

# SIMILARITIES AND DIFFERENCES BETWEEN PLANTS AND ANIMALS

In general, there are some basic similarities between plants and animals:



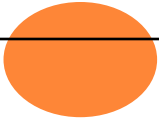
- Both plants and animals are made up of cells that are the smallest unit in the body in respect to structure and function.
- Some metabolic events are the same in both groups; however tissues, organ systems, general structures and appearances of plants and animals are not similar.
- In general, complex plants and animals show distinct differences, but these differences are far from being distinct in primitive plants and animals. Therefore some simple living beings are considered to be both plants and animals and are classified accordingly. However, living beings that contain chlorophyll are considered to be plants and living beings that do not contain chlorophyll are classified as animals.



**Primary differences between plants and animals are summarized in the following table:**



PLANTS	ANIMALS
Do not move actively (as in going somewhere)	Move actively
Contain chlorophyll, perform photosynthesis	Do not contain chlorophyll, therefore can not perform photosynthesis
Autotrophic	Heterotrophic
Basic source of energy is the sun.	Basic energy is provided from the potential energy that foods contain
Their cells have cellulosic cell walls	They lack cell wall, they only have cytoplasmic membranes
They are excitable, however they lack nervous system	They have nervous systems
They do not have systems for digestion, respiration, however these functions are somehow performed.	They have systems for digestion and respiration.
Their growth is unlimited (meristem tissue is present at the tips of the roots and the stems)	Their growth is limited.



# Differences between plant and animal cells:



Plant cell	Animal cell
Has a cellulosic cell wall	Only has a cell membrane
Plastids are found in the cytoplasm	Lacks plastids
Vacuole is present and is big	Vacuole is present and is small
Does not contain lysosome and centrosome	Lysosome and centrosome are present
Stores starch and cellulose	Stores glycogen
Cells are bound to each other with cell walls	Cells are independent
Cytoplasm division is via median lamella	Cytoplasm division is via articulation

# DIFFERENCES BETWEEN CELL WALL AND CELL MEMBRANE:

Cell wall	Cell membrane
Non-living	Living
Permeable	Semipermeable)
Durable	Indurable
Made up of cellulose	Made up of proteins and lipids

## Comparison of plant and animals cells in respect to structure and function:

<u>Structure</u>	<u>Plant cells</u>	<u>Animal cell</u>	<u>Some functions</u>
Cell membrane	Present	Present	Exchange of substances and separating the cytoplasm from the environment
Cell membrane	Present	Absent	Protection and support
Ribosome	Present	Present	Protein synthesis
Mitochondrium	Present	Present	Energy production center
Plastids	Present	Absent	Bearing various pigments, storing nutrients
Chlorophyll	Present (mostly)	Absent	Photosynthesis
Centrosome	Absent	Present	Cell division
Lisosome	A similar structure is present	Present	Digestion (within the cell)
Peroxisome	In some plant cells	Present	Carries enzymes similar to those of lysosomes and other enzymes that are related to hydrogen peroxide metabolism
Golgi device	Present	Present	Producing extracellular hormones etc.
Endoplasmic reticulum	Present	Present	Carrying some substances, lipid synthesis
Vacuole	Present (big)	Present (small)	Temporary storage unit
Nucleus	Present	Present	Genetics and management center of the cell
Nucleolus	Present	Present	RNA and ribosome synthesis



## Plant Biology:

Plants are photosynthetic organisms that are accustomed to terrestrial living. Plants and microscopic organisms help preserving the atmosphere and the climate and also serve as a source of food.



## General Properties of Plants:

- Multicellular organisms
- Have cell wall that is rich in cellulose
- Contain chlorophyll and perform photosynthesis (or if not photosynthetic, then derived from photosynthetic ancestors)
- Adapt to terrestrial life in different ways (or if aquatic plants, then they have to derive from terrestrial ancestors)
  - Bryophytes
  - Lycophytes
  - Pteridophytes
  - Gymnospermae & Angiospermae plants



# Plants and Humans

## Plants and Atmosphere

Plants produce nearly half of the oxygen found in the atmosphere algae and some bacteria produce the other half. Humans and animals can not survive without oxygen.

Oxygen is a byproduct of photosynthesis and is released into the atmosphere. Most of the living beings require oxygen to benefit from the chemical energy that foods contain. This chemical energy provides the energy that is required in metabolic reactions. And moreover, some of the oxygen that is produced by plants and microorganisms are converted into ozone by sunlight at the upper parts of the atmosphere. This ozone layer protects all living beings from the harmful ultraviolet rays of the sun.



## Plants and Humans

Plants also help in balancing the carbon dioxide level in the atmosphere. Carbon dioxide, methane and water vapor are the gases that are called «greenhouse gas». These gases have the ability to absorb infrared lights that reach our world and prevent their being reflected to the space.



Atmospheric absorption of heat by this way increases the temperature of our world. Just like a greenhouse in which thermal rays go inside and do not get out, and thereby heating the greenhouse. The name greenhouse effect comes from this phenomenon. If this effect had not been present, then life on earth would have been too cold for us to survive. However, the increase in the amount of greenhouse gases leads to «global warming». That's why companies are developing ecological policies and try to reduce their carbon footprints.



## What is a Carbon Footprint?

A carbon footprint is a measure of the impact our activities have on the environment, and in particular climate change. It is related to the amount of greenhouse gases produced in our life every day through burning fossil fuels for electricity, heating and transportation etc.



**Ethnobotany:** The science that examines the usage of plants by ancient people. Ethnobotany usually reveals new information especially related to medicinal the usage of plants along with their usages.

Ethnobotany researches have demonstrated that indigenous populations (a population living in a certain area for generations) use a method of trial and error that is similar to the functioning of modern science. This method led to the discovery of nearly thousands of beneficial properties of plants. People first take a small amount of a plant material or its extract and try it, then they repeat their trials by increasing the dose in order to determine whether it can generally be used, or not.



**Secondary Metabolites:** Food plants are important since they provide primary metabolites to other living beings. These are carbohydrates, lipids, proteins, minerals and vitamins. They may also provide secondary metabolites with various chemical structures.





Secondary metabolites do not have a role in the growth and development of plants. They serve for the purpose of protection against herbivore animals and pathogenic microorganisms. Since plants can not run away from these aggressors, they rely on chemicals for protection and they have become experts in chemical war (this topic will be dealt in detail later).

