

# PLANT TERMINOLOGY

Plant terminology for the identification of plants is a necessary evil in order to be more exact, to cut down on lengthy descriptions, and of course to use the more professional texts. I have tried to keep the terminology in the database fairly simple but there is no choice in using some descriptive terms. The following slides deal with the most commonly used terms (more specialized terms are sometimes given in family descriptions where needed). A separate section on Ferns is at the end.

Do not be dismayed if a plant or plant part does not seem to fit any given term, or that some terms seem to have more than one definition – that's life. Although quite incomplete and with less than full descriptions, the terms discussed here illustrate the kinds of things one must look for when involved with plant identification.

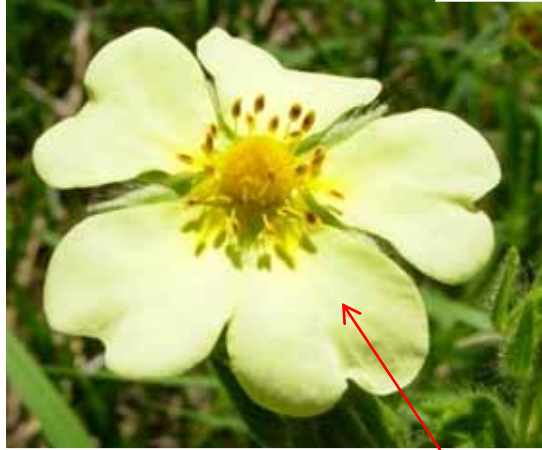
There are several texts that define and illustrate plant terminology – I use *Plant Identification Terminology, An illustrated Glossary* by Harris and Harris (see CREDITS) and others. Most plant books have at least some terms defined. To really begin to appreciate the diversity of plants, a good text on plant systematics is a necessity.

# FLOWER ANATOMY

[V. Max Brown]

Flowers may be **Perfect** (male or **staminate** and female or **pistillate** parts in the same flower) **OR Monoecious** – flowers **Imperfect** (each flower either staminate or pistillate but both on the same plant) **OR Dioecious** – flowers imperfect with staminate and pistillate flowers on different plants

**Inflorescence** – the flowering portion of a plant (includes all flowers, etc.)



**Bract** – a reduced leaf structure sometimes found at base of a single flower or at base of the inflorescence



**Phyllary** – a **Bract** in the Asteraceae Family (**Involucre** – a whorl of bracts)

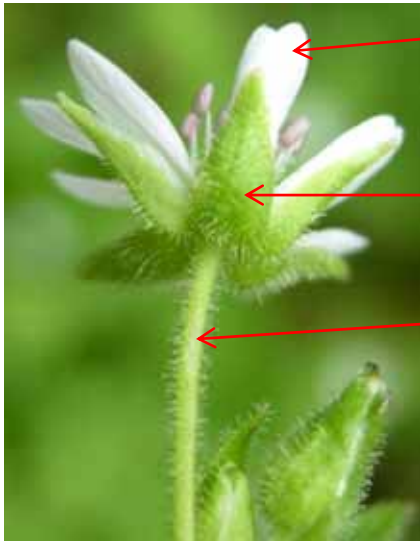


**Tepals** – term used for both petals and sepals when they are generally alike and difficult to differentiate

**Tepals**



**Perianth** – Petals and Sepals taken together

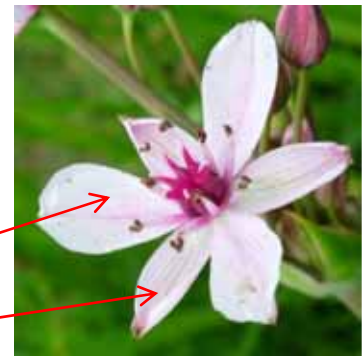


**Petal** (all petals = **Corolla**), usually white or colored to attract insects; absent in some plants

**Sepal** (all sepals = **Calyx**), usually green and similar to leaves but may be colored; absent in some plants

**Pedicel** - single flower stalk within inflorescence - first **Internode** below flower;  
**Peduncle** – stalk of a solitary flower or of whole inflorescence

**Petaloids and Sepaloids** - appear to be petals and sepals but occur by a different origin



**Petaloid**

**Colored Sepal**

# FLOWER ANATOMY

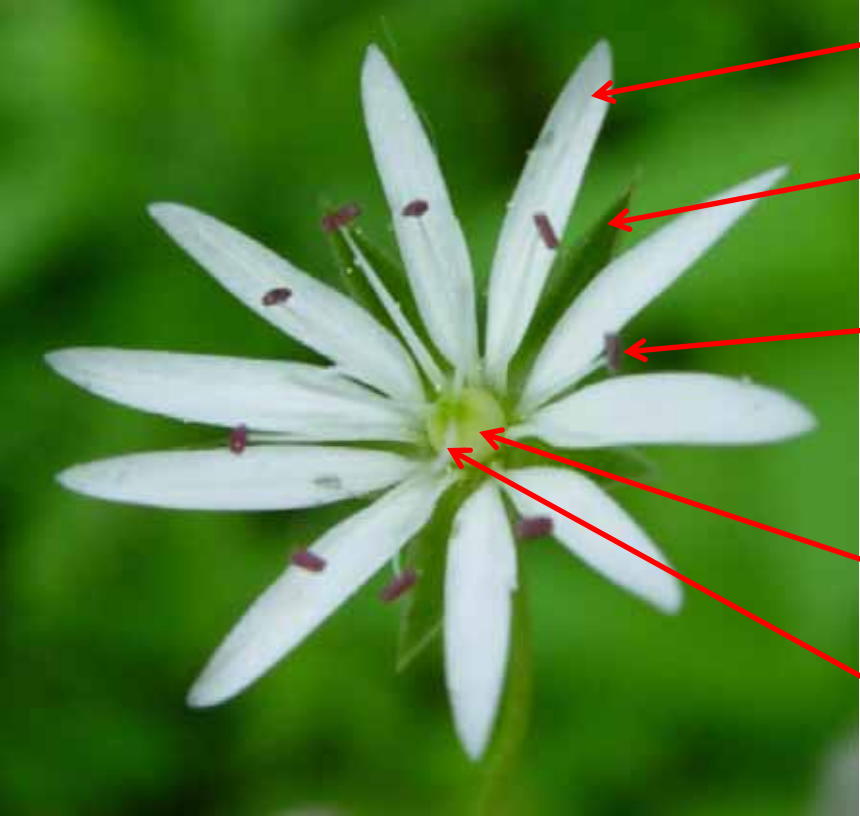
[V. Max Brown]

Flower anatomy is almost infinitely diverse, only a few examples will be examined here – see family descriptions in the database for details.

This is a Longleaf Starwort [Stitchwort] (*Stellaria longifolia* Muhl. ex Willd.). It has 5 green sepals, shorter than the petals, and 5 white petals, each petal is split or divided so that it looks like a total of 10 petals. It has several stamens and one pistil with 3 styles.

The **Staminate** (male) part is the **Stamen** – a stamen is composed of the **Filament** (stalk) and the **Anther** (bears the **Pollen**).

The **Pistillate** (female) part is the **Pistil** – a pistil is composed of an **Ovary** (at base), a **Style** (stalk), and a **Stigma** (top portion that receives the pollen). The ovary is superior (visible) in this example.



1/2 of a Petal

Green Sepal

Stamen with purple Anther

Ovary (inflated, superior in position)

1 of 3 Styles (white)

**Ovary Position** is named as to its position in relationship to the attachment of the whorled floral parts (sepals and petals).

1. Superior (hypogynous) – ovary attached above
2. Inferior (epigynous) – ovary attached below
3. Intermediate positions – a Hypanthium (a floral cup formed from the basal fusion of petals, sepals and stamens) is sometimes present. If the floral cup is attached partway up the ovary, the ovary position is Half-Inferior; if the floral cup surrounds the ovary but is not attached, ovary position is still Superior and termed Perigynous.

# FLOWER ANATOMY

[V. Max Brown]

This is a Michigan Lily (*Lilium michiganense* Farw.). It has 6 colored tepals (sepals and petals that are alike), one pistil, and 6 stamens.

The **Staminate** (male) part is the **Stamen** – a stamen is composed of the **Filament** (stalk) and the **Anther** (bears the **Pollen**).

The **Pistillate** (female) part is the **Pistil** – a pistil is composed of an **Ovary** (at base), a **Style** (stalk), and a **Stigma** (top portion that receives the pollen). The ovary is mostly hidden in this example but is **superior**.



**Pistil (ovary at base)**

**Anther**  
**Filament** } **Stamen**



**Filament**  
**Anther** } **Stamen**

**Style**  
**Stigma** } **Pistil**



# FLOWER ANATOMY

[V. Max Brown]

This is Blackberry Lily (*Belamcanda chinensis* (L.) DC. (Introduced)). It has 6 tepals (sepals and petals alike, not differentiated). The ovary position is inferior – note the tepals attached at the top of the ovary.



Tepals



Tepals

Ovaries



Leaves basal or near-basal, parallel veined, and sword-like

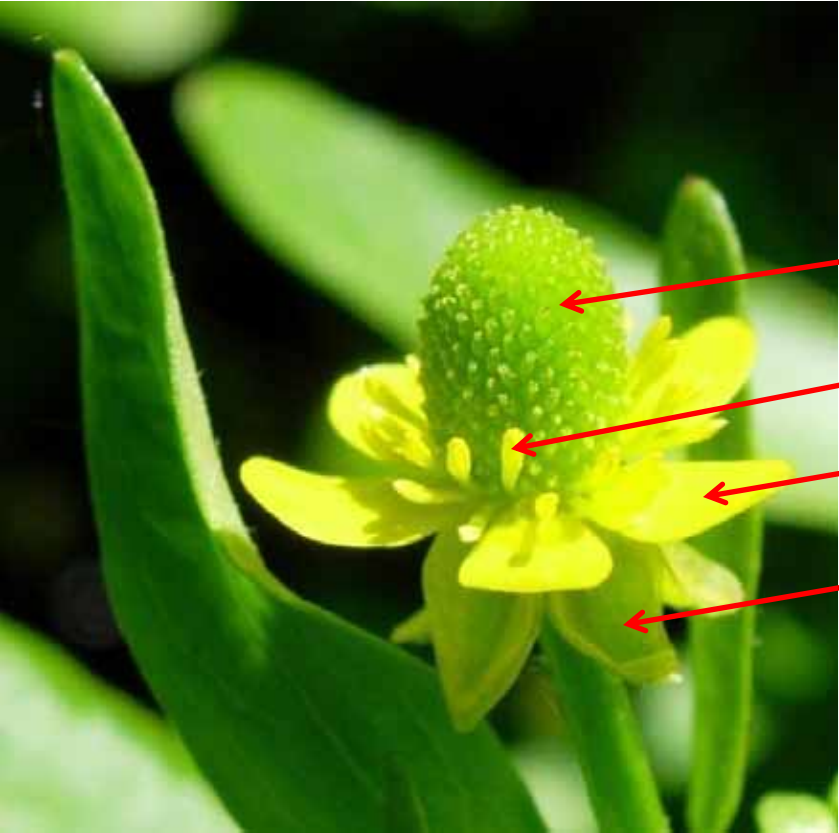
# FLOWER ANATOMY

[V. Max Brown]

This is a Cursed Buttercup [Crowfoot] (*Ranunculus sceleratus* L. var. *sceleratus*). It has 5 green sepals that are reflexed (bent downward) and 5 yellow petals. It has a number of stamens and many pistils (carpels) forming a conical head.

The **Staminate** (male) part is the **Stamen** – a stamen is composed of the **Filament** (stalk) and the **Anther** (bears the **Pollen**).

The **Pistillate** (female) part is the **Pistil** – a pistil is composed of an **Ovary** (at base), a **Style** (stalk), and a **Stigma** (top portion that receives the pollen).



Many small Pistils (Ovaries Superior in position)

Stamen

Petal

Reflexed Sepal



Another species of Buttercup with fewer and larger pistils

# FLOWER ANATOMY

[V. Max Brown]

This is Indian Tobacco (*Lobelia inflata* L.). It has 5 green sepals that are spreading and 5 petals expressed as lobes in a bilaterally symmetrical flower. The ovary position is half-inferior (usually just termed inferior) – note the sepals and petals attached almost at the top of the ovary – sepals and petals fused at base (Adnate – stuck to or fused).



Sepal

Ovary within a floral cup or Hypanthium



Another species of Lobelia with 5 lobes, style and stigma also shown



5-lobed flower (corolla), 3 lobes below and 2 above

# FLOWER SHAPE AND FORM

[V. Max Brown]



Salverform (thin tube and flair)



Calceolate or Saccate (sac)



Calcarate (with spur)



Inflated



Infundibular (funnel)



Galeate (helmet-like)



Gibbous (swollen on one side)



Personate (2-lipped, throat closed) and Bilabiate (2-lipped)



Campanulate (bell-like)



Cruciform (cross)



Fringed



Pendant – hanging down



Urceolate (urn-like)



Bilabiate (2-lipped)



Tubular



Coneflower (petals reflexed)

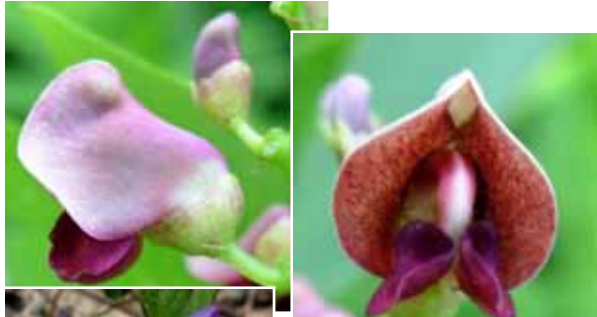


Irregular



# FLOWER SHAPE AND FORM

[V. Max Brown]



**Carinate (with keel) and Papilionaceous (butterfly-like) - 5-part with banner (2 fused petals), keel, and wings (2 fused petals) – see Fabaceae (Pea Family)**



**4 petals – 2 inner and 2 outer, spurs at base (Dutchman's Breeches)**



**Corolla closed (Bottle Gentian)**



**Spathe and Spadix structure – see Araceae (Arum Family)**



**Numerous stamens mask the other flower parts**



**Inflorescence with outside sterile flowers**



**Corniculate (Horns with Hoods) and Reflexed petals) – see Asclepiadaceae (Milkweed Family)**



**Flower structure in the Spurges – see Euphorbiaceae (Spurge Family)**



**Coronate (with corona - a petal-like structure between stamens and petals)**

# FLOWER SHAPE AND FORM

[V. Max Brown]



**Radiate** – contains both ray and disc florets

**Ligulate** – contains only ray florets

**Discoid** – contains only disc florets

The three flower types of the Asteraceae (Aster Family) – composite flowers (many flowers in one).



Flower with 5 sepals and no petals



Flower with 3 sepals (colored inside) and no petals



All flowers above are considered 5-part flowers - lobes and lips count, doesn't matter if they are fused or not!

# INFLORESCENCE TYPES

[V. Max Brown]

**SOLITARY** – single flower on long pedicel or scape



**HEAD (CAPITATE)** – flowers in a dense and compact arrangement on a **Receptacle** – shape usually flat, convex, conical, rarely concave – typical of Asteraceae (Aster Family) but found elsewhere



**UMBEL** – pedicels (flower stem or stalk) arising from a common point – simple (1) or compound (2 or more). Umbels may be round, flat, convex or concave. Bracts usually occur at base of Umbel. Found in several families but characteristic of the Apiaceae (Carrot or Parsley Family)



Umbel



Umbel Ray

Compound Umbel

**SPIKE** – long terminal inflorescence with sessile to sub-sessile (pedicel absent or very short) flowers – may be scattered along rachis or so dense as to obscure rachis (stem of inflorescence)



# INFLORESCENCE TYPES – often difficult to apply

[V. Max Brown]

**Determinate Condition** – unbranched inflorescence with the central flower solitary and blooming first thereby stopping any further elongation of stem.

**Indeterminate Condition** - unbranched inflorescence with the lateral flowers blooming first, terminal or apical bud continues to grow

**CYME** – a determinate inflorescence in which pedicels do **not** arise from a common point – compound cyme if branched



**CORYMB** – an indeterminate inflorescence with pedicels of different lengths (lower ones much longer than upper), pedicels do **not** arise from a common point – inflorescence tends to be somewhat flat to round but not spike-like; compound corymb if branched

**RACEME** – an indeterminate, elongated, unbranched inflorescence with flowers having noticeable pedicels – similar to spike but flowers with pedicels or stalks



# INFLORESCENCE TYPES – often difficult to apply

[V. Max Brown]

**PANICLE** – elongated and branched inflorescence (compound) of spikes, racemes or corymbs – inflorescence is fairly open (flowers not densely packed). **THYRSE** – a very compact, congested or dense Panicle



**VERTICILLATE INFLORESCENCE** – whorled arrangement of flowers, often at leaf axils (a type of Spike) – particularly common in the Lamiaceae (Mint Family)



**Catkin** – inflorescence of unisexual flowers, similar to a raceme



# LEAVES

[V. Max Brown]

Leaves may be **Simple** (undivided) or **Compound** (divided into segments).



## A Simple Leaf



**Leaf Base** – often thickened at attachment to stem

**Midrib**

**Leaf Blade**

**Petiole** – leaf stalk; leaf is **Sessile** if attached directly to stem without a petiole

**Stipules** – leaf-like appendages at base of petiole, often reduced to a scale, spine or may be absent



**Sessile** – no petiole but not clasp

**Clasp** – leaf partially surrounds stem

**Perfoliate** – leaf surrounds stem

**Parallel Veined** – common in Monocotyledons

**Midrib** (major or middle vein) and first branches commonly **Pinnate** or sometimes **Palmate** and then smaller veins **Net Veined** – this branching scheme is common in Dicotyledons



**Winged Petiole**



**Petiole Gland**



**Winged Rachis** (stem of pinnate leaf)



**Peltate** – petiole attached to center of leaf

# LEAF ARRANGEMENT ON STEM

[V. Max Brown]

1. Leaves may be arranged at the base  
- **Basal** (base of stem) and/or **Cauline**  
(along stem)



**Basal**



**Cauline**

2. Cauline leaves may be **Alternate** (one leaf per node), **Opposite** (two leaves per node on opposite side of stem), or **Whorled** (three or more leaves per node encircling stem)



**Alternate**



**Opposite**



**Whorled**

3. Specialized Arrangement Terms (there are many more)



**Rosette** – whorled arrangement of leaves usually at base of plant



**Decussate** – opposite with next set on stem at 90 degrees



**Ranked** – in vertical rows

# LEAF SHAPE

[V. Max Brown]



**Reniform** – kidney shaped



**Ovate**



**Lyrate**



**Deltoid** – triangle



**Lanceolate** (generally)



**Oblanceolate**



**Filiform** – thread-like



**Cordate** – heart shaped



**Elliptical**



**Spatulate** – spoon-like



**Awl-like**



**Linear to linear-lanceolate**



**Hastate** – Sagittate, lobes turned out



**Scale-like**



**Linear**



**Oblong**



**Sagittate** - arrowhead, lobes sharp, often turned down



**Halberd** - Hastate with lobes at right angle



**Pitcher** – modified leaves



**Acerose** - Needle



**Succulent or Fleshy**





# LEAF TERMS – PINNATE AND PALMATE

[V. Max Brown]



**Pinnate Leaf** – compound leaf, single leaf divided into leaflets to the stem or **Rachis** (central axis of compound leaf) - leaflets may be odd or even numbered)



**Pinnatifid Leaf** - pinnately cut but not all the way to midrib (winged between leaflets), then toothed



**Twice Pinnate** (2 orders) and then toothed



**Palmate or Digitate Leaf** – compound leaf, single leaf divided from a single point



**Trifoliate** – compound (3 leaflets)



Very large **Twice Pinnate** leaves



**Palmate Leaves**

# LEAF MARGIN TERMS

[V. Max Brown]

## TEETH



**Serrate** – larger sharp teeth, teeth point forward; **Serrulate** – fine serrate teeth

**Dentate** – larger sharp teeth, teeth point outward; **Denticulate** – fine dentate teeth

**Retrorse** if sharp teeth pointed backward



**Double Toothed or Biserrate**



**Crenate** – larger rounded teeth; **Crenulate** – fine crenate teeth



**Crisped** – wavy leaf margins (vertical or up and down).

**Sinuate** – wavy margin horizontally or in and out.

**Undulate** – general term - can be used for either or both above.



**Entire** – smooth margin (no teeth)

**Acuminate tip** – to a sharp point with concave sides along the tip



**Apiculate tip** – small and slender



**Acute tip** - (<90 deg angle) and straight



**Obtuse tip** - (>90 deg angle) and straight



**Revolute** – rolled under edge of leaf



**Winged Petiole**

# LEAF MARGIN TERMS - LOBES AND DIVISIONS

[V. Max Brown]



**Sinuate margin**



**Lobed Leaf** – rounded leaf segments, cut  $< \frac{1}{2}$  to midrib



**Cleft** – lobed to about  $\frac{1}{2}$  distance to midrib – in this case **Pinnately** lobed (pointed toward midrib) and **Pinnately** veined (from midrib).



**Tripartite (3) Lobed** - in this case **Palmate** lobed (pointed toward base) and **palmately** Veined



**Parted** (Very Deeply Lobed) –  $> \frac{1}{2}$  to midrib, **Sinuses** are here rounded, lobes are coarsely toothed.



**Parted or deeply Divided**



**Incised (jagged)** – deep and sharply cut, often irregular



**Pinnatifid Divided** – winged rachis

**Divided** – lobes or cuts nearly all the way to the midrib (**Pinnatifid** – if pointed toward midrib or **Palmatifid** – if pointed toward base).



**Auriculate (with Auricles)** – rounded ear-like lobes



**Runcinate** – pinnatifid cut with segments point back



**Palmately Divided**

# STEMS – SHAPE, PUBESCENCE, ETC.

[V. Max Brown]



**Terete** – stem round;  
**Glabrous** – smooth and without hairs;  
**Glaucous** – a white bloom that rubs off



**Downward hooked hairs on angles**, or may be on **flats**, or both



**Angled Stem**



**Downward angled hairs on edges of angles**



**4-Angled or Square Stem**



**Winged Stem**



**Ridged Stem**



**Winged (with Spines), and Ridged stem**



**Prickly Stem** – sharp or prickly outgrowth from epidermis (skin cells) of stem



**Glandular and often Glutinous (sticky) hairs**



**Ridged stem with hairs on ridges**



**Jointed stem**

# MORE TERMS CONCERNING HAIRS, SCALES, AND STEMS

[V. Max Brown]



**Rugose** – rough surface, or sometimes with sunken veins



**Hispid** – hairs stiff and rough



**Hoary** – light colored, short, abundant fine hairs



**Villous** – long, dense, unmatted hairs



**Appressed** – Hair pressed flat, ascending or descending



**Lenticels** – elongated, corky, raised areas on many woody stems



**Tomentose** – short, dense, matted, soft, wolly hair



**Woolly** – long, dense, usually matted, soft hair



**Stellate** – star-like hairs



**Scaly** – covered with tiny scales



**Ciliate or Fringed** – hairs, etc. on margin



**Mealy** – dry, powdered, like meal

# STEMS – MORE FEATURES OF STEMS

[V. Max Brown]



Woody wings on twig

Hollow twig filled with pith, some with chambers (transverse partitions, or no filling at all)

Twig and bud covered with fine scales



Tendril – a twining structure used by vines for support



Willow



Goldenrod

Gall – parasitic infestation by bacteria, fungi, or often by insects



Swollen joints with Ocrea (fringing sheath often with hairs or bristles) – see Polygonaceae (Smartweed Family)



Tendrils ending with adhesive disks

# OTHER STEM FEATURES

[V. Max Brown]

**Rhizome** – horizontal stem growing below the ground – rhizomes and **stolons** sometimes cannot be distinguished.

**Tuber** – swollen storage area developed along a rhizome (potato, etc.).

**Adventitious Roots** – roots that develop at nodes of stolons.



**Scape** – a flowering stem without leaves.

**Corms and Bulbs** – an enlargement of an underground stem, a **Bulb** is covered with scale-like leaves (onion). **Bulbels** – small bulbs growing at base of larger bulb. **Bulblets** – small bulbs (above ground).



**Bulb**



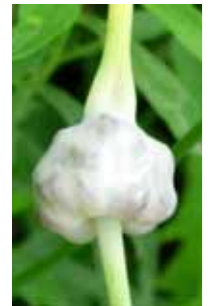
**Bulblets** – in upper leaf axils of a hemlock species.



**Stolon** – horizontal stem growing along the surface of the ground (Cinquefoil, strawberry, some brambles, etc.).



**Corms** – with papery covering



**Bulblets** – in sac, wild garlic.

# THORNS, SPINES AND PRICKLES

[V. Max Brown]



**Thorn** – a sharp woody branch



**Spine** – develops from stipule or leaf, spines usually form just below a bud or branch or on leaf



**Prickle** – develops from epidermal (skin) cells of the stem, usually easy to remove



**Setose** – many bristles (**Bristle** - sharp and stiff hair-like structure)



**Bristle-tipped lobes**



**Retrorse Prickles** – reflexed (downward)



# FRUITS – see a good botanical text for full definitions

[V. Max Brown]



**Samara** – dry, winged fruit



**Bur** – fruit with barbed or hooked structures



**Capsule (Inflated)**



**Capsule (prickly)**



Mericarp

**Schizocarp** – dry fruit that splits into two segments (**Mericarps**) when mature of one seed each, Apiaceae (Carrot Family)



**Legume** – a pod that separates along 2 sutures (Fabaceae – Pea or Bean Family)



**Capsule** – seed dispersal through pores



**Capsule** – 2-valved



**Achene** – one seeded, small, dry fruit (common in Asteraceae – Aster or Sunflower Family)



**Loment** – a Legume Pod with constrictions between seed segments (Fabaceae – Pea or Bean Family)



**Follicle** – a dry pod that separates along one suture (typical in Milkweeds)



**Silicle** – a dry fruit, spherical to usually less than 2-3x long as wide (Brassicaceae – Mustard Family)



**Silique** – a dry fruit, long (usually > 4-5x long as wide (Brassicaceae – Mustard Family))

# FRUITS – see a good botanical text for other structures and for full definitions

[V. Max Brown]



**Drupe** – fleshy fruit, usually one-seeded, enclosed by an endocarp (usually stony)



**Berry** – fleshy fruit (single pistil) with multiple seeds



**Accessory Fruit** – small achenes develop on the surface of a fleshy fruit



**Pome** – fleshy outside, seeds enclosed by ovary wall, not in fleshy part; apples etc.



**Aggregate Fruit** – a fleshy clustered fruit (many pistils) composed of **Drupelets** (a small drupe)



**Pepo** – Gourd Family, has a hard rind, fleshy inside



**Utricle** – a larger (one-seeded) inflated achene



**Fruit (Grain) in calyx** – see Rumex Genus (Dock)



**Hip** – somewhat like a fleshy berry filled with achenes (roses)



**Nut** – dry, hard fruit, usually one-seeded



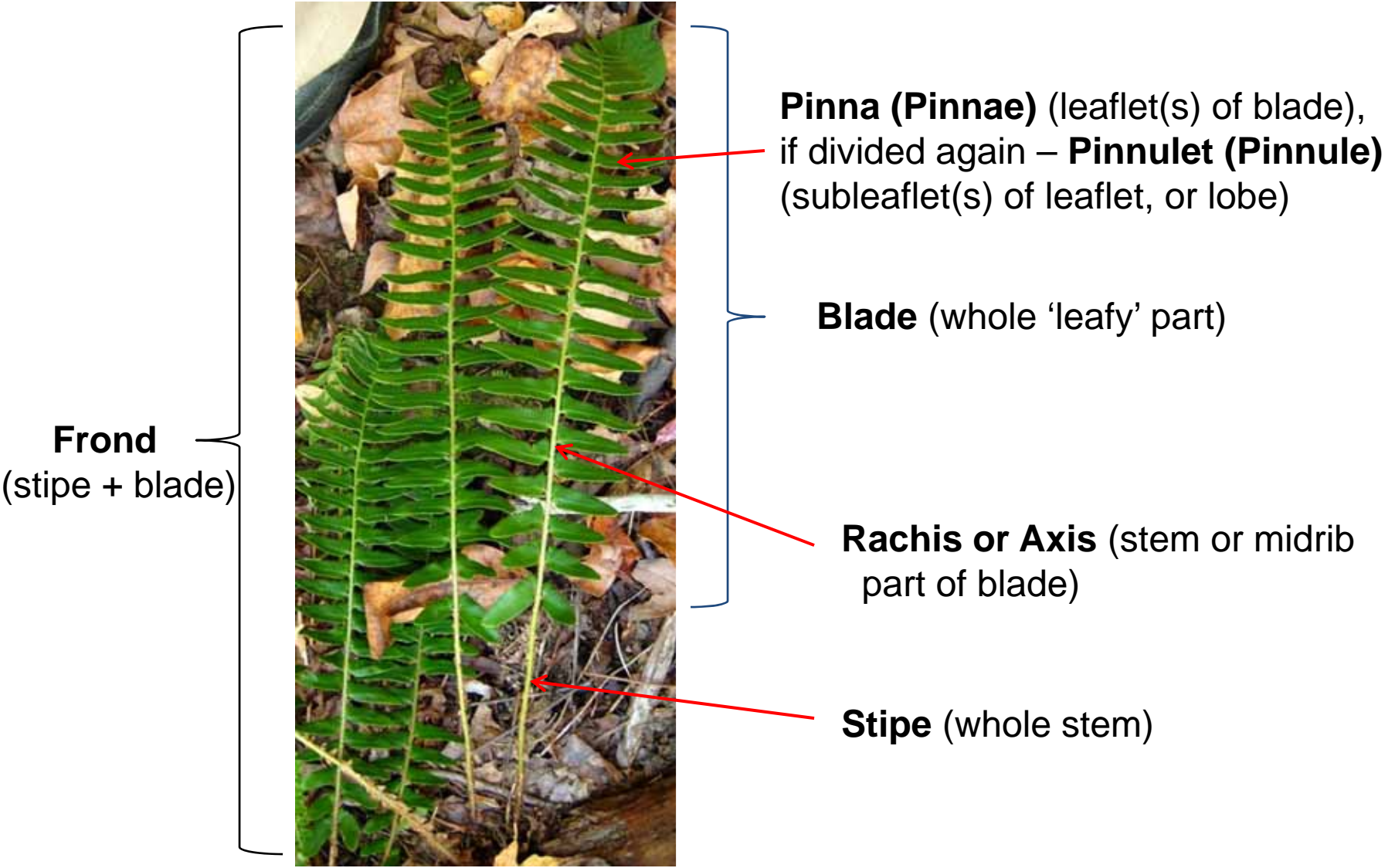
**Cones**



**Acorn** – one-seeded, dry and hard fruit of Oaks

# Basic Fern Morphology

[V. Max Brown]



**Frond**  
(stipe + blade)

**Pinna (Pinnae)** (leaflet(s) of blade),  
if divided again – **Pinnulet (Pinnule)**  
(subleaflet(s) of leaflet, or lobe)

**Blade** (whole 'leafy' part)

**Rachis or Axis** (stem or midrib  
part of blade)

**Stipe** (whole stem)

# Basic Fern Morphology – Leaves

[V. Max Brown]



**Pinnate** – once cut or divided to rachis



**Pinnatifid** – once cut but not to rachis (winged)



**Pinnate – Pinnatifid** - once cut to axis then second cut but not to axis (lobed)



**Bipinnate** – twice cut or divided to axis



**Bipinnate – Pinnatifid** – twice cut to axis then third cut but not cut to axis

# Basic Fern Morphology – Reproduction

[V. Max Brown]

Reproduction is by **Spores**. **Spores** are contained in a **Sporangium** which are usually in clusters termed **Sori**.



**Indusium** (plural **Indusia**) – a thin, skin-like covering of the **Sorus** found in some ferns



Sterile frond

Fertile frond



Fertile pinnae

**Sporangia** may be on separate fertile fronds (**Dimorphic**) or -

**Sporangia** may be on separate parts of a single frond – sterile and fertile pinnae on one frond (**Monomorphic**)