

The Flower

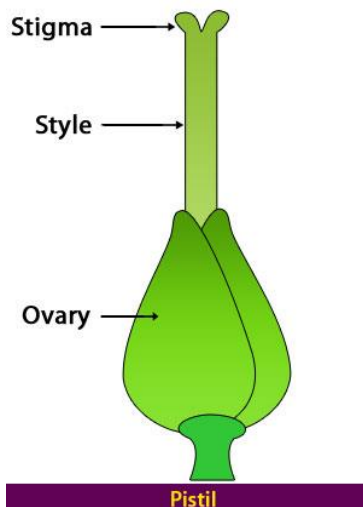
Flowers are the reproductive structures of a flowering plant. Flowers are the primary structures used in grouping plant families.

Function

- Reproduction, beginning with pollination and fertilization.
- Advertisement and rewards to lure a pollinator.
- Horticultural uses.
- Aesthetic qualities.
- Cut flowers and potted blooming plants.
- Edible flowers and herbs.
- Plant identification.

The Female Structure:

Pistil – Central female organ of the flower. It is generally bowling-pin shaped and located in the center of the flower. **Pistil consists of four parts:**

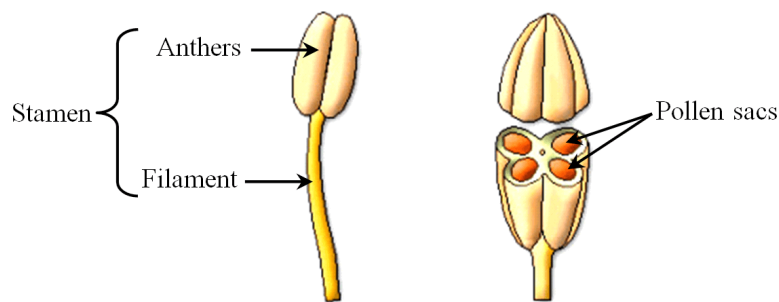


- **Stigma**- This is found at the tip of the style. It forms the head of the pistil. The stigma contains a sticky substance whose job is to catch pollen grains from different pollinators or those dispersed through the wind. They are responsible to begin the process of fertilization.
- **Style** -is a long slender stalk that holds the stigma. Once the pollen reaches the stigma, the style starts to become hollow and forms a tube called the pollen tube which takes the pollen to the ovaries to enable fertilization.
- **Ovary** – They form the base of the pistil. The ovary holds the ovules.
- **Ovules**– These are the egg cells of a flower. They are contained in the ovary. In the event of a favorable pollination where compatible pollen reaches the stigma and eventually reaches the ovary to fuse with the ovules, this fertilized product forms the fruit and the ovules become the seeds of the fruit.

The Male Structure:

Stamen consists of two parts:

- **Anthers** – It is the head of the stamen and is responsible for producing the pollen which is transferred to the pistil or female parts of the same or another flower to bring about fertilization.

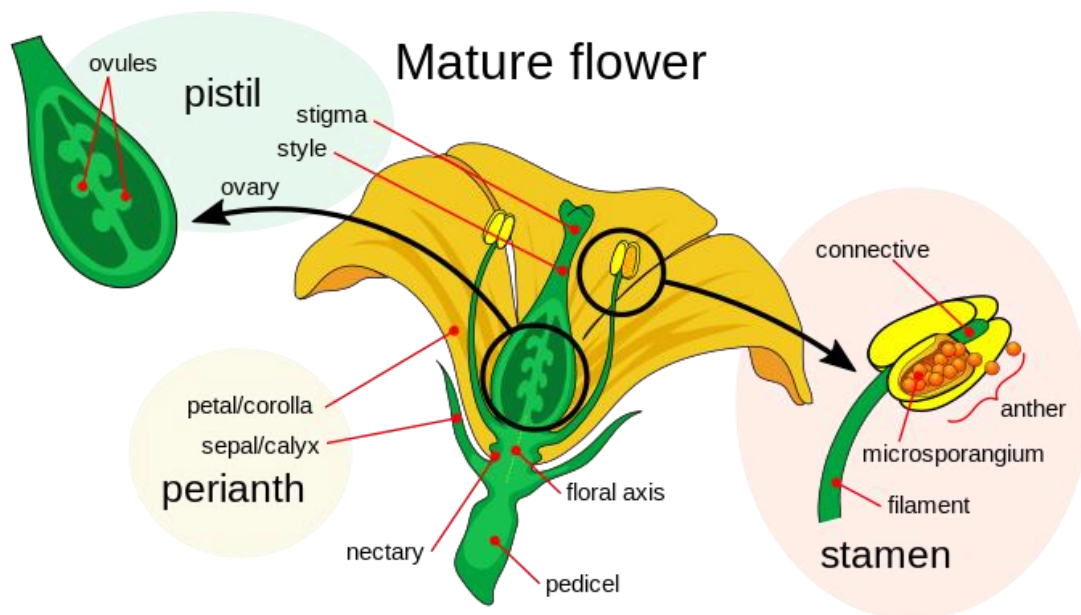


Structure of stamen

- **Filament** – Stalk supporting anthers

The Flowers Consist:


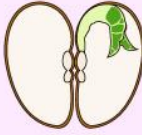










- **Petals** – Usually colorful petal-like structures making up the “flower”, collectively called the *corolla*. They may contain perfume and nectar glands.
- **Sepals** – Protective leaf-like enclosures for the flower buds, usually green, collectively called *calyx*. Sometimes highly colored like the petal as in iris.
- **Receptacle** – Base of the flower
- **Pedicle** – Flower stalk of an individual flower in an inflorescence



Monocot or Dicot Flower

The number of sepals and petals is used in plant identification. **Dicots** typically have sepals and petals in fours, fives, or multiples thereof. **Monocots** typically have flower parts in threes or multiples of three.

Definition: Plants having only one cotyledon within the seed are called monocotyledons or monocot plants. A plant having two cotyledons within a seed is called a dicotyledon or dicot plant.

	Monocot	vs	Dicot
Seed	 1 cotyledon		 2 cotyledons
Root	 Fibrous roots		 Tap roots
Flower	 Have petals in multiples of 3		 Have 4 or 5 petals
Leaf	 Narrow, parallel veins		 Oval or palmate, net-like veins
Vascular Bundles	 Scattered		 Ringed
Pollen Grains	 Have 1 pore or furrow		 Have 3 pores or furrows

Terms Defining Flower Parts

1- Terms referring to flowers:

- **Complete** – Flower containing sepals, petals, stamens, and pistil
- **Incomplete** – Flower lacking sepals, petals, stamens, and/or pistils
- **Perfect** – Flowers containing male *and* female parts
- **Imperfect** – Flowers that lack either male *or* female parts
- **Pistillate** – Flowers containing only female parts
- **Staminate** – Flowers containing only male parts

2-Terms referring to plants:

- **Hermaphroditic** – Plants with perfect flowers
- **Monoecious** – Plants with separate male flowers and female flowers on the same plant.
- **Dioecious** – Plants with male flowers and female flowers on separate.
- **Gynoecious** – Plants with only female flowers
- **Andromonoecious** – Plants with only male flowers

Plants are majorly classified on basis of presence or absence of flower into flowering and non- flowering plants. A flower is a characteristic feature of flowering plants and is actually an extension of the shoot meant for reproduction. Flowers are attractive and appear in different colours and shapes to attract pollinators who help in pollen transfer.

Plant Reproduction

Plants are living organisms. That means they need to reproduce in order to pass on their **genes** to future generations. Plants can create **offspring** through either sexual or asexual reproduction.

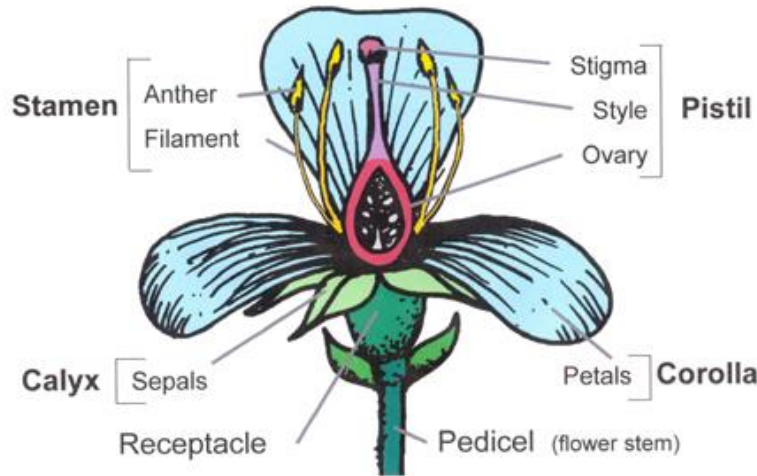
Sexual Reproduction

Sexual reproduction requires genetic material (DNA) from two parents. The parent plants have male and female sex cells, called **gametes**. The genetic material from the male and female gametes combines to produce offspring. This process is called **fertilization**.

Seeds produced through fertilization contain genetic material from both parents. As a result, the offspring are not genetically identical to either of the parent plants. This **genetic diversity** can help them survive if the environment changes.

Flowering plants reproduce sexually through a process called **pollination**. The flowers contain male sex organs called **stamens** and female sex organs called **pistils**.

The **anther** is the part of the stamen that contains pollen. This pollen needs to be moved to a part of the pistil called the **stigma**.



Misconception Alert

Not all flowers are large and brightly coloured! Some flowering plants, like grasses, have flowers that are tiny and may even be green, which can make them hard to see.

Plants can either self-pollinate or cross-pollinate. **Self-pollination** happens when a plant's own pollen fertilizes its own ovules. **Cross-pollination** happens when the wind or animals move pollen from one plant to fertilize the ovules on a different plant. The advantage of cross-pollination is that it promotes genetic diversity. Some plants have features that prevent self-pollination, such as pollen and ovules that develop at different times.

Pollinators are animals that carry pollen between plants. Many pollinators are insects, like bees, butterflies, moths and beetles. Some birds, including hummingbirds, also play a part. Likewise, certain mammals, like bats and rodents, move pollen between plants.

The colours and smells of flowers often attract pollinators. Pollen will stick to a pollinator's body as it feeds on the flower's **nectar**.



Bee covered in pollen (Source: USGS Bee Inventory and Monitoring Lab [public domain] via Wikimedia Commons).

Fertilization: is the next step after pollination. Once it reaches the pistil, the pollen needs to fertilize an egg inside the stigma. This egg is called an **ovule**.

Fertilization creates fruits that contain seeds. Some fruits are fleshy, like oranges and watermelons. Others are dry, like acorns or walnuts. These fruits are an attractive food for various animals. After digesting fruit, animals expel waste that contains seeds. This way, seeds can take root and grow in places far from the plants that produced them!

Misconception Alert

Some plants have no flowers at all. Flowering plants are a group of plants called **angiosperms**. There are also non-flowering plants. These include mosses, ferns and conifers.

Asexual Reproduction

Asexual reproduction: only requires DNA from one parent. It creates offspring that are genetically identical to the parent. Genetically identical offspring are called **clones**. Clones lack genetic diversity. This makes them more susceptible to disease. It also makes them less adaptable to changes in the environment.

There are different methods of asexual reproduction. They include vegetative propagation and fragmentation.

Vegetative propagation: Does not require **seeds** or **spores**. Instead, offspring grow from a part of the parent plant. In different plants, vegetative propagation happens in different ways. Here are a few examples.

- Garlic, onions and tulip plants all reproduce using **true bulbs**. These short underground stems are also called **scaly bulbs**. They have a basal plate that is usually surrounded by modified leaves. These leaves form a papery covering called a **tunic**. New bulbs grow off of the parent bulb's basal plate.
- Crocuses reproduce using **corms**, which are similar to true bulbs. However, a corm doesn't have as many layers. Corms are used up during the growing season and get replaced by one or more new corms.
- Potato plants reproduce using **tubers**. These underground growths produce new plants from stems or growing points called eyes.
- Ginger plants reproduce using **rhizomes**. These stems that grow sideways along the soil or just below the surface. They branch apart to produce new points of growth.
- Strawberry plants reproduce using **stolons**. They look like branches growing along the ground. Stolons anchor themselves to the ground and develop roots. And these roots grow into new plants.

10 Examples of Monocots



corn



grass



coconut



orchid



banana



iris



onion



daffodil



wheat



agave

sciencenotes.org

10 Examples of Dicots



bean



coffee



tomato



daisy



mint



rose



pea



sunflower



apple



maple

sciencenotes.org

Monocot vs Dicot

Monocots and dicots are the two broad groups of flowering plants.

MONOCOTS



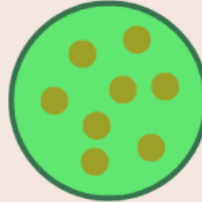
1 cotyledon



fibrous roots



parallel leaf veins



scattered stem vascular bundles



flower parts in threes

DICOTS



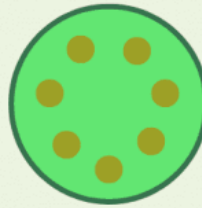
2 cotyledons



tap root



net leaf veins



vascular bundles form ring



flower parts in fours or fives