

Unit 5:

Living beings



- 1. Characteristics of living beings**
 - 2. Composition of living beings**
 - 3. The cell**
 - 4. The vital functions**
 - 5. Levels of organisation**
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Think and answer?

- What living beings can you see in the photograph?
- How are living and non-living things different?
- What characteristics do living beings have in common?
- Which are the vital functions?
- Which is the basic unit of life?

UNIT OBJECTIVES

In this unit you will learn:

- To distinguish between living and non-living things
- To identify the characteristics of life
- To enumerate the chemical compounds of living beings
- To describe cell structure and cell functions
- To distinguish between prokaryotic and eukaryotic cells.
- To classify unicellular and multicellular organisms
- To describe the levels of organization of multicellular organisms.

1. Characteristics of living beings

All living beings have several characteristics in common:

- They have a similar **chemical composition**. The living matter has *unit of composition*.
- They are made up by structural units called **cells**. They have *unit of organization*.
- They carry out the **vital functions**: nutrition, interaction and reproduction. They have *unit of function*.

READING ACTIVITIES

After reading the text, copy and answer the following questions into your notebook:

Remember: you must make complete sentences.

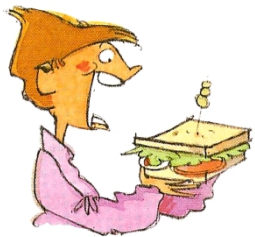
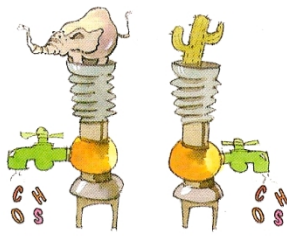






1.1. Look at the following pictures:

a. Mark which of them represent *living beings* and which *inert beings*.



b. Is an *inert being* the same as a *dead being*? Why?
Are there any examples among the pictures where there is a clear difference between them?

1.2. Match every characteristic of living beings with its meaning:

			
Feeding	Same chemical composition	Movement	Breathing
			
Growth	Reproduction	Excretion	Made of cells

1. Living matter has unit of composition.....
2. They have unit of organization.....
3. They take energy and matter from the outside to stay themselves alive.....
4. They increase their size and mature.....
5. They expel useless substances
6. They react to stimuli.....
7. They produce new living beings similar to them.....

2. Chemical composition of living beings

All living beings are made up of the same chemical substances. The most abundant chemical elements of living matter are: Carbon (C), Oxygen (O), Hydrogen (H), and Nitrogen (N) that make up about 95% of all living matter. But others elements, such as Calcium (Ca), Sodium (Na), Chlorine (Cl), Iron (Fe), Magnesium (Mg), among others, are also important. These elements are called **bioelements**. Combinations of these elements form molecules of living matter called **biomolecules**. These biomolecules can be **inorganic** and **organic**.

a) Inorganic substances

Inorganic substances do not contain carbon. They are present in living things and non-living things. The main inorganic substances are mineral salts and water.

- **Mineral salts** have various functions:

- Solid: They make up different structures, like shells, bones and teeth.
- Dissolved: They are present in internal fluids, like tears, sweat and blood.

- **Water** is the most abundant substance in living things. Water is necessary for chemical reactions and to transport all other substances.

b) Organic substances

Organic substances are exclusive of living beings. Carbon is their main element. There are several types:

- **Glucids** (sugars or carbohydrates). Their function is provide energy (e.g. glucose) and make structures such as plant cellular wall (e.g. cellulose)
- **Lipids**. They are insulating and energetic reserve substances (e.g. fatty acids) and they also make structures, such as cell membranes (e.g. cholesterol)
- **Proteins**. They have several functions: transport substances (e.g. haemoglobin transport oxygen), defense against microorganisms (e.g. antibodies), help in chemical reactions (e.g. enzymes), make structures (e.g. queratine forms nails and hair), etc.
- **Nucleic acids**. They control the cell's activity and contain the inheritance information (e.g. DNA)

READING ACTIVITIES

After reading the text, copy and answer the following questions into your notebook.

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2.1. About the following *chemical elements*:

C Carbon	Ca Calcium	N Nitrogen	Al Aluminium	Fe Iron	Si Silicon	Na Sodium	H Hydrogen
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- a. Classify them into chemical elements "typical of the *living matter*" or "typical of the *inert matter*"
- b. Which are the most abundant ones in the organic matter?
- c. Which is the most representative one of the living beings?
- d. What is the name of the group of elements which are characteristics of organic matter?

2.2. Classify the biomolecules into organic and inorganic biomolecules.

What is the main difference between these two groups of molecules?

2.3. Join every biomolecule with its function:

- | | |
|------------------|--|
| a. Glucids | 1. Contains the inheritance information |
| b. Lipids | 2. Give energy to the organism |
| c. Proteins | 3. Transport other substances through the body |
| d. Nucleic acids | 4. Build structures, transport substances, etc. |
| e. Water | 5. Be reserve and insulating substances |
| f. Mineral salts | 6. Regulate chemical reactions and build skeletal structures |

3. Cells

Cells are the smallest unit of life. They are the structural and functional units for all living beings.

- All living things are made up of one or more cells.
- Cells carry out the functions of nutrition, interaction and reproduction.
- All cells come from other cells.

Most cells are very small. It is necessary a microscope to see them.

a) Structure of a cell:

Every cell has three main parts:

- The **cell membrane** covers the whole cell. It is a thin layer of lipids that controls the pass of substances in and out of the cell.
- The **cytoplasm** is the inside of the cell.
 - It is a jelly-like substance. Many of the chemical reactions of the cell take place here.
 - It contains the **organelles**. They are small structures responsible for respiration, making and storing nutrients, etc.
- The **nucleus** contains the DNA, the genetic material that forms the chromosomes. Its function is to control and to regulate how cell works. DNA contains the hereditary information that is passed from one cell to the daughter cell.

b) Types of cellular organisation:

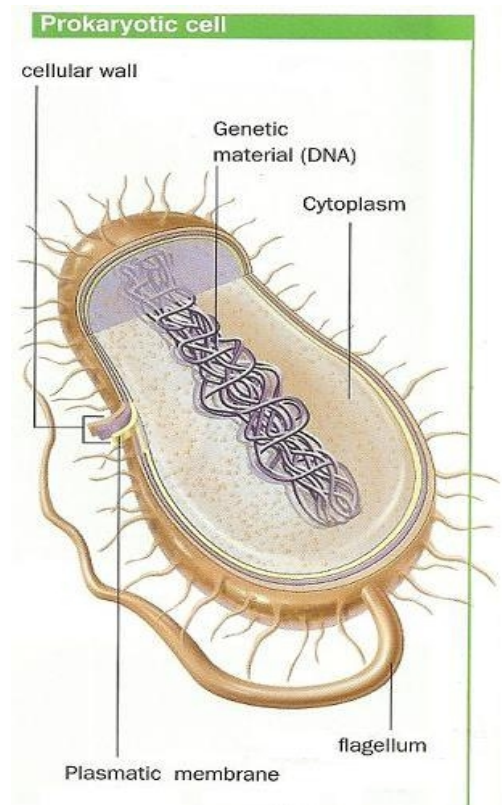
There are two kinds of cellular organisation: prokaryote and eukaryote.

- Prokaryotic cells

They are *simple*.
They are much smaller than eukaryotic cells.
Their genetic material is not separated from the cytoplasm. They don't have a real nucleus.
They have a cell wall and flagellum that allow them to move.
They only form unicellular organisms.
Bacteria have this kind of cells.

- Eukaryotic cells

They are *complex*.
They are *bigger* than prokaryotic cells.
Their genetic material is *separated* from the cytoplasm into the nucleus.
They have many types of *organelles* that make different metabolic jobs.
They form *unicellular* and *multicellular* organisms.
They are the cells of all the rest of living beings (fungi, protocists, animals and plants)

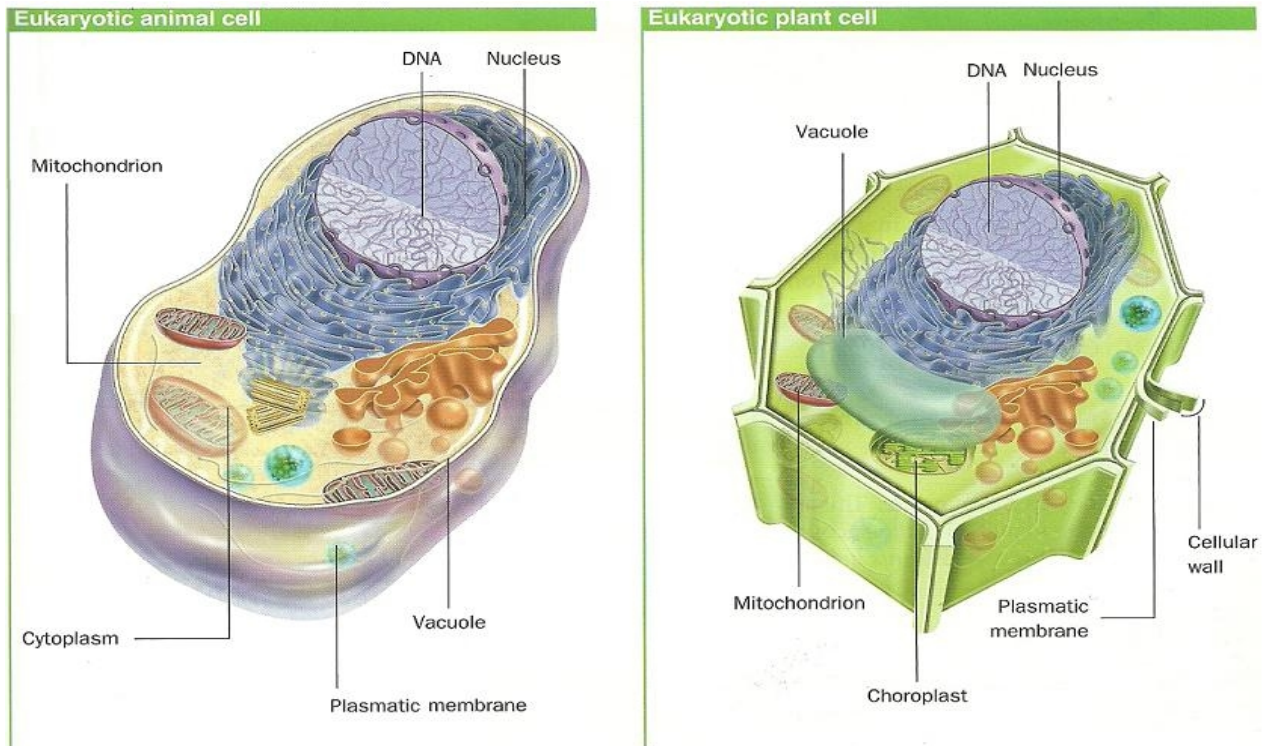


c) Types of eukaryotic cells

There are two types of eukaryotic cells: **animal cells** and **plant cells**. Plant cells can be easily distinguished from the animal cells because they have some exclusive organelles:

- They have **cell wall**, surrounding the cell membrane. It gives the cell a polyhedral shape. Its function is protecting the cell and being a skeleton structure.
- They have **chloroplasts**. Their function is to make *photosynthesis*.
- They have a big **vacuole** that takes up the biggest part of the cytoplasm. (Animal cells have vacuoles too, but they are smaller and numerous) Its function is accumulating useless substances.

The plant cells are in algae and plants and the animal cells are in animals and protozoa.

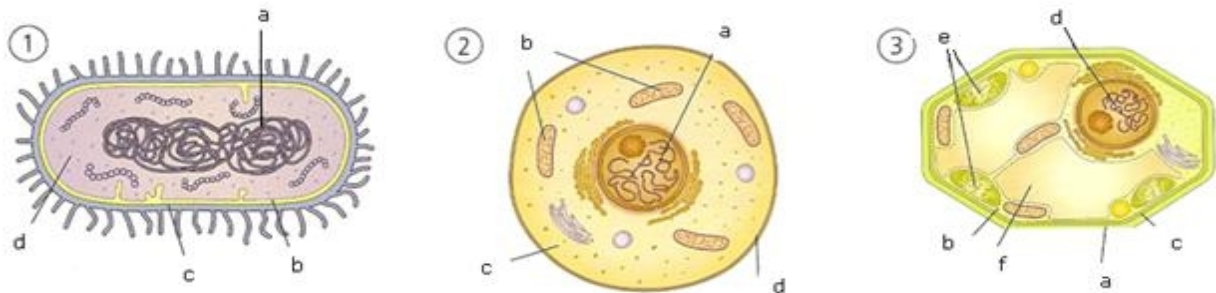


READING ACTIVITIES

After read the text, copy and answer the following questions on your notebook:

Remember: you must make complete sentences.

3.1. Identify every one of the following cells and name the indicated structures:



3.2. Indicate if the following sentences are referent to *animal cells*, *plant cells* or *both*:

- a. They have *mitochondria*, the organelles which produce energy.....
- b. They have *ribosomes*, little organelles that make proteins.....
- c. They have a big *vacuole* that occupies the most part of the cytoplasm.....
- d. They have *plasmatic membrane*, which controls the pass of substances.....
- e. They have *chloroplasts*, which allow the photosynthesis.....
- f. They have *cellular wall*, a rigid structure located outside.....
- g. They have nucleus that contains the inheritance information.....

3.3. Answer these questions:

- a. Is there any multicellular organism made up of prokaryotic cells?
- b. What organelles are exclusive of plant cells?

4. The vital functions

a) Nutrition function

It involves all the processes to obtain the energy and the substances that living beings need to stay alive and grow.

According to this function, we can distinguish between two kinds of living beings:

- Autotrophic organisms

Autotrophs produce their own organic matter from inorganic matter. The most important kind of autotrophic nutrition is *photosynthesis*. They are plants, algae and some bacteria.

- Heterotrophic organisms

Heterotrophs take organic matter made by other living beings. They are animals, fungi and many microorganisms, like protozoa and some bacteria. In order by the type of food they eat, the heterotrophic organisms are classified into:

- *Herbivores* (they eat plants; e.g. cows)
- *Carnivores* (they eat meat; e.g. lions)
- *Omnivores* (they eat meat and plants; e.g. humans)
- *Saprophytes* (they eat decaying organic matter; e.g. fungi)

b) Interaction function

It is a group of processes, which allows living beings:

- To interact with their environment (with other living beings and with their surroundings)
- To perceive what is happening in the inside of the organism itself.

They have *sensitivity*; that is they are able to react to different circumstances.

The change able to cause a reaction in an organism is called *stimulus* and the reaction itself is called *response*.

c) Reproduction function

Living beings are able to create descendants in order to assure the survival of their species.

There are two types of reproduction:

- Asexual reproduction

Only an individual creates the descendants. These individuals are genetically identical to their progenitor. It can be able through specialized cells (*spores*) or not (*fragmentation*). It is typical of bacteria, plants like ferns and some invertebrates, among others.

- Sexual reproduction

There are two individuals of different sex. They produce a sexual cell called *gamete* (ovule and spermatozoid). Both gametes join together to make a *zygote*. A new individual will grow from that zygote. The descendants are similar, but no identical to their progenitors. Plants and vertebrates belong to this group.

READING ACTIVITIES

After reading the text, copy and answer the following questions into your notebook:

Remember: you must make complete sentences.

4.1. Complete the following sentences related to the function of nutrition:

- a. There are two types of nutrition: nutrition, natural to and.....nutrition, characteristic of
- b. The organisms which have autotrophic nutrition make the matter that they need from.....matter
- c. Is the most important kind of autotrophic nutrition.
- d. Plants and other photosynthetic organisms use energy from the.....
- e. They obtain the inorganic matter from the (carbon dioxide and) and from the (mineral salts and
- f. Organisms with..... nutrition depend on the organisms with nutrition to live, because they feed up of

4.2. Mark which of the following creatures have *autotrophic nutrition* and which ones have *heterotrophic nutrition*.



Algae



Funqu



Butterfly



Moss



Starfish



Cypress

4.3. Indicate if the following sentences, which refers to the *interaction function*, are true (T) or false (F):

- a. Responses are the reactions of living beings to a stimulus.....
- b. Stimuli are all environmental changes able to cause a response in a living creature.....
- c. Interaction function allows living beings their adaptation to new environmental conditions.....
- d. Plants, as they cannot move, are unable to respond to environmental changes.....
- e. Animals can feel the changes around them thanks to their sense organs.....
- f. Unicellular organisms are unable to detect changes in environment or to react to them.....

4.4. Complete the chart with the characteristics of sexual and asexual reproduction:

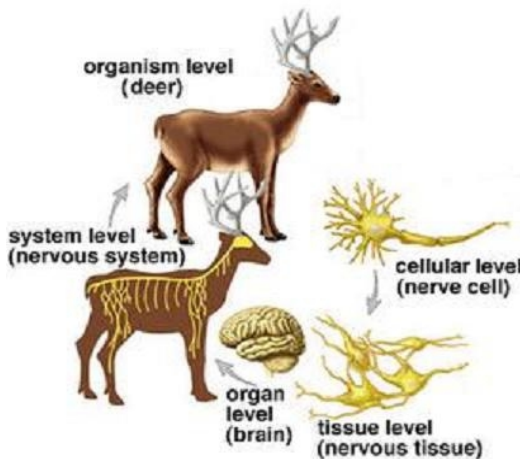
- a) It is made through gametes.
- b) The sex doesn't exist.
- c) Only one parent is necessary.
- d) Specialized cells aren't needed.
- e) Descendants are similar to parents.
- f) Two parents are absolutely necessary.
- g) Descendants are identical to parents.
- h) There are two different sexes.

Sexual reproduction	Asexual reproduction

5. The levels of organisation

Living beings can be classified into two different groups: **unicellular** and **multicellular**.

- **Unicellular** living things have only one cell. E.g. paramecia, bacteria, etc.
In unicellular (or single-celled) organisms, the single cell performs all life functions. Sometimes they form **colonies**, groups of cells in which everyone functions independently although they live together.
- **Multicellular** living things have many cells. E.g. plants and animals.
In multicellular living beings, cells work together to carry out the vital functions. They are dependent on one another and they are organised in **levels of organization**.



- **Cells** are the basic units of living beings. They are specialised. Each type has a unique shape and structure and has a specific function. Example: muscle cells are long and can contract.
- **Tissues** are groups of cells with the same function. Example: muscle cells form muscle tissue.
- **Organs** are groups of various tissues which act together. Example: a muscle is an organ made up of muscle tissue, nerve tissue and connective tissue.
- **Systems** are made up of several organs. Example: the digestive system includes the stomach, the intestines, etc.

READING ACTIVITIES

5.1. Fill in blanks with the following words and complete the text:

shape number relationship reproduction size multicellular alone organisms
work specialized nutrition unicellular small functions complex

"We can classify the according to theof cells that make them up, in two groups that are:organisms, formed for a single cell and organisms formed by many cells.

Unicellular organisms live without other cells to help them. So the cell does all things that it needs to live:,and

Multicellular organisms areorganisms. They can have anumber of cells, or millions of cells. These cells are not all the same. They have different and, and do only a kind ofin the organism. The cells are..... by themselves, they cannot do all the vital They need other cells to do other work. They live together, but cannot live....."

5.2. Classify the following elements into its **organisation level**

- Osseous tissue Stomach Muscle system Human Digestive system
Spermatozoid Epithelial tissue Neuron Tree Heart

Cellular level	Tissular level	Organ level	System level	Organism level