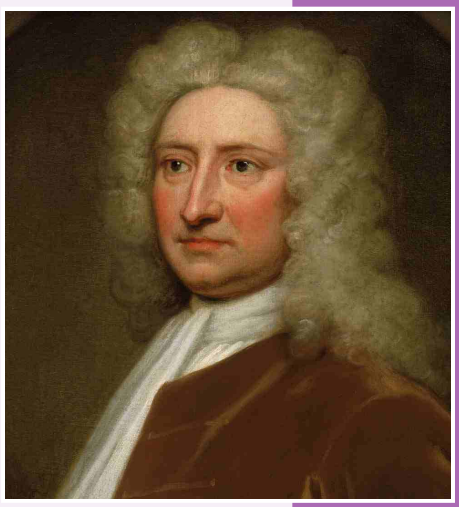
1 CELL-BASIC UNIT OF LIFE

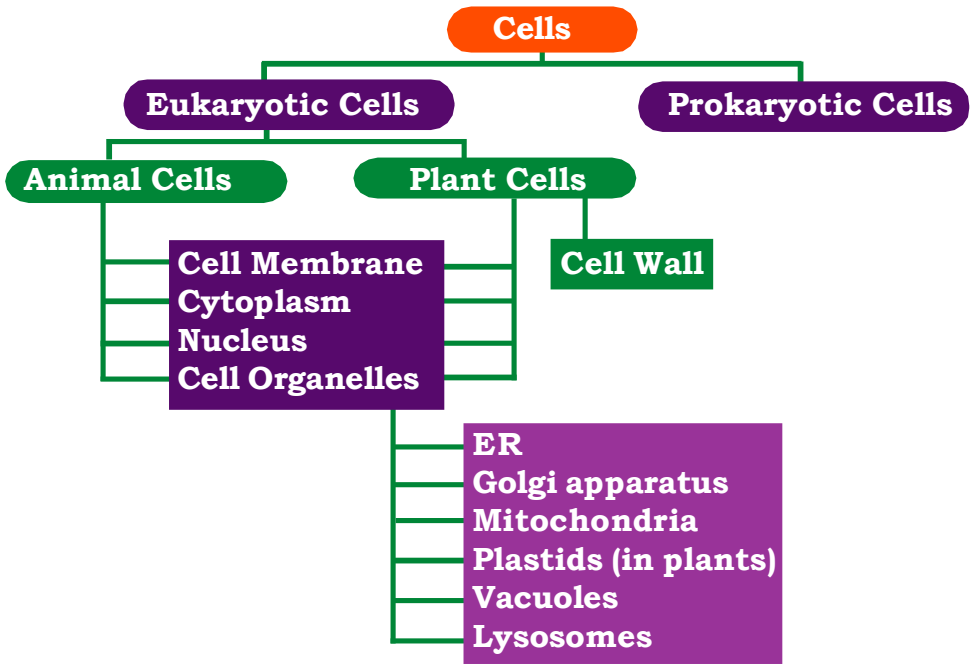
Robert Hooke was born on 18 July 1635 in Fresh water, United Kingdom. He was a scientist, natural philosopher, and architect.

The credit to discover the microorganisms in 1665 using a compound microscope that he built himself goes to him.

In 1655, Hooke discovered his law of elasticity, which states that the stretching of a solid body is proportional to the force applied. He applied these studies in his designs for the balance springs of the watches.



CONCEPT MAP



Concept 1

The Basic Structural and Functional Unit of an Organism:

The basic structural and functional unit of an organism is called cell. Cells are like bricks that are assembled to make a building. Similarly, cells are assembled to make the body of every organism. This is why cell are called the basic structural and functional unit of an organism.

Discovery of Cell:

In 1665, Robert Hooke observed slices of cork under a simple magnifying device. He saw that the cork resembled the structure of a honeycomb consisting of numerous small compartments. Cork is part of the bark obtained from a tree. He observed that one box was separated from the other by a wall or partition. Robert Hooke called these boxes "cell". The cell is a Latin word meaning "a little room".

Cork Cells Observed by Robert Hooke

These cells or boxes observed by Robert Hooke were actually dead cells. The discovery of cells is very important in the history of science. But very little was known about the cell for the next 150 years until the discovery of microscopes with high magnification power.

How do scientists observe and study the living cells?

Scientists used microscopes which magnify objects. Stains (dyes) are used to colour parts of the cell to study the detailed structure.

Kinds of Organism:

Organisms which are made up of a single cell are called unicellular whereas Organisms made up of more than one cell is called multicellular.

Cell Theory:

The cell theory states that, all the plants and animals are composed of cells and the cell is the basic unit of life. But the theory however did not explain as to how the new cells were formed.

In 1855, Rudolf Carl Virchow a German pathologist expanded cell theory further by suggesting that all cells arise from pre-existing cells, which was stated that by him in Latin as **'Omnis Cellula e cellula'.**

Fun Facts

Did you know? Your body has around 37.2 trillion cells! That's more than the number of stars in our galaxy!

Tissue:

The group of cells that are similar in structure and functions is called tissue. **Example:** Nervous tissue in animal and Vascular tissue in plant cells have different shape of Cells according to function they perform in body. Generally, cells are round, spherical or elongated (red blood). Some cells are long and pointed at both ends. They exhibit spindle shape (muscle cells). Cells sometimes are quite long. Some are branched like the nerve cell or a neuron. Guard cell in leaves are kidney shaped. White blood cells change their shape and move like amoeba.

Which Part of the Cell gives it Shape?

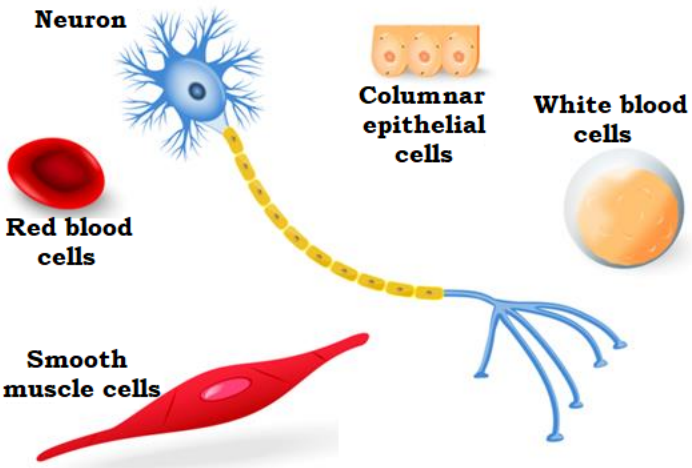
Cell membrane provides shape to the cells of plants and animals. Cell wall is an additional covering over the cell membrane in plant cells. It gives shape and rigidity to cells. The smallest cell is 0.1 to 0.5 micrometre in bacteria.

Introduction:

Cell is a fundamental, structural and functional unit of living organism. The science which deals with cells and their organelles is called cell-biology. The term cell was first used by Robert Hooke in 1665. He described the cell first as cella which means hollow space. Robert Hooke observed cells in the section of cork. In 1831 Robert Brown observed nucleus in plant cells. In 1855 Rudolf Virchow stated that new cells arise from pre-existing cells "Omnis cellula e cellula". Schleiden, German Botanist in 1938 described cell theory with regard to plant cell. T. Schwann German Zoologist in 1939 described cell theory with regard to animal cells. Cell theory denotes that "Cell is the structural and functional unit of life."

Shape of Cells:

The shape and size of cells are related to the function that they perform. Some cells like amoeba have no definite shape. It keeps on changing its shape. They move with the help of pseudopodia (pseudo: false ; podia: feet). In human beings, white blood cells (WBC) are also single-celled and can change their shape.



Human Cells of Different Shapes

Usually, cells are round, spherical, or elongated. Some may be long and pointed at both ends exhibiting a spindle shape. Cells can be long and branched like nerve cells.

Note: WBC is a cell, but amoeba is a full-fledged organism capable of independent existence.

Size of Cells:

Size is extremely variable, measuring from one micron to 175 mm. The ostrich egg cell is 170 mm. in diameter, thus visible to the naked eye. The nerve cell found in mammals may reach a length of 3 or 3.5 feet. Smaller cells are those of the Pleuropneumonia like organisms.

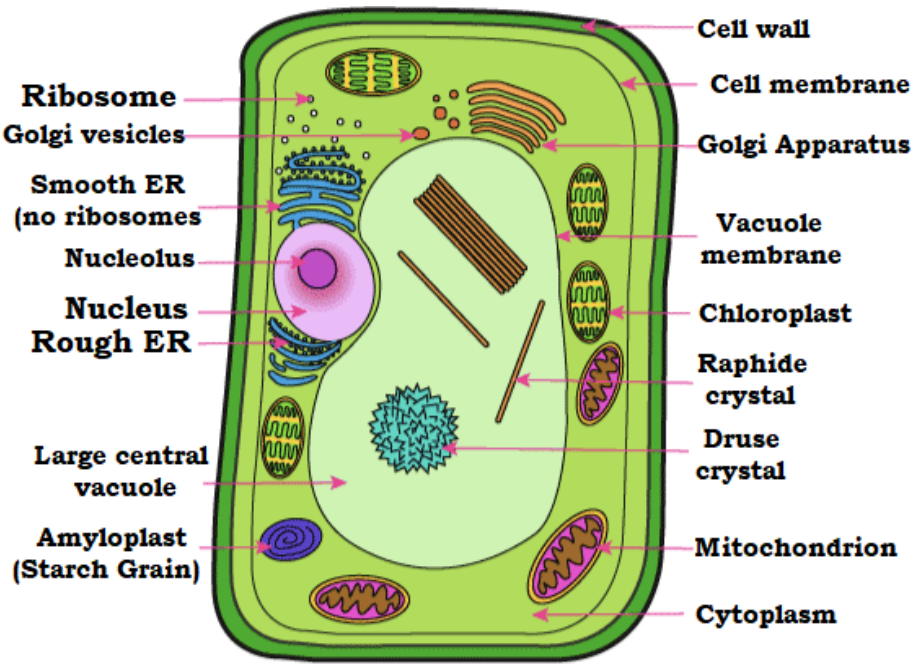
The smallest cell of bacteria = 0.1 to 0.5 micrometer

Difference between Unicellular and Multicellular Organisms:

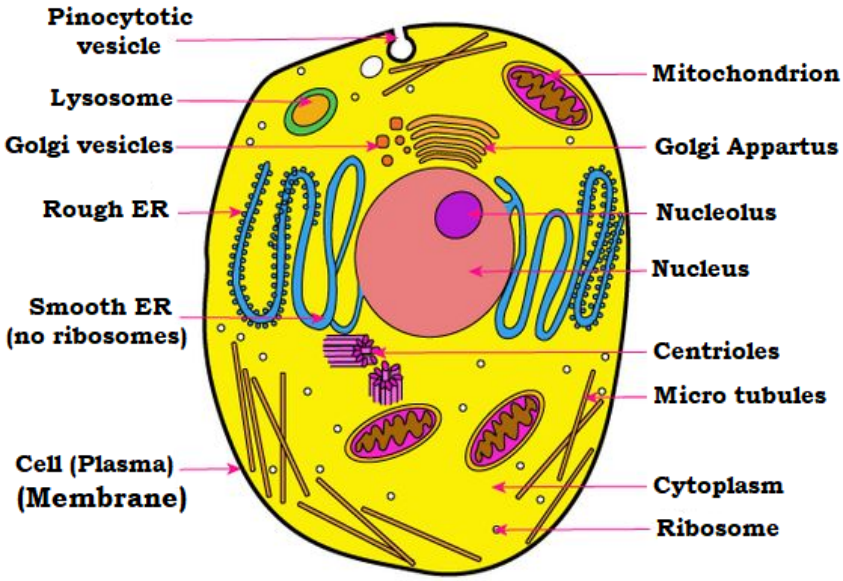
Unicellular Organism	Multicellular Organism
Made up of a single cell	Made up of more than one cell
Usually smaller in size	Larger in size
Short life span	Lives longer
Single-cell performs all the necessary function	Multiple cells carry out different functions
Simple body organisation	Complex body organisation

Parts of the Cell:

The basic components of a cell are the cell membrane, cytoplasm, and nucleus.



PLANT CELL



Animal Cell

Plasma Membrane:

A porous membrane surrounds the cytoplasm called plasma membrane. Electron microscopic studies reveal that the plasma membrane is composed of outer, inner protein layers and in between them double layered lipids are present Robertson called plasma membrane unit membrane.

The main function of plasma membrane is to regulate the entry and exit of substances.

By the process of diffusion, some substances like carbon dioxide or oxygen move easily across the cell membrane. Water also obeys the law of diffusion. The movement of water molecules through a selectively permeable membrane is called as osmosis. Osmosis is the net diffusion of water across a selectively permeable membrane towards the region of higher solute concentration.

If we put an animal or plant cell in sugar or salt solution of different concentration than following things could happen:

- **Hypotonic solutions:** If the medium surrounding the cell has a higher water concentration, then the cell will gain water by osmosis and will swell up. Such solution is known as a hypotonic solution.
- **Isotonic solution:** When the medium has exactly the same water concentration as that of the cell then such a solution is an isotonic solution. There is no net movement of water across the cell membrane and there is no change in the size of the cell.
- **Hypertonic solution:** If the medium surrounding the cell has a lower water concentration, then the cell will lose water by osmosis. Such a solution is known as a hypertonic solution. The cell will shrink. This process in which cells lose water when they are kept in a hypertonic solution is called **plasmolysis**.

CLASSROOM DISCUSSION QUESTIONS CDQ 01

1. **What is the basic structural and functional unit of an organism called?**
   (A) Nucleus
   (B) Tissue
   (C) Cell
   (D) Organelle

2. **Who coined the term "cell" after observing slices of cork under a microscope in 1665?**
   (A) Robert Brown
   (B) Rudolf Virchow
   (C) Robert Hooke
   (D) T. Schwann

3. **What is the main function of the plasma membrane?**
   (A) Synthesizing proteins
   (B) Regulating entry and exit of substances
   (C) Storing genetic information
   (D) Providing shape to the cell

4. **What is the main function of the plasma membrane?**
   A) Provide energy to the cell
   B) Control the movement of substances in and out of the cell
   C) Produce proteins
   D) Store genetic information

5. **Who described the cell theory about plant cells?**
   (A) Rudolf Virchow
   (B) Robert Hooke
   (C) T. Schwann
   (D) Robert Brown

6. **Which part of the cell gives it shape?**
   (A) Cytoplasm
   (B) Nucleus
   (C) Plasma membrane
   (D) Cell wall

7. **What is the largest known cell?**
   (A) Nerve cell
   (B) White blood cell
   (C) Bacterial cell
   (D) Ostrich egg cell

8. **Which of the following is NOT a function of the plasma membrane?**
   A) Protection of the cell
   B) Transport of materials
   C) Production of energy
   D) Maintaining the shape of the cell

MARK YOUR ANSWERS WITH PEN ONLY. Time Taken ☐ Minutes

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Concept 2

Cell Wall:

In addition to the plasma membrane the plant cells have an outer thick layer known as the cell wall. This is a rigid outer covering required by plants for protection. The cell wall is made up of cellulose that provides structural strength to plants.

The cell wall allows the cell of plants and fungi and bacteria to withstand hypotonic external media without bursting.

Cytoplasm:

Cytoplasm is the fluid content inside the plasma membrane. Various cell organelles are present in the cytoplasm.

Cell Organelles:

A cell keeps its content separated from the external surrounding with the help of the membranes. Cell organelles are membrane-bound little structure present within cells and have specific functions to carry out. Cell organelles are characteristic feature of eukaryotic cells.

Knowledge Box

Organelles are the tiny organs inside a cell that perform specific functions. Just like the organs in your body(heart, lungs, brain), a cell has mitochondria (powerhouse).

Centrosome:

It is the centre of the cell discovered by van Benden in 1887. It is found near the nucleus and includes a specialised portion of cytoplasm, called centrosome. Its matrix is called as kino plasm, in which two centrioles are embedded. Each centriole consists of nine fibrillar units and each fibrillar unit is found to contain three microtubules. The function of centrioles is to form the spindle at the time of cell division.

Endoplasmic Reticulum:

In the cytoplasm a network of tubules is present. It is called endoplasmic reticulum. This network of tubules will be two types.

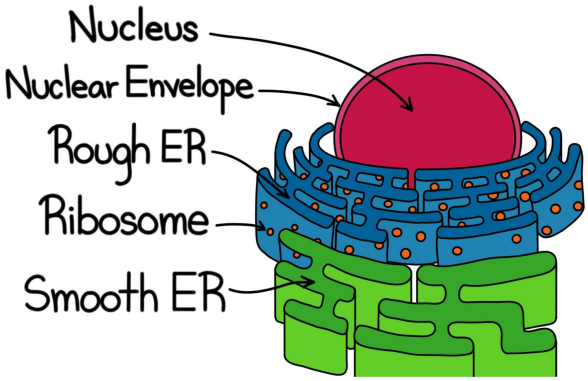
i. Smooth Endoplasmic Reticulum:

On the surface of the tubules ribosomes are absent. Hence, they are called smooth endoplasmic reticulum or agranular endoplasmic reticulum.

ii. Rough Endoplasmic Reticulum:

On the surface of the tubules ribosomes are present. It is rough endoplasmic reticulum. This is called granular endoplasmic reticulum.

Endoplasmic reticulum will connect plasma-membrane nucleus and other organelles.



Functions:

1. Endoplasmic reticulum acts as an ultra structural skeletal framework in the cell and provide mechanical support.
2. Granular endoplasmic reticulum (Rough E.R) will produce proteins.
3. Agranular endoplasmic reticulum (Smooth E.R) will produce lipids.
4. It forms the work bench for many biochemical reactions in the cell.

Ribosomes:

Ribosomes are smallest cell organelles of the cell and they are non-membranous.

They are spherical bodies composed of RNA (ribo nucleic acid) and proteins.

Each ribosome is composed of two sub units (one large 60s and one small 40s subunit)

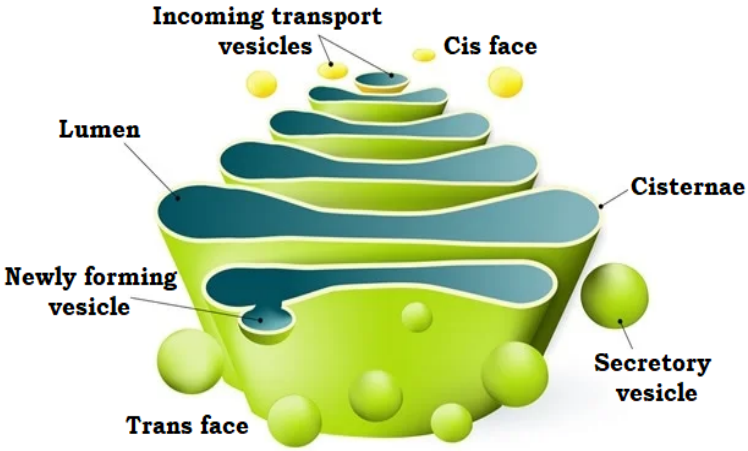
Golgi Complex(Middle Man of Cell):

They are described by Camillo Golgi. They are also called dictyosomes, lipochondria and idiosomes. The complex shows three types of structures,

a. Cisternae: These are flat sacs. They are arranged one above the other. They are 0.5 to 1.0 µm in length, 60 A° in thickness.

b. Vacuoles: These are oval in shape. They are big.

c. Vesicles: They are in the form of groups. All these structures totally called Golgi complex.



Golgi Apparatus

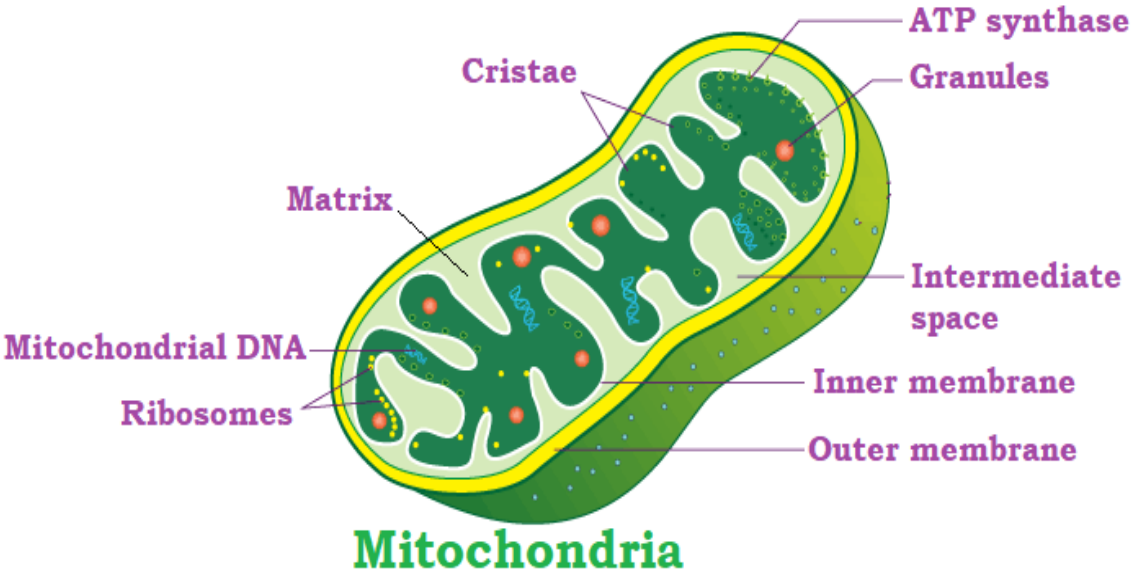
Functions:

They are more in secretory cells. Hence, they are connected with secretory function. They store proteins and lipids. During cell division they produce cell, plate. During the formation of sperm, they will form the acrosome of the sperm.

Storage modification and packaging of materials in vesicles. It is involved in the formation of lysosomes.

Mitochondria:

These are first described by Altamann as Bioplasts, in 1894. They were named as mitochondria by Benda in 1897.



Mitochondria

They are filamentous or rod like structures. The mitochondria are covered by layers. Inner membrane is folded inside. Those folding's are called cristae. On these cristae oxysomes are present.

i) Respiratory enzymes are present in the central matrix of mitochondria. They carry out the Krebs cycle reactions.

Fun Facts

Your mitochondria make energy equivalent to a tiny battery inside each cell! Without them, you'd feel as tired as a phone with 1% battery left!

ii) Electron transport enzymes are present in the inner membrane of mitochondria.

iii) Mitochondria help in the oxidation of food material and liberate energy. Hence, they are called the powerhouses of the cell.

iv) A circular DNA is present in mitochondria. Hence, mitochondria are also called semi-autonomous bodies.

CLASSROOM DISCUSSION QUESTIONS CDQ 02

1. Who first described the Golgi complex?

(A) Benda

(B) Altamann

(C) Golgi

(D) Krebs

2. What are the flat sacs in the Golgi complex called?

(A) Vesicles

(B) Vacuoles

(C) Cristae

(D) Cisternae

3. What is the primary function of the Golgi complex in secretory cells?

(A) Photosynthesis

(B) Protein and lipid storage

(C) DNA replication

(D) Waste removal

4. During cell division, what does the Golgi complex produce?

(A) Mitochondria

(B) Ribosomes

(C) Cell plate

(D) Nucleus

5. Who named mitochondria as such in 1897?

(A) Altamann

(B) Golgi

(C) Krebs

(D) Benda

6. What is the function of the cristae in mitochondria?

(A) Protein synthesis

(B) Lipid storage

(C) Electron transport

(D) Cell division

7. Why are mitochondria called the powerhouses of the cell?

(A) They produce DNA

(B) They store proteins

(C) They oxidize food material and liberate energy

(D) They transport lipids

8. What cycle's reactions take place in the central matrix of mitochondria?

(A) Calvin cycle

(B) Krebs cycle

(C) Cell cycle

(D) Nitrogen cycle

MARK YOUR ANSWERS WITH PEN ONLY. Time Taken ☐ Minutes

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6 Ⓐ Ⓑ Ⓒ Ⓓ	7 Ⓐ Ⓑ Ⓒ Ⓓ	8 Ⓐ Ⓑ Ⓒ Ⓓ	9 Ⓐ Ⓑ Ⓒ Ⓓ	10 Ⓐ Ⓑ Ⓒ Ⓓ

Concept 3

Lysosomes:

These are described by De-Duve. Each lysosome is round in shape. It shows 0.4μ to 0.8μ in diameter. It is covered by lipoprotein layer. It contains hydrolytic enzymes. It is useful for intracellular digestion and autolysis of the cell.

Functions:

i) Lysosome is helpful in the digestion of the food (carbohydrates, proteins, lipids and nucleic acids).

ii) At starvation lysosome will digest cell organelles.

Riddle

I eat the waste, I keep things clean, without me, the cell would be an ugly scene! Who am I?

iii) Lysosome can dissolve the cell. This process is called autolysis, often referred to as 'cell suicide'. Hence lysosomes are called suicidal bags of cells.

iv) Lysosome keeps the cell clean by digesting the foreign material and worn out cells, so it is the waste disposal system of the cell.

Vacuoles:

- These are storage sacs for liquids and solids.
- Animal cells have small vacuoles and plant cells have very large vacuoles. In some plant cells, the vacuoles may occupy 50-90% of the cell volume.
- The vacuoles in plant cells are filled with cell sap to provide rigidity and turgidity to the cell.
- Vacuoles store amino acids, sugar, organic acids, and some proteins.

Plastids:

Plastids are found in plant cells only. They are of different colours. The green coloured plastids are known as chloroplasts, which provide green colour to the leaves.

Nucleus:

In a eukaryotic cell, a definite nucleus is present. It is 5 to 25 microns in size and shows the following parts.

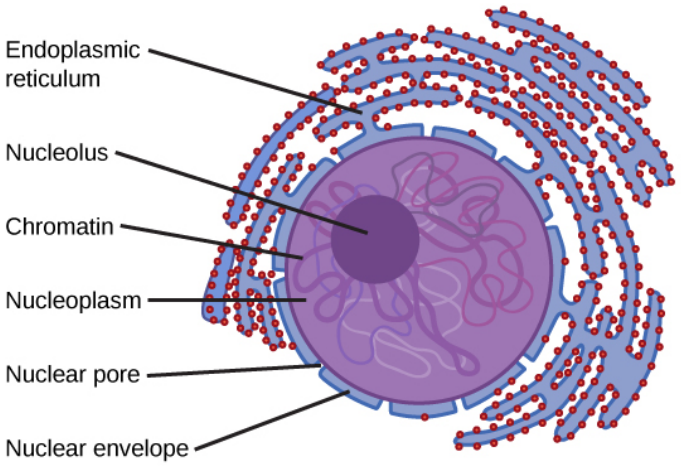
a) Nuclear Membrane:

It surrounds the nucleus and separates it from the cytoplasm. It has many nuclear pores. It is permeable and controls the passage of materials between cytoplasm and nucleoplasm.

Hammerling proved that nucleus is the seat of heredity through grafting experiments on Acetabularia (Alga).

b) Nucleoplasm:

The part of protoplasm which is enclosed by nuclear membrane is called nucleoplasm. It contains chromatin threads and nucleolus.



c) Chromatin Network:

In the nuclear space many chromosomes are present. They are thin and filamentous. They are in the form of a network. On the chromosomes genes are present. They are units of heredity.

Euchromatin & Heterochromatin:

In the interphase nucleus the chromatin network shows dark stained regions. They are called heterochromatin regions, Light stained regions are called euchromatin (Mostly decondensed).

Misconception :

Misconception: The nucleus makes energy.
Correction: Mitochondria make energy - the nucleus only gives instructions!

In 1928 "Hertz" defined heterochromatin as condensed chromatin part. The hetero-chromatin is two types - Constitutive and facultative.

d) Nucleolus:

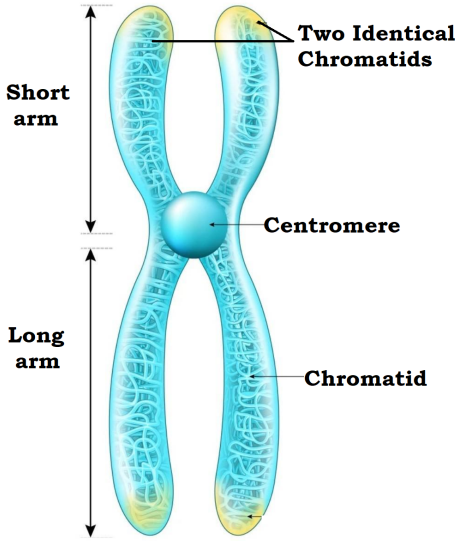
It is a spherical body in the nucleus. It is composed of RNA and is responsible for protein synthesis.

Functions:

- The nucleolus produces and assembles ribosomes, which are essential for protein synthesis.
- It helps in the synthesis of ribosomal RNA (rRNA), a key component of ribosomes.
- It stores proteins needed for ribosome formation.

Chromosome:

In the nucleus of each cell, the DNA molecule is packaged into thread-like structures called chromosomes. Each chromosome is made up of DNA tightly coiled many times around proteins called histones that support its structure.



Chromosome

Prokaryotes and Eukaryotes:

The nucleus of a bacterial cell is not well organised as in the cells of multicellular organisms. This is so because of the absence of a nuclear membrane. The cells having nuclear material without a nuclear membrane are called as prokaryotic cells and organisms having these cells are prokaryotes. The cells having a well-organised nucleus with a nuclear membrane are the eukaryotic cells and such organisms as eukaryotes.

Task to the student

Give students different traits (eye colour, height) and ask them to match them with chromosomes that carry those genes!

Difference between Prokaryotes and Eukaryotes:

Prokaryotes	Eukaryotes
No membrane-bound nucleus	Membrane-bound nucleus
No membrane bound organelles	Membrane-bound organelles present
Unicellular	Usually, multicellular
Cell wall is composed of peptidoglycan	Cell wall of plant cells is composed of cellulose
For example: Bacteria and archaea	For example: Animal, plants, fungi and protist cells

CLASSROOM DISCUSSION QUESTIONS CDQ 03

1. Who described lysosomes?

(A) Benda

(B) De-Duve

(C) Altamann

(D) Golgi

2. Why are lysosomes called the "suicidal bags" of the cell?

(A) They store energy

(B) They digest cell organelles during starvation

(C) They produce proteins

(D) They replicate DNA

3. What is the membrane covering a vacuole called?

(A) Lysosome

(B) Cristae

(C) Tonoplast

(D) Nucleolus

4. Which of the following cell organelles functions as a storage sac for liquids and solids?

(A) Smooth endoplasmic reticulum

(B) Rough endoplasmic reticulum

(C) Vacuoles

(D) Ribosomes

5. Who proved that the nucleus is the seat of heredity?

(A) Altamann

(B) Hammerling

(C) Golgi

(D) De-Duve

6. Animal cells are different from plant cells in lack of:

(A) Cell wall

(B) Plastids

(C) Nucleus

(D) Both (A) & (B)

7. What does the nucleolus contain?

(A) DNA and lipids

(B) Proteins and RNA

(C) Enzymes and DNA

(D) Ribosomes and lipids

8. What is the main function of the chromosomes?

(A) Control cell division

(B) Package DNA and support its structure

(C) Synthesize proteins

(D) Store energy and nutrients

MARK YOUR ANSWERS WITH PEN ONLY. Time Taken ☐ Minutes

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6 Ⓐ Ⓑ Ⓒ Ⓓ	7 Ⓐ Ⓑ Ⓒ Ⓓ	8 Ⓐ Ⓑ Ⓒ Ⓓ	9 Ⓐ Ⓑ Ⓒ Ⓓ	10 Ⓐ Ⓑ Ⓒ Ⓓ

R.K.C. (Review of Key Concepts)

1. Cell is the basic unit of life that can carry out all the processes of life
2. Robert Hooke was the first person to observe cells under a microscope. Schleiden and Schwann proposed the cell theory in 1838.
3. All organisms are made of smaller parts called organs. Organs are made of still smaller parts called cell.
4. Tissue is a group of cells that are alike and work together to perform a specific function. Organ is a relatively independent part of the body. It is a group of tissue that carries out one or more specialised function.
5. Organisms made of more than one cell are called multicellular organisms. **Examples:** Plants and Animals
6. Organism made of single cell are called unicellular organisms.
   Examples: Amoeba and Paramecium.
7. The single cell of unicellular organisms performs all the basic functions performed by a variety of cells in multicellular organisms.
8. The cell has three main parts:- Cell membrane, Cytoplasm, Nucleus
9. Cells without well organised nuclei (lacking nuclear membrane) are called prokaryotic cells. **Example:** Bacterial cell
10. Cells having well organised nuclei with a nuclear membrane are called eukaryotic cells. **Example:** Onion cells and Cheek cells
11. Plasma membrane is a selective permeable membrane. It regulates the movement of molecules in and out of the cells.
12. Plant cells differ from animal cells in having an additional layer over cell membrane called cell wall.
13. Various membrane bound cell organelles present in eukaryotic cell are - Nucleus, Endoplasmic reticulum, Golgi apparatus, mitochondria, plastids, lysosomes etc.
14. Mitochondria form the powerhouse of the cell. They use the oxygen to generate the energy rich compounds.
15. Chloroplasts are chlorophyll containing green plastids. They use water and CO_2 and convert radiant energy of sunlight into chemical energy of carbohydrates.
16. Ribosomes are the sites of protein synthesis.
17. Endoplasmic reticulum is of two types - Smooth ER and Rough ER, SER synthesizes lipids and RER synthesizes proteins.
18. Golgi apparatus is the site for the storage, processing and packaging of various cellular secretions.
19. Lysosomes form garbage disposal system of animal cells.
20. Nucleus contains thread like structures called chromosomes, which carry genes and helps in transmission of characters.

Advanced Worksheet

LEVEL 1

Single Correct Answer Type (S.C.A.T.):

1. Who first coined the word 'cell'?

(A) Aristotle

(B) Hooke

(C) Schwann

(D) Leeuwenhoek

2. Robert Hooke observed cells in the cork of _____ tree.

(A) Oak

(B) Neem

(C) Mango

(D) All of these

3. _____ is a large cell organelle in the cell.

(A) Nucleus

(B) Lysosome

(C) Endoplasmic reticulum

(D) Chloroplast

4. The jelly like substance between nucleus and cell membrane:

(A) Cytoplasm

(B) Nucleoli

(C) Cell organelles

(D) All of these

5. Unicellular organism is:

(A) Bacteria

(B) Amoeba

(C) Chlamydomonas

(D) All of these

6. Identify the below diagram.

1) Mitochondrion

2) Lysosome

3) Golgi apparatus

4) Chloroplast

7. Basic unit of organism:

(A) Nucleus

(B) Cytoplasm

(C) Cell

(D) Cell wall

8. Which structure helps in the movement of chromosomes during cell division?

(A) Centrosomes

(B) Golgi apparatus

(C) Nucleolus

(D) Ribosomes

9. Living substance of a cell is collectively known as:

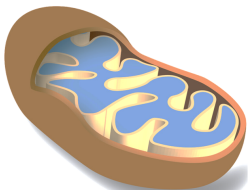
(A) Nucleoplasm

(B) Cytoplasm

(C) Protoplasm

(D) Blood

10. Who find the term for the given figure?



(A) Altman

(B) Benda

(C) De duva

(D) C.Golgi

11. The first compound microscope we made in the year 1595 by:

(A) Robert Brown

(B) Hooke

(C) Johnson

(D) Janssen

12. Which of the following is called the brain of the cell?

(A) Nucleus

(B) Mitochondrion

(C) Ribosomes

(D) Plasma membrane

13. Microorganisms are discovered by:

(A) Robert Hooke

(B) Leeuwenhoek

(C) Robert Brown

(D) Swaminathan

14. The boundary of cell is:

(A) Nucleus

(B) Cell membrane

(C) Cytoplasm

(D) Organelles

15. Plant cells possess outer covering over the cell membrane called:

(A) Cytoplasm

(B) Organelles

(C) Cell wall

(D) Nucleus

16. Which of the following group is prokaryotes?

(A) Blue-green algae

(B) Brown algae

(C) Protozoa

(D) Both A & B

17. The size of the cell is primarily related to its:

(A) Shape

(B) Function

(C) Location

(D) None of these

18. Size of organism depends on:

(A) Number of cells

(B) Shape of cells

(C) Size of cell

(D) Function of cell

19. Which of the following occurs only in animal cell?

(A) Ribosomes

(B) Dictyosomes

(C) Chromosomes

(D) Centrosomes

20. Who began the history of cell science?

(A) Robert Brown

(B) Robert Hooke

(C) Van Leeuwenhoek

(D) Schwann

21. All the living organisms are made up of:

(A) Cells

(B) Tissues

(C) Organs

(D) Organelles

22. The powerhouse of the cell is:

(A) Chloroplast

(B) Ribosomes

(C) Mitochondria

(D) Golgi complex

23. Who proposed that cells are formed from pre-existing cells:

A) Schwann

(B) Robert Hooke

(C) Rudolph Virchow

(D) Schleiden

24. Who studied animal cells?

(A) Robert Hooke

(B) Schwann

(C) Schleiden

(D) Rudolph Virchow

25. Who first referred to the cell structure as a Nucleus?

(A) Robert Brown

(B) Robert Hooke

(C) Felica Fontana

(D) Schwann

26. The property of the cell membrane that allows only specific molecules to enter or leave the cell is known as:

(A) Selectively permeable

(B) Freely Permeable

(C) Impermeable

(D) Non-selective barrier

27. In cell mounting on slide which material stop from drying (dehydration):

(A) Iodine

(B) Safranin

(C) Glycerine

(D) Fast green

28. The function of centriole and centrosome is:

(A) Help in food ingestion

(B) Help in locomotion

(C) Help in the reproduction of cells

(D) Help in energy formation

29. Which of the following is the site for energy production?

(A) Mitochondria

(B) Nucleoplasm

(C) Cytoplasm

(D) Nuclear membrane

30. The energy currency of a cell is

(A) ADP

(B) AMP

(C) ATP

(D) CTP

31. Which part of the cell contains organelles?

(A) Protoplasm

(B) Nucleoplasm

(C) Chromosomes

(D) Cytoplasm

32. Which of the following is not a plastid?

(A) Chloroplast

(B) Chromoplast

(C) Leucoplast

(D) Ribosome

33. The common feature amongst nucleus, chloroplast and mitochondrion is:

(A) DNA

(B) Lamellae

(C) Cristae

(D) All of these

34. Cell wall of plant is made up of:

(A) Starch

(B) Lignin

(C) Cellulose

(D) Protein

35. Which of the following is not a unicellular organism?

(A) WBC

(B) Paramecium

(C) Bacteria

(D) Amoeba

36. Mitosis is a:

(A) Cell division

(B) Cell death

(C) Cell elongation

(D) Cell wall

37. DNA stands for:

(A) Deoxyribonucleic Acid

(B) Dihydroxy ribonucleic acid

(C) Dioxide nucleic acid

(D) Dehydrogenate ribose nucleic acid

38. The largest cell is that of:

(A) Plant

(B) Ostrich egg

(C) Hen egg

(D) Human check

39. Which is the outermost layer of an animal cell?

(A) Cell wall

(B) Cytoplasm

(C) Plasma membrane

(D) Protoplasm

40. The main difference between prokaryotic and eukaryotic cell is that the prokaryotic cell does not have a

(A) Plasma membrane

(B) Cell wall

(C) Genetic system

(D) Well defined nucleus with a membrane

41. The Englishman, who discovered cell in 1665 was:

(A) Robert Cook

(B) Robert Frost

(C) Robert Fleming

(D) Robert Hooke

42. Which of the following is correct about nuclear membrane?

(A) It bounds the nucleus of eukaryotic cell

(B) Control the passage of materials between cytoplasm and nucleoplasm

(C) It has many nuclear pores

(D) All of these

43. The smallest organelle in a cell are:

(A) Lysosomes

(B) Sphaerosomes

(C) Peroxisomes

(D) Ribosomes

44. Which one of the following cell organelles is enclosed by a single membrane?

[AIPMT-2016]

(A) Mitochondria

(B) Chloroplasts

(C) Lysosomes

(D) Nucleus

45. A major site for synthesis of lipids is: [NEET 2013]

(A) RER

(B) SER

(C) Symplast

(D) Nucleoplasm

46. The Golgi complex plays a major role: [NEET 2013]

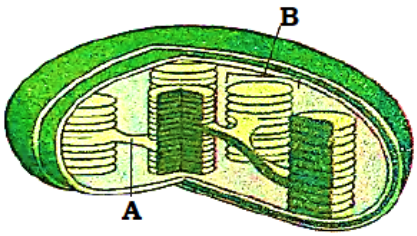
(A) In trapping the light and transforming it into chemical energy

(B) In digesting proteins and carbohydrates

(C) As energy transferring organelles

(D) In post translational modification of proteins and glycoxidation of lipids

47. Identify A and B in the given figure and select the correct option.



	A	B
(A)	Grana thylakoid	Stoma
(B)	Stroma lamella	Granum
(C)	Granum	Stroma
(D)	Stroma	Granum

48. Select the mismatch:

[NEET 2016]

(A) Protists-Eukaryotes

(B) Methanogens-Prokaryotes

(C) Gas vacuoles-Green bacteria

(D) Large central vacuoles - Animal cells

49. A cell organelle containing hydrolytic enzymes is:

[NEET 2016]

(A) Ribosome

(B) Mesosome

(C) Lysosome

(D) Microsome

50. Which organelle is covered by only a single membrane?

(A) Lysosome

(B) Nucleus

(C) Plastid

(D) Mitochondria

51. Full form of ATP is:

(A) Adenine two phosphate

(B) Adenosine triphosphate

(C) Adenine triphosphate

(D) Adenosine tri-potassium

52. Functional segment of DNA is:

(A) Proteins

(B) Chromatin

(C) Genes

(D) Chromosomes

53. The folds in the inner membrane of the mitochondria are known as:

(A) Cisternae

(B) Grana

(C) Matrix

(D) Cristae

LEVEL 2

Analytical Approach Type (A.A.T.):

54. Who proposed the "Cell theory"

[KCET 2003; HP PMT 2005]

i) Schleiden

ii) Schwann

iii) Watson and Crick

iv) Mendel and Morgan

(A)(i) & (ii)

(B) (ii) & (iv)

(C) (i), (ii) & (iii

(D) All of the above

55. The endoplasmic reticulum in a cell probably functions in the

(i) Protein synthesis

(ii) Transport of materials

(iii) Cell division

(iv) Secretory activities of the cell

(A) (i) and (iv)

(B) (i) and (ii)

(C) (ii) and (iii)

(D) (iv) only

56. Which of the following is a component of a chromosome?

(i) DNA

(ii) RNA

(iii) Proteins

(A) (i) and (ii)

(B) (ii) and (iii)

(C) (i), (ii) and (iii)

(D) (i) and (iii)

LEVEL 3

Matrix Matching Type (M.M.T.):

SET-I

COLUMN-I

57. Leeuwenhoek

58. Robert Hooke

59. Robert Brown

60. Unicellular

61. Jelly substance

COLUMN-II

(A) Cytoplasm

(B) Bacteria

(C) Cell

(D) Nucleus

(E) Cell membrane

(F) Microscope

SET-II

COLUMN-I

62. Suicidal bag of the cell

63. Power house of the cell

64. Kitchen of the cell

65. Protein factory of the cell

COLUMN-II

(A) Mitochondria

(B) Ribosome

(C) Lysosome

(D) Chloroplast

Assertion Reason Type (A.R.T.):

(A) Both assertion (A) and reason (R) are true, and reason (R) is the correct explanation of the assertion (A).

(B) Both assertion and reason are true, but reason (R) is not the correct explanation of the assertion(A).

(C) Assertion (A) is true, but reason (R) is false

(D) Assertion (A) is false, but reason (R) is true.

66. Assertion (A): Plant and animal cells both have a nucleus.

Reason (R): Nucleus is spherical in shape and contains thread-like structures.

67. Assertion (A): Rudolf Virchow modified the cell theory given by Schleiden and Schwann.

Reason (R): According to the cell theory given by Schleiden and Schwann cells arise from pre-existing cells.

68. Assertion (A): Plants have an outer covering of cell wall.

Reason (R): Cell wall is made up of cellulose.

69. Assertion (A): Plant and animal cells have eukaryotic cells.

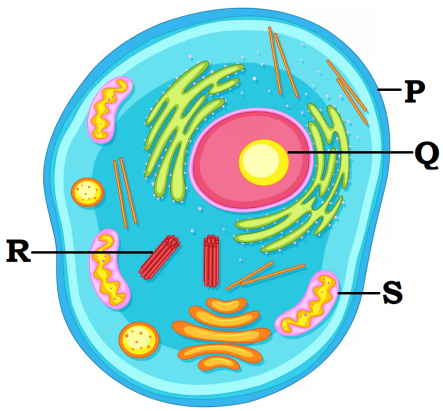
Reason (R): Plant and animal cells have a nucleus which is bounded by nuclear membrane.

70. Assertion (A): Lysosomes are also known as suicide bags.

Reason (R): Lysosomes remove the worn out and poorly working cellular organelles by digesting them.

Figure Based Questions (F.B.Q):

71. Refer the given figure of a cell. Which organelle is more in number? Also, identify among P, Q, R and S, the organelle which is responsible for transmission of hereditary information.



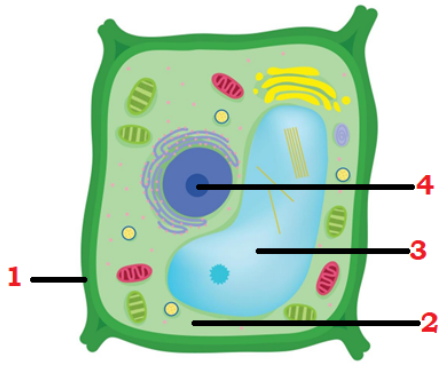
(A) Endoplasmic reticulum; P

(B) Mitochondrion; Q

(C) Ribosome; R

(D) Golgi body; S

72. Which of the following is not correctly matched based on given plant cell?



(A) 3-Chloroplast

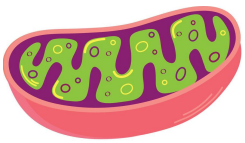
(B) 2-Cytoplasm

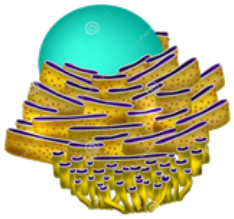
(C) 1-Cell wall

(D) 4-Nucleus

73. Which of the following cell organelles helps in protein synthesis and transport?

(A) 

(B) 

(C) 

(D) 

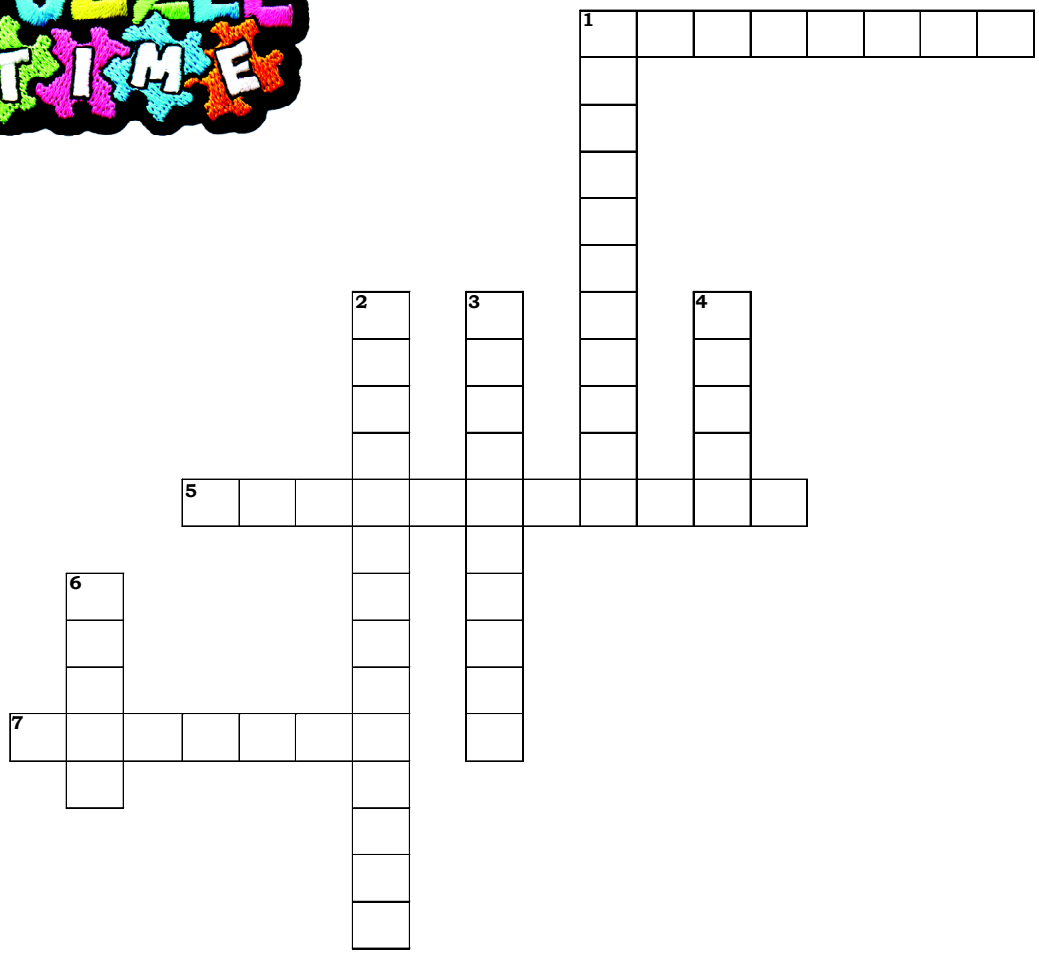
74. Identify X and Y in the following diagram.

(A) X-Cristae; Y-Matrix

(B) X-Thylakoid; Y-Matrix

(C) X-Matrix; Y-Inner membrane

(D) X-Cristae; Y-Thylakoid



***Across*: (→)**

1. Separates contents of cell from surrounding medium
5. Organelles responsible for photosynthesis
7. Empty structures in cytoplasm

***Down*: (↓)**

1. Pigment necessary for photosynthesis
2. Components present in the cytoplasm
3. Living substance in the cell
4. Unit of inheritance present in the chromosomes
6. Formed by a collection of tissues

Aim: To study the 'Structure of freshwater Algae'.

Materials: A wide-mouthed glass jar, dilute iodine solution, and a medicine dropper.

Procedure:

1. Collect water from a pond in a wide-mouthed glass jar.
2. Keep this at room temperature.
3. Expose the jar of pond water to the sunlight for several hours each day for a week.
4. Then place a drop of pond water culture in the middle of a clean glass slide.
5. Add to it a drop of dilute iodine.
6. Place a cover slip carefully over the drops on the slide.

Observation: You will observe

7. First under low power, and then under high power of your microscope.
8. Several types of very simple green plants called algae.
9. Many will be stained blue-black within their cells.
10. Some will have only one cell, and others will seem to live in groups or colonies or strands.
11. Algae are the simplest water plants which contain chlorophyll, that chemical which is necessary in the production of food for all forms of life.
12. Some algae live only in fresh water and others only in salt water.
13. These plants (like all green plants) can manufacture food in the form of a simple sugar.
14. But plants cannot store sugar in their cells. Within a cell, the sugar is miraculously changed by a chemical process into starch.
15. Starch can be stored for future use. Dilute iodine stains the starch to a blue-black colour.

Conclusion:

By this observation we can understand that algae contain starch and are capable of photosynthesis.