History of the Science Development Basic Cytology

Histology is the study of the tissues of the body and of how these tissues are arranged to constitute organs. Each of the fundamental tissues is formed by several types of cells and typically by specific associations of cells and extracalllar matrix. Histology is classed as subdiscpline of anatomy, because its methods involve dividing tissues and organs into pieces and preparing them for microscopic examination and chemical analyses.

Two aspects of the subject are distinguished;

special histology deals with the arrangement and special adaptation of tissues in the various organs whereas.

general histology deals with the components of the individual .

Cytology is the science about a cell .

The cell is the basic structural and functional unit of all multicellular organisms, limited to an active cell membrane, cytoplasm and nucleus.

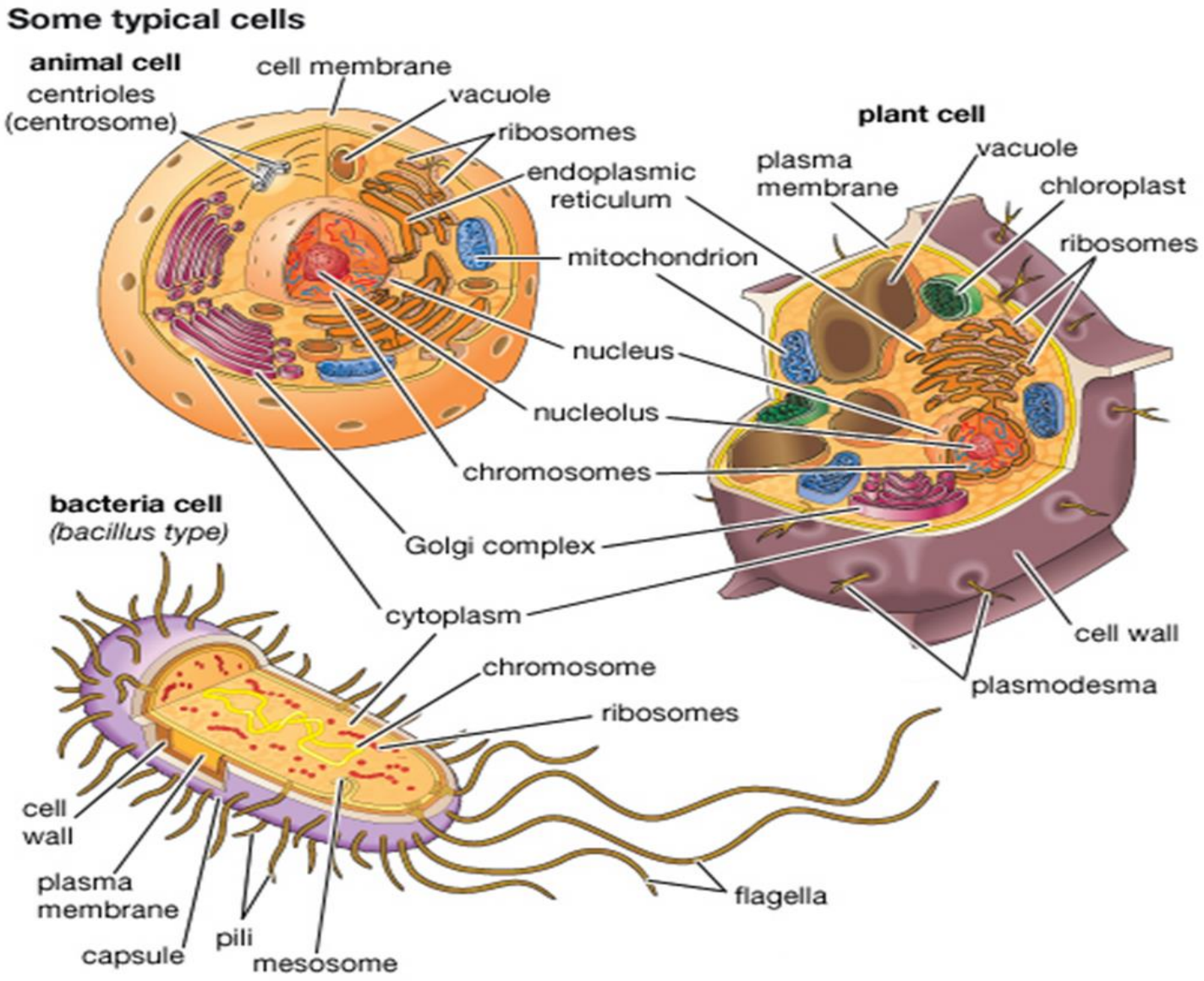
Types of cells

Cells based on the presence or absence of a nucleus can be divided into 2 types, Prokaryotic and the Eukaryotic cells.

There are 2 basic cell types:

Prokaryotic cells; lack nucleus (e.g. bacteria), unicellular and primitive.

- **Eukaryotic cells**; have a nucleus (e.g. animal, plant and fungal cells), may be unicellular (e.g. algae) or multicellular (e.g. animals and plants) and are more advanced than the prokaryotic cells


Some typical cells
animal cell
centrioles
(centrosome)
cell membrane
vacuole
ribosomes
endoplasmic
reticulum
mitochondrion
nucleus
nucleolus
chromosomes
Golgi complex
cytoplasm
plant cell
plasma
membrane
vacuole
chloroplast
ribosomes
cell wall
plasmodesma
bacteria cell
(bacillus type)
chromosome
ribosomes
cell
wall
plasma
membrane
capsule
pili
mesosome
flagella

Eukaryotic vs. Prokaryotic Cells

Characteristics	Eukaryotic Cells	Prokaryotic Cells
Definition	Any cell that contains a clearly defined nucleus and membrane bound organelles	Any unicellular organism that does not contain a membrane bound nucleus or organelles
Examples	Animal, plant, fungi, and protist cells	Bacteria and Archaea
Nucleus	Present (membrane bound)	Absent (nucleoid region)
Cell Size	Large (10-100 micrometers)	Small (less than a micrometer to 5 micrometers)
DNA Replication	Highly regulated with selective origins and sequences	Replicates entire genome at once
Organism Type	Usually multicellular	Unicellular
Chromosomes	More than one	One long single loop of DNA and plasmids
Ribosomes	Large	Small
Growth Rate/Generation Time	Slower	Faster
Organelles	Present	Absent
Ability to Store Hereditary Information	All eukaryotes have this ability	All prokaryotes have this ability
Cell Wall	Simple: Present in plants and fungi	Complex: Present in all prokaryotes
Plasma Membrane	Present	Present
Cytoplasm	Present	Present

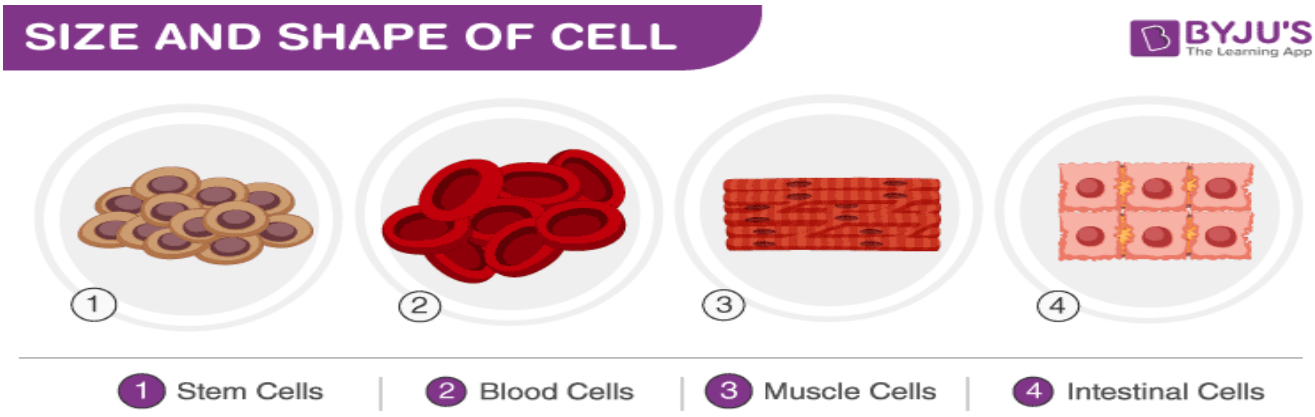
Number of Cells

Cells are the lowest level of organization in every life form. From organism to organism, the count of the cell may vary. Humans have more cells than bacteria. If an organism is made up of a single cell, it is called a unicellular organism(*uni*: one; *cellular:* cell). Whereas, the organisms which are made up of more than one cell are called multicellular organisms (*multi:* many; *cellular:* cell). Among multicellular organisms, the count of the cell varies. Some might have billions of cells while others have trillions (like the human). But every organism starts its life from a single cell which further divides into thousands and millions.

As the size of the organism increases so does the number of cells that they have. However, this count will not determine the efficiency of an organism i.e., the function and efficiency of a cell in a unicellular organism and multicellular organism will be the same.

Sizes and Shapes

Living organisms are made up of different types of cells, of different shapes and sizes. A unicellular organism differs in shape from another unicellular organism. Within a multicellular organism, there are a variety of cells. Some are long while others are short; some are circular while some are oval. Shape and size vary from cell to cell according to their functions and composition. For example, a nerve cell is long and branched, meant for the transmission of signals throughout our body while a muscle cell is small and spindle-shaped which helps in movement.



Considering an animal cell, we can generalize the shape of a cell as round (spherical) or irregular. Plant cells are much more rigid and rectangular in shape. The size of a cell can be as small as 0.0001 mm (*mycoplasma*) and as large as six to twelve inches (*Caulerpa taxifolia*). Generally, the unicellular organisms are microscopic, like bacteria. But a single cell like an egg is large enough to touch. Whether regular or irregular in shape, they all consist of the same organelles and help us to perform the daily activities efficiently.

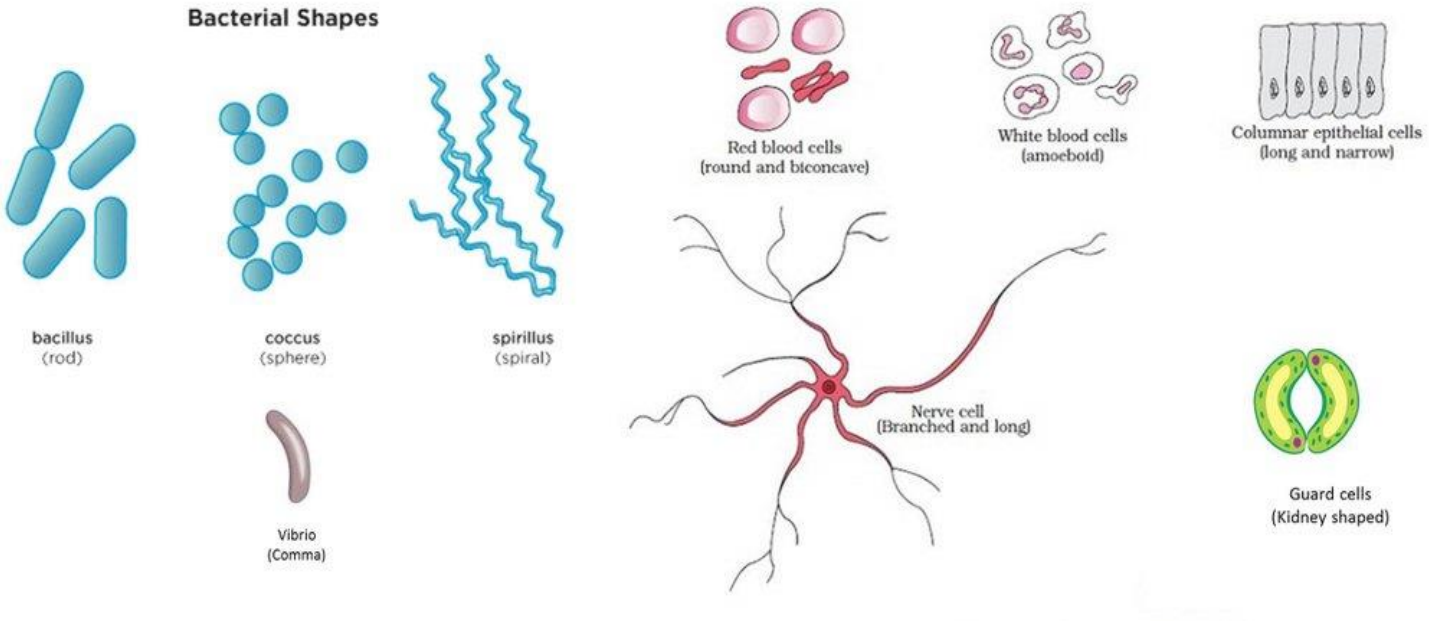
Shape of the cell

Different cells have different shapes. The cell wall in bacteria, algae, fungi and plant cells give shape to the cell. .

In animal cells which lack cell wall, the cell membrane provides the boundary.

- The cells of the bacteria (Prokaryotes) have different shapes and they are classified based on the shape as ; Bacilli (rod shaped), Cocci (spherical shaped) Vibrio (comma shaped), Spirilla (spiral/helical shaped).
- In Eukaryotes (plant, animal, fungal cells), the shape of the cell depends on its function;
- Humans have cells of various shapes; circular and biconcave (RBC), amoeboid (WBC), long and stretched and branched cells (nerve cells), long and narrow cells (columnar epithelium) etc.
- Plant cells usually have square or rectangle shape. Even in plants some specialized cells have different shapes e.g. Guard cells of stomata (kidney/Dumbell shaped)

- Fungal cells have a variety of shapes. Single cellular fungi are usually spherical and some fungi are tubular and some form long chains of cells.



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