5. The Fundamental Unit of Life

Check Point 01

1. Question

Who discovered free-living cells?

Answer

Free- living cells were discovered by Anton Van Leeuwenhoek in the pond water.

2. Question

Give name of two organisms each that are

(i) Unicellular

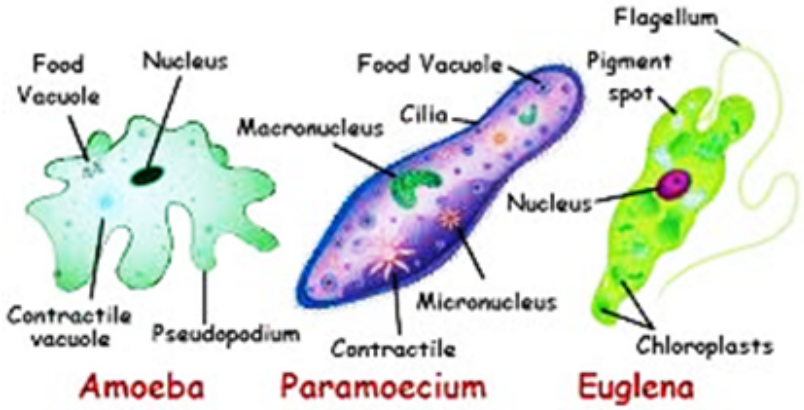
(ii) Multicellular

Answer

(i) unicellular organisms – *Amoeba, Paramoecium*

(ii) Multicellular organisms- Fungi and Plants

This is a picture showing different unicellular organisms.



3. Question

Name the two cells which can change their shape?

Answer

i. *Amoeba* changes its shape through its pseudopodia as it tries to catch its food.

ii. White blood cells in humans change its shape as it engulfs the germs to kill them.

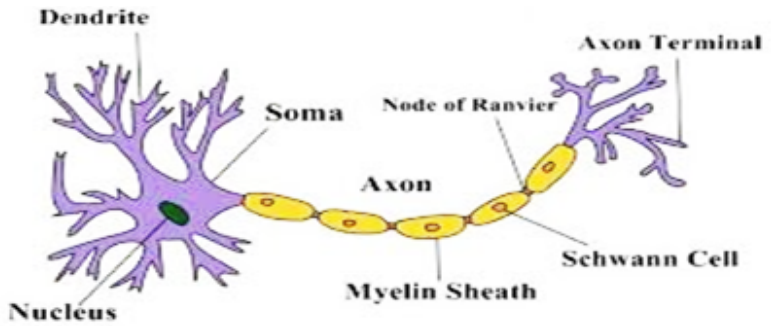
4. Question

Which is the longest cell in human body?

Answer

Nerve cell is the longest in human body. It is about one meter long.

This is a diagram showing a nerve cell.



5. Question

Unicellular organisms differ from multicellular ones. How?

Answer

Unicellular organism	Multicellular organisms
1. Organisms made up of only a single cell are known as unicellular organisms.	1. Organisms made up of more than a single cell are known as multi-cellular organisms.
2. Eg- *Amoeba*	2. Eg- Plants and animals
They each live and carry out all of their life processes as one single cell.	Multicellular organisms arise in various ways, for example by cell division or by aggregation of many single cells.

Check Point 02

1. Question

Name the molecules which contribute to the flexibility exhibited by the plasma membrane.

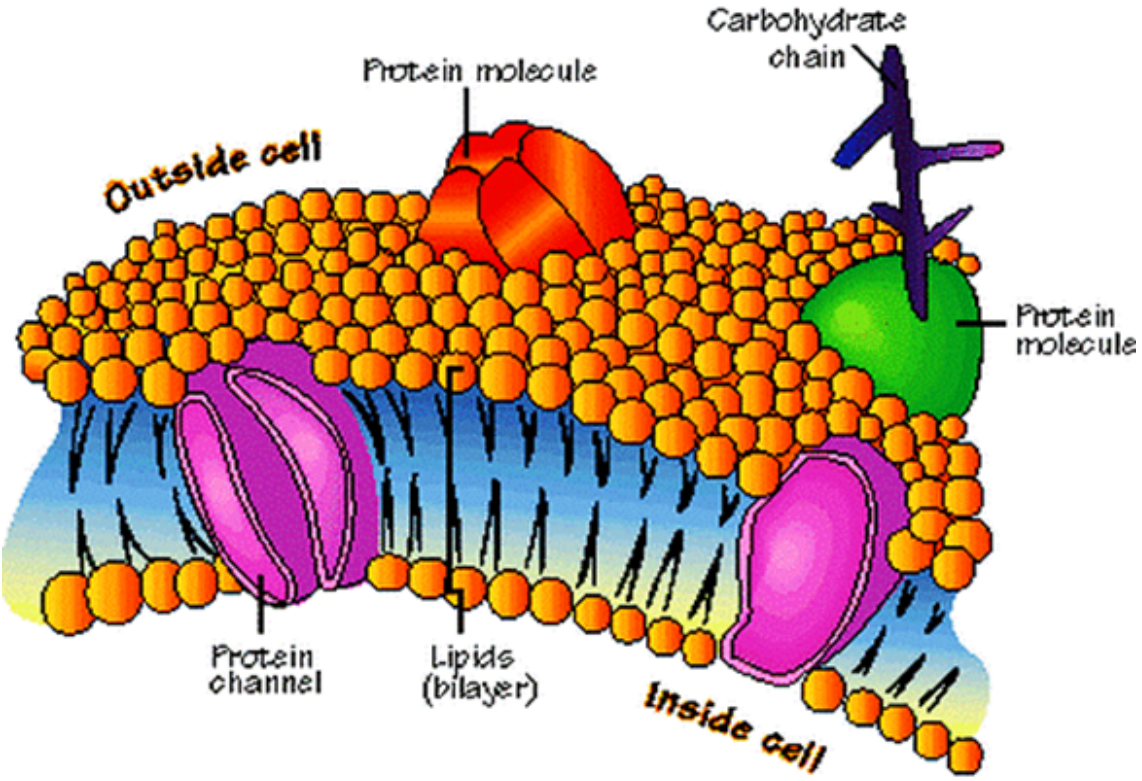
Answer

Lipids and proteins contribute to the flexibility of the plasma membrane.

Lipids constitute of 40-80% of the plasma membrane and the remaining is filled with proteins.

The lipids help to give membranes their flexibility and the proteins maintain the cell's chemical climate and assist in the transfer of molecules across the membrane.

The diagram of plasma membrane is given as:



2. Question

Why plasma membrane is called selectively permeable membrane?

Answer

The plasma membrane separates the contents of the cell from the outer environment. It allows the entry and exit of only selected molecules in and out of the cell, respectively.

3. Question

Name the process by which CO_2 is removed from the cell.

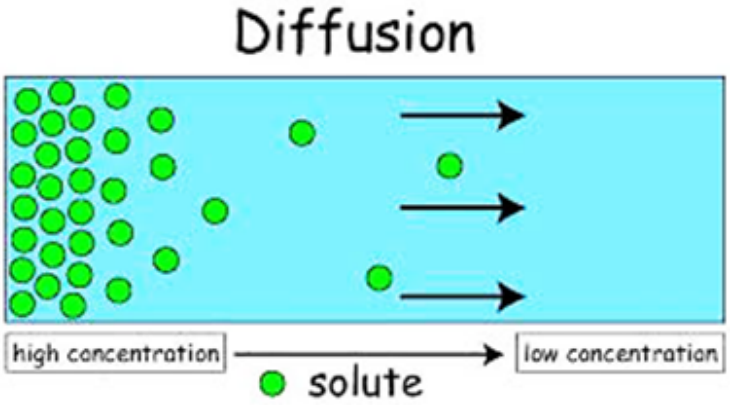
Answer

Carbon dioxide is removed from the cell through the process of diffusion.

As carbon dioxide is produced, the concentration inside the cell increases to a level higher than the surrounding blood, so carbon dioxide diffuses out of the cell.

Diffusion is a spontaneous movement of a substance from a region of high concentration to a region where its concentration is low.

This is a diagram showing the process of diffusion.



4. Question

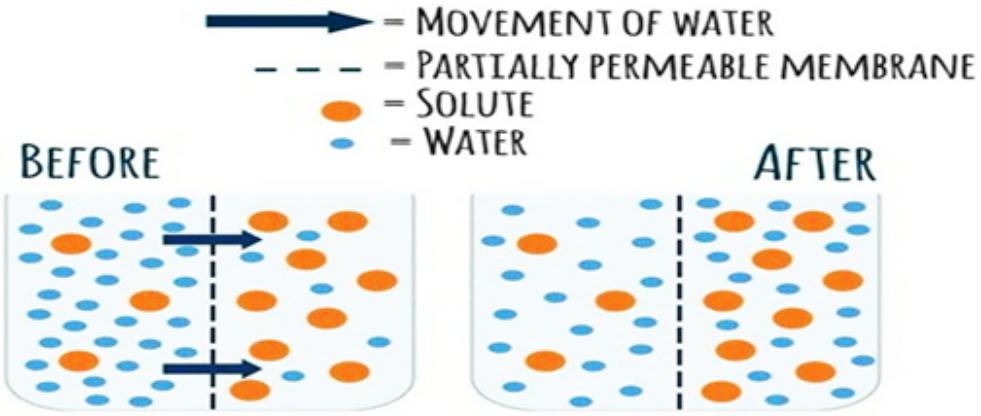
Apart from gaseous exchange, how is diffusion important for organisms?

Answer

Diffusion also helps in the movement of water across the concentration gradient.

The movement of water molecules from a region of higher concentration to region of lower concentration is known as osmosis, through a semi-permeable membrane.

This is a diagram showing the process of osmosis.



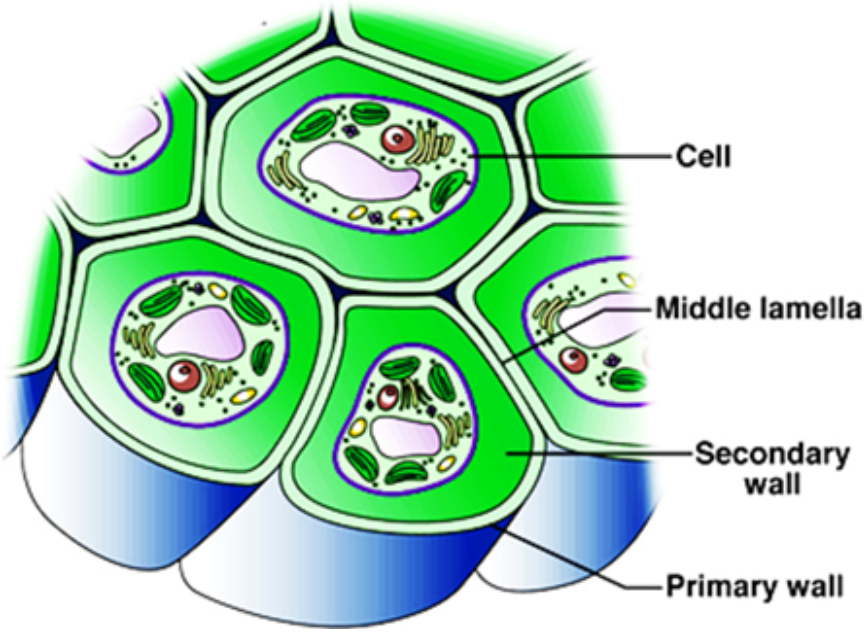
5. Question

Which component of plant cell provides the structural strength to it?

Answer

Cell wall is the component of the cell wall that provides the structural strength to it. Cellulose in the cell wall is a complex substance that confers strength to it.

This is a diagram showing the part of the cell wall.



Check Point 03

1. Question

What is the role of nuclear pores in a cell?

Answer

Nuclear pores are protein-based channels in the nuclear envelope

i. The nuclear pores help in the transfer of molecules from inside of the nucleus to the cytoplasm of the cell.

ii. Nuclear pores allow necessary proteins to enter the nucleus from the cytoplasm.

2. Question

What are genes? Where are they located?

Answer

A segment of DNA that is functionally active is known as a gene. They are located in the nucleus of the cell. A gene provides information for the production RNA and then protein, following a series of steps.

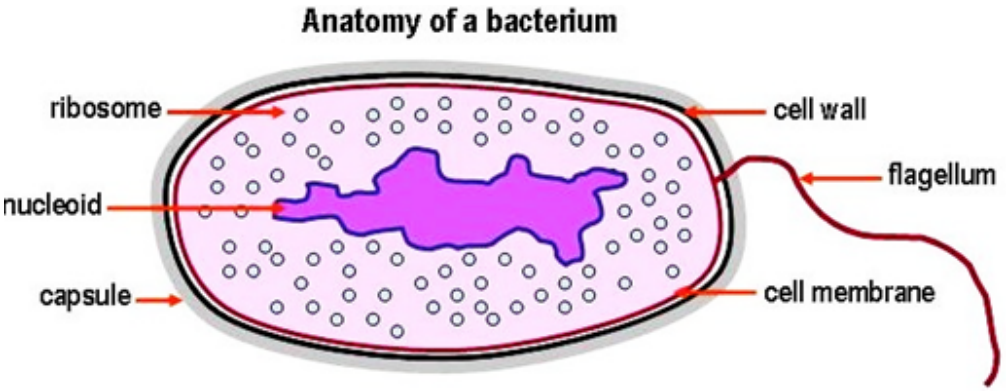
3. Question

Why is nuclear region in prokaryotes poorly defined?

Answer

Prokaryotes lack the nuclear membrane around the nuclear region in the cell. Nucleic acid of the nucleus is present in an undefined form known as 'Nucleoid'. That is why, it is said that the nuclear region of the prokaryotes is poorly defined.

This is a diagram showing nucleoid in prokaryotes.



4. Question

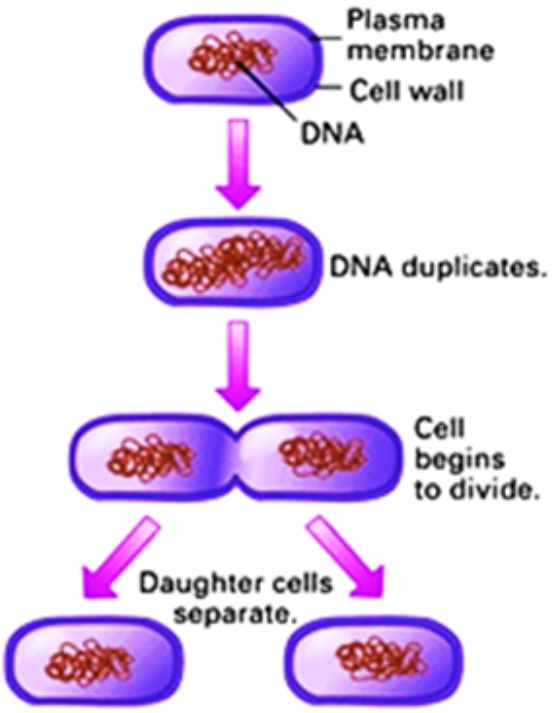
How do prokaryotic cells reproduce? Name two prokaryotes.

Answer

Prokaryotic cells divide by the process of binary fission. The parent cell divides into two daughter cells that are identical to each other. It is a mode of asexual reproduction.

Two prokaryotes are *E.coli* and streptococcus bacteria.

This is diagram showing the process of binary fission.



5. Question

Give one significance of cytoplasm in a eukaryotic cell.

Answer

Cytoplasm is the fluid content inside the cell membrane. It contains the specialized cell organelles that play important functions in the cell.

Check Point 04

1. Question

Identify the site for protein synthesis in a cell.

Answer

The site for protein synthesis in a cell is ribosome.

Protein is needed for many cell functions such as repairing damage or directing chemical processes.

Ribosomes can be found floating within the cytoplasm or attached to the endoplasmic reticulum.

2. Question

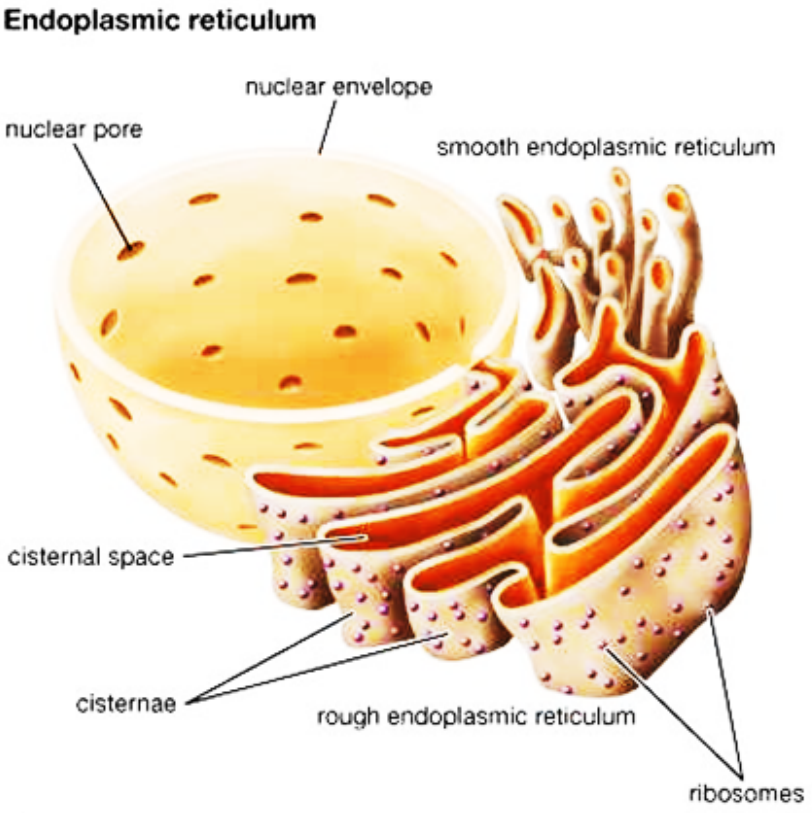
What is the role of SER in liver cells of vertebrates?

Answer

SER stands for Smooth Endoplasmic Reticulum. The role of SER in liver cells of vertebrates is to break down (detoxifying) drugs and poisons.

It is also involved in detoxification, production of biochemicals necessary for digestion and in lipid digestion.

This is a picture showing the Endoplasmic Reticulum.



3. Question

Which organelles constitutes the network of complex cellular membrane system in living cells?

Answer

Endoplasmic reticulum, Golgi apparatus, and lysosomes constitute the complex cellular system in living cells.

4. Question

Fill in the blanks to complete the statement.

During ……., the lysosomes digest stored food contents by ……. to supply energy to the cell.

Answer

During **digestion**, the lysosomes digest stored food contents by **digestive enzymes** to supply energy to the cell.

Explanation:

Lysosomes are formed by the Golgi body or the endoplasmic reticulum. These powerful enzymes can digest cell structures and food molecules such as carbohydrates and proteins.

5. Question

What is the similarity between mitochondria and plastids? Give any two.

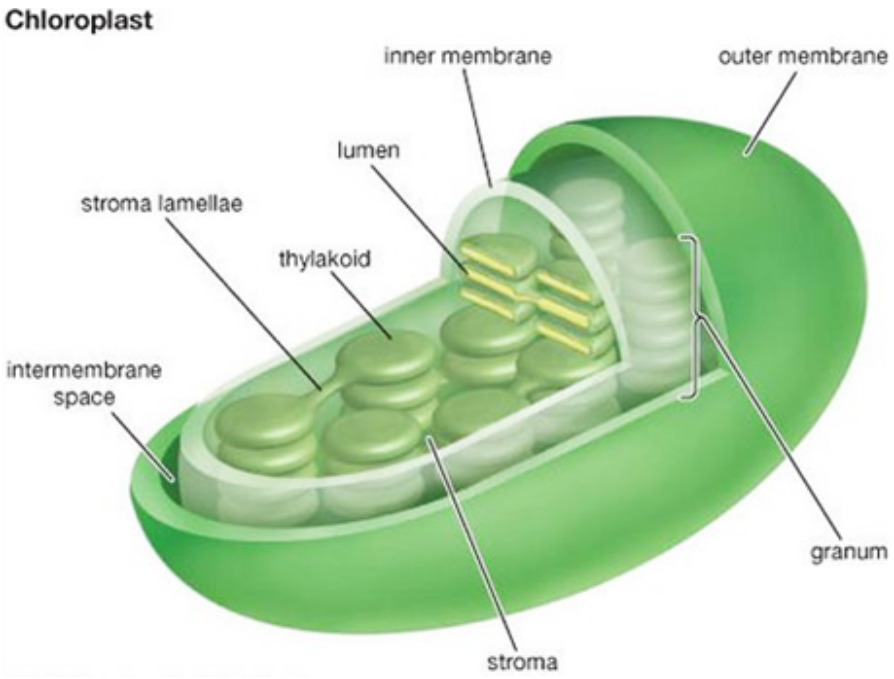
Answer

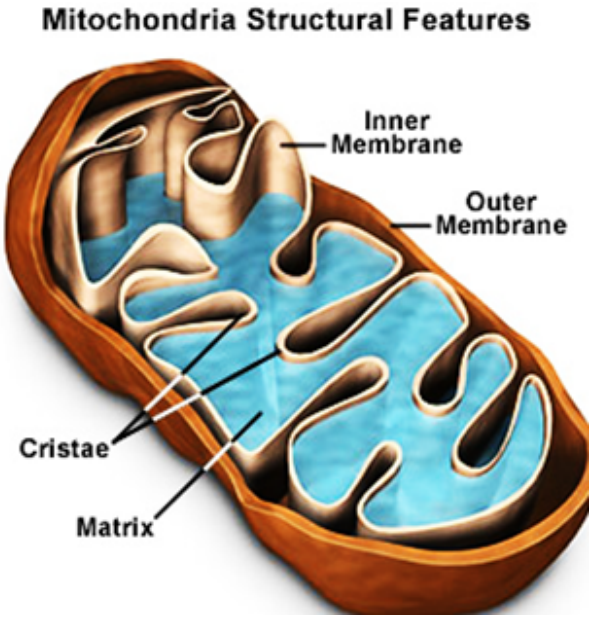
Two similarities between mitochondria and plastids are:

1. They both contain their own DNA content and ribosomes.

2. They both bear the same external structure organization.

The two pictures show the external details of mitochondria and plastid (chloroplast)





6. Question

Name the organelle, which acts as storage sacs of the cell.

Answer

Vacuole act as the storage sacs of the cell. It stores cell sap. It maintains the turbidity and rigidity of the cell.

Chapter Exercise

1. Question

From where do new cells arise?

Answer

New cells arise from the pre-existing cells. Cells divide and produce new cells of their own kind.

2. Question

Give two examples of organisms in which a single cell performs all the functions.

Answer

Two examples of organisms in which a single cell performs all the functions are:

1. *Amoeba*

2. *Paramoecium*

3. Question

What would happen to the life of a cell, if there are no vacuoles?

Answer

The cell may die if there are no vacuoles present in the cell. Vacuoles act as the storage sac of the cell for important proteins, vitamins, and amino acids.

4. Question

In which form is the DNA present in a cell when the cell is not dividing?

Answer

The DNA is present in the form of a **chromatin material** when the cell is not dividing. It is present in an un-winded form.

5. Question

What does the DNA molecule contain?

Answer

The DNA molecule contains the necessary information for proper functioning and organization of the cell. It acts as a source of information for the production of RNA and then proteins in the cell.

6. Question

Chromoplasts are present in which parts of the plant?

Answer

Chromoplast are present in the coloured part of the plants. It is a type of plastid that imparts colour to the plant parts like flowers, fruits, etc.

7. Question

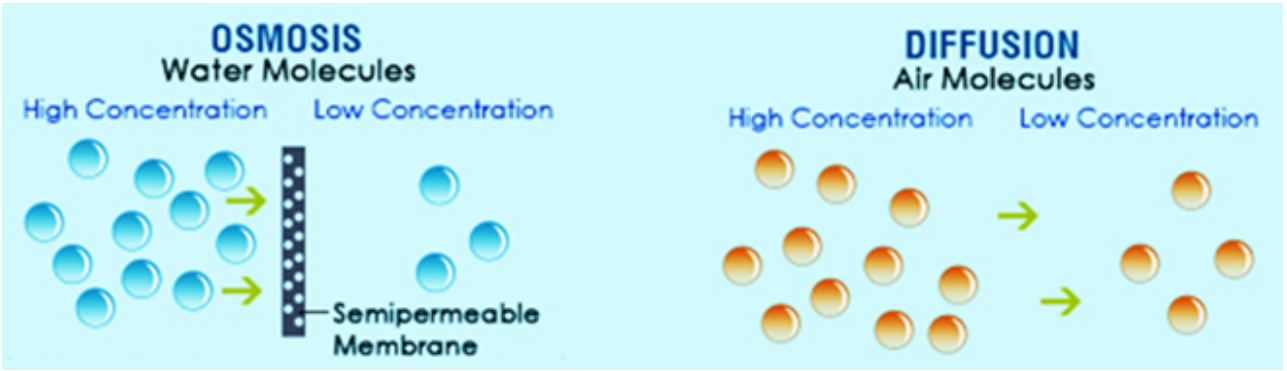
How diffusion and osmosis are related to each other?

Answer

The movement of **solute particles** take place from a region of higher concentration to a region where the concentration of solutes is low. This is diffusion.

Similarly, osmosis involves the movement of **water molecules** from a region of higher concentration to a region of lower where the concentration of water molecule is low, through a semi-permeable membrane.

This is a picture showing comparison between osmosis and diffusion.



8. Question

Name the organelle of the cell, which has membrane-bound sac filled with powerful digestive enzymes

Answer

Lysosome is the organelle of the cell which is membrane- bound and contain powerful digestive enzymes,that acts upon harmful pathogens in the cell. It is also known as the suicide bags of the cell.

9. Question

Which type of organelles are found in prokaryote and eukaryotes?

Answer

Membrane bound organelles are found in eukaryotes. Examples – Nucleus and mitochondria.

Organelles in prokaryotes are non- membrane bound. Example- Nucleoid.

Prokaryotic cells lack a nucleus and membrane-bound structures. Eukaryotic cells have a nucleus and membrane-bound structures called organelles

10. Question

What is the chemical composition of cell wall in plants and fungi?

Answer

Chemical composition of plant cell wall is **cellulosic** while that of fungi is made up of **chitin**.

Plant cell walls are composed of cellulose, while fungi cells walls are composed of chitin.

11. Question

Write two factors on which shape of a cell depends?

Answer

The shape of the cell depends upon:

1. Function it performs:

They may be spherical, rounded, cuboidal, tubular, discoidal or irregular.

It also depends on the cytoskeleton.

2. Its cytoskeleton

The cytoskeleton supports the cell & gives it shape.

It is responsible for organizing the organelles, and has roles in molecule transport, cell division and cell signaling.

12. Question

Where is the genetic material of a cell located? Why is it called so?

Answer

The genetic material of a cell is located in the nucleus. The nucleic acid stores vital information for the proper functioning of the cell.

It is called so because it directs all the important functions that take place in a cell.

This is a diagram showing the nucleus and its internal details.

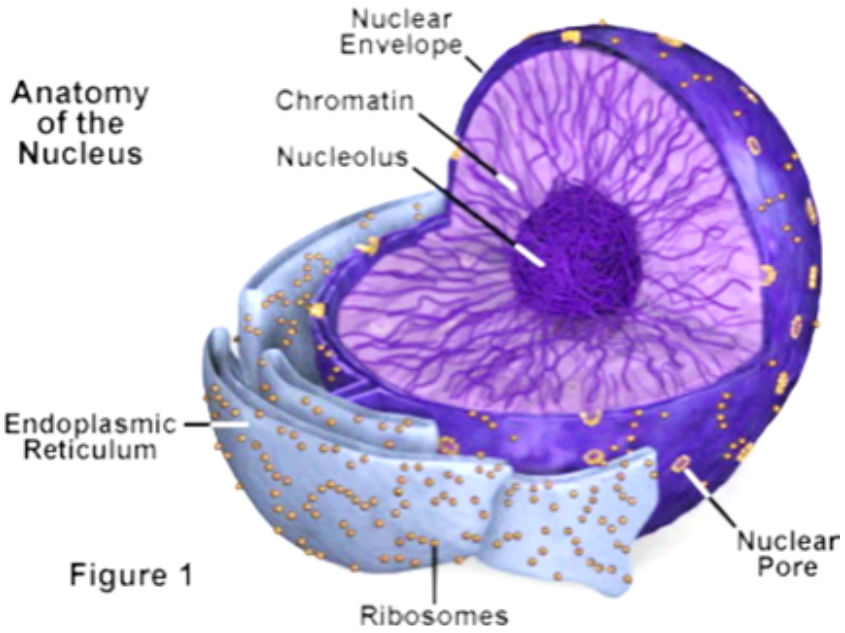


Figure 1

13. Question

Different colours are seen in different fruits and flowers. Why?

Answer

Different colours are seen in different fruits and flowers. This is because of the presence of the chromoplast on the cell. Chromoplast is a type of plastid which imparts colour to different parts of the plant.

14. Question

Why is it said that ‘a’ cell without a nucleus is without any future?

Answer

The nucleus is the most important and efficient organelle among all the other organelles. It stores genetic information in the form of DNA (De-oxyribo nucleic acid). The nucleus plays the most important role in cellular reproduction, the process by which a cell divides to form two daughter cells.

That is why it is said that a cell without a nucleus is without any future, as it will not be able to divide further.

15. Question

How do vacuoles perform differently in plant cell and a unicellular organisms like *Amoeba*?

Answer

Vacuoles in plant cell	Vacuoles in *Amoeba*
1. The vacuoles are filled with cell sap.	1. The vacuole is filled with food substances that are consumed by the organism.
2. It helps in maintaining the turgidity and rigidity of the cell.	2. It does not confer rigidity or turbidity to the cell.

16. Question

Write the function of leucoplast and chromoplast.

Answer

1. FUNCTION OF LEUCOPLAST- They helps in the storage of starch, oils and protein granules in the cell.

2. FUNCTION OF CHROMOPLAST- They impart colour to different parts of the plants like flowers, fruits, etc.

17. Question

Name the fluid content of a cell. Write its function(s).

Answer

Cytoplasm is the fluid content of the cytoplasm.

Functions- It contain specialized organelles which performs important functions in the cell.

18. Question

Draw a well-labelled diagram of an eukaryotic nucleus. How is it different from nucleoid?

Answer

Eukaryotic nucleus

Diagram showing eukaryotic nucleus

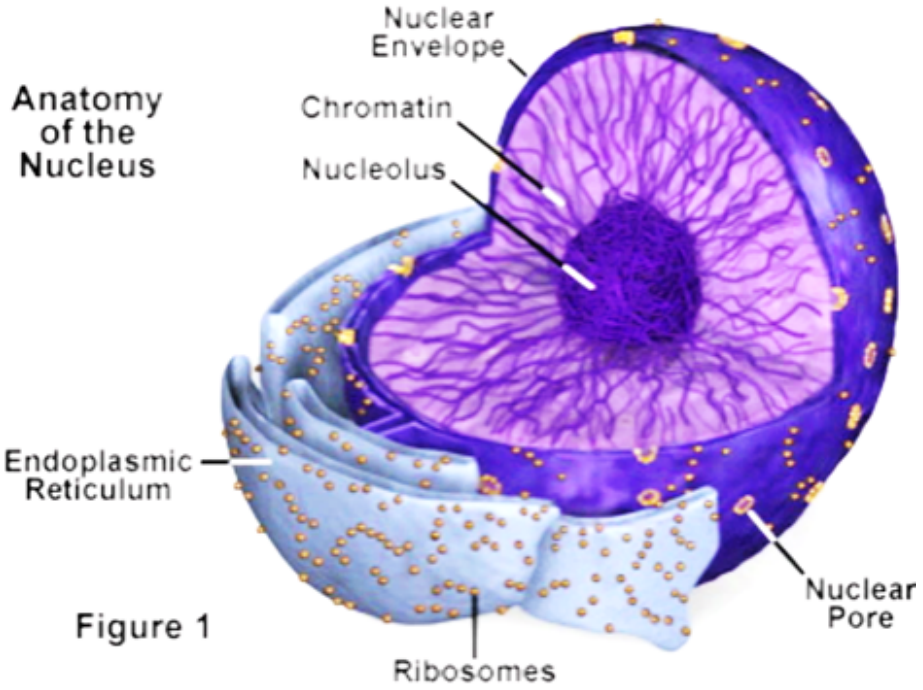
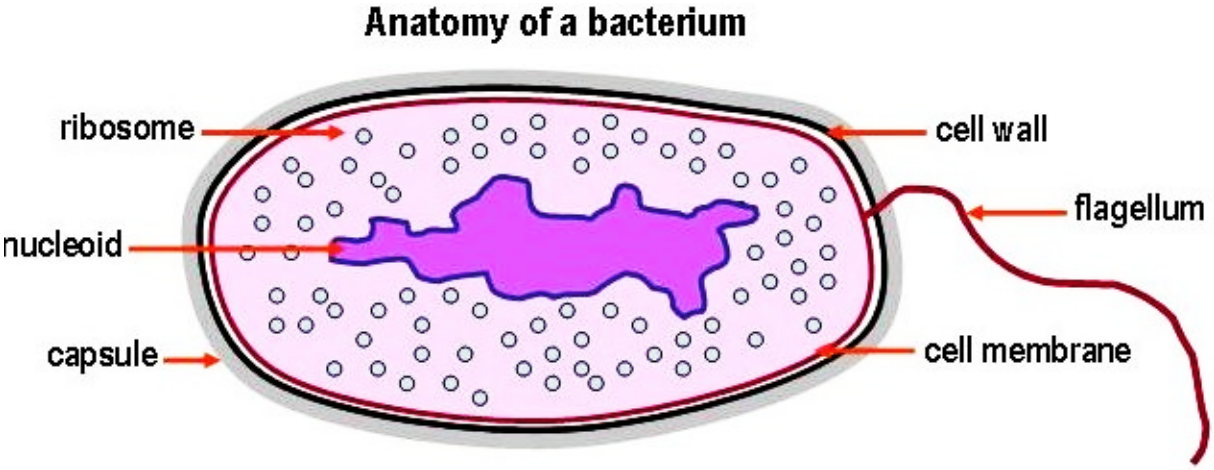


Figure 1

It is different from nucleoid of prokaryotes as, eukaryotic nucleus contains well-defined nuclear membranes but in prokaryotes the nuclear membrane is absent. The genetic content is present as nucleoid.

Diagram showing nucleoid in prokayotic bacteria.



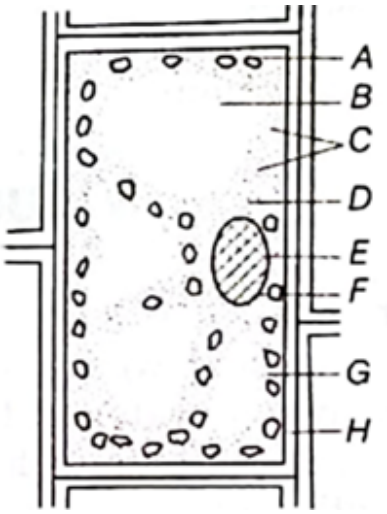
19. Question

Given below is a diagrammatic sketch of a certain generalised cell.

(i) Name the parts labeled as A-H.

(ii) Is it a plant cell or an animal cell? Give two reasons in support of your answer.

(iii) List the functions of parts marked as A, F and H.



Answer

(i) A- Chloroplast; B-Vacuole; C- Ribosome; D- Cytoplasm; E-Nuclear Membrane; F-Nucleus; G- Tonoplast; H- Cell Wall

(ii) It is a plant cell as it shows cell wall. Animal cell do not possess cell wall.

(iii) Functions:

1. A (Chloroplast) – It helps in carrying out the process of photosynthesis in plants.
2. F (Nucleus) - It contains all the genetic information in the form of DNA.
3. H (Cell Wall) – It is made up of cellulose. Provides strength to the cell.

20. Question

What will happen if

(i) excess amount of fertilisers is added to a green lawn?

(ii) salt is added to cut pieces of raw mango?

Answer

(i) It degrades the soil fertility. As excess of salt will make the soil hypertonic, due to which the water from roots will move out through osmosis. And, as a result the crop will die.

(ii) It is based upon on the concept of osmosis. Salt enter the cell and water will eventually move out of the cell to maintain the osmotic level. This prevents the mango from rotting.

12. Question

Ishita observed a slide of eukaryotic cell under electron microscope. She complained that it contained structures showing rough uneven surfaces.

(i) Name the organelle observed by Ishita.

(ii) Why did she complain about rough surface?

(iii) What is the function of this organelle?

(iv)What values are shown by Ishita?

Answer

(i) The organelle observed by Ishita is Rough Endoplasmic Reticulum (RER).

(ii) The rough surface of the organelle is due to the presence of ribsomes on it, which imparts are rough look to it.

(iii) The ribosomes on RER is associated with the manufacturing of proteins in the cell. And, the sending it to the site where they are needed.

(iv) It can be easily observed that Ishita is a keen learner who takes into account every little detail.

Challengers

1. Question

Swollen feets and ankle can be naturally cured by dipping them in salt water. Suggest the mechanism involved in this treatment.

A. Diffusion

B. Osmosis

C. Plasmolysis

D. Deplasmolysis

Answer

Osmosis- It is the movement of water molecules from a region of high concentration to a region of low concentration. Swollen feet gets cured when soaked in salt water as it reduces inflammation in the muscles. And, salt particles move inside the feet through the membrane in order to maintain solute – solvent level. These salt particles give relief to the feet muscles.

Diffusion is the movement of solute particles only. Plasmolysis is the movement of water when placed in a hypertonic solution while de-plasmolysis is the movement of water hypotonic solution.

2. Question

Which of these options are not a function of ribosomes?

I. It helps in manufacture of protein molecules.

II. It helps in manufacture of enzymes

III. It helps in manufacture of hormones

IV. It helps in manufacture of starch molecules

A. I and II

B. II and III

C. III and IV

D. IV and I

Answer

Because ribosome help in the production of protein molecules and enzymes for the cell to work efficiently.

But hormone and starch molecule formation is not carried out by ribosomes.

3. Question

Which of the following plastid impart red colour to pomegranate?

A. Chloroplast

B. Chromoplast

C. Amyloplast

D. Leucoplast

Answer

This is because it imparts colour to different parts of the plant. Chromoplast that contain chlorophyll pigment is chloroplast.

Amylopast is responsible for the synthesis of starch granules whole leucoplast serves the function of storing it.

4. Question

Which among the following cells is involved in continuity of life?

A. 

B. 

C. 

D. 

Answer

Ovum is responsible for the production of new cells through the process of fertilization. Fat cells (b) stores fat. (c) bone cell is present in the bones and (d) muscle cell is present in the muscles.

5. Question

Pick out the incorrect statement.

A. Leucoplast is a colourless plastid.

B. Cell wall is a non-living structure, mainly composed of cellulose.

C. Golgi apparatus acts as the site of protein synthesis.

D. Protoplasm is a life giving substance of a cell.

Answer

Because, Golgi apparatus performs the function packaging, storage and modification of products in vesicles.

6. Question

Choose the incorrectly matched pair from the options given below.

A. Director of the cell – Nucleus

B. Protein factories – Ribosomes

C. Semiautonomous organelle – Mitochondria

D. Cytoplasmic bridges – Nucleolus

Answer

Cytoplasmic bridges are known as **plasmodesmata**.

7. Question

The cell organelle found in prokaryotes as well as eukaryotes is

A. centrioles

B. plastids

C. endoplasmic reticulum

D. ribosomes

Answer

Because, other than ribosomes all other organelles are found in eukaryotes only.

8. Question

DNA stands for

A. Deoxyribonucleic acid

B. Dihydroribonucleate acetate

C. Diribonucleate acetate

D. Decarboribonucleic acid

Answer

Deoxyribonucleic acid

9. Question

Cell wall of fungi is made up of

A. cellulose

B. Chitin

C. pectins

D. All of these

Answer

Because, cell wall of plants is made up of cellulose and pectins.

10. Question

Vacuoles

A. disrupt water balance in animals

B. provide flexibility to plant cells

C. are small-sized in animal cell and large-sized in plant cell

D. All of the above

Answer

Are small-sized in animal cell and large-sized in plant cell. In plant cell they are located centrally and cover about 90% of space.