Golgi bodies etc., are examples of such organelles. These cell organelles are absent in prokaryotes.
- (d) All cells arise from pre-existing cells.

#424421

Topic: Prokaryotic cell

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

Solution

Mesosome is a convoluted membranous structure formed in a prokaryotic cell by the invagination of the plasma membrane. Its functions are as follows :

- (1) These extensions help in the synthesis of the cell wall and replication of DNA. They also help in the equal distribution of chromosomes into the daughter cells.
- (2) It also increases the surface area of the plasma membrane to carry out various enzymatic activities.
- (3) It helps in secretion processes as well as in bacterial respiration.

#424422

Topic: Eukaryotic cell envelope and cytoplasm

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?

Solution

Neutral molecules move across the plasma membrane by simple passive diffusion without expenditure of energy.

No, the polar molecules cannot move through the plasma membrane by passive diffusion because the cell membrane is made up of a phospholipid bilayer and proteins. so, the movement of polar molecules across the non-polar lipid bilayer requires carrier proteins which are integral protein particles having a certain affinity for specific solutes. As a result, they facilitate the transport of molecules across the membrane.

#424424

Topic: Prokaryotic cell

What are the characteristics of prokaryotic cells?

Solution

Prokaryotic cells are those cell that does not possess membrane-bounded nucleus e.g., bacteria, cyanobacteria. The characteristics of prokaryotic cells are as follows:

- 1. They are small in size 0.1 mm to 10 mm.
- 2. They do not possess membrane-bound organelles.
- 3. They have single circular DNA as genetic material and plasmid.
- 4. They possess mesosomes for respiration.
- 5. Some are autotrophic and some are saprotrophic.

#424426

Topic: Cell introduction and cell theory

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

Solution

Cells are the basic units of life capable of doing all the required biochemical processes that a normal cell has to do in order to live. The basic needs for the survival of all living organisms are the same. All living organisms need to respire, digest food for obtaining energy, and get rid of metabolic wastes. Cells are capable of performing all the metabolic functions of the body. Hence, cells are called as the functional units of life.

#424427

Topic: Centrosome, nucleus and chromosome

What are nuclear pores? State their function.

Solution

Nuclear pores are tiny holes present in the nuclear membrane of the nucleus. They are formed by the fusion of two nuclear membranes.

These holes allow specific substances to be transferred into a cell and out from it. They allow molecules such as RNA and proteins to move in both directions, between the nucleus and the cytoplasm.

#424428

Topic: Endomembrane system

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

Solution

Lysosomes are membrane-bound vesicular structures holding a variety of enzymes such as lipases, proteases and amylases. The purpose of lysosomes is to digest worn out cells. They are involved in the intracellular digestion of foreign food particles and microbes. Sometimes, they also act as suicidal bags. They are involved in the self digestion of cells. They are a kind of waste disposal systems of a cell. On the other hand, vacuoles are storage sacs found in cells. They might store the waste products of cells. In unicellular organisms, the food vacuole contains the consumed food particles. It also plays a role in expelling excess water and some wastes from the cell.

#424429

Topic: Centrosome, nucleus and chromosome

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

(i) Nucleus

(ii) Centrosome

Solution

(i) Nucleus

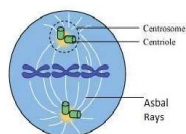
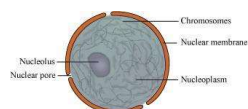
The nucleus is a double wall membrane structure. It regulates the cellular activities . It constitutes the following parts-

Nuclear membrane : It is a double membrane separating the contents of the nucleus from the cytoplasm. The narrow space between the two membranes is called the perinuclear space. Nuclear membrane has tiny holes called nuclear pores. These holes allow specific substances to be transferred into a nucleus and out from it.

Nucleoplasm/Nuclear matrix : It is a homogenous granular fluid present inside the nucleus. It contains the nucleolus and chromatin. The nucleolus is a spherical structure that is not bound by any membrane. It is rich in protein and RNA molecules and is the site of ribosome formation. Chromatin is an entangled mass of thread-like structures. It contains DNA and some basic proteins called as histones.

(ii) Centrosome

Centrosome has two cylindrical structures called centrioles. Each has a cartwheel-like organisation. A centriole is made up of microtubule triplets in a ring. The adjacent triplets are linked together. There is a proteinaceous hub in the central part of a centriole. The hub is connected to the triplets via radial spokes. These centrioles help in organising the spindle fibres and astral rays during cell division. They form the basal body of cilia and flagella as well.



#424884

Topic: Eukaryotic cell envelope and cytoplasm

What are porins? What role do they play in diffusion?

Solution

Porins are proteins which forms pores of large sizes in the outer membranes of plastids such as the chloroplast, mitochondria and the membranes in bacteria. They help in facilitating the passive transport of small-sized protein molecules.

#462770

Topic: Prokaryotic cell

State the difference between eukaryotes and prokaryotes.

Solution

1. Eukaryotic cells contains membrane bounded organelles, such as the nucleus, while prokaryotic cells do not.
2. Prokaryotes are also known as the primitive life forms as they arrived earlier than the eukaryotes during the course of evolution.
3. Eukaryotes are multicellular and prokaryotes are unicellular.
4. Ribosomes are smaller in prokaryotes and larger in eukaryotes.
5. Prokaryotes lacks 'true nucleus', whereas eukaryotes possess nucleus as well as nuclear membrane.

#462773

Topic: Centrosome, nucleus and chromosome

Where are chromosomes found in a cell? State their function.

Solution

Chromosomes are located inside the nucleus of animal and plant cells. Each chromosome is made of proteins (histones and non-histones) and a single molecule of deoxyribonucleic acid (DNA). The function of chromosomes is to carry the genetic material from one generation to another.

#462774

Topic: Cell introduction and cell theory

'Cells are the basic structural units of living organisms'. Explain.

Solution

Each living organism is made up of cells. All the life processes takes place inside the cell. A group of cells make up a tissue to perform specific function, these tissues combine together to form organ. Different organs together make-up an organism,

#462775

Topic: Eukaryotic cell envelope and cytoplasm

Explain why chloroplasts are found only in plant cells?

Solution

Chloroplast is an organelle, having chlorophyll pigments in them. These pigments trap light energy to support photosynthetic reaction. Chloroplast are specific to plant cell because plants are the autotrophs which can prepare their own food by conversion of light energy to chemical energy.

#464522

Topic: Prokaryotic cell

How is a prokaryotic cell different from a eukaryotic cell?

Solution

Differences between prokaryotic and eukaryotic cell

| Prokaryotic cell | Eukaryotic cell |
|--|--|
| 1. They are generally small in size (1-10 micrometer). | 1. Eukaryotic cells are comparatively larger in size. |
| 2. Nuclear matter is undefined without any nuclear membrane and is called as nucleoid. | 2. A true nucleus with nuclear membrane is present. |
| 3. Single chromosome is present as genetic material. | 3. More than one chromosome is present. |
| 4. It lacks any membrane bound organelles, i.e., ER, Golgi body, mitochondria etc, are absent. | 4. It is characterized by presence of membrane bound organelles. |
| 5. 70S type ribosome is present. | 5. 80S type ribosome is present. |
| 6. Cell division occurs by fission, budding or fragmentation. | 6. It exhibits mitosis and meiosis as cell division processes. |

#464523

Topic: Eukaryotic cell envelope and cytoplasm

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

Solution

Plasma membrane serves as selectively permeable barrier between cell component and the surroundings. It allows only selected material to move in and out of cell thereby maintains the cell's interior intact. Rupture or break down of plasma membrane would result in the exposure of cell component to the external environment and would ultimately result in cell death.

#464524

Topic: Endomembrane system

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

Solution

Golgi apparatus consists of flattened sacs stacked on each other and serves to process and transport the secretory and synthetic products from the endoplasmic reticulum (ER) (lipids and proteins). In absence of Golgi apparatus, these ER products would not be carried to the designated location in cell. Golgi apparatus also serves to store and modify the material synthesized in cell, these materials would not be stored and modified. Lysosomes are the suicidal bags of cell that digest and remove the wear and tear organelles and molecules from cell. In absence of Golgi apparatus, lysosomes would not be produced and accumulation of dead and damaged organelles and molecules in cell would ultimately result in cell death.

#464526

Topic: Endomembrane system

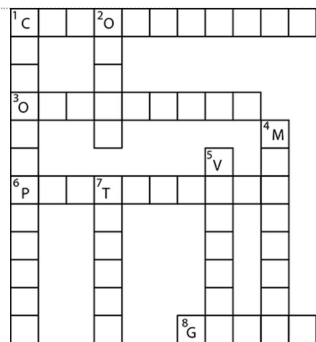
Where do the lipids and proteins constituting the cell membrane get synthesised?

Solution

The lipids constituting the membrane are synthesized in smooth endoplasmic reticulum (SER) and are transported to cell membrane. Membrane proteins are synthesized on cytoplasmic ribosomes from where they are transported to Golgi apparatus and endoplasmic reticulum for further modifications and then transported to cell membrane.

#464532

Topic: Eukaryotic cell envelope and cytoplasm



Complete the crossword with the help of clues given below.

Across

1. This is necessary for photosynthesis.
3. Term for component present in the cytoplasm.
6. The living substance in the cell.
8. Units of inheritance present on the chromosome.

Down

1. Green plastids.
2. Formed by collection of tissues.
4. It separated the contents of the cell from the surrounding medium.
5. Empty structure in the cytoplasm.
7. A group of cells.

Solution

Across:

1. CHLOROPHYLL
3. ORGANELLE
6. PROTOPLASM
8. GENES

DOWN:

1. CHLOROPLAST
2. ORGAN
4. MEMBRANE
5. VACUOLE
7. TISSUE

1. Chlorophyll are the green pigments present in plants necessary for the process of photosynthesis.
3. Organelle is a part of a cell which carries out specific function and is suspended in the cytoplasm of a eukaryotic cell.
6. Protoplasm is a part of the cell. It is the living content of a cell and is surrounded by a plasma membrane. It is a general term for the cytoplasm.
8. Genes contains DNA, which is responsible for passing on the characters from one generation to another, are present on the chromosomes.
1. Chloroplasts are the green coloured plastids present in plant cell.
2. Organ is a structure formed by a group of tissues to perform a specific function in the body.
5. The name vacuole is derieved from Latin word, vacuus meaning 'empty' due to its nature of appearance when observed under the microscope.
7. Cells together combine to form tissues to perform special function in the body.