Horticultural Classification Terms

Horticulture and Related Fields

Horticulture – The science and art of cultivating flowers, fruits, vegetables, turf, and ornamental plants in an orchard, garden, nursery, or greenhouse, on a large or small scale.

Horticulturist – A specialist in horticulture.

The terms **ornamental horticulture**, **landscape horticulture**, and **environmental horticulture** are commonly used to identify the sub-fields of horticulture dealing with designed landscape settings.

Agriculture – The theory and practice of growing crops.

Agronomy – A branch of agriculture dealing with field crop production and soil management.

Botany – A branch of biology dealing with plant life, (i.e., anatomy, taxonomy, genetics, physiology, and ecology). The science of applied botany deals with plants grown in uncultivated settings.

Forestry – The science of developing, caring for, or cultivating forests; the management of growing timber.

Urban forestry – A branch of forestry dealing specifically with the unique growth limitations and needs of trees in the landscape setting.

Horticultural Classifications of Plants

With hundreds of thousands of plant species and varieties on the planet, horticulturists look for practical ways to group them together. Plants are grouped by various common characteristics to help us communicate similar cultural requirements, garden uses, morphology, or taxonomy among other things. The following are examples of common classifications used in horticulture.

Classification by Use

1. **Edibles**
    A. Fruits*
        1. Tree fruits.
        2. Small fruits.
    B. Vegetables
        1. Warm-season vegetables.
        2. Cool-season vegetables.
    C. Herbs
        1. Culinary.

2. Medicinal.

D. Nuts

2. Ornamentals/Landscape Plants

A. Woody plants

1. Trees.
2. Shrubs.
3. Vines and ground covers.

B. Herbaceous plants

1. Flowers and foliage plants.
2. Vines and ground covers (that do not develop woody stems).

C. Grass/Turf

3. Potted Plants, Houseplants, Gift Plants

A. Flowering Plants (grown primarily for flowers).

B. Foliage plants (plants that may produce flowers, but which are grown for their foliar characteristics).

*Note: Do not confuse the multiple uses of the word ***fruit***. In reference to cookery (fruits and vegetables), "fruit" refers to crops primarily used in some European cuisines as a dessert (e.g. peaches, apples, strawberries, and raspberries) whereas "vegetables" refers to crops served as part of savory dishes (potatoes, carrots, spinach, etc.). In this frame of reference, tomatoes are vegetables. In taxonomic or anatomical classification, "fruit" refers to a seed-bearing structure – in this sense, tomatoes and squash are fruit. Potatoes are rhizomes (modified stems), carrots are roots, spinach is leaves, etc.

Classification by Climatic Requirements

1) **Tropical** plants originate in tropical climates with a year-round summer-like growing season without freezing temperatures (but possibly with wet and dry seasons). Examples include cacao, cashew and macadamia nuts, banana, mango, papaya, and pineapple.

2) **Sub-tropical** plants cannot tolerate severe winter temperatures but often need winter chilling to grow and produce correctly. Examples include citrus, dates, figs, and olives.

3) **Temperate** plants require a cold winter season as well as a summer growing season and are adapted to survive temperatures below freezing. Examples include apples, cherries, peaches, maples, cottonwoods, and aspen. In temperate-zones, tropical and sub-tropical plants can be grown as annuals and houseplants.

4) **Cool Season** plants thrive in cool temperatures (40°F to 70°F daytime temperatures) and are tolerant of light frosts. Examples include Kentucky bluegrass, peas, lettuce, and pansies.

5) **Warm Season** plants thrive in warm temperatures (65°F to 90°F daytime temperatures) and are intolerant of cool temperatures. Examples include corn, tomatoes, and squash.

6) **Tender** plants are intolerant of cool temperatures, frost, and cold winds. Examples include most summer annuals, including impatiens, squash, and tomatoes.

7) **Hardy** plants are tolerant of cool temperatures, light frost, and cold winds. Examples include spring-flowering bulbs, spring-flowering perennials, peas, lettuce, and cole crops.

8) **Hardiness** refers to a plant's tolerance to winter climatic conditions. Factors that influence hardiness include minimum temperature, recent temperature patterns, water supply, wind and sun exposure, genetic makeup, and carbohydrate reserves.

9) **Cold hardiness zones** are determined by the USDA and refer to the average annual minimum temperature for a geographic area, and thus the average minimum temperature that a plant can tolerate. Temperature is only one factor that influences a plant's winter hardiness.

Classification by Elevation and Plant Life Zones

Plants can be classified by the plant communities in which they usually occur. Environmental characteristics determined by elevation create “zones” dominated by distinguishable plant communities. Examples of these communities include pinyon-juniper woodlands, sagebrush steppes, high plains grasslands, montane and subalpine forests, and the alpine tundra. Matching plants’ life zones to garden conditions can be a great way to pair the “right plant” with the “right place.” Plants grown outside of their life zones may require mitigations like extra water, more (or less) shade than they might tolerate in their natural habitat, special soil modifications, etc.

The elevation of life zones shifts downward as latitude increases. A climb of 1,000 feet is equal to a

trip around 600 miles northward. Plant life zones will remain in the same relative position regardless of latitude, but the absolute elevation of each zone decreases as you move northward, for example the alpine tundra above 11,500 feet in Colorado is similar to the artic tundra near sea level on the north coast of Alaska and Canada. Higher elevations have increasingly shorter growing seasons due to colder temperatures. High elevations tend to have poorly developed soils, stronger light, persistent winds, and greater temperature fluctuations than lower elevations of the same region. Due to this harsh environment, plants of the alpine tundra tend to be compact in form. [**Figure 1**]

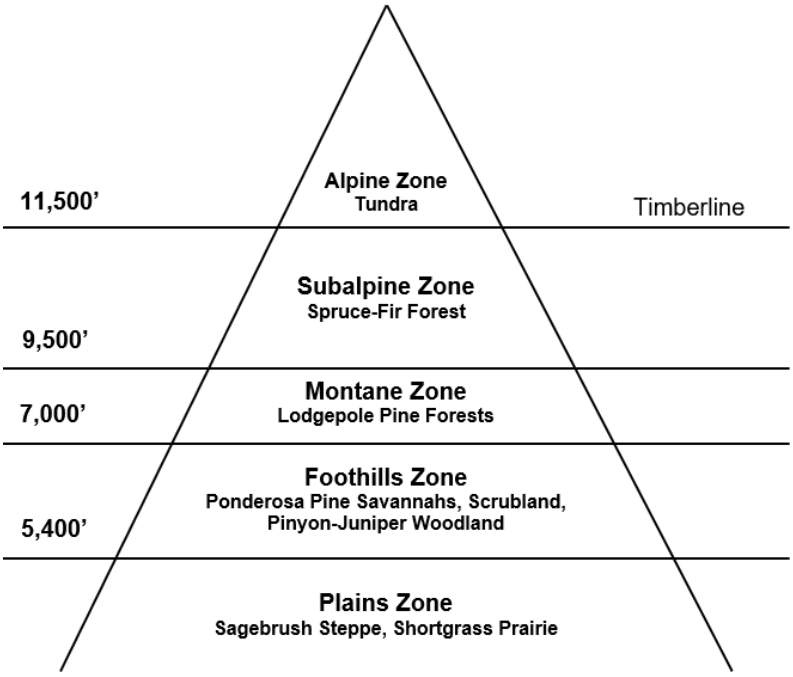


Figure 1. Colorado Plant Life Zone

Classification by Ecological Adaptations

Related to life zones are ***ecological adaptations*** of plants. For example, characteristics of the Colorado high plains include low humidity, limited rainfall, and alkaline soils low in organic matter. Plants from environments with similar growing conditions will do well on the high plains, in general.

In higher mountain communities, the short frost-free season and low summer growing temperatures significantly change what plants can be grown well there compared to on the plains.

The following are a few examples of terms used to describe classifications based on ecological adaptation.

1) **Alpine** plants tolerate the short growing season, cold, and wind of higher mountain elevations. They are typically low-growing, small leaf perennials. Growing alpines at lower elevations takes special gardening techniques and care and has led to the development of Rock Alpine gardening as a horticultural movement.

2) **Prairie** plants are adapted to the open sun and winds of the plains. These plants are further classified into dry, mesic, and wet categories, or as tallgrass or shortgrass prairie plants. Many prairie plants, particularly tallgrass prairie plants, are very competitive in deep, nutrient-rich soil that you would find in the American Midwest.

3) **Woodland** plants are adapted to low light conditions either by shade avoidance (spring and winter growth and summer dormancy) or by shade tolerance. They tend to do best in soils rich in organic matter.

4) **Wetland** plants tolerate continually moist soil conditions of a bog or a pond. Some will tolerate drier soils, but most make poor choices for standard garden conditions. Some wetland species, like cattails, will spring up in overwatered, compacted soils in landscapes, and can serve as an indicator of irrigation issues.

5) **Xeric** plants tolerate dry conditions. They are often also tolerant of bright light and warm temperatures due to a variety of adaptations such as succulent, waxy, hairy, or small leaves, taproots, and succulent stems. Growing xeric plants in too wet conditions can result in poor plant performance.

Native and Adapted Plants for the Urban Environment

Native (indigenous) plants refer to plants growing in a given area during a defined time period. In The United States, the term often refers to plants growing in a region prior to the time of settlement by people of European descent. Many gardeners mistakenly consider *native* plants as *xeric* plants, and *xeric* plants as *native* plants. The two terms are **not** interchangeable – many native plants in our region are xeric, for example, but many others are not.

In gardening, the concept of native should not refer to political boundaries, such as state or country, but to an ecological habitat during a defined chronological period. For example, Colorado blue spruce and quaking aspen are native to the ecological habitat referred to as the montane zone. They are not

native to the Colorado high plains, or elevations below 8,000 feet. Between 500 million and 300 million years ago, what is now Eastern Colorado was once an inland sea. Therefore, aquatic plants such as kelp would have been native at one time. Over time, the ecological habitat changed, changing the native plants along with it. Environmental change is an ongoing process, based both on global climatic events and on the activity of all organisms, including humankind.

Adapted plants are those that reliably grow well in a particular habitat without specific attention from humans in the form of winter protection, soil amendments, pest protection, water, etc. Adapted plants are considered to be ***low maintenance*** plants. In the context of gardening, **Adapted Plants** usually refers to non-native plants from similar ecological contexts. Some adapted plants have become noxious weeds.

The urban environment, for gardening purposes, needs to be recognized as a unique ecosystem, with challenges beyond what could be expected in the native natural environment. Characteristics of the urban environment include:

- Soil compaction.
- Reduced rooting areas.
- Increased surface runoff creates significant water quality problems.
- Higher temperatures and lower humidity.
- Air pollution.

Characteristics of an urban environment cultivated by humans (a garden) may include:

- Reduced wind.
- Increased availability of water due to irrigation.
- Increased organic matter and soil fertility.
- Different insect communities, both pests and beneficial.
- Increased soil stability.
- Slower temperature fluctuations.

The unique challenges of the urban environment and site-specific features should be considered when planning gardens with native or adapted plants.

Classification by Stem and Leaf Texture

- **Herbaceous** plants have non-woody stems.
- **Woody** plants have woody stems that usually live for several years, adding new growth each year.
    - **Deciduous** trees and shrubs shed all leaves at approximately the same time annually. Deciduous plants can be conifers (e.g. larch or bald cypress) or flowering plants (most shade trees), broadleaf or narrowleaf.
    - **Evergreen** trees and shrubs retain some leaves longer than one growing season so that leaves are present throughout the year. Seasonal drop of some of the oldest interior leaves are a natural part of the life cycle. Evergreens can be broadleaf or narrowleaf.
    - **Semi-evergreen** plants may retain their leaves year-round, depending on the winter temperature and moisture, losing them only in harsh winters.
- **Broadleaf** plants have a broad leaf blade, such as ash, maple, lilac, and beans.
- **Narrowleaf** plants have needle-like leaves such as pine and spruce, or awl-like leaves such as junipers.
- **Grass-like** plants or **graminoids** have narrow leaves, usually arising from the base of the plant. Grasses, rushes, and sedges are all graminoids.

Classification of Woody Plants by Growth Habit

Growth Habit refers to the genetic tendency of a plant to grow in a certain shape and to attain a certain mature height and spread. [**Figure 2**]

- **Trees** typically have a single trunk and mature height over twelve feet.
- **Shrubs** typically have multiple branches from the ground and a mature height less than twelve feet.
- **Vines** have a climbing, clasping, or self-clinging growth habit.

Many landscape plants can be considered small trees or large shrubs. The terms tree or shrub is applied based on the general appearance of the plant – some say, “you walk under a tree, and around a shrub.” Trees can be further classified by canopy shape.

A thorough understanding of growth habits is important to make knowledgeable decisions regarding

plant placement, selection, pruning, and maintenance.

The species, cultivar, and/or marketing names of plants sometimes indicate a particular characteristic of growth habit – for example, *Pinus ponderosa* roughly translates to "big [heavy/significant] pine," and Mini-Man™ Viburnum is a dwarf variety.

Columnar Oval Vase Weeping Pyramidal Round

Figure 2. Tree Forms

Classification by Life Span

From a horticultural perspective, life span is a function of inherent plant characteristics, climate, and usage. Garden plants including tomatoes and geraniums that are grown as annuals in Colorado, are perennials in climates without freezing winter temperatures.

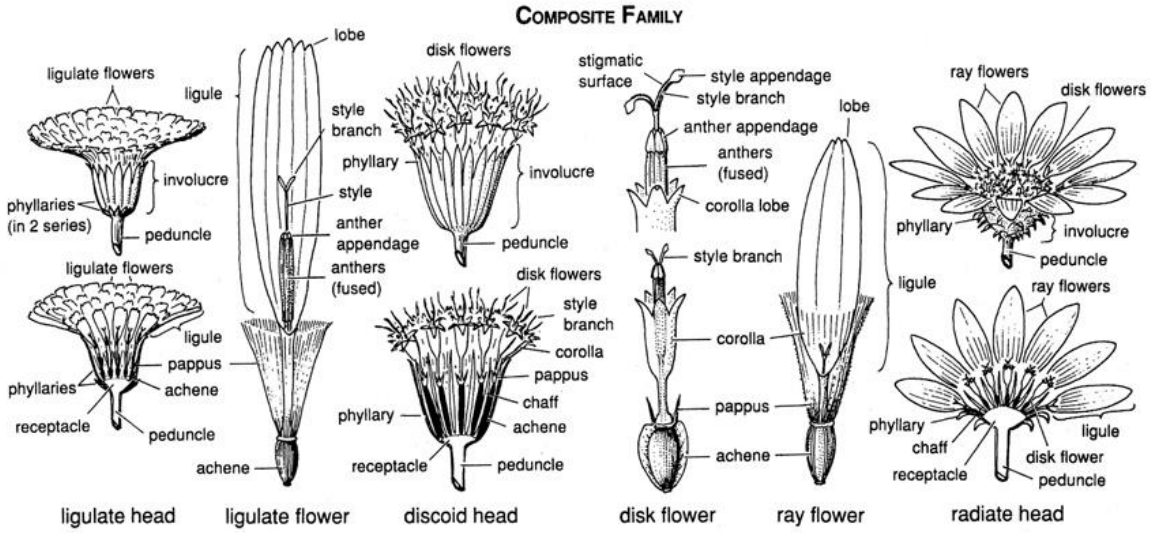
1) **Annuals** complete their life cycle (from seedling to setting seed) within a single growing season. However, the growing season may be from fall to summer, not just from spring to fall. These plants come back in subsequent growing seasons only from seeds.

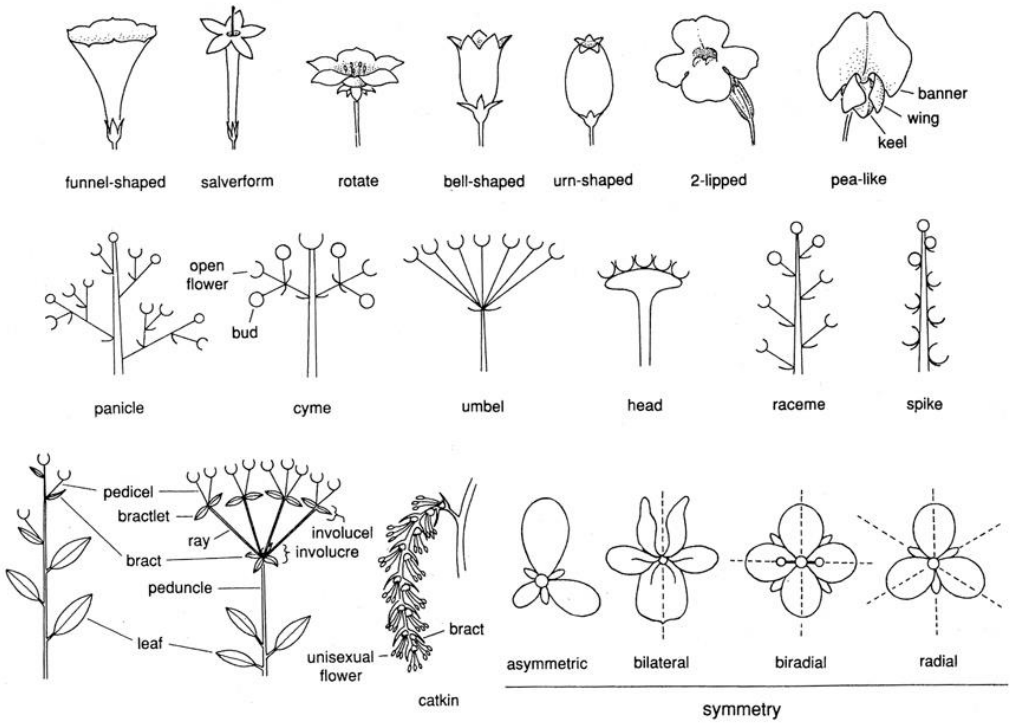
    a) **Summer annuals** germinate from seed in the spring and complete flowering and seed production by fall, followed by plant death. Their growing season ranges from spring to fall. Examples include marigolds, squash, and crabgrass.
    b) **Winter annuals** germinate from seed in the fall, with flowering and seed development

the following spring, followed by plant death in summer. Their growing season is from fall to summer. Examples include winter wheat, cheatgrass, redstem filaree (*Erodium cicutarium*) and annual bluegrass.

2) **Biennials** complete their life cycle within two growing seasons. Biennials germinate from seed during the first growing season and produce foliage and storage organs the first summer. Quite often, they maintain a rosette growth habit the first season, meaning that all the leaves are basal, or close to the base of the plant. They flower and develop seeds the second season, followed by death. In the garden setting, we grow certain biennials as annuals - carrots, onions, and beets, for example, because we are more interested in the root than the bloom. Some biennial flowers, such as hollyhocks, may persist as short-lived perennials.

3) **Perennials** live through several growing seasons and can survive a period of dormancy between growing seasons. These plants regenerate from root systems or protected buds, in addition to seeds.

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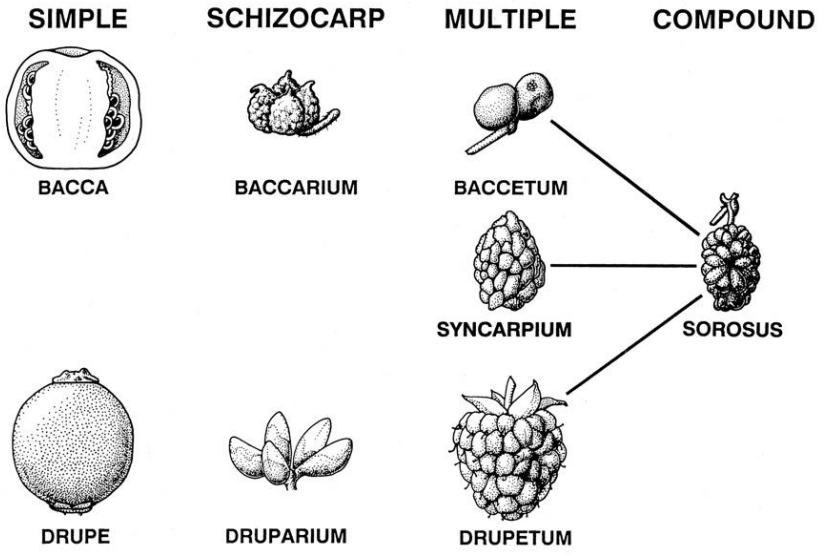
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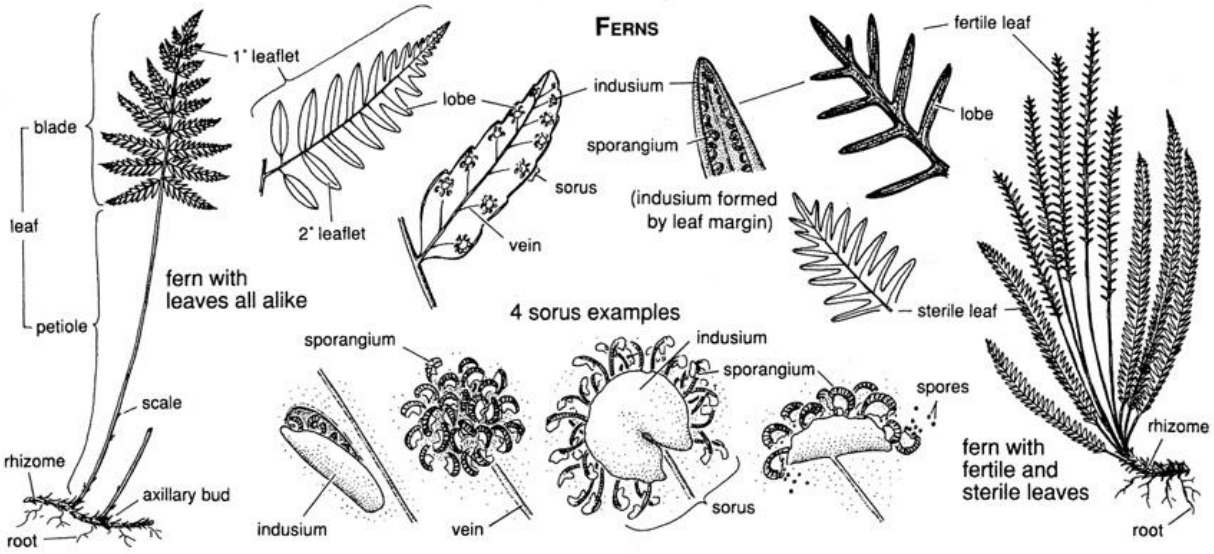
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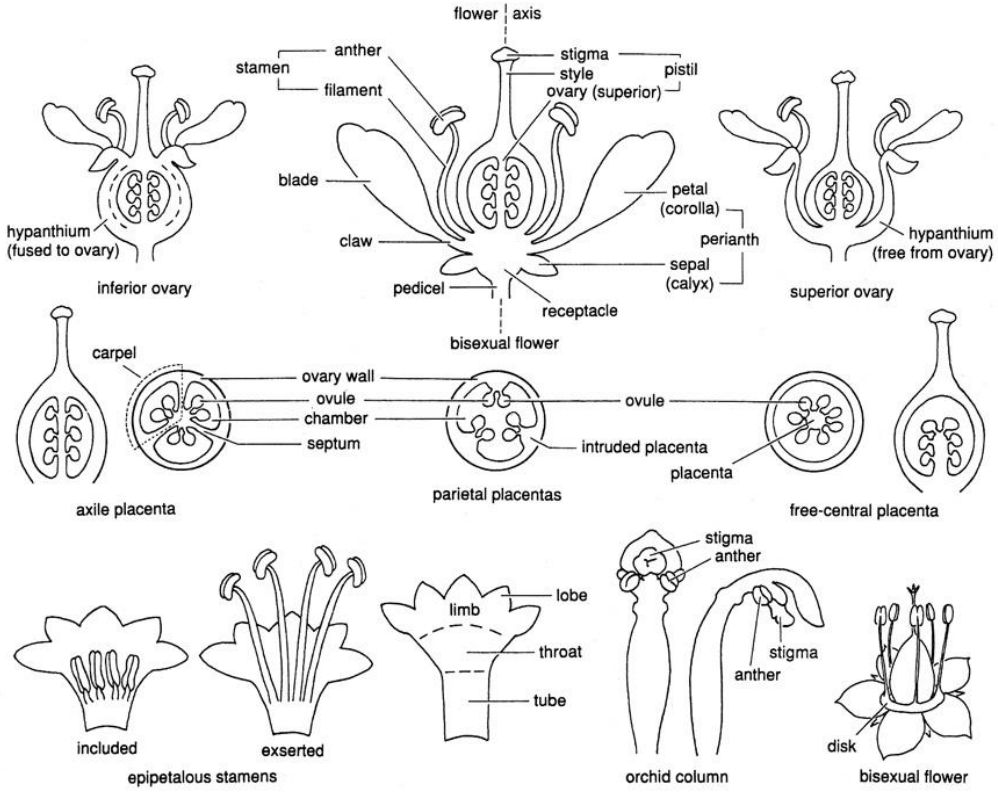
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hypanthium
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superior ovary
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ovary wall
ovule
chamber
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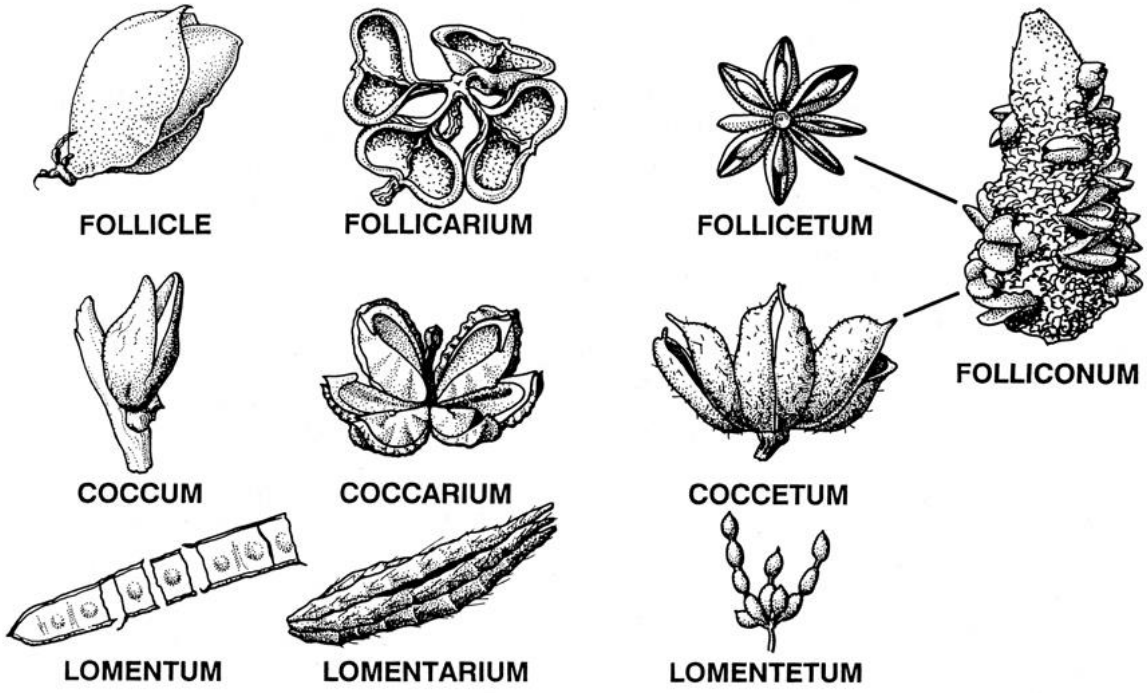
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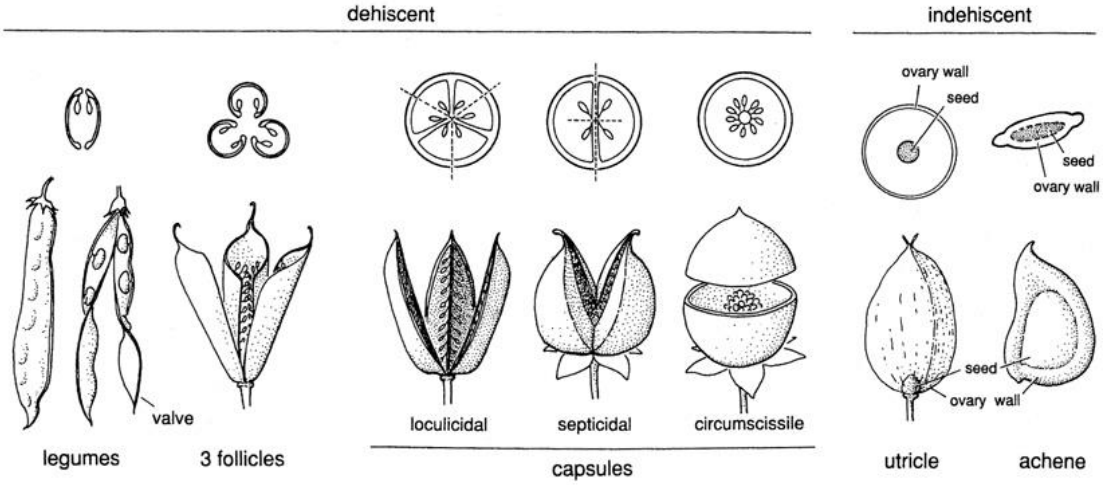
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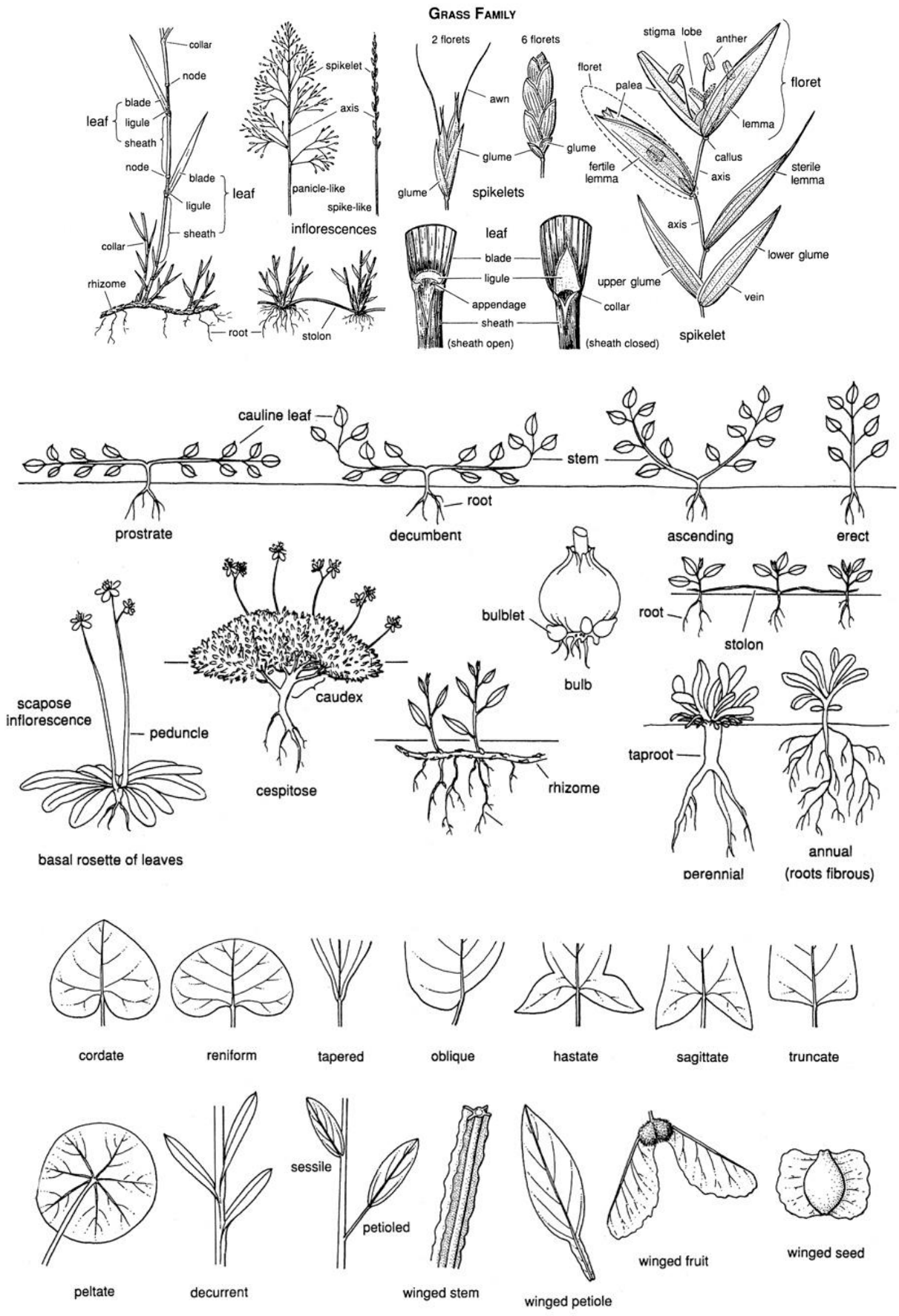
GRASS FAMILY
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lower glume
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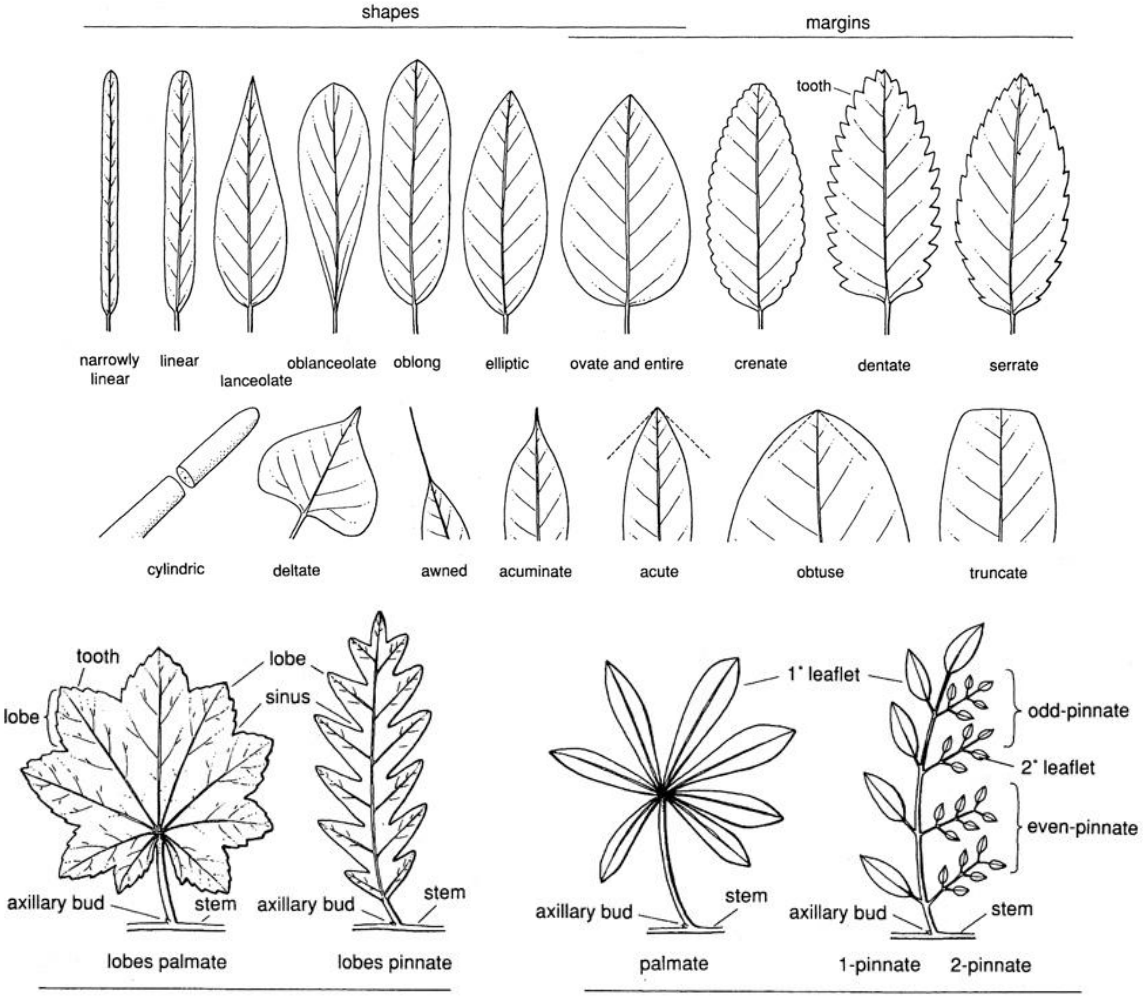
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axillary bud
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simple leaf
1° leaflet
odd-pinnate
2° leaflet
even-pinnate
axillary bud
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axillary bud
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palmate
1-pinnate
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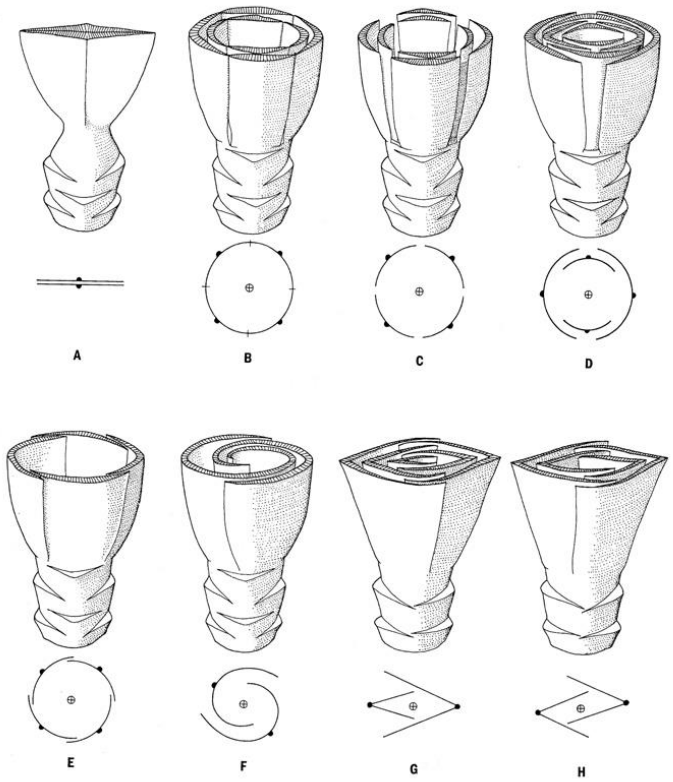
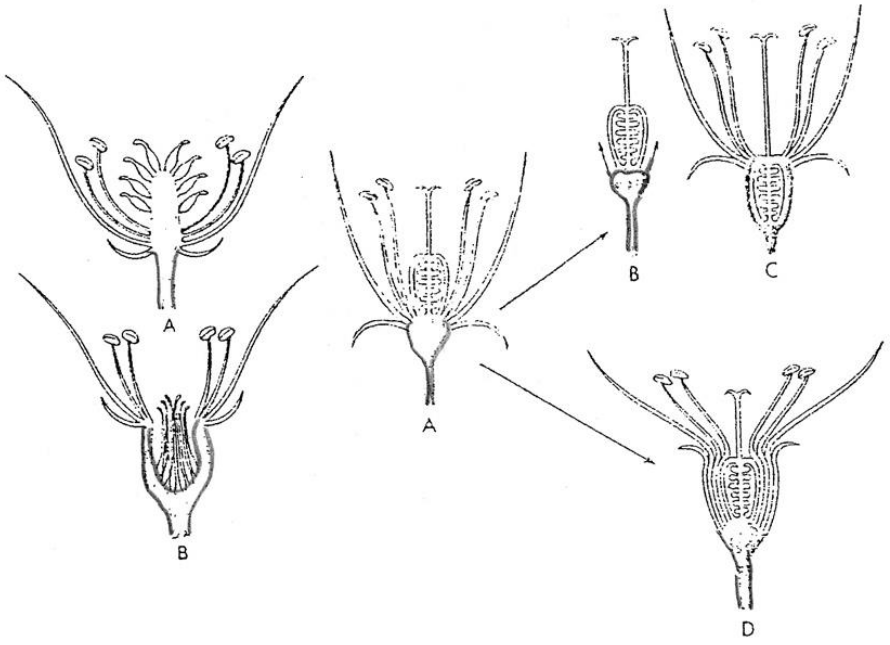
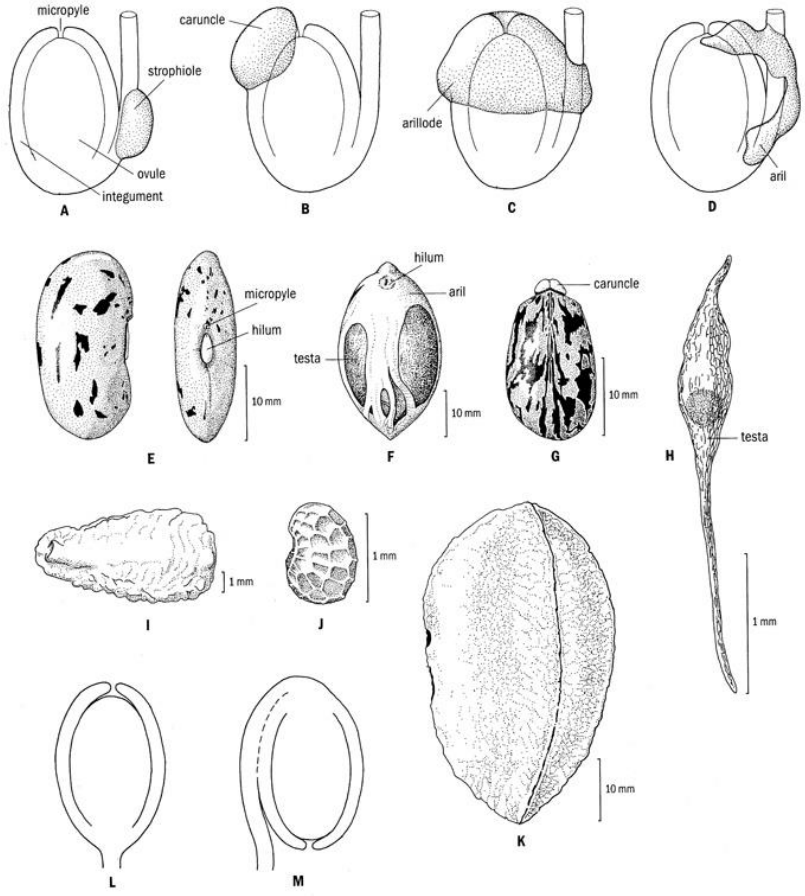
compound leaf

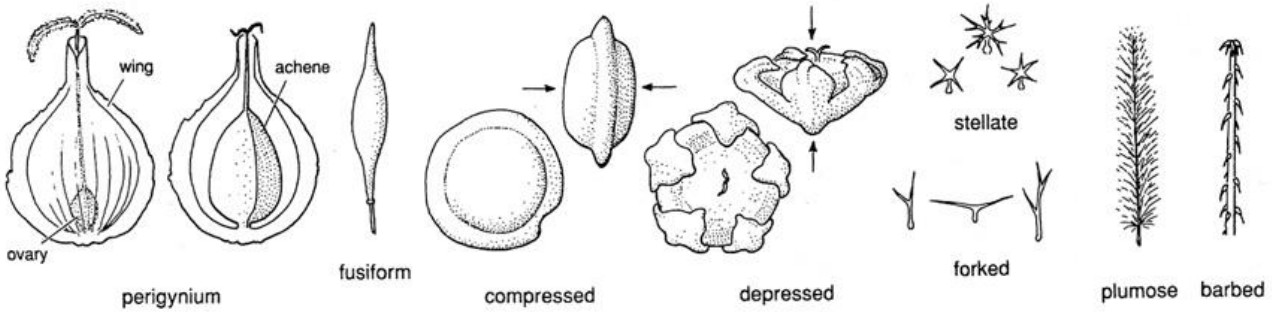


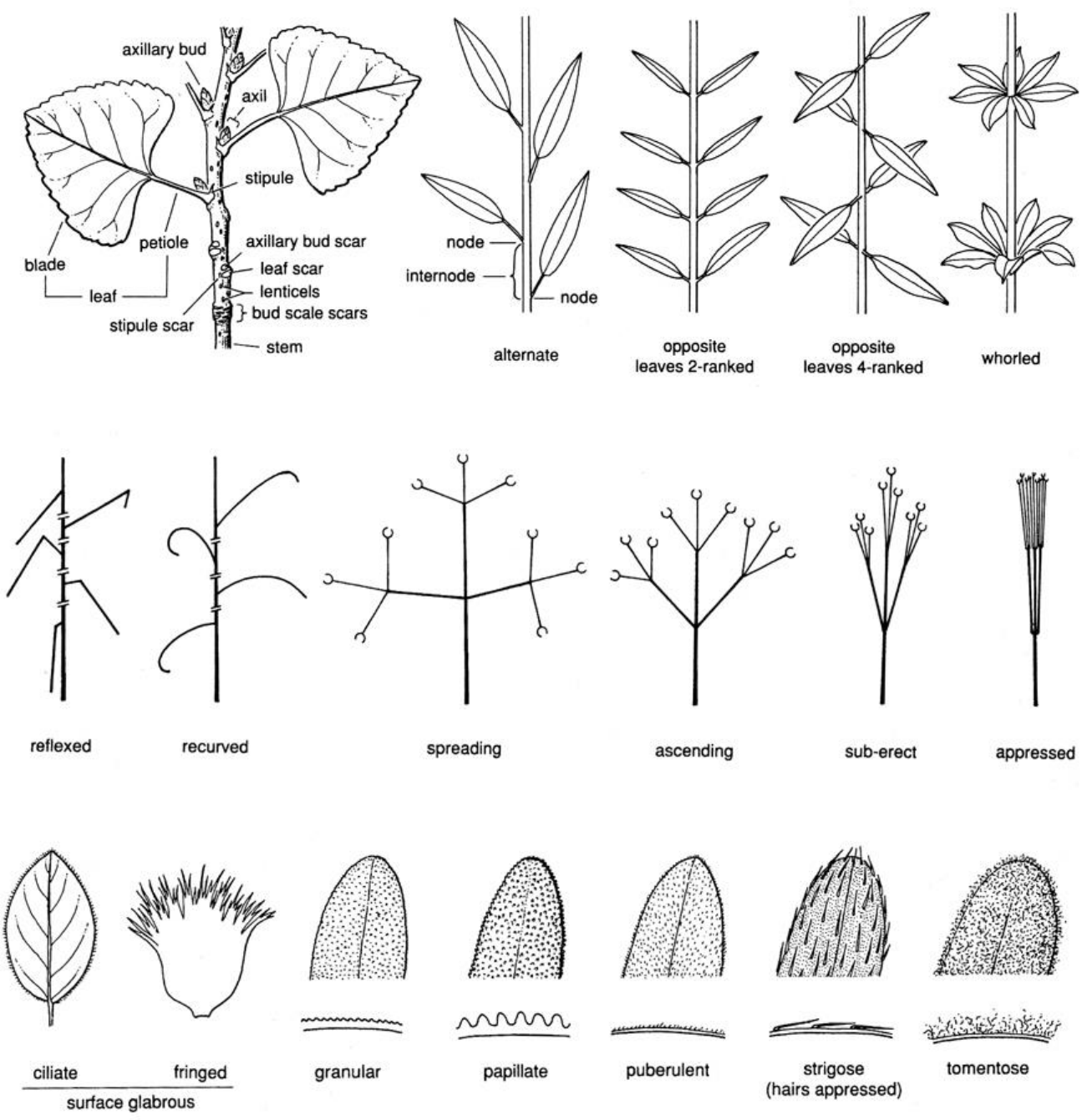
Folding of leaves together: **A** appressed; **B** valvate; **C** open; **D** opposite; **E** convolute; **F** convolute; **G** equitant; **H** obvolute.





A–D Arilloids: **A** strophiole; **B** caruncle; **C** arillode; **D** aril; **E–K** single seeds: **E** *Phaseolus vulgaris*; **F** *Myristica fragrans*; **G** *Ricinus communis*; **H** *Epidendrum ibaguense*; **I** *Proboscidea parviflora*; **J** *Papaver hybridum*; **K** *Bertholletia excelsa*; **L** orthotropous ovule; **M** anatropous ovule.





Parts of a Flower, Diagram and Functions

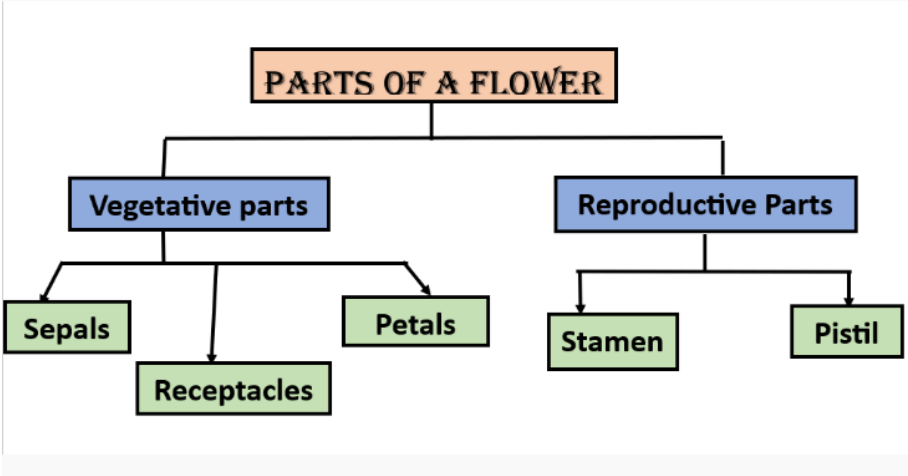
Parts of A flower is divided into 5 main parts: receptacles, sepals, petals, stamen, and pistil or carpel.

Parts of a Flower and Their Functions

There are a total of 5 main parts of a flower, which are the receptacles, sepals, petals, stamen, and carpel. Each part of a flower has a specific function that contributes to the reproduction process of a plant. These parts of a flower are divided into two parts: The vegetative part and the Reproductive part.

A flower is a reproductive structure of flowering plants (or angiosperms) that typically consists of colorful petals, protective sepals, male part stamens, and female part pistils.

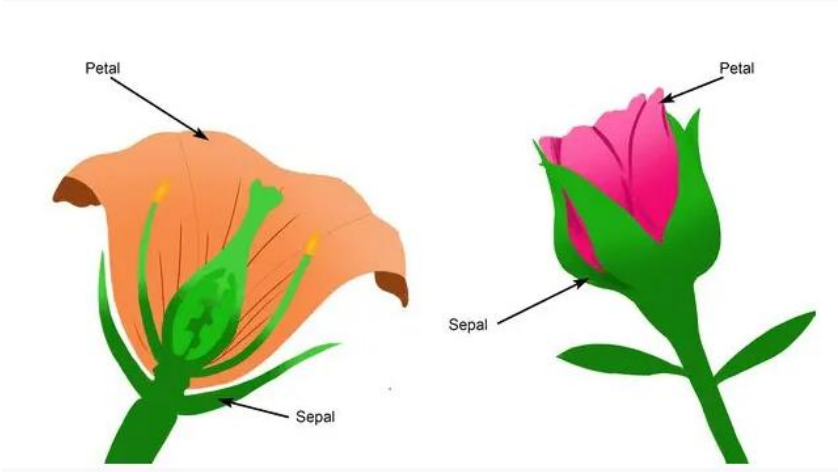
Flowers play a crucial role in plant reproduction by attracting pollinators, helping pollen move between the male and female parts of the plant's reproductive system, and later on, creating seeds that can grow into fresh new plants. The male part (Stamen) of the Flower consists of Anther and Filament, while the female part (Carpel or Pistil) of the flower comprises Stigma, Style, and Ovary.



In a flower, the parts that aren't involved in making seeds are called vegetative parts. These are things like receptacles, petals, and sepals. On the other hand, the parts that help make seeds are the reproductive parts, which include the stamen, pistil, or carpel. Along with the vegetative and reproductive parts, a flower also consists of four Whorls which are calyx, corolla, stamen, and carpel. Here discuss both the vegetative and reproductive parts of a flower. Firstly the main 9 parts of a flower are tabulated below:

Parts of the Flower	
Name of the parts	**Description**
Receptacles	It is the base of the flower where all the floral organs (such as petals, sepals, and stamen) are attached.
Sepals	The leaf-like structures found at the base of a flower protect the flower during its budding stage and can be green or colored.
Petals	They are the most beautiful, colorful, and delicate parts of a flower. The petals surround the reproductive organs, they also help in attracting pollinators, which leads to the process of pollination.
Stamen	**The stamen is the male reproductive part of a flower, consisting of filament and anther**. The anther produces pollen, while the filament holds the anther in place.
Carpel	**The carpel is a female reproductive structure of a flower, consisting of a stigma, style, and ovary.**

Parts of the Flower



Name of the parts

The vegetative parts of a flower are components that support and protect a flower's reproductive structure. The vegetative parts involve the receptacles, sepals, and petals. All three vegetative parts of a flower combine and contribute to the functioning and success of both pollination and fertilization.

Different Vegetative Parts of a Flower	
Vegetative parts	**Description**
Receptacles	Receptacles are flower base that supports the reproductive parts of a flower and develops into a fruit after fertilization.
Sepals	Sepals are the outermost part of the flower which protects the developing bud.
Petals	Petals are the brightly colored parts of a flower that help in Pollination by attracting pollinators.

1. Receptacles

The bottom part of a flower called the receptacle, is where all the different flower parts are connected. It can be said that the receptacles serve as an attachment point for the sepals, petals, stamen, and pistils of the flower. All these parts are arranged around the receptacle in different patterns. The receptacle is an important part of the flower, as it provides support and connection for various reproductive components. The receptacle is not a reproductive part itself, but it gives a platform that supports the floral organs together.

Functions of Receptacles

The receptacle is like a flower's base that holds and organizes its parts. It also helps carry nutrients and

can even play a part in making fruit for certain plants. Although it's not super specialized, the receptacle does many important jobs in a flower.

a) **Structural Support:** The receptacle provides structural support for the entire flower and holds all the other floral organs which are the sepals, petals, stamen, and pistils. This support makes sure that these reproductive parts are positioned well for effective pollination and fertilization to happen.
b) **Organ Coordination:** By keeping all the flower parts together, the receptacles enable smooth teamwork among the various reproductive organs.
c) **Nutrient Transport:** The receptacles might contribute to moving nutrients around. All the parts of the flower are connected to the vascular system with the help of the receptacles.
d) **Adaptation and pollination:** The receptacle's size, shape, and features can be adapted to attract specific pollinators, ensuring effective pollination.
e) **Formation of Fruits:** As the flower matures and gets fertilized, the receptacles often transform into parts of a fruit structure, providing a protective enclosure for the developing seeds.

2. Sepals

The sepals are leaf-like structures that form the outermost whorl of a flower, usually green in color. Collectively all the sepals are known as "Calyx". The sepals or calyx play a great role in protecting the flower when it is in its initial stages or we can simply say when the flowers are in the bud form.

Functions of Sepals

The sepal plays several functions, and these functions can vary among different plant species and types of flowers. The functions of the sepals include the protection of the developing bud, and providing support to the petals, these petals also play a very important role in attracting pollinators and regulating the opening and closing of the flower. Some other important functions of a sepal are discussed below:

a) **Protection:** Sepals enclose and protect the developing flower bud in its early stage, providing a shield against physical damage, pathogens, and harsh weather conditions.
b) **Determination of flower color:** Sepals can influence the coloration of the flower, as their pigmentation can contribute to the overall appearance of the blooming flower.
c) **Regulation of Bud Opening:** Sepals can control the opening of the flower bud, allowing it to open at the appropriate time for pollination and preventing premature blooming. They usually act as a barrier, which helps in preventing the flower from opening.
d) **Photosynthesis:** In some plants, photosynthesis can be performed by the sepals, in the presence of sunlight which gives energy to the plant. However, this feature is less common.
e) **Sensory Role:** Sepals can play a role in sensing and responding to environmental cues, such as changes in light, temperature, or humidity.

3. Petals

The petals refer to the colorful parts of a flower. The petals lie inside the sepals. Collectively all the petals are known as "Corolla". The petals are usually scented and sticky which allows the flower's reproductive process by enacting pollinators. The petal's main function is to attract insects (for pollination) and to protect the reproductive organs which are at the center of the flower.

Functions of Petals

The petals play many important roles, one of them is that the petals help in the reproductive success of the flower by pollinators, protecting reproductive structures, and facilitating the pollination process. Some other important functions of the Petals are discussed below:

a) **Attraction:** Petals are often brightly colored and scented to attract pollinators such as bees,

butterflies, and birds, which leads to the process of fertilization.

b) **Protection:** Petals can shield the reproductive parts of a flower, including the stamen and pistil, from harsh weather conditions and potential damage.
c) **Advertisement:** The shape, color, and patterns of the petals can convey information to the pollinators about the flower's nectar availability and suitable pollination.
d) **Landing Platform:** Petals provide a stable platform for pollinators to land on, making it easier for them to access the flower's nectar and pollen. This makes sure that the pollen grains are transferred for Fertilization.
e) **Environmental Sensing:** Petals can respond to environmental changes such as temperature and light, influencing their opening and closing, which affects pollination

Reproductive Parts of a Flower

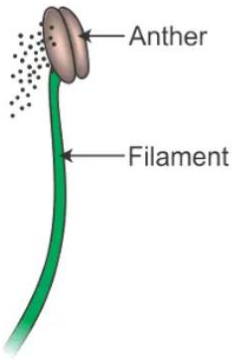
A flower consists of both male and female reproductive structures that enable the process of reproduction in plants. The male reproductive part of a flower is known as the Stamen which consists of a filament and anther. The anther consists of the plant's male reproductive cells or sperms, and the female reproductive part of a flower is known as the Pistil which consists of the stigma, style, and ovary. All three pistil parts work together and help form seeds and fruits.

Reproductive Parts of a Flower	
Reproductive Parts	**Description**
Stamen	The stamen is the male reproductive organ of a flower which consists of anther and filament.
Carpel or Pistil	The carpel is the female reproductive organ of a flower which includes stigma, style, and ovary.

1. Stamen

The stamen is the little stalks with swollen tops just inside the ring of petals in a flower. The male reproductive organ of plants is known as Stamen. The stamen produces pollen grains. The stamen is a set of two parts other parts which are: the Filament and an Anther. The filament is the stalk of the stamen, while the anther is the swollen top of the stamen. The making and storing of the pollen grains is done by the anther of the stamen. The pollen grains appear as a yellow, powder-like substance.

The male gametes or male sex cells of the plant are present in the pollen grains. It is clear from the above discussion that the male gametes of a plant are made in the anther of the stamen. There are a very large number of stamens present in each flower.



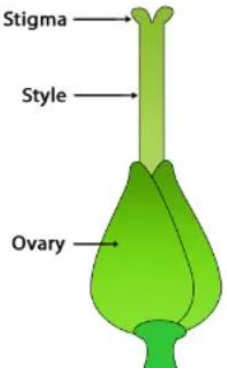
Functions of the Stamen

The stamen has many different functions, one of them is the success of the reproduction process and genetic diversity of a flowering plant. The stamen is a set of two different parts: the filament and the anther. We have mentioned all the important functions of a stamen below.

a) **Pollen Production:** The anther is responsible for producing pollens. These pollens contain the male reproductive cells called sperms, which are necessary for fertilization.
b) **Male Gamete Dispersal:** The pollens are released into the environment with the help of the anther. These pollens can be carried by various pollinating agents like insects, birds, wind, or water to the other flower, which helps in the process of cross-pollination.
c) **Genetic Diversity:** The stamen also helps in promoting genetic diversity within a plant population.
d) **Reproduction:** The stamen and its pollen must coordinate with the Pistil (female reproductive parts) of other flowers for successful fertilization. This coordination makes sure that the pollens are transferred.
e) **Pollen Tube Formation:** After pollination, the pollen tube formation occurs when the pollen grain lands on the stigma of the pistil. These pollen tubes grow down through the style, which delivers sperm cells to the ovules within the ovary for fertilization.

2. Carpel

The carpel is present at the center of a flower, which is a flask-shaped organ. The female reproductive organ of the flower is known as the Carpel. A carpel consists of three main parts: The stigma, style, and ovary. Where the topmost part of the carpel is known as Stigma. The Sigma is a sticky surface where pollens are received. The stigma helps in receiving the pollen grains from the anther of the stamen (at the time of pollination). The connecting link between the stigma and the ovary is known as style. There may be one or multiple carpels in each flower. All parts of the carpel or pistil work together for the proper functioning of the carpel.



Functions of a Carpel or Pistil

The female reproductive structure found in a flower is the carpel or pistil. The main function of the Pistil or Carpel is to receive pollen, facilitate the fertilization process, and protect and nurture the developing seeds within the ovary. Other functions of the pistil are discussed here.

a) **Reproductive structure:** The carpel is the female reproductive organ of a flower, responsible for producing and protecting the ovules.
b) **Ovule Enclosure:** The carpel's main function is to enclose and protect the developing ovules, which eventually develop into seeds after fertilization.
c) **Fertilization:** Within the ovary, these pollens fertilize the ovule (egg-containing structures). This results in the formation of seeds.
d) **Seed Development:** The ovules develop into seeds, after a successful fertilization. The protection and nourishment of these developing seeds is also provided by the pistil.
e) **Chemical Signaling:** Specific chemicals and scents are released by these pistils or carpels that attract pollinators, and then these pollinators help in the transfer of pollens from one flower to the other.

Whorls of a Flower

The whorls of a flower refer to the concentric rings of floral organs that are arranged around the central axis of a flower. A flower consists of a total of four whorls that are – the calyx, corolla, stamen, and carpel. Variations in the number, arrangement, and fusion of these whorls contribute to the diverse array of flower shapes and sizes observed in the natural world. All four types of Whorls of a flower are briefly discussed below.

Different Whorls of a Flower	
Whorls	**Description**
Calyx	Calyx are the outermost whorls, made up of sepals.
Corolla	Corolla are the whorls present inside the calyx, composed of petals.
Stamen	Stamen is the male reproductive structure of a flower.
Carpel	The carpel is the female reproductive structure of a flower.

Calyx

The outermost whorl of a flower is known as a Calyx, typically composed of individual leaf-like structures known as sepals. These sepals are generally green in colour, they encircle the base of the flower, and these sepals also play a great role in protecting the developing bud before it opens. The most important function of the calyx is to provide support and protection to the inner floral structure as it develops. When the flowers are fully opened, the sepals of the flower may remain small or change various shapes and colors, depending on the plant species.

Corolla

The second whorl of a flower is known as the Corolla, located just inside the calyx. One or more petals together are called corolla, these corollas are usually colorful and often play a role in attracting pollinators like insects, birds, or even bats. The petals are typically larger and more delicate than the sepals of the calyx. The corolla's appearance, color, and shape can greatly vary across different plant species,

reflecting adaptations to their specific pollination strategies.

Stamens

As we already discussed, the stamen is the male reproductive structure of a flower. Each stamen mainly consists of two parts: a filament and an anther. The pollens are produced by the anther, these pollens contain the male gametes which are necessary for fertilization.

Carpels

The carpels are known as the flower's female reproductive structures. Every carpel has its own ovary, style, and stigma. The ovary contains the female gametes which are known as ovules. After fertilization, the ovaries develop into fruits. The other details about the carpel are discussed in the above paragraphs.