

THE CELL

STEP 1 - MOTIVATION

The teacher comes to class with an apparently casual collection of "natural objects" : some moss, some flowers and leaves, an onion, a small piece of meat ... What do you think we are going to do? A discussion follows. As usual, some students are eager to answer and some students will be silent. Write some words on the board or show them pictures of what they are expected to do. Let the most silent phrase them starting from the pictures. We are going to observe some fragments of these things in the lab. How do you feel about it? Again, don't accept one single answer but elicit many emotions names (hopefully positive ones). You can use emoticons too to widen the vocabulary of emotions and also quantifiers (very, a little, slightly...). Once in the lab, the students are divided in small groups and examine different samples on the microscope. Every group has a different "natural object" to examine.

Before the activity you can ask: "what do you expect to see?" You can let them discuss in group or ask them to draw what they think they will see. The teacher distributes the materials needed to carry out the activity. Students observe and answer these questions: "What do you see? What shape are they? Write some notes in your notebooks." The notes will be compared at the end. Possible answers : "many bricks elongated and placed side by side (vegetable cells). It is big. This is smaller.... "All the answers are written on the board. A scaffold can be given with useful words to describe what they see to choose from, if needed.

STEP 2- INPUT PRESENTATION

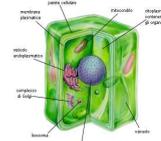
In class

The teacher could choose whether to divide students in groups and give each group a part to work on or to give the material to all the class to carry it out individually. The activities are scaffolded. This text is linguistically simplified as a scaffold for vulnerable students.

WHAT IS THE CELL

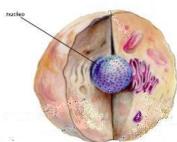
The **cell** is the smallest part of any living organism. In 1655, Robert Hooke was the first scientist to discover the cell.

The English scientist R. Hooke was not very well known, but he made a very important contribution to the scientific revolution of 1600. Hooke worked under a microscope. The microscope is an instrument that allows you to see microscopic organisms, that is, very small ones, that cannot be seen with the naked eye. During one of his microscopic observations he saw, for the first time, plant cells. They were like the small rooms of monks called cells. In fact, the cell takes its name from the word cell.



The cells that Robert Hooke first saw were **plant cells**, that is, they were vegetal cells. They are square in shape.

Animal cells, on the other hand, have a round shape. They are easily recognizable because they are made like an egg that has the yolk in the center and the egg white all around.



The cell has all the properties of living beings: it breathes, reacts to stimuli and reproduces. You can't see it with your naked eye. For this reason it is necessary to use a microscope to study it.

Each cell comes exclusively from another pre-existing cell, that is, a cell that already exists.

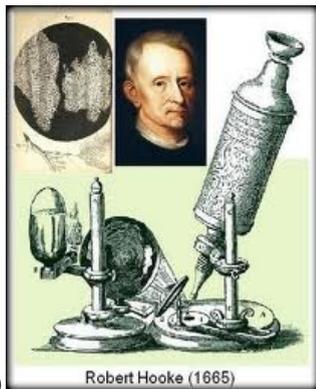
An organism can be formed by a single cell and is called a **single-cell organism**, or by several cells and is called a **multicellular organism**; animals, plants and humans are multicellular organisms.

Even multicellular organisms, however, start their life from a single cell. The size of an organism does not depend on the size of the cells, but on the number of cells that form it. Cells have different functions and forms.

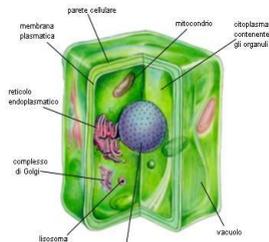
ACTIVITY 1

Join the sentences to the right pictures.

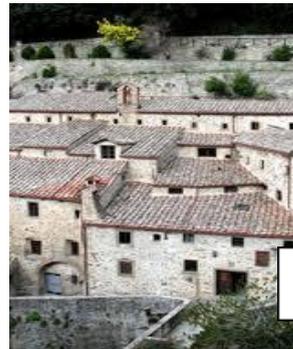
	1	According to Robert Hooke, the cell was made like the cell where the monks lived.
	2	It is for this reason that the word "cell" derives from the word "cell".
A	3	Robert Hooke was a seventeenth-century English scientist working under a microscope.
	4	One day he observed a square-shaped plant cell.



A) Robert Hooke (1665)



B)



C) D)

CELL > CELL

ACTIVITY 2

Link the words to their meaning.

a2	a) CELL	1) formed by a single cell
	b) unicellular	2) smaller part of a living being
	c) multicellular	3) instrument used to enlarge and observe very small organisms
	d) Plant cell	4) very small, which you can't see with the naked eye.
	e) Animal cells	5) plant cells
	f) Microscopic	6) formed by multiple cells
	g) microscope	7) Animal Cells

ACTIVITY 3

Complete the text with the words written below.

cell - pre-existing - unicellular - microscope - plus - microscopic - number

The **cell** is the smallest part of any living organism. It is....., that is, it is not visible to the naked eye. You must use a to see it. Each cell comes exclusively from another cell....., that is, it already exists.

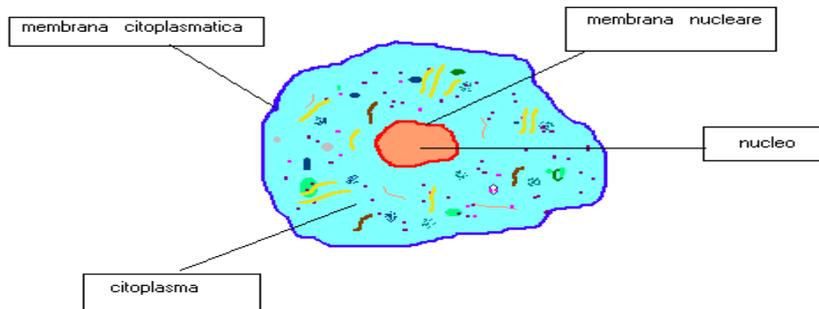
An organism can be formed by a single cell and is called organism, or by..... cells and is called multicellular organism. The size of an organism depends on the.....of cells.

Before proceeding to input 2 it is better to give each group/student the correct answers so that they can reestablish focus without feeling evaluated.

INPUT 2

THE PARTS OF THE CELL

Cells have all four fundamental parts:
the cytoplasmic membrane, the cytoplasm, the nuclear membrane and the nucleus.



Outside the cell is the **cytoplasmic membrane**. The cytoplasmic membrane is a thin coating that is all around the cell. It encloses, that is, it contains the cytoplasm. The cytoplasm is a substance composed mainly of water, where the structures of the cell are immersed, that is, placed in a liquid and mineral salts and organic substances are dissolved.

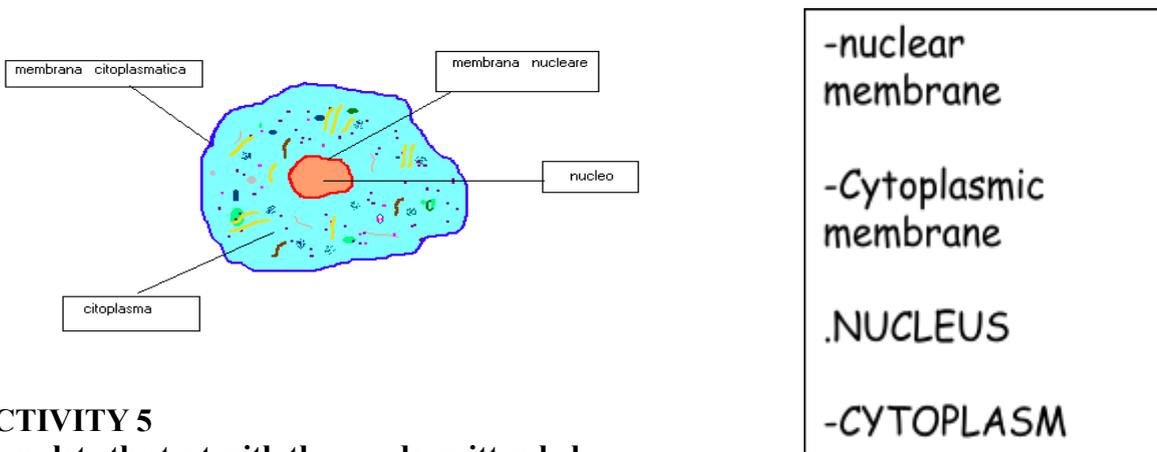
In the cytoplasm there are **organelles (organuli)**: the most important organelles are used by the cell to breathe, to produce proteins, to defend itself, to transport substances both inside and outside the cell.

The **nuclear membrane** is a coating that encloses the core. It has numerous openings through which substances pass into the cytoplasm.

The **nucleus** is the central and most important part of the cell because it represents its brain. The nucleus contains the DNA that serves for the reproduction of the cell.

ACTIVITY 4

Write the words in the box in the drawing.



ACTIVITY 5

Complete the text with the words written below.

membrane(x2) - more - cell - nucleus - unicellular - number- microscope - pre-existing

The ... **cell**..... is the smallest part of any living organism. You can't see it with your naked eye. You need to use ato see it. Each cell comes exclusively from another cell.....

An organism can be formed by a single cell and it is called a.....organism. , or by..... cells and it is called a multicellular organism. The size of an organism does not depend from the size of the cells but from their..... . Although they have different functions and shapes, the cells have all 4 fundamental parts: the cytoplasmic....., the nuclear..... cytoplasm and the.....

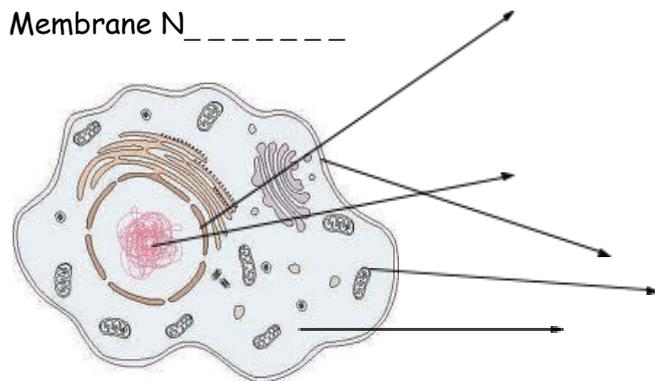
ACTIVITY 6

Link the words to their meaning.

a2	a) ORGANULI	1) coating enclosing the nucleus
	b) nuclear membrane	2) structures that have important functions found in the cytoplasm
	c) CYTOPLASM	3) coating that envelops the cell.
	d) NUCLEUS	4) Gelatinous substance composed mainly of water
	e) Cell Membrane	5) Central part of the cell

ACTIVITY 7

Complete with the words of activity 6 : organelles, nuclear membrane, cytoplasm, nucleus, cytoplasmic membrane



STEP 3 - FOCUS (in pairs)

ACTIVITY 8

Indicate whether the sentences are true (T) or false (F). Correct the false ones.

	T	F	Corrections
1) The nuclear membrane encloses the cell		X	The nuclear membrane encloses the nucleus

2) The cytoplasm is located in the nucleus			
3) Some organelles are used by the cell to breathe			
4) The cell membrane is also called the cytoplasmic membrane			
5) The cytoplasm is mostly made up of water			
6) The nucleus is the central and most important part of the cell			

ACTIVITY 9

Connect the parts of the cell to their function:

a5	a) NUCLEUS	1) enclose the nucleus It has numerous openings through which substances pass into the cytoplasm.
	Cell Membrane	2) contains the structures of the cell and many substances including mineral salts and organic substances.
	nuclear membrane	3) Transport, breathe, produce protein, defend...
	d)ORGANELLES	4) Adjust the exchange of materials with the outside
	e)CYTOPLASM	5) Represents the brain of the cell and contains the DNA

CELLS, TISSUES, ORGANS

The cells are divided into two fundamental types: **PROKARYOTIC cells** and **EUKARYOTIC CELLS**. Prokaryotic cells were formed first and for a very long time were the only form of life. Prokaryotic cells are the cells of unicellular organisms, that is formed by a single cell. The prokaryotic cells are organless and the nucleus is immersed in the cytoplasm. The formation of prokaryotic cells has been very important for the evolution of life on earth and even today there are organisms formed by prokaryotic cells such as bacteria and blue algae.

Over time, prokaryotic cells have formed eukaryotic cells that are the cells of multicellular organisms, that is, formed by several cells.

The eukaryotic cell is much larger and more complex than the prokaryotic cell. Man, animals and plants are made of eukaryotic cells.

There are various types of cells, because each cell performs a function, that is, each cell has a different task. Cells that perform the same function join together and form a **tissue**.

A set of different tissues forms an **organ**. The organs of the human body are many and also perform different functions: the stomach, for example, performs one of the functions of digestion.

A set of organs that perform the same function, that is, that have the same task, forms an **apparatus**. For example, the mouth, stomach and intestine perform the function of digestion and form the digestive system.



Finally, more apparatuses, that is, many apparatuses, form an **organism**: the human body is an organism.

In an organism the cells do not have the same life span; for example in a human body the skin cells live for about 20 days, those of the intestine for 7 days and the muscle cells for a lifetime .The death of a cell does not cause the death of the organism.

It is estimated that approximately 100 million cells die every day in the human body.

An example of dead cells is dandruff that is found on the skin, especially in hair.

When the cell dies, the **DNA** reproduces an identical cell.

INSERT MENTORING

STEP 4 - PRACTICE

ACTIVITY 10

Write the answers below the questions choosing from those in the box

The cells are divided into prokaryotic cells and eukaryotic cells.
 Eukaryotic cells are larger and more complex.
 They are different organs that perform the same function.
 Tissues are made up of a set of cells that have the same function.
 An organ is made up of a set of tissues.

- 1) What is an organ made of?
*An organ is made up of a set of tissues*.....
- 2) How are cells divided?

- 3) What are the cells that form man?

- 4) Which are the largest cells?

- 5) What are tissues made of?

- 6) What are the apparatuses?

ACTIVITY 11

Indicates whether the sentences are true (T) or false (F). Correct the false ones.

	T	F	Mileage
1) Prokaryotic cells have the organelles		X	Prokaryotic cells are organless
2) Prokaryotic cells are found in single-cell organisms			
3) Eukaryotic cells are very small			
4) Man is made up of prokaryotic cells			

DNA: a code for life

Every human being has unique characteristics such as height, weight, physical appearance, way of thinking, which differentiate him from others. Many of these characteristics, for example, the physical appearance and color of the eyes, are hereditary, that is, transmitted by our parents and our ancestors.

The transmission of hereditary characters takes place through genes. The genes are in the DNA that's in each of our cells. In fact, in the nucleus of the cell there are chromosomes; each chromosome contains DNA strands. Each of these filaments is called a gene. Genes transmit the hereditary characteristics of the organism. The set of genes is called the genome. The genome contains the genetic code and includes all the information that cells need to reproduce and perform vital functions.

The characteristics of DNA are identical in all humans, but there are different parts, called sequences, that are unique to each person. The color of our eyes, our hair, our skin is written on the DNA. The difference between being a man and being a woman is also written in the DNA. In 2001 there was a very important discovery: the human genome was reconstructed. The genome is the set of all the DNA and genes that make it up and contains all the factors that determine the hereditary characteristics of each person.

ACTIVITY 17

Check if you understand the text: answer the questions.

- 1) What are genes?
- 2) Where are they located?
- 3) What are they used for?
- 4) Where are the chromosomes?
- 5) What does hereditary characteristics mean?
- 6) Do humans have the same or different DNA?
- 7) What was discovered in 2001?
- 8) What is the genome?
- 9) Write the name to which the underlined words refer:
a) that..... b) that..... c) lo
- 10) Search the text for words that mean:
a) DNA strands contained in the G __ I chromosomes
b) set of DNA and genes: G _ _ _ _ A

STEP 7/ - TESTS

Title:

COMPLETE

In eukaryotic cells, the structure that is generally more visible is the nucleus, a large corpuscle, most often spherical, surrounded by a nuclear membrane consisting in turn of two membranes each of which is formed by a double layer of phospholipids. The two nuclear membranes are fused together at different points, creating small nuclear pores through which substances can pass between the nucleus and the cytoplasm. Our current knowledge of the role of the nucleus in the cell started from the first observations under a microscope. One of the most important of these observations was made, more than a century ago, by the German embryologist Oscar Hertwig. This observation has proved important in demonstrating that a fundamental function of the nucleus is to transmit hereditary information. From the experiments carried out in the thirties of the last century by Joachim Hammerling it can be deduced that the nucleus also plays another important role in the cell; it, in fact, exerts a continuous control on all the activities that take place in the cytoplasm, regulating both the type and the quantity of the molecules produced to cope with the cellular metabolism.

Taken from:
Invitation to biology Zanichelli, 2010.

(Text for Secondary School)

ACTIVITY 18

Read the text: choose the correct and complete answer.

- 1) Choose the title and write it in the space above the text:
 - a) The discovery of the nucleus
 - b) the cytoplasm
 - c) the functions of the nucleus

- 2) The expression " the two membranes are fused together" means:
 - a) The two membranes are close
 - b) The two membranes are attached.
 - c) The two membranes are far away

- 3) The term "started " means:
 - a) If they turned on
 - b) They started
 - c) They finished

- 4) Complete the following sentences with text information
 - a) Through nuclear pores it can happen.....
 - b) Oscar Hertwig discovered a fundamental function of the core that is.....
 - c) Joachim Hammerling, on the other hand, discovered another important function that is.....

Oral tests with cued cards can follow (in pairs)