

Animal Cells versus Plant Cells

According to scientific research, it is clear that eukaryotic cells have a more complex structure than do prokaryotic cells. Organelles allow for various functions to occur in the cell at the same time. Despite their fundamental similarities, there are some striking differences between animal and plant cells (see Figure 1).

Animal cells have centrosomes (or a pair of centrioles), and lysosomes, whereas plant cells do not. Plant cells have a cell wall, chloroplasts, plasmodesmata, and plastids used for storage, and a large central vacuole, whereas animal cells do not.

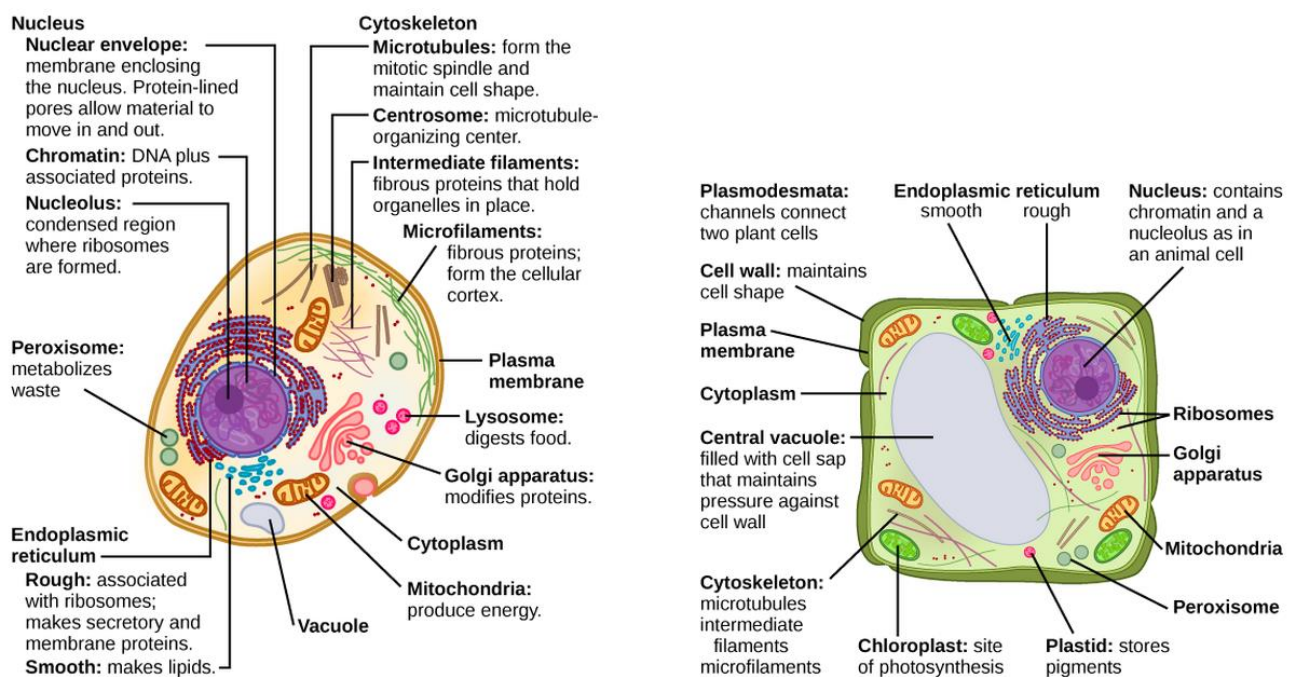


Figure 1. (a) A typical animal cell and (b) a typical plant cell.

I. Plant Cells (Des cellules végétales)

a. The Cell Wall (La paroi cellulaire)

Cell wall: is a rigid covering that protects the cell, provides structural support, and gives shape to the cell. Fungal cells and some protist cells also have cell walls.

While the chief component of prokaryotic cell walls is peptidoglycan, the major organic molecule in the plant cell wall is cellulose (Figure 2), a polysaccharide made up of long, straight chains of glucose units. When nutritional information refers to dietary fiber, it is referring to the cellulose content of food.

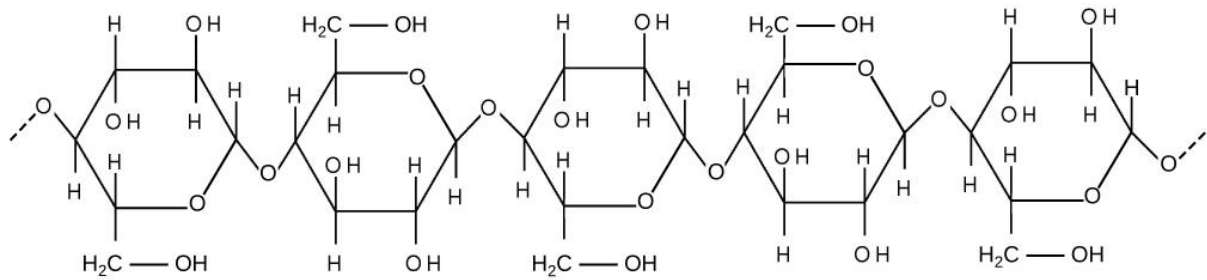


Figure 2. Cellulose is a long chain of β -glucose molecules connected by a 1–4 linkage. The dashed lines at each end of the figure indicate a series of many more glucose units.

Chloroplasts : (*Chloroplastes*) ((in green plant cells) a plastid that contains chlorophyll and in which photosynthesis takes place. (dans les cellules végétales vertes, une plaste contenant de la chlorophylle et dans lequel se produit la photosynthèse))

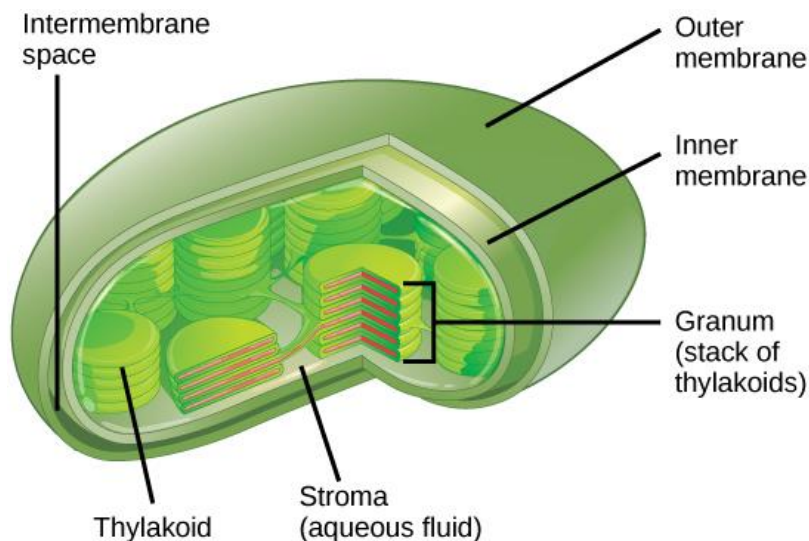


Figure 3. Chloroplast with membrane, inner membrane, thylakoids, grana, and stroma.

Like mitochondria, chloroplasts also have their own DNA and ribosomes. Chloroplasts function in photosynthesis and can be found in photoautotrophic eukaryotic cells such as plants and algae. In photosynthesis, carbon dioxide, water, and light energy are used to make glucose and oxygen. This is the major difference between plants and animals: Plants (autotrophs) are able to make their own food, like glucose, whereas animals (heterotrophs) must rely on other organisms for their organic compounds or food source.

Like mitochondria, chloroplasts have outer and inner membranes, but within the space enclosed by a chloroplast's inner membrane is a set of interconnected and stacked, fluid-filled membrane sacs called thylakoids (Figure 3). Each stack of thylakoids is called a granum (plural = *grana*). The fluid enclosed by the inner membrane and surrounding the grana is called the stroma.

The chloroplasts contain a green pigment called chlorophyll, which captures the energy of sunlight for photosynthesis. Like plant cells, photosynthetic protists also have chloroplasts. Some bacteria also perform photosynthesis, but they do not have chloroplasts. Their photosynthetic pigments are located in the thylakoid membrane within the cell itself.

The Central Vacuole (La Vacuole **central**)

The central vacuole plays a key role in regulating the cell's concentration of water in changing environmental conditions.

Animal cell (Cellule animal)

An animal cell is a type of cell that dominates most of the tissue cells in animals. Animal cells are different from plant cells because they don't have cell walls and chloroplasts, which are relevant to plant cells. Without the cell wall, animal cells can be in any sort of shape or size as they are instead surrounded by a plasma membrane.

One thing why animal cells are exclusive because they have centrioles and plant cells do not have centrioles. Centrioles are important for DNA segregation when the cell undergoes the process of mitosis, a process of dividing a cell. Centrioles are important in the structure of the spindles, which helps to pull the chromosomes apart.

Both animal and plant cells have vacuoles, however, in animal cells, vacuoles are very tiny or absent while the vacuole in plant cells are quite large. There are different kinds of animal cells such as- muscle cells, nerve cells, and many more. animal cells.

Cell Membrane (Membrane cellulaire): The cell membrane is a fluid mosaic structure which is composed of a phospholipid bilayer and other important macromolecules such as proteins. The cell membrane separates the cell from the environment and allows the movement of materials in and out of the cell.

Cytoplasm (Cytoplasme): the liquid within the cell where the different organelles are found. It is here where many functions occur. Including cell division and glycolysis.

Golgi apparatus (Appareil de Golgi): the organelle in which proteins are modified, sorted, and sent to various parts of the cell. Modifications on the protein include but are not limited to, glycosylation

Mitochondria (Mitochondries): does the cellular respiration of the cell by converting glucose into ATP (cellular energy).

Ribosome (Ribosome): The mRNA from the nucleus are used by Ribosomes in a process called translation. Translation is when the Ribosome joins amino acids together according to the sequence of the mRNA. The more ribosomes in a cell, the proteins it synthesizes. They are located in two areas, on the ER or in the cytosol.

Rough Endoplasmic Reticulum (Réticulum endoplasmique rugueux) :: is used to store and transport material through the cell. Proteins are produced here in the ribosomes bound to the rough ER.

Smooth Endoplasmic Reticulum (Réticulum endoplasmique lisse) : Functions in the synthesis of lipids, detoxification of drugs and poisons, storage of calcium ions, and metabolism of carbohydrates. In contrast to the Rough Endoplasmic Reticulum, the smooth ER is not studded with proteins.

Peroxisome (Peroxisome): A specialized metabolic compartment bounded by a single membrane. Additionally, it possesses enzymes that transfer hydrogen atoms from substrates to oxygen, producing hydrogen peroxide as a by-product. Then, hydrogen peroxide is converted to water by another enzyme.

Nucleus (Noyau) : The nucleus is usually the largest organelle in a cell. It consists of different parts such as the nuclear envelope, chromosomes, and the nucleolus. The nuclear envelope surrounds the nucleus while segregating the chromatin from the cytoplasm and consists of two membranes each made of a lipid bilayer. The membranes have pores that regulate what goes in and out of the nucleus. Inside the nucleus is the nucleolus which holds the genetic material DNA. Using this DNA, transcription is carried out making mRNA.

Vacuole (Vacuole): the "storage space" that stores water, salt, and other important substances. There are also food vacuoles that are cellular organelles in which food is broken down by hydrolytic enzymes. These food vacuoles are the simplest digestive compartments. The process of intracellular digestion occurs inside vacuoles, which is the process of hydrolysis of food. This process begins after a cell engulfs food materials through phagocytosis (solid food) or pinocytosis (liquid food).

Lysosome (Lysosome): considered the "digestion compartment" of the cell. Lysosomes break down cellular wastes such as fats, proteins, or carbohydrates. The rid of the cellular materials that are no longer useful in the cell.

Cytoskeleton (Cytosquelette): is a structure made out of protein to give the cell its shape and structure. It also helps cellular motion with the use of flagella, cilia, or lamellipodia.

Centrioles(Centrioles) : are used through cell division. They organize the mitotic spindle during the end of cytokinesis. The centrioles are located within the centrosome and come in pairs. Each pair of centrioles are compiled of nine sets of triplet microtubules assembled into a ring. Prior to animal cell division, the centrioles replicate. Although centrosomes with centrioles may assist the organization of microtubule construction in animal cells, they are not crucial for this particular function in all eukaryotes; e.g. the fungi and the majority of plant cells lack centrosomes with centrioles, but still contain well-assembled microtubules.

Terminology:

Eukaryotic cells: Des cellules eucaryotes:

Prokaryotic cells: Des cellules procaryotes

Animal cells: Cellules animales:
 Plant cells: Des cellules végétales
 Peptidoglycan:
 Photoautotrophic eukaryotic cells:
 Photosynthesis: Peptidoglycane:
 Autotrophs: Autotrophes:
 Heterotrophs: Hétérotrophes:
 Chlorophyll: Chlorophylle:
 Thylakoids: Thylakoïdes:
 Inner membrane: Membrane intérieure:
 Grana: grana
 Stroma: stroma
Glycosylation : glycosylation

What is microbiology (microbiologie) ?

Microbiology is the study of microorganisms– biological entities too small to be seen with the unaided eye. Most major advances in microbiology have occurred within the past 150 years, and several important sub disciplines of microbiology have developed during this time, including microbial ecology, molecular biology, immunology, industrial microbiology and biotechnology. Microorganisms of various types exist in all three domains of life (the *Bacteria*, *Archaea* and *Eukarya*), and they are by far the most abundant life forms on Earth. Microscopic biological agents include bacteria, archaea, protists (protozoa and algae), fungi, parasitic worms (helminths) and viruses. Although a small percentage of microorganisms are harmful to certain plants and animals and may cause serious disease in humans, the vast majority of microorganisms provide beneficial services, such as assisting in water purification and the production of certain foods, and many are essential for the proper functioning of Earth’s ecosystems.

Table 1 Selected major subdisciplines of microbiology (Les Sous-disciplines majeures sélectionnées de la microbiologie)

Subdiscipline (Sous-discipline)	Focus(concentrer)
Agricultural/soil microbiology (Microbiologie du sol / agricole)	Microbial diversity and processes in soils(Diversité microbienne et processus dans les sols)
Aquatic microbiology(Microbiologie aquatique))	Microbial processes in water and wastewaters (Processus microbiens dans l'eau et les eaux usés)

Biotechnology (Biotechnologie)	Production of high-value products by genetically engineered (Production de produits de grande valeur par génie génétique)
Genomics (Génomique)	Genome sequencing and analyses (Séquençage et analyses du genome)
Immunology (Immunologie)	The immune response (La réponse immunitaire)
Industrial microbiology (Microbiologie industrielle)	Large-scale production of antibiotics and commodity chemicals (Production à grande échelle d'antibiotiques et de produits chimiques de base)
Medical microbiology (Microbiologie médicale)	Nature and control of infectious diseases (Nature et contrôle des maladies infectieuses)
Microbial biochemistry (Biochimie microbienne)	Enzymes, chemical reactions in cells, structural biology (Enzymes, réactions chimiques dans les cellules, biologie structural)
Microbial ecology (Écologie microbienne)	Microbial diversity and activity in natural habitats, biogeochemistry (Diversité et activité microbiennes dans les habitats naturels, biogéochimie)
Microbial genetics (Génétique microbienne)	Genes, heredity and genetic variation (Gènes, hérédité et variation génétique)
Microbial physiology (Physiologie microbienne)	Nutrition, metabolism and bioenergetics (Nutrition, métabolisme et bioénergétique)
Microbial systematic (Systématique microbienne)	Classification and nomenclature (Classification et nomenclature)
Molecular biology (Biologie moléculaire)	Nucleic acids and proteins, genetic information processing (Acides nucléiques et protéines, traitement de l'information génétique)
Virology (Virologie)	Viruses and subviral particles period: Période des virus et particules subvirales:

Branches of microbiology Branches de microbiologie

The branches of microbiology can be classified into applied sciences, or divided according to taxonomy, as is the case with bacteriology, mycology, protozoology, and phycology. There is cellular microbiology. Les branches de la microbiologie peuvent être classées en sciences appliquées, ou divisées selon la taxonomie, comme c'est le cas avec la bactériologie, la mycologie, la protozoologie et la phycologie. Il y a la microbiologie cellulaire

Applications

While some fear microbes due to the association of some microbes with various human diseases, many microbes are also responsible for numerous beneficial processes such as industrial fermentation (e.g. the production of alcohol, vinegar and dairy products), antibiotic production and act as molecular vehicles to transfer DNA to complex organisms such as plants and animals. Scientists have also exploited their knowledge of microbes to produce biotechnologically important enzymes such as Taq polymerase, reporter genes for use in other genetic systems and novel molecular biology techniques such as the yeast two-hybrid system.

Bacteria can be used for the industrial production of amino acids. *Corynebacterium glutamicum* is one of the most important bacterial species with an annual production of more than two million tons of amino acids, mainly L-glutamate and L-lysine.^[33] Since some bacteria have the ability to synthesize antibiotics, they are used for medicinal purposes, such as *Streptomyces* to make aminoglycoside antibiotics.

Applications

Alors que certains craignent les microbes en raison de l'association de certains microbes avec diverses maladies humaines, de nombreux microbes sont également responsables de nombreux processus bénéfiques tels que la fermentation industrielle (par exemple la production d'alcool, de vinaigre et de produits laitiers), la production d'antibiotiques et agissent comme des véhicules moléculaires pour transférer de l'ADN à des organismes complexes tels que les plantes et les animaux. Les scientifiques ont également exploité leurs connaissances des microbes pour produire des enzymes importantes sur le plan biotechnologique telles que la Taq polymérase, des gènes rapporteurs à utiliser dans d'autres systèmes génétiques et de nouvelles techniques de biologie moléculaire telles que le système de levure à deux hybrides.

Les bactéries peuvent être utilisées pour la production industrielle d'acides aminés. *Corynebacterium glutamicum* est l'une des espèces bactériennes les plus importantes avec une production annuelle de plus de deux millions de tonnes d'acides aminés, principalement du L-glutamate et de la L-lysine. Étant donné que certaines bactéries ont la capacité de synthétiser des antibiotiques, elles sont utilisées à des fins médicales, comme les *Streptomyces*, pour fabriquer des antibiotiques aminoglycosides.

Professional organizations

- [American Society for Microbiology](#)
- [Federation of European Microbiological Societies](#)
- [Society for Applied Microbiology](#)
- [Society for General Microbiology](#)

Journals

- Critical Reviews in Microbiology
- International Journal of Systematic and Evolutionary Microbiology
- Journal of Bacteriology
- Nature Reviews Microbiology

Organisations professionnelles

- Société américaine de microbiologie
- Fédération des sociétés européennes de microbiologie
- Société de microbiologie appliquée
- Société de microbiologie générale

Journaux

- Revues critiques en microbiologie
- Journal international de microbiologie systématique et évolutive
- Journal de bactériologie
- La nature examine la microbiologie

Terminology

Microbiology and its Historical Roots

Microorganisms: Microorganismes

Microscopic organisms: Organismes microscopiques

Bacteria: Les bactéries

Microbial cells: Cellules microbiennes

Structure: Structure

Metabolism: Métabolisme

Diversity: La diversité

Genetics: La génétique

Evolution: Évolution

Ecology: Écologie

Infectious diseases: Maladies infectieuses

Microbiologists: Scientists who study microorganisms, Microbiologistes

Microscope: Microscope

Microscopic discoveries: Découvertes microscopiques

Methods for the culture and identification of microorganisms: Méthodes de culture et d'identification des micro-organismes

Beneficial and detrimental effects of microbes: Effets bénéfiques et néfastes des microbes

Archaea : archées

A : algues

Fungi : champignons

Protozoa : protozoaires

Viruses : virus.

The field: Le champ

Function: une fonction

Classification : classification

Activities: Activités

Discovery: Découverte

invisible forms : formes invisibles

the naked eye was a significant milestone in the history of science: l'œil nu a été une étape importante dans l'histoire de la science,

the inner and outer surfaces of the human body: les surfaces internes et externes du corps humain

Soil: Sol:

Seas: Mers,

Air. Air.

Earth's ecology : L'écologie de la Terre,

Mutations : Mutations, alteration

Decay of materials: pourriture des matériaux

spread diseases: propager des maladies

Microbes and disease : Microbes et maladies

Abiogenesis: Abiogenèse:

Experiments: **Expériences:**

Disease: Maladie:

Harmful : Nocif

Signs: les signes

Symptoms: Symptômes

Injury: blessure

Abnormal state: état anormal.

The hallmarks of disease: les caractéristiques de la maladie

Health : Santé:

Pathology (The study of disease): pathologie: L'étude de la maladie

Etiology (Determination of the cause of the disease): Étiologie (détermination de la cause de la maladie):

Pathogenesis (The mechanisms of its development) : pathogénèse,(Les mechanisms de son développement

(morphological changes: (changements morphologiques

The structural changes: les changements structurels

Treatment: Traitement:

The homeostatic control mechanisms: Les mécanismes de contrôle homéostatique

The pathogenesis. La pathogénèse.

Death: Décès

Humans: Humains

Mammals, Les mammifères

Heart : Cœur

Lung failure: insuffisance pulmonaire

Organ systems: systèmes d'organes

Control mechanisms: Mécanismes de contrôle

Unicellular (single cell): Unicellulaire (cellule unique)

multicellular (cell colony): multicellulaire (colonie cellulaire)

An agar plate Une plaque d'agar

acellular (lacking cells): acellulaire (manque de cellules)

Virology : parasitology

Mycology : mycologie

molecular biology : biologie moléculaire

chronic viral infections: infections virales chroniques

infectious proteins: protéines infectieuses

Photosynthetic bacteria : photosynthetic bacteria

Endospores : endospores

Théorie de la génération spontanée

Pasteurization : pasteurisation

Vaccines anthrax : vaccins anthrax

Cholera: choléra

rabies germ theory of disease : théorie de la maladie des germes de la rage

Pathogenic microorganisms: micro-organismes pathogènes

Mycobacterium tuberculosis:the causative agent of tuberculosis. *Mycobacterium tuberculosis*:
l'agent causal de la tuberculose:

Isolation of bacteria in pure culture : isolement des bactéries en culture pure

Enrichment culture techniques : techniques de culture d'enrichissement

Tobacco mosaic virus : virus de la mosaïque du tabac