TP N°01: MORPHOLOGICAL STUDY OF ANGIOSPERMS

INTRODUCTION

Angiosperms (angios: closed vessel; sperma: seed) are cormophytes. In cormophytes (plants with stems), the ovule is located in a closed organ called the ovary, and the seed forms inside the fruit. There are two main classes :

- Monocotyledons (monocots)

- Dicotyledons (Dicots)

OBJECTIVE: The objective of the practical work in the course Plant Biology Elements is to illustrate the theoretical course and to show the morphological characteristics of the different parts of angiosperms.

MATERIALS AND METHODS

 Plates with the types and shapes of each organ: root, stem, leaf and flower, Specimens from the herbarium, woody stems stored in the laboratory, specimens as specimens, photographs and slides.

PLANT ORGANIZATION

The vegetative apparatus is the set of organs of a plant that provides its growth. It is opposite to the reproductive system and adapts to external conditions. to external conditions. It consists of different parts: root, stem, leaf and flower. Each of these parts is formed by buds containing meristems and is composed of different tissues.

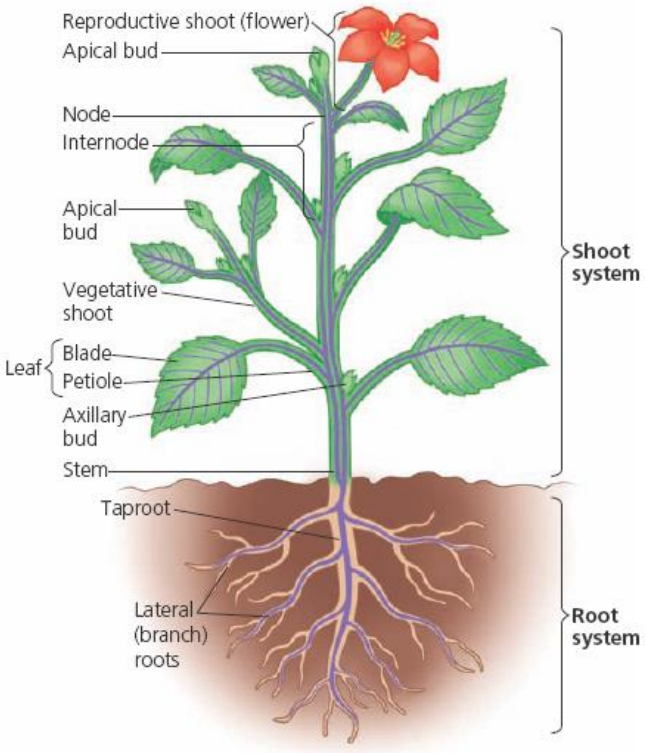


Figure n1: morphology of a plant.

https://www.facebook.com/plantmorphology/

LOW MORPHOLOGY OF AN ORGANIZATION OF AN ANGIOSPERM

1. **THE ROOT:** Mostly a subterranean organ without chlorophyll, that performs the following functions: Attachment of the plant to the substrate, absorption of water and nutrients, storage (sometimes). it is coposed by 4 parts

1.1.The cap : terminates and protects the root. The cells of the root cap are always in a state of division, thus constantly renewing and growing in number as the root penetrates the soil.

Functions

- Carrying water and minerals from the soil
- Protecting the sensitive growing tissues in the root
- Secreting the viscous mucilage that helps the root to penetrate the soil
- Communicating with soil microorganisms

1.2.The Region of Cell Division (Meristematic Region) it is located a few millimeters above the root cap. The cells of the meristematic region are typically small, thin-walled, and contain dense protoplasm.

Functions

- Performing cell division to produce new cells for the developing root
- Helping in root elongation.

1.3.The Region of Elongation

It is located next to the meristematic region. They are incapable of cell division.

Functions

2. Helping to increase the length and size of the root cell that has lost the ability to multiply.
3. Helping in the absorption of water and minerals from the soil

1.4. The Region of Maturation or Differentiation

Located next to the region of elongation, it is also called the piliferous region. They develop when the cells of the elongation zone differentiate and mature into specialized tissues such as root hairs, endodermis, and cortex.

Functions

- Keeping plants and trees attached to the soil
- Forming specialized tissues like root hairs, xylem, and phloem that helps in absorption and conduction of water and minerals from the soil

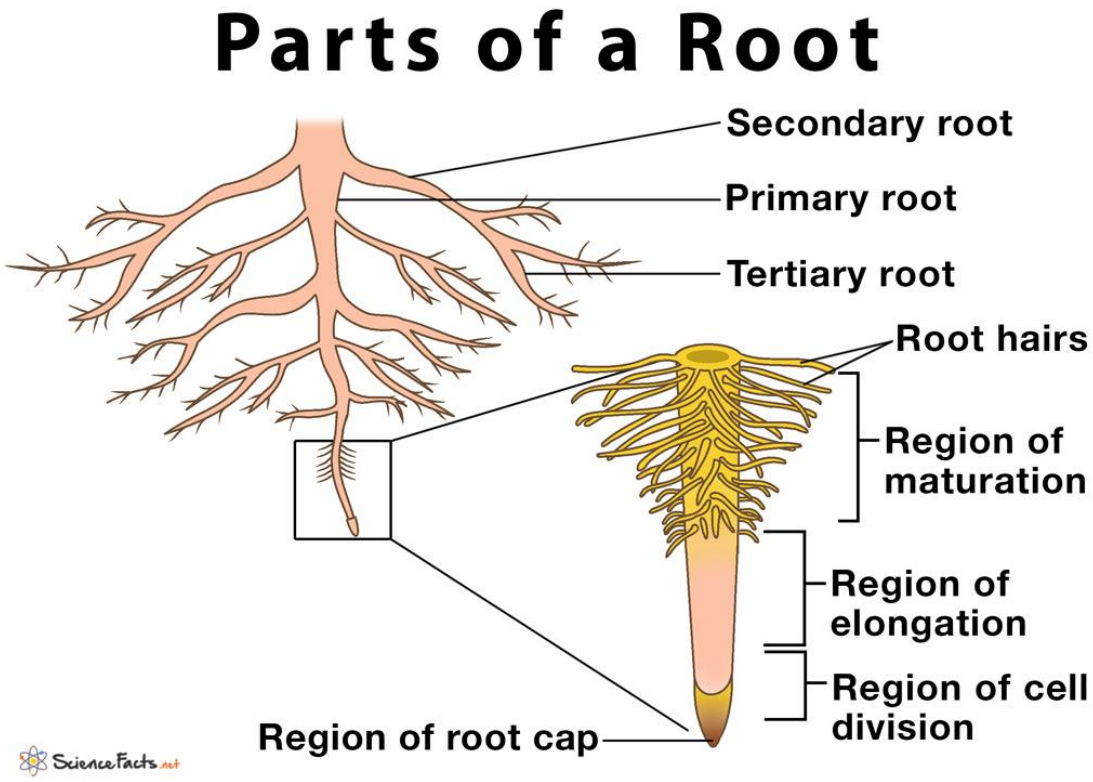


Figure n2 : parts of a root. https://www.sciencefacts.net/wp-content/uploads/2019/12/Parts-of-a-Root.jpg

2. Types of Roots

Types of Root System Based on their structure, all plant root systemsare broadly classified into two main types:

2.1. 1. Taproot or Primary Root System

It is the root system that develops from the growing embryo (radicle) of a germinating seed. The taproot is the true root that grows vertically downwards and produces many lateral roots called root hairs. The taproot system is present in all dicot plants.

Examples: Mango, carrot, radish, sugar beet, and parsnip

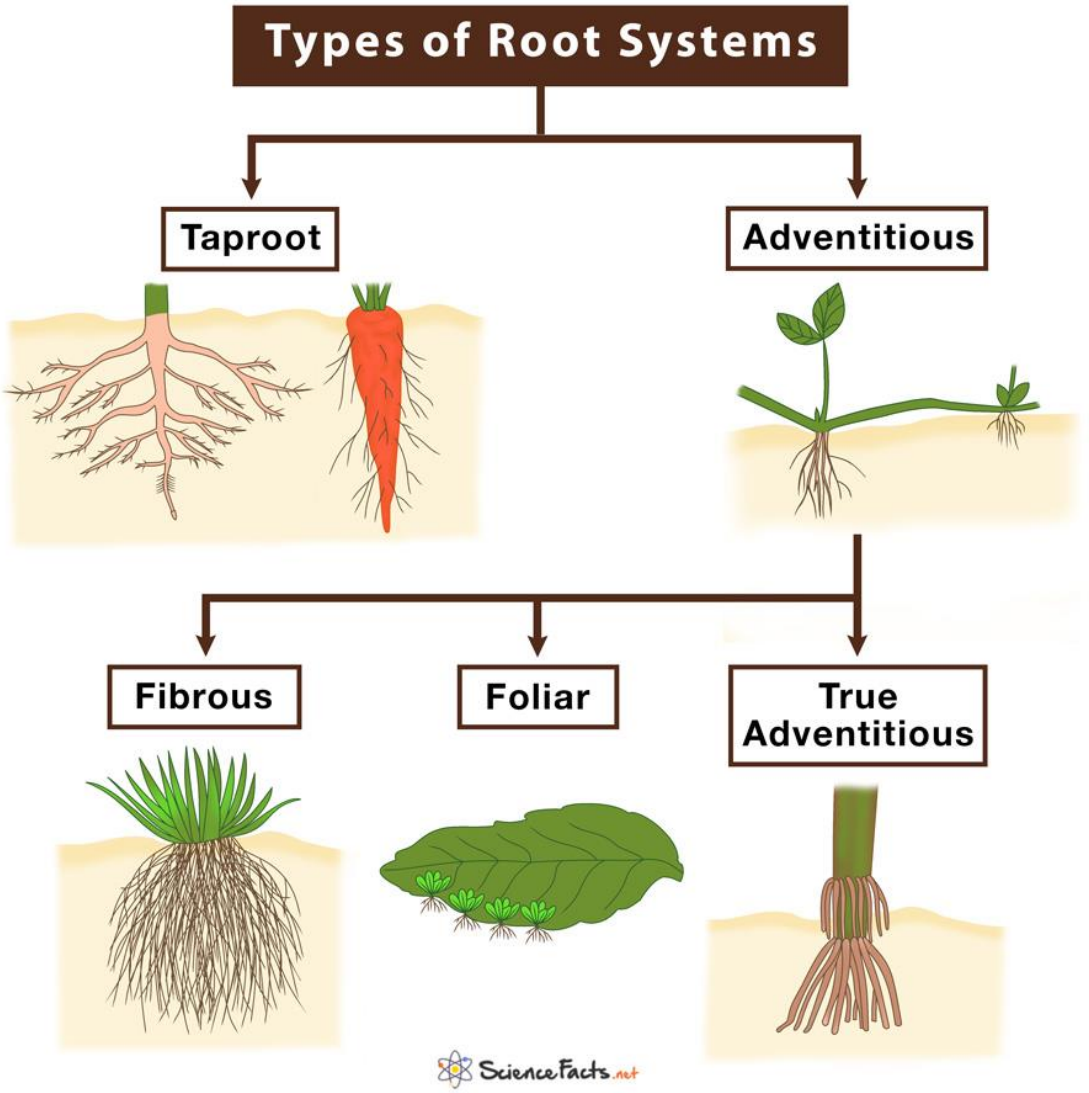


Figure n3 : type of root. https://www.sciencefacts.net/types-of-roots.html

2. Adventitious Root System

It is the root system that develops from any part of the plant other than the radicle – usually a stem and sometimes a leaf. The adventitious roots are found in monocot plants where the taproot is short-lived. Examples: Grass, sugarcane, oak, and ivy.

Based on the origin of the adventitious root, they are further classified into:

a) Fibrous Roots

They are slender, branched, bushy roots that grow directly from the stem of the plant. Fibrous roots are formed from moderate branching of the taproot and do not penetrate deep into the soil.

Examples: Grass, rice, wheat, maize, and banana.

b) Foliar Roots

They arise naturally from leaf veins or petioles due to some injury on the leaf. The injured region develops new buds called foliar buds, which later give rise to these roots for new plants to grow. Sometimes, artificial application of plant growth hormones can also stimulate the plant to develop new foliar buds from the region where it is applied.

Examples: Pogostemon, rubber plant, Bryophyllum, and Begonia.

c) True Adventitious Roots

Lateral buds that arise from parts of the stem (at the nodes and internodes) are called true adventitious roots. Examples: Aerial roots of a banyan tree, stilt roots of sugarcane, and clasping roots of the money plant.

2. THE STEMS

2.1. Types of Stems

Based on their location with respect to the ground, there are three types of stems:

- Underground stem
- Aerial stem
- Subaerial stem.

2.1.1. Underground stems

These stems remain at the ground level and produce aerial shoots that rise above the soil. Their roots are superficially present. These stems are meant for storage of food and perennation. These stems are also capable of vegetative propagation.

They are of different types as follows:

Rhizome : is a thickened underground stem that has distinct nodes and internodes and scaly leaves at the nodes. Example: Ginger.

Tuber : is a horizontal underground stem that becomes enlarged at its growing tips due to the accumulation of stored food, commonly starch. E.g. Potato.

Bulb : It is a short underground stem with a fleshy base with leafy scales. The stem is actually reduced to form a disc-like structure. The nodes bear fleshy scales. On the upper side, the disc bears a terminal bud surrounded by a number of leaves. E .g. Onion.

Corm : is a short, vertical, swollen underground stem of a plant that serves as a food storage organ to enable the plant to survive adverse conditions. E.g Colocasia

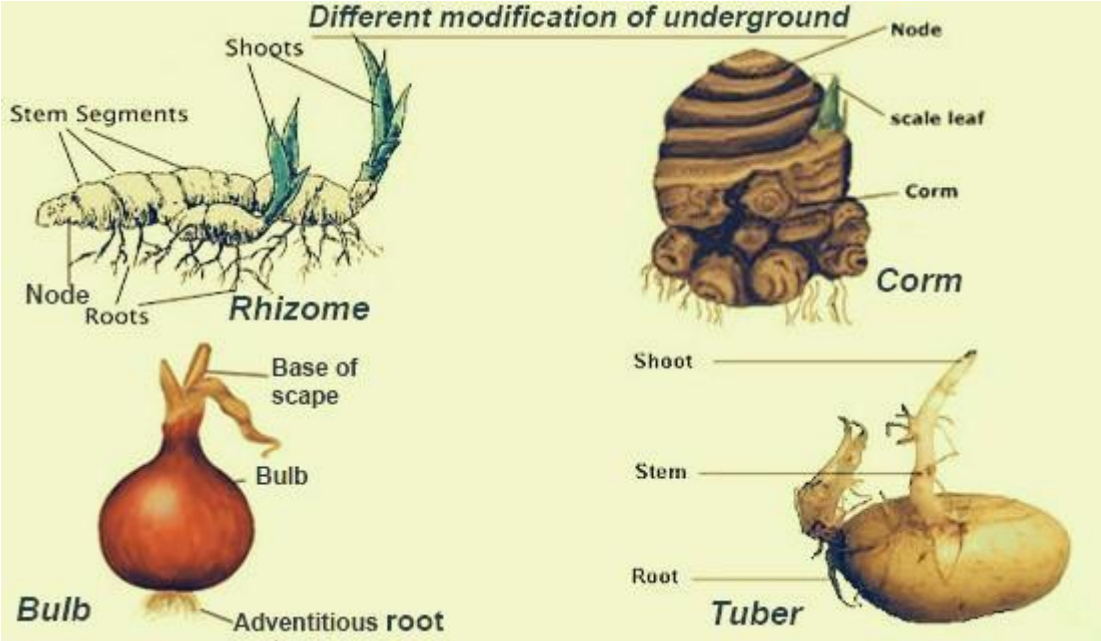


Figure n4 : undergound stems types. https://www.vedantu.com/question-answer/are-the-different-types-of-underground-stem-m-class-11-biology-cbse-5f4cbf7a56e9d4741097efe2

2.1.2. Subaerial Stems

These stems run parallel to the ground and give off roots at certain intervals or nodes.

They are further divided into the following types:

Runner : It grows parallel to the ground and has a creeping stem with long internodes. On the lower surface, the nodes give out adventitious roots at regular intervals. A runner develops from the axils of lower leaves of the aerial stem

Offset: These are shorter and thicker than the runner and are often seen in aquatic plants

Stolon : It is similar to a runner but arises from the lower part of the main axis.

Sucker: These stems are similar to the stolon but it grows obliquely upwards and gives rise to a new plant.

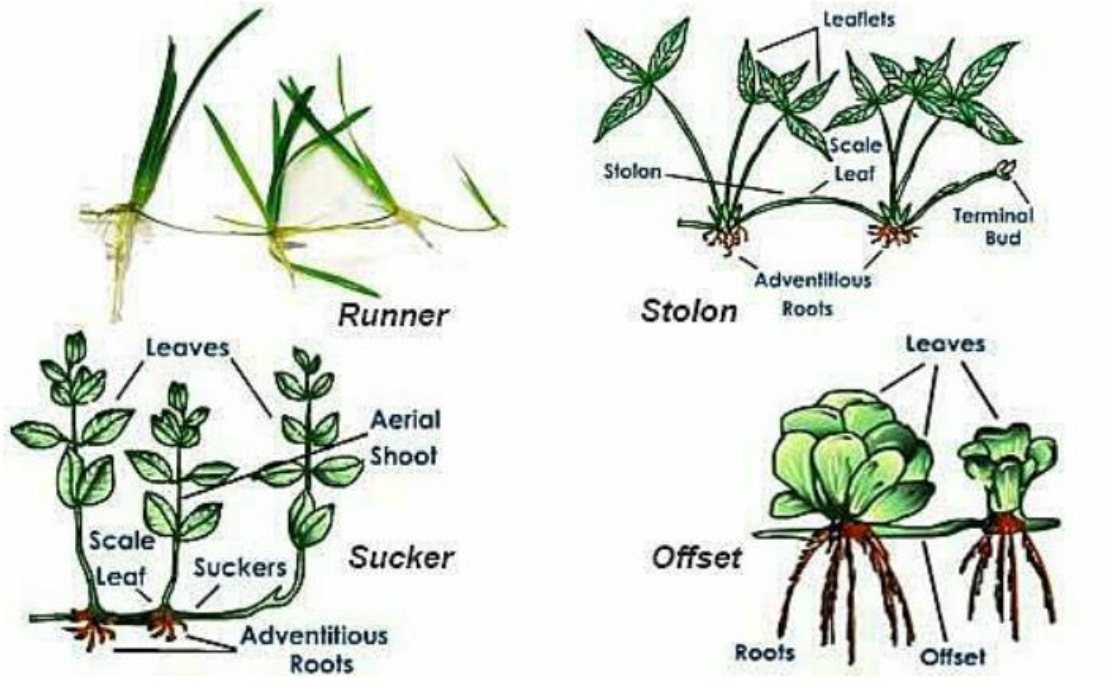


Figure n5 : Subaerial Stems. https://www.vedantu.com/question-answer/which-of-the-following-is-a-subaerial-stem-class-12-biology-icse-5f4fe3e2ec753306111a7e52

2.1.3. Aerial Stems

These stems are found above the ground and perform varied functions.

They are of the following types:

Thorns : These stem modifications appear as hard, woody and sharp outgrowths that protect the plant. example: roses

Tendril : These types of stems are slender, twining strands that enable a plant to seek support while climbing on other surfaces.

Phylloclade : This type of stem is a green, flattened or cylindrical one that resembles a leaf. A phylloclade is capable of performing photosynthesis and we can find them in xerophytes or in other plants that have little or no leaves.

Cladode : This is a modification of the phylloclade where it contains one or more internodes.

Bulbil : These stems are actually modified axillary buds which become fleshy and rounded due to the storage of food. They become detached from the plant, fall o the ground and develop into a new plant, thus help in vegetative propagation.

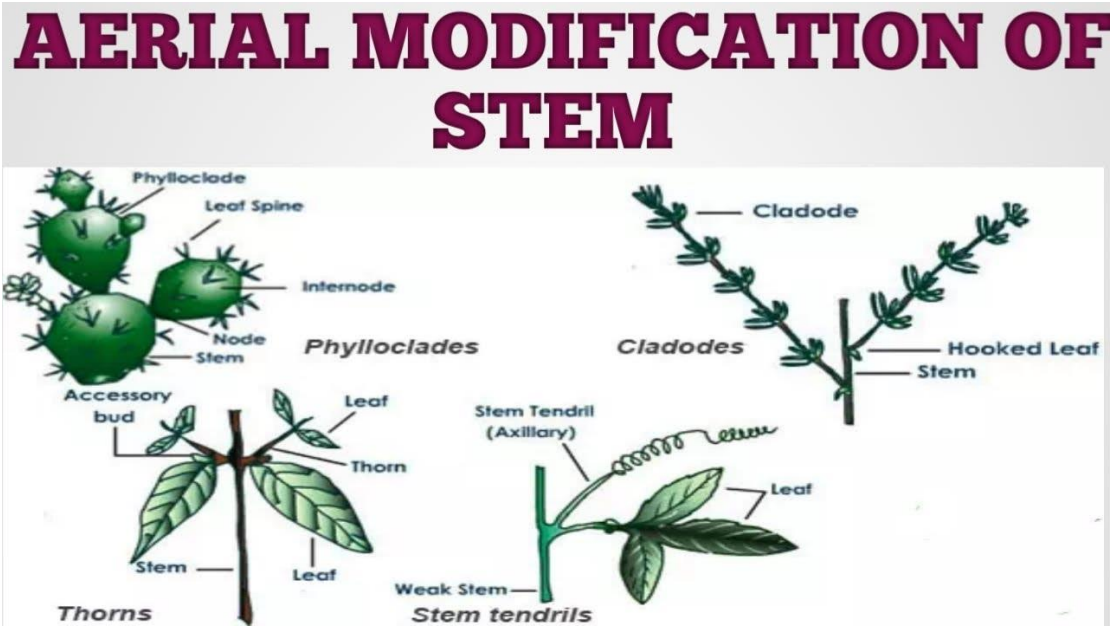


Figure n 6 : Aerial Stems. https://www.youtube.com/watch?v=urJaY26WXfE

3. LEAF :

A very important aerial organ in plant nutrition. It is where photosynthesis takes place, producing organic compounds (sugars, proteins) that form the sap used by the plant to feed its cells. It composed of 3 parts: The leaf blade, the petiole: connecting the leaf blade and the stem, and the sheath: dilatation of the petiole, more or less embracing the stem at a node. Its main part, the leaf blade, is flattened to increase light collection. Leaves are also adapted to other functions: they form scales to protect protective scales for buds... etc. They fall off after a few years in deciduous trees. Leaves are arranged in various ways on the stem:

Two leaves located on the same node and arranged at 180° are said to be opposite.

Leaves are said to alternate when a single leaf appears at each node and alternate orientations When three or more leaves are attached to a node, this arrangement is called whorled.

Leaves may be simple or compound :

- **A simple** leaf has a single, continuous blade at the tip of an unbranched petiole.

at the base of which is an axillary bud.

- **A compound** leaf has several leaflets and no buds at the base of the leaflets.

The axillary bud is located at the base of the petiole. Leaf simple fan-shaped compound leaf pinnate compound leaf Leaves differ in shape:

lanceolate oval heart-shaped triangular

Structure of Leaves

Mainly plants have leaf bases, petioles, and lamina, all these together form the main parts of the Leaves.

Leaf Base: The part at which the leaf attaches to the stem leaf-like is called as leaf base. It has two leaf-like structure which is called stipules.

Petiole: It is a thin, long stalk that joins the leaf blade to the stem.

Lamina: It is the green color flat surface of the leaf which is also known as leaf blade. The surface of the lamina is divided into two which is called midrib. Lamina also consists of small branched veins and veinlets. Veins and veinlets help in the transportation of water and minerals and also provides the rigidity to the lamina. The arrangement of veins and veinlets are known as venation. Mainly it is of two types:

Reticulate venation: In this type of venation, the arrangement of veinlets are random and forms a complex network. Example- Dicotyledonous plants.

Parallel venation: In this type of venation, the veinlets are run parallel to one another. Example: Monocotyledonous plants.

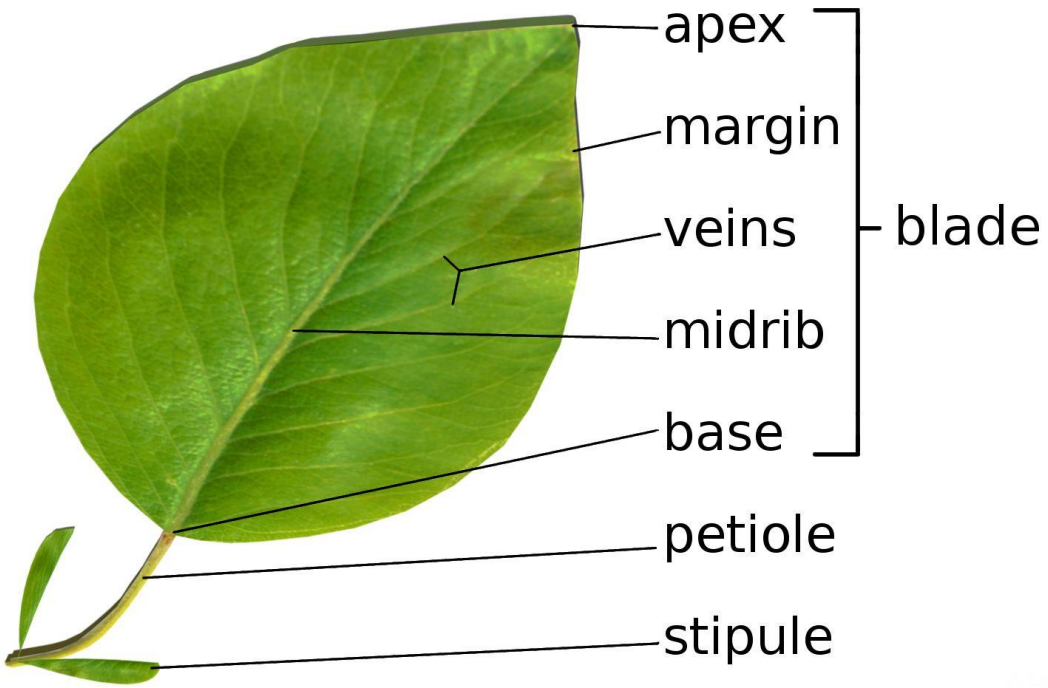


Figure 7 : leaf morphological https://www.thoughtco.com/plant-leaves-and-leaf-anatomy-373618

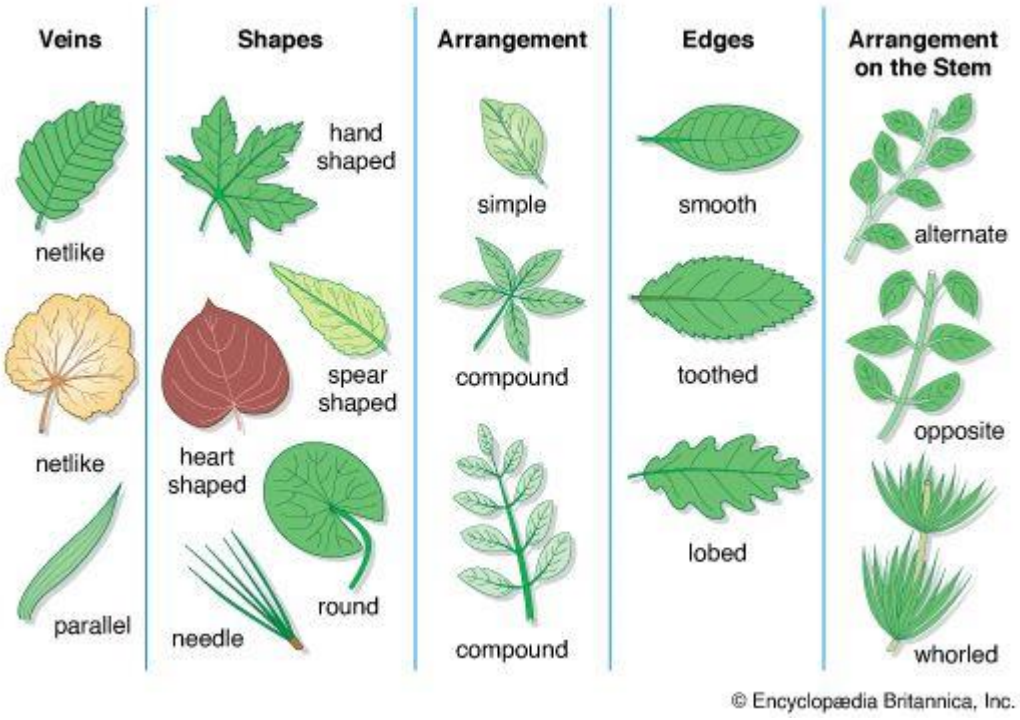


Figure n8 : type of leaf. https://kids.britannica.com/kids/article/leaf/433080

4. Flower

The structure of a flower is pretty straightforward. There are four major parts of an angiosperm. At the bottom of the flower are the **sepals**, which are usually green. They wrap the flower before it opens. Above the sepals are the **petals,** which are usually very colorful in an attempt to attract insects and other pollinators. The actual reproductive structures are multiple **stamens** and one or more **carpels.** Each stamen consists of a stalk- the **filament**, and a sac at the top, called the **anther.** That's where the pollen grains develop. The **carpel** or **pistil** consists of a stalk- the **style**- with an ovary at the base and a sticky tip known as the **stigma,** which traps pollen. The **ovary** is a protective chamber, containing one or more ovules, where the eggs develop.

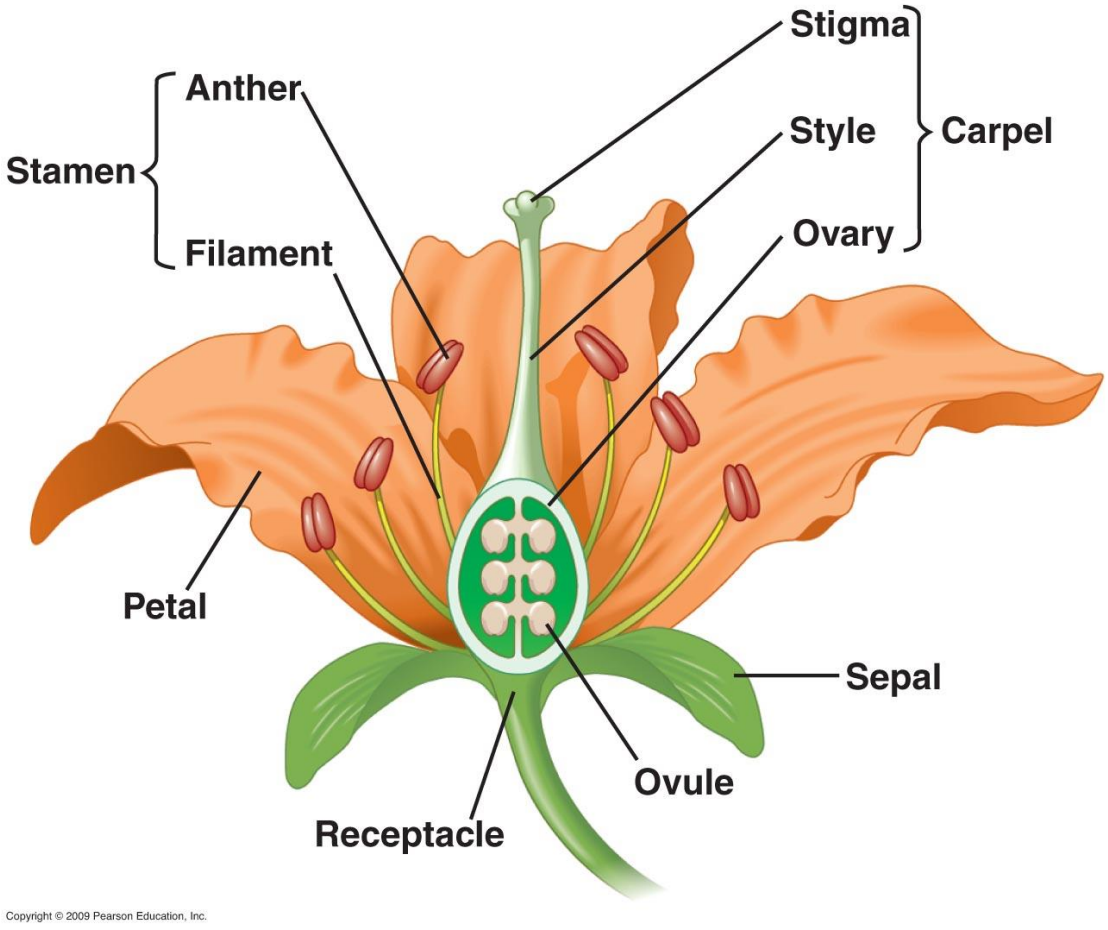
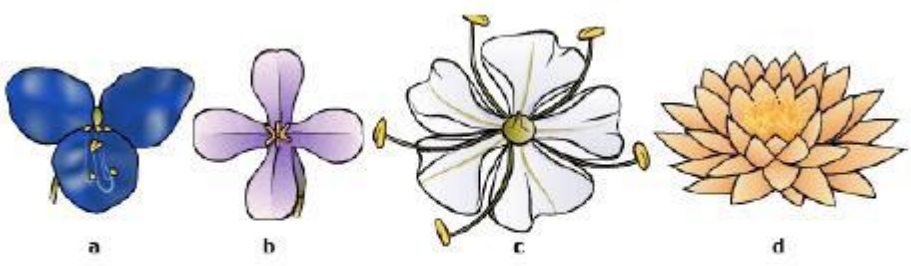


Figure 9 : Flower morphological.

https://www.mathwizurd.com/bio/2015/10/6/angiosperms-and-the-structure-of-a-flower

4.1. Flower type

- Trimer
- Tetramer
- Pentamer
- Polymer



WORK TO DO

- Observe the different shapes of leaves, roots, stems and flowers using the herbarium.
- Diagram of some leaf types.
- Observation and determination of three types of stem.
- Diagram of some types of roots.
- Observe and identify the different parts of a flower.
- After observation and identification, describe and characterize morphologically of each species in a few lines.