

# Flower Anatomy

**D**ID YOU KNOW that the plants most important to agriculture all produce flowers? Every major food crop is a flowering plant. We do not think about the flowers of wheat, rice, corn, and soybeans. Maybe it is because they are not as showy as the flowers of horticultural crops.



## Objective:



Describe the parts of flowers and their functions, the types of flowers, and inflorescences.

## Key Terms:



anther	imperfect flower	pistillate
bract	incomplete flower	pollen
calyx	indeterminate	raceme
carpel	inflorescence	receptacle
catkin	monoecious	sepals
complete flower	ovary	spadix
corolla	panicle	spike
corymb	pedicel	stamen
cymes	peduncle	staminate
determinate	perfect flower	stigma
dioecious	perianth	style
filament	petals	tepals
head	pistil	umbel

## Flowers

Flowers are the most obvious part of many plants. In some cases, they are extremely showy. In other cases, they are not easily seen. Whether they are showy or not, the purpose of a flower is for a plant to be able to reproduce sexually.

## FLOWER PARTS

Flowers are made of many intricate and important parts. Most flowers contain male and female parts.

### Male Flower Parts

The male part of the flower is called the **stamen**. It is made of the stalk-like **filament** that holds up the sack-like **anther**. The anther contains **pollen**, the grain released by flowers, which contains the sperm. Flowers that have male parts and no female parts are called **staminate**.

### Female Flower Parts

The female part of the flower is called the **pistil**. The **carpel** is the basic unit of the female reproductive organ, and a pistil may consist of one or more carpels. The carpel is composed of a stigma, style, and ovary. The **stigma** is a sticky tissue at the end of the pistil that is receptive to pollen. Located below the stigma is a rod-shaped middle part called the **style** and a swollen base (called the **ovary**) that contains eggs. Once the pollen reaches the stigma, it forms a pollen tube down through the style to the ovary where sperm is deposited. Flowers that have female parts and no male parts are called **pistillate**.

### Other Parts

Flowers have parts that are not classified as male or female. The **petals**, usually colorful leaf-like structures, attract animals and insects. Sometimes the petals are fused together and form a structure called a **corolla**. Beneath the petals are green leaf-like structures called **sepals**. The sepals support the petals and protect the flower before it opens; the sepals may be fused together to form a **calyx**. Together, the petals and the sepals are called the **perianth**. With some plants, a clear distinction between petals and sepals cannot be made. In these cases, the parts of the perianth are called **tepals**. Tulip flowers and many monocots have tepals.

Some plants have modified leaves at the base of a flower or floral inflorescence called a **bract**. The bracts may be green, but in some cases (e.g., the poinsettia) the bracts are colorful.

The flower stem is referred to as the **pedicel**, and the portion of the pedicel that holds the flower parts is the **receptacle**.

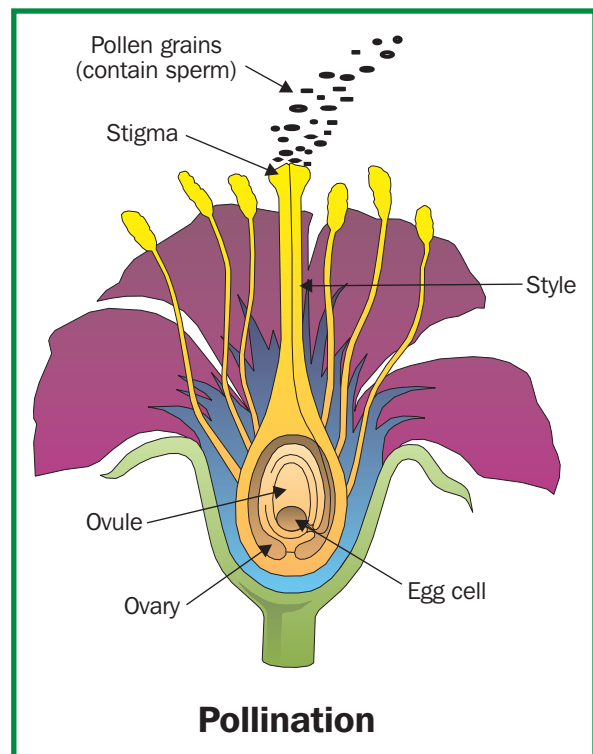


FIGURE 1. The transfer of pollen to the stigma.

## TYPES OF FLOWERS

Flowers come in many shapes, sizes, and colors. Not all of them have all of the structures mentioned previously.

Plants may produce flowers that are perfect or imperfect. A flower with male and female parts is called a **perfect flower**. A flower that is missing male or female parts is an **imperfect flower**.

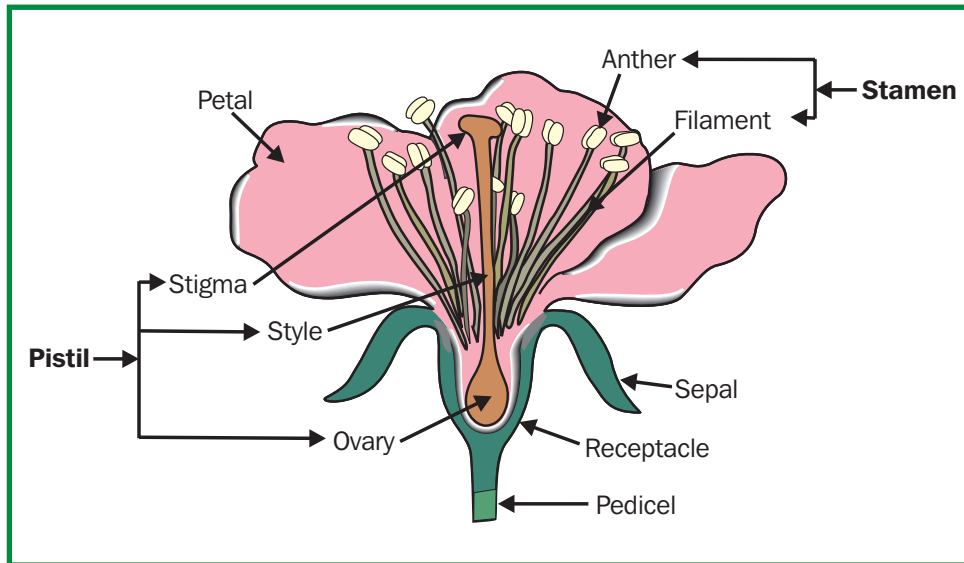


FIGURE 2. Parts of a perfect flower.

Plants may have flowers that are complete or incomplete. If a flower has sepals, petals, pistils, and stamens, it is a **complete flower**. If a flower is missing one of those, it is an **incomplete flower**. Imperfect flowers are always incomplete, but incomplete flowers may or may not be imperfect.

Plants may be classified as monoecious or dioecious. **Monoecious** plants have male and female flowers on one plant. Corn, cucumbers, and oaks are monoecious. **Dioecious** plants have male and female flowers on separate plants. Soybeans, asparagus, kiwi, and hemp are examples of dioecious plants.

A good way to tell the difference between a monocot and a dicot is to look closely at the flowers. Monocots have flowers with flower parts in multiples of three, and dicots have flowers with flower parts in multiples of four or five.

## TYPES OF INFLORESCENCES

Flowers are borne on plant stems in one of two ways. Some plants have solitary flowers, such as the tulip, narcissus, and rose. Other plants have flower clusters, known as an **inflorescence**, which is the stem's branching system. The main stem of an inflorescence is known as the **peduncle**. Pedicels that branch from the peduncle support individual flowers.

Types of inflorescence can be classified by the sequence of flowering within the flower cluster. If the first flower to open is at the apex of the stem and the progression of flowering is downward or outward, the inflorescence is said to be **determinate**. Some examples of determinate flowers include liatris, kalanchoe, and the African violet. If the last flower to open is terminal on the main axis and the progression of flowering is inward or upward, the inflorescence is **indeterminate**. Indeterminate types of inflorescences are racemes, corymbs, heads, and umbels. Freesia, cineraria, snapdragon, and stock have indeterminate inflorescence.

There a variety of inflorescence types. Some common types are cyme, spike, raceme, panicle, corymb, umbel, spadix, catkin, and head. The spike and the panicle types of inflorescence are the most common among monocot plants.

**Cymes** take on several forms, but cymes are usually flat-topped inflorescences. Dichasium cymes bear terminal flowers on peduncles with a pair of branches that produce lateral flowers. Cymes may be simple or compound. Monochasium cymes have terminal flowers, and below it, monochasium cymes have one branch that produces a single lateral flower. The terminal flower is the oldest. Tomatoes, potatoes, and alstroemerias are cymes. Baby's breath is a compound dichasium cyme.

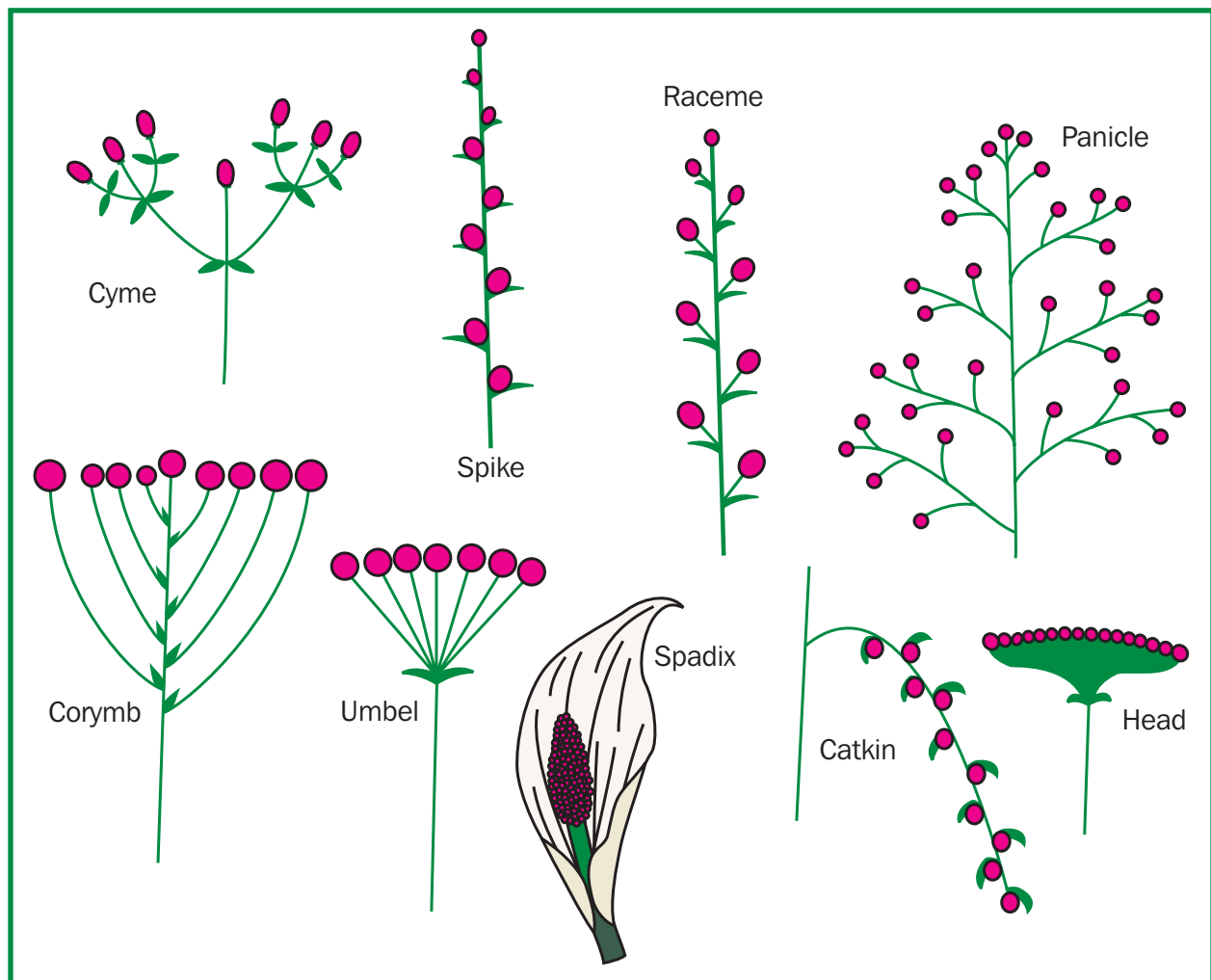


FIGURE 3. The arrangement of flowers on a stem.

A **spike** is an elongated inflorescence with a central axis where sessile flowers are attached. Wheat, barley, ryegrass, wheatgrass, gladioli, and liatris are spike inflorescences.

A **raceme** is an elongated inflorescence with a central axis where simple pedicels of more or less equal length are attached. Examples of racemes include foxtail millet, snapdragon, delphinium, Scotch broom, and stock.

A **panicle** is an elongated inflorescence with a central axis where there are branches that are themselves branched. Rice, oats, Sudan grass, Kentucky bluegrass, tall fescue, timothy, grain sorghum, astilbe, and begonia have a panicle inflorescence.

A **corymb** is a short and broad, flat-topped indeterminate inflorescence with a main vertical axis and pedicels or branches of unequal length. The outer flowers open first. Yarrow is an example of a corymb.

An **umbel** is an inflorescence with several branches arising from a common point. A simple umbel consists of flowers with single pedicels. Compound umbels have secondary branching in the form of pedicels at the end of a ray. Queen Anne's lace and amaryllis have umbels.

A **spadix** is a spike with a thickened, fleshy axis, usually enveloped by a showy bract called a spathe. Floriculture crops with a spadix include the calla lily and anthurium.

A **catkin** is a spike, raceme, or cyme composed of unisexual flowers without petals and falling as a unit. Catkins are found on willows, alders, oaks, and birch.

A **head** is a rounded or flat-topped cluster of sessile flowers. Head inflorescences of the aster family resemble single flowers. These consist of centrally grouped flowers called disc flowers encircled by ray flowers. Some common plants that have a head inflorescence are gerbera daisy, chrysanthemum, sunflower, marigold, dahlia, strawflowers, and cineraria.

## Summary:



The purpose of a flower is for a plant to be able to reproduce sexually.

The male part of the flower (stamen) consists of a filament and an anther. The anther contains pollen. The female part of the flower (pistil) is composed of the stigma, style, and ovary. Other flower parts include petals, sepals, bracts, pedicels, and receptacles.

Plants may produce flowers that are perfect or imperfect and may have flowers that are complete or incomplete. Plants may be classified as monoecious or dioecious. Monocots have flowers with flower parts in multiples of three. Dicots have flowers with flower parts in multiples of four or five.

Flowers may be borne solitary, or they may be in flower clusters (inflorescence). An inflorescence may be determinate or indeterminate. Some common inflorescence types are cyme, spike, raceme, panicle, corymb, umbel, spadix, catkin, and head.

## Checking Your Knowledge:

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1. What is the purpose of a flower?
2. What are the male and female parts of a flower?
3. What are complete, incomplete, perfect, and imperfect flowers?
4. How do monocot flowers differ from dicot flowers?
5. What is an inflorescence?

## Expanding Your Knowledge:

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Obtain flowers from different plants. Using a forceps and scalpel, carefully dissect the flowers. Identify the floral parts, and then count the floral parts. Use a magnifying lens or microscope for a closer look at the structures.

## Web Links:

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### The Basics of Flowers

<http://www2.mcdaniel.edu/Biology/botf99/flowernew/flowerstructure.htm>

### Corn (Maize) Flowers

[http://www.backyardnature.net/fl\\_corn.htm](http://www.backyardnature.net/fl_corn.htm)

### Flowers

<http://extension.oregonstate.edu/mg/botany/flowers.html#figure19>

### Flowers: Features of Flowering Plants

<http://www.biologie.uni-hamburg.de/b-online/e02/02d.htm>