PLANT MORPHOLOGICAL TERMS

PLANT PARTS

bud - an immature shoot, vegetative or reproductive or both, the outer leaves of which may be modified as protective scales; may be gametophytic or sporophytic.

capsule - the spore-producing components of the sporophytes of liverworts, hornworts, and mosses. [Note: the term “capsule” is also used for a specific fruit type of angiosperms; see below.]

cone / strobilus - a modified, determinate, reproductive shoot system of many non-flowering vascular plants, consisting of a stem axis bearing either sporophylls (in “simple” cones) or modified shoot systems (in “compound” cones).

flower - the reproductive organ of flowering plants; a modified, determinate shoot bearing sporophylls (stamens and/or carpels), with or without outer modified leaves (the perianth).

fruit - the mature ovary of flowering plants, consisting of the pericarp (mature ovary wall), seeds, and (if present) accessory parts.

inflorescence - an aggregate of one or more flowers, the boundaries of which generally occur with the presence of vegetative leaves; may be composed of two or more unit inflorescences.

leaf - a generally dorsi-ventrally flattened organ, usually functioning in photosynthesis and transpiration; derived from a leaf primordium in the shoot apex; in vascular plants containing one to many vascular bundles (veins); often variously modified.

ovule - a megasporganium enveloped by one or more protective integuments; the immature seed.

rhizoids - uniseriate chains of cells arising typically from the base of the gametophytes of liverworts, hornworts, and mosses that function in water and mineral absorption.

root - a cylindrical organ of virtually all vascular plants, consisting of an apical meristem that gives rise to a protective root cap, a central endodermis-bounded vascular system, absorptive epidermal root hairs, and endogenously developed lateral roots; usually functioning in anchorage and absorption of water and minerals; initially derived from the radicle of the embryo and typically growing downward.

shoot - a stem plus associated, derivative leaves; initially formed by an apical meristem that gives rise to the stem and external (exogenous) leaf primordia; may be gametophytic or sporophytic.

sporangium - the spore-producing part of a plant; sporangia are of two types - male (microsporangium) or female (megasporangium) - in all heterosporous plants, including all of the seed plants.

stem - a generally cylindrical organ that bears leaves, typically functioning in support and elevation of the leaves and reproductive structures and in conduction of water, minerals, and sugars; in vascular plants initially derived from the epicotyl of the embryo and generally growing upward.

thallus - the flattened (dorsi-ventral) gametophyte of some liverworts and all hornworts.

vein - the discrete vascular bundles of the leaves of vascular plants.

PLANT HABIT (= general form of plant, including stem duration, branching pattern, development, and texture)

herb - a plant with annual aboveground shoots (including a flower or inflorescence); the plant itself may be annual, biennial, or perennial

gephyte - a perennial herb, typically with a bulb, corm, rhizome, or tuber at the underground stem

shrub - a perennial, woody plant having several main stems arising at ground level

subshrub - a short shrub that is woody only at the base and that seasonally bears new, non-woody, annual shoots above

tree - a generally tall, perennial, woody plant having one main stem (the trunk) arising at ground level

vine - a plant with elongate, weak stems, supported by means of scrambling, twining, tendrils, or roots; may be annual or perennial, herbaceous or woody

liana - a woody, perennial vine, in tropical forests often a component of the tree canopy layer
ROOT TYPE

adventitious roots - a root arising from an organ other than a root, usually from a stem
  aerial roots - adventitious roots that absorb moisture and minerals from the air or runoff; common in some epiphytic plants, e. g., of Araceae and Orchidaceae
  fibrous roots - lacking a taproot, having adventitious roots that are typically fine and numerous
  prop root - above-ground, adventitious roots that function in supporting the stem
  buttress roots - enlarged, horizontally spreading and often vertically thickened roots at the base of trees that aid in mechanical support

primary root - the root derived from the original radicle of the embryo
radicle - the first root of the embryo
storage root [root tuber] - a swollen taproot containing concentrations of high energy compounds such as starch
taproot - a persistent, well-developed primary root

STEM / SHOOT PARTS

leaf primordium - an immature leaf of the shoot
epicotyl - the first shoot of a seed plant, derived from the embryo of the seed
node - the point of attachment of a leaf to a stem
internode - the region between two adjacent nodes
bud primordium - an immature bud of the shoot, typically located in the axil, the upper (adaxial) junction of leaf and stem
vascular strands - vascular tissue, composed of xylem and phloem, functioning in fluid transport
bud - an immature shoot system, often surrounded by protective scale leaves, developing into a lateral branch, a flower, or an inflorescence
bark - tissues external to vascular cambium in stem (and roots) of woody plants, consisting of secondary phloem (inner bark) and derivatives of cork cambium (outer bark or periderm)
cortex - outer, mostly parenchymatous tissue, external to vasculature
ground meristem - mostly parenchymatous tissue surrounding vascular bundles in atactostele
pith - central, mostly parenchymatous tissue, internal to vasculature of siphonosteles and eusteles
wood - secondary xylem tissue, derived from vascular cambium of woody vascular plants
STEM / SHOOT TYPES

cladode - a flattened photosynthetic stem, functioning as and resembling a leaf [cladophyll, phylloclad]
rootstock - a general term for an underground stem or shoot; these generally give rise to aerial shoots either by direct conversion of the terminal apical meristem or via lateral buds
bulb - a short, erect, underground stem surrounded by fleshy leaves
corm - an enlarged, solid underground storage stem or stem base, with outer, protective scales
rhizome - a horizontal, underground stem, generally with short internodes and scale-like leaves; term also used for horizontal stems of ferns that are at ground level
tuber - a thick, underground storage stem, usually not upright, typically bearing outer buds and lacking surrounding storage leaves or protective scales
stolon / runner - an indeterminate, elongate, slightly underground or aboveground propagative stem, with long internodes, rooting at the tip forming new plants
thorn - a sharp-pointed stem or shoot (cf. prickle, spine)

LEAF ARRANGEMENT (= placement with respect to similar parts)
alternate - one leaf or other structure per node
distichous - alternate leaves or other structures two-ranked, in one plane
spiral - alternate leaves or other structures in more than two rows [polystichous]
opposite - two leaves or other structures per node, on opposite sides of stem or central axis
decussate - opposite leaves or other structures at right angles to preceding pair
whorled - three or more leaves or other structures per node [verticillate]
LEAF PARTS
blade / lamina - the flat, expanded portion of leaf
leaflet - a distinct and separate segment of a leaf
petiole / stipe - a leaf stalk; the term “stipe” used for ferns
petiolule - a leaflet stalk
pinna - the first divisions of a leaf, usually applied to ferns
pinnule - the ultimate divisions or leaflets of a leaf, usually applied to ferns
rachilla - a lateral or secondary axis of a bipinnate leaf (plural, “rachillae”)
rachis - the main axis of a pinnately compound leaf
sheath - a flattened leaf base or petiole that partially or wholly clasps the stem; e. g., Poaceae and many Apiaceae
stipules - paired leaf-like structures, which may be modified as spines or glands, at either side of the base of a petiole
stipulate - with stipules
exstipulate - without stipules
vein / nerve - the vascular bundle of a leaf, containing the conductive tissues

LEAF TYPES
compound - with leaf divided into two or more discrete leaflets
bipinnately comp. - with two orders of leaflets, each pinnately compound (bipinnate)
costapalmate - essentially palmately lobed to compound but with an elongate, rachis-like extension of the petiole, as in some palms
palmately compound - with 4 or more leaflets arising from a common point, usually at the end of the petiole (palmate)
pinnately compound - with leaflets arranged oppositely or alternately along a central axis, the rachis (pinnate)
trifoliolate / ternate - with three leaflets (ternately compound) [trifoliate]
simple - with leaf not divided into leaflets, bearing a single blade
SHAPE: PLANE [Note: generally after Taxon 11(5): 145-156 (1962)]

**acicular** - needlelike, often round in cross-section; margins straight, parallel, length:width ratio > 12:1

**cordate** - heart-shaped; approximately ovate with a cordate base (see “Base”) [cordiform]

**elliptic** - margins curved, widest at midpoint, length:width ratio between 2:1 and 3:2

**falcate** - lanceolate to linear and curved to one side; scimitar-shaped [falciform]

**lanceolate** - margins curved, widest near base, length:width ratio between 6:1 and 3:1

**lance-ovate** - margins curved, widest near base, length:width ratio between 3:1 and 2:1

**linear** - margins straight, parallel, length:width ratio between 12:1 and 6:1

**narrowly elliptic** - margins curved, widest near midpoint, length:width ratio between 6:1 and 3:1

**oblanceolate** - margins curved, widest near apex, length:width ratio between 6:1 and 3:1

**oblance-ovate** - margins curved, widest near apex, length:width ratio between 3:1 and 2:1

**oblong** - margins straight, parallel, length:width ratio 2:1 and 3:2

**obovate** - margins curved, widest near apex, length:width ratio between 2:1 and 3:2

**ovate** - margins curved, widest near base, length:width ratio between 2:1 and 3:2

**reniform** - kidney-shaped; wider than long with a rounded apex and reniform base (see “Base”)

**spatulate** - oblong, obovate, or oblanceolate with a long attenuate base

**subulate** - awl-shaped; approximately narrowly oblong to narrowly triangular

**triangular** - three-sided, length:width ratio between 2:1 and 3:2
BASE
attenuate - basal margins abruptly incurved (concave), basal intersection angle < 45°
auriculate - with two rounded, basal lobes, margins above lobes concave
cordate - with two rounded, basal lobes intersecting at sharp angle, margins above lobes rounded
cuneate - basal margins approximately straight, intersection angle 45° - 90°
hastate - with two basal lobes, more or less pointed and oriented outwardly, approximately 90° relative to central axis
narrowly cuneate - basal margins approximately straight, intersection angle < 45°
oblite - with an asymmetrical base
obtuse - basal margins approximately straight, intersection angle > 90°
peltate - having petiole attached away from the margin, on the underside of blade
reniform - with two rounded, basal lobes, smoothly concave at intersection of lobes
rounded - basal margins convex, forming a single, smooth arc
sagittate - with two basal lobes, more or less pointed and oriented downward, away from apex
sheathing - having a basal, clasping leaf sheath
truncate - basal margin cut straight across, angle approximately 180°

APEX (plural, “Apices”)
acuminate - apical margins abruptly incurved (concave), apical intersection angle < 45°
acute - apical margins approximately straight, intersection angle 45° - 90°
caudate - abruptly acuminate into a long, narrowly triangular (tail-like) apical region
cuspidate - abruptly acuminate into a triangular, stiff or sharp apex
emarginate - having an apical incision, cut 1/16 - 1/8 distance to midrib, midvein, or junction of primary veins
narrowly acute - apical margins approximately straight, intersection angle < 45°
oblique - with an asymmetrical apex (see Base)
obtuse - apical margins approximately straight, intersection angle > 90°
retuse - having an apical incision, cut up to 1/16 distance to midrib, midvein, or junction of main veins
rounded - apical margins convex, forming a single, smooth arc
truncate - apical margin cut straight across, angle approximately 180°
MARGIN

ciliate - with trichomes protruding from margins

ciliolate - with minute trichomes protruding from margins; minutely ciliate

crenate - with rounded to obtuse, shallowly ascending teeth, cut 1/16 - 1/8 distance to midrib, midvein, or junction of primary veins

crenulate - diminutive of crenate, teeth cut to 1/16 distance to midrib, midvein, or junction of primary veins

dentate - with sharp, coarse teeth that point outward at right angles to margin outline, cut 1/16 - 1/8 distance to midrib, midvein, or junction of primary veins

denticulate - diminutive of dentate, cut to 1/16 distance to midrib, midvein, or junction of primary veins

doubly serrate - with large, serrate teeth having along the margin smaller, serrate teeth

ciliate / ciliolate

tomose - margins with teeth bearing sharp, stiff, spine-like processes

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EPIDERMAL EXCRESCEENCE (from structural outgrowths or secretions of epidermis)

farinaceous - finely mealy, covered with small granules [granular, scurfy]
glaucous - covered with a smooth, usually whitish, waxy coating (that can be rubbed off with touch)
prickly - with prickles = sharp non-spine, non-thorn appendages
scabrous - having a rough surface, like that of sandpaper (also treated under “Vestiture”)

Vestiture

glabrous

pubescent

tomentose

scabrous

VESTITURE (=trichome cover, a combination of type, length, strength, shape, density, and color)
glabrous - without trichomes

pubescent - with straight, short, soft, somewhat scattered, slender trichomes (Note: This can be a general term = “having trichomes.”)
tomentose - covered with dense, interwoven trichomes
DIVISION

lobed - sinuses extending (pinnately or palmately) $\frac{1}{8}$ - $\frac{1}{4}$ distance to midrib, midvein, or vein junction

cleft - sinuses extending (pinnately or palmately) $\frac{1}{4}$ - $\frac{1}{2}$ distance to midrib, midvein, or vein junction

parted - sinuses extending (pinnately or palmately) $\frac{1}{2}$ - $\frac{3}{4}$ distance to midrib, midvein, or vein junction

divided - sinuses extending (pinnately or palmately) $\frac{3}{4}$ - almost to midrib, midvein, or vein junction

bipinnatifid - bipinnately lobed to divided

decompound - deeply divided into numerous segments such that leaflets not clearly defined

pinnatifid - pinnately lobed to divided