

Cell Structure and Micro-organisms

EXERCISE [PAGE 80]

Exercise | Q 1.1 | Page 80

Answer the following question.

What is a 'cell'?

Solution: Cell is the smallest unit of life. They are the structural, functional and biological units of life. The discovery of cells was first made by Robert Hooke. While examining a section of a cork under the microscope, he observed small compartment-like structures and named them cells. However, Hooke observed dead cells under the microscope as cork is made up of dead cells. Cells exhibit different types of properties like:

- It is the smallest living unit of life.
- It is so small that it is not visible to the naked eye.
- The shape of the cell varies in different organisms and within an organism.
- Size of cells also differs.
- All living cells exhibit certain basic characteristics like respiration, growth, metabolism, etc.
- Cells originate from a pre-existing cell. A mother cell divides to produce daughter cells. Hence, cells exhibit cell division.

Exercise | Q 1.2 | Page 80

Answer the following question.

Name the different organelles in a cell?

Solution: The cells may contain the following cell organelles depending upon whether it is a plant or animal cell:

Cell membrane, cell wall, vacuole, plastids, endoplasmic reticulum, chloroplast, golgi apparatus, ribosomes, mitochondria, nucleus, lysosomes, centrosome and inclusion bodies.

Exercise | Q 1.3 | Page 80

Answer the following question.

What are micro-organisms?



Solution: Living organisms which are not visible to the naked eye are known as micro-organisms. They are living organisms that can be seen only with a microscope or a magnifying glass. Microorganisms were observed for the first time by Anton von Leeuwenhoek in 1674, using a microscope of his own.

Exercise | Q 1.4 | Page 80

Answer the following question.

Which are the different types of micro-organisms?

Solution: Microorganisms can be divided into 5 major groups like:

Bacteria- Bacteria are the most primitive and diverse unicellular organisms found in living world. They are prokaryotic in nature as their genetic material, i.e. DNA, is not enclosed within a nuclear membrane. Because of their unique biochemical pathways and properties, they are of high economic importance to the human beings.

Fungi- Fungi is a group of eukaryotic, unicellular as well as multicellular, non-photosynthetic organisms that includes mushrooms, moulds and yeasts. These organisms have a rigid cell wall made up of chitin and are found in diverse shapes and sizes.

Algae- Algae are a diverse group of aquatic organisms that have the ability to conduct photosynthesis.

Protozoa- Protozoa are a group of unicellular microorganism which are non-photosynthetic in nature. Many protozoa cause disease in animals and humans.

Viruses- Viruses are ultra microscopic and non cellular organisms. They have simple structure having genetic material coated by protein coat. They are obligate parasites and highly pathogenic.

Exercise | Q 2.1 | Page 80

Fill in the blanks with the proper word.

The organelle called the is present in plant cells only.

Solution: The organelle called the chloroplast is present in plant cells only.

Exercise | Q 2.2 | Page 80

Fill in the blanks with the proper word.

Garbage is converted into by micro-organisms.

Solution: Garbage is converted into compost by micro-organisms.

Exercise | Q 2.3 | Page 80

Fill in the blanks with the proper word.

In the cell, photosynthesis is carried out with the help of

Solution: In the cell, photosynthesis is carried out with the help of chloroplast.

Exercise | Q 2.4 | Page 80

Fill in the blanks with the proper word.

An electron microscope is necessary for the study of

Solution: An electron microscope is necessary for the study of cells.

Exercise | Q 3.1 | Page 80

What is difference between us?

Plant cell and animal cell.

Solution:

Animal cell		Plant cell	
i.	Animal cells are smaller in size.	i.	Plant cells are comparatively larger.
ii.	They lack a cell wall.	ii.	Cell wall is the outermost structure in a plant cell.
iii.	They lack plastids except <i>Euglena</i> .	iii.	Plastids are present in all plant cells.
iv.	Many vacuoles are present and they are smaller in size.	iv.	They have a single large central vacuole.
v.	They have centrioles.	v.	They lack centrioles.

Exercise | Q 3.2 | Page 80

What is difference between us?

Prokaryotic cell and eukaryotic cell.

Solution:

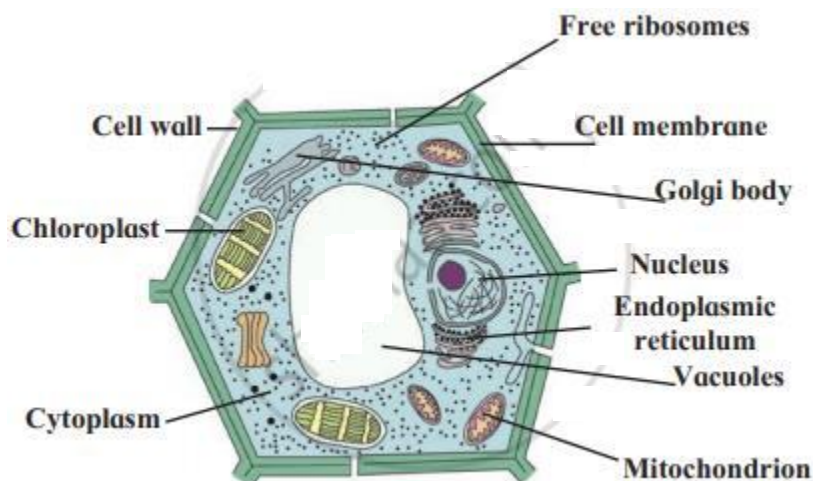


Prokaryotes	Eukaryotes
Cells are small in size.	Cells vary in size and are generally larger than those in prokaryotes.
No nucleus with a nuclear membrane is present.	There is a well-defined nucleus with a nuclear membrane.
Organelles having a membrane around them (e.g., mitochondria, plastids) are absent.	Membrane-enclosed organelles are present.
Cell wall is usually present. It is composed of peptidoglycan.	Cell wall is usually present in plant cells. It is composed of cellulose.
The genetic material is present as nucleoid, i.e., a properly defined nucleus is absent.	The genetic material is present inside the well-defined nucleus.

Exercise | Q 4.1 | Page 80

Sketch and describe in your own words, the plant cell

Solution:



- **Cell membrane:** A cell is composed of cell membrane, cytoplasm and nucleus. The cytoplasm and nucleus enclosed in the cell membrane together constitute the plasma membrane. It checks the transport of substances in the cell.
- **Cell wall:** In plants, an extra protective covering known as cellulose is present. It is called cell wall and protects the plant cell from environment variations.
- **Cytoplasm:** It is a jelly-like substance present between the cell membrane and nucleus. It contains various cell organelles such as mitochondria and Golgi body.
- **Nucleus:** It is a dense spherical body located at the centre of the cell. It is surrounded by a porous nuclear membrane. It contains a spherical body called

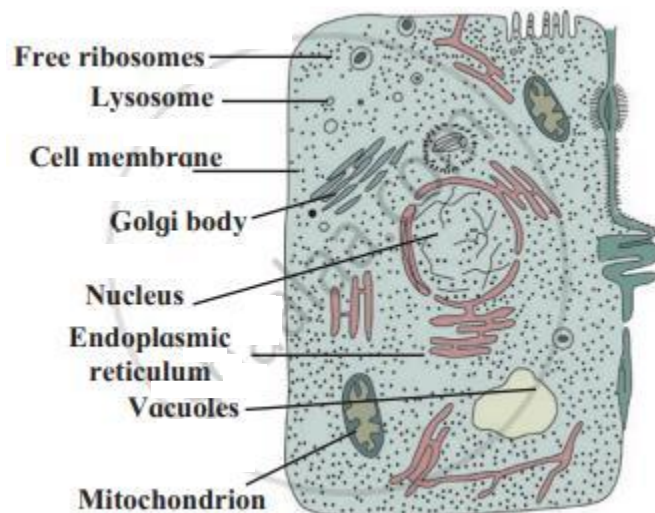
nucleolus and thread-like structures called chromosomes. Chromosomes are the structures that carry genes and play an important role in inheritance. The entire living substance in a cell is known as protoplast.

- **Vacuoles:** Vacuoles are fluid-filled membrane-bound structures in the cell. In plant cells, a single large vacuole is present.
- **Plastids:** They are present only in plant cells. Chloroplast is a plastid containing the green pigment called chlorophyll, which is required for photosynthesis.
- **Mitochondria:** They are involved in cellular respiration, and hence, are called 'power houses of the cell'.

Exercise | Q 4.2 | Page 80

Sketch and describe in your own words, the animal cell

Solution:



- **Cell membrane:** A cell is composed of cell membrane, cytoplasm and nucleus. The cytoplasm and nucleus enclosed in the cell membrane together constitute the plasma membrane. It checks the transport of substances in the cell.
- **Plasma membrane**
- **Cytoplasm:** It is a jelly-like substance present between the cell membrane and nucleus. It contains various cell organelles such as mitochondria and Golgi body.
- **Nucleus:** It is a dense spherical body located at the centre of the cell. It is surrounded by a porous nuclear membrane. It contains a spherical body called nucleolus and thread-like structures called chromosomes. Chromosomes are the structures that carry genes and play an important role in inheritance. The entire living substance in a cell is known as protoplast.
- **Vacuoles:** Vacuoles are fluid-filled membrane-bound structures in the cell. In animal cells, numerous small vacuoles are present.



- Mitochondria: They are involved in cellular respiration, and hence, are called 'power houses of the cell'.

Exercise | Q 5.1 | Page 80

Explain the uses of micro-organisms.

Solution: Microorganisms have found widescale application in various industries. Some of their applications are:

Use of Microorganisms in Food Industry

- Lactobacillus bacterium promotes the conversion of milk into curd.
- Yeast is used in preparation of breads, pastries, and cakes.

Use of Microorganisms in Vaccine Production

- Protection of the body from the attack of various disease-causing microorganisms through vaccines is known as vaccination.
- Vaccine includes dead or weakened microbes that trigger the production of antibodies in the body.

Use of Microorganisms in Increasing Soil Fertility

- Blue green algae and Rhizobium are called biological nitrogen fixers.
- They fix atmospheric free nitrogen to enhance soil fertility.

These are just few examples which highlight the commercial importance of these microorganisms.

Exercise | Q 5.2 | Page 80

Explain the harmful effects of micro-organisms.

Solution: Microorganisms are not always beneficial can lead to various kinds of damage. This damage can be in terms of health of humans and animals, crop production etc. There are various kinds of microorganisms which are known to cause disease in humans and animals.

Human disease	Pathogen
Tuberculosis	Bacteria
Measles	Virus
Chicken pox	Virus
Polio	Virus



Cholera	Bacteria
Typhoid	Bacteria

Similarly there are certain species of microorganisms which cause disease in plants and affect the crop productivity.

Plant disease	Pathogen
Citrus canker	Bacteria
Rust of wheat	Fungi
Yellow vein mosaic of bhindi (okra)	Virus

Exercise | Q 6.1 | Page 80

Give reasons.

Diseases spread on a large scale during periods of heavy rainfall and floods.

Solution: Diseases spread on a large scale during periods of heavy rainfall and floods because it provides the optimum conditions for the growth of vectors which transmit diseases. After heavy rainfall and floods, water gets accumulated at places and acts as breeding grounds for mosquitoes and other vectors. These vectors lead to transmission of the microorganisms to their host and result in the development of disease.

For example, malaria is caused by a virus which is transmitted by a mosquito.

Exercise | Q 6.2 | Page 80

Give reasons.

There is a possibility of food poisoning if we eat stale food.

Solution: There is a possibility of food poisoning if we eat stale food because there are chances that it can be infested by microorganisms. Bacteria and fungi can infect the foods which are stored for longer durations of time. For example, the greenish powdery substance which is seen on stale breads is an example of fungus infection.

Exercise | Q 6.3 | Page 80

Give reasons.

Soil is turned over during tilling.

Solution: Tilling is a mechanical procedure of agitating soil where the top layer is mixed with the lower layers of soil. This promotes the mixing of organic matter throughout the soil and also promotes the growth of microorganism. These microorganisms help in the conversion of organic matter.

Exercise | Q 6.4 | Page 80

Give reasons.

Fungus grows quickly in moist or humid conditions.

Solution: Fungus grows quickly in moist or humid conditions because these are the favourable conditions for its growth. Fungus is not seen growing in areas which are well exposed to sunlight.

Exercise | Q 6.5 | Page 80

Give reasons.

A refrigerator is used in almost every home.

Solution: Refrigerator is used in almost every home because it prevents the spoilage of food. Refrigerator provides an optimum environment for storage of vegetable, fruits, cooked and uncooked food. If an optimum temperature is not provided, it can lead to the growth of bacteria and fungi thus leading to spoilage of food.

Exercise | Q 6.6 | Page 80

Give reasons.

Bread 'rises' during baking.

Solution: Bread rises during baking because of addition of yeast to its dough. Yeast cells respire anaerobically and liberates CO_2 in the process. When yeast cells are added to the bread dough, they utilise the nutrients (carbohydrates) found in the dough and respire anaerobically. Also, they multiply at a very fast rate under such favourable conditions. As a result of the growing bacterial population, large amount of CO_2 is released that makes the dough very soft and fluffy, and thus improves the quality of the bread.

Exercise | Q 6.7 | Page 80

Give reasons.

Fodder is soaked in water before offering to cattle.

Solution: Fodder is soaked in water before offering it to cattles because it may contain seeds which have been left behind after harvesting. Soaking this fodder helps in the sprouting of these seeds/grains and thus increases the nutritional value of the fodder.

Exercise | Q 7 | Page 80

When will you use a simple microscope and when, a compound microscope? Explain in detail how you will use them.

Solution: The simple microscope is generally considered to be the first microscope which was created by Antony van Leeuwenhoek in the 17th century. It was essentially a type of which was used by Leeuwenhoek to gain information about biological specimens, including the difference in shapes between red blood cells. Today, simple microscopes are not used often because the introduction of compound microscopes which have better resolution and magnifying power.

Compound microscope offers better magnification than a simple microscope. These devices provide a magnification of 1,000 times. It can be used to observe microorganisms like bacteria, fungi, protozoa etc. It can be used in their detailed study, for example studying their structures.