

Biology: is a natural science concerned with the study of life and living things (which called organisms), including their structure, function, growth, evolution, distribution, and taxonomy.

Zoology: is the scientific study that deals with animals and animal life, including the study of structure, physiology, development, classification and behavior of animals.

Morphology: Study the outer shape of the animals.

Anatomy: Study of the structure of entire organisms and their parts.

Cytology: Study of structure and functions of cells.

Ecology: Study of interaction of organisms with their environment.

Histology: Study of tissues.

Embryology: Study of the development of an animal from the fertilized egg to birth

Physiology: Study of the function of organisms and their parts.

Genetics: Study of the mechanisms of transmission of traits from parent to offspring.

Molecular Biology: Study the subcellular details of structure and function.

Parasitology: Study of animals that live in or on other organisms at the expense of host.

Cell: (from Latin *cella*, meaning "**small room**") is the basic structural, functional and biological unit of all known living organisms.

Cell biology or **Cytology:** is the science which study of cell, which includes the study of cell structure and cell function.

Zacharias Jansen: is a Dutch lens maker, which made the first compound microscope with magnification power (**9X**) times.

Robert Hooke: the first scientist described a plant cell by his microscope when he observed a honeycomb-like shape of a slice of a cork and he was he first who called these chambers as a cell

Anton van Leeuwenhoek: a Dutchman who made a simple microscope with magnification reach to (**250X**). He was the first to examine a drop of pond water under the microscope and observe bacteria and protozoa.

Robert Brown: was the first described the nucleus in plant cell.

Hugo Von Mohl: was the first described cell division in plant.

Matthias Schleiden: concluded that, every structural part of plant was made of cells and that the plant embryo arose from a single cell.

Theodor Schwann: stated that animals are also made up of cells.

Rudolf Virchow: added the third tenet of the cell theory.

Microvilli: are long and thin projections located on the surface of intestinal cells which increase surface area without an increase in cell's volume.

Cytosol (or **soluble fraction**) is a gel-like material in the cytoplasm that is 80% percent water and usually clear in color, also contains the soluble proteins and enzymes.

Ectoplasm: is outer, thin, clear non-granulate layer of cytosol in eukaryotic cell.

Endoplasm: is inner mass granulated layer of cytosol in eukaryotic cell.

Nuclear envelope: is a double membrane of lipid bilayer enclosed the nucleus and separating its contents from the cytoplasm. The envelope is perforated by pore structures.

Pore complex: A complicated protein structure, which lines the nuclear pore and plays an important role in the cell by regulating the entry and exit of most proteins and RNAs, as well as large complexes of macromolecules.

Nuclear lamina: a net-like array of protein filaments which lined the nuclear side of the nuclear envelope and maintains the shape of the nucleus by mechanically supporting the nuclear envelope.

Nuclear matrix: a framework of fibers extending throughout the nuclear interior.

Nucleolus: a mass of densely stained granules and fibers adjoining part of the chromatin inside cell nucleus. In the nucleolus, **ribosomal RNA** (rRNA) is assembled with protein imported from the cytoplasm into large and small ribosomal subunits.

Cisternae: a network of membranous tubules and sacs in endoplasmic reticulum.

Cisternal space: a space which separates the internal compartment of the endoplasmic reticulum from the cytosol.

Glycoproteins: carbohydrates that have covalently bonded to proteins.

Transitional ER: a specialised region in endoplasmic reticulum which the secretory proteins depart from the ER wrapped in the membranes of vesicles that bud like bubbles toward Golgi apparatus.

Transport vesicle: It is a bubble shaped membrane which bud off from transitional ER or trans face (in Golgi apparatus). It transports **secretory protein** (produced by endoplasmic reticulum) or **secretory lipid** (produced by Golgi apparatus) to other parts of the cell.

Sacculles: are Flattened membranous sacs like a stack of pita bread, which separates the internal space of Golgi apparatus from the cytosol.

Cis face: (Cisterna face) is one of the Golgi apparatus pole, which located near ER and it works as **receiving** department of **transport vesicle** produced by ER.

Trans face: (Transport face) is one of the Golgi apparatus pole and works as **shipping** department. The *trans* face gives rise to transport vesicles, which pinch off and transit material produced by Golgi apparatus towards other part of the cell or to outside of the cell.

Autodigestion: an excessive leakage from large number of lysosomes which can destroy a cell.

Phagocytosis: Eats by engulfing smaller organisms or other food particles and producing food vacuole by protists and macrophage.

Macrophages: a type of white blood cell that helps defend the body by engulfing and destroying bacteria and other invaders by phagocytosis.

Autophagy: recycle the cell's own organic material or damaged organelle by hydrolytic enzymes of Lysosomes.

Tay-Sachs disease: is missing or inactive of lipid-digesting enzyme in lysosome and caused the brain becomes impaired by an accumulation of undigested lipids in the cells.

Contractile vacuole: is a vacuole that pump excess water out of the cell, thereby maintaining a suitable concentration of ions and molecules inside the cell of many freshwater protists.

Central vacuole: In a mature plant cell, a large membranous sac with diverse roles in growth, storage, colouring and protect the plant against predators.

Cell sap: the solution inside the central vacuole which differs in composition from the cytosol.

Cellular respiration: the metabolic process done by mitochondria that generates **ATP** by extracting energy from sugars, fats, and other fuels with the help of oxygen.

Crista: An infolding of the inner membrane of a mitochondrion that increase the surface area.

Mitochondrial matrix: The compartment of the mitochondrion enclosed by the inner membrane and containing many different enzymes, as well as mitochondrial DNA and ribosomes.