



CELL - STRUCTURE AND FUNCTIONS

- Discovery Of The Cell

DISCOVERY OF THE CELL



The things around us are either
LIVING or **NON-LIVING**.

DISCOVERY OF THE CELL



Let us talk about a few
NON-LIVING THINGS...

DISCOVERY OF THE CELL



But do they have
any common
prop... DIFFERENT
...
YES!!!!
They differ in **SIZE** and
THE FOLLOWING
STRUCTURES





**They all are made up of
'BRICKS'.**

**Bricks are the BASIC
BUILDING BLOCKS.**

DISCOVERY OF THE CELL

SIMILARLY THERE ARE MILLIONS OF LIVING BEINGS ON THIS EARTH.



DISCOVERY OF THE CELL

DIFFERENT FORMS

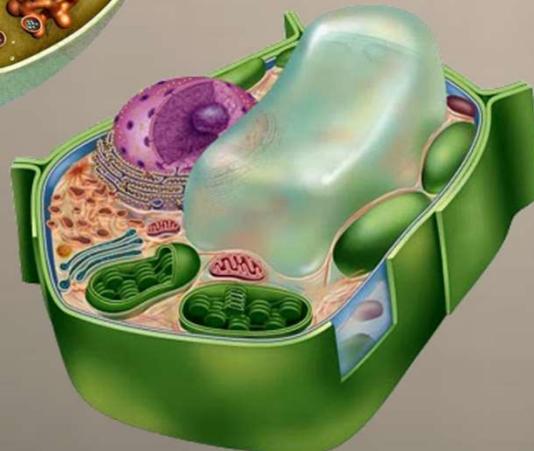
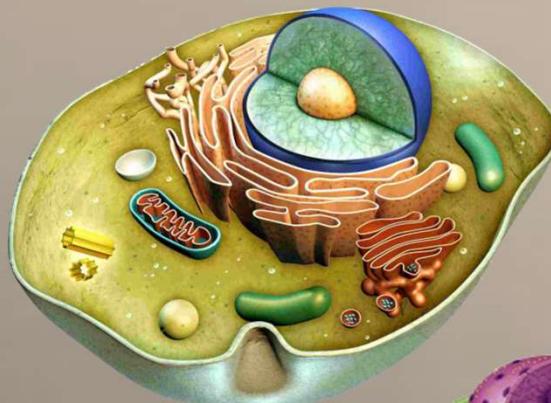


They also differ in
SIZE and **SHAPE**.



DISCOVERY OF THE CELL

These building blocks
are called as **CELLS**.



But they all are made up
of same **BUILDING BLOCKS**.

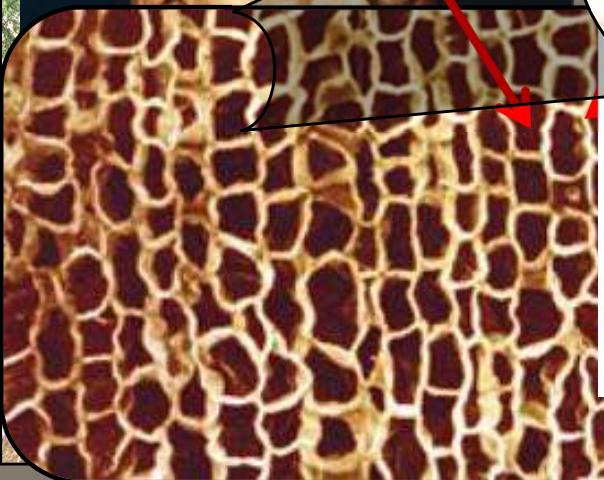


DISCOVERY OF THE CELL

ROBERT HOOKE in 1665 observed Slices Of Cork under a Simple Magnifying Device.

Cork is a part of the BA

He noticed PARTITIONE



TS in the cork slice.

DISCOVERY OF THE CELL

These boxes appeared like a **HONEY- COMB**.

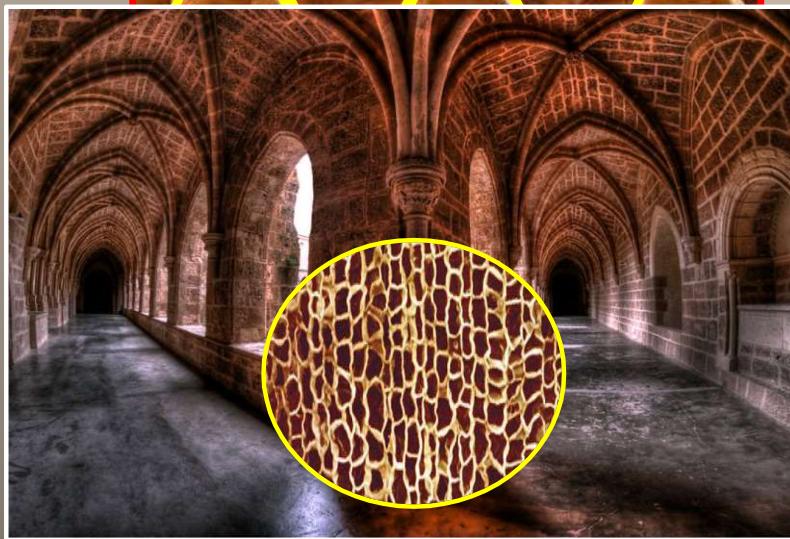
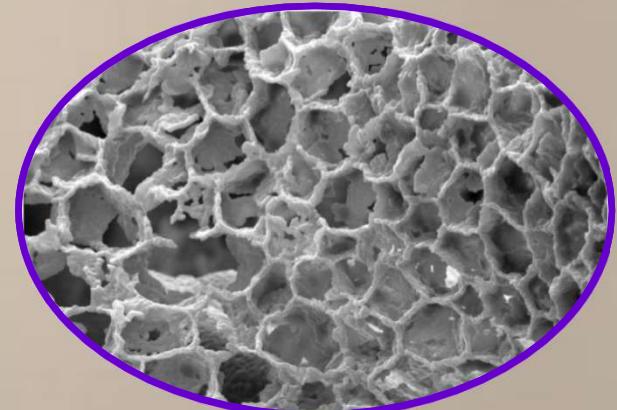
He also noticed that **One Box was Separated From The Other by A WALL or PARTITION.**



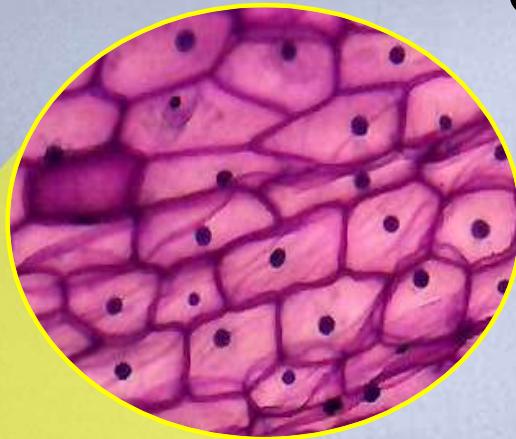
What
in the
Hook



or cells
CELLS.
or each box.



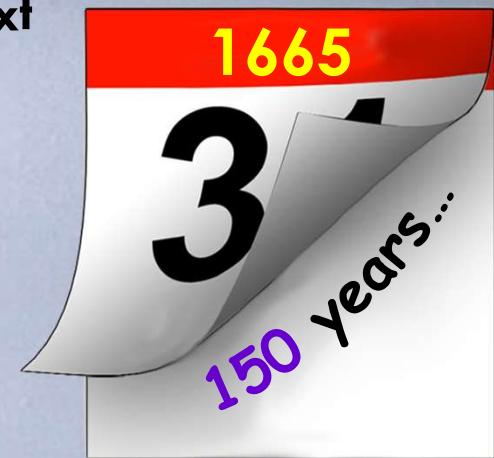
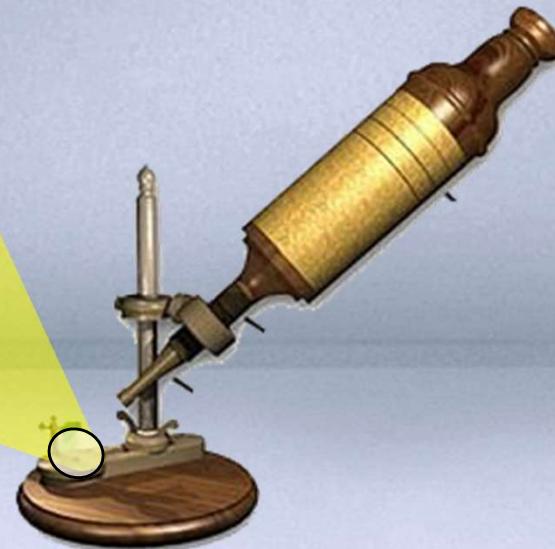
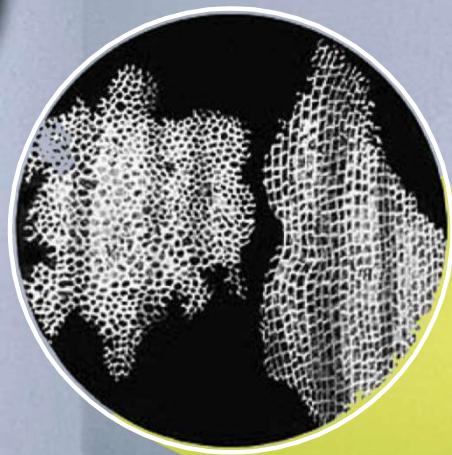
DISCOVERY OF THE CELL



Cells of living organisms could
be observed only after the
discovery of
IMPROVED MICROSCOPES.

DISCOVERY OF THE CELL

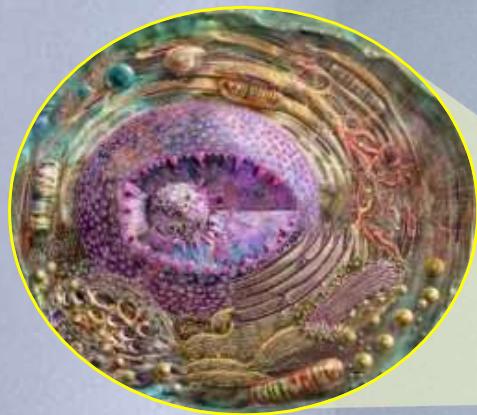
Very little was known about the cell for the next
150 YEARS AFTER ROBERT HOOKE'S
OBSERVATIONS.



DISCOVERY OF THE CELL

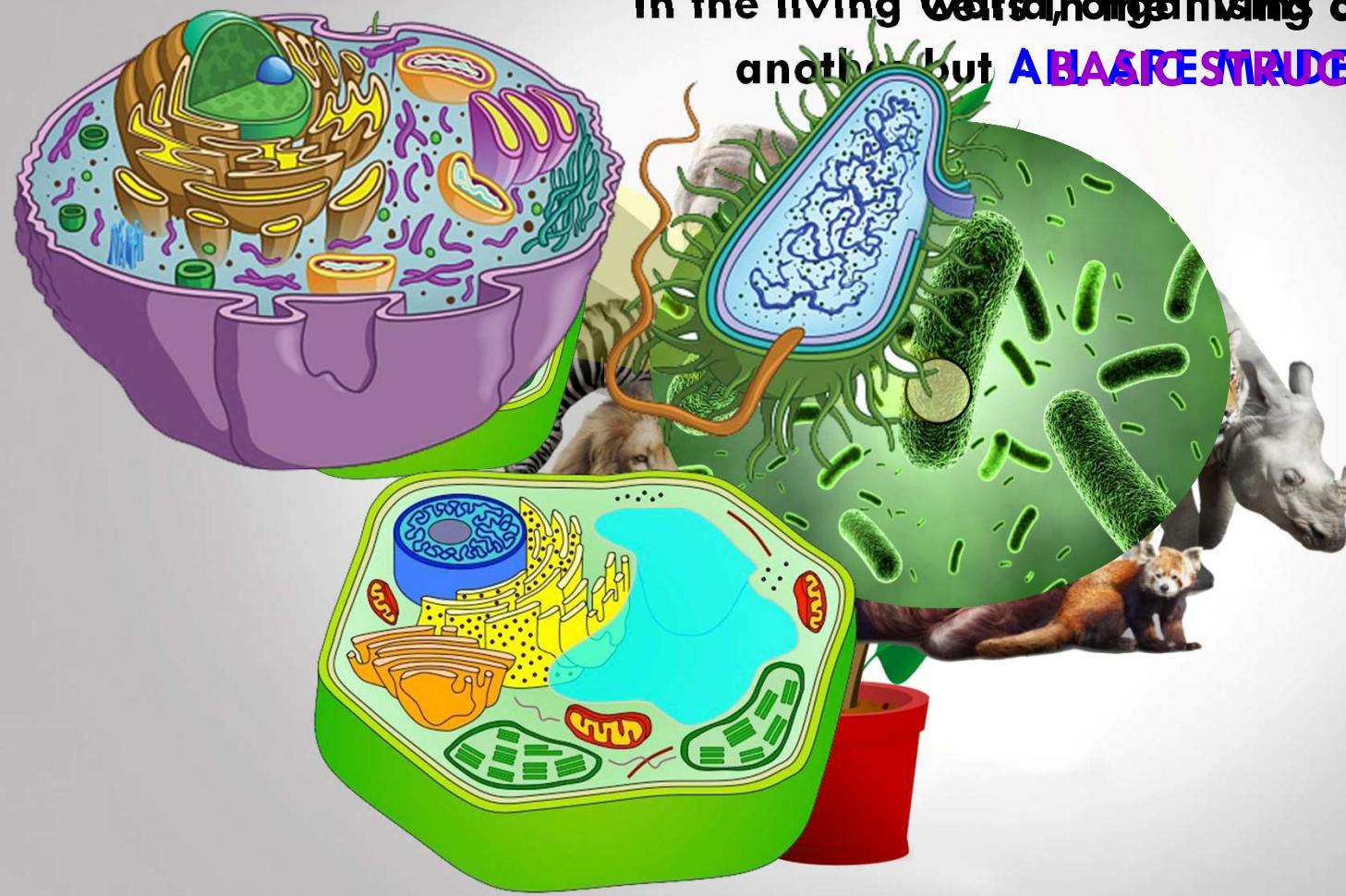
Today, we know a lot about cell structure and its functions,

because of improved microscopes
having high magnification.

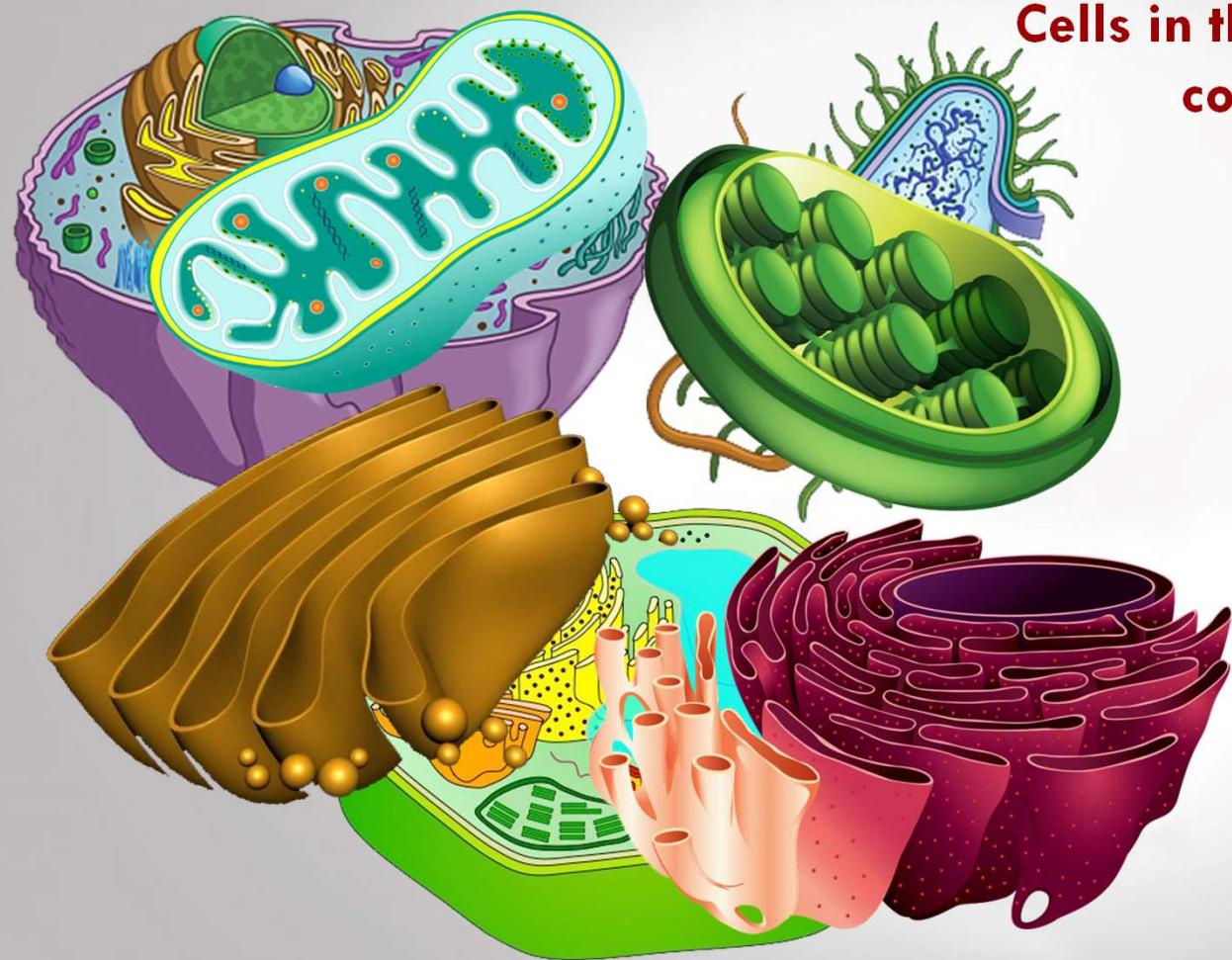


THE CELL

In the living ~~Cell~~ ~~body~~, ~~not~~ ~~in~~ hising different, one another, but **A BASIC STRUCTURE OF UNITS.**



THE CELL



Cells in the living organisms are complex living structures.



As the cells are made up of many little organs within them called as organelles.



CELL - STRUCTURE AND FUNCTIONS

- Cell Number, Shape And Size

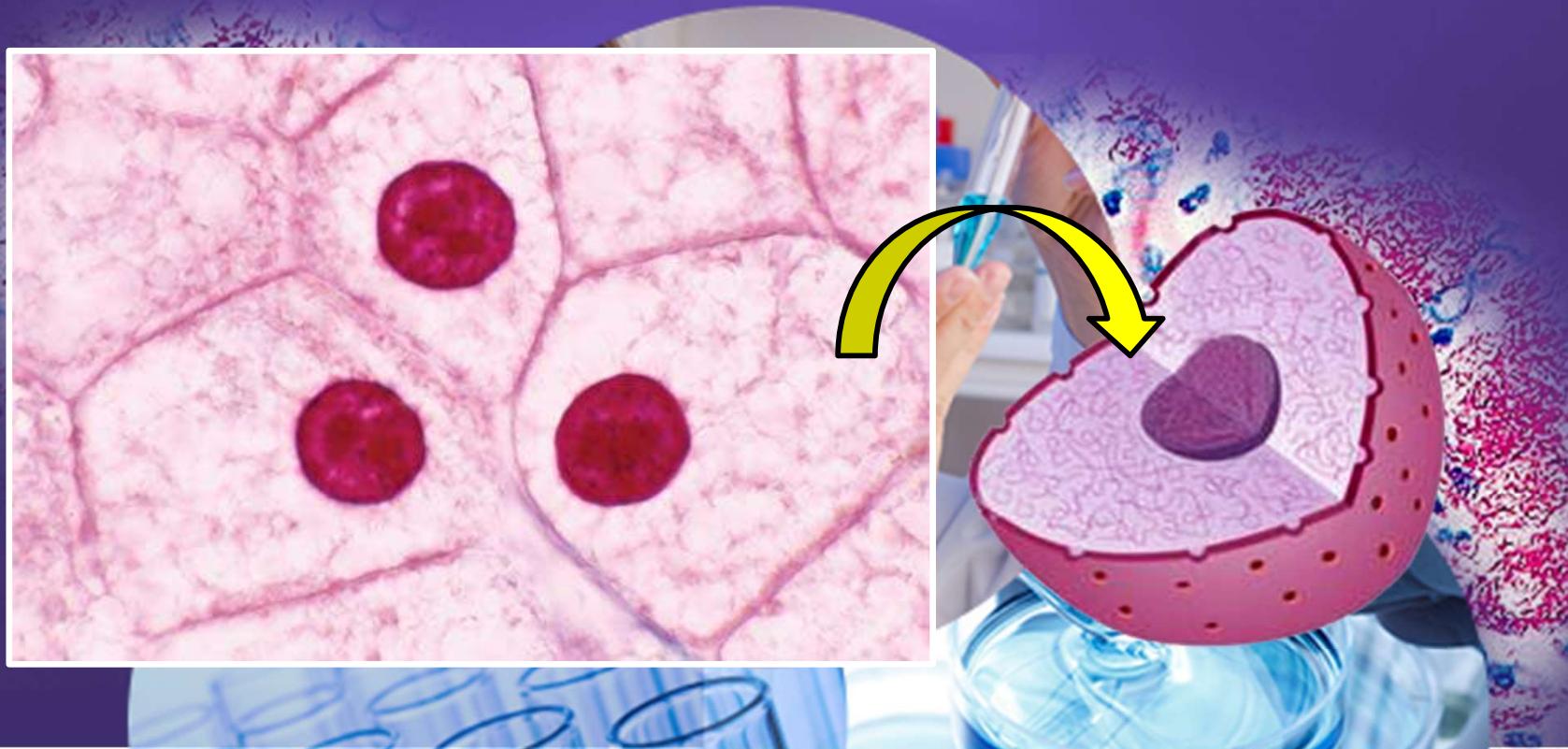
CELL NUMBER, SHAPE AND SIZE

How do scientists observe and study living cells?



CELL NUMBER, SHAPE AND SIZE

STAINS (dyes) are used to colour
parts of the cell to **STUDY THE DETAILED STRUCTURE.**



CELL NUMBER, SHAPE AND SIZE

Living organisms are of **DIFFERENT SHAPES** and **SIZES**.

Their organs also vary in **SHAPE, SIZE** and **NUMBER OF CELLS**.



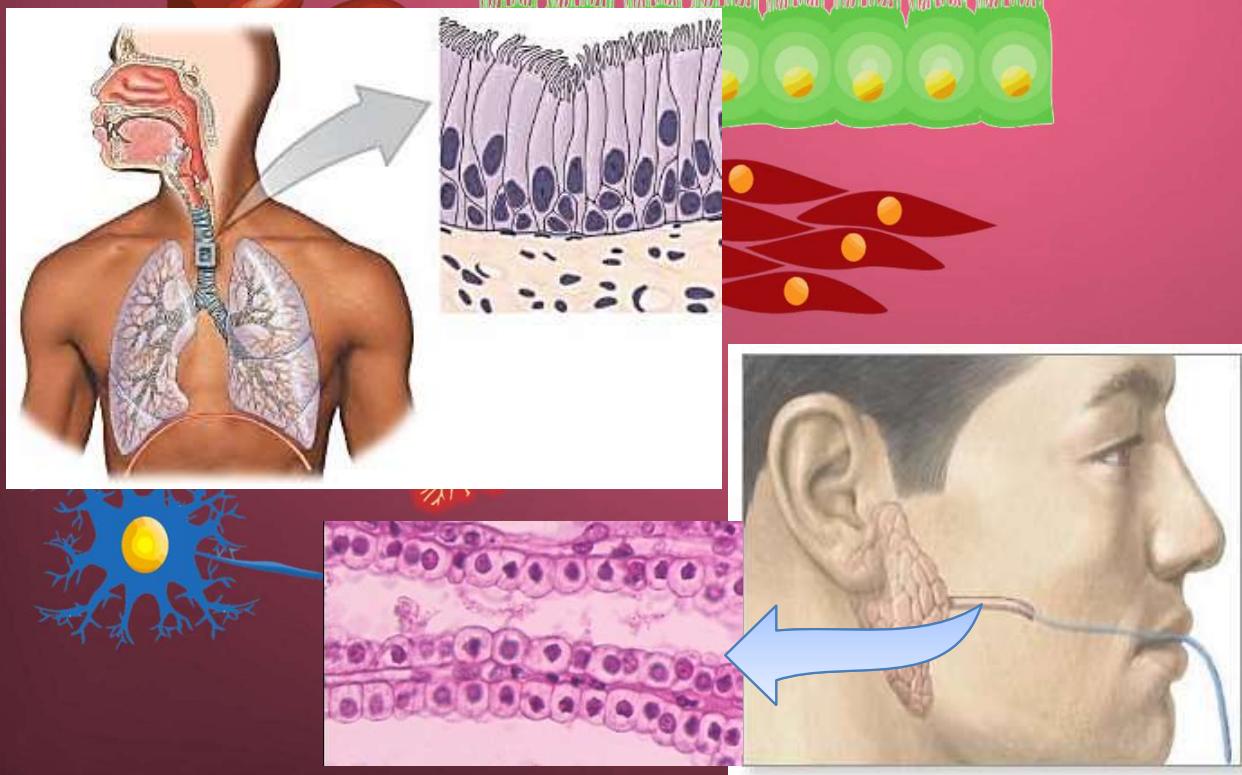


Let us study about
SOME OF THEM...

NUMBER OF CELLS

Human body has trillions of cells which vary in **SHAPES** and **SIZES**.

Different groups of cells perform a **VARIETY OF FUNCTIONS**.



NUMBER OF CELLS

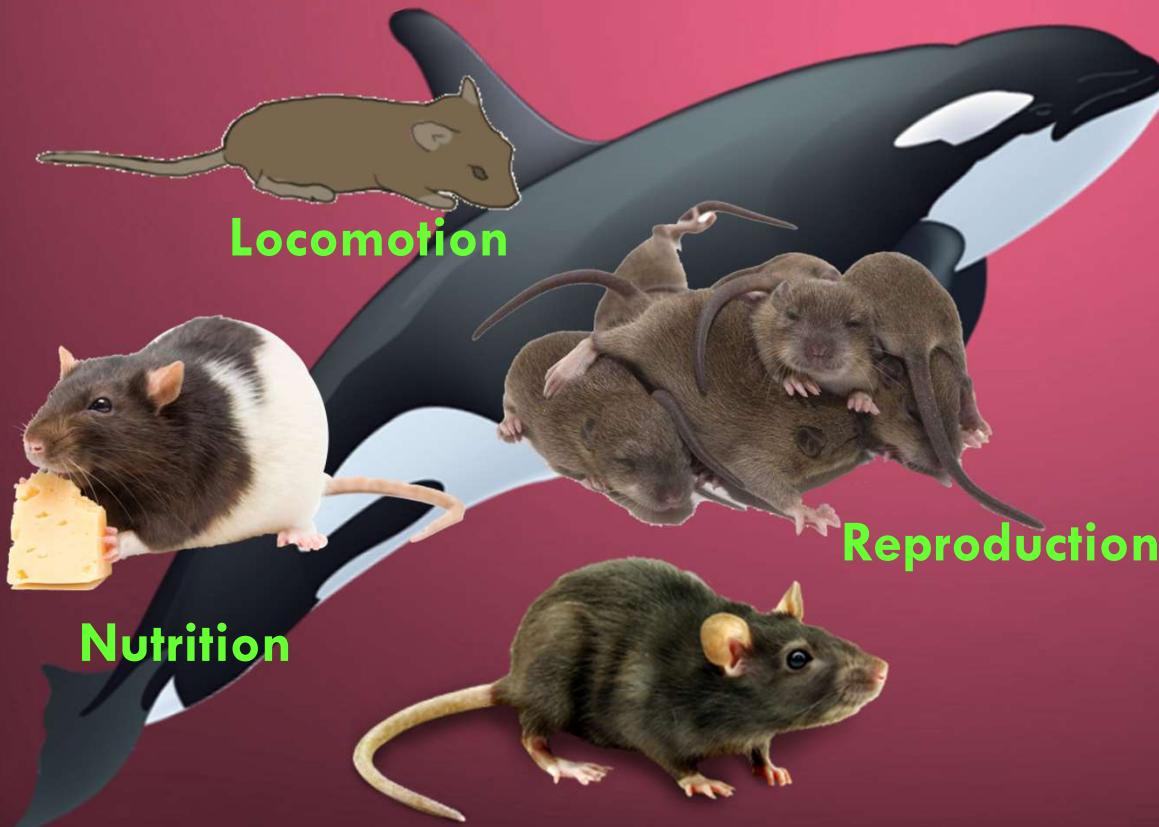
Organisms made of more than one cell

are called
MULTICELLULAR ORGANISMS.



NUMBER OF CELLS

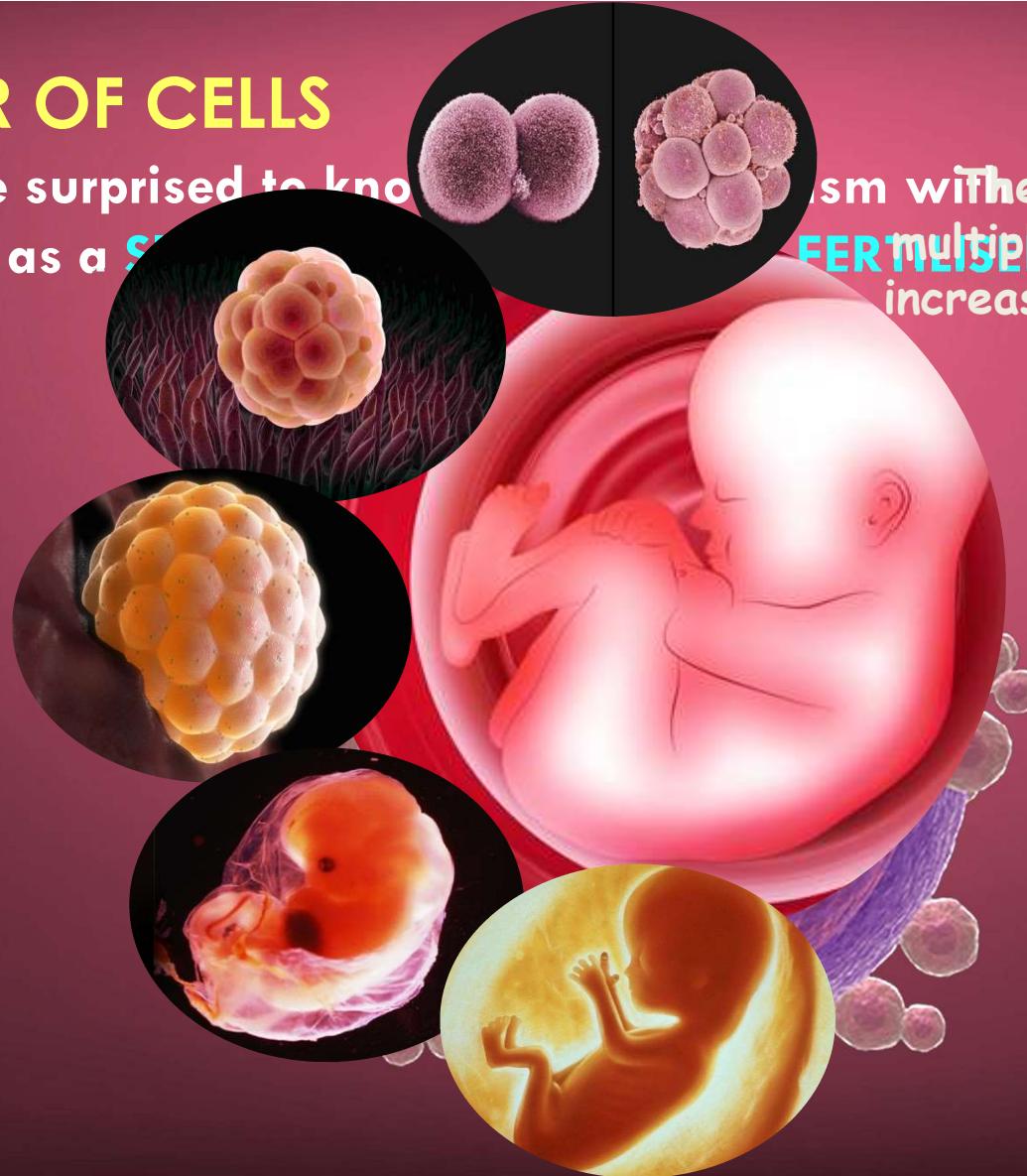
The Number Of Cells Being Less In Smaller Organisms
DOES NOT, IN ANY WAY, Affect The Functioning Of The Organisms.



NUMBER OF CELLS

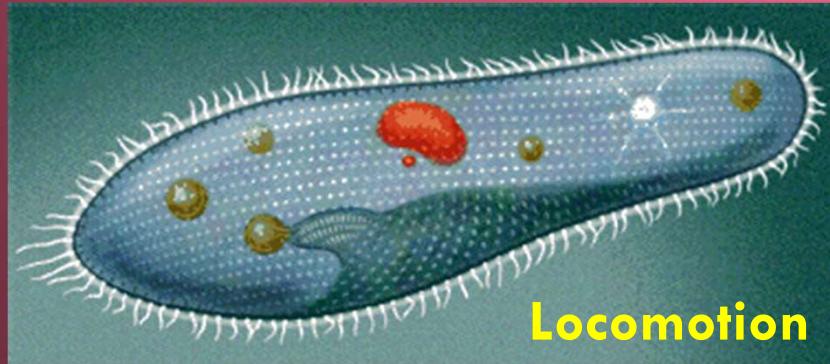
You will be surprised to know
began life as a SPERM AND EGG.

As development begins with the **FERTILISED EGG CELL**, the number of cells increases as development proceeds.



NUMBER OF CELLS

The **SINGLE-CELLED ORGANISMS**



Locomotion

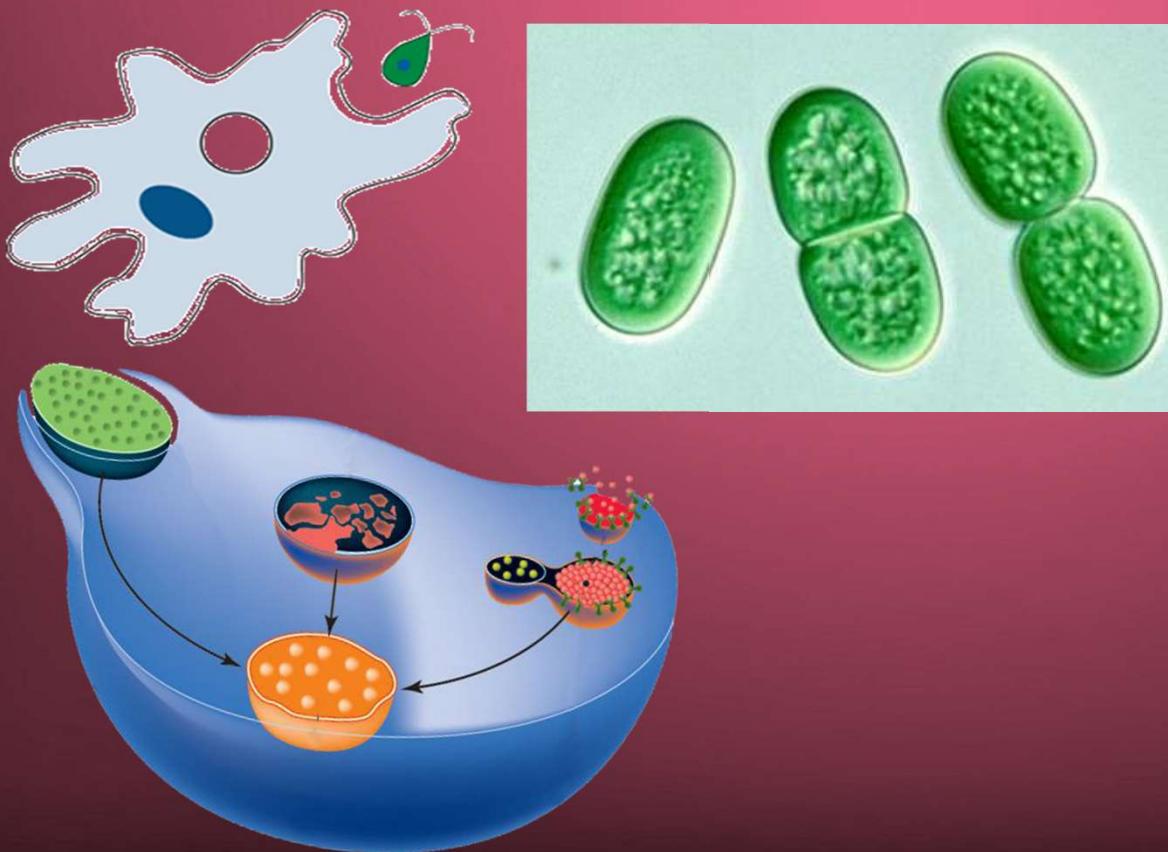
are called
UNICELLULAR ORGANISMS.



A single-celled organism performs **All The Necessary Functions** that multicellular organisms perform.

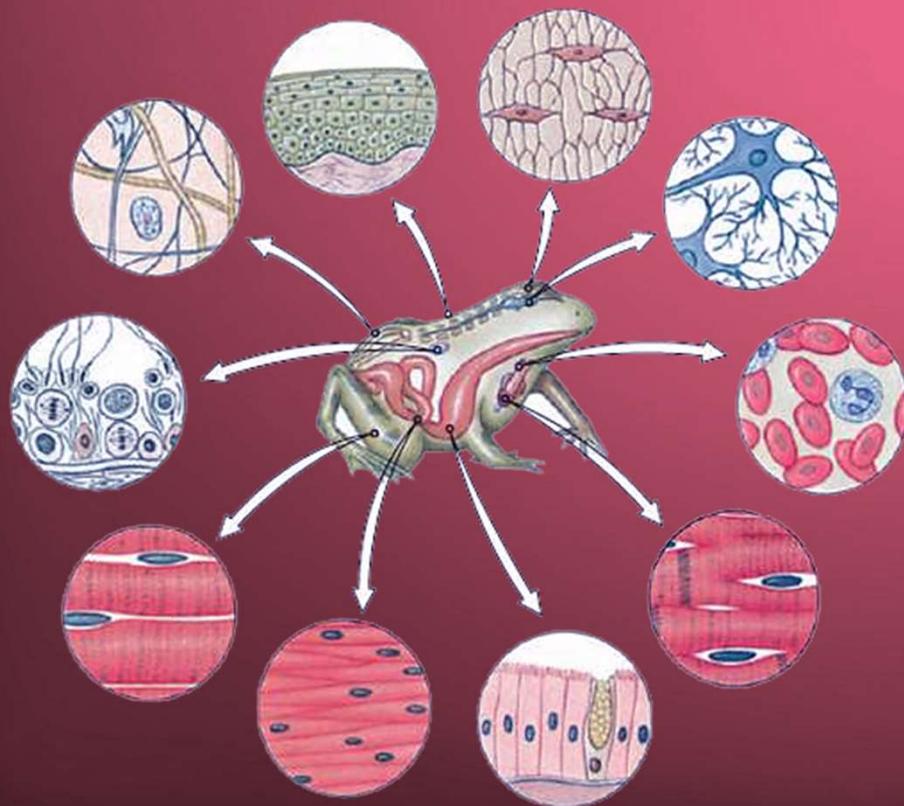
NUMBER OF CELLS

A Single-celled Organism, like amoeba, Captures And Digests Food, Respires, Excretes, Grows and Reproduces.

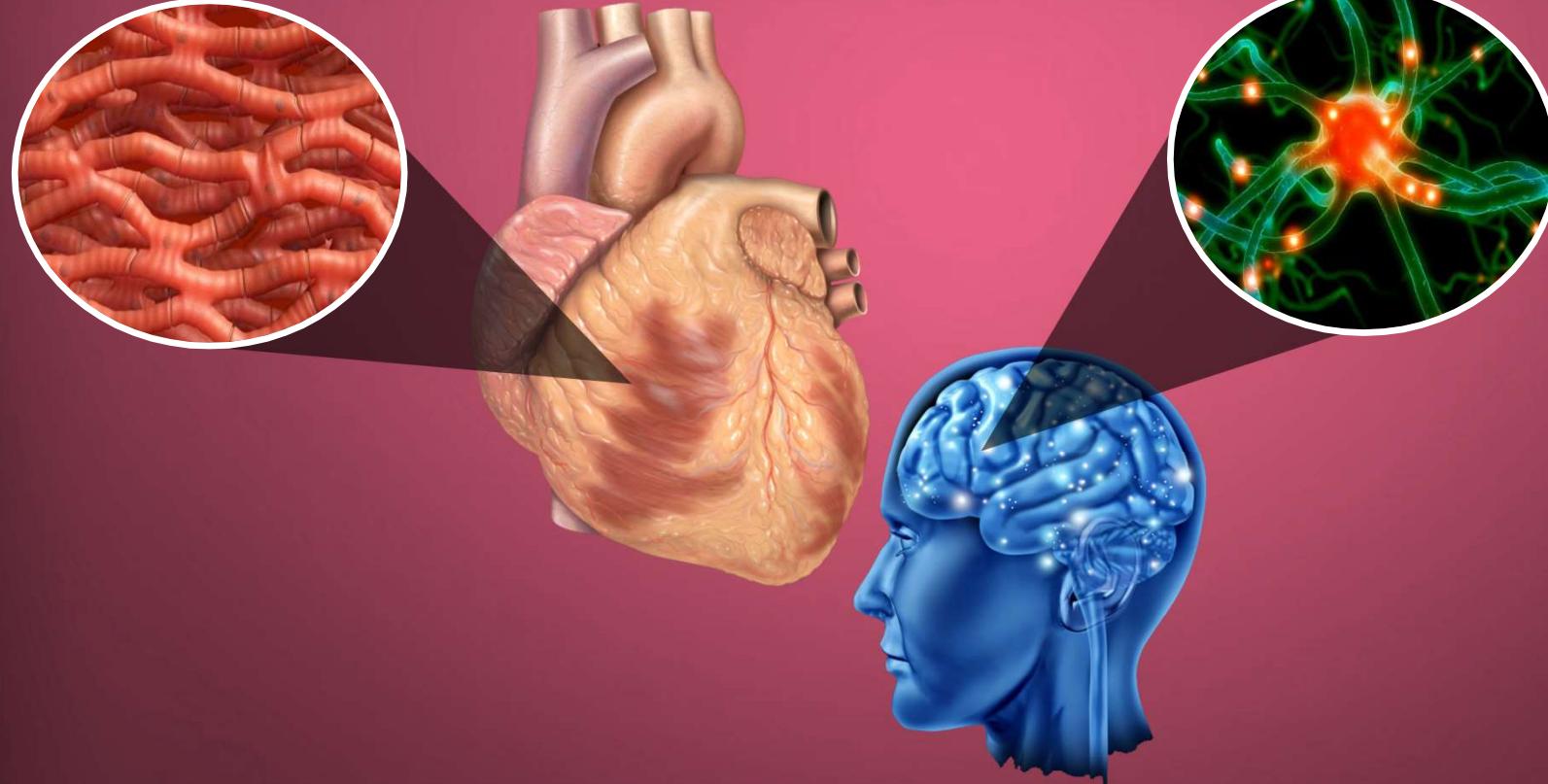


NUMBER OF CELLS

Similar functions in Multicellular Organisms are carried out by Groups Of Specialized Cells forming different Tissues.



NUMBER OF CELLS

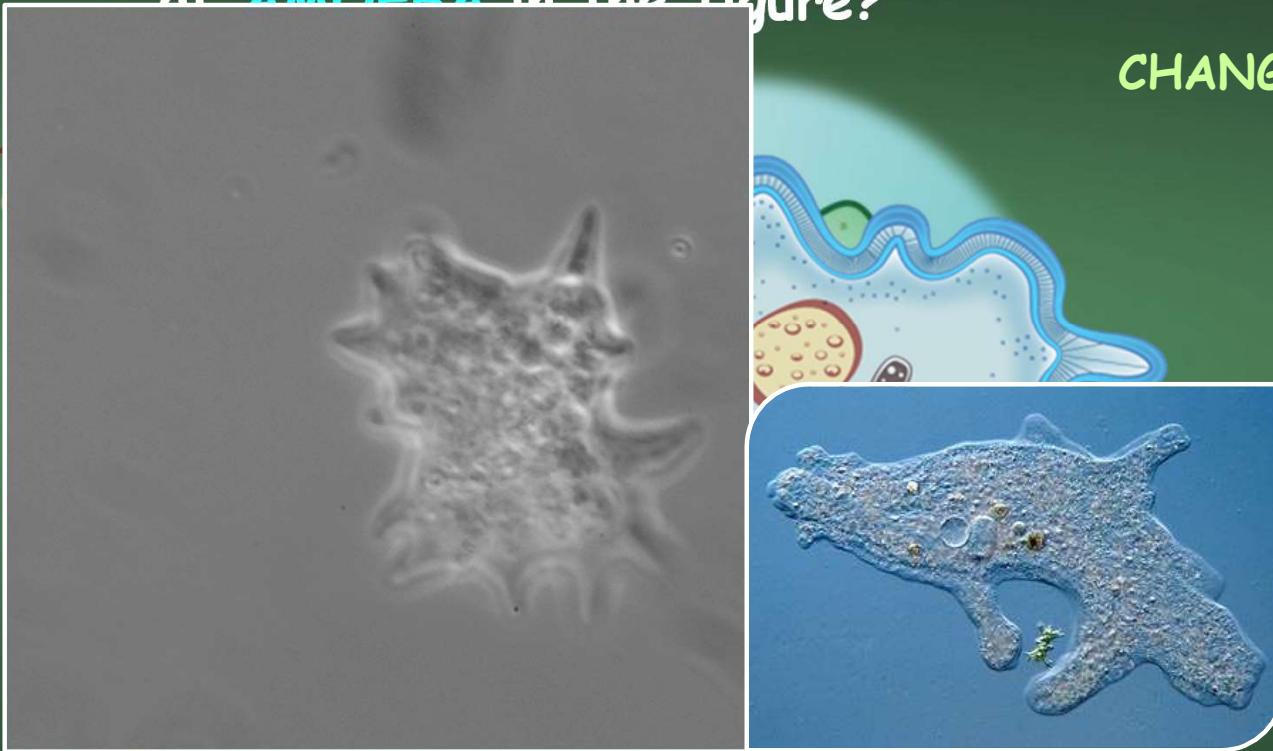


Tissues, in turn, form organs.

SHAPE OF CELLS

You may say that the shape appears **IRREGULAR**.

In fact ~~How do other defines the~~ **AMOEBA** has **NO DEFINITE SHAPE**.
~~of AMOEBA in the figure?~~



It keeps on
CHANGING ITS SHAPE.

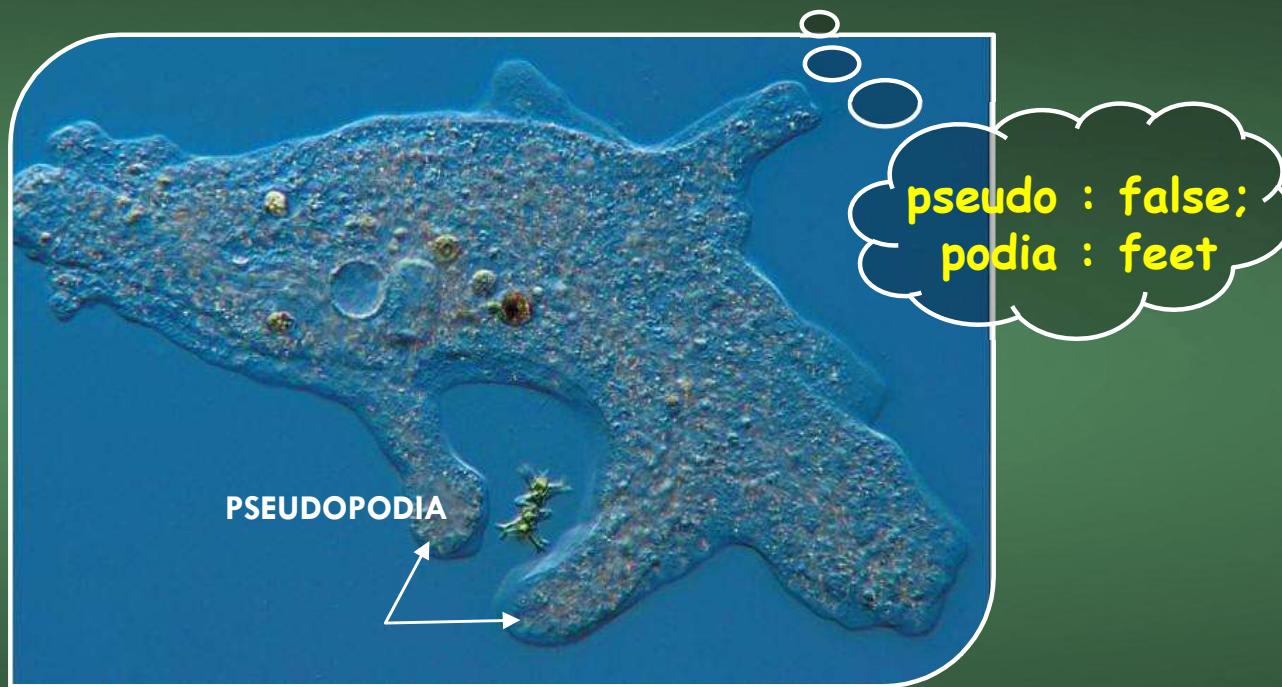


SHAPE OF CELLS



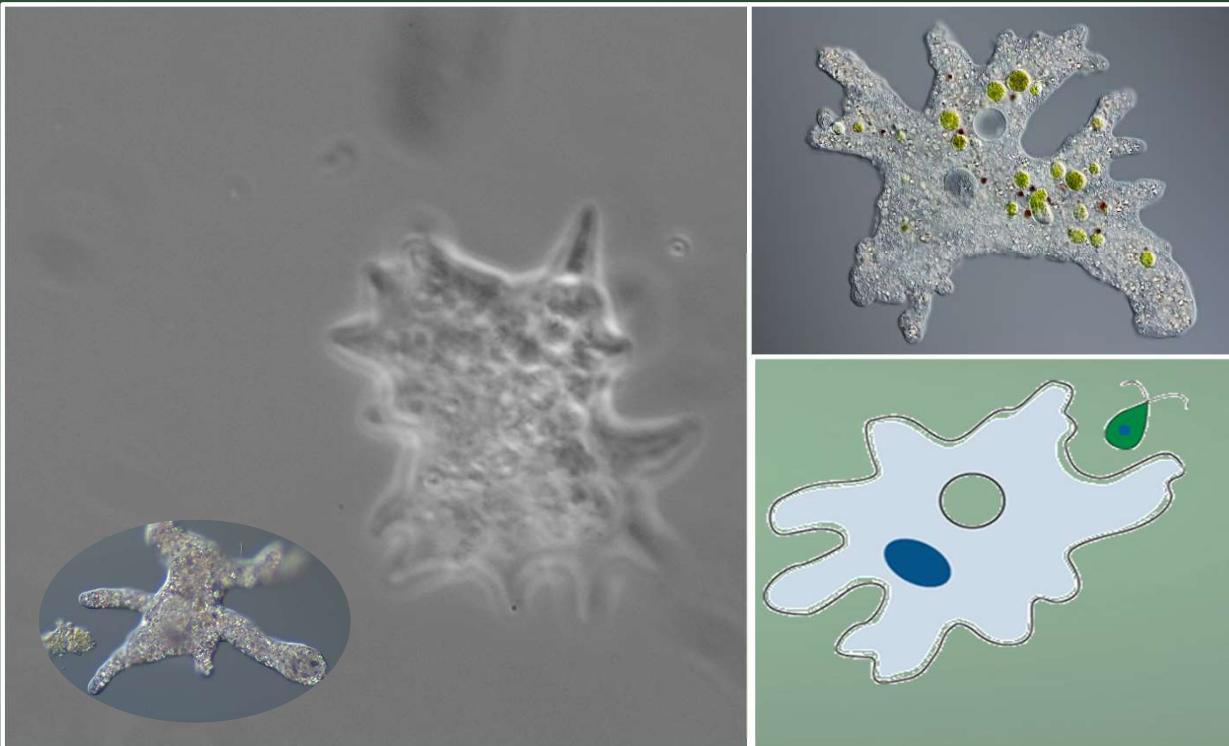
This is because of the **PROJECTIONS OF VARYING LENGTHS** protruding out of its body.

These are called **PSEUDOPODIA**.



SHAPE OF CELLS

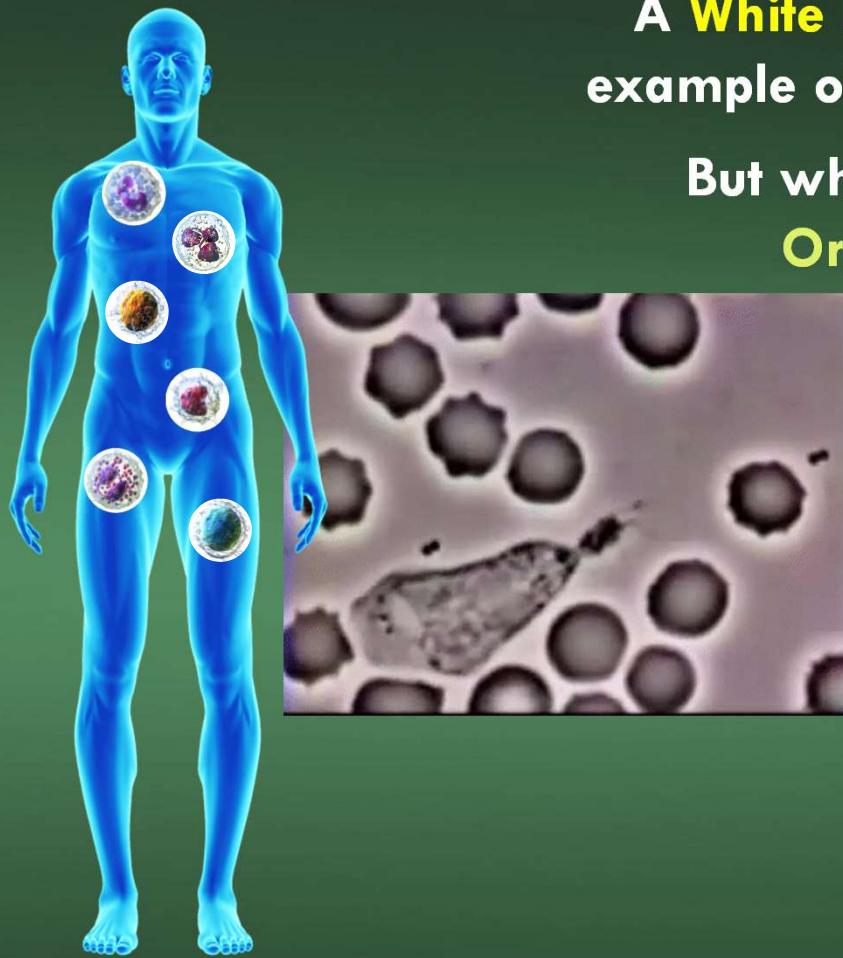
Pseudopodia **FACILITATES MOVEMENT** and **CAPTURING OF FOOD** in amoeba.



SHAPE OF CELLS

A White Blood Cell (WBC) in human blood is another example of a Single Cell Which Can Change Its Shape.

But while WBC is a cell, Amoeba Is A Full Fledged Organism capable of independence existence.

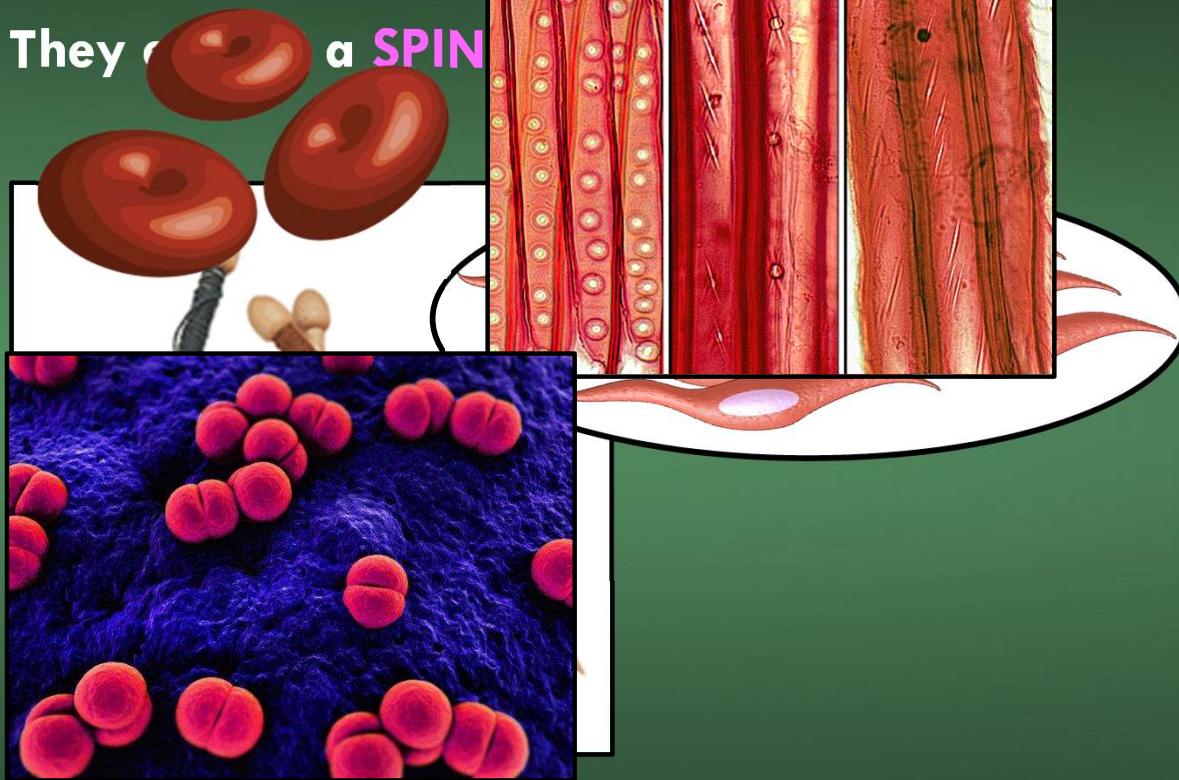


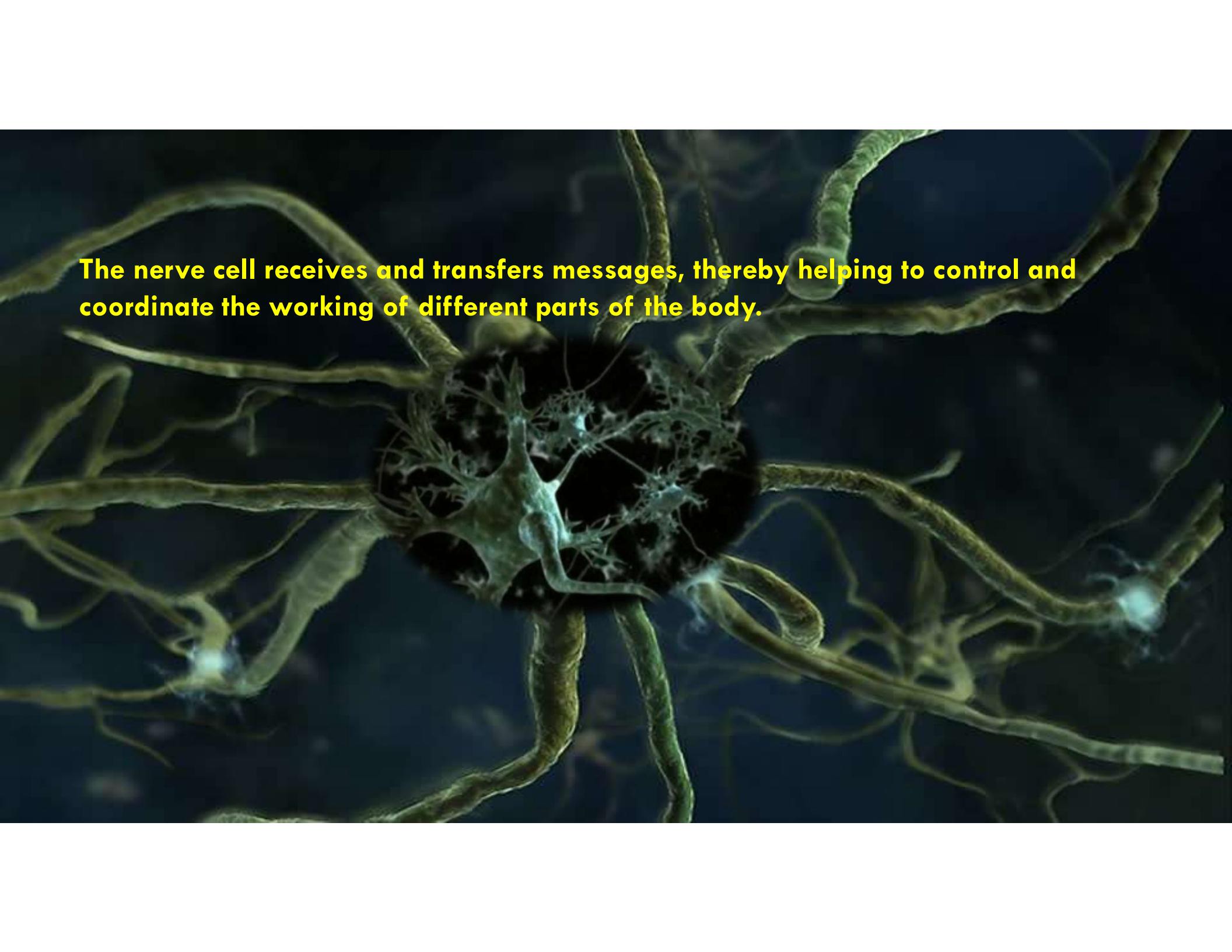
SHAPE OF CELLS

Generally, cells are **ROUND**, **SPHERICAL** or **ELONGATED**.

Some cells are **LONG** and **POINTED AT BOTH ENDS**.

They can have a **SPINE**



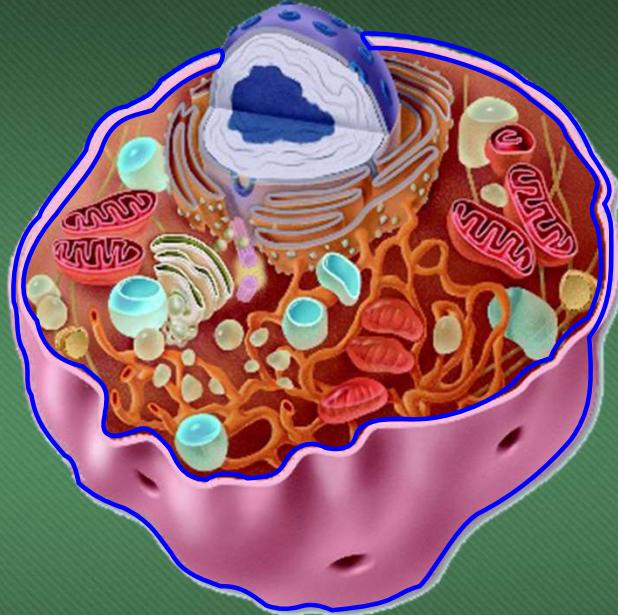


The nerve cell receives and transfers messages, thereby helping to control and coordinate the working of different parts of the body.

SHAPE OF CELLS

Components of the cell are ENCLOSED IN A MEMBRANE.

This membrane **PROVIDES SHAPE TO THE CELLS** of organisms, like animals.

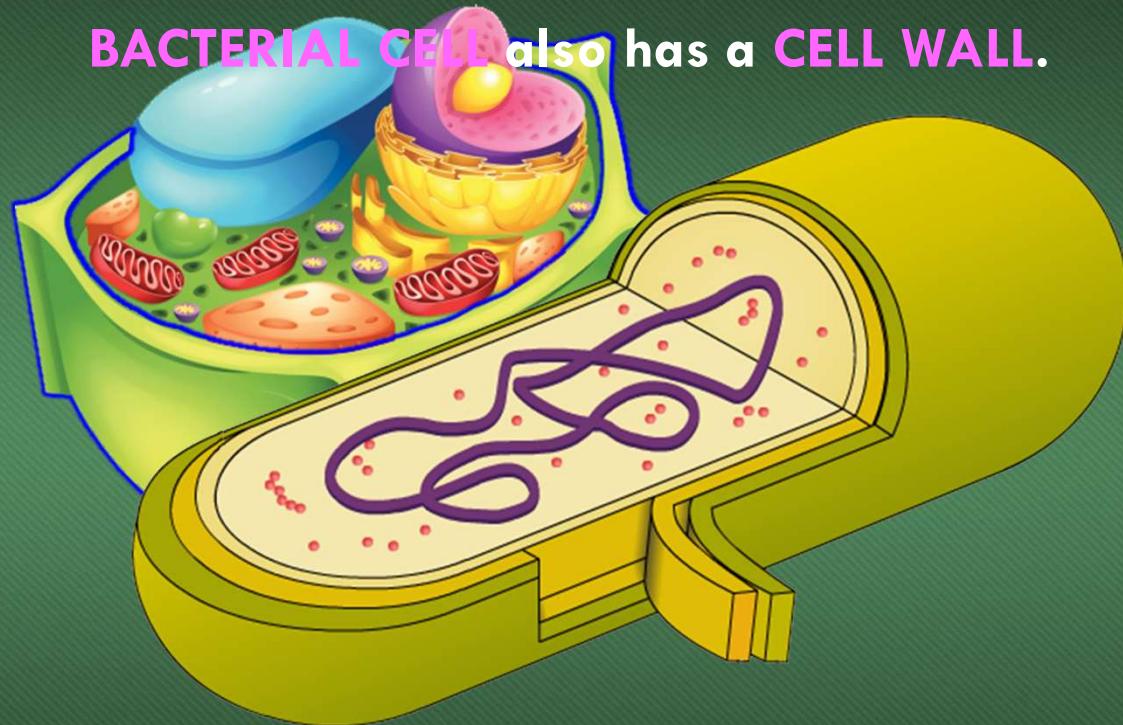


SHAPE OF CELLS

CELL WALL is an additional covering over the cell membrane in plant cells.

It gives **SHAPE** and **RIGIDITY** to plant cells.

BACTERIAL CELL also has a **CELL WALL**.





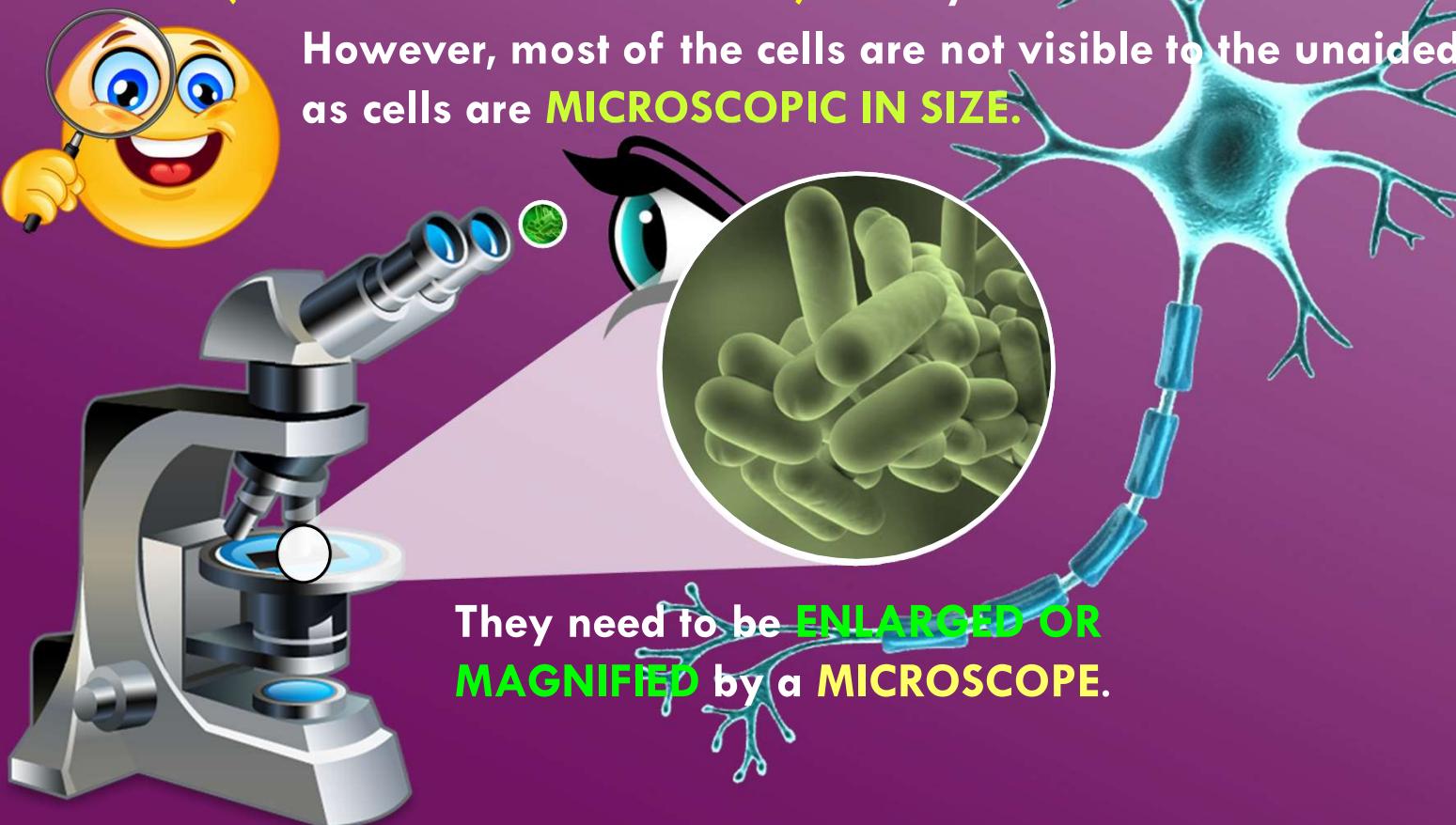
CELL - STRUCTURE AND FUNCTIONS

- Size Of Cells
- Cell Structure And Function

SIZE OF CELLS

The size of cells in living organisms may be AS SMALL AS A MILLIONTH OF A METRE (MICROMETRE OR MICRON) or may be AS LARGE AS A FEW CENTIMETRES.

However, most of the cells are not visible to the unaided eye as cells are MICROSCOPIC IN SIZE.



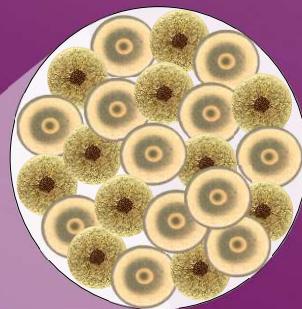
They need to be ENLARGED OR MAGNIFIED by a MICROSCOPE.

SIZE OF CELLS



The **SMALLEST CELL IS 0.1 TO 0.5 micrometre in bacteria.**

The **LARGEST CELL MEASURING 170MM X 130 MM, is the egg of an ostrich.**



SIZE OF CELLS



The **Size Of The Cells** has **NO RELATION** with the **Size Of The Body** of the organism.

It is not necessary that the cells in the elephant be much bigger than those in rat.



SIZE OF CELLS

NERVE CELLS, both in the elephant and rat, are long and branched.



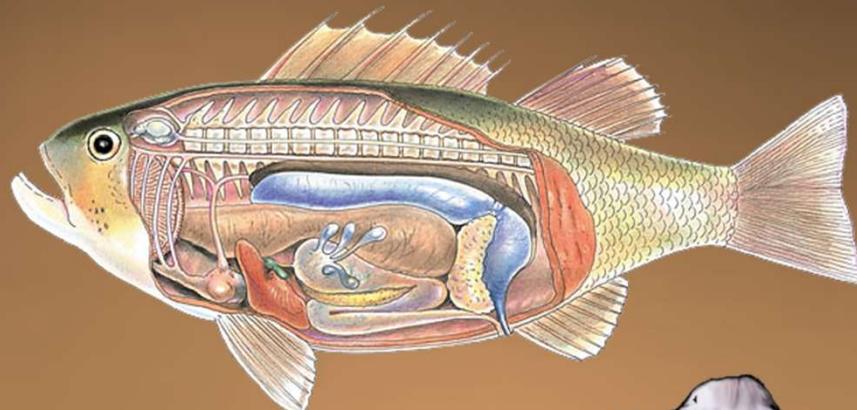
They ~~perform~~ the ~~same~~ function, that related to ~~transferring~~ messages.

FOR EXAMPLE



CELL STRUCTURE AND FUNCTION

Each living organism has **MANY ORGANS.**



Each organ in the system performs different functions such as **DIGESTION, ASSIMILATION AND ABSORPTION.**



Roots help in the absorption of WATER and MINERALS.
By the process of PHOTOSYNTHESES.

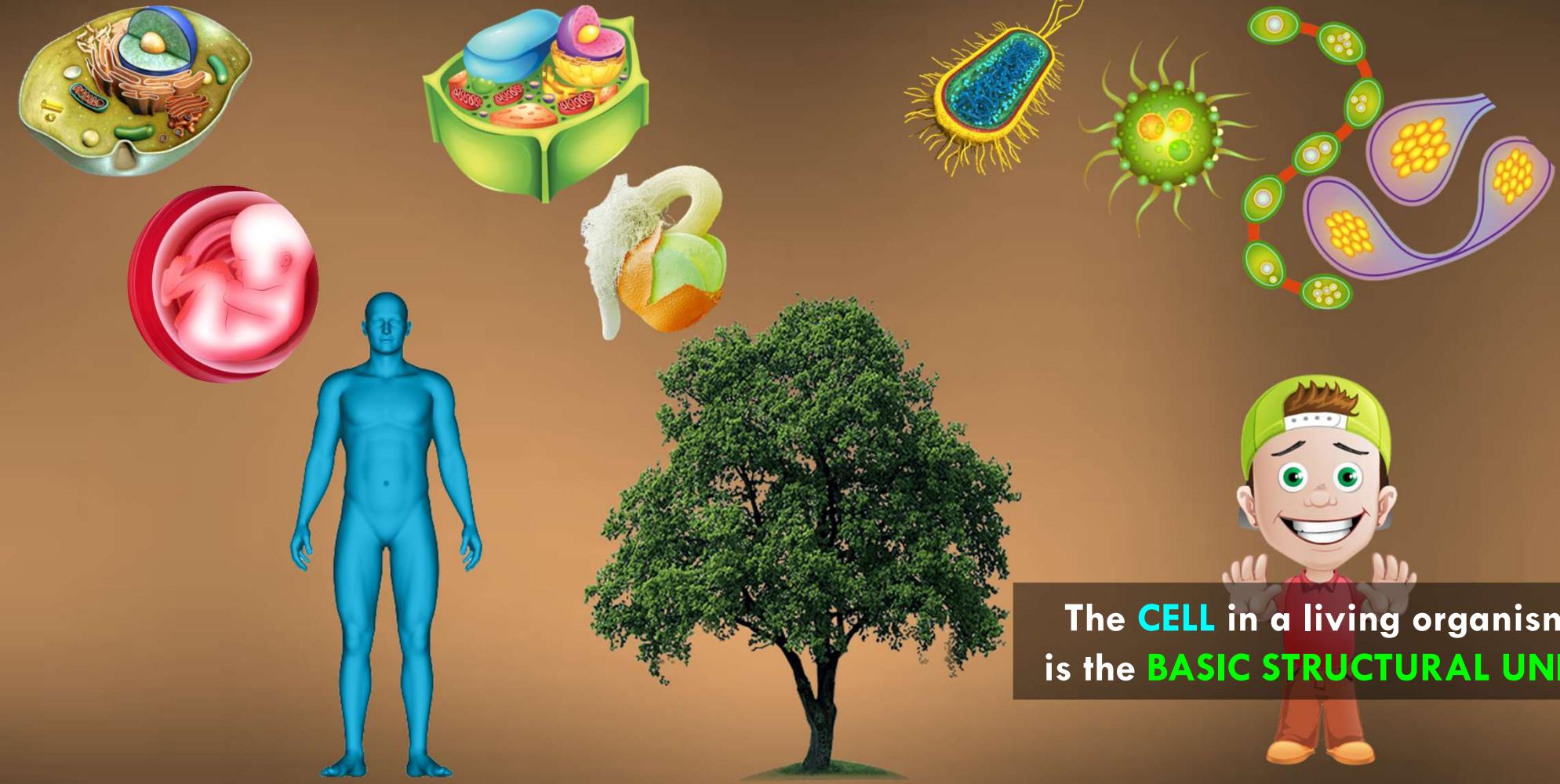
**Similarly, different organs of a plant perform specific/
specialised functions.**



CELL STRUCTURE AND FUNCTION



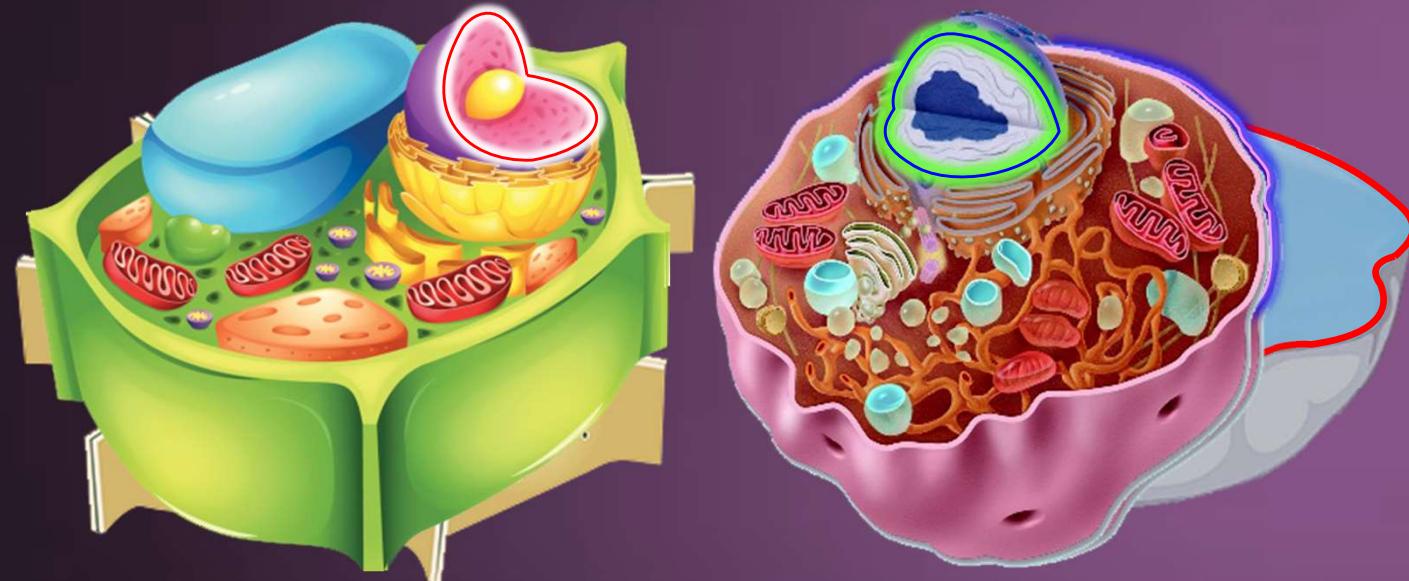
CELL STRUCTURE AND FUNCTION



The **CELL** in a living organism
is the **BASIC STRUCTURAL UNIT**.

PARTS OF THE CELL

The basic components of a cell are
CELL MEMBRANE, CYTOPLASM and NUCLEUS.



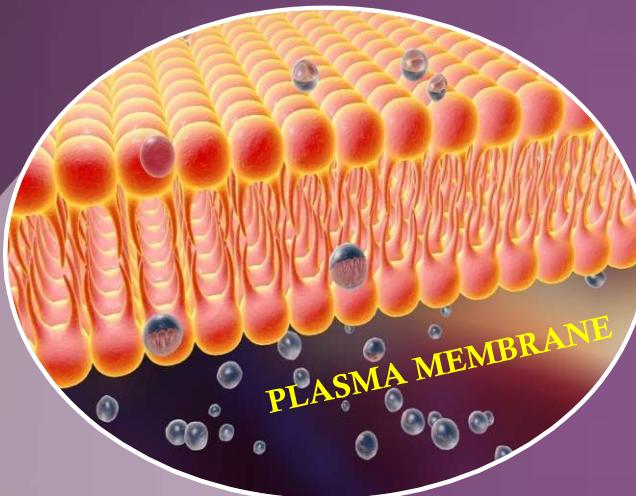
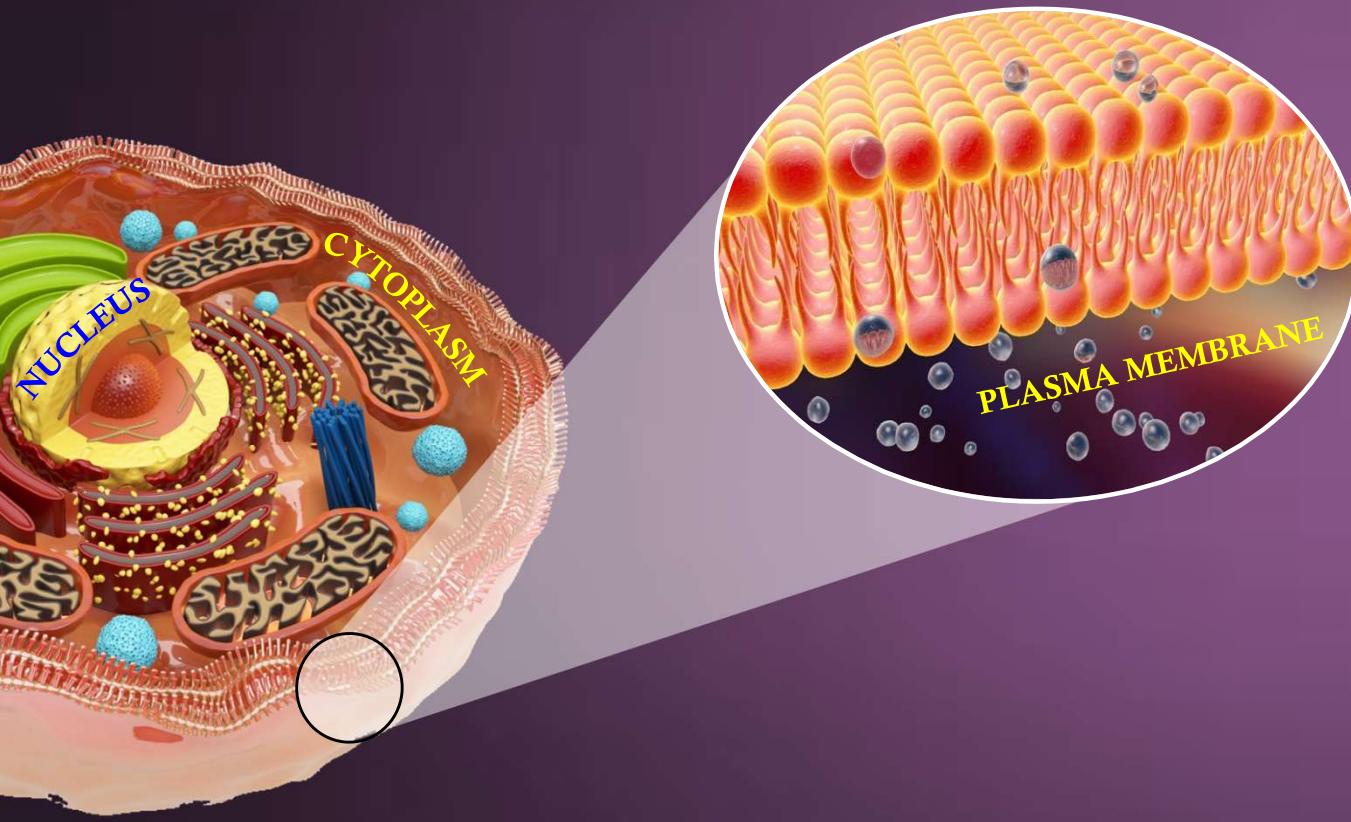


CELL - STRUCTURE AND FUNCTIONS

- Cell Membrane
- Cell Wall
- Cytoplasm

PLASMA MEMBRANE / CELL MEMBRANE

The cytoplasm and nucleus are enclosed within the **CELL MEMBRANE**, also called the **PLASMA MEMBRANE**.



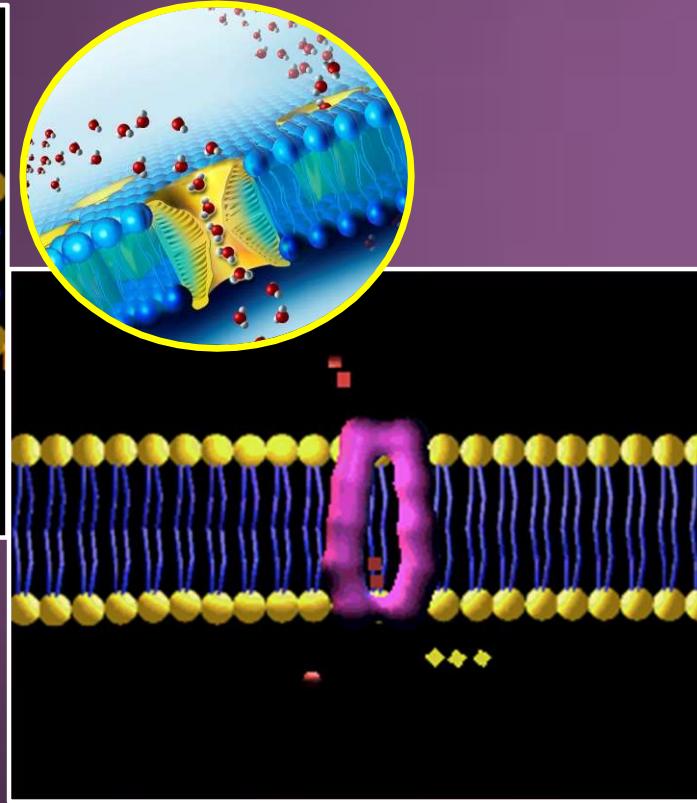
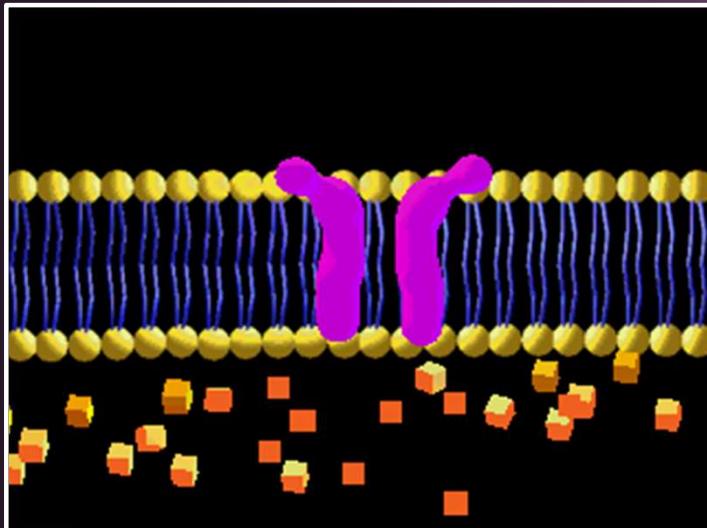
PLASMA MEMBRANE / CELL MEMBRANE

The membrane **SEPARATES CELLS FROM ONE ANOTHER** and also the **CELL FROM THE SURROUNDING MEDIUM.**



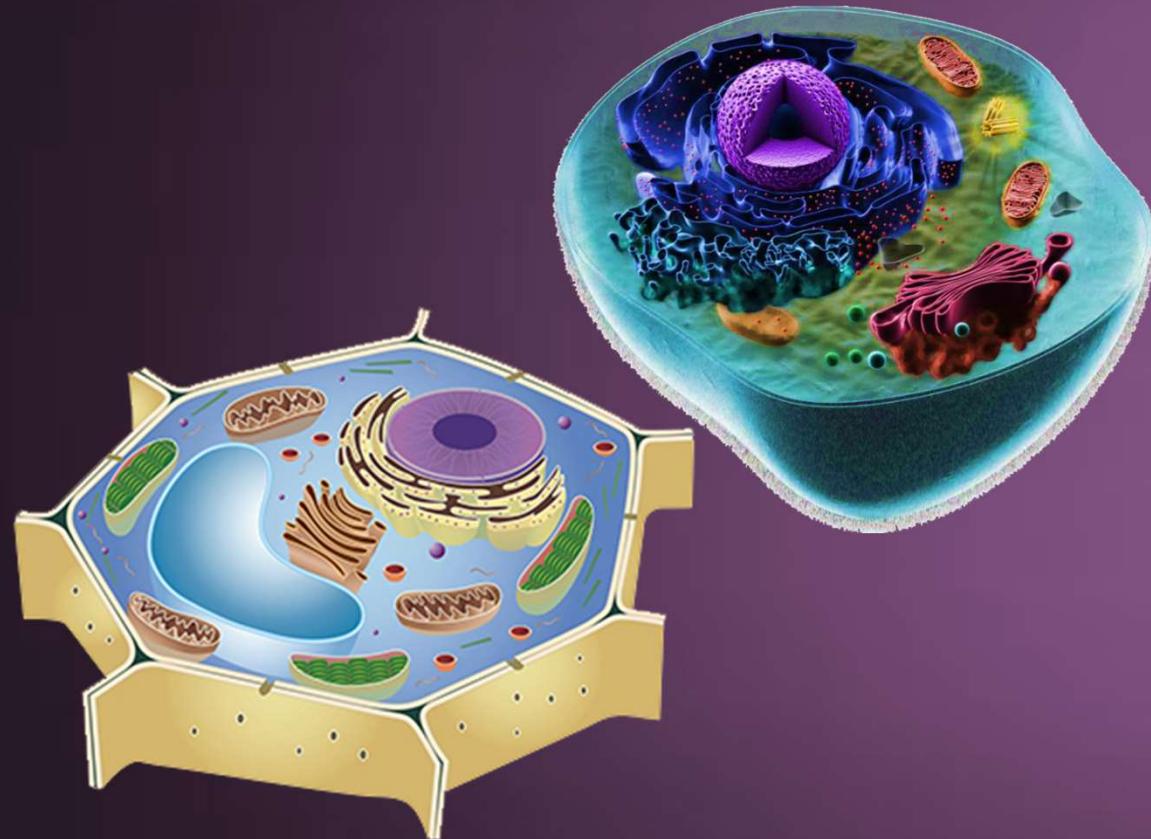
PLASMA MEMBRANE / CELL MEMBRANE

The plasma membrane is **POROUS** and allows the movement of substances or **MATERIALS BOTH INWARD AND OUTWARD.**



PLASMA MEMBRANE / CELL MEMBRANE

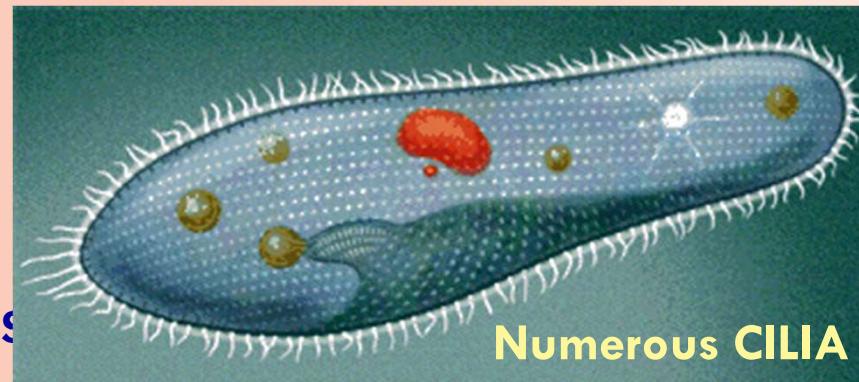
The cell membrane gives **SHAPE TO THE CELL.**



CILIA AND FLAGELLA

Some cells have these **SMALL EXTENSIONS** on their cell membrane.

Unicellular organisms **Paramoecium** have **Numerous CILIA** while **Euglena** has a **Single FLAGELLUM**.



They help in **LOCOMOTION** and **COLLECTION OF FOOD**.



Single FLAGELLUM

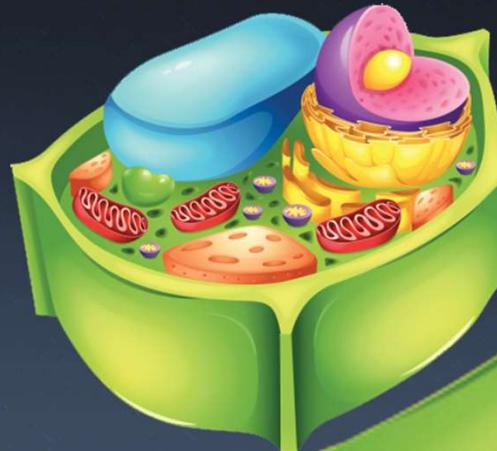
CELL WALL

In addition to the **CELL MEMBRANE**,
there is the an outer thick layer in cells of plants called **CELL WALL**.
This additional layer surrounding the cell membrane is
REQUIRED BY PLANTS FOR PROTECTION.



CELL WALL

Protection Against Variations Like
TEMPERATURE



high

CELL WALL

Protection Against Variations Like
TEMPERATURE



CELL WALL

Protection Against Variations Like
HIGH WIND SPEED



CELL WALL



Protection Against Variations Like
ATMOSPHERIC MOISTURE



CELL WALL

Plants are exposed to these variations to because THEY CANNOT MOVE.



CELL WALL

To observe cells the leaf peels of **TRADESCANTIA**, **ELODEA** or **RHOEO** can be used as samples.

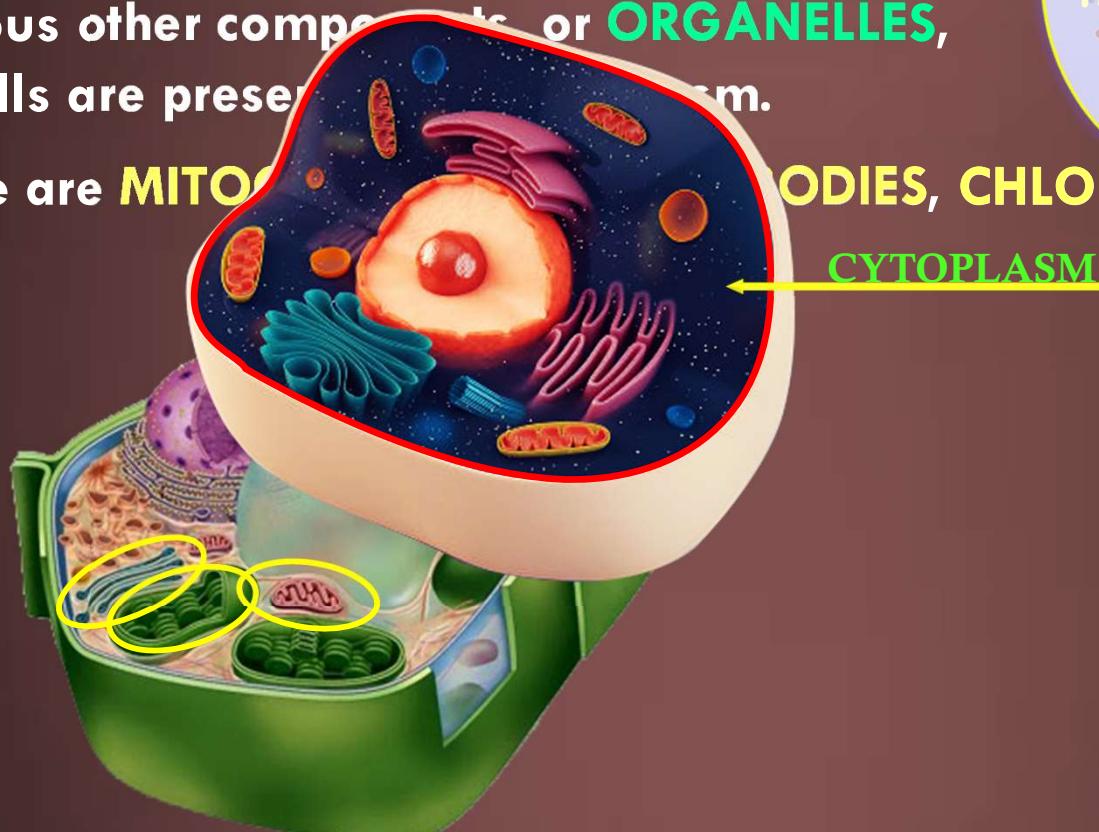


CYTOPLASM

It Is the **JELLY-LIKE SUBSTANCE** present between the **CELL MEMBRANE** and **THE NUCLEUS**.

Various other components or **ORGANELLES**, of cells are present in the cytoplasm.

These are **MITOCHONDRIA**, **RIBOSOMES**, **PROTEIN BODIES**, **CHLOROPLASTS**, etc.





CELL - STRUCTURE AND FUNCTIONS

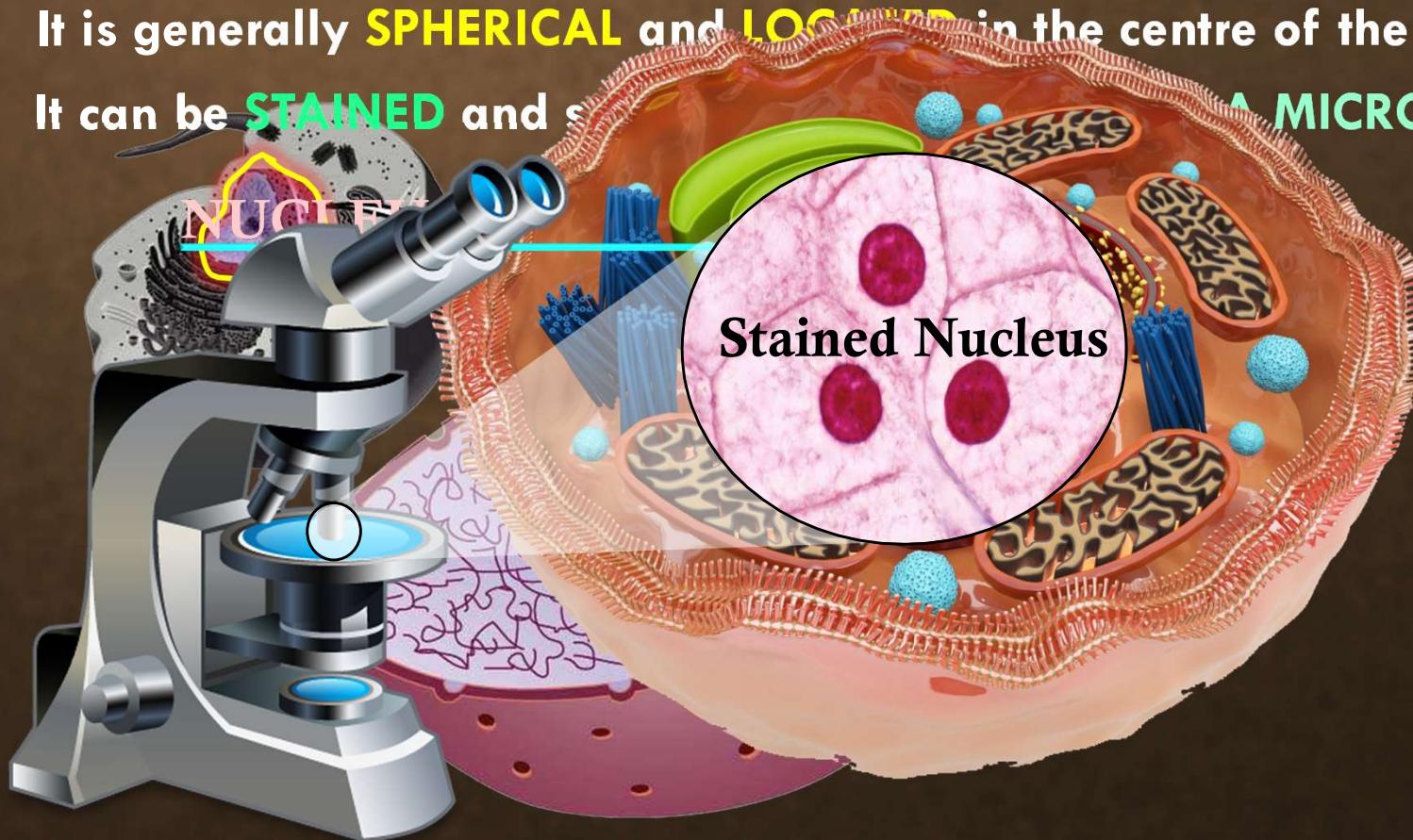
- Nucleus

NUCLEUS

It is an **IMPORTANT COMPONENT** of the living cell.

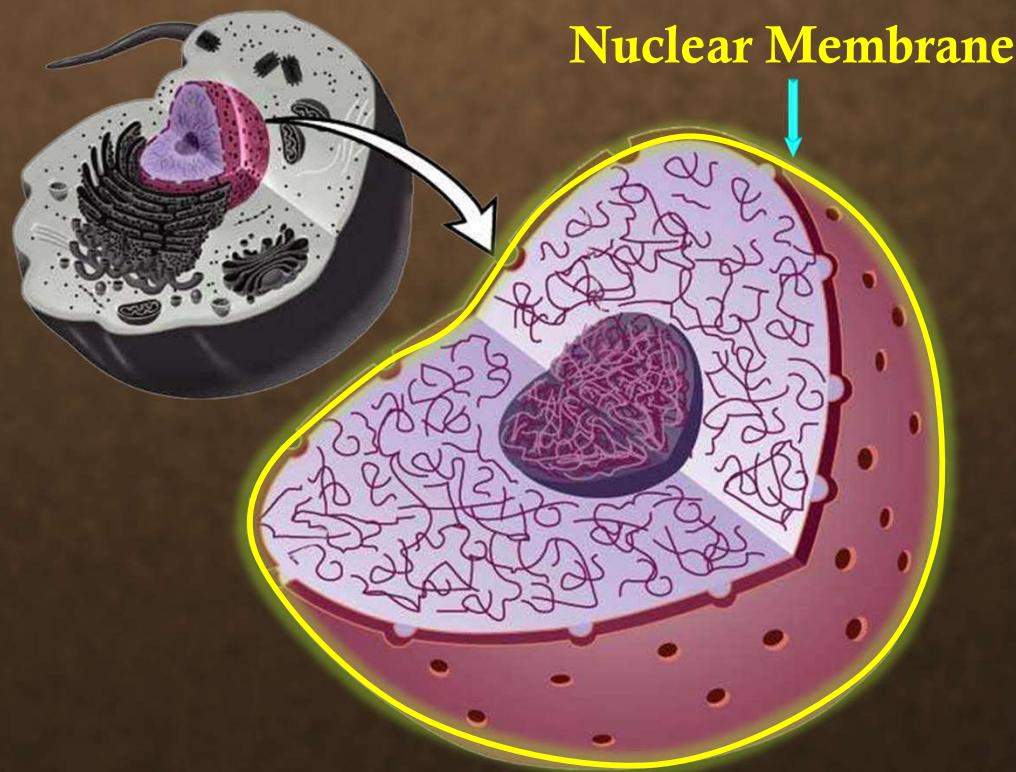
It is generally **SPHERICAL** and **LOCATED** in the centre of the cell.

It can be **STAINED** and seen through **A MICROSCOPE**.



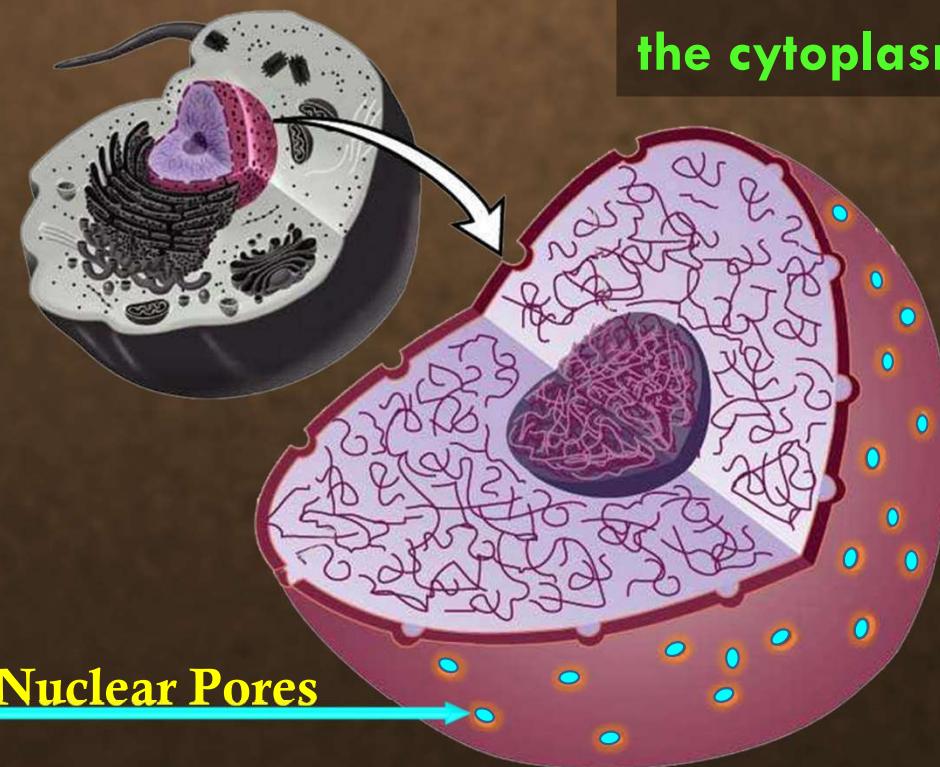
NUCLEUS

Nucleus is separated from the cytoplasm by a membrane called the **NUCLEAR MEMBRANE**.



NUCLEUS

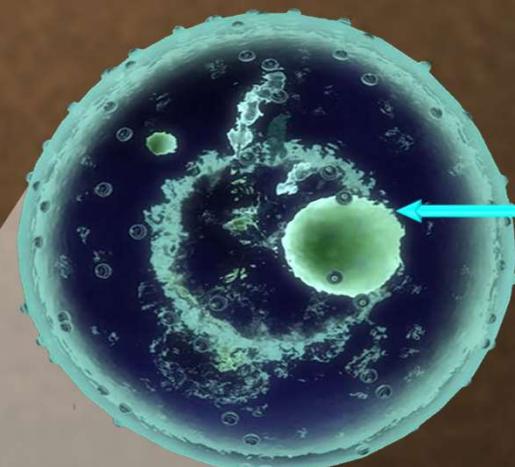
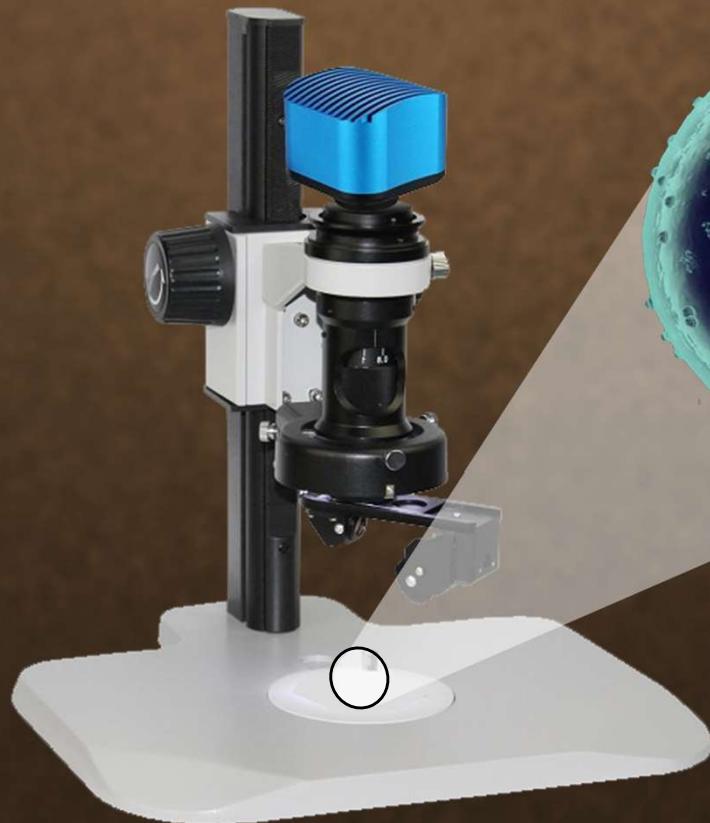
This membrane is also **POROUS**.



This allows the movement of materials between the cytoplasm and the inside of the nucleus.

NUCLEUS

With a microscope of **HIGHER MAGNIFICATION**, we can see a **SMALLER SPHERICAL BODY** in the nucleus.



It is called **NUCLEOLUS**.



Nucleolus

NUCLEUS

In addition, nucleus contains thread-like structures called **CHROMOSOMES**. These carry **GENES**. Genes help in **INHERITANCE**.

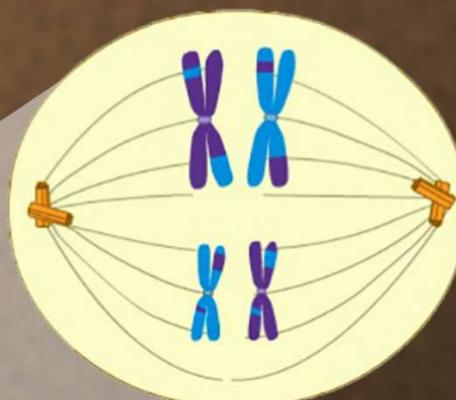
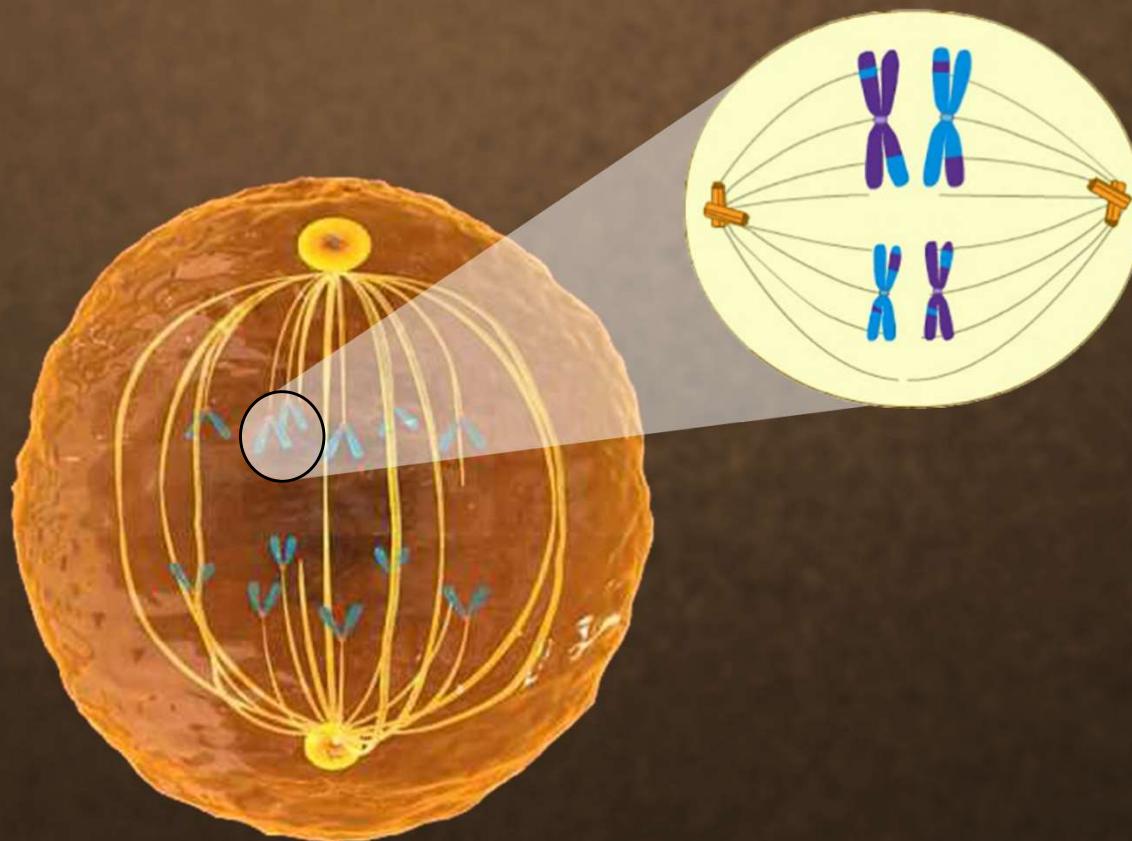


Transfer of characters from the parents to the offspring.



NUCLEUS

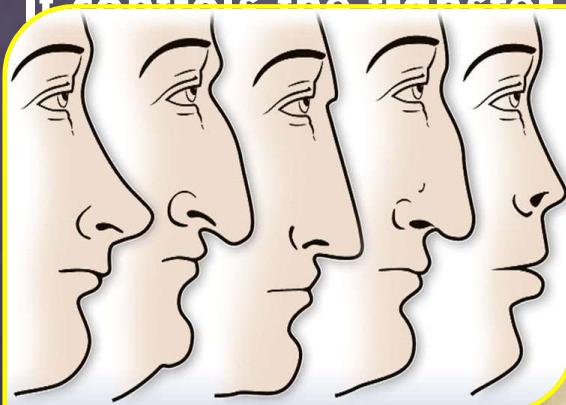
The chromosomes can be seen only when the **CELL DIVIDES.**



GENE

Gene is a **UNIT OF INHERITANCE** in living organisms.

It controls the transfer of a **HEREDITARY** characteristic from parents to offspring. Transmission of genetic qualities from parents to offspring. Your parents pass some characteristics on to you.



GENE

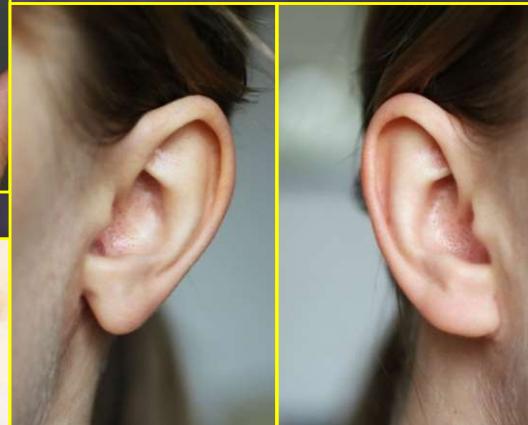
If your FATHER HAS BROWN EYES, YOU MAY ALSO HAVE BROWN EYES.

If your MOTHER HAS CURLY HAIR,
YOU MIGHT ALSO END UP HAVING CURLY HAIR.



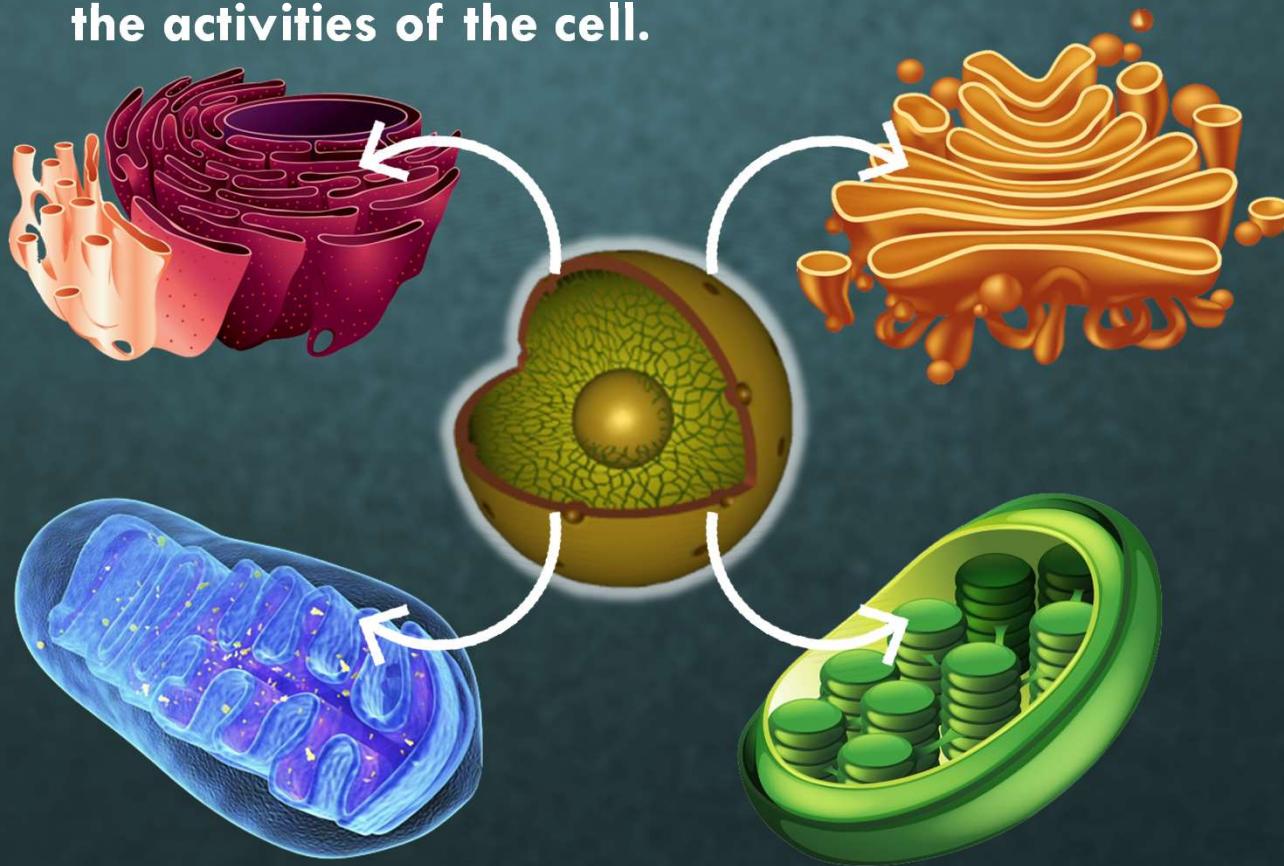
GENE

However, the **DIFFERENT COMBINATION OF GENES** from parents result in different characteristics.



NUCLEUS

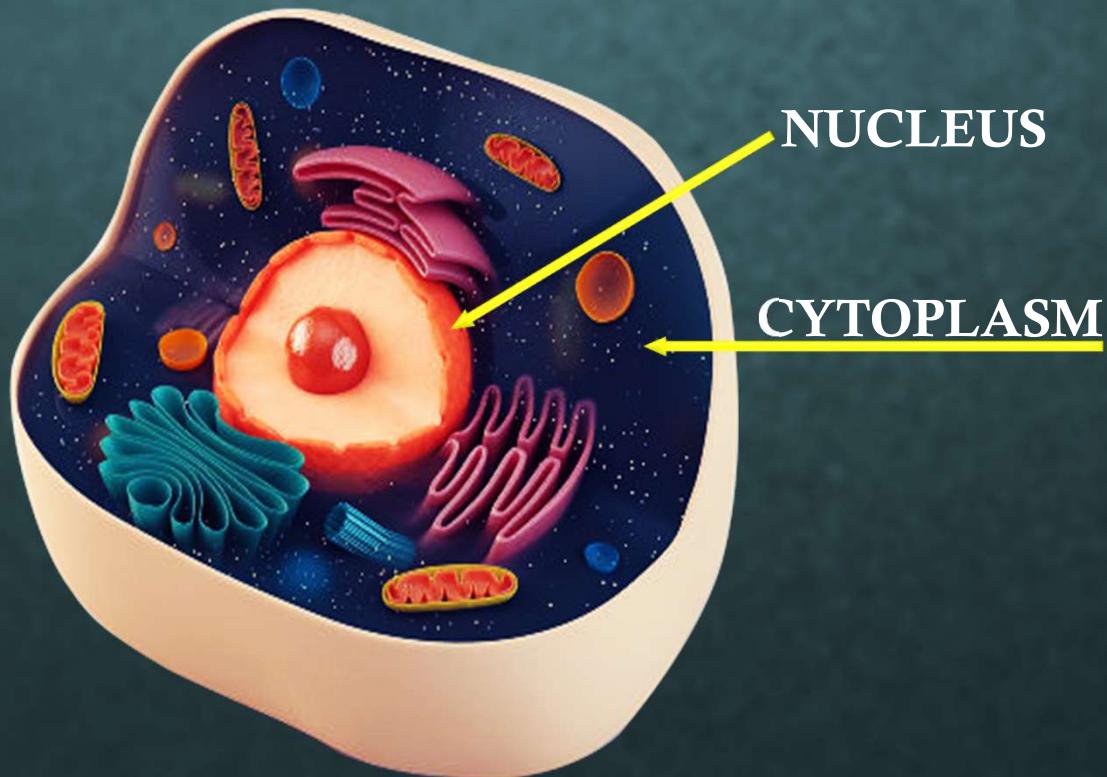
Nucleus, in addition to its role in inheritance, acts as **CONTROL CENTRE** of the activities of the cell.



NUCLEUS

The entire content of a living cell is known as **PROTOPLASM**.

It includes the **CYTOPLASM** and the **NUCLEUS**.

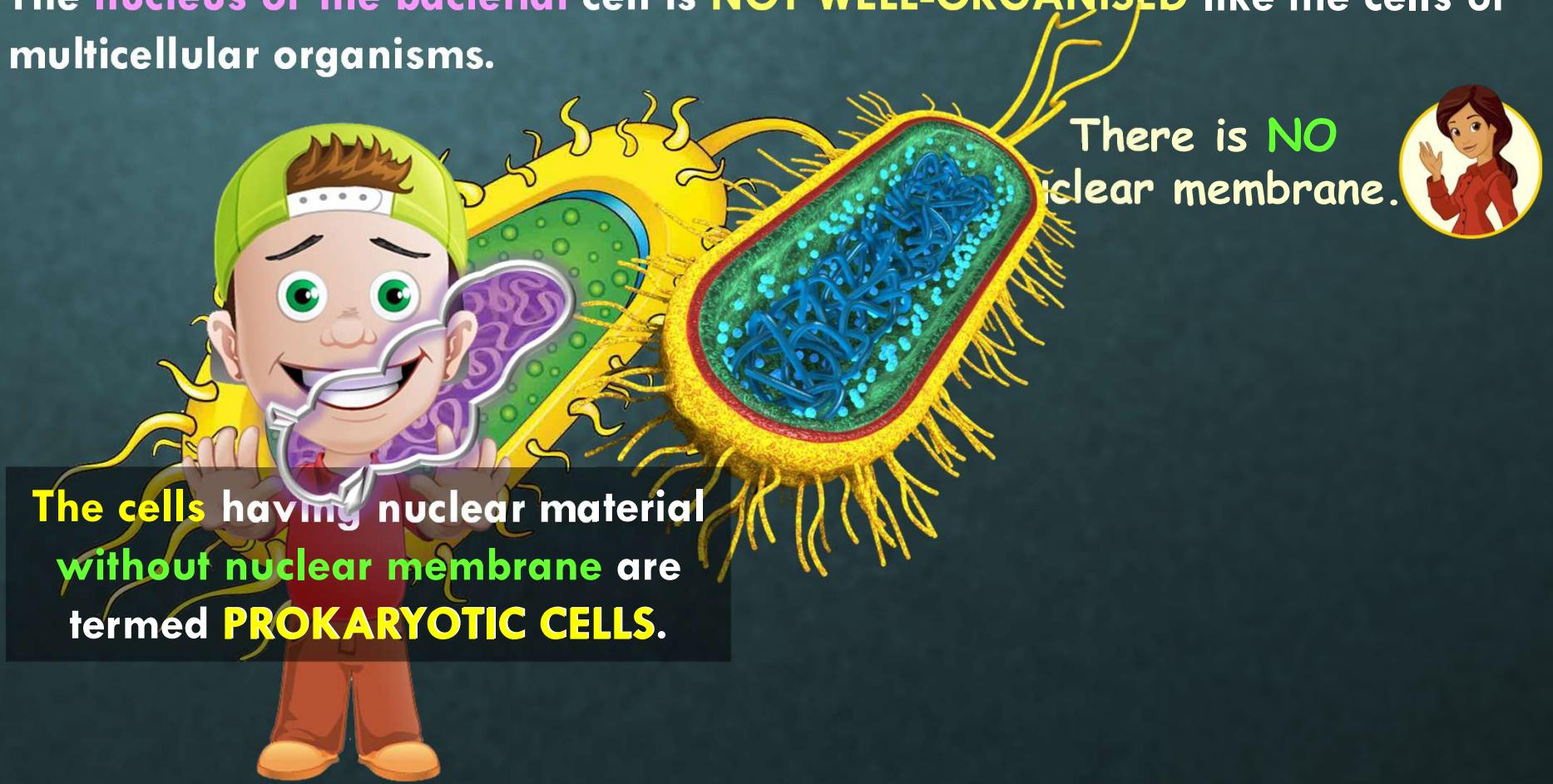


Protoplasm is called the living substance of the cell.



NUCLEUS

The **nucleus** of the bacterial cell is **NOT WELL-ORGANISED** like the cells of multicellular organisms.

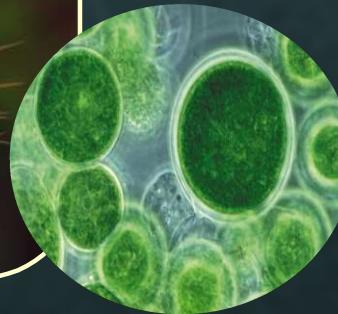
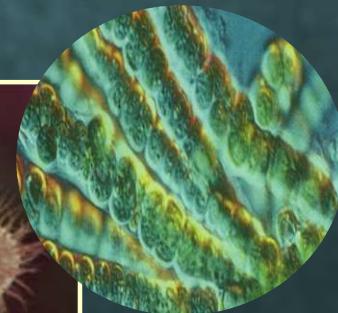


There is **NO**
nuclear membrane.

The **cells having nuclear material without nuclear membrane** are termed **PROKARYOTIC CELLS**.

NUCLEUS

The organisms with these kinds of cells are called PROKARYOTES

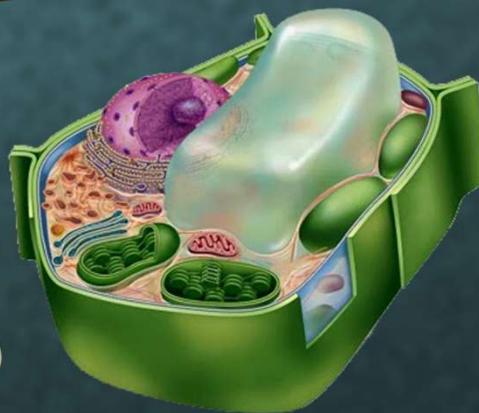
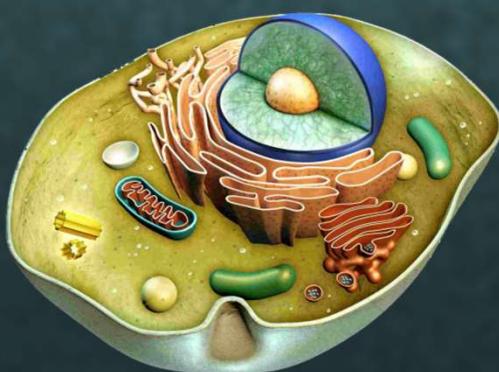


Examples are BACTERIA and BLUE GREEN ALGAE.



NUCLEUS

cells having well-organised nucleus with a nuclear membrane are designated as EUKARYOTIC CELLS.



All organisms other than bacteria and blue green algae are called EUKARYOTES.





CELL - STRUCTURE AND FUNCTIONS

- Vacuole
- Plastids
- Mitochondria

VACUOLE

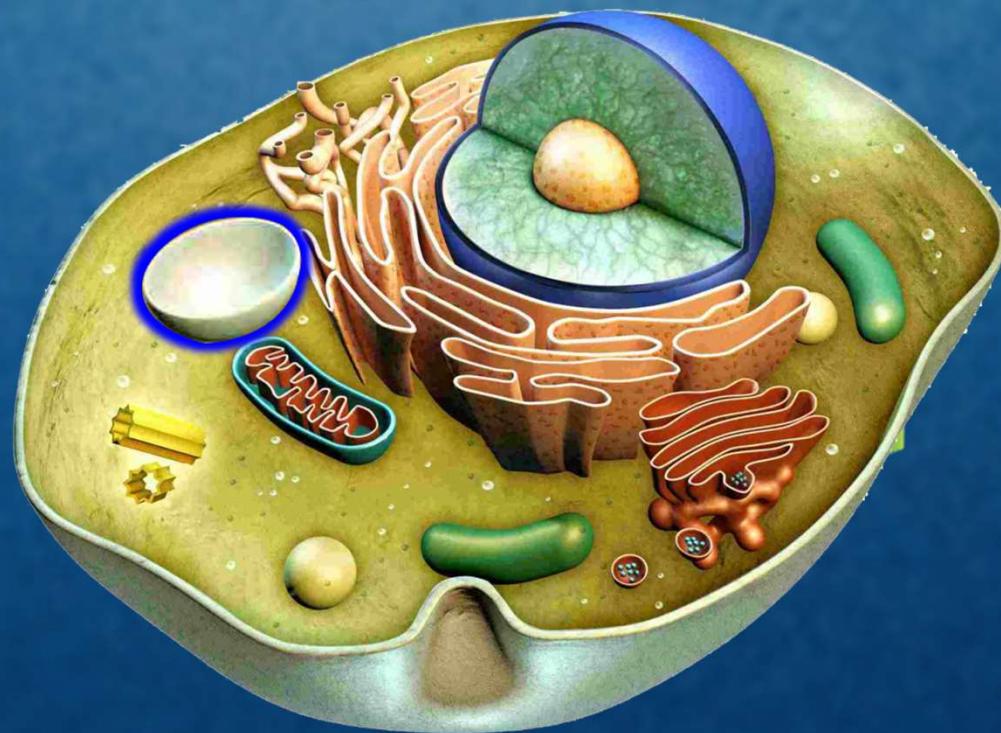
While observing the **ONION CELLS** under the microscope,
we notice **BLANK-LOOKING STRUCTURES** in the cytoplasm.



VACUOLE

LARGE VACUOLES are common in PLANT CELLS.

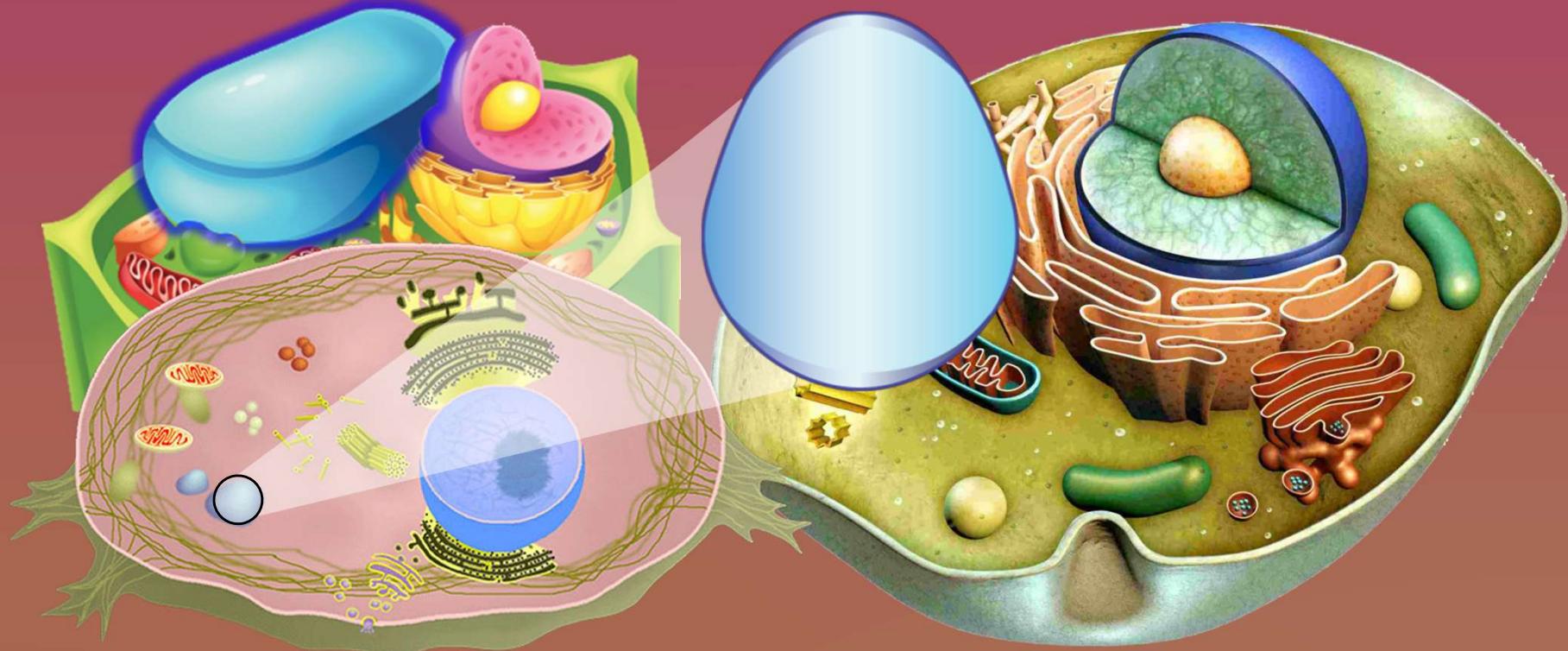
Vacuoles in ANIMAL CELLS are MUCH SMALLER.



VACUOLE

It appears as an **EMPTY SPACE** in the cytoplasm.

It is **GENERALLY LARGE** in plant cells and **SMALLER IN SIZE** in animal cells.



VACUOLE

It stores excess of WATER and WASTE PRODUCTS.

In AMOEBA, food materials held in FOOD VACUOLES for digestion.



PLASTIDS

There are several **SMALL COLOURED BODIES** in the cytoplasm of the **PLANT CELLS**. For example : Cells of **TRADESCANTIA LEAF**.



PLASTIDS



They are **SCATTERED IN THE CYTOPLASM** of the **LEAF CELLS**.

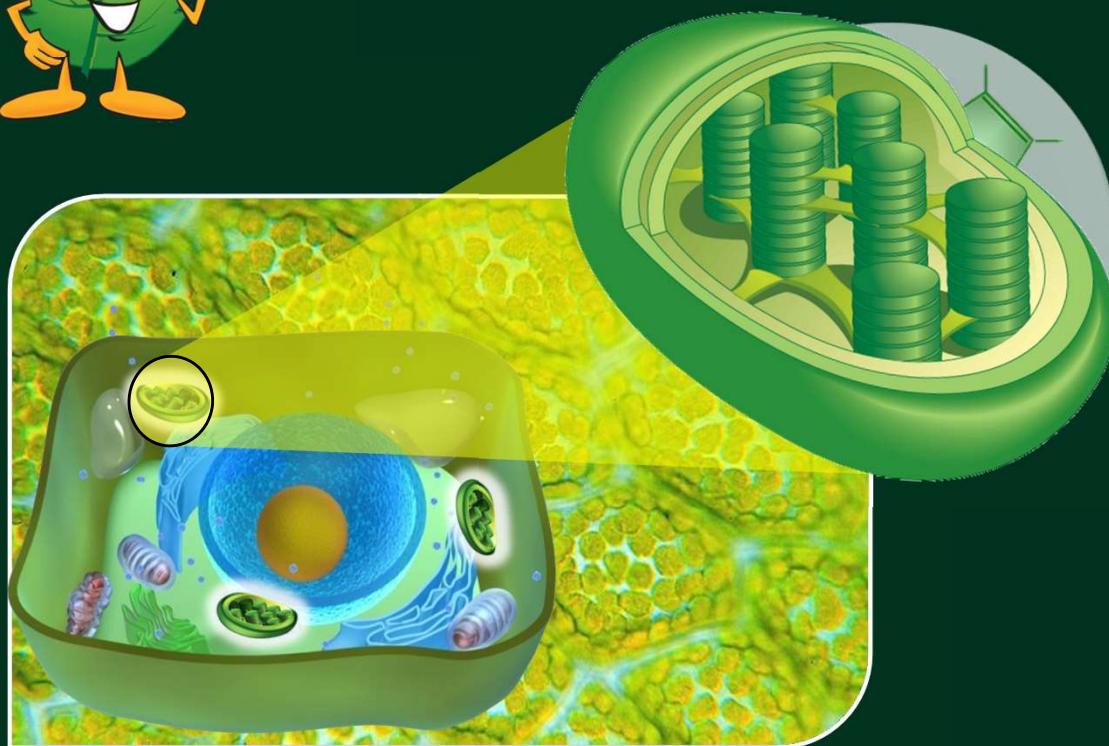
These are called
PLASTIDS.



PLASTIDS



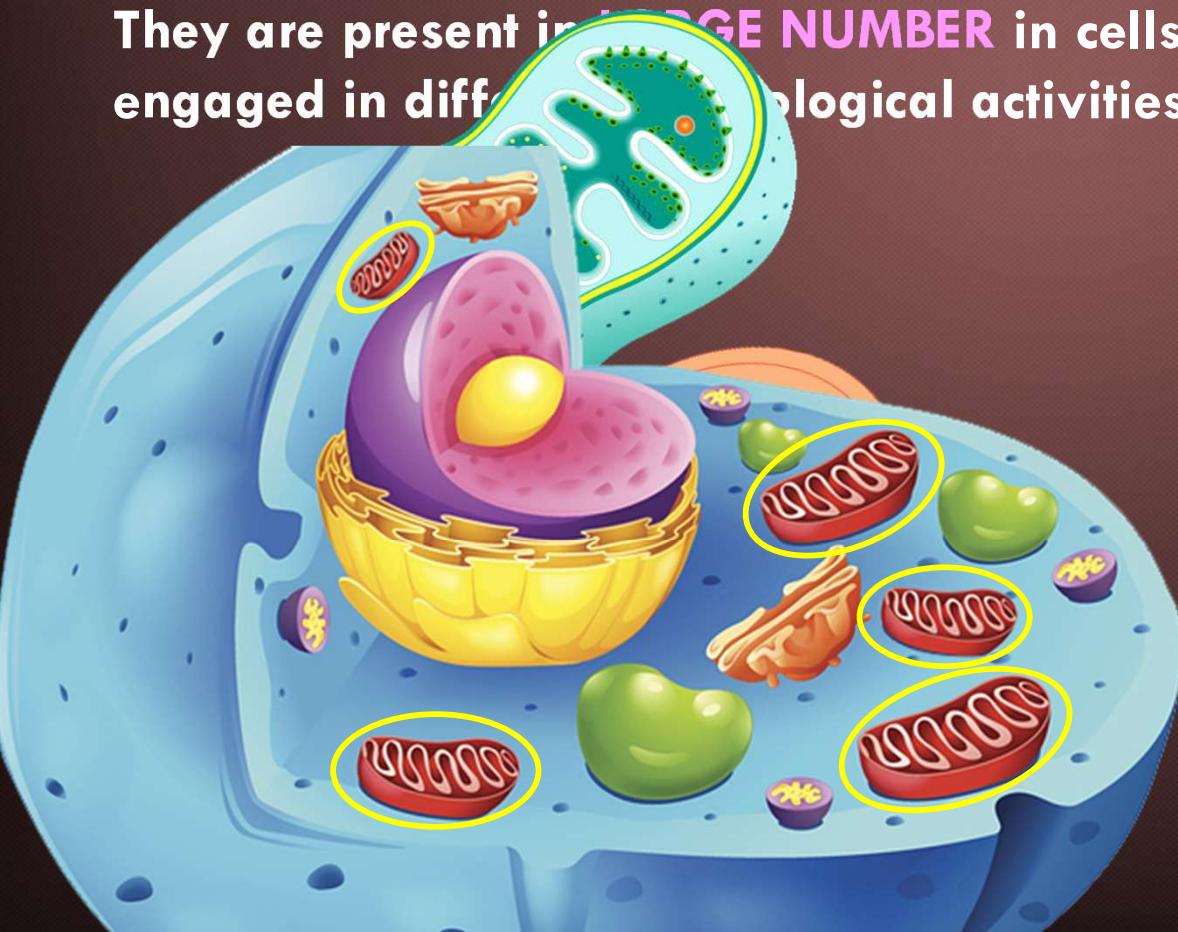
They are of different colors, chloroplasts have green chlorophyll.



MITOCHONDRIA

These are **ROD-SHAPED** or **SPHERICAL** structures.

They are present in **large number** in cells engaged in different biological activities.



MITOCHONDRIA

They responsible for **CELLULAR RESPIRATION** and
GENERATING ENERGY for different activities of cell.

Hence, they are also called the **POWER HOUSE** of the cell.





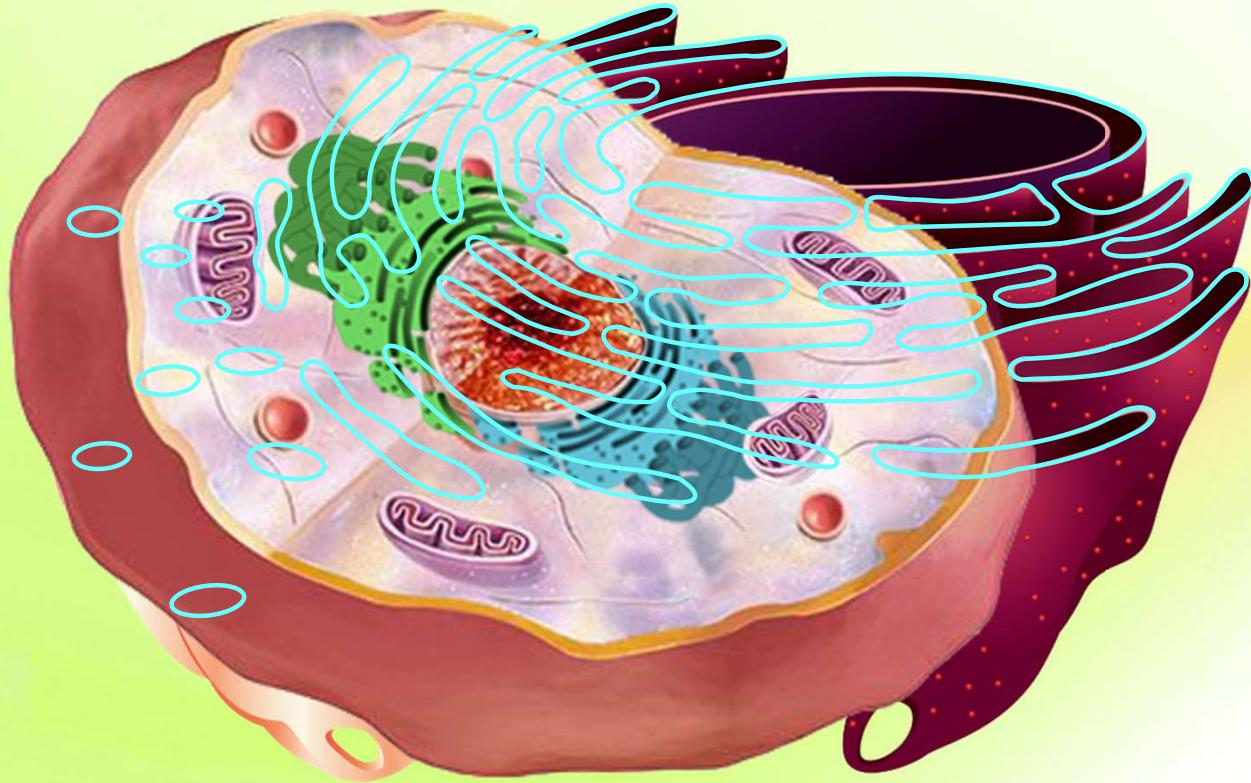
CELL - STRUCTURE AND FUNCTIONS

- Endoplasmic Reticulum (Er)
- Ribosomes
- Golgi Complex
- Comparison Of Plant Cell And Animal Cell

ENDOPLASMIC RETICULUM (ER)

It is a network of MEMBRANES.

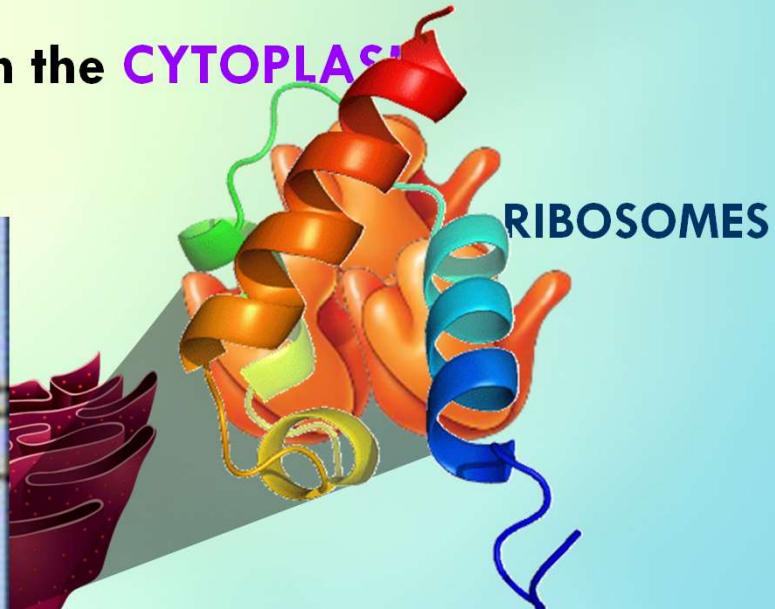
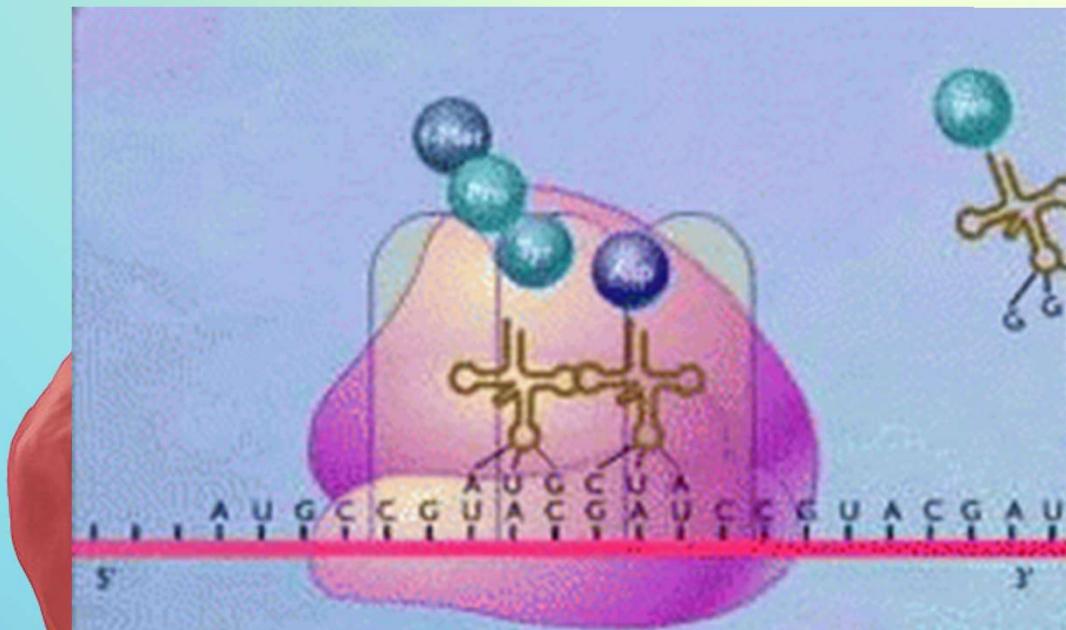
It provides a SKELETAL FRAMEWORK to the cell.



RIBOSOMES

These are the **TINY GRANULES** present in the **CYTOPLASM**.

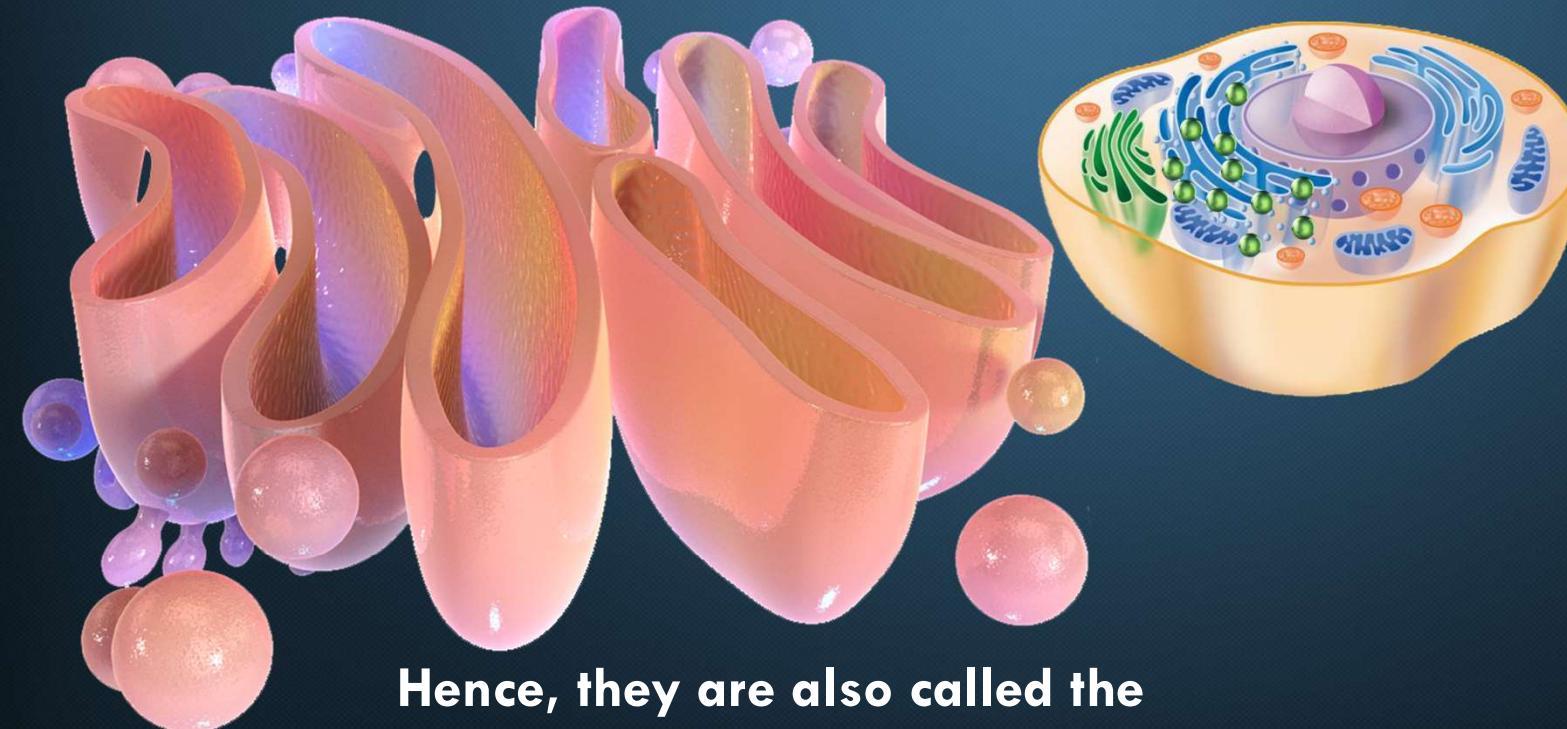
They help in **PROTEIN SYNTHESIS**.



GOLGI COMPLEX

They are **SAC-LIKE STRUCTURES** stacked one above the other.

They **STORE THE MATERIALS** which are produced by the cell.



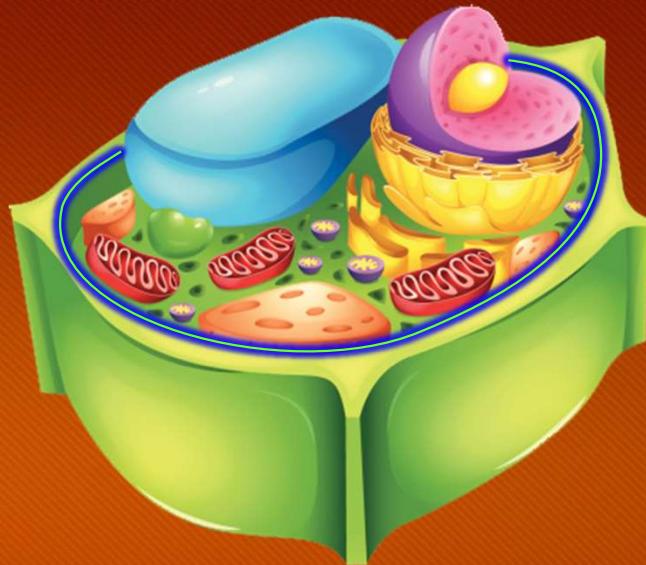
Hence, they are also called the
STORE HOUSE of the cell.

COMPARISON OF PLANT CELL AND ANIMAL CELL

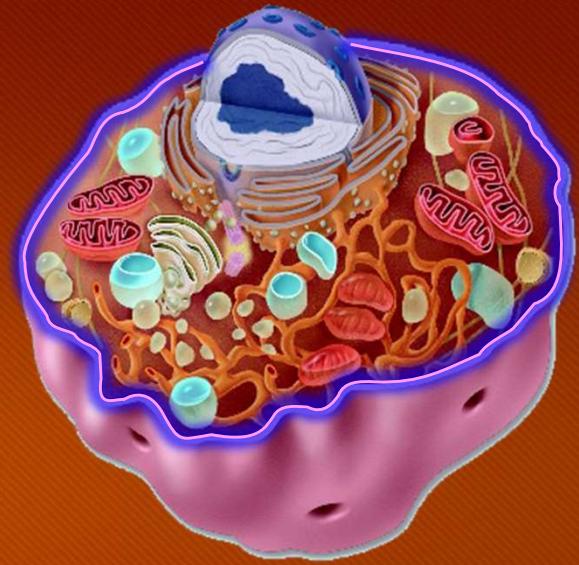
PART

Cell Membrane

PLANT CELL



ANIMAL CELL



Present

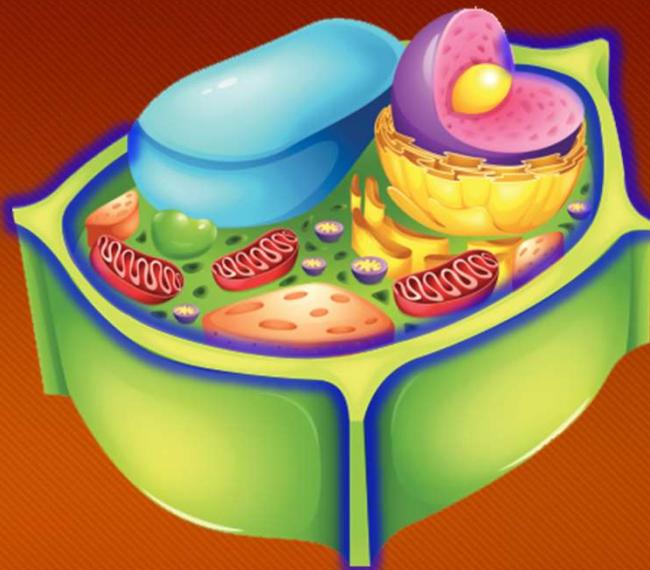
Present

COMPARISON OF PLANT CELL AND ANIMAL CELL

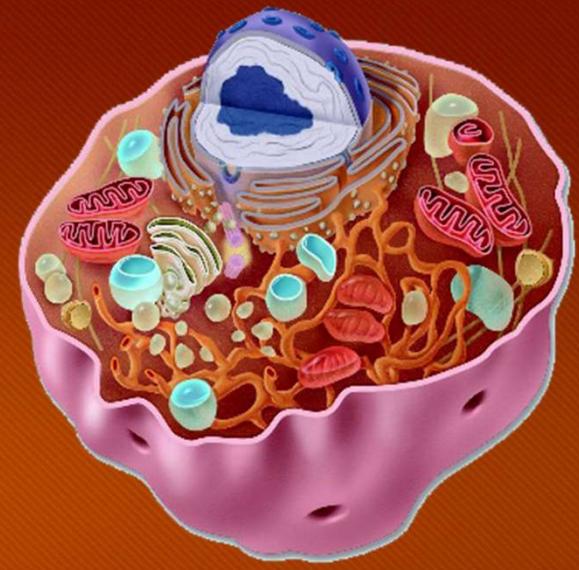
PART

Cell wall

PLANT CELL



ANIMAL CELL



Present

Absent

COMPARISON OF PLANT CELL AND ANIMAL CELL

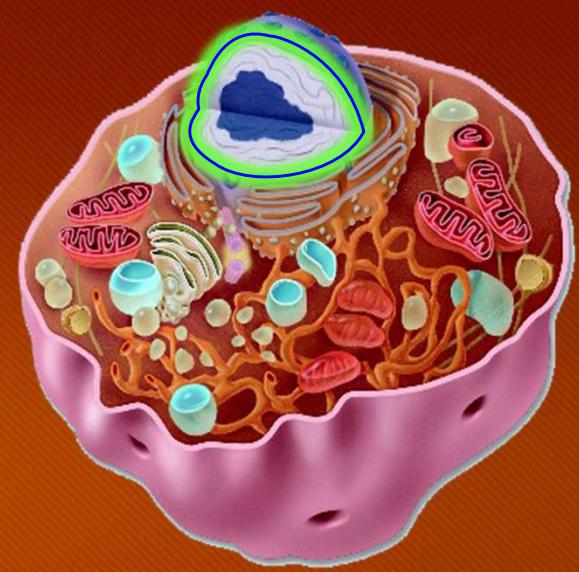
PART

Nucleus

PLANT CELL



ANIMAL CELL



Present

Present

COMPARISON OF PLANT CELL AND ANIMAL CELL

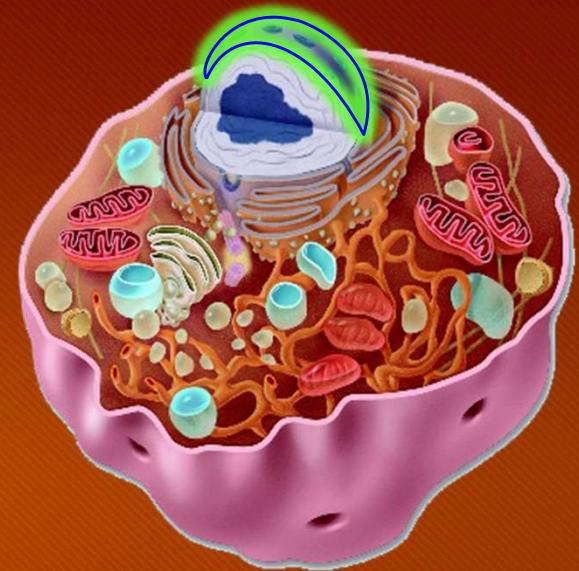
PART

Nuclear membrane

PLANT CELL



ANIMAL CELL



Present

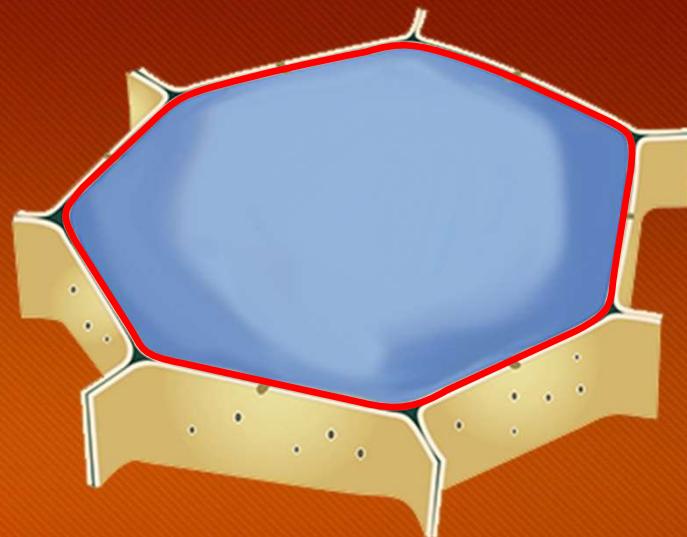
Present

COMPARISON OF PLANT CELL AND ANIMAL CELL

PART

Cytoplasm

PLANT CELL



ANIMAL CELL



Present

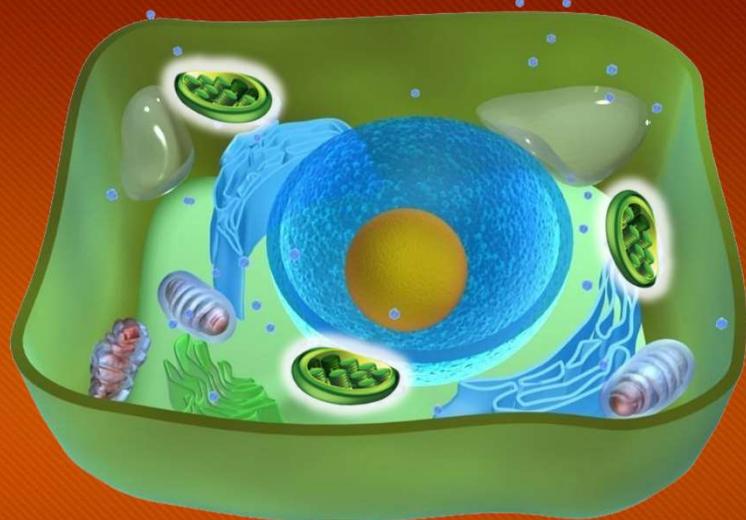
Present

COMPARISON OF PLANT CELL AND ANIMAL CELL

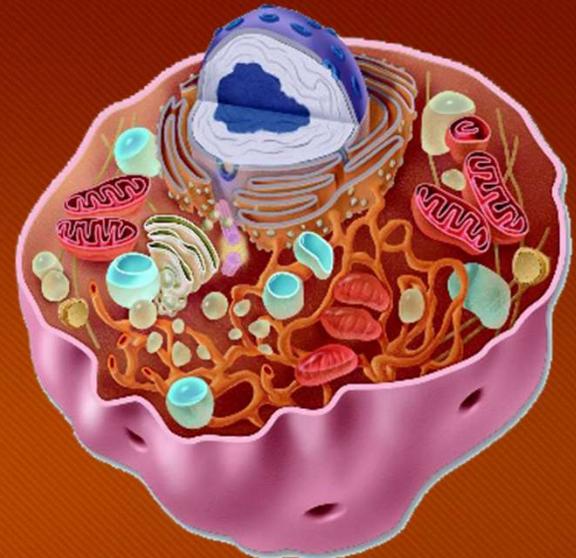
PART

Plastids

PLANT CELL



ANIMAL CELL



Present

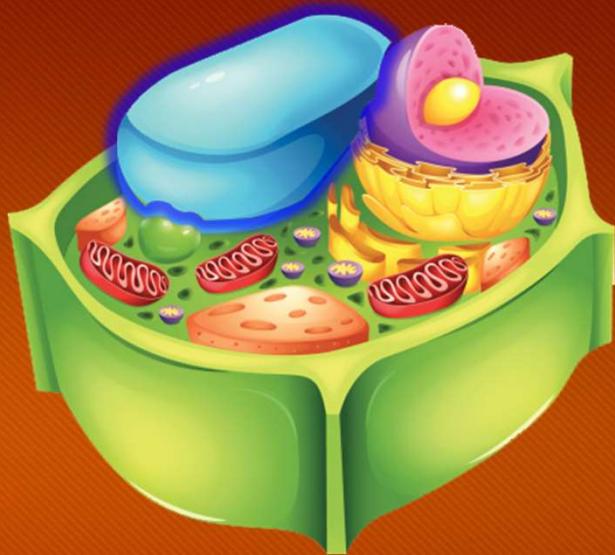
Absent

COMPARISON OF PLANT CELL AND ANIMAL CELL

PART

Vacuole

PLANT CELL



ANIMAL CELL



Present

Present

Thank You