Plant Identification
Brooklyn Botanic Garden

Parts of a leaf

The leaf consists of two main parts: the lamina and the petiole.

- **Lamina**: The flat portion of a leaf, also called the leaf blade.
- **Petiole**: The stalk to which the lamina is attached. There are several types of petiole:
  - **Phyllode**: A broadened, leaf-like petiole. In this case, the leaf has lost its lamina during evolution and the petiole has taken its place in photosynthesis. Some acacias have phyllodes.
  - **Pulvinus**: A swollen area at the base of a petiole. The pulvinus often acts to lower the leaf when it is wilted. It is also the part of the sensitive plant (*Mimosa pudica*) that makes the leaves close up when touched.
  - **Sheath**: A broadened petiole base that surrounds the stem. Most grasses have leaf sheaths.

Other leaf parts include:

- **Stipule**: A leaf-like growth at the base of the petiole. The presence of stipules is characteristic of a number of species. Often, they protect the buds and developing leaves and then fall off. Some can be large and conspicuous. They are typically paired in dicots, when they are present, and absent in monocots.
- **Buds**: Small shoots with scale-like leaves which, when given the proper conditions, burst out in growth. Although not technically leaves, buds are nearly always found associated with the base of a leaf petiole.

Leaf Divisions

- **Simple leaf**: A leaf with only one lamina.
- **Compound leaf**: A leaf with two or more lamina (called leaflets). It is often difficult to distinguish a leaflet from a simple leaf; they look for all intents and purposes the same. It is important to keep in mind that a leaf is defined by its development and position, not just by its appearance. In general, compound leaves can be recognized by the absence of a bud at the base of the leaflet. There are several different types of compound leaves, including:
  - **Palmate**: Leaves with the leaflets attached to a common point like the fingers of a human hand.
  - **Pinnate/bipinnate/tripinnate**: Leaves with the leaflets aligned along a central stalk (called a rachis) like the tines of a comb. Pinnately compound leaves may have only a single rachis or the rachis may branch once, in which case it is called *bipinnate*; twice, in which case it is called *tripinnate*; or three times, in which case it is called *quadripinnate*. These leaves can be further classified into *paripinnate*, in which all the leaflets are more or less paired, and there is no single terminal leaflet, and *imparipinnate*, in which there is a single terminal leaflet.
  - **Ternate/biternate**: Leaves with three leaflets and in which the terminal leaf is not stalked. In other words, this is a palmately compound leaf with three leaflets. It follows that biternate leaves are doubly ternate, with the ternate divisions again ternately divided.
  - **Trifoliate**: Leaves with three leaflets and in which the terminal leaflet is stalked. In other words, this is a pinnately compound leaf with three leaflets.
Leaf Shape

When describing leaf shapes, botanists use a variety of terms often taken from Latin. These terms can be used for describing any flat shape on a plant (not only the leaf, but also the stipule, sepal, petal, and so on). These terms take into account the length-to-width ratio, the curving of the margin or edge, and the position of the widest point. For additional precision, words like "narrowly," "widely," and "depressed" are often used to qualify the terms. The following are some of the more common leaf shapes:

- **Deltoid (deltate):** About the same length as width. Shaped like a triangle in which all sides are the same length. Cottonwood ( *Populus grandidentata* ) has deltoid leaves.
- **Elliptic:** One and a half to two times longer than wide. Shaped like a narrow oval. The margins are symmetrically curved, and the leaf is widest at the middle. Chestnuts ( *Castanea* species) have elliptic leaves.
- **Lanceolate:** Three to six times longer than wide. Shaped like the tip of a lance. The margins are symmetrically curved, and the leaf is widest toward the base. Willows ( *Salix* species) have lanceolate leaves.
- **Linear:** More than twelve times longer than wide. Long and narrow with more or less parallel margins. Most grasses have linear leaves.
- **Oblong:** One and a half to two times longer than wide. Similar to elliptic but the margins are parallel, not curved. Willow oak ( *Quercus phellos* ) has oblong leaves.
- **Ovate:** One and a half to two times longer than wide. Shaped like an egg. The margins are symmetrically curved, and the leaf is widest below the middle. Beaked hazelnut ( *Corylus cornuta* ) has ovate leaves.

Leaf Base

The base of the leaf blade can have a wide variety of shapes. The following are a few common leaf base shapes:

- **Acute:** Tapering to a sharp point with convex sides.
- **Auriculate:** A base with rounded projections that have a concave inner margin.
- **Cordate:** Heart-shaped; the base has a notch similar to that at the top of a heart.
- **Cuneate:** Tapering to a sharp point. Similar to acute but with straight, not convex, sides.
- **Hastate:** A base with outwardly pointed lobes.
- **Oblique:** A base that is not symmetrical on both sides.
- **Obtuse:** Tapering to a blunt point.
- **Peltate:** Borne on a stalk attached to the lower surface rather than to the base or margin of the leaf. Nasturtiums ( *Tropaeolum majus* ) have peltate leaves.
- **Perfoliata:** A leaf in which the bases of two opposite leaves are fused around the stem, so that the stem appears to pass through the leaf.
- **Sagittate:** With a downwardly pointed lobe on each side of the base.
- **Truncate:** A base that is squared off at the ends, as if cut off.

Leaf Margin

The margin or edge of a leaf can have teeth, hairs, or other type of indentation. Some of the more common margin types are:

- **Ciliate:** With hairs along the margin.
- **Crenate:** With low, rounded teeth that have no point.
- **Dentate:** With teeth along the margin that are pointed outward from the margin. Similar to serrate, but in serrate the teeth are pointed at least slightly upward towards the tip.
- **Double serrate**: With serrate teeth along the margins of other, larger serrate teeth.
- **Entire**: Without any indentations or teeth.
- **Serrate**: With teeth along the margin that are pointed upwards towards the tip of the leaf.
- **Undulate**: With a wavy margin.

**Leaf Lobe**

Leaves can have shallow indentations or deeper indentations, forming lobes. It can be difficult to distinguish between deeply incised teeth and shallow lobes. Some of the more common types of lobing are:

- **Cleft**: The margin is cut in towards the midvein.
- **Incised**: The leaf is cut sharply and deeply, into usually regularly shaped lobes.
- **Lacerate**: Irregularly lobed with deep incisions that look as if they were torn.
- **Laciniate**: Slashed; similar to incised, but the cuts are sharply angled.
- **Palmate**: Palm-shaped; with several lobes from a single point.
- **Pectinate**: Comb-shaped; the same as pinnatifid but with more numerous, straighter, and narrower lobes.
- **Pedate**: Similar to palmate, but the lateral lobes are further dissected.
- **Pinnatifid**: Pinnately lobed half the distance or more to the midrib, but not all the way to the midrib.

**Leaf Apex**

The apex or tip of the leaf, like the base, comes in a wide variety of shapes that are characteristic of different species. Some of the more common leaf apex shapes are:

- **Acuminate**: A sharp apex with less than a 90 degree angle and concave sides.
- **Acute**: Similar to acuminate but with straight to convex sides.
- **Apiculate**: Similar to mucronate in that it ends in a sharp point but the point includes tissue from the midvein and the lamina.
- **Aristate**: Ending in a hard, bristle-shaped tip.
- **Caudate**: Very acuminate, with a long and thin tip.
- **Cuspidate**: A form of acuminate in which the tip tapers gradually to a point.
- **Emarginate**: Broadly notched at the apex. Similar to retuse, which is only slightly notched.
- **Mucronate**: A sharp point (mucro) formed by a continuation of the midvein.
- **Obcordate**: Heart-shaped; notched at the tip like the top of a heart.
- **Obtuse**: A blunt apex with more than a 90 degree angle.
- **Retuse**: Slightly notched at the apex.

**Leaf Arrangement**

Leaves can be arranged on a stem in a variety of ways. Some of the more common arrangements are:

- **Alternate**: One leaf per node. Oaks have alternate leaves.
- **Basal**: All the leaves coming from the base. Tulips have basal leaves.
- **Equitant**: Overlapping one another into two vertical rows or ranks, forming a fan, as the leaves of irises.
- **Fascicled**: Clustered, as in most species of pine.
- **Imbricate**: Overlapping one another. The leaves of Norfolk Island pine (*Araucaria heterophylla*) are imbricate.
- **Opposite**: Borne across from one another at the same node; paired. Maples have opposite leaves.
- **Rosulate**: Arranged in a basal rosette, with little or no stem. Sedums have rosulate leaves.
- **Whorled**: With three or more leaves at the same node, arranged in whorls. Joe-pye weed (Eupatorium maculatum) has whorled leaves.

### Modified Stems

Stems of some plants occur in a modified form to accommodate additional functions. The following are some modified stem forms:

- **Corm**: An underground, vertical stem that is swollen. A corm looks very much like a bulb but is composed of stem tissue, as opposed to a bulb, which is made up of leaf tissue. Gladioli, crocuses, and freesias are corms.

- **Phylloclade**: A flattened, green stem with small, scale-like leaves. Phylloclades look like leaves and even function as leaves. But morphologically, they are stems. One plant with phylloclades is Ruscus hypoglossum, the "laurel" of Caesar.

- **Rhizome**: A horizontal stem found underground. A rhizome can be distinguished from a root by the presence of nodes on the rhizome ends. Ginger (Zingiber officinale) is a rhizome.

- **Runner**: A thin, horizontal stem found above ground with a rosette of leaves at the end. A runner is very similar to a stolon. Both structures allow the plant to move within its environment. Strawberries (Fragaria species) have runners.

- **Spine**: A modified stem (or leaf stipule, or root) that is sharp. The term thorn is a synonym. A prickle is similar, but is produced from the epidermis of the stem, leaf, or root. Opuntia and other cacti have spines.

- **Stolon**: A horizontally growing stem at ground level with leaves along its length (not just a rosette at the end, as in a runner) and adventitious roots that form at the nodes. Stolons are similar to runners. White clover (Trifolium repens) has stolons.

- **Tendril and hook**: Modified stems or leaves that grasp other plants and act like grappling hooks. Tendrils and hooks, which are found on vines, assist the vine in supporting itself. The Virginia creeper is unusual because it has small pads at the ends of its tendrils. These pads attach themselves to walls and tree trunks instead of twining around the trunk.

- **Tuber**: An underground, swollen stem. A tuber is usually a swollen rhizome. The potato is the classic tuber.

### Parts of an Inflorescence

An inflorescence is composed of several different parts:

- **Floret**: The smallest unit of an inflorescence. In grasses, it is composed of a flower and two bracts called the *palea* and *lemma*.
- **Pedicel**: The portion of stem immediately below a flower (or spikelet in grasses).
- **Peduncle**: The portion of stem above the leaves and below the lowest branching point of the inflorescence. Or, in a single-flowered inflorescence, the portion of stem below the flower and above the leaves.
- **Rachis**: The main stem portion of an inflorescence above the peduncle and below the pedicels.
- **Ray**: The outermost flowers of a composite inflorescence. Rays often look like petals of a flower.
• **Scape:** A leafless stem arising at ground level and ending at the inflorescence. The term is equivalent to peduncle but only for plants with basal leaves.

• **Spathe:** A large bract beneath and enclosing the inflorescence.

### Inflorescence Types

Inflorescences are some of the most complex parts of a plant to describe. There are many small differences and exceptions to common definitions. Some of the more common inflorescence types are:

- **Capitulum:** An inflorescence in which the flowers are found on a flattened surface called a receptacle. This is the type of inflorescence found in the sunflower family (Asteraceae).

- **Catkin:** A pendulous spike of reduced flowers. Catkins are adapted to wind pollination; they dangle down from the branch and blow in the wind, allowing the pollen to be freely dispersed. Oaks and birches have catkins.

- **Cauliflower:** Having inflorescences on the stem of a tree. This is the type of inflorescence found in the native redbud tree (*Cercis canadensis*).

- **Corymb:** A flat-topped raceme; the lower branches of the raceme are long and the upper branches are short so that the overall shape is flat. Bridal-wreath *Spiraea x van houttei* is an example of a plant with corymbose inflorescences.

- **Cyme:** An inflorescence that terminates in a flower, and lateral branches arising below this flower also terminate in flowers. Usually, the flower at the end of the central shoot blooms first, with additional flower buds opening in sequence, from inside out. Wild pink (*Silene caroliniana*) bears cymes.

- **Fascicle:** An inflorescence with a very short shoot and long pedicels, so that it appears as if a cluster of flowers arises from a single point. Common cherries (*Prunus domestica*) are borne on fascicles.

- **Panicle:** A raceme in which the lateral branches are themselves branched. Kentucky bluegrass (*Poa pratensis*) has spikelets in panicles.

- **Raceme:** An unbranched, elongated shoot with lateral flowers that mature from the bottom upwards. Black cherry (*Prunus serotina*) has racemose inflorescences.

- **Single flower:** An inflorescence composed of a single flower. Tulips have single-flowered inflorescences.

- **Spadix:** A spike with small flowers crowded on a fleshy axis, characteristic of the Araceae (Jack-in-the-pulpit family).

- **Spike:** A raceme with unstalked flowers maturing from the bottom upwards. Wheat (*Triticum aestivum*) has spike-form inflorescences.

- **Umbel:** A flat-topped inflorescence in which the pedicels all originate from a single point, much like the struts of an umbrella. Queen-Anne's-lace (*Daucus carota*) has umbelliform inflorescences.

### Flower Parts

The following are the major flower parts:

- **Androecium:** The male parts of the flower forming a whorl between the gynoecium (the female parts) to the inside and the corolla (the showy parts) to the outside. It includes one to many stamens, each of which typically includes a filament and an anther. Within the anther pollen is produced.

- **Anther:** The part of a stamen where pollen is produced. It typically sits atop a filament.

- **Calyx:** The outermost whorl of modified leaves found in the typical flower. It is the collective term for all the sepals of a single flower and is frequently green and inconspicuous.

- **Corolla:** The usually showy part of the flower, a whorl of modified leaves just inside the calyx. This is the collective term for all the petals of a single flower.
• **Carpel:** The structure that bears and encloses the ovules (egg-containing structures in the ovary).

• **Corona:** An extra-floral set of appendages that protrude from between the corolla and the stamens or from the corolla. The crown-like corona of Daffodils is an example.

• **Filament:** The part of the stamen that typically serves as a stalk for the anther.

• **Fruit:** A mature ovary that frequently contains mature ovules or seeds.

• **Gynoecium:** The female parts forming a whorl at the center of the flower. It includes one to many pistils, each of which typically includes a stigma, style, and ovary.

• **Hypanthium:** The cup formed from the receptacle and/or perianth that has fused with the androecium. Not all flowers have a hypanthium. The rose family (Rosaceae) has many species whose flowers have a hypanthium.

• **Ovary:** The typically enlarged, bottom part of the pistil where ovules are produced.

• **Ovule:** The egg-containing structures within the ovary that develop into seeds.

• **Locule:** A chamber within the ovary. A simple ovary has a single locule while a compound ovary has more than one locule. For example, a bicarpellate ovary has two locules. The number of locules is usually the same as the number of carpels.

• **Pedicel:** The "stalk" that supports a single flower in an inflorescence made up of more than one flower.

• **Peduncle:** The "stalk" that supports either a single flower, in plants that produce only a single flower, or an entire inflorescence.

• **Perianth:** The collective term for all the sepals and petals of a single flower.

• **Petal:** A sterile, highly modified leaf that is a single "unit" of the corolla. Petals are usually the showy part of a flower and may include special structures, called nectaries, for attracting insect pollinators and/or special, ultraviolet markings, called honey guides, for guiding insects, such as bees, to pollen.

• **Pistil:** A single female reproductive "unit." The pistil typically has three recognizable regions: the stigma, the style, and the ovary.

• **Pollen:** The male gametophyte. Pollen grains give rise to sperm.

• **Rachis:** The central stalk of an inflorescence to which the pedicels of individual flowers are attached.

• **Receptacle:** The region at the top of either the peduncle or pedicel where the floral appendages (for example, sepals, petals, stamens, and pistils) are attached.

• **Sepal:** A sterile, modified leaf that is a single "unit" of the calyx. Sepals are frequently green and inconspicuous.

• **Stamen:** The male reproductive structure made up of an anther and a filament.

• **Staminode:** A whorl of modified leaves just outside the stamens. Staminodes are frequently inconspicuous and stamen-like.

• **Stigma:** Typically, the top portion of a pistil, which receives pollen and provides conditions necessary for their germination.

• **Style:** The typically elongated region of a pistil between the stigma and ovary.

• **Tepal:** The term used for any single "unit" of the perianth when sepals and petals are morphologically similar.

Corolla is the collective term for all the petals of a single flower. This is usually the showy part of the flower.

**Corolla Shape**

Corollas can be either actinomorphic (radially symmetrical, meaning that when you look down on the calyx or corolla you can see an infinite number of bisecting lines or planes that can cut the flower in equal halves) or zygomorphic (bilaterally symmetrical, meaning that when you look down on the calyx or corolla you can see that only one bisecting line that can cut the flower in equal halves). The following are different actinomorphic forms:

• **Campanulate:** Bell-shaped, as in bellflowers (Campanula species).

• **Funnelform:** Funnel-shaped, as in bindweeds (Convolvulus species).
• **Rotate:** Wheel-shaped, as in bluets (Hedyotis caerulea).
• **Salverform:** Trumpet-shaped, as in Russian olive (Elaeagnus angustifolia).
• **Tubular:** Cylindrical, as in trumpet vine (Campsis radicans).
• **Urceolate:** Urn-shaped, as in highbush blueberry (Vaccinium corymbosum).

The following are different zygomorphic forms:
• **Bilabiate:** With two lips composed of fused petals, as in snapdragon (Antirrhinum majus).
• **Galeate:** With a helmet-shaped appendage on one side. The corollas of monkshoods (Aconitum species) are galeate.
• **Saccate:** With an enlarged, pouch-like appendage on one side, as in the lady-slipper orchid (Cypripedium acaule).

**Plant Longevity**

Another way of looking at plants is based on longevity -- how many years the plant lives.

• **Annual:** A plant that completes its life cycle within a single year.
• **Biennial:** A plant that completes its life cycle in two years.
• **Perennial:** A plant that lives more than two years.

**Life Stages**

Within broad categories such as annual and perennial, individual plants exhibit a variety of forms and functions during their life span. These stages in the life of a plant can be classified as follows:

• **Seed:** A period in the life of a plant in which no growth is taking place.
• **Pre-reproductive:** The period in the life of a plant after germination but before reproduction. This phase can be separated into several stages: seedling, juvenile, and virginile.
• **Seedling:** A young plant that is partly dependent on substances of the maternal plant stored in the seed (especially the first leaves, called cotyledons). The plant always has embryological structures, including cotyledons, a primary root (the embryological root), and a primary shoot (the embryological stem).
• **Juvenile:** Juvenile plants are structurally simple but have progressed beyond the seedling stage. They no longer have cotyledons and often exhibit the mature forms of leaves, shoots, and roots. A tree sapling is an example of a juvenile plant.
• **Virginile:** Virginile plants begin to show the main features of mature plants but are not reproductive. In other words, these are mature plants that have not started to flower.
• **Reproductive:** A mature plant that forms flowers and fruits. This long period can be separated into three sub-categories: young, mature, and old.
• **Young:** Young reproductive plants exhibit more new growth than death of old parts.
• **Mature:** Mature plants exhibit a balance between growth and death of parts. These plants usually have the greatest yearly seed production and biomass increase (increase in weight). In other words, they are at their peak.

**Botanical Freaks**

Abnormal growth, caused by disease, genetics, or human manipulation, is far from unusual in the plant world. Three common forms are:

**Fasciation:** A stem or root that is abnormally flattened or sometimes develops into a hollow tube (ring fasciation). Cockscomb (Celosia cristata) is a fasciated form of the species Celosia argentea. In this case, the inflorescence has become abnormally flattened and resembles a cockscomb.
**Chimera:** A structure or tissue that is formed from two genetically different sources. Some chimeras are the result of grafts in which a branch is formed from tissue from the root stock and the grafted stem growing together. *Vinca minor* 'Variegata' is an example of a chimera.

**Galls:** A structure formed in response to insect, nematode, mite, or fungal infestations. The galls often are home to the invader for a portion of its life cycle. Oak trees often have a large number of ball-shaped galls formed by wasps. They appear to be so normal a part of the plant at times that botanists in the past have mistaken them for a type of fruit.

**How Plants Are Named**

**Taxon**

Taxonomy is the science of plant classification. The word taxon (plural, taxa) refers to any taxonomic entity, regardless of rank. In other words, the plant family Ericaceae is a taxon, the genus *Vaccinium* is a taxon, and the species *Vaccinium angustifolium* is a taxon.

**Genus and Species**

The basic category of plants is the *species*. Every species on Earth has one, and only one, correct scientific name by which it is known throughout the world. This species name is called a binomial because, in fact, it is two words: the genus and the specific epithet. The binomial system we use today was founded by the Swedish botanist Linnaeus over 200 years ago. Because there has been a standard method of naming plants and rules for the creation and application of new names, we not only can communicate more effectively but also read works from Linnaeus's day and easily understand which species the author was referring to.

The following is the scientific name for the potato:

*Solanum tuberosum* Linnaeus

*Solanum*, the first part of the scientific name for potato, is the genus. It comes from the classical Latin name for this large and varied group that includes bittersweet, nightshade, potato, and Jerusalem cherry. In fact, the genus name is often based on the original Latin or Greek name for the plant. It also may be derived from a number of other sources, including the name of a botanist or an anagram. The name of the genus is written in italics.

The specific epithet is "tuberosum." It should almost always be in lower case; occasionally, if it is a proper noun (for example, someone's name), it can have an initial capital letter (this is optional under the code). The specific epithet is usually an adjective that modifies the genus. In this case, *tuberosum* indicates that potato is a tuberous species in the genus *Solanum*. Like the genus, the species is always written in italics.

"Linnaeus" refers to the author of the scientific name for potato. In other words, Linnaeus was the first person to use the binomial *Solanum tuberosum* for the potato plant. If the species were first classified in a different genus or at a different rank (if, for example, it were once considered a subspecies of another species) and was reclassified in its current genus and rank at a later time, the original author's name would be placed in parentheses, followed by the author of the current binomial. For example, *Petroselinum crispum* (Miller) A. W. Hill indicates that the botanist Philip Miller first named parsley using the epithet "crispum." Its original name was *Apium crispum* Miller. Later, this species was transferred by a botanist named Arthur Hill to the genus *Petroselinum*. In the interest of brevity, in many gardening books the author's name is omitted.
**Subspecies, Variety, or Form**

Often, a species exhibits some variation, such as different flower color, leaf shape, or height. If this variation is sufficient to warrant naming a new species, then a new species is named; but if the variation is minor or there is a broad range of overlap, a subspecies, variety, or form may be named. When one of these ranks is recognized, its name is formed by using the species name followed by "subsp.," "var.," or "f.," an additional epithet, and the name of the author of the subspecies, variety, or form. Which of these three ranks is used depends upon the type and magnitude of the differences between it and the other members of the species.

*Subspecies* is usually used to designate a group of populations that are approaching species status, and given time it is expected that the subspecies will evolve into a species. A subspecies is usually geographically distinct and has other characteristics that distinguish it from the species; however, the degree of separation is insufficient to call it a species. This is admittedly subjective and is one of the reasons why botanists change the names of plants. An alternative view held by many botanists is that subspecies is a rank between species and variety. In other words, subspecies are groups of varieties.

An example of a subspecies is

*Chimaphila umbellata* subsp. *cisatlantica* S. F. Blake

This is the scientific name for the eastern North American variant of pipsissewa. This plant is larger, with longer leaves and racemose inflorescences (the flower stalks occur along a branch), compared to the typical European subspecies, which has umbellate inflorescences (the flower stalks all come from a common point).

Variety has traditionally been used in the same manner as subspecies, to distinguish taxa that are approaching species but have not yet reached species status. Variety is also used to distinguish groups of populations with ecological differences. Variety and subspecies are often used interchangeably.

A form is usually used to designate a minor variation within a population or a region. For instance, albino forms of species are often designated as f. *alba*.

**Cultivar**

The names of cultivated variants are created in a similar manner. If a plant has been selected for some purpose-color, shape, growth characteristics, or other properties-and this selection can be propagated, it can be given a cultivar name. This name is created by taking the binomial species name and appending a non-Latin, non-italicized name placed in single quotation marks. (It is no longer acceptable to use "cv." before the cultivar name.) When a new cultivated plant is derived by hybridizing two species, the name is derived from the genus only, followed by cultivar epithet in single quotes. Some examples include:

*Clematis alpina* 'Ruby'
*Magnolia* 'Elizabeth'

In other words, *Clematis alpina* 'Ruby' is a selection of the species *Clematis alpina*. *Magnolia* 'Elizabeth' is a magnolia hybrid resulting from the crossing of at least two *Magnolia* species.

**Species epithet** – The second half of the species name. It is usually an adjective that describes something about the organism, the person who found the original, or where it was found. Many different kinds of species share the same species epithet. Thus, it is important to also include the genus name when giving the species epithet.
Common Species Epithets

In many cases, the specific epithet is the Latin word that describes some important characteristic of the plant-flower color, for example, or leaf shape. Familiarity with these Latin terms helps in understanding a plant's name and its characteristics. Some common examples are:

- **alba**: white
- **aqua**: water
- **arbor**: tree
- **aurantiacus**: orange
- **bi-**: two-
- **californicus**: from California
- **campanulate**: bell-shaped
- **canadensis**: from Canada
- **caroliniana**: from the Carolinas
- **communis**: common
- **concolor**: of the same color
- **discolor**: of another color
- **ebeneus**: ebony black
- **eburneus**: ivory white
- **ellipticus**: oval
- **erythrinus**: red
- **fallax**: deceptive
- **filiformis**: thread-shaped
- **flavescens**: yellowish
- **floridus**: abounding in flowers
- **foetida**: stinking
- **frutescens**: becoming shrubby
- **funestus**: deadly
- **hispida**: covered with coarse, erect hairs
- **inodoratus**: without an odor
- **laciniatus**: slashed into narrow divisions
- **lanceolate**: with a narrow elliptic or ovate, pointed shape
- **linearis**: with a very narrow shape
- **luteus**: yellow
- **magnus**: great, big
- **maritima**: maritime, by the sea
- **multi-**: many-
- **nigra**: black
- **novaeanglia**: from New England
- **novacaesarea**: from New Jersey
- **noveboracum**: from New York
- **ob-**: reversed-
- **officinalis**: used in medicine
- **ovatus**: ovate (oval, but widest below the middle)
- **pensylvanica**: from Pennsylvania
- **radicans**: rooting, putting out aerial roots
- **rubra**: red
- **sanguinia**: blood
- **tomentosa**: thickly and evenly covered with short, curled, and matted hairs
- **urceolate**: urn-shaped
- **vacillans**: swinging to and fro
- **velutinus**: velvety
- **virginiana**: from Virginia
- **viridis**: green
- **vulgaris**: common
Why Plant Names Change

It may seem as if botanists take perverse pleasure in changing long-established names, but they are simply following the international rules that have been in force for nearly 100 years. There are many reasons why names change; the following are some of the major ones:

- Change in circumscription. If, after research on a particular group, it is determined that the group (typically genus or species) needs to be reclassified, it will often need a new name. For example, if a genus is split into several genera, only some of the species can retain the original genus name. *Chrysanthemum* is one genus that has been reclassified as several distinct genera. As a result, the botanical name of the ox-eye daisy changed from *Chrysanthemum leucanthemum* to *Leucanthemum vulgare*.

- The discovery of an earlier name. If an earlier name is found, it takes priority. An example of a plant whose botanical name changed several times as botanists discovered earlier epithets is wheat, *Triticum aestivum*. Recent changes in the rules make this type of change less likely in the future.

- Type. If, after examining the type, botanists determine that it belongs to a different species, its name must change.