

Definitions of Characters, Character States and Related Terms Used in the OpenKey Project

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The characters and character state terms listed here correspond to elements in the OpenKey project plant description XML schema, ver. 2.20. The schema is viewable in conceptual form at: http://www.ibiblio.org/openkey/schema/Plant_Description_Table2.20.html

Definitions of *character states* are given in the order in which they appear in the conceptual schema, with the exception that groups of character states that apply to several characters are listed together near the end of the document. Definitions of *characters* and additional terms contained within definitions are given at the end of the document. Characters in the schema with no character states requiring definition are omitted from the main part of the document.

The definitions given here, while mostly reflecting general usage in botanical literature, are sometimes more narrow than the possible range of meanings for given terms. The intention has been to create definitions that permit making distinctions useful for plant identification in the field, rather than to produce a more broadly applicable botanical glossary.

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Character State Definitions

Plant Habit and Lifestyle

Life Span

Annual – Normally living one year or less; growing, reproducing, and dying within one cycle of seasons. [K&P, p. 15]

Biennial – Normally living two years; germinating or forming and growing vegetatively during one cycle of seasons, then reproducing sexually and dying during the following one. [K&P, p. 21]

Perennial – Normally living more than two years, with no definite limit to its life span. [K&P, p. 79]

Woodiness

Herbaceous – Having little or no living portion of the shoot persisting aboveground from one growing season to the next, the aboveground portion being composed of relatively soft, non-woody tissue. [K&P, p. 56, modified]

Woody – With an aboveground shoot composed of relatively hard tissue that persists from one growing season to the next.

Growth Habit

- Aquatic-emergent** – Growing in water with stem and leaves extending above the surface. (Compare with aquatic-floating and aquatic-submerged.)
- Aquatic-floating** – Growing in water with leaves floating on the surface. (Compare with aquatic-emergent and aquatic-submerged.)
- Aquatic-submerged** – Growing in water with stem and leaves beneath the surface. (Compare with aquatic-emergent and aquatic-floating.)
- Broadleaf herbaceous** – Herbaceous with relatively broad leaves, thus differing from the long, narrow leaves of grasses (Poaceae) and other grass-like plants. (Compare with grass-like herbaceous.)
- Epiphytic** – Physically supported in its entirety by another plant through all or the major part of its life, but not drawing direct nutrition from the host plant. (Compare with parasitic.) [K&P, p. 44, modified]
- Grass-like herbaceous** – Herbaceous with relatively long, narrow leaves appearing similar to those of grasses (Poaceae). (Compare with broadleaf herbaceous.)
- Shrub** – A relatively short, woody, perennial plant, usually without a single trunk, and often with many crowded branches. (Compare with subshrub and tree.) [RDMB, p. 88, modified] [Illustrations: H&H2, p. 108, Fig. 1150]
- Subshrub** – 1) A shrub-like plant but with only the base composed of woody tissue, the herbaceous branches dying back at the end of each growing season. [K&P, pp. 106-107, modified] 2) A very low shrub that sprawls on the ground; a trailing shrub. (Compare with shrub.) [L, p. 772, modified]
- Succulent** – Juicy, fleshy and often thickened, as the stem of a cactus or the leaves of *Aloe*. [H&H2, p. 117, modified] [Illustrations: H&H2, p. 117, Figs. 1252 & 1253]
- Tree** – A relatively tall, woody, perennial plant usually with a single stem or trunk that bears branches. (Compare with shrub.) [RDMB, p. 88, modified]
- Vine** – A perennial plant with long woody or herbaceous stems that are flexible (at least initially), and are supported by other plants or structures, or that trail across the ground. [K&P, p. 118, modified/W&K, p. 608, modified] [Illustrations: H&H2, p. 134, Fig. 1445]

Herbaceous Plant Growth Form

- Bunching** –
Single upright stem –

Nutrition

- Autotrophic** – Able to synthesize the nutritive substances an organism needs from the non-living environment; in plants, photosynthetic. (Compare with parasitic.) [REE, p. 891, modified]
- Hemi-parasitic** – Partially parasitic; in plants, photosynthetic but deriving at least some nutrients from a host organism. (Compare with parasitic.) [RDMB, p. 312, modified]
- Parasitic** – Living in or on an organism of a different species and deriving nutrients from it. (Compare with autotrophic, epiphytic, hemi-parasitic and saprophytic.) [REE, p. 904, modified]
- Saprophytic** – Obtaining nourishment from dead organic matter. (Compare with parasitic.) [RDMB, p. 312, modified]

Carnivory

- Carnivorous** – Capturing animals (usually insects), digesting their tissues and assimilating the digested substances as nourishment, especially nitrogen. [K&P, p. 25, modified]

Stems

Stem Type

Aerial stem – A prostrate to erect, above ground stem. [W&K, p. 30, modified] [Illustrations: H&H2, p. 142, Fig. 1498 (see caulis)]

Bulb – A short, vertical, usually underground stem with fleshy storage leaves attached, as in onions (*Allium cepa*). (Compare with corm.) [W&K, p. 588, modified.] [Illustrations: RDMB, p. 90, Fig. 6-2; H&H2, p. 19, Fig. 174 & p. 142, Fig. 1495; W&K, p. 31, Fig. 3-1; L, p. 738, Fig. 301]

Corm – A short, solid, vertical, usually underground, enlarged stem with leaves that are dry and scale-like or absent. (Compare with bulb.) [W&K, p. 31, modified.] [Illustrations: RDMB, p. 90, Fig. 6-2; H&H2, p. 142, Fig. 1501; W&K, p. 31, Fig. 3-1; L, p. 738, Fig. 301]

Rhizome – An underground, usually horizontal stem, often resembling a root but bearing nodes (points where leaves and/or branches can arise); usually with adventitious roots. (Compare with stolon and tuber.) [K&P, p. 89, modified] [Illustrations: RDMB, p. 90, Fig. 6-2; H&H2, p. 143, Fig. 1508; W&K, p. 31, Fig. 3-1; L, p. 738, Fig. 301]

Stolon – A slender horizontal stem, at or just above the surface of the ground, that gives rise to a new plant at its tip or from axillary branches. (Compare with rhizome and tuber.) [W&K, pp. 30-31, modified] [Illustrations: RDMB, p. 90, Fig. 6-2 (see runner); H&H2, p. 143, Fig. 1509 (see runner); W&K, p. 31, Fig. 3-1]

Tuber – A solid, enlarged, horizontal, shortened stem, usually borne below ground and containing food reserves, as in potatoes (*Solanum tuberosum*). (Compare with rhizome and stolon.) [W&K, p. 31, modified] [Illustrations: RDMB, p. 90, Fig. 6-2; H&H2, p. 144, Fig. 1516; W&K, p. 31, Fig. 3-1; L, p. 738, Fig. 301]

Pith

Chambered – Interrupted by more or less regularly spaced cavities. (Compare with continuous, diaphragmed and hollow.) [K&P, p. 27, modified] [Illustrations: RDMB, p. 89, Fig. 6-1; C&A, p. 8, Fig. 20]

Continuous – Uninterrupted by cavities and essentially homogenous in texture; solid. (Compare with chambered, diaphragmed and hollow.) [K&P, p. 32, modified] [Illustrations: RDMB, p. 89, Fig. 6-1; C&A, p. 8, Fig. 18]

Diaphragmed – Uninterrupted by cavities but with regularly spaced partitions of denser tissue. (Compare with chambered, continuous and hollow.) [K&P, p. 38, modified] [Illustrations: RDMB, p. 89, Fig. 6-1; C&A, p. 8, Fig. 19]

Hollow – With an uninterrupted central cavity, the pith lacking or disintegrating prior to maturity. (Compare with chambered, continuous and diaphragmed.) [K&P, p. 57, modified] [Illustrations: RDMB, p. 89, Fig. 6-1]

Pubescence of Herbaceous Stems or Young Twigs (<= 1 year old)

See Pubescence below.

Pubescence Type of Herbaceous Stems or Young Twigs (<= 1 year old)

See Pubescence below.

Other Surface Features of Herbaceous Stems or Young Twigs (<= 1 year old)

See Other Surface Features below.

Pubescence of 2-4-year-old Twigs

See Pubescence below.

Other Surface Features of 2-4-year-old Twigs

See Other Surface Features below.

Leaf Scar Shape

Crescent-shaped – [Illustrations: P&W, p. 4, Plate 2 (see both crescent-shaped and broadly crescent)]

Half-round – [Illustrations: P&W, p. 4, Plate 2]

Heart-shaped – [Illustrations: P&W, p. 4, Plate 2]

Horseshoe-shaped – [Illustrations: P&W, p. 4, Plate 2]

Oval – [Illustrations: P&W, p. 4, Plate 2]

Round – [Illustrations: P&W, p. 4, Plate 2]

Shield-shaped – [Illustrations: P&W, p. 4, Plate 2]

Three-lobed – [Illustrations: P&W, p. 4, Plate 2]

Triangular – [Illustrations: P&W, p. 4, Plate 2]

U-shaped – [Illustrations: P&W, p. 4, Plate 2]

V-shaped – [Illustrations: P&W, p. 4, Plate 2]

Stipule Scar Presence

Inconspicuous – Not readily visible.

Stipule Scar Extent

Circumferential – Encircling the twig. [Illustrations: C&A, p. 8, Fig. 16]

Bark of Mature Trunks

Armed – Bearing any kind of sharp defense such as thorns, spines, or prickles. [L, p. 739, modified] [Illustrations: H&H2, p. 12, Fig. 92 & p. 144, Fig. 1514; W&K, p. 39, Fig. 3-11; RDMB, p. 89, Fig. 6-1 & p. 90, Fig. 6-2; L, p. 748, Fig. 310i]

Checkered – Bark divided into small squarish plates, resembling alligator leather, as in flowering dogwood (*Cornus florida*). (Compare with plated and warty.) [C&A, pp. 1-3, modified] [Illustrations: C&A, p. 2, Fig. 5]

Conspicuous lenticels – Bark with readily visible pores or lenticels, as in many of the birches (*Betula*). [Illustrations: RDMB, p. 89, Fig. 6-1; H&H2, p. 64, Fig. 658; W&K, p. 32, Fig. 3-2]

Exfoliating – Bark splitting or cracking and falling away in thin patches or sheets, as in shagbark hickory (*Carya ovata*) and river birch (*Betula nigra*). [K&P p. 44, modified] [Illustrations: H&H1, p. 35, Fig. 354; H&H2, p. 44, Fig. 457; H, MP27]

Flaky – Bark with more or less regular, thin flakes, as in eastern hophornbeam (*Ostrya virginiana*) and many pines (*Pinus*). [H, p. 18 (see scaly), modified] [Illustrations:]

Furrowed – Bark with relatively long narrow depressions or grooves, as in tulip-tree (*Liriodendron tulipifera*). [K&P, p. 50, modified] [Illustrations: H&H1, p. 85, Fig. 889 (see rimose)]

Plated – Bark with relatively large, more or less flat plates between furrows, as in mature loblolly pine (*Pinus taeda*). (Compare with checkered.) [RDMB, p. 91, modified] [Illustrations:]

Ridged – Bark with long, narrow protrusions or ridges, as in tulip-tree (*Liriodendron tulipifera*). [K&P, p. 90, modified] [Illustrations:]

- Shreddy** – Soft but coarse, fibrous bark, usually shallowly furrowed, as in eastern red cedar (*Juniperus virginiana*). [RDMB, p. 91] [Illustrations:]
- Smooth** – Bark having a more or less continuous, even surface, with relatively few fissures or protrusions, as in American beech (*Fagus grandifolia*). [H, p. xx, modified] [Illustrations:]
- Warty** – Bark with relatively small, scattered protuberances, as in southern hackberry (*Celtis laevigata*). (Compare with checkered.) [Illustrations:]

Buds

Bud Position

- Axillary** – On the stem just above the point of attachment of a leaf or a leaf scar; borne in the axil of a leaf. (Compare with terminal.) [W&K, p. 32, modified] [Illustrations: RDMB, p. 90, Fig. 6-2 (see both lateral and axillary); H&H2, p. 13, Fig. 109; W&K, p. 32, Fig. 3-2 (see lateral); L, p. 749, Fig. 311; P&W, p. 2, Plate 1]
- Collateral** – In pairs, within or straddling the leaf axils; often located on either side of an axillary bud. (Compare with superposed.) [K&P, p. 30, modified] [Illustrations: RDMB, p. 90, Fig. 6-2; P&W, p. 2, Plate 1]
- Infrapetiolar** – Axillary and surrounded by the base of the leaf stalk or petiole. [K&P, p. 60, modified] [Illustrations: RDMB, p. 90, Fig. 6-2; L, p. 749, Fig. 311 (see subpetiolar)]
- Pseudoterminal** – Appearing to be the terminal bud, but actually the uppermost axillary bud with a subtending leaf scar on one side and the scar of the terminal bud often visible on the other side. (Compare with terminal.) [L, p. 767, modified] [Illustrations: RDMB, p. 90, Fig. 6-2; L, p. 749, Fig. 311; P&W, p. 2, Plate 1]
- Superposed** – Located directly above an axillary bud. (Compare with collateral.) [RDMB, p. 92, modified] [Illustrations: RDMB, p. 90, Fig. 6-2; L, p. 749, Fig. 311; C&A, p. 4, Fig. 6]
- Terminal** – At the apex or tip of the stem. (Compare with axillary and pseudoterminal.) [RDMB, p. 93, modified] [Illustrations: RDMB, p. 89, Fig. 6-1 (see *Aesculus*); W&K, p. 32, Fig. 3-2; L, p. 749, Fig. 311g; C&A, p. 4, Figs. 6 & 7; P&W, p. 2, Plate 1]

Bud Shape

- Conic** – Rounded in cross section, broadest at the base and essentially triangular in outline; cone-shaped. [K&P, p. 32, modified]
- Cylindric** – Rounded in cross section with a more or less uniform diameter and blunt ends; cylinder-shaped. [K&P, p. 36, modified]
- Ellipsoid** – Widest near the middle, with convex sides tapering equally toward rounded ends, and rounded in cross section; elliptic or oval-shaped in outline. [K&P, p. 42, modified]
- Ellipsoid-cylindric** – Intermediate in shape between ellipsoid and cylindric.
- Fusiform** – Elongate, broadest at the middle, evenly tapering to either end, and rounded in cross section; spindle-shaped. [K&P, p. 51, modified]
- Globose** – Circular in cross section and in outline when viewed from any angle; like a globe or sphere. [K&P, p. 52, modified]
- Lance-cylindric** – Intermediate in shape between lanceoloid and cylindric.
- Lanceoloid** – Considerably longer than broad, rounded or somewhat flattened in cross section, broadest near the base and somewhat concavely tapering toward the tip; lance-head shaped in outline. [K&P, p. 63, modified]
- Lance-ovoid** – Intermediate in shape between lanceoloid and ovoid.
- Oblong** – Shaped like an elongated ellipsoid, the sides almost parallel from near one end to near the other end. [K&P, p. 73, modified]
- Oblong-cylindric** – Intermediate in shape between oblong and cylindric.

- Oblong-ovoid** – Intermediate in shape between oblong and ovoid.
- Ovoid** – Rounded in cross section, broadest near a bluntly rounded base and convexly tapering to a narrower rounded tip; egg-shaped. [K&P, p. 75, modified]
- Ovoid-acuminate** – Egg-shaped but with the narrow end concavely tapering to a point.
- Ovoid-conic** – Intermediate in shape between ovoid and conic.
- Ovoid-cylindric** – Intermediate in shape between ovoid and cylindric.
- Ovoid-ellipsoid** – Intermediate in shape between ovoid and ellipsoid.

Bud Scale Type

- Imbricate** – Overlapping, as the shingles on a roof. (Compare with valvate.) [L, p. 756, modified] [Illustrations: RDMB, p. 90, Fig. 6-2 (see pseudoterminal); L, p. 749, Fig. 311; P&W, p. 2, Plate 1]
- Single Scale** – Covered by a single scale.
- Valvate** – With scales (usually two) meeting by the edges without overlapping. (Compare with imbricate.) [L, p. 774, modified] [Illustrations: L, p. 749, Fig. 311; P&W, p. 2, Plate 1]

Bud Pubescence

See Pubescence below.

Bud Pubescence Type

See Pubescence below.

Other Surface Features of Buds

See Other Surface Features below.

Leaves

Leaf Duration

- Deciduous** – Falling at the end of one growing season, as the leaves of non-evergreen trees; not evergreen. (Compare with evergreen and semi-evergreen.) [L, p. 748, modified]
- Evergreen** – Bearing green leaves through the winter and into the next growing season; persisting two or more growing seasons; not deciduous. (Compare with deciduous and semi-evergreen.) [RDMB, pp. 146 & 154, modified]
- Semi-evergreen** – Bearing green leaves into or through the winter, but dropping them by the beginning of the next growing season; tardily deciduous or winter deciduous. (Compare with deciduous and evergreen.)

Leaf Complexity

- Simple** – Undivided, as a leaf blade that is not separated into distinct leaflets; not compound. [H&H2, p. 156, modified] [Illustrations: RDMB, p. 136, Fig. 6-16 (any of several simple leaves); H&H2, p. 156, Fig. 1586b; L, p. 741, Fig. 304b; W&K, p. 33, Fig. 3-3]
- Compound** – Divided into two or more equivalent parts, as a leaf that consists of multiple, distinct leaflets; not simple. [K&P, p. 31, modified] [Illustrations: RDMB, p. 95, Fig. 6-3; H&H2, p. 156, Fig. 1586a & b; L, p. 741, Fig. 304; W&K, p. 33, Fig. 3-3]

Leaf Attachment

Nearly sessile – With a very short, somewhat indistinct stalk. (Compare with petiolate and sessile.) [K&P, p. 106, modified] [Illustrations:]

Petiolate – With a leaf stalk or petiole. (Compare with nearly sessile, petiolulate and sessile.) [Illustrations: H&H2, p. 161, Fig. 1600; W&K, p. 34, Fig. 3-4; L, p. , Fig. 304b & c]

Sessile – Without a stalk, positioned directly against the bearing structure, as a leaf without a petiole. (Compare with nearly sessile and petiolate.) [W&K, p. 604, modified] [Illustrations: H&H2, p. 162, Fig. 1602; W&K, p. 34, Fig. 3-4; L, p. , Fig. 304a]

Leaf Position

Basal – With leaves arising at or near the base of the stem. (Compare with cauline.) [H&H2, p. 162, modified] [Illustrations: H&H2, p. 14, Fig. 120 & p. 162, Fig. 1604a; L, p. 740, Fig. 303]

Cauline – With leaves positioned along the stem above ground level. (Compare with basal.) [H&H2, p. 162, modified] [Illustrations: H&H2, p. 23, Fig. 220; L, p. 740, Fig. 303]

Leaf Arrangement

Alternate – Positioned singly at different heights on the stem; one leaf occurring at each node. (Compare with opposite and whorled.) [L, p. 738, modified] [Illustrations: RDMB, p. 136, Fig. 6-16; H&H2, p. 162, Fig. 1604a; W&K, p. 35, Fig. 3-5; L, p. 740, Fig. 303]

Clustered – Leaves grouped closely together at the point of attachment and tending to diverge from one another, as the leaves on short shoots in *Ginkgo* (*Ginkgo biloba*). (Compare with fascicled.) [K&P, p. 29, modified] [W&K, p. 132, Fig. 9-6 (an example in *Ginkgo*); L, p. 358, Fig. 56 (an example in *Ginkgo*) & p. 362, Fig. 60A (an example in *Cedrus*)]

Decussate – Arranged along the stem in pairs, with each pair at right angles to the pair above or below; a form of opposite arrangement. [H&H2, p. 162, modified] [Illustrations: RDMB, p. 136, Fig. 6-16; H&H2, p. 162, Fig. 1604a; L, p. 740, Fig. 303d & g]

Distichous – With leaves arranged along opposite sides of the stem and in the same plane; two-ranked. [L, p. 749, modified] [Illustrations: RDMB, p. 136, Fig. 6-16; H&H2, p. 39, Fig. 400 & p. 162, Fig. 1604a; L, p. 365, Fig. 61A & p. 740, Fig. 303]

Equitant – With leaves clustered at the base of the stem and in two ranks, the sides overlapping at the base and often sharply folded along their midridge, as in *Iris*. [Z, p. 367, modified] [Illustrations: RDMB, p. 136, Fig. 6-16; H&H2, p. 163, Fig. 1604b; L, p. 740, Fig. 303; Z, p. 367, Fig. 93]

Fascicled – In a tight bundle, several leaves appearing to arise from a common point and diverging little if at all, as the needles of many pines (*Pinus*). (Compare with clustered.) [RDMB, p. 119, modified] [Illustrations: RDMB, p. 136, Fig. 6-16; H&H2, p. 45, Fig. 469; L, p. 740, Fig. 303]

Imbricate – Overlapping, as the shingles on a roof. [L, p. 756, modified] [Illustrations: RDMB, p. 136, Fig. 6-16; L, p. 740, Fig. 303; Z, p. 371, Fig. 126]

Opposite – Positioned in pairs along the stem, the members of each pair at the same level across from one another; two leaves occurring at each node. (Compare with alternate and whorled.) [K&P, p. 75, modified] [Illustrations: RDMB, p. 136, Fig. 6-16; H&H2, p. 163, Fig. 1604b; W&K, p. 35, Fig. 3-5; L, p. 740, Fig. 303]

Pectinate – Arranged like the teeth of a comb, the leaves slender and more or less perpendicular to the stem; comb-like. [K&P, p. 78, modified] [Illustrations: H&H1, p. 67, Fig. 692; L, p. 365, Fig. 61A & p. 743, Fig. 306 (neither the H&H1 nor the 2nd L illustrations fit the definition well.)]

Rosetted – With leaves in a tight cluster radiating from a central axis, usually at or near the base of the stem, as in dandelion (*Taraxacum*). [W&K, p. 603, modified] [Illustrations: RDMB, p. 862, Fig. a & p. 863, Fig. a; H&H2, p. 163, Fig. 1604b (see rosette); L, p. 740, Fig. 303]

Spiral – Arranged along the stem in such a way that a line connecting the points of attachment would form a spiral; a form of alternate arrangement. [H&K, p. 39, modified] [Illustrations: H&H2, p. 162, Fig. 1604a (see dextrorse) & p. 163, Fig. 1604b (see sinistrorse)]

Whorled – With three or more leaves positioned on the stem at the same level; three or more leaves occurring at each node. (Compare with alternate and opposite.) [K&P, p. 119, modified] [Illustrations: RDMB, p. 136, Fig. 6-16; H&H2, p. 162, Fig. 1604a; W&K, p. 35, Fig. 3-5; L, p. 740, Fig. 303]

Leaf Orientation

Ascending –

Appressed –

Reflexed –

Spreading –

Leaf Shape

See Shape below.

Leaf Margin

See Margin below.

Leaf Apex

See Apex below.

Leaf Base and Leaflet Base

Attenuate – Tapering gradually to a narrow base. [H&H2, p. 150] [Illustrations: RDMB, p. 135, Fig 6-15; H&H2, p. 153, Fig. 1584a; L, p. 744, Fig. 307]

Auriculate – With ear-shaped appendages at the base. [H&H2, p. 150, modified] [Illustrations: RDMB, p. 135, Fig 6-15; H&H2, p. 153, Fig. 1584a]

Clasping – The base partly surrounding the stem. [RDMB, p. 134, modified] [Illustrations: H&H1, p. 143, Fig. 1400 & 1401; W&K, p. 34, Fig. 3-4]

Cordate – Heart-shaped, with the notch at the base. [H&H2, p. 150] [Illustrations: RDMB, p. 135, Fig 6-15; H&H2, p. 153, Fig. 1584a; L, p. 744, Fig. 307; W&K, p. 37, Fig. 3-9]

Cuneate – Wedge-shaped and tapering to a point at the base. [H&H2, p. 150] [Illustrations: W&K, p. 37, Fig. 3-9 (see acute); H&H2, p. 153, Fig. 1584a; RDMB, p. 135, Fig. 6-15]

Decurrent – With the leaf base extending downward along the stem. [RDMB, p. 134, modified] [Illustrations: RDMB, p. 135, Fig 6-15; H&H2, p. 161, Fig. 1597]

Hastate – Arrowhead-shaped, but with the basal lobes turned outward rather than downward. (Compare with sagittate.) [H&H2, p. 153, modified] [Illustrations: RDMB, p. 135, Fig 6-15; H&H2, p. 153, Fig. 1584a; L, p. 744, Fig. 307; W&K, p. 37, Fig. 3-9]

Oblique – Having an asymmetrical base. [RDMB, p. 137] [Illustrations: RDMB, p. 135, Fig 6-15; H&H2, p. 153, Fig. 1584b; L, p. 744, Fig. 307; W&K, p. 37, Fig. 3-9]

Obtuse – More or less blunt at the base, with the sides coming together at an angle of greater than 90°. [W&K, p. 37, modified] [Illustrations: L, p. 744, Fig. 307; W&K, p. 37, Fig. 3-9]

- Peltate** – Having the leaf stalk (petiole) attached to the lower surface of the leaf, usually near the center. [RDMB, p. 137, modified] [Illustrations: RDMB, p. 135, Fig 6-15; H&H2, p. 152, Fig. 1583c; L, p. 744, Fig. 307; W&K, p. 37, Fig. 3-9]
- Perfoliate** – Having the base completely surrounding the stem, so that the stem appears to pass through the leaf. [H&H2, p. 150, modified] [Illustrations: RDMB, p. 135, Fig 6-15; H&H2, p. 152, Fig. 1583d; L, p. 744, Fig. 307]
- Rounded** – Forming a smooth continuous curve. [W&K, p. 37] [Illustrations: H&H2, p. 153, Fig. 1584b; W&K, p. 37, Fig. 3-9]
- Sagittate** – Arrowhead-shaped, with the basal lobes directed downward. (Compare with hastate.) [H&H2, p. 153, modified] [Illustrations: RDMB, p. 135, Fig 6-15; H&H2, p. 153, Fig. 1584b; L, p. 744, Fig. 307; W&K, p. 37, Fig. 3-9]
- Sheathing** – Having a tubular structure partially or completely enclosing the stem below the apparent point of attachment of the leaf blade or stalk (petiole). [RDMB, p. 137, modified] [Illustrations: RDMB, p. 135, Fig 6-15; H&H2, p. 162, Fig. 1603; W&K, p. 34, Fig. 3-4]
- Truncate** – With the base cut more or less straight across; ending abruptly, almost at right angles to the midrib. [RDMB, p. 134, modified] [Illustrations: H&H2, p. 153, Fig. 1584b; L, p. 744, Fig. 307; W&K, p. 37, Fig. 3-9]

Leaf Shape in Cross Section

- Two-sided** – More or less flat in cross section, with an upper and lower surface. [Illustrations: W&K, p. 38, Fig. 3-10K, L & M; V, p. 25, Fig. 7; K, p. 340, Fig. 230]
- Three-sided** – More or less triangular-shaped in cross section. [Illustrations: V, p. 25, Fig. 7; K, p. 211, Fig. 140 & p. 340, Fig. 230]
- Four-sided** – More or less diamond-shaped in cross section. [Illustrations: V, p. 25, Fig. 7; K, p. 186, Fig. 125 & p. 340, Fig. 230]
- Circular** – Round in cross section. [Illustrations: V, p. 25, Fig. 7; K, p. 211, Fig. 140 & p. 340, Fig. 230]
- Oval** – Elliptic in cross section. [Illustrations: K, p. 186, Fig. 125]
- Semicircular** – Shaped like a half circle in cross section. [Illustrations: V, p. 25, Fig. 7; K, p. 211, Fig. 140 & p. 340, Fig. 230]
- Keeled above** – With a longitudinal ridge or keel, more or less triangular in cross section, running down the center of the upper surface of the leaf. (Compare with keeled below.) [K&P, p. 61, modified] [Illustrations: K, p. 340, Fig. 230 (see *Taxus baccata* & *Larix gemelini* var. *japonica*)]
- Keeled below** – With a longitudinal ridge or keel, more or less triangular in cross section, running down the center of the lower surface of the leaf. (Compare with keeled above.) [K&P, p. 61, modified] [Illustrations: K, p. 340, Fig. 230 (see *Larix gemelini* var. *japonica*)]

Leaf Upper Surface Color Variegation and Leaf Lower Surface Color Variegation

- Banded** – Transverse, or horizontal, stripes of one color crossing another. (Compare with striped.) [RDMB, p. 150, modified]
- Blotched** – The color disposed in broad, irregular blotches. [RDMB, p. 150]
- Bordered** – One color is surrounded by an edging of another. (Compare with edged.) [RDMB, p. 150, modified]
- Clouded** – Colors are unequally blended together. [RDMB, p. 150]
- Discoidal** – A single large spot of color in the center of another. (Compare with dotted and spotted.) [RDMB, p. 150, modified]
- Dotted** – The color disposed in very small round spots. (Compare with discoidal and spotted.) [RDMB, p. 150, modified]

- Edged** – One color is surrounded by a very narrow rim of another. (Compare with bordered.) [RDMB, p. 150, modified]
- Marbled** – A surface traversed by irregular veins of color, as a block of marble. [RDMB, p. 150, modified]
- Ocellated** – A broad spot of some color has another spot of a different color within it. (Compare with zoned.) [RDMB, p. 150, modified]
- Painted** – Colors disposed in streaks of unequal intensity. [RDMB, p. 150]
- Spotted** – The color disposed in small spots. (Compare with discoidal and dotted.) [RDMB, p. 150, modified]
- Striped** – Longitudinal, or vertical, stripes of one color crossing another. (Compare with banded.) [RDMB, p. 150, modified]
- Tessellated** – Color arranged in small squares, so as to have some resemblance to a checkered pavement. [RDMB, p. 150]
- Variegated** – The color disposed in various irregular, sinuous, spaces. [RDMB, p. 150]
- Zoned** – The same as ocellated, but the concentric bands more numerous. (Compare with ocellated.) [RDMB, p. 150, modified]

Leaf Upper Surface Pubescence and Leaf Lower Surface Pubescence

See Pubescence below.

Leaf Upper Surface Pubescence Type and Leaf Lower Surface Pubescence Type

See Pubescence below.

Other Features of Leaf Upper Surface and Other Features of Leaf Lower Surface

See Other Surface Features below.

Leaf Venation and Leaflet Venation

- Dichotomous** – With veins forking into more or less equal pairs, as in *Ginkgo* leaves. (Compare with palmate, parallel, pinnate and reticulate venation.) [W&K, p. 591, modified] [Illustrations: RDMB, p. 136, Fig. 6-16; W&K, p. 132, Fig. 9-6]
- Palmate** – With three or more primary veins arising from a common point at or near the base of the leaf or leaflet blade. (Compare with dichotomous, parallel, pinnate and reticulate venation.) [RDMB, p. 139, modified] [Illustrations: RDMB, p. 136, Fig. 6-16; H&H2, p. 79, Fig. 823 (see palmatifid); L, p. 741, Fig. 304c]
- Parallel** – With two or more primary veins that run more or less parallel from the base to the tip of the leaf or leaflet blade. (Compare with dichotomous, palmate, pinnate and reticulate venation.) [K&P, p. 87 (see parallelodromous), modified] [Illustrations: RDMB, p. 136, Fig. 6-16; H&H1, p. 67, Fig. 685; L, p. 741, Fig. 304a]
- Pinnate** – With secondary veins arising from a single, large midvein. (Compare with dichotomous, palmate, parallel and reticulate venation.) [RDMB, p. 139, modified] [Illustrations: RDMB, p. 136, Fig. 6-16 (see pinnately netted, penni-parallel and reticulate); H&H2, p. 86, Fig. 903 (see pinninerved); L, p. 741, Fig. 304b]
- Reticulate** – With a clearly visible network of interconnecting veins. (Compare with dichotomous, palmate, parallel and pinnate venation.) [W&K, p. 603 & K&P, p. 89, modified] [Illustrations: RDMB, p. 136, Fig. 6-16; H&H2, p. 157, Fig. 1588]

Leaf Venation Relief

Impressed –

Raised –

Leaf Lobing and Leaflet Lobing

Unlobed – Without major protrusions or segments in the leaf margin; may be toothed or otherwise shallowly notched. (Compare with palmate lobing and pinnate lobing.) [Illustrations: RDMB, p. 136, Fig. 6-16 (any of several showing leaves without major divisions); H&H2, pp. 159-161, Figs. 1593a-e (any of several showing leaves without major divisions); L, p. 743, Fig. 306 (any of several showing leaves without major divisions)]

Palmate – With three or more main segments or lobes essentially arising from a common point near the base of the leaf or leaflet blade; lobed in a hand-like pattern. (Compare with pinnate lobing and unlobed.) [RDMB, p. 139, modified] [Illustrations: RDMB, p. 136, Fig. 6-16 (see palmatifid and palmately netted); H&H2, p. 79, Fig. 823 (see palmatifid) & p. 85, Fig. 889 (see phyllome); L, p. 741, Fig. 304c & p. 743, Fig. 306q; W&K, p. 38, Fig. 3-10]

Pinnate – With several main segments or lobes positioned along and on either side of a central axis; lobed in a feather-like pattern. (Compare with palmate lobing and unlobed.) [K&P, p. 81, modified] [Illustrations: RDMB, p. 136, Fig. 6-16 (see cleft, lobed, parted and pinnatifid); H&H2, p. 86, Fig. 901 (see pinnatilobate); L, p. 743, Fig. 306l & o; W&K, p. 38, Fig. 3-10]

Leaf Division

Bifoliolate – Compound with two leaflets; two-leafleted or geminate. (Compare with bigeminate and trifoliolate) [W&K, p. 587, modified] [Illustrations: RDMB, p. 95, Fig. 6-3]

Bigeminate – With two orders of leaflets, each divided into pairs or geminately compound; doubly paired. (Compare with bifoliolate.) [RDMB, p. 94, modified; H&H2, p. 16, Fig. 140]

Bipalmately compound – With two orders of leaflets, each palmately compound; twice palmately compound. (Compare with once palmately compound and tripalmately compound.) [RDMB, p. 94, modified] [Illustrations: RDMB, p. 95, Fig. 6-3; H&H2, p. 16, Fig. 147]

Bipinnately compound – With two orders of leaflets, each pinnately compound; twice pinnately compound. (Compare with once pinnately compound and tripinnately compound.) [RDMB, p. 94, modified] [Illustrations: RDMB, p. 95, Fig. 6-3; H&H2, p. 156, Fig. 1586a; L, p. 741, Fig. 304; W&K, p. 33, Fig. 3-3]

Bipinnate-pinnatifid – Twice pinnately compound with pinnatifid leaflets. (Compare with once pinnate-pinnatifid and tripinnate-pinnatifid.) [Illustrations:]

Bipinnatifid – With two orders of leaf lobing, each pinnatifid; twice pinnatifid. (Compare with pinnatifid and tripinnatifid.) [Illustrations: H&H2, p. 159, 1593a]

Biternate – With two orders of leaflets, each divided into threes or ternately compound; twice trifoliolate. (Compare with trifoliolate and triternate.) [RDMB, p. 94, modified] [Illustrations: RDMB, p. 95, Fig. 6-3; H&H2, p. 156, Fig. 1586a]

Once palmately compound – Compound with leaflets all attached at a common point and diverging from one another. (Compare with once pinnately compound, bipalmately compound and tripalmately compound.) [K&P, p. 76, modified] [Illustrations: RDMB, p. 95, Fig. 6-3; H&H2, p. 156, Fig. 1586b; L, p. 741, Fig. 304; W&K, p. 33, Fig. 3-3]

Once pinnately compound – Compound with leaflets attached at different points along and on either side of a central axis or rachis. (Compare with once palmately compound, bipinnately compound and tripinnately compound.) [K&P, p. 82, modified] [Illustrations: RDMB, p. 95, Fig. 6-3; H&H2, p. 156, Fig. 1586a; L, p. 741, Fig. 304; W&K, p. 33, Fig. 3-3]

Once pinnate-pinnatifid – Once pinnately compound with pinnatifid leaflets. (Compare with bipinnate-pinnatifid and tripinnate-pinnatifid.) [Illustrations:]

Palmatifid – Palmately lobed about half the distance or more to the base, but not reaching the base. (Compare with pinnatifid.) [W&K, p. 600, modified] [Illustrations: RDMB, p. 136, Fig. 6-16; H&H2, p. 160, 1593c; L, p. 743, Fig. 306q]

- Pinnatifid** – Pinnately lobed about half the distance or more to the midrib, but not reaching the midrib. (Compare with bipinnatifid, palmatifid and tripinnatifid.) [H&H2, p. 158, modified] [Illustrations: RDMB, p. 136, Fig. 6-16; H&H2, p. 160, 1593d; L, p. 743, Fig. 306o]
- Trifoliolate** – Compound with three leaflets; three-leafleted or ternate. (Compare with bifoliolate, biternate and triternate.) [W&K, p. 587, modified] [Illustrations: RDMB, p. 95, Fig. 6-3; H&H2, p. 120, Fig. 1282 (see ternate) & p. 125, Fig. 1343 (see trifoliolate); L, p. 741, Fig. 304i & j]
- Tripalmately compound** – With three orders of leaflets, each palmately compound; three-times palmately compound. (Compare with once palmately compound and bipalmately compound.) [RDMB, p. 94, modified] [Illustrations: RDMB, p. 95, Fig. 6-3; H&H2, p. 16, Fig. 147]
- Tripinnately compound** – With three orders of leaflets, each pinnately compound; three-times pinnately compound. (Compare with once pinnately compound and bipinnately compound.) [RDMB, p. 94, modified] [Illustrations: RDMB, p. 95, Fig. 6-3; H&H2, p. 156, Fig. 1586a]
- Tripinnate-pinnatifid** – Three times pinnately compound with pinnatifid leaflets. (Compare with bipinnate-pinnatifid and once pinnate-pinnatifid.) [Illustrations:]
- Tripinnatifid** – With three orders of leaf lobing, each pinnatifid; three-times pinnatifid. (Compare with bipinnatifid and pinnatifid.) [Illustrations: H&H2, p. 161, Fig. 1593e]
- Triternate** – With three orders of leaflets, each divided into threes or ternately compound; three-times trifoliolate. (Compare with biternate and trifoliolate.) [RDMB, p. 94, modified] [Illustrations: RDMB, p. 95, Fig. 6-3; H&H2, p. 156, Fig. 1586b; L, p. 741, Fig. 304g]
- Unifoliolate** – A structurally compound leaf with a single leaflet, making it appear simple, the compound nature of the leaf evident by a distinct articulation in the leaf stalk, as in redbud (*Cercis canadensis*); one-leafleted. [K&P, p. 115, modified] [Illustrations: RDMB, p. 95, Fig. 6-3; H&H2, p. 130, Fig. 1402]

Leaflet Attachment

- Nearly sessile** – With a very short, somewhat indistinct stalk. (Compare with petiolulate and sessile.) [K&P, p. 106, modified] [Illustrations:]
- Petiolulate** – With a leaflet stalk or petiolule. (Compare with nearly sessile, petiolate and sessile.) [Illustrations: H&H2, p. 161, Fig. 1601; L, p. , Fig. 304j]
- Sessile** – Without a stalk, positioned directly against the bearing structure, as a leaf without a petiole. (Compare with nearly sessile and petiolulate.) [W&K, p. 604, modified] [Illustrations: H&H2, p. 162, Fig. 1602; W&K, p. 34, Fig. 3-4; L, p. , Fig. 304a]

Terminal Leaflet Presence

- Even-pinnate** – Pinnately compound with an even number of leaflets, none truly terminal. (Compare with odd-pinnate.) [K&P, p. 44, modified] [Illustrations: RDMB, p. 95, Fig. 6-3 (see paripinnate); H&H2, p. 156, Fig. 1586a; L, p. 741, Fig. 304]
- Odd-pinnate** – Pinnately compound with an odd number of leaflets, one of them terminal. (Compare with even-pinnate.) [K&P, p. 74, modified] [Illustrations: RDMB, p. 95, Fig. 6-3 (see imparipinnate); H&H2, p. 156, Fig. 1586a; L, p. 741, Fig. 304]

Leaflet Shape

See Shape below.

Leaflet Margin

See Margin below.

Leaflet Apex

See Apex below.

Leaflet Base

See Leaf Base and Leaflet Base above.

Leaflet Venation

See Leaf Venation and Leaflet Venation above.

Leaflet Lobing

See Leaf Lobing and Leaflet Lobing above.

Petiole Pubescence and Petiole Pubescence Type

See Pubescence below.

Other Surface Features of Petioles

See Other Surface Features below.

Rachis Pubescence and Rachis Pubescence Type

See Pubescence below.

Other Surface Features of Rachises

See Other Surface Features below.

Stipule Persistence

Caducous – Falling off very early, as stipules that drop soon after the leaf develops. (Compare with persistent.) [Z, p. 361, modified]

Persistent – Remaining attached; not falling off early, as stipules that remain attached while the leaves are attached. (Compare with caducous.) [L, p. 764, modified]

Stipule Type

Blade-like – Expanded and flattened, as the main portion or blade of a broad leaf. (Compare with glandular, scale-like and spinose.) [Illustrations: C&A, p. 8, Fig. 15]

Circumferential – Encircling the twig. [Illustrations: Z, p. 167, Fig. 74b; C&A, p. 8, Fig. 16]

Glandular – In the form of a secreting organ or gland. (Compare with blade-like, scale-like and spinose.) [L, p. 754, modified] [Illustrations:]

Scale-like – In the form of a small, flattened structure, usually thin, dry and membranous in texture. (Compare with blade-like, glandular and spinose.) [W&K, p. 603, modified] [Illustrations:]

Spinose – Modified into a woody, sharp-pointed structure, as a stipular spine. (Compare with blade-like, glandular and scale-like.) [Illustrations: W&K, p. 39, Fig. 3-11; RDMB, p. 95, Fig. 6-3; H&H2, p. 111, Fig. 1183; L, p. 748, Fig. 310i; C&A, p. 8, Fig. 17]

Flowers

General

Inflorescence Position

Axillary – On the stem just above the point of attachment of a leaf or a leaf scar; borne in the axil of a leaf. (Compare with terminal.) [W&K, p. 32, modified] [Illustrations: H&H2, p. 178, Fig. 1723]

Terminal – At the apex or tip of the stem. (Compare with axillary.) [RDMB, p. 93, modified] [Illustrations: H&H2, p. 180, Fig. 1738]

Inflorescence Type

Catkin – A pendent, more or less flexible, spike-like inflorescence with numerous small flowers, typically of only one sex (unisexual), lacking petals and subtended by scaly bracts, as in willows (*Salix*) and birches (*Betula*); catkins are often wind pollinated and fall as a unit after flowering or fruiting. [Z, p. 358 (see ament), modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H1, p. 158, Fig. 1528a; L, p. 447, Fig. 103Aa & Ba, & p. 458, Fig. 109 Aa & Da; Z, p. 358, Fig. 8]

Compound dichasium – A determinate, cymose inflorescence with the main axis bearing a terminal flower and a pair of opposite or nearly opposite lateral branches, each branch also bearing a terminal flower and a pair of lateral flowers or branches; a branched dichasium. (Compare with cyme and simple dichasium.) [K&P, p. 38, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 176, Fig. 1722b & p. 177, Fig. 1722d; L, p. 750, Fig. 312; W&K, p. 158, Fig. 10-13 (see dichasial cyme)]

Compound umbel – An inflorescence composed of several branches that radiate from almost the same point, like the ribs of an umbrella, each terminated by a secondary set of radiating branches that end in one or more flowers, the upper surface of the whole inflorescence rounded, or more or less flat; a branched umbel; as in Queen Anne's lace (*Daucus carota*). (Compare with simple umbel.) [Z, p. 388, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 176, Fig. 1722a & p. 177, Fig. 1722d; W&K, p. 158, Fig. 10-13; L, p. 645, Fig. 246Aa, Ea & Fa; Z, p. 388, Fig. 290]

Corymb – A racemose inflorescence with the individual flower stalks (pedicels) progressively shorter toward the apex so the flowers are all at about the same level, forming a flat or rounded surface across the top. (Compare with simple umbel.) [K&P, p. 33, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 176, Fig. 1722a; L, p. 751, Fig. 313; W&K, p. 158, Fig. 10-13; Z, p. 364, Fig. 65]

Cyathium – An inflorescence consisting of a single, naked, terminal pistillate flower with several tiny, naked, lateral staminate flowers, the whole more or less enclosed by a cuplike whorl of bracts (involucre) and resembling a single flower; as in poinsettias (*Euphorbia*). [K&P, p. 36, modified] [Illustrations: RDMB, p. 868, Figs. b & m; H&H2, p. 176, Fig. 1722a; W&K, p. 245, Fig. 13-9L & M; L, p. 565, Fig. 181Ab & Ac; Z, p. 365, Fig. 71]

Cyme – Generally, a determinate, compound, and frequently more or less flat-topped inflorescence; the basic cymose unit is a three-flowered cluster composed of a main stalk bearing a terminal flower and below it, two stalked, lateral flowers, each with a reduced leaf or bract at the base. (Compare with compound dichasium, helicoid cyme, scorpioid cyme and simple dichasium.) [Z, p. 365, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 176, Fig. 1722a & p. 177, Fig. 1722d; L, p. 751, Fig. 313; W&K, p. 158, Fig. 10-13J; Z, p. 365, Fig. 72]

Fascicle –

- Glomerule** – A dense cluster of flowers. [H&H2, p. 51, modified] [Illustrations: RDMB, p. 96, Fig. 6-4 (?); H&H2, p. 51, Fig. 522 (?) & Fig. 523]
- Head** – An inflorescence with crowded, sessile or nearly sessile, small flowers (florets) borne on a common receptacle which is convex or flat and often disc-shaped; characteristic of the sunflower family (Asteraceae). [K&P, p. 55, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 53, Fig. 542 & 543, p. 176, Fig. 1722b & p. 177, Fig. 1722d; L, p. 751, Fig. 313e & f; W&K, p. 158, Fig. 10-13; Z, p. 362, Fig. 37]
- Helicoid cyme** – A cyme in which the lateral branches develop on only one side, all segments branching on the same side, causing the inflorescence to curve or coil. (Compare with cyme and scorpioid cyme.) [K&P, p. 36, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 176, Fig. 1722b & p. 177, Fig. 1722d; L, p. 751, Fig. 313; W&K, p. 158, Fig. 10-13L & M (see scorpioid cyme); Z, p. 370, Fig. 117]
- Panicle** – A branched raceme, the main axis either determinate or indeterminate, and the lateral branches racemose; more loosely, a much-branched inflorescence of various types. (Compare with raceme and thyrses.) [K&P, p. 76, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 176, Fig. 1722b; L, p. 750, Fig. 312; W&K, p. 158, Fig. 10-13; Z, p. 377, Fig. 181]
- Raceme** – An elongate, indeterminate inflorescence with stalked flowers borne singly along an unbranched main axis or rachis. (Compare with panicle and spike.) [K&P, p. 87, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 176, Fig. 1722b & p. 178, Fig. 1722e; L, p. 750, Fig. 312; W&K, p. 158, Fig. 10-13; Z, p. 381, Fig. 218]
- Scorpioid cyme** – A cyme in which the lateral branches develop on only one side, each successive segment branching on the side opposite the previous one, producing a more or less zig-zag effect. (Compare with cyme and helicoid cyme.) [K&P, p. 36, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 177, Fig. 1722c; Z, p. 383, Fig. 238]
- Simple dichasium** – A determinate, cymose, three-flowered inflorescence composed of a main stalk bearing a terminal flower and a pair of opposite or nearly opposite lateral flowers. (Compare with compound dichasium and cyme.) [K&P, p. 38, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 176, Fig. 1722b & p. 177, Fig. 1722d; W&K, p. 158, Fig. 10-13]
- Simple umbel** – An inflorescence composed of several branches that radiate from almost the same point, like the ribs of an umbrella, each terminated by one or more flowers, the upper surface of the whole inflorescence rounded, or more or less flat. (Compare with compound umbel and corymb.) [Z, p. 388, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 177, Fig. 1722c & p. 178, Fig. 1722e; W&K, p. 158, Fig. 10-13; L, p. 751, Fig. 313]
- Solitary** – Flowers occurring singly and not borne in a cluster or group. [H&H2, p. 175] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 177, Fig. 1722c & p. 178, Fig. 1722e; L, p. 750, Fig. 312; W&K, p. 158, Fig. 10-13 (see scapose); Z, p. 383, Fig. 236 (see scapose)]
- Spadix** – An inflorescence with small, stalkless (sessile) flowers more or less embedded in a thick, fleshy, unbranched axis or rachis, the whole inflorescence subtended and sometimes partially enclosed by a specialized bract or spathe, as in Jack-in-the-pulpit (*Arisaema triphyllum*). (Compare with spike.) [K&P, p. 100, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 177, Fig. 1722c; L, p. 399, Fig. 79; W&K, p. 414, Fig. 19-7; Z, p. 384, Fig. 248]
- Spike** – A usually indeterminate, elongate inflorescence with unstalked (sessile) flowers arranged singly along an unbranched axis or rachis. (Compare with raceme and spadix.) [K&P, p. 100, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; L, p. 750, Fig. 312; W&K, p. 158, Fig. 10-13]
- Spikelet** – The basic unit of inflorescence in the sedges (Cyperaceae) and grasses (Poaceae) consisting of a spike of tiny flowers that lack petals, each subtended by scale-like bracts; spikelets are the ultimate subdivision in a typically more complex inflorescence. [W&K, p. 605, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 177, Fig. 1722c; L, p. 388, Fig. 75; W&K, p. 443, Fig. 20-5; Z, p. 384, Fig. 252, p. 348, Fig. 163 & p. 351, Fig. 164]

Thyrse – An elongate, many-flowered inflorescence with an indeterminate main axis or rachis and numerous lateral branches, each in the form of a cyme, as in most lilacs (*Syringa*).

(Compare with panicle.) [K&P, p. 111, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 177, Fig. 1722c & p. 178, Fig. 1722e; L. p. 668, Fig. 261Ba & p. 750, Fig. 312]

Verticillaster – A pair of axillary cymes arising from opposite leaves or bracts and forming a false whorl, as in many salvias (*Salvia*). [H&H2, p. 175, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 177, Fig. 1722d; L, p. 751, Fig. 313; Z, p. 266, Fig. 120-1a]

Flower Attachment

Nearly sessile – With a very short, somewhat indistinct stalk. (Compare with sessile and stalked.) [K&P, p. 106, modified] [Illustrations:]

Sessile – Without a stalk, positioned directly against the bearing structure. (Compare with nearly sessile and stalked.) [W&K, p. 604, modified] [Illustrations:]

Stalked – With a stalk. (Compare with nearly sessile and sessile.) [Illustrations: H&H2, p. 112, Fig. 1200]

Flower Gender

Bisexual – Having functional reproductive structures of both sexes (i.e. male and female) in the same flower or cone. (Compare with unisexual.) [K&P, p. 21, modified] [Illustrations: RDMB, p. 142, Fig. 6-18; H&H2, p. 17, Fig. 153]

Pistillate – Having functional pistils, but no functional stamens, making the flower unisexual and female. (Compare with staminate.) [K&P, p. 81, modified] [Illustrations: H&H2, p. 87, Fig. 913; L, p. 82, Fig. 9b; Z, p. 362, Fig. 39]

Staminate – Having one or more functional stamens, but no functional pistils, making the flower unisexual and male. (Compare with pistillate.) [K&P, p. 103, modified] [Illustrations: RDMB, p. 105, Fig. 6-7; H&H2, p. 113, 1202; L, p. 82, Fig. 9a; Z, p. 385, Fig. 255]

Unisexual – Having functional reproductive structures of only one sex in the flower or cone. (Compare with bisexual.) [K&P, p. 115, modified] [Illustrations: RDMB, p. 142, Fig. 6-18; H&H2, p. 87, Fig. 913 & p. 113, Fig. 1202, & p. 131, Fig. 1410]

Position of Perianth

Epigynous –

Hypogynous –

Perigynous –

Perianth

Calyx Symmetry and Corolla Symmetry

Asymmetric – Not divisible into essentially equal halves along any plane. (Compare with bilaterally symmetric and radially symmetric.) [K&P, p. 18, modified] [Illustrations: RDMB, p. 101, Fig. 6-6 (see amorphic and haplomorphic); L, p. 82, Fig. 9 (see irregular); Z, p. 372, Fig. 133 (see irregular)]

Bilaterally symmetric – Divisible into two essentially equal portions along only one plane. (Compare with asymmetric and radially symmetric.) [K&P, p. 120 (see zygomorphic), modified] [Illustrations: RDMB, p. 101, Fig. 6-6; H&H2, p. 135, Fig. 1461; W&K, p. 150, Fig. 10-6; L, p. 82, Fig. 9; Z, p. 360, Fig. 29]

Radially symmetric – Divisible into two essentially equal portions along more than one plane. (Compare with asymmetric and bilaterally symmetric.) [K&P, p. 12 (see actinomorphic), modified] [Illustrations: RDMB, p. 101, Fig. 6-6 (see actinomorphic and pleomorphic);

H&H2, p. 5, Fig. 22 (see actinomorphic); W&K, p. 150, Fig. 10-6 ; L, p. 82, Fig. 9 (see actinomorphic); Z, p. 357, Fig. 4 (see actinomorphic)]

Calyx Fusion

Aposepalous – With sepals distinct, not fused. (Compare with synsepalous.) [K&P, p. 16, modified] [Illustrations: H&H2, p. 90, Fig. 943 & p. 187, Fig. 1796; L, p. 73, Fig. 5c & p. 82, Fig. 9c]

Synsepalous – With sepals united, at least at the base. (Compare with aposepalous.) [Z, p. 386, modified] [Illustrations: RDMB, p. 101, Fig. 6-6 (any of several); H&H2, p. 187, Fig. 1800; L, p. 752, Fig. 314d & pp. 754-56, Fig. 315 & 316 (any of several)]

Sepal Orientation

Ascending –

Appressed –

Reflexed –

Spreading –

Sepal Shape

See Shape below.

Sepal Margin

See Margin below.

Sepal Apex

See Apex below.

Sepal Pubescence

See Pubescence below.

Sepal Pubescence Type

See Pubescence below

Other Sepal Surface Features

See Other Surface Features below.

Sepal Persistence

Caducous –

Persistent –

Corolla Symmetry

See Calyx Symmetry and Corolla Symmetry above.

Corolla Fusion

Apopetalous – With petals distinct, not fused. (Compare with sympetalous.) [K&P, p. 16, modified] [Illustrations: H&H2, p. 90, Fig. 943 & p. 187, Fig. 1796; W&K, p. 149, Fig. 10-3; L, p. 73, Fig. 5c & p. 82, Fig. 9c]

Sympetalous – With petals united, at least at the base. (Compare with apopetalous.) [Z, p. 386, modified] [Illustrations: RDMB, p. 101, Fig. 6-6 (any of several); H&H2, p. 187, Fig. 1798 & p. 188, Fig. 1804; W&K, p. 149, Fig. 10-3; L, pp. 754-56, Fig. 315 & 316 (any of several)]

Corolla Shape

Campanulate –

Funnelform –

Rotate –

Salverform –

Tubular –

Urceolate –

Petal Orientation

Ascending –

Appressed –

Reflexed –

Spreading –

Petal Shape

See Shape below.

Petal Margin

See Margin below.

Petal Apex

See Apex below.

Petal Pubescence

See Pubescence below.

Petal Persistence

Caducous –

Persistent –

Androecium

Stamen Position

Alternating with petals –

Opposite petals –

Stamen Grouping and Fusion

Diadelphous –

Monadelphous –
Separate –

Gynoecium

Ovary Position

Half-inferior – With the lower portion of the ovary enclosed by and fused to a floral cup, the whorl of sepals and petals (perianth) and/or stamens (androecium) thus appearing to arise from near the middle of the ovary. (Compare with inferior and superior.) [K&P, p. 54, modified] [Illustrations: RDMB, p. 120, Fig. 6-11; H&H2, p. 52, Fig. 536; L, p. 80, Fig. 8]

Inferior – With the ovary wholly enclosed by and fused to a floral cup, the whorl of sepals and petals (perianth) and/or stamens (androecium) thus appearing to arise from the top of the ovary. (Compare with half-inferior and superior.) [K&P, p. 60, modified] [Illustrations: RDMB, p. 120, Fig. 6-11; H&H2, p. 59, Fig. 603 & p. 199, Fig. 1888; W&K, p. 154, Fig. 10-10; L, p. 80, Fig. 8; Z, p. 371, Fig. 29]

Superior – With the ovary not fused to any portion of a floral cup, the whorl of sepals and petals (perianth) and/or stamens (androecium) thus arising from beneath the ovary. (Compare with inferior and half-inferior.) [K&P, p. 107, modified] [Illustrations: RDMB, p. 120, Fig. 6-11; H&H2, p. 117, Fig. 1256 & p. 199, Fig. 1889; W&K, p. 154, Fig. 10-10; L, p. 80, Fig. 8; Z, p. 368, Fig. 101, p. 371, Fig. 125 & p. 386, Fig. 266]

Carpel Fusion

Apocarpous –
Monocarpous –
Syncarpous –

Placentation

Apical – Attachment of ovules at the top or apex of the ovary. (Compare with basal placentation.) [Z, p. 359, modified] [Illustrations: RDMB, p. 120, Fig. 6-11 (see pendulous); W&K, p. 154, Fig. 10-9; Z, p. 359, Fig. 14]

Axile – Attachment of ovules at or near the center of a compound ovary which has more than one inner compartment (multilocular), the ovules located on the inner angle formed by the interior partitions (septa). (Compare with free-central placentation.) [Z, pp. 359-60, modified] [Illustrations: RDMB, p. 120, Fig. 6-11; H&H2, p. 199, Fig. 1898; W&K, p. 154, Fig. 10-9; L, p. 76, Fig. 7Aa & Ab; Z, p. 360, Fig. 21]

Basal – Attachment of ovules at the base of the ovary. (Compare with apical placentation.) [Z, p. 360, modified] [Illustrations: RDMB, p. 120, Fig. 6-11; H&H2, p. 200, Fig. 1899; W&K, p. 154, Fig. 10-9; L, p. 76, Fig. 7D & E; Z, p. 360, Fig. 23]

Free-central – Attachment of ovules to a free-standing central axis in a compound ovary which has a single inner compartment (unilocular), and thus no interior partitions (septa). (Compare with axile placentation.) [Z, p. 368] [Illustrations: RDMB, p. 120, Fig. 6-11; H&H2, p. 200, Fig. 1900; W&K, p. 154, Fig. 10-9; L, p. 76, Fig. 7Ca & Cb; Z, p. 369, Fig. 104]

Marginal – Attachment of ovules along one side of a simple ovary. (Compare with parietal placentation.) [H&K, p. 25, modified] [Illustrations: RDMB, p. 120, Fig. 6-11; H&H2, p. 200, Fig. 1901; W&K, p. 154, Fig. 10-9]

Parietal – Attachment of ovules on the inner wall, or intrusions of the wall, of a compound ovary with a single inner compartment (unilocular). (Compare with marginal placentation.) [RDMB, p. 18, modified] [Illustrations: RDMB, p. 120, Fig. 6-11; H&H2, p. 200, Fig. 1902; W&K, p. 154, Fig. 10-9; L, p. 76, Fig. 7Ka, Kb, La & Lb; Z, p. 378, Fig. 186]

Other Floral Features

Receptacle Shape

Alveolate –
Concave –
Cone-like –
Convex –

Involucre Shape

Campanulate –

Phyllary Orientation

Ascending –
Appressed –
Reflexed –
Squarrose –

Phyllary Shape

See Shape below.

Phyllary Margin

See Margin below.

Phyllary Apex

See Apex below.

Phyllary Pubescence

See Pubescence below.

Phyllary Pubescence Type

See Pubescence below

Other Phyllary Surface Features

See Other Surface Features below.

Pappus Type

Bristle-like –
Plumose –
Scale-like –

Pappus Whorl Complexity

Double-whorled –
Simple-whorled –

Fruits

Fruit Type

- Accessory fruit** – A fruit or group of fruits that ripen together and include some accessory tissue (i.e. structures not derived from the pistil) such as the thickened hypanthium of a rose (*Rosa*) hip or the fleshy receptacle of a strawberry (*Fragaria*). [W&K, p. 585, modified] [Illustrations: RDMB, p. 113, Fig. 6-10 (see pseudocarp); H&H2, p. 205, Fig. 1927a; L, p. 760, Fig. 321j & k]
- Achene** – A more or less small, dry fruit that does not split open at maturity (indehiscent), with a typically thin, close-fitting wall surrounding a single seed. [Z, p. 357, modified] [Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 205, Fig. 1927a; L, p. 759, Fig. 320b & c; Z, p. 357, Fig. 2]
- Acorn** – A nut with a persistent, cup-like structure (cupule) attached at the base consisting of numerous partially fused, overlapping, dry bracts, as in oaks (*Quercus*). [K&P, p. 11, modified] [Illustrations: RDMB, p. 113, Fig. 6-10 (see glans); H&H2, p. 205, Fig. 1927a; L, p. 459, Fig. 110Cd; Z, p. 180, Fig. 80-1j]
- Aggregate fruit** – A cluster of fruits that stick together or are fused, originating from two or more separate pistils contained within a single flower, as in blackberry (*Rubus*). (Compare with multiple fruit.) [H&H2, p. 6, modified] [Illustrations: RDMB, p. 113, Fig. 6-10; H&H2, p. 205, Fig. 1927a; L, p. 760, Fig. 321g & h; Z, p. 358, Fig. 6]
- Berry** – A fleshy fruit that does not split open at maturity (indehiscent), with few or more seeds (rarely just one), the seeds without a stony covering; the flesh may be more or less homogenous or with the outer portion more firm or leathery; as grapes (*Vitis*). (Compare with drupe.) [Z, p. 360, modified] [Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 205, Fig. 1927a; L, p. 760, Fig. 321; Z, p. 360, Fig. 26]
- Bur** – A cypsela or other fruit enclosed in a whorl of dry bracts (involucre) covered with spines or prickles that are often hooked, aiding in their dispersal by animals, as in cocklebur (*Xanthium*). [RDMB, p. 111, H&H2, p. 19, & H&K, p. 6, modified] [Illustrations: RDMB, p. 113, Fig. 6-10; H&H2, p. 205, Fig. 1927a; Z, p. 210, Fig. 96-4]
- Capsule** – A dry fruit that opens (dehisces) in any of various ways at maturity to release few to many seeds. [Z, p. 362, modified] [Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 22, Fig. 206, p. 205, Fig. 1927a & p. 206, Fig. 1927d; L, p. 759, Fig. 320; Z, p. 362, Fig. 38]
- Caryopsis** – A more or less small, dry fruit that does not split open at maturity (indehiscent), with a thin wall surrounding and fused to the single seed, as the fruits of the grass family (Poaceae); a grain. [Z, p. 362 & H&H2, p. 22, modified] [Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 205, Fig. 1927a; Z, p. 362, Fig. 42]
- Circumscissile capsule** – A capsule that splits open (dehisces) by a horizontal line around the fruit, the top coming off as a lid. [Z, p. 362, modified] [Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 206, Fig. 1927d; L, p. 759, Fig. 320d; Z, p. 362, Fig. 46]
- Cypsela** – A dry, one-seeded fruit that does not split open at maturity (indehiscent), with persistent perianth tissue (pappus) attached at the top, as in some members of the sunflower family (Asteraceae). [H&H2, p. 35, modified] [Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 35, Fig. 351; L, p. 761, Fig. 322a, b, d & f]
- Denticidal capsule** – A capsule that opens (dehisces) at the apex, leaving a ring of teeth. [RDMB, p. 110, modified] [Illustrations: RDMB, p. 112, Fig. 6-9; W&K, p. 163, Fig. 10-17]
- Drupe** – A fleshy fruit that does not split open at maturity (indehiscent), with a soft outer wall and one or more hard inner stone(s) each usually containing a single seed, as cherries and plums (*Prunus*). (Compare with berry.) [K&P, p. 41, modified] [Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 205, Fig. 1927b; L, p. 760, Fig. 321a & b; Z, p. 366, Fig. 84]

- Follicle** – A usually dry fruit, with one interior chamber or locule, and splitting open (dehiscing) lengthwise along a single line, as in milkweed (*Asclepias*). [K&P, p. 49 & Z, p. 368, modified] [Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 205, Fig. 1927b; L, p. 759, Fig. 320a; Z, p. 369, Fig. 103]
- Hesperidium** – A specialized berry with a leathery skin or rind, and a fleshy interior divided into sections or locules, as lemons and oranges (*Citrus*). (Compare with pepo.) [K&P, p. 56, modified] [Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 54, Fig. 552; Z, p. 370, Fig. 119]
- Hip** – An aggregation of achenes surrounded by an urn-shaped, more or less fleshy floral cup or hypanthium, as in roses (*Rosa*). [RDMB, P. 111, modified] [Illustrations: RDMB, p. 113, Fig. 6-10; H&H2, p. 55, Figs. 563 & 564; Z, p. 182, Fig. 81-1d & e]
- Legume** – A usually dry fruit that splits open (dehisces) lengthwise along two sutures and has a single interior chamber (locule), as in the pea family (Fabaceae). (Compare with loment.) [Z, p. 373 & K&P, p. 64, modified] [Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 205, Fig. 1927b; L, p. 759, Fig. 320j; Z, p. 373, Fig. 141]
- Loculicidal capsule** – A capsule that splits open (dehisces) lengthwise directly into the locules or chambers of the ovary, more or less midway between the ovary partitions. (Compare with septicidal capsule.) [Z, p. 374 & L, p. 760, modified] [Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 206, Fig. 1927d; L, p. 759, Fig. 320f; Z, p. 374, Fig. 151]
- Loment** – A usually dry fruit that breaks apart crosswise at points of constriction into one-seeded segments, as in beggar's ticks (*Desmodium*); considered to be a modified legume. (Compare with legume.) [Z, p. 374 & W&K, p. 597, modified] [Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 205, Fig. 1927b; L, p. 759, Fig. 320i; Z, p. 374, Fig. 153]
- Mericarp** – One of the segments of a schizocarp once it has split apart, often appearing to be a separate fruit; usually one-seeded and not splitting open at maturity (indehiscent); as the small, relatively hard-coated "nutlets" in the mint family (Lamiaceae) or the individual winged samaras of maples (*Acer*). [K&P, p. 69, modified] [Illustrations: RDMB, p. 112, Fig. 6-9 (see schiz. mericarp, schiz. nutlets & schiz. samaras); L, p. 759, Fig. 320k, l & p. 645, Fig. 246Da; Z, p. 266, Fig. 120-1k, p. 374, Fig. 156 & p. 383, Fig. 237]
- Multiple fruit** – A fruit formed from several flowers (and associated parts) more or less coalesced into a single structure with a common axis, as a mulberry (*Morus*) or pineapple (*Ananas comosus*). (Compare with aggregate fruit.) [Z, p. 375 & H&H2, p. 71, modified] [Illustrations: RDMB, p. 113, Fig. 6-10 (see syconium); H&H2, p. 71, Fig. 739, L, p. 463, Fig. 112Ab & Ba; Z, p. 102, Fig. 45-1i & 1j]
- Nut** – A more or less large, dry fruit that does not split open at maturity (indehiscent), with a single inner chamber and a thick, bony wall surrounding a single seed, as walnuts (*Juglans*). [Z, p. 376 & K&P, p. 73, modified] [Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 206, Fig. 1927c; L, p. 759, Fig. 320h; Z, p. 376, Fig. 167]
- Pepo** – A specialized berry with a hard or leathery rind and a fleshy interior surrounding a mass of seeds, without interior sections or locules, as melons and cucumbers (*Cucumis*). (Compare with hesperidium.) [Z, p. 378, modified] [Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 206, Fig. 1927c; L, p. 718, Fig. 292A & E]
- Pome** – A fleshy fruit that does not split open at maturity (indehiscent), with a more or less soft outer part derived from ripened hypanthium; the interior portion enclosing the seeds is divided into several sections or locules bounded by cartilaginous tissue; as apples (*Malus*). [K&P, p. 84, modified] [Illustrations: RDMB, p. 113, Fig. 6-10; H&H2, p. 206, Fig. 1927c; L, p. 760, Fig. 321; Z, p. 380, Fig. 208]
- Poricidal capsule** – A capsule that develops openings or pores (dehisces), usually at or near the apex, through which the seeds pass to the outside; as in poppy (*Papaver*). [K&P, p. 84, modified] [Illustrations: RDMB, p. 112, Fig. 6-9 (see operculate and poricidal); H&H2, p. 206, Fig. 1927d; L, p. 759, Fig. 320g; Z, p. 46, Fig. 17-2]

- Samara** – A winged, more or less dry fruit that does not split open at maturity (indehiscent), and contains a single seed, as in ash (*Fraxinus*) and maple (*Acer*). [Z, p. 382, modified]
[Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 206, Fig. 1927c; L, p. 759, Fig. 320; Z, p. 383, Fig. 234]
- Schizocarp** – A dry fruit with two or more interior chambers (locules), splitting open (dehiscing) along the partitions between chambers and separating into indehiscent, usually one-seeded segments (mericarps), as in the carrot family (Apiaceae) and maples (*Acer*). [K&P, p. 94, modified] [Illustrations: RDMB, p. 112, Fig. 6-9 (see schiz. mericarp, schiz. nutlets & schiz. samaras); L, p. 759, Fig. 320k, l & p. 645, Fig. 246Da; Z, p. 374, Fig. 156 & p. 383, Fig. 237]
- Septicidal capsule** – A capsule that splits open (dehisces) lengthwise along lines formed by the septa or the partitions separating chambers (locules) inside the ovary. (Compare with loculicidal capsule.) [Z, p. 383, modified] [Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 206, Fig. 1927d; L, p. 759, Fig. 320e; Z, p. 383, Fig. 241]
- Silicle** – A dry fruit that splits open (dehisces) along two sutures, the exterior walls eventually falling away in two halves, leaving a single, persistent, interior partition (septum) to which the seeds are attached; usually not more than twice as long as wide; common in the mustard family (Brassicaceae). (Compare with silique.) [K&P, p. 98 & Z, p. 384, modified]
[Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 206, Fig. 1927c; L, p. 522, Fig. 152Ag, Ah, Ea & Eb; Z, p. 384, Fig. 246]
- Silique** – A dry fruit that splits open (dehisces) along two sutures, the exterior walls eventually falling away in two halves, leaving a single, persistent, interior partition (septum) to which the seeds are attached; usually at least twice as long as wide; common in the mustard family (Brassicaceae). (Compare with silicle.) [K&P, p. 98 & Z, p. 384, modified] [Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 206, Fig. 1927c; L, p. 522, Fig. 152Bc & Jd; Z, p. 384, Fig. 247]
- Syconium** – a multiple fruit characteristic of the figs (*Ficus*) with an enlarged, hollow, flask-like structure that becomes fleshy at maturity and bears numerous tiny, dry fruits along the inner surface. [W&K, p. 606 & Z, p. 386, modified] [Illustrations: RDMB, p. 113, Fig. 6-10; H&H2, p. 206, Fig. 1927d; L, p. 463, Fig. 112Ab; Z, p. 386, Fig. 267]
- Utricle** – A more or less small, dry fruit that does not split open at maturity (indehiscent), with a thin bladder-like outer wall that is loose and free from the single seed. [Z, p. 388]
[Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 206, Fig. 1927d; Z, p. 388, Fig. 293]

Cones

Seed Cone Position

- Axillary** – On the stem just above the point of attachment of a leaf (or leaf scar) or branch; borne in the axil of a leaf or branch. (Compare with terminal.) [W&K, p. 32, modified]
- Terminal** – At the apex or tip of the stem. (Compare with axillary.) [RDMB, p. 93, modified]

Seed Cone Attachment

- Nearly sessile** – With a very short, somewhat indistinct stalk. (Compare with sessile and stalked.) [K&P, p. 106, modified] [Illustrations:]
- Sessile** – Without a stalk, positioned directly against the bearing structure. (Compare with nearly sessile and stalked.) [W&K, p. 604, modified] [Illustrations:]
- Stalked** – With a stalk. (Compare with nearly sessile and sessile.) [Illustrations:]

Seed Cone Symmetry

Asymmetric – Not divisible into essentially equal halves along any plane. (Compare with nearly symmetric and symmetric.) [K&P, p. 18, modified]

Nearly symmetric – Not fully symmetric, but divisible into nearly equal halves along one or more planes. (Compare with asymmetric and symmetric.)

Symmetric – Divisible into essentially equal halves along one or more planes. (Compare with asymmetric and nearly symmetric.) [K&P, p. 108, modified]

Seed Cone Shape Before Opening and Seed Cone Shape After Opening

Conic – Rounded in cross section, broadest at the base and essentially triangular in outline; cone-shaped. [K&P, p. 32, modified]

Cylindric – Rounded in cross section with a more or less uniform diameter and blunt ends; cylinder-shaped. [K&P, p. 36, modified]

Ellipsoid – Widest near the middle, with convex sides tapering equally toward rounded ends, and rounded in cross section; elliptic or oval-shaped in outline. [K&P, p. 42, modified]

Ellipsoid-cylindric – Intermediate in shape between ellipsoid and cylindric.

Globose – Circular in cross section and in outline when viewed from any angle; like a globe or sphere. [K&P, p. 52, modified]

Lance-cylindric – Intermediate in shape between lanceoloid and cylindric.

Lance-obovoid – Intermediate in shape between lanceoloid and obovoid.

Lanceoloid – Considerably longer than broad, rounded or somewhat flattened in cross section, broadest near the base and somewhat concavely tapering toward the tip; lance-head shaped in outline. [K&P, p. 63, modified]

Lance-ovoid – Intermediate in shape between lanceoloid and ovoid.

Oblong – Shaped like an elongated ellipsoid, the sides almost parallel from near one end to near the other end. [K&P, p. 73, modified]

Oblong-cylindric – Intermediate in shape between oblong and cylindric.

Oblong-ovoid – Intermediate in shape between oblong and ovoid.

Obovoid – Egg-shaped with the base at the narrow end; inversely ovoid. [K&P, p. 74, modified]

Ovoid – Rounded in cross section, broadest near a bluntly rounded base and convexly tapering to a narrower rounded tip; egg-shaped. [K&P, p. 75, modified]

Ovoid-conic – Intermediate in shape between ovoid and conic.

Ovoid-cylindric – Intermediate in shape between ovoid and cylindric.

Seed Cone Persistence

Not persistent –

Persistent –

Semi-persistent –

Seed Cone Serotiny

Not serotinous – Having cones that open when the seeds ripen or soon thereafter.

Serotinous – Having cones that remain closed long after the seeds are ripe. [D, p. 1143, modified]

Variably serotinous – Having some cones that open when the seeds ripen and others that remain closed long after the seeds are ripe.

Seed Cone Scale Type

Fleshy – Fairly firm and dense, juicy or at least moist, and easily cut. (Compare with leathery and woody.) [K&P, p. 47, modified]

Leathery – Moderately thick, tough and pliable. (Compare with fleshy and woody.) [K&P, p. 64, modified]

Woody – Of or resembling wood, and thus relatively hard and dry. (Compare with fleshy and leathery.) [K&P, p. 119, modified]

Seed Cone Armature Presence

Armed – Bearing a hook, prickle or other sharply pointed structure on the end of the cone scale. [Illustrations: H&H2, p. 10, Fig. 80; K (look for particular species)]

Unarmed – Without a hook, prickle or other sharply pointed structure on the end of the cone scale. [Illustrations: K (look for particular species)]

Seed Cone Armature Persistence

Deciduous – Armature tending to fall off while the cone is otherwise still intact. (Compare with persistent.)

Persistent – Remaining attached; not falling off while the cone is still intact. (Compare with deciduous.) [L, p. 764, modified]

Seed Cone Armature Features

Curved – [Illustration without definition may be adequate]

Straight – [Illustration without definition may be adequate]

Strong – With sturdy armature that is not easily broken.

Weak – With armature that tends to break easily.

Apophysis Features

Cross-keeled – With a horizontal ridge or keel. (Compare with keeled.) [Illustrations: (see illustrations for *P. taeda*, *P. palustris* and *P. resinosa* cones in K and elsewhere)]

Grooved – With a narrow depression or groove. [Illustrations:]

Keeled – With a vertical ridge or keel. (Compare with cross-keeled.) [Illustrations:]

Smooth – With an even surface, lacking keels, grooves or other surface features. [Illustrations:]

Wrinkled – With small folds or creases. [Illustrations:]

Other Features

Habitat

Bogs and seepages –

Bottomland forests –

Disturbed and weedy areas –

Dry-mesic upland forests –

Mesic upland forests –

Mixed forest edges –

Prairies –

Rock outcrops –

Suburban plantings –

Distribution of Gender

Dioecious – Having functionally unisexual (i.e. separate male and female) flowers or cones, which are borne on *different* plants within the species; thus some plants are male and others are female. (Compare with monoecious and synoecious.) [K&P p. 39, modified]

Monoecious – Having functionally unisexual (i.e. separate male and female) flowers or cones, which are borne on the *same* plant; each plant thus possessing both male and female reproductive structures. (Compare with dioecious and synoecious.) [K&P, p. 70, modified]

Polygamous – Having both bisexual (combined male and female) and unisexual (separate male and female) flowers or cones, which are borne on the same plant or on different plants of the same species. [K&P, p. 83, modified]

Synoecious – With all flowers or cones bisexual, i.e. bearing functional reproductive structures of both sexes. (Compare with dioecious and monoecious.) [K&P, p. 109, modified]

Root Type

Adventitious – Roots arising from any part of the plant (e.g. stem or leaf) other than the root system; usually growing laterally, often from the lower part of the main stem. [Z, p. 358, modified] [Illustrations: RDMB, p. 90, Fig. 6-2 (see corm, rhizome & tiller); H&H2, p. 5, Fig. 32; W&K, p. 31, Fig. 3-1; L, p. 738, Fig. 301a & f; Z, p. 358, Fig. 5; H&K, p. 53 & p. 56]

Fibrous – With several to many relatively slender roots of about the same diameter. (Compare with tap root.) [W&K, p. 593, modified] [Illustrations: RDMB, p. 89, Fig. 6-1; H&H2, p. 46, Fig. 475; W&K, p. 31, Fig. 3-1]

Tap – An enlarged vertical main root that is noticeably larger in diameter than any attached lateral roots. (Compare with fibrous roots.) [W&K, p. 606, modified] [Illustrations: RDMB, p. 89, Fig. 6-1; H&H2, p. 119, Fig. 1273; W&K, p. 31, Fig. 3-1]

Character State Definitions Applicable to Several Characters

Apex

(These character states variously apply to Leaflets, Leaves, Petals, Phyllaries and/or Sepals as indicated in brackets below.)

Acuminate – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Gradually tapering to a sharp point, forming concave sides along the tip. (Compare with acute.) [H&H2, p. 153, modified] [Illustrations: RDMB, p. 135, Fig. 6-15 (both acuminate and cuspidate); H&H2, p. 154, Fig. 1585a; L, p. 744, Fig. 307 (both acuminate and cuspidate); W&K, p. 37, Fig. 3-8]

Acute – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Tapering to a pointed apex with more or less straight sides, the sides coming together at an angle of less than 90°. (Compare with acuminate and obtuse.) [H&H2, p. 153, modified] [Illustrations: RDMB, p. 135, Fig. 6-15; H&H2, p. 154, Fig. 1585a; L, p. 744, Fig. 307; W&K, p. 37, Fig. 3-8]

Apiculate – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Ending abruptly in a small, slender, point that is not stiff and often slightly curved. (Compare with aristate, caudate and mucronate.) [H&H2, p. 153, modified] [Illustrations: RDMB, p. 135, Fig. 6-15; H&H2, p. 154, Fig. 1585a; L, p. 744, Fig. 307]

Aristate – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Bearing a prolonged, slender, stiff, usually straight tip; awned or bristled. (Compare with apiculate, caudate and mucronate.) [K&P, p. 18, modified] [Illustrations: RDMB, p. 135, Fig. 6-15; H&H2, p. 154, Fig. 1585a; L, p. 744, Fig. 307]

Caudate – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Ending in a long, tapering, straight or curved, flexible tip; tailed. (Compare with apiculate, aristate and mucronate.) [K&P, p. 26,

modified] [Illustrations: RDMB, p. 135, Fig. 6-15; H&H2, p. 154, Fig. 1585a; L, p. 744, Fig. 307]

Cleft – [Petals]

Emarginate – [Leaflets, Leaves, Petals, Phyllaries, Sepals] With a notch at the apex. [H&H2, p. 153] [Illustrations: RDMB, p. 135, Fig. 6-15 (emarginate, obcordate and retuse); H&H2, p. 154, Fig. 1585b (emarginate and muticous); L, p. 744, Fig. 307 (emarginate, obcordate and retuse); W&K, p. 37, Fig. 3-8]

Fringed – [Petals]

Mucronate – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Ending abruptly in a short, hard point. (Compare with apiculate, aristate and caudate.) [K&P, p.71, modified] [Illustrations: RDMB, p. 135, Fig. 6-15 (mucronate and mucronulate); H&H2, p. 154, Fig. 1585b (mucronate and mucronulate); L, p. 744, Fig. 307 (mucronate and mucronulate); W&K, p. 37, Fig. 3-8]

Obtuse – [Leaflets, Leaves, Petals, Phyllaries, Sepals] More or less blunt at the apex, with the sides coming together at an angle of greater than 90°. (Compare with acute.) [H&H2, p. 153, modified] [Illustrations: RDMB, p. 135, Fig. 6-15; L, p. 744, Fig. 307; W&K, p. 37, Fig. 3-8]

Rounded – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Forming a smooth, continuous curve. [W&K, p. 37] [Illustrations: RDMB, p. 135, Fig. 6-15; W&K, p. 37, Fig. 3-8]

Spinose – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Ending in a rigid, tapering, sharp tip; bearing a spine at the apex. [K&P, p. 101, modified] [Illustrations: RDMB, p. 135, Fig. 6-15]

Truncate – [Leaflets, Leaves, Petals, Phyllaries, Sepals] With the apex cut more or less straight across; ending abruptly, almost at right angles to the midrib. [RDMB, p. 134, modified] [Illustrations: RDMB, p. 135, Fig. 6-15; H&H2, p. 155, Fig. 1585c; W&K, p. 37, Fig. 3-8]

Margin

(These character states variously apply to Leaves, Leaflets, Petals, Phyllaries and/or Sepals as indicated in brackets below.)

Ciliate – [Leaflets, Leaves, Petals, Phyllaries, Sepals] With a fringe of hairs along the margin. [H&H2, p. 24, modified] [Illustrations: RDMB, p. 136, Fig 6-16; H&H2, p. 24, Fig. 231; L, p. 743, Fig. 306]

Crenate – [Leaflets, Leaves, Petals, Phyllaries, Sepals] With rounded teeth along the margin; scalloped. (Compare with crenulate, dentate and serrate.) [H&H2, p. 157, modified] [Illustrations: RDMB, p. 136, Fig 6-16; H&H2, p. 159, Fig. 1593a; W&K, p. 38, Fig. 3-10; L, p. 743, Fig. 306]

Crenulate – [Leaflets, Leaves] With very small, rounded teeth along the margin; finely crenate or small-scalloped. (Compare with crenate, denticulate and serrulate.) [H&H2, p. 157, K&P, p. 34, modified] [Illustrations: RDMB, p. 136, Fig 6-16; H&H2, p. 159, Fig. 1593a; W&K, p. 38, Fig. 3-10]

Crisped – [Leaflets, Leaves] Margins divided and twisted in more than one plane, as parsley (*Petroselinum crispum*) leaves; curled. [RDMB, p. 137 (see crispate), modified] [Illustrations: RDMB, p. 136, Fig 6-16 (see crispate); L, p. 743, Fig. 306 (see crispate)]

Deeply lobed – [Leaflets, Leaves, Petals, Sepals] With lobes that are cut approximately $\frac{1}{2}$ to $\frac{3}{4}$ the distance to the midrib or base; deeply cleft. (Compare with divided, moderately lobed and shallowly lobed.) [RDMB, p. 137 (see parted) & H&H2, pp. 157-58 (see parted), modified] [Illustrations: RDMB, p. 136, Fig 6-16; H&H2, p. 160, Fig. 1593c; L, p. 743, Fig. 306]

Dentate – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Toothed along the margin, with pointed teeth that are directed outward rather than forward. (Compare with crenate, denticulate and serrate.) [H&H2, p. 157, modified] [Illustrations: RDMB, p. 136, Fig 6-16; H&H2, p. 159, Fig. 1593b; W&K, p. 38, Fig. 3-10; L, p. 743, Fig. 306]

- Denticulate** – [Leaflets, Leaves] Toothed along the margin, with very small, pointed teeth that are directed outward rather than forward; finely dentate. (Compare with crenulate, dentate and serrulate.) [H&H2, p. 157, & K&P, p. 37, modified] [Illustrations: RDMB, p. 136, Fig 6-16; H&H2, p. 159, Fig. 1593b; W&K, p. 38, Fig. 3-10; L, p. 743, Fig. 306]
- Divided** – [Leaflets, Leaves, Petals, Sepals] Cut or split almost to the midrib or base. (Compare with deeply lobed, moderately lobed and shallowly lobed.) (*Please note that the word “divided” as used here to describe a particular type of leaf margin, has a narrower meaning than the general sense of the word used elsewhere in this glossary.*) [H&H2, p. 157, modified] [Illustrations: RDMB, p. 136, Fig 6-16; H&H2, p. 159, Fig. 1593b]
- Doubly serrate** – [Leaflets, Leaves] Margin with teeth of two sizes (small teeth on the big teeth), teeth bent toward the apex; doubly sawtoothed. (Compare with serrate.) [W&K, p. 38, modified] [Illustrations: RDMB, p. 136, Fig 6-16; H&H2, p. 159, Fig. 1593a (see biserrate); W&K, p. 38, Fig. 3-10; L, p. 743, Fig. 306]
- Entire** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Not toothed, notched or divided along the margin; with a continuous margin. [H&H2, p. 157, modified] [Illustrations: RDMB, p. 136, Fig 6-16; H&H2, p. 159, Fig. 1593b; W&K, p. 38, Fig. 3-10; L, p. 743, Fig. 306]
- Erose** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] With the margin irregularly toothed, as if gnawed. [H&H2, p. 157] [Illustrations: RDMB, p. 136, Fig 6-16; H&H2, p. 169, Fig. 1593b]
- Incised** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Margins sharply and deeply cut, usually jaggedly. [RDMB, p. 137] [Illustrations: RDMB, p. 136, Fig 6-16; H&H2, p. 159, Fig. 1593b; L, p. 743, Fig. 306]
- Involute** – [Leaflets, Leaves] With margins rolled inward, toward the upper side. (Compare with plane and revolute.) [H&H2, p. 157, modified] [Illustrations: RDMB, p. 120, Fig. 6-11 (see both involute and rolled); H&H2, p. 160, Fig. 1593c; W&K, p. 38, Fig. 3-10]
- Lacerate** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Margins irregularly cut, appearing torn. [RDMB, p. 137] [Illustrations: RDMB, p. 136, Fig 6-16; H&H2, p. 160, Fig. 1593c]
- Laciniate** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Cut into narrow, ribbon-like segments. [H&H2, p. 157, modified] [Illustrations: RDMB, p. 136, Fig 6-16; H&K, p. 108]
- Moderately lobed** – [Leaflets, Leaves, Petals, Sepals] With lobes that are cut approximately $\frac{1}{4}$ to $\frac{1}{2}$ the distance to the midrib or base. (Compare with deeply lobed, divided and shallowly lobed.) [RDMB, p. 137 (see cleft) & H&H2, pp. 157 (see cleft), modified] [Illustrations: RDMB, p. 136, Fig 6-16; H&H2, p. 159, Fig. 1593a; L, p. 743, Fig. 306]
- Plane** – [Leaflets, Leaves] With midrib and margin all in one plane, or nearly so; flat. (Compare with involute and revolute.) [W&K, p. 39, modified] [Illustrations: RDMB, p. 136, Fig 6-16 (could use entire leaf); W&K, p. 38, Fig. 3-10]
- Revolute** – [Leaflets, Leaves] With margins rolled backward, toward the underside. (Compare with involute and plane.) [H&H2, p. 158, modified] [Illustrations: RDMB, p. 136, Fig 6-16 & p. 120, Fig. 6-11; W&K, p. 38, Fig. 3-10]
- Serrate** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Toothed along the margin, the sharp teeth pointing forward; sawtoothed. (Compare with crenate, dentate and serrulate.) [H&H2, p. 158 & K&P, p. 97, modified] [Illustrations: RDMB, p. 136, Fig 6-16; H&H2, p. 160, Fig. 1593d; W&K, p. 38, Fig. 3-10; L, p. 743, Fig. 306]
- Serrulate** – [Leaflets, Leaves] Toothed along the margin with very small, sharp, forward-pointing teeth; finely serrate or small-sawtoothed. (Compare with crenulate, denticulate and serrate.) [H&H2, p. 158 & K&P, p. 97, modified] [Illustrations: RDMB, p. 136, Fig 6-16; H&H2, p. 161, Fig. 1593e; W&K, p. 38, Fig. 3-10; L, p. 743, Fig. 306]
- Shallowly lobed** – [Leaflets, Leaves, Petals, Sepals] With lobes that are cut approximately $\frac{1}{8}$ to $\frac{1}{4}$ the distance to the midrib or base. (Compare with deeply lobed, divided and moderately lobed.) [RDMB, p. 137 (see lobed) & H&H2, pp. 157 (see lobed), modified] [Illustrations: RDMB, p. 136, Fig 6-16; H&H2, p. 160, Fig. 1593c; L, p. 743, Fig. 306]

Sinuate – [Leaflets, Leaves, Petals, Phyllaries, Sepals] With the margin smoothly and shallowly indented; wavy in a horizontal plane. (Compare with undulate.) [RDMB, p. 138, modified] [Illustrations: RDMB, p. 136, Fig 6-16; H&H2, p. 161, Fig. 1593e]

Spiny or prickly – [Leaflets, Leaves, Phyllaries, Sepals] Bearing spines or prickles along the margin. [Illustrations: RDMB, p. 136, Fig 6-16 (see aculeate); H&H2, p. 111, Fig. 1183]

Undulate – [Leaflets, Leaves, Petals, Phyllaries, Sepals] With the margin undulating or wavy in a vertical plane. (Compare with sinuate.) [RDMB, p. 138, modified] [Illustrations: RDMB, p. 136, Fig 6-16 & p. 120, Fig. 6-11 (see undulate and sinuate); W&K, p. 38 Fig. 3-10; L, p. 743, Fig. 306]

Other Surface Features

(These character states variously apply to Buds, Herbaceous Stems or Young Twigs, 2-4-year-old Twigs, Leaf Upper or Lower Surface, Petioles, and Rachises as indicated in brackets below.)

Glandular – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface, Petioles, Rachises] Bearing secreting organs, or glands. [L, p. 754, modified] [Illustrations: W&K, p. 40, Fig. 3-12; RDMB, p. 141, Fig. 6-17]

Glaucous – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface] Covered with a whitish or bluish waxy coating (bloom) that can sometimes be rubbed off. [W&K, p. 594, modified] [Illustrations: none yet found]

Glossy – [Buds, Leaf Upper or Lower Surface] Lustrous or shiny, as the upper surface of southern magnolia (*Magnolia grandiflora*) leaves. [Illustrations: none yet found]

Glutinous – [Buds, Leaf Upper or Lower Surface] Gluey, sticky or gummy; covered with sticky exudates. [H&H2, p. 168, modified] [Illustrations: none yet found]

Lepidote – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface] Covered with small scales. [RDMB, p. 141, modified] [Illustrations: H&H2, p. 168, Fig. 1655; RDMB, p. 141, Fig. 6-17]

Nectary-bearing – [Herbaceous Stems or Young Twigs, Petioles, Rachises] Bearing a glandular structure that secretes nectar [W&K, p. 598 (see nectary), modified], often appearing as a protuberance, scale or pit [L, p. 762 (see nectary), modified]. [Illustrations: none yet found for nectaries on stems or petioles]

Punctate glandular– [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface, Petioles, Rachises] Bearing sessile or embedded glands. (Compare with stipitate glandular.) [W&K, p. 602 (see punctate), modified] [Illustrations: W&K, p. 40, Fig. 3-12L (see sessile glandular); RDMB, p. 141, Fig. 6-17 (see glandular)]

Rugose – [Leaf Upper or Lower Surface] Wrinkled. [H&H2, p. 170] [Illustrations: L, p. 748, Fig. 310c; H&H2, p. 170, Fig. 1677]

Scabrous – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface] Rough and sand-papery to the touch, due to structure of the epidermis or to the presence of short stiff hairs. (Compare with smooth.) [W&K, p. 603 & H&H2, pp. 170-71, modified] [Illustrations: W&K, p. 40, Fig. 3-12; RDMB, p. 141, Fig. 6-17; L, p. 747, Fig. 309]

Scaly – [Herbaceous Stems or Young Twigs, 2-4-year-old Twigs, Leaf Upper or Lower Surface] Bearing scales of one kind or another. [Illustrations to be associated with the definitions for the different types of scales (see below).]

Scurfy – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface] Covered with small, bran-like scales. [H&H2, p. 171] [Illustrations: H&H2, p. 171, Fig. 1682]

Smooth – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface] With an even surface; not rough to the touch. (Compare with rugose and scabrous.) [H&H2, p. 171] [Illustrations: none yet found]

- Spiny, prickly, thorny** – [Herbaceous Stems or Young Twigs, 2-4-year-old Twigs, Petioles, Rachises] Bearing spines, prickles or thorns. [Illustrations: see definitions for prickle, spine, and thorn below.]
- Sterigma-bearing** – [2-4-year-old Twigs] With persistent leaf bases that remain on the twig after the leaf falls and appear as peg-like projections. [Illustrations: H&H2, p. 113, Fig. 1211, (see sterigma, not very good)]
- Tendrill-bearing** – [Herbaceous Stems or Young Twigs, 2-4-year-old Twigs, Petioles, Rachises] With a slender, twining organ used to grasp support for climbing, as grape (*Vitis*) vines. [H&H2, p. 120 (see tendrill), modified] [Illustrations: W&K, p. 39, Fig. 3-11 (see tendrill); RDMB, p. 90, Fig. 6-2 (see tendrill)]
- Winged** – [Herbaceous Stems or Young Twigs, 2-4-year-old Twigs, Petioles, Rachises] Having one or more elongate, relatively thin protrusions or appendages that loosely resemble wings, as the twigs of winged elm (*Ulmus alata*). [K&P, p. 119, modified] [Illustrations: H&H2, p. 148, Fig. 1570]

Pubescence

(These character states variously apply to Buds, Herbaceous Stems or Young Twigs, 2-4-year-old Twigs, Leaf Upper or Lower Surface, Petioles, and Rachises as indicated in brackets below.)

- Glabrous** – [Buds, Herbaceous Stems or Young Twigs, 2-4-year-old Twigs, Leaf Upper or Lower Surface, Petioles, Rachises] Lacking plant hairs (trichomes). (Compare with pubescent.) [W&K, p. 39, modified] [Illustrations: W&K, p. 40, Fig. 3-12]
- Pubescent** – [Buds, Herbaceous Stems or Young Twigs, 2-4-year-old Twigs, Leaf Upper or Lower Surface, Petioles, Rachises] Bearing plant hairs (trichomes). (Compare with glabrous.) [W&K, p. 39, modified] [Illustrations: any of several from W&K, p. 40, Fig. 3-12; RDMB, p. 141, Fig. 6-17; or L, p. 746, Fig. 308, & p. 747, Fig. 309]
- Arachnoid** – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface] With fairly sparse, fine, white, loosely tangled hairs; cobwebby. [K&P, p. 17, modified] [Illustrations: RDMB; p. 141, Fig. 6-17; H&H2, p. 164, Fig. 1622]
- Canescent** – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface] Gray or white in color due to a covering of short, fine, gray or white hairs. [H&H2, p. 165] [Illustrations: H&H2, p. 165, Fig. 1628 (not very good); RDMB, p. 141, Fig. 6-17 (not very good)]
- Ciliate** – [Buds] Bearing a fringe of hairs along the margin. [L, p. 744, modified] [Illustrations: RDMB; p. 141, Fig. 6-17; L, p. 743, Fig. 306u]
- Glabrate** – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface, Petioles, Rachises] Becoming glabrous; almost glabrous [H&H2, p. 167]; pubescent when young, but losing the hairs in maturity [W&K, p. 594]. [Illustrations: none found yet]
- Hirsute** – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface] With coarse, stiff hairs. [W&K, p. 595, modified] [Illustrations: W&K, p. 40, Fig. 3-12; RDMB, p. 141, Fig. 6-17; L, p. 747, Fig. 309]
- Hispid** – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface] With stiff, bristly, usually stout-based hairs. [W&K, p. 595, modified] [Illustrations: W&K, p. 40, Fig. 3-12; RDMB, p. 141, Fig. 6-17; L, p. 747, Fig. 309]
- Pilose** – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface, Petioles, Rachises] With soft, more or less straight hairs. [W&K, p. 39, modified] [Illustrations: W&K, p. 40, Fig. 3-12; L, p. 746, Fig. 308]
- Puberulent** – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface, Petioles, Rachises] With very short hairs. [W&K, p. 39, modified] [Illustrations: W&K, p. 40, Fig. 3-12; RDMB, p. 141, Fig. 6-17; L, p. 746, Fig. 308]

- Sericeous** – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface] With long, silky, usually appressed hairs. [RDMB, p. 140, modified] [Illustrations: RDMB, p. 141, Fig. 6-17; L, p. 747, Fig. 309]
- Stellate** – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface, Petioles, Rachises] With hairs that branch from the base and resemble tiny stars. [W&K, p. 605, modified] [Illustrations: W&K, p. 40, Fig. 3-12; L, p. 747, Fig. 309]
- Stinging** – [Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface, Petioles, Rachises] With erect, usually long hairs, that produce irritation when touched, as in stinging nettle (*Urtica*). [RDMB, p. 140 (see urent), modified] [Illustrations: RDMB, p. 141, Fig. 6-17 (see urent); H&H2, p.172, Fig. 1697 (see urent)]
- Stipitate glandular** – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface, Petioles, Rachises] With stalked glandular hairs. (Compare with punctate glandular.) [W&K, p. 605, modified] [Illustrations: W&K, p. 40, Fig. 3-12; L, p. 748, Fig. 310k]
- Strigose** – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface] With straight, stiff, sharp appressed hairs. [W&K, p. 605, modified] [Illustrations: W&K, p. 40, Fig. 3-12; RDMB, p. 141, Fig. 6-17; L, p. 747, Fig. 309]
- Tomentose** – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface] With tangled woolly hairs. [W&K, p. 607, modified] [Illustrations: W&K, p. 40, Fig. 3-12; RDMB, p. 141, Fig. 6-17; L, p. 746, Fig. 308 (see also woolly)]
- Villous** – [Buds, Herbaceous Stems or Young Twigs, Leaf Upper or Lower Surface] With slender curved or wavy, but not matted hairs. [W&K, p. 39, modified] [Illustrations: W&K, p. 40, Fig. 3-12; RDMB, p. 141, Fig. 6-17; L, p. 746, Fig. 308]

Shape

(These character states variously apply to Leaves, Leaflets, Petals, Phyllaries and/or Sepals as indicated in brackets below.)

- Acicular** – [Leaflets, Leaves] Very long and slender, gradually tapering to a point, like a needle; needle-shaped. (Compare with awl-shaped, filiform and linear.) [K&P, p. 11, modified] [Illustrations: H&H2, p. 151, Fig. 1583a (see acerose); L, p. 742, Fig. 305]
- Awl-shaped** – [Leaflets, Leaves] Narrowly triangular and sharply pointed, like an awl. (Compare with acicular and ensiform.) [H&H2, p. 150, modified] [Illustrations: H&H1, p. 133, Fig. 1389a; H&H2, p. 151, Fig. 1583a]
- Clawed** – [Petals]
- Cordate** – [Leaflets, Leaves] Heart-shaped, with the notch at the base. (Compare with deltoid, obcordate and reniform.) [H&H2, p. 132, modified] [Illustrations: RDMB, p. 131, Fig. 6-13 (see cordiform); H&H2, p. 151, Fig. 1583a]
- Deltoid** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Similar in shape to an equilateral triangle, with the point of attachment along one of the sides; like the Greek letter delta. (Compare with cordate and obdeltoid.) [H&H2, p. 150, modified] [Illustrations: H&H2, p. 151, Fig. 1583a; L, p. 742, Fig. 305]
- Elliptic** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Widest near the middle, with convex sides tapering equally toward both ends [W&K, p. 36, modified]; in the shape of an ellipse or narrow oval [H&H2, p. 150, modified]. (Compare with oblong and oval.) [Illustrations: H&H2, p. 151, Fig. 1583a; W&K, p. 36, Fig. 3-7 (elliptic only, not broadly elliptic); L, p. 742, Fig. 305]
- Ensiform** – [Leaflets, Leaves] Long and moderately slender, flat in cross section, gradually tapering to a pointed apex; sword-shaped; as an *Iris* leaf. (Compare with awl-shaped, linear and lorate.) [K&P, p. 43 & H&H2, p. 150, modified] [Illustrations: H&H2, p. 151, Fig. 1583a]

- Falcate** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Long, arcing to one side and tapering toward the apex; sickle-shaped. [K&P, p. 45, modified] [Illustrations: RDMB, p. 131, Fig. 6-13 (see falciform); H&H1, p. 133, Fig. 1389a]
- Fan-shaped** – [Leaflets, Leaves] Shaped like a fan, as a *Ginkgo* leaf. [Illustrations: H&H2, p. 151, Fig. 1583a (see flabellate)]
- Filiform** – [Leaflets, Leaves] Long and very slender, basically round in cross section and of uniform diameter; thread-like. (Compare with acicular and linear.) [K&P, p. 46, modified] [Illustrations: L, p. 742, Fig. 305]
- Hastate** – [Leaflets, Leaves] Arrowhead-shaped, but with the basal lobes turned outward rather than downward; halberd-head-shaped. (Compare with sagittate.) [H&H2, p.150, modified] [Illustrations: RDMB, p. 131, Fig. 6-13 (see hastiform); H&H2, p. 151, Fig. 1583a]
- Keeled** – [Petals]
- Lanceolate** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Several times longer than broad, widest near the base and tapering to a point at the apex; lance-head-shaped. (Compare with oblanceolate.) [W&K, p. 36, modified] [Illustrations: H&H2, p. 151, Fig. 1583b; W&K, p. 36, Fig. 3-7; L, p. 742, Fig. 305]
- Linear** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Long and narrow, with the sides more or less straight and parallel. (Compare with acicular, ensiform, filiform and lorate.) [K&P, p. 66, modified] [Illustrations: H&H2, p. 151, Fig. 1583a; W&K, p. 36, Fig. 3-7; L, p. 363, Fig. 60D & p. 742, Fig. 305; H&K. p. 105]
- Lorate** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Long and moderately narrow, flat in cross section, with sides more or less straight and parallel, often flexible and curving; strap-shaped. (Compare with ensiform and linear.) [K&P, p. 67, modified] [Illustrations: L, p. 742, Fig. 305]
- Lyrate** – [Leaflets, Leaves] Pinnately lobed, with a large, rounded terminal lobe and smaller lower lobes; lyre-shaped. (Compare with pandurate, runcinate and spatulate.) [H&H2, p.150, modified] [Illustrations: RDMB, p. 131, Fig. 6-13; H&H2, p. 151, Fig. 1583a;]
- Needle-like** – [Leaflets, Leaves] Leaves that are more or less linear and usually evergreen; they may be flattened as in hemlocks (*Tsuga*) or more rounded as in pines (*Pinus*). [Illustrations: H&H2, p. 151, Fig. 1583a (see acerose); W&K, p. 36, Fig. 3-7]
- Obcordate** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Heart-shaped with the point of attachment at the narrow end; inversely cordate. (Compare with cordate and obdeltoid.) [H&H2, p.150, modified] [Illustrations: H&H2, p. 151, Fig. 1583b]
- Obdeltoid** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Similar in shape to an equilateral triangle, with the point of attachment at the narrow end; inversely deltoid. (Compare with deltoid and obcordate.) [H&H2, p.150, modified] [Illustrations: H&H2, p. 151, Fig. 1583b]
- Oblanceolate** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Several times longer than broad, widest near the apex and tapering to a point at the place of attachment; inversely lanceolate. (Compare with lanceolate and spatulate.) [H&H2, p.150, modified] [Illustrations: W&K, p. 36, Fig. 3-7; L, p. 742, Fig. 305]
- Oblong** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Shaped like a compressed oval, with the sides approximately parallel for most of their length. (Compare with elliptic.) [K&P, p. 73, modified] [Illustrations: H&H2, p. 152, Fig. 1583c; W&K, p. 36, Fig. 3-7; L, p. 742, Fig. 305]
- Obovate** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Egg-shaped with the point of attachment at the narrower end; inversely ovate. (Compare with ovate.) [H&H2, p.150, modified] [Illustrations: H&H2, p. 152, Fig. 1583c; W&K, p. 36, Fig. 3-7; L, p. 742, Fig. 305]
- Orbiculate** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Approximately circular in outline. (Compare with oval and reniform.) [H&H2, p.150, modified] [Illustrations: H&H2, p. 152, Fig. 1583c (see orbicular); W&K, p. 36, Fig. 3-7 (see orbicular); L, p. 742, Fig. 305 (see orbicular)]

- Oval** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Broadly elliptic, the width more than one-half the length, with rounded ends. (Compare with elliptic, orbiculate and ovate.) [H&H2, p.150, modified] [Illustrations: H&H2, p. 152, Fig. 1583c;]
- Ovate** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Egg-shaped in outline, with the broader end near the base. (Compare with obovate and oval.) [H&H2, p.150, modified] [Illustrations: H&H2, p. 152, Fig. 1583c; W&K, p. 36, Fig. 3-7; L, p. 742, Fig. 305]
- Pandurate** – [Leaflets, Leaves] Basically inversely egg-shaped (obovate), but with two opposite rounded sinuses in the lower half and two small basal lobes; fiddle-shaped. (Compare with lyrate.) [K&P, p. 76, modified] [Illustrations: RDMB, p. 131, Fig. 6-13 (see panduriform); H&H1, p. 134, Fig. 1389c; L, p. 742, Fig. 305]
- Reniform** – [Leaflets, Leaves] Broader than long, broadly rounded and notched at the base; kidney-shaped. (Compare with cordate and orbiculate.) [W&K, p. 603, modified] [Illustrations: RDMB, p. 131, Fig. 6-13; H&H2, p. 152, Fig. 1583d; W&K, p. 36, Fig. 3-7; L, p. 742, Fig. 305]
- Rhombic** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Broadest at the middle, with more or less straight sides of equal length tapering to either end; diamond-shape. [K&P, p. 89, modified] [Illustrations: H&H2, p. 152, Fig. 1583d (see rhombic [poor example] and quadrate); L, p. 742, Fig. 305 (see rhombate); try to find illustration for rhombic scale-like leaves.]
- Runcinate** – [Leaflets, Leaves] Broad near the apex and tapering toward the base, with a series of coarse, sharp lobes on either side that mostly point toward the base, as a dandelion (*Taraxacum*) leaf. (Compare with lyrate.) [K&P, p. 92, modified] [Illustrations: RDMB, p. 131, Fig. 6-13; H&H2, p. 160, Fig. 1593d; L, p. 742, Fig. 305]
- Saccate** – [Petals]
- Sagittate** – [Leaflets, Leaves] Arrowhead-shaped, with the basal lobes directed downward. (Compare with hastate.) [H&H2, p.150, modified] [Illustrations: RDMB, p. 131, Fig. 6-13; H&H2, p. 152, Fig. 1583d]
- Scale-like** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Having the form of small, often triangular shaped, leaves that are appressed to the branchlets, as in juniper (*Juniperus*). [W&K, p. 603, modified] [Illustrations: W&K, p. 36, Fig. 3-7B]
- Spatulate** – [Leaflets, Leaves, Petals, Phyllaries, Sepals] Broad and rounded near the apex with a narrower, long, tapering base; spatula-shaped or spoon-shaped. (Compare with lyrate and oblanceolate.) [K&P, p. 100, modified] [Illustrations: RDMB, p. 131, Fig. 6-13; H&H2, p. 152, Fig. 1583d; L, p. 742, Fig. 305]
- Spurred** – [Petals]

Definitions of Characters and Additional Terms Contained in Definitions

- Accessory parts of fruits** – Structures consisting of, or derived from, floral parts other than the pistil, such as sepals, hypanthium or receptacle.
- Adventitious** – Structures or organs arising in a position that is unusual for their type, as roots originating on the stem. [H&H2, p. 5, modified] [Illustrations: H&H2, p. 5, Fig. 32; H&K, p. 53 & p. 56]
- Androecium** – A collective term for all the stamens and any closely associated structures in a flower. [W&K, p. 585, modified] [Illustrations: RDMB, p. 100, Fig. 6-5; L, p. 756, Fig. 317; Z, p. 384, Fig. 254]
- Angiosperm** – Plants that bear their seeds enclosed in an ovary; the flowering plants. (Compare with gymnosperm.)

- Anther** – The pollen-producing portion of the stamen typically borne at the tip of a stalk or filament. [Z, p. 358, modified] [Illustrations: RDMB, p. 105, Fig. 6-7; H&H2, p. 195, Figs. 1847, 1848 & 1849; L, p. 70, Fig. 4; Z, p. 384, Fig. 254]
- Apex** – The portion of a plant structure (such as a leaf, bud, stem, etc.) farthest from its point of attachment or uppermost; the tip. (Compare with base.) [H&H2, p. 10, modified] [Illustrations: H&H2, p. 10, Fig. 74 & p. 148, Fig. 1571]
- Apophysis** – The outer portion of a cone scale which is exposed when the cone is closed. [H&H2, p. 10, modified] [Illustrations: H&H2, p. 10, Fig. 80; K (see particular species for examples)]
- Armature** – Any kind of sharp defense such as thorns, spines, or prickles. [L, p. 739, modified] [Illustrations: H&H2, p. 12, Fig. 92 & p. 144, Fig. 1514; W&K, p. 39, Fig. 3-11; RDMB, p. 89, Fig. 6-1 & p. 90, Fig. 6-2; L, p. 748, Fig. 310i; (also look for cone scales with prickles)]
- Awn** – A slender, more or less straight and stiff, fine-pointed appendage; may be located at the tip of a leaf or bract and a continuation of the midvein, or comprising the pappus in fruits of the sunflower family (Asteraceae). [K&P, p. 19 & W&K, p. 587, modified] [Illustrations: RDMB, p. 135, Fig. 6-15 (see aristate); H&H2, p. 13, Fig. 108 & p. 19, Fig. 172; L, p. 744, Fig. 307b & p. 761, Fig. 322c; Z, p. 359, Fig. 19]
- Axil** – The point of the upper angle formed between the axis of a stem and any part (usually a leaf) arising from it. [H&H2, p. 13] [H&H2, p. 13, Fig. 109]
- Axis** – Any relatively long, continuous, supporting structure that typically bears other organs laterally, and represents the main line of growth and/or symmetry; as a stem that bears leaves or branches, or the rachis of an inflorescence that bears flowers along its length. [K&P, p. 19 & H&H2, p. 13, modified] [Illustrations: H&H2, p. 14, Fig. 111; L, p. 740, Figs. 303a-e & p. 750, Figs. 312b-f]
- Bark** – The outermost layer of a woody stem, usually with one or more corky layers that prevent water loss and protect the inner living tissues from mechanical damage. [W&K, p. 587, modified] [Illustrations: H&H1, p. 11, Fig. 82; H&H2, p. 14, Fig. 119]
- Basal** – At or very near the base of a plant structure. [K&P, p. 20, modified]
- Base** – The portion of a plant structure (such as a leaf, bud, stem, etc.) nearest the point of attachment or lowermost; the bottom. (Compare with apex.) [Illustrations: H&H2, p. 148, Fig. 1571]
- Bisexual** – Having functional reproductive structures of both sexes (i.e. male and female) in the same flower or cone. (Compare with unisexual.) [K&P, p. 21, modified] [Illustrations: RDMB, p. 142, Fig. 6-18; H&H2, p. 17, Fig. 153]
- Blade** – The flat, expanded portion of a leaf, petal, sepal, etc. [RDMB, p. 93, modified] [Illustrations: W&K, p. 32, Fig. 3-2 (leaf) & p. 33, Fig. 3-3 (leaf), p. 150, Fig. 10-4 (petal); H&H1, p. 14, Fig. 114 (leaf); H&H2, p. 17, Fig. 158 (petal) & p. 148, Fig. 1571]
- Bract** – A modified, usually reduced leaf, often occurring at the base of a flower or inflorescence. [H&H2, p. 18, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 18, Fig. 166]
- Branch** – A division or subdivision of a stem or other axis. [H&K, p. 6, modified] [Illustrations: H&H2, p. 18, Fig. 170]
- Branchlet** – An ultimate branch, i.e. one located at the end of a system of branches; a small branch. (Compare with twig.) [K&P, p. 22, modified] [Illustrations: H&H2, p. 18, Fig. 170]
- Bristle** – A slender, more or less straight and stiff, fine-pointed appendage; may be located at the tip of a leaf or bract and a continuation of the midvein, or comprising the pappus in fruits of the sunflower family (Asteraceae). [K&P, p. 22 & W&K, p. 587 (see awn), modified] [Illustrations: RDMB, p. 135, Fig. 6-15 (see aristate); H&H2, p. 13, Fig. 108 & p. 19, Fig. 172; L, p. 744, Fig. 307b & p. 761; Z, p. 359, Fig. 19]
- Bud** – An immature shoot, either vegetative, floral or both, and often covered by protective scales. [RDMB, p. 88, modified] [Illustrations: RDMB, p. 89, Fig. 6-1; H&H2, p. 19, Fig. 173; W&K, p. 32, Fig. 3-2]

- Bundle scar** – A small scar within a leaf scar left by a vascular bundle that previously entered the stalk (petiole) or base of the fallen leaf. [W&K, p. 588, modified] [Illustrations: RDMB, p. 89, Fig. 6-1; H&H2, p. 19, Fig. 179; L, p. 749, Fig. 311; P&W, p. 4, Plate 2]
- Calyx** – The collective term for all of the sepals of a flower; the outer perianth whorl. (Compare with corolla.) [H&H2, p. 20, modified] [Illustrations: RDMB, p. 100, Fig 6-5; H&H2, p. 20, Fig. 191]
- Calyx tube** –
- Carpel** – The basic ovule-bearing unit of flowers, thought to be evolutionarily derived from an infolded leaf-like structure; equivalent to a simple pistil or a division of a compound pistil. [K&P, p. 25, modified] [Illustrations: H&H2, p. 195, Fig. 1855; W&K, p. 153, Fig. 10-8; L, p. 74, Fig. 6]
- Chaff** –
- Color Variegation** –
- Composite** –
- Compound** – Divided into two or more equivalent parts, as a leaf comprised of multiple leaflets; not simple. [K&P, p. 31, modified] [Illustrations: RDMB, p. 95, Fig. 6-3; H&H2, p. 156, Fig. 1586a & b; L, p. 741, Fig. 304; W&K, p. 33, Fig. 3-3]
- Compound ovary** – An ovary formed by the fusion of the bases of two or more carpels; recognizable by the presence of more than one area of placentation, locule, ovary lobe, style (or style branch), or stigma. (Compare with simple ovary.) [W&K, p. 590, modified] [Illustrations: RDMB, p. 106, Fig. 6-8; H&H2, p. 198, Fig. 1880 & 1886; Z, p. 369, Fig. 103]
- Cone** – Reproductive structures in conifers comprised of scales and/or other types of modified leaves densely arranged on a central stalk; female, or seed cones, bear ovules on the surface of their scales; male cones produce pollen. [Illustrations: H&H2, p. 29, Fig. 279; L, p. 363, Fig. 60 & p. 365, Fig. 61; K (see particular species for examples)]
- Conifer** – Cone-bearing plants, such as pines (*Pinus*). [Illustrations:]
- Corolla** – The collective term for all of the petals of a flower; the inner perianth whorl. (Compare with calyx.) [H&H2, p. 31, modified] [Illustrations: RDMB, p. 100, Fig 6-5; H&H2, p. 31, Fig. 302]
- Corolla tube** –
- Cupule** – A cup-like structure at the base of some fruits, such as the acorns of oaks (*Quercus*), composed of a persistent, usually dried, whorl of bracts (involucre) or other sterile floral parts, that are often partially fused. [L, p. 747, & K&P, p. 35, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 34, Fig. 340 & 341; L, p. 459, Fig. 110Cd; Z, p. 365, Fig. 70]
- Cymose** – In the form of a simple or compound cyme; bearing cymes. [H&K, p. 11, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 176, Fig. 1722a & p. 177, Fig. 1722d; L, p. 751, Fig. 313; W&K, p. 158, Fig. 10-13J; Z, p. 365, Fig. 70]
- Dehiscent** – Splitting or forming one or more openings in a regular pattern at maturity enabling the contents to be released for dispersal, as certain fruits, such as capsules, that split open when ripe releasing seeds. (Compare with indehiscent.) [K&P, p. 37 & W&K, p. 591, modified] [Illustrations: RDMB, p. 112, Fig. 6-9; H&H2, p. 36, Fig. 359; L, p. 759, Fig. 320d-g & k; Z, p. 374, Fig. 151]
- Determinate inflorescence** – An inflorescence in which the terminal or central flower opens first, halting further elongation of the main axis, as in cymes. (Compare with indeterminate inflorescence.) [Z, p. 366, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 176, Fig. 1722a & p. 177, Fig. 1722d; L, p. 751, Fig. 313; W&K, p. 158, Fig. 10-13J; Z, p. 365, Fig. 72]
- Disc Floret** –
- Duration** – The length of time that a plant or any of its component parts exists. [RDMB, p. 87]
- Epidermis** – The outermost layer of cells of leaves, young stems and roots. [REE, p. 896, modified] [Illustrations: H&H2, p. 42, Fig. 436]

Fascicle – [leaves]

Filament – The stalk of a stamen, which supports an anther at its tip. [K&P, p. 46, modified]
[Illustrations: RDMB, p. 105, Fig. 6-7; H&H2, p. 46, Fig. 477 & p. 195, Figs. 1847, 1848 & 1849; L, p. 756, Fig. 317b; Z, p. 384, Fig. 254]

Floral – upon, within, or associated with the flowers. [K&P, p. 48]

Floral cup – A cup or tube usually formed by the fusion of the basal parts of the sepals, petals and/or stamens, and on which they are seemingly borne; surrounds the ovary, or ovaries, and may be fused wholly, partly or not at all to them; the shape varies from disc-like to cup-shaped, flask-like or tubular; a hypanthium. [REE, p. 897 (see floral tube), Z, p. 368, K&P, p. 48, & W&K, p. 595 (see hypanthium), modified] [Illustrations: H&H2, p. 56, Fig. 578; L, p. 80, Fig. 8 & p. 542, Figs. 166Fa, Gb & Hb; Z, p. 368, Fig. 101]

Floret – A very small, structurally specialized flower, especially those of the grasses (Poaceae) and the sunflower family (Asteraceae). [K&P, 48, modified] [Illustrations: RDMB, p. 877, Figs. a-f; H&H2, p. 47, Figs. 490 & 491; L, p. 727, Fig. 299; Z, p. 369, Fig. 110]

Flower – The reproductive structure in flowering plants (angiosperms), consisting of stamens and/or pistils, and usually including a perianth of sepals and/or petals. [H&H2, p. 48, modified] [Illustrations: RDMB, p. 100, Fig 6-5; H&H2, p. 48, Fig. 492; W&K, p. 148, Fig. 10-2]

Flower Gender –

Fruit – The seed-bearing structure in flowering plants, consisting of one or more matured or ripened pistil(s), along with any persisting accessory parts such as sepals or receptacle. [K&P, p. 49, modified] [Illustrations: RDMB, pp. 112-13, Figs. 6-9 & 6-10; H&H2, pp. 205-206, Figs. 1927a-1927d; L, pp. 759-61, Figs. 320-322]

Fusion – The physical connection of equivalent or dissimilar structures, as fused sepals or petals. [K&P, p. 51, modified]

Geminate – In pairs, as a leaf which is divided into two leaflets. (Compare with ternate.) [Illustrations: RDMB, p. 95, Fig. 6-3 (see bifoliolate)]

Germination – The beginning or resumption of growth by a seed, bud or other structure. [REE, p. 898, modified]

Gymnosperm – A seed plant which produces seeds that are not enclosed inside an ovary, as the conifers. (Compare with angiosperm.) [REE, p. 898, modified]

Habit – The general appearance, characteristic form, or mode of growth of a plant. [H&H2, p. 52]

Hypanthium – A cup or tube usually formed by the fusion of the basal parts of the sepals, petals and/or stamens, and on which they are seemingly borne; surrounds the ovary, or ovaries, and may be fused wholly, partly or not at all to them; the shape varies from disc-like to cup-shaped, flask-like or tubular; a floral cup. [REE, p. (see floral tube), Z, p. 368 (see floral cup), K&P, p. 58, & W&K, p. 595, modified] [Illustrations: H&H2, p. 56, Fig. 578; L, p. 80, Fig. 8 & p. 542, Figs. 166Fa, Gb & Hb; Z, p. 368, Fig. 101]

Indehiscent – Not splitting or forming an opening at maturity, the contents being released for dispersal only after decay, digestion or erosion of the structure, as certain fruits, such as achenes and berries, that retain their seeds when ripe. (Compare with dehiscent.) [K&P, p. 59, modified] [Illustrations: RDMB, p. 112, Fig. 6-9 (see achene & berry); L, p. 760, Fig. 321d & p. 761, Fig. 322a]

Indeterminate inflorescence – An inflorescence in which the lowermost or outermost flower opens first, with the main axis often elongating as the flowers develop, as in racemes. (Compare with determinate inflorescence.) [Z, p. 371, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 176, Fig. 1722b & p. 178, Fig. 1722e; L, p. 750, Fig. 312; W&K, p. 158, Fig. 10-13; Z, p. 381, Fig. 218]

Inflorescence – 1) The mode or pattern of flower bearing; the arrangement of flowers on the floral axis. 2) A basic unit of the flower-producing portion of a plant, composed of one or

more flowers and any supporting stalks and appendages (e.g. bracts, involucre, etc.); a flower cluster. [K&P, p. 60, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, pp. 176-77, Figs. 1722a-1772d; L, p. 750, Fig. 312 & p. 751, Fig. 313]

Internode – The portion of a stem between two nodes, i.e. the part where leaves and/or branches do not arise. [H&H2, p. 60] [Illustrations: RDMB, p. 89, Fig. 6-1 (see *Aesculus*); H&H2, p. 60, Fig. 613; W&K, p. 32, Fig. 3-2]

Involucre – A whorl of bracts subtending a flower or flower cluster. [H&H2, p. 61] [Illustrations: H&H2, p. 61, Fig. 623; Z, p. 372, Fig. 132]

Keel – A longitudinal ridge, more or less triangular in cross section, like the keel of a boat. [K&P, p. 61, modified] [Illustrations:]

Leaf – A lateral outgrowth of a stem, usually green and photosynthetic, and often consisting of a stalk (petiole) and an expanded portion (blade); leaves may also be needle-like or scale-like in form. (Compare with leaflet.) [H&K, p. 24, modified] [Illustrations: H&H1, p. 51, Fig. 518; H&H2, p. 64, Fig. 656]

Leaf arrangement – The relative position of leaves as defined by the location of their points of attachment on the stem and/or their orientation (e.g. alternate, opposite, whorled, etc.).

Leaf complexity – The division (or not) of a leaf into distinctly separate segments or leaflets; whether a leaf is simple or compound. (Also see leaf division.)

Leaf division – The degree and form of division of a leaf into distinct leaflets and/or leaflet-like segments. (Also see leaf complexity.) (*As used here, leaf division applies to both compound leaves and leaves that are simple but deeply dissected.*)

Leaf scar – The scar remaining on a twig at the former place of attachment of a leaf, after the leaf has fallen. [H&H2, p. 63, modified] [Illustrations: RDMB, p. 89, Fig. 6-1; H&H2, p. 64, Fig. 662]

Leaf venation – The visible pattern of veins on a leaf. [W&K, p. 608, modified] [Illustrations: RDMB, p. 136, Fig. 6-16 & p. 194, Fig. 7-6; H&H2, p. 132, Fig. 1424; L, p. 741, Fig. 304b & c; W&K, p. 35, Fig. 3-6]

Leaf venation relief –

Leaflet – One of the separate, leaf-like segments of a compound leaf. [K&P, p. 64, modified] [Illustrations: RDMB, p. 95, Fig. 6-3; H&H2, p. 64, Fig. 657; W&K, p. 33, Fig. 3-3]

Lenticel – The specialized openings in the bark of some woody stems that provide a passage for gas exchange, often appearing as small, circular to elongate marks on the surface of the bark. [W&K, p. 596, modified] [Illustrations: RDMB, p. 89, Fig. 6-1; H&H2, p. 64, Fig. 658; W&K, p. 32, Fig. 3-2]

Lobe – A more or less major protrusion or segment of a leaf or leaflet delimited by concavities (sinuses) in the leaf margin. [K&P, p. 66, modified] [Illustrations: RDMB, p. 136, Fig. 6-16 (any of several showing leaves with divisions); H&H2, p. 65, Fig. 676 & p. 149, Fig. 1575; L, p. 743, Fig. 306 l & n]

Locule – A distinct compartment or cavity within organs such as ovaries, anthers or fruits. [K&P, pp. 66-67, modified] [Illustrations: RDMB, p. 106, Fig. 6-8; H&H2, p. 201, Fig. 1910; Z, p. 359, Fig. 14]

Margin – The edge, as in the edge of a leaf blade. [H&H2, p. 67] [Illustrations: H&H2, p. 67, Fig. 696 & p. 148, Fig. 1571]

Midrib – A main or primary vein running lengthwise down the center of a leaf or leaf-like structure; a continuation of the leaf stalk (petiole); the midvein. [W&K, p. 598, & K&P, p. 70, modified] [Illustrations: RDMB, p. 136, Fig. 6-16 & p. 194, Fig. 7-6; H&H2, p. 132, Fig. 1424; L, p. 741, Fig. 304b; W&K, p. 35, Fig. 3-6]

Midvein – A main or primary vein running lengthwise down the center of a leaf or leaf-like structure; a continuation of the leaf stalk (petiole); the midrib. [W&K, p. 598 (see midrib), & K&P, p. 70, modified] [Illustrations: RDMB, p. 136, Fig. 6-16 & p. 194, Fig. 7-6; H&H2, p. 132, Fig. 1424; L, p. 741, Fig. 304b; W&K, p. 35, Fig. 3-6]

- Multilocular** – With more than one interior compartment or locule. (Compare with unilocular.) [Illustrations: RDMB, p. 106, Fig. 6-8; H&H2, p. 201, Fig. 1910; L, p. 76, Fig. 7]
- Nectar** – A sugary, sticky fluid secreted by many plants. [H&H2, p. 73] [Illustrations: none yet found]
- Needle** –
- Node** – The portion of a stem where leaves and/or branches arise; often recognizable by the presence of one or more buds. (Compare with internode.) [H&H2, p. 73, modified] [Illustrations: H&H2, p. 73, Fig. 759 & p. 60, Fig. 613; W&K, p. 32, Fig. 3-2]
- Nutrition** – Mode of acquiring substances necessary for growth and development. [K&P, p. 73, modified]
- Ovary** – The lower portion of a pistil where ovules are borne; often distinguishable from the rest of the pistil by its larger circumference. [K&P, p. 75, modified] [Illustrations: H&H2, p. 78, Fig. 814, p. 116, Fig. 1234 & p. 196, Fig. 1863; L, p. 73, Fig. 5c; Z, p. 379, Fig. 201]
- Ovule** – The structure in flowering plants and gymnosperms which when fertilized develops into a seed. [H&K, p. 29, modified] [Illustrations: H&H2, p. 78, Fig. 814, p. 200, Fig. 1901 & 1902; Z, p. 377, Fig. 177]
- Pappus** – A ring or pair of hairs, bristles, awns or scales attached at the top of the ovary just beneath the petals, persisting in fruit and often aiding in dispersal by wind or animals, especially in the sunflower family (*Asteraceae*). [K&P, p. 77 & Z, p. 377, modified] [Illustrations: RDMB, p. 100, Fig. 6-5 & p. 877; H&H2, p. 80, Fig. 834; L, p. 727, Fig. 299Ab, Db & Dc, & p. 761, Fig. 322a-i; Z, p. 377, Fig. 184]
- Pedicel** – The stalk of a individual flower, either that of a solitary flower or of single flowers in a multi-flower inflorescence. (Compare with peduncle.) [K&P, p. 78, modified] [RDMB, p. 96, Fig. 6-4; H&H2, p. 173, Fig. 1713; L, p. 750, Fig. 312 (any of several); Z, p. 378, Fig. 187]
- Peduncle** – The main stalk of a multi-flower inflorescence or of a cluster of flowers within an inflorescence. (Compare with pedicel.) [K&P, p. 79, modified] [RDMB, p. 96, Fig. 6-4; H&H2, p. 176, Fig. 1722a (any of several); L, p. 750, Fig. 312 (any of several); Z, p. 378, Fig. 188]
- Perianth** – The collective term for the outer sterile parts of a flower, comprising the calyx (sepals) and the corolla (petals) when both whorls are present. [W&K, p. 600, modified] [Illustrations: H&H2, p. 83, Fig. 864]
- Petal** – A unit or segment of the inner floral envelope or corolla of a flower; often colored and more or less showy. (Compare with sepal.) [L, p. 764, modified] [Illustrations: RDMB, p. 100, Fig. 6-5; H&H2, p. 84, Fig. 875; H&H1, p. 70, Fig. 721; W&K, p. 148, Fig. 10-2]
- Petiole** – The stalk of a leaf. (Compare with petiolule and rachis.) [W&K, p. 600, modified] [Illustrations: W&K, p. 32, Fig. 3-2 & p. 33, Fig. 3-3; H&H2, p. 84, Fig. 878 & p. 148, Fig. 1571]
- Petiolule** – The stalk of a leaflet of a compound leaf. (Compare with petiole.) [H&H2, p. 84, modified] [Illustrations: H&H2, p. 161, Fig. 1601; W&K, p. 33, Fig. 3-3; L, p. 741, Fig. 304j]
- Photosynthetic** – Able to convert light energy to chemical energy by means of chlorophylls and other photosynthetic pigments. [REE, p. 905 (see photosynthesis), modified]
- Phyllary** –
- Pistil** – The female or ovule-bearing organ of a flower, typically composed of an ovary, style and stigma. [Z, p. 379, modified] [Illustrations: RDMB, p. 100, Fig. 6-5 & p. 106, Fig. 6-8; H&H2, p. 87, Fig. 912; W&K, p. 148, Fig. 10-2; L, p. 80, Fig. 8; Z, p. 379, Fig. 201]
- Pistillate** – Having functional pistils, but no functional stamens, making the flower unisexual and female. (Compare with staminate.) [K&P, p. 81, modified] [Illustrations: H&H2, p. 87, Fig. 913; L, p. 82, Fig. 9b; Z, p. 362, Fig. 39]

Pith – The more or less soft and spongy tissue in the center of some stems and roots; sometimes degenerating to leave a hollow tube. [H&H2, p. 87, modified] [Illustrations: RDMB, p. 89, Fig. 6-1; H&H1, p. 73, Fig. 760; H&H2, p. 139, Fig. 1464]

Placentation – The arrangement of ovules within the ovary. [L, p. 765, modified] [Illustrations: RDMB, p. 120, Fig. 6-11; W&K, p. 154, Fig. 10-9; L, p. 76, Fig. 7]

Pollen – The small, often powdery, grains which contain the male reproductive cells of flowering plants and gymnosperms. [H&K, p. 33, modified] [Illustrations: none yet found]

Pollen cone – A male or pollen-producing cone; typically smaller and of shorter duration than seed cones. [Illustrations: W&K, p. 122, Fig. 9-1; L, p. 363, Fig. 60Ed]

Prickle – A small, sharp, non-woody structure developed from outgrowth of the surface of bark or epidermis. (Compare with spine and thorn.) [W&K, p. 39, modified] [Illustrations: W&K, p. 39, Fig. 3-11; RDMB, p. 89, Fig. 6-1; L, p. 748, Fig. 310e]

Primary vein – A main vein in a leaf or other laminar structure from which other veins branch; the midvein or midrib when present. [K&P, p. 84, modified] [Illustrations: RDMB, p. 136, Fig. 6-16 & p. 194, Fig. 7-6; H&H2, p. 132, Fig. 1424; L, p. 741, Fig. 304b & c; W&K, p. 35, Fig. 3-6]

Pubescence – The broad term for any type of plant hairiness. [W&K, p. 602]

Racemose – In the form of a simple or compound raceme; bearing racemes. [H&K, p. 35, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 176, Fig. 1722b & p. 178, Fig. 1722e; L, p. 750, Fig. 312; W&K, p. 158, Fig. 10-13; Z, p. 381, Fig. 218]

Rachis – 1) The main axis of a compound leaf above the point of attachment of the lowermost leaflet; a continuation of the leaf stalk or petiole. 2) The main axis of a compound inflorescence above the point of attachment of the lowermost flower; a continuation of the inflorescence stalk or peduncle. [W&K, p. 33, modified] [Illustrations: (any of several from the following) RDMB, p. 95, Fig. 6-3; H&H2, p. 96, Fig. 1012 & Fig. 1013; L, p. 741, Fig. 304; W&K, p. 33, Fig. 3-3 & p. 156, Fig. 10-11]

Ray Floret –

Receptacle – 1) The more or less enlarged end of an individual flower stalk (pedicel) which bears some or all of the flower parts. 2) The enlarged end of a compound flower stalk (peduncle) bearing two or more flowers, or the florets of a head, as in the sunflower family (Asteraceae). [W&K, p. 602, Z, p. 381 & K&P, p. 88, modified] [Illustrations: RDMB, p. 861, Fig. b, p. 865, Fig. e & p. 877, Fig. a; H&H2, p. 97, Figs. 1029 & 1030; Z, p. 381, Fig. 222]

Root – The portions of a plant that are anatomically distinct from the shoot and that lack nodes and internodes; roots serve for anchorage, absorption and/or storage, and usually grow below ground. (Compare with shoot.) [K&P, pp. 87-88 (see radix), modified] [Illustrations: RDMB, p. 89, Fig. 6-1; H&H2, p. 46, Fig. 475 & p. 119, Fig. 1273; W&K, p. 31, Fig. 3-1]

Scale – 1) Small, flattened structures that are usually thin, dry and membranous in texture. [Illustrations: H&H2, p. 168, Fig. 1655 (see lepidote); RDMB, p. 141, Fig. 6-17 (see lepidote)] 2) Small, often triangular shaped, leaves that are appressed to the branchlets as in Juniper (*Juniperus*). [Illustrations: W&K, p. 36, Fig. 3-7B] 3) The often woody, ovule-bearing structures of gymnosperm seed cones. [Illustrations: W&K, p. 122, Fig. 9-1L; K, p. 342, Fig. 231]. [W&K, p. 603, modified]

Secondary vein – A vein in a leaf or other laminar structure that branches from a main or primary vein; a side vein.. [K&P, p. 95, modified] [Illustrations: RDMB, p. 136, Fig. 6-16 & p. 194, Fig. 7-6; H&H2, p. 132, Fig. 1424; L, p. 741, Fig. 304b & c; W&K, p. 35, Fig. 3-6]

Seed – A mature or ripened ovule. [K&P, p. 95, modified] [Illustrations: RDMB, p. 868, Figs. h & p; H&H2, p. 106, Fig. 1131; Z, p. 382, Fig. 224, p. 383, Fig. 235 & p. 387, Fig. 273]

Seed cone – A female or ovule-producing cone; typically larger and persisting longer than pollen cones. [Illustrations: H&H2, p. 29, Fig. 279; L, p. 363, Fig. 60 & p. 365, Fig. 61; K (see particular species for examples)]

Sepal – A unit or segment of the outermost floral envelope or calyx of a flower; usually green and leaf-like. (Compare with petal.) [L, p. 769, modified] [Illustrations: RDMB, p. 100, Fig. 6-5; H&H2, p. 106, Fig. 1133; W&K, p. 148, Fig. 10-2]

Septum (plural **septa**) – A distinct wall or partition that separates the chambers or locules of an ovary, fruit or other structure. [K&P, p. 97, modified] [Illustrations: RDMB, p. 106, Fig. 6-8; H&H2, p. 201, Fig. 1910; Z, p. 384, Fig. 243]

Serotiny – The tendency of some seed cones to remain closed long after the seeds are ripe.

Shoot – 1) The portions of a plant that are anatomically distinct from the root and differentiated into nodes, where leaves and branches originate, and the spaces in between (internodes); shoots consist of stems, leaves and any other structures borne from the stem. (Compare with root.) [K&P, p. 98, modified] 2) A young stem or branch. [H&H2, p. 107]

Short shoot – A stumpy, slow growing, lateral branch with very short internodes, often bearing flowers; a dwarf shoot. [W&K, p. 604, modified] [Illustrations: RDMB, p. 90, Fig. 6-2 (see spur); H&H2, p. 112, Fig. 1195 (see spur); W&K, p. 132, Fig. 9-6 (an example in *Ginkgo*); L, p. 358, Fig. 56 (an example in *Ginkgo*) & p. 362, Fig. 60A (an example in *Cedrus*)]

Simple ovary – An ovary composed of only one carpel; recognizable by the presence of only one area of placentation, locule, ovary lobe, style (or style branch), and stigma. (Compare with compound ovary.) [H&H2, p. 198, modified] [Illustrations: RDMB, p. 106, Fig. 6-8; H&H2, p. 198, Fig. 1881; L, p. 73, Fig. 5h & i]

Sinus – The space or recess between two divisions or lobes of an organ such as a leaf or petal. [L, p. 770, modified] [Illustrations: RDMB, p. 136, Fig. 6-16 (any of several showing leaves with divisions); H&H2, p. 109, Fig. 1163]

Spathe – An often large, sometimes colored and flowerlike bract subtending and sometimes partially enclosing an inflorescence, as in calla lily (*Zantedeschia*) or jack-in-the-pulpit (*Arisaema triphyllum*). [K&P, p. 100, modified] [Illustrations: RDMB, p. 96, Fig. 6-4; H&H2, p. 174, Fig. 1721; L, p. 399, Fig. 79; W&K, p. 414, Fig. 19-7; Z, p. 384, Fig. 249]

Spine – A woody, sharp-pointed, modified leaf or leaf part. (Compare with prickle and thorn.) [W&K, p. 39, modified] [Illustrations: W&K, p. 39, Fig. 3-11; RDMB, p. 95, Fig. 6-3; H&H2, p. 111, Fig. 1183; L, p. 748, Fig. 310i]

Stalk – A supporting axis or column that bears a structure at its apex and is usually narrower than the structure being borne, as the stalk of a flower or leaf. [K&P, p. 102, modified] [Illustrations: H&H2, p. 84, Fig. 878, p. 112, Fig. 1200 & p. 161, Fig. 1600; W&K, p. 34, Fig. 3-4; L, p. , Fig. 304b & c]

Stamen – The male reproductive organ in a flower that produces and releases pollen, composed of an anther usually borne on a stalk (filament). [Z, pp. 384-85, modified] [Illustrations: RDMB, p. 100, Fig. 6-5 & p. 105, Fig. 6-7; H&H2, p. 113, Fig. 1201; L, p. 756, Fig. 317; Z, p. 384, Fig. 254]

Staminate – Having one or more functional stamens, but no functional pistils, making the flower unisexual and male. (Compare with pistillate.) [K&P, p. 103, modified] [Illustrations: RDMB, p. 105, Fig. 6-7; H&H2, p. 113, 1202; L, p. 82, Fig. 9a; Z, p. 385, Fig. 255]

Staminode –

Stem – The axis of a shoot, bearing leaves, bracts and/or flowers, and usually growing above ground, but sometimes specialized and growing underground (see bulb, corm, rhizome and tuber) or on the surface of the ground (see stolon); stems are differentiated into regions called nodes, where leaves and branches originate, and internodes. [K&P, p. 103, modified] [Illustrations: H&H2, p. 113, Fig. 1207]

Stigma – The pollen-receptive region at the tip of a pistil. [Z, p. 385, modified] [Illustrations: RDMB, p. 106, Fig. 6-8; H&H2, p. 116, Fig. 1234 & p. 196, Fig. 1863; W&K, p. 148, Fig. 10-2; Z, p. 385, Fig. 259]

Stipule – A relatively small, typically leaf-like structure occurring at the base of a leaf stalk (petiole), usually one of a pair; stipules are sometimes in the form of spines, scales or glands.

- [K&P, p. 104, modified] [Illustrations: H&H2, p. 114, Fig. 1217, p. 148, Fig. 1571 & p. 76, Fig. 791 (see ocrea); W&K, p. 32, Fig. 3-2; L, p. 446, Fig. 102b, C&A, p. 8, Figs. 15, 16 & 17]
- Stipule scar** – The scar remaining on a twig at the former place of attachment of a stipule. [Illustrations: RDMB, p. 89, Fig. 6-1; W&K, p. 32, Fig. 3-2; C&A, p. 4, Fig. 7 & p. 8, Figs. 15 & 16]
- Style** – The more or less elongated portion of a pistil between the ovary and the stigma. [L, p. 772, modified] [Illustrations: RDMB, p. 106, Fig. 6-8; H&H2, p. 116, Fig. 1234 & p. 196, Fig. 1863; W&K, p. 148, Fig. 10-2; Z, p. 385, Fig. 259]
- Terminal** – At the top, tip, or end of a structure. [RDMB, p. 116] [Illustrations: RDMB, p. 89, Fig. 6-1 (see *Aesculus*); L, p. 749, Fig. 311g; C&A, p. 4, Figs. 6 & 7; P&W, p. 2, Plate 1; RDMB, p. 95, Fig. 6-3 (see imparipinnate); L, p. 741, Fig. 304d; H&H2, p. 176, Fig. 1722b (see polychasium)]
- Ternate** – In threes, as a leaf which is divided into three leaflets. (Compare with geminate.) [H&H2, p. 120, modified] [Illustrations: RDMB, p. 95, Fig. 6-3; H&H2, p. 120, Fig. 1282 & p. 125, Fig. 1343 (see trifoliolate); L, p. 741, Fig. 304i & j]
- Thorn** – A woody, sharp-pointed, modified stem. (Compare with prickle and spine.) [W&K, p. 39, modified] [Illustrations: W&K, p. 39, Fig. 3-11; RDMB, p. 89, Fig. 6-1, & p. 90, Fig. 6-2; H&H2, p. 144, Fig. 1514]
- Trichome** – Any type of plant hair (except for root hairs). [W&K, p. 607] [Illustrations: W&K, p. 40, Fig. 3-12; RDMB, p. 200, Fig. 7-7; L, & p. 748, Fig. 310f-h, 310k]
- Trunk** – The aboveground, relatively stout, main stem of a tree; the bole. [K&P, p. 133, modified] [Illustrations: H&H2, p. 127, Fig. 1363]
- Twig** – The relatively small end portion of a woody branchlet; a small branchlet. (Compare with branchlet.) [K&P, p. 114, modified] [Illustrations: RDMB, p. 89, Fig. 6-1 & p. 857, Fig. 1; H&H2, p. 18, Fig. 170; P&W, p. 2, Plate 1]
- Unilocular** – With a single interior compartment or locule. (Compare with multilocular.) [Illustrations: RDMB, p. 106, Fig. 6-8; H&H2, p. 200, Fig. 1901 & 1902; L, p. 76, Fig. 7]
- Unisexual** – Having functional reproductive structures of only one sex in the flower or cone. (Compare with bisexual.) [K&P, p. 115, modified] [Illustrations: RDMB, p. 142, Fig. 6-18; H&H2, p. 87, Fig. 913 & p. 113, Fig. 1202, & p. 131, Fig. 1410]
- Vascular bundle** – A strand of conducting tissues and associated cells within a stem or connected structure. [K&P, p. 16, modified] [Illustrations: RDMB, p. 204, Fig. 7-8; H&H2, p. 132, Fig. 1423]
- Vegetative** – 1) Of, or relating to, the non-flowering parts of a plant. 2) Producing new plants asexually by the spread or fragmentation of sterile (non-reproductive) tissue, without the formation of seeds. [H&K, p. 45 & K&P, p. 116, modified]
- Woody** – 1) Of or resembling wood, thus relatively hard and dry. (Compare with fleshy and leathery.) [K&P, p. 119, modified] 2) With an aboveground shoot composed of relatively hard tissue that persists from one growing season to the next. (Compare with herbaceous.)

References and Sources Consulted

- C&A Core, Earle L. and Nelle P. Ammons. 1958. *Woody Plants in Winter: A Manual of Common Trees and Shrubs in Winter in the Northeastern United States and Southeastern Canada*. The Boxwood Press: Pittsburgh, Pennsylvania.
- D Dirr, Michael A. 1998. *Manual of Woody Landscape Plants: Their Identification, Ornamental Characteristics, Culture, Propagation and Uses*, 5th ed. Stipes Publishing: Champaign, Illinois.

- H&H1 Harris, James G. and Melinda Woolf Harris. 1994. *Plant Identification Terminology: An Illustrated Glossary*. Spring Lake Publishing: Spring Lake, Utah.
- H&H2 Harris, James G. and Melinda Woolf Harris. 2001. *Plant Identification Terminology: An Illustrated Glossary*, 2nd ed. Spring Lake Publishing: Spring Lake, Utah.
- H&K Hickey, Michael and Clive King. 2000. *The Cambridge Illustrated Glossary of Botanical Terms*. Cambridge University Press: Cambridge.
- H Hightshoe, Gary L. 1978. *Native Trees for Urban and Rural America: A Planting Design Manual for Environmental Designers*. Iowa State University Research Foundation: Ames, Iowa.
- K&P Kiger, Robert W. and Duncan M. Porter. 2001. *Categorical Glossary for the Flora of North America Project*. Hunt Institute for Botanical Documentation, Carnegie Mellon University: Pittsburgh, Pennsylvania.
- K Krüssmann, Gerd. 1985. *Manual of Cultivated Conifers*. Timber Press: Portland, Oregon.
- L Lawrence, George H. M. 1951. *Taxonomy of Vascular Plants*. The MacMillan Company: New York.
- P&W Preston, Richard J., Jr. and Valerie G. Wright. 1981. *Identification of Southeastern Trees in Winter*. The North Carolina Agricultural Extension Service: Raleigh, North Carolina.
- RDMB Radford, Albert E., William C. Dickison, Jimmy R. Massey, and C. Ritchie Bell. 1974. *Vascular Plant Systematics*. Harper & Row Publishers: New York, Evanston, San Francisco, London.
- REE Raven, Peter H., Ray F. Evert, and Susan E. Eichhorn. 1999. *Biology of Plants*, 6th ed. Worth Publishers: New York.
- W&K Walters, Dirk R. and David J. Keil. 1996. *Vascular Plant Taxonomy*, 4th ed. Kendall/Hunt Publishing: Dubuque, Iowa.
- V Vidakovic, Mirko. 1991. *Conifers: Morphology and Variation*. Graficki zavod Hrvatske: Zagreb.
- Z Zomlefer, Wendy B. 1994. *Guide to Flowering Plant Families*. University of North Carolina Press: Chapel Hill, NC & London.