

Plant Family Short Descriptions by J. Richard Abbott, July 2020

[keep in mind that these are brief generalizations for diagnosing families in general; there will be many exceptions; also, this is an unproofed rough draft; descriptions are biased towards the midwest, but have not been carefully modified to reflect all midwest taxa; variation elsewhere is often much greater]

Ferns and allies: spores

Lycophytes: Herbs, dichotomous branching, sporangia borne in axils, spirally arranged sporophylls

Lycopodiaceae (clubmoss): Sporangia solitary, adaxial near leaf base or axillary; homosporous; ligule lacking

Selaginellaceae (spikemoss): Sporangia short-stalked, solitary in axil of sporophylls, opening by distal slits; heterosporous; ligule present

Ferns: many with circinate vernation (leaf development)

Equisetaceae (horsetail): Scale-like whorled leaves, internodes with vertical ridges, stems hollow

Ophioglossaceae (grape fern or adder's-tongue): Cluster of large sporangia, lacking annulus; "grape fern" or "adder's-tongue fern"

Osmundaceae (royal, cinnamon, or interrupted fern): Sporangia not clustered in sori, annulus cells thickened (few cells in small cluster)

Marsileaceae (water-clover): Aquatic, leaves long petioled, sporocarps born on short stalks; "four-leaf clover"-like habit, or bladeless

"Polypodiaceae" s.l. [ferns; including most fern families recognized in se US]: Vertical annulus, interrupted by sporangium stalk, (indusium absent in core members, present in others in broad sense)

Salviniaceae (water fern): Small free-floating ferns, fertile leaf submersed

Gymnosperms: seeds (in cones or modified fleshy structures), no flowers

Ginkgoaceae (ginkgo): Leaf fan shaped, ovules paired on long stalk

Cupressaceae (cypress or juniper): Aromatic, leaves 1 mm to 3 cm long, bract fused to scale, seed often with 2-3 lateral wings; often with reddish shredding bark; 1-20 ovules per scale

Pinaceae (pine): Aromatic, leaf length variable but usually > 3 cm, bract free from scale, micropyle directed toward cone axis, seed usually with large terminal wing; 2 ovules per scale

Taxaceae (yew): Colorful aril around ovule, lacking cones (highly reduced)

Angiosperms: Flowering Plants, seeds in fruits

"Basal Angiosperms":

most woody members have alternate entire simple leaves with minute pellucid dots (best seen with high magnification) and no stipules; ethereal oils (fragrant to foetid smell); flowers with many free tepals and poorly differentiated anthers and filaments, sometimes 3-merous

Nymphaeaceae (water lily): Aquatic rhizomatous herbs, leaves alternate with long petiole, long pedicel, petal like stamens

Ceratophyllaceae (coon-tail): Submersed aquatic herbs, roots lacking, leaves whorled and dichotomously dissected, inflorescences of solitary, tiny, axillary flowers

Magnoliaceae (magnolia or tulip tree) Trees, stipule surrounding terminal bud (leaving ring-scar at node), terminal solitary inflorescence, elongated receptacle, fruit an aggregate of follicles (*Magnolia*) or samaras (*Liriodendron*)

Annonaceae (pawpaw): Trees, shrubs, (smell often harsh), leaves 2-ranked, ruminant endosperm, ball of stamens, flowers open before mature & gradually expand

Lauraceae (sassafras or laurel or bay): Trees or shrubs (*Cassytha*, not in KY, a twining parasite vine), leaves alternate and spiral (rarely opposite elsewhere, plinervy common elsewhere), stamens open by 4 flaps, fruit a drupe associated with fleshy to woody receptacle

Aristolochiaceae (wild ginger or dutchman's pipe): Herbs or lianas, (usually with a harsh, foetid smell), swollen nodes, 3 showy sepals, fruit a septicidal capsule

Monocots:

most are herbaceous with parallel veins; flowers 3-merous (often 6 tepals, 6 stamens, and 3 carpels); leaves frequently linear and with sheathing petiole base

Araceae (arum, aroid, or jack-in-the-pulpit): Herbs, well-developed blade, flowers packed in spadix subtended by the spathe, berries usually

Alismataceae (water plantain): Aquatic herbs, tissue with aerenchyma, latex white, inflorescences at apex of scape, clear calyx & corolla

Hydrocharitaceae (waterweed or frog's-bit): Aquatic herbs, ovary inferior, fruit fleshy

Potamogetonaceae (pondweed): Aquatic rhizomatous herbs, sheath open and separated from blade, so it appears as a stipule, emergent inflorescence spike like; tepals lacking, stamens & carpels 4

Dioscoreaceae (yam): Twining vines with thick rhizomes, leaves ovate-cordate with palmate venation, petiole with upper and lower pulvinus, fruit usually triangular with flat seeds

Pontederiaceae (pickerelweed): Aquatic rhizomatous herbs, 6 tepals variably connate, filaments adnate to perianth tube (basal portion persistent around fruit)

Commelinaceae (day-flower or spiderwort): Herbs (sometimes somewhat succulent), leaves with closed basal sheath, inflorescence often subtended by a folded leafy bract, 3 sepals and petals, filaments with conspicuous moniliform hairs

Liliales: tepals showy (often spotted or with lines), nectaries usually at base of tepals, seed coat without phytomelan [with "petaloid monocots" - pretty much have to imprint the various genera]

Liliaceae (lily): Herbs with bulbs usually, ovary superior [in regional floras, many genera are still included in this family that are now known to belong in other families]

Trilliaceae (trillium or wake-robin): Herbs, leaves whorled with palmate venation, inflorescence a single flower, perianth differentiated (calyx & corolla present)

Smilacaceae (greenbrier): Vines usually, leaves with palmate venation, primary veins converging and connected by a reticulum of smaller veins, paired tendrils from petiole; umbels; dioecious

Asparagales: tepals showy or not (but only rarely spotted), nectaries usually in septa of ovary, seed coat with phytomelan (lost in some with fleshy fruits)

Convallariaceae (lily-of-the-valley): Herbs to trees, rhizomes, fruit a berry (seeds lack phytomelan), ovary usually superior

Asparagaceae s.str. (asparagus): Herbs, stems with papery scale-like leaves, what look like leaves are modified stems -- now treated broadly to include Convallariaceae & Agavaceae [no shared morpho?]

Agavaceae (agave): Herbs to trees, leaves usually in a large rosette, leaves usually tough & fibrous with sharp spine at apex

Alliaceae (onion): Herbs with bulb (rhizome in *Tulbaghia*), garlic odor, "umbels" at the end of long scape

Amaryllidaceae (amaryllis): Herbs with bulb, "umbels" at the end of long scape -- now incl. Alliaceae

Iridaceae (iris): Rhizomatous herbs, leaves 2-ranked equitant, stamens 3

Orchidaceae (orchid): Labellum, column, capsule with numerous minute seeds

Poales: many are grass-like plants ("graminoids")

Typhaceae (cat-tail): Rhizomatous aquatic herbs, spongy 2-ranked leaves; flowers in elongate narrow cylindrical (*Typha*) or round (*Sparganium*) clusters, staminate positioned above the carpellate flowers

Juncaceae (rush): Herbs, stems round and solid, 3-ranked leaves, with open sheath, ligule absent, flowers bisexual, 6 tepals, fruit a capsule

Cyperaceae (sedge): Herbs, stems often triangular, 3-ranked leaves, closed sheath, ligule usually absent (present in *Carex* & some others), fruit an achene

Poaceae (grass): Herbs (to bamboo "trees"), rounded stems with jointed/swollen nodes, 2-ranked leaves, sheath open, ligule usually present, fruit a caryopsis

True dicots (tricolpate dicots):

Platanaceae (sycamore): Trees, bark coming off in large irregular sheets, leaving a patchy, light colored smooth surface; petiole base surrounds axillary bud, leaves palmately lobed; globose heads

Vitaceae (grape or virginia creeper): Lianas with leaf-opposed tendrils & inflorescences, seeds 4 (with distinctive raphe and chalazial knot)

Ranunculales: toothed to lobed or even compound leaves, generally with a many-ness of flower parts; if woody, tend to have yellowish wood

Ranunculaceae (buttercup): Herbs (to shrubs or vines), leaves usually with toothed margin, often with a somewhat sheathing base, actinomorphic flowers, tepals 4 to numerous (*Ranunculus* with sepals & petals), stamens and carpels numerous, fruit an aggregate of follicles, achenes, or berries

Berberidaceae (barberry): Herbs or shrubs (sometimes with spines), leaves entire to toothed to spiny, 1 carpel, fruit a berry, stamens open by 2 flaps in most (not in *Podophyllum*); the herbs all look very different from each other, so one must learn the genera

Menispermaceae (moonseed): Vines (lianas or shrubs elsewhere), swollen pulvinus (often upper and lower, one usually twisted - kinky petiole), leaves often palmately veined (often peltate in tropics), usually dioecious with inconspicuous flowers, fruit drupe

Papaveraceae (poppy): Herbs to shrubs, leaves usually lobed or dissected and toothed, colored sap (yellow, white, cream, orange, red); sepals deciduous, petals wrinkled, fruit often a capsule (often with apical pores)

Caryophyllales: often with presence of betalins (beet purple-red to yellow color), mostly herbs in se US

Caryophyllaceae (chickweed): Herbs, leaves opposite, simple, entire, nodes swollen (from fused petiole bases), free notched “petals”; no betalins

Phytolaccaceae (pokeweed): Herbs, racemes, fruit a berry with 3-∞ carpels, 5 tepals

Nyctaginaceae (four o'clock): Leaves opposite, tepals forming a tube that is differentiated into distal and basal portions (so that the superior ovary often looks inferior externally); often, when folded, leaves break in fine line (more or less crisply, thinly succulent)

Amaranthaceae (incl. Chenopodiaceae; amaranth, pigweed, goosefoot, quinoa, beet, or spinach): Herbs, inflorescence in dense clusters, bracts and tepals dry and papery or green and fleshy, achene or utricle

Cactaceae (cactus): Stem succulent and spiny

Portulacaceae (purslane): Herbs (shrubs elsewhere), leaves succulent; 5 tepals, 2 “sepals”

Polygonaceae (knotweed, smartweed, dock, buckwheat, or rhubarb): Leaves alternate and with an ocrea (stipules connate around stem); not in betalin group

Fabales: the 2 commonest families can artificially be recognized by their papilionoid (pea) flowers (the similarities are non-homologous), i.e., standard, keel, & wings

Fabaceae (legume, bean, pea, clover, or indigo): Herbs, vines, trees, often with root nodules; leaves alternate, entire, pinnately compound (several common herbs trifoliate & toothed; few simple), pulvinus of leaf and leaflets often well developed (& different color from adjacent midvein), stipules present (sometimes very inconspicuous, best seen on very young twigs); fruit usually a legume or loment

Polygalaceae (milkwort): Herbs (woody elsewhere); roots with methyl salicylate (wintergreen smell); leaves alternate (whorled in a few), entire, simple, unlobed, venation obscure; heart-shaped capsule with 2 seeds

Saxifragales: presence of hypanthium; 2 or more styles (carpels free in some); flowers mostly fairly small, not very showy mostly; capsules

Saxifragaceae (saxifrage): Perennial herbs, often more or less palmate venation of leaves (usually more or less in a rosette-like clump), no stipules, inflorescence at top of scape, 2 (-few) carpels usually only partially fused (so partly to largely free)

Hamamelidaceae (witch-hazel): Woody; flower usually with 4 strap-shaped petals; with 2 more or less bony, persistent styles in fruit

Altingiaceae (sweetgum): Woody, aromatic odors, leaves palmately lobed, flowers & fruits in globose heads, with 2 more or less bony, persistent styles in fruit (*Liquidambar*)

Rosales: hypanthium; usually alternate (few opposite), toothed leaves with stipules (rarely lacking); usually 2 or more styles; flowers large & showy or highly reduced & inconspicuous (petals not showy); no capsules in se US

Rosaceae (rose, apple, cherry, pear, strawberry, blackberry, or raspberry): Herbs to trees, alternate leaves (often compound), showy flowers, numerous stamens

Rhamnaceae (buckthorn): Woody (few herbs), leaves simple, unlobed, alternate (some opposite, some entire), often with plinervy at base or with secondary veins parallel, small dark Δ stipules, stamens opposite the petals & cupped by them, fruit with a conspicuous subbasal rim

Ulmaceae (elm): Woody, alternate 2-ranked leaves, often scabrous in commonest local *Ulmus*, strongly toothed (mostly doubly), secondary veins ending in teeth & scalariform, blade often with asymmetrical base; *Ulmus* with samara, flat seeds

Cannabaceae (hackberry): Woody, pith chambered; alternate 2-ranked leaves, toothed or entire, plinerved (3 main veins from the base), veins ending in sinuses between teeth (or in the teeth -- need to check this character more), blade symmetric at base or asymmetric; fruit a drupe (*Celtis*) [above for *Celtis*; *Cannabis* & *Humulus* - marijuana & hops have opposite palmate leaves]

Urticaceae (nettle): Herbs (woody elsewhere), stipules, sometimes with stinging hairs, stems & petioles often with a "watery" appearance; flowers tiny & inconspicuous, cystoliths in leaves

Moraceae (mulberry or fig): Mostly woody; usually with milky sap, 2-ranked leaves, often plinerved, stipules often leaving a ring around most of the stem, flowers tiny but aggregated into tight clusters, accessory multiple fruit (mulberry, osage orange)

Myrtales: hypanthium; many with opposite, entire leaves (some alternate, some toothed or lobed); single style (carpels completely connate); flowers mostly showy (large; if small, petals still colored in ours); capsules in most; mostly herbs in our area

Lythraceae (loosestrife): Stamens attached below the top of hypanthium (on different-length filaments); petals crumpled in bud, wrinkled; ovary superior (in ours), 2-many carpels; flowers mostly 5-merous; often in or near water

Onagraceae (evening primrose): Stamens attached at tip of hypanthium, hypanthium long, tubular (not in *Ludwigia*); pollen grains with viscin threads (keep pollen grains attached together); ovary inferior (4 carpels); flowers 4-5-merous (2 in *Circaea*)

Melastomataceae (meadow beauty): “checker board” pattern of venation (poorly developed in *Rhexia*), stamens contrasting in color to tepals, filaments bent, commonly twisted bringing anthers to one side of the flower; anthers open by pores

Fagales: woody; alternate leaves; often with glandular or stellate hairs; unisexual flowers with tepals reduced & lacking (flowers not showy, often in catkins);

Fagaceae (beech, chestnut, or oak): Stipules; female flowers in clusters of 1-3, male flowers in catkins; fruit a nut associated with a spiny to scaly cupule; leaves never doubly serrate

Betulaceae (birch, alder, or hazelnut): Stipules; often with peeling bark & horizontal lenticels; leaves doubly serrate (big and little teeth); male and female flowers in separate catkins

Myricaceae (bayberry): Aromatic; peltate scales on leaves; leaves entire or toothed, no stipules (*Comptonia* with deeply lobed leaves, with stipules)

Juglandaceae (walnut or hickory): No stipules; aromatic (glandular hairs, peltate scales); leaves pinnately compound; stem with chambered pith (*Juglans*); large nuts (*Carya* drupe-like with dehiscent husk)

Malpighiales: a heterogeneous group; many are three-carpellate and have parietal placentation; most have alternate, simple leaves (in our area)

Violaceae (violet): Herbs (here); many *Viola* have cordate leaves in an acaulescent rosette, stipules present; flowers zygomorphic (here), abaxial petal with a spur, edges of the 5 stamens forming a ring around gynoecium (shedding pollen inward); 3-lobed capsule

Passifloraceae (passionflower): Vines; leaves and petioles with nectar glands, axillary tendrils, stipules, corona, androgynophore; berry (here)

Salicaceae (willow, poplar, or cottonwood): Woody; salicoid teeth on leaves (vein expanding at apex and associated with spherical, glandular hair - often falls off), stipules; catkins (unisexual, plants dioecious), sepals vestigial; seed with basal tuft of hairs

Euphorbiaceae s.l. (spurge, rubber, or cassava): Mostly herbs in our area; leaves usually alternate, sometimes with milky sap or with extra-floral glands; flowers unisexual (usually on same plant, often together in an inflorescence), styles usually 3 (often branched); schizocarp (1-2 seeds per segment); morphologically diverse (hard to develop a gestalt)

Hypericaceae (St. John's-wort): Herbs or shrubs; opposite leaves with pellucid dots (sometimes dark spots), no stipules; mostly showy flowers (yellow or pinkish petals); sometimes with dimorphic sepals; stamens numerous, in tufts; styles elongate, mostly free; capsule

Sapindales: mostly woody (rarely herbs), alternate (few opposite), pinnately compound leaves (few palmate, trifoliolate, or unifoliolate), no stipules (except for a few tropical lianas in Sapindaceae); flowers with distinct nectar disk

Sapindaceae (soapberry): Vine (with tendrils & biternate leaves) or tree with pinnate to bipinnate leaves; stamens usually 8 [the following two groups are now treated as specialized subgroups within the Sapindaceae, but for recognition purposes, it is convenient to learn them separately:]

- Aceraceae (maple): opposite leaves, palmate, mostly simple (some trifoliolate or compound); samaroid schizocarps
- Hippocastanaceae (buckeye or horse chestnut): opposite leaves, palmately compound; flowers in large showy clusters; capsule with few large nut-like seeds

Simaroubaceae (tree-of-heaven): with bitter compounds (smell a bit like peanut butter or rancid burnt oil), glands on some of the lower leaflets; carpels united by styles; samara (description here based only on *Ailanthus*)

Anacardiaceae (sumac, poison ivy, mango, pistachio, or cashew): Several trifoliolate (*Cotinus* with simple leaf); clear resin dries black (older leaves & damaged spots often with black mottling), spicy resinous smell; often unisexual flowers; drupe

Rutaceae (citrus or rue): Mostly woody (some introduced herbs); thorns or spines in some; pellucid dots with aromatic oils (sometimes foetid); the introduced *Phellodendron* can have opposite leaves & alternate (and the pellucid dots are very inconspicuous)

other miscellaneous core dicots:

Viscaceae (mistletoe): Hemi-parasites, shrubs epiphytic on trees, yellowish green foliage, branches break easily; swollen nodes; inconspicuous flowers

Brassicaceae (mustard, horse radish, radish, or cress): Herbs; mustard oils (smell); 4 petals in cross shape; stamens often 6 (with 2 short outer ones & 4 longer inner ones); modified capsule (silique or silicle -- replum & false partition)

Cucurbitaceae (cucurbit, squash, cucumber, or watermelon): Vines; tendrils usually spirally coiled and often branched (attached at right angle to petiole base); leaves palmately veined (& usually lobed); no stipules; petals fused; flowers unisexual; stamens mimic stigma

Malvaceae (incl. Sterculiaceae & Tiliaceae; mallow, hibiscus, okra, cotton, chocolate, cola, linden, or basswood): Herbs to trees, leaves alternate, often palmately lobed or compound, often with stellate hairs; stipules; most of ours are herbs with schizocarps (or capsules) & epicalyx

Oxalidaceae (wood sorrel or star fruit): Herbs (to woody elsewhere), often with bulblike tubers or fleshy rhizomes, leaves trifoliolate (in ours), entire; stipules; with oxalic acid (sour taste)

Geraniaceae (geranium): Herbs with palmately lobed or pinnately compound leaves, fruit a schizocarp with 5 one-seeded segments that separate elastically from the persistent central column

Sympetalae:

petals fused (there are a few that developmentally become deeply lobed or even free); Cucurbitaceae can also have fused petals (& a few euphorbs)

Cornaceae (dogwood): Woody, usually opposite leaves, hairs Y- or T-shaped (need magnification), secondary veins usually smoothly arching toward margin (arcuate venation); inflorescences sometimes with showy bracts; inferior ovary; “Dogwood Test” (carefully fold leaf in half perpendicular to the petiole, gently tear the two halves apart slowly, and spiral thickenings in the vascular strands will hold the 2 parts together like mini-cables) [**Nyssaceae** (tupelo, blackgum) included here in past have alternate leaves & ridged drupes; rather non-descript]

Ericales: generally these are woody plants with alternate, simple, exstipulate leaves; it is also common for there to be 2 times (or more) as many stamens (or staminodes) as there are petals

Ebenaceae (persimmon or ebony): Trees, domatia in leaves (black dots or cavities, but not usually seen in ours), flowers unisexual, expanded persistent calyx; older leaves often with blackish-drying spots (from pigments) where injured

Ericaceae (heath, heather, blueberry, cranberry, huckleberry, wintergreen, azalea, or rhododendron): Trees, shrubs, or herbs (some lianas in the tropics), some evergreen; flowers pendulous, urn shaped; anthers open by pores, stamens usually with various appendages

Polemoniaceae (phlox or jacob’s ladder): Herbs, showy flowers with narrow tube; carpels 3

Following 3 are traditionally separate families, but studies show the limits are not clear; e.g., our *Lysimachia* (traditionally in Primulaceae) belongs with Myrsinaceae: stamens opposite the petals, free central placentation

[**Myrsinaceae:** trees, shrubs or lianas, dots and/or lines in leaves, drupe]

[**Theophrastaceae:** s.str. woody, coarse fibers in leaves; but herbaceous *Samolus* related]

Primulaceae (primrose): Herbs, some with lines & dots in leaves

Core Asterids:

sympetalous, epipetalous stamens (equal or less than number of petals), gynoecium usually 2 fused carpels

Aquifoliaceae (holly): Woody; leaves simple; small dark Δ stipules; flowers unisexual (often dioecious); sessile, capitate stigma; berry-like drupe (with 4-5 pits)

Apiaceae (carrot, parsley, parsnip, licorice, cilantro, dill, fennel, or poison hemlock): Herbs, crushed leaves (or root) often aromatic (carrotty smell); leaves mostly with sheathing petiole base, usually very compound & lobed (few simple, trifoliolate, or palmate leaves); flowers small, petals mostly white (or yellow), but often in large showy clusters (umbels, often compound umbels, rarely reduced to heads); inferior ovary, schizocarp

Caprifoliaceae s.l. (honeysuckle): Herbs, vines, & shrubs with opposite leaves (simple & unlobed in most, but lobed or even compound in a few); bilaterally symmetric flowers, elongate style, & capitate stigma; some of the genera are fairly different looking, making it difficult to develop a morphological gestalt for this family, i.e., learn the genera [many authors, based on modern phylogenetic analyses

include the first two families below within the Caprifoliaceae, while others split them out, along with other families not discussed here; for i.d. purposes, it is useful to think of them as distinctive subgroups; what we know suggests that the first two families are specialized subgroups within the broader Caprifoliaceae, while *Sambucus* & *Viburnum* are part of the more distantly related Adoxaceae, i.e., they are NOT closely related to other Caprifoliaceae as traditionally classified]

-- Dipsacaceae (teasel): Herbs; the only common species are the teasels (*Dipsacus*), which have prickly leaves & dense, cone-like heads; other genera look like Asteraceae mostly

-- Valerianaceae (valerian): Herbs; in our area only *Valeriana* & *Valerianella*

-- **Adoxaceae** (viburnum or elderberry): Shrubs with radially symmetric flowers, short style, & lobed stigma; in our area only *Sambucus* (compound leaves) and *Viburnum* [there are many native, naturalized, & cultivated species of *Viburnum*, some of which have sterile lateral flowers, looking a lot like *Hydrangea*; *Viburnum* have a single style, 5 stamens, and the fruits are drupes while *Hydrangea* have 2 styles, 8 or more stamens, and the fruits are capsules]

Gentianales: Usually opposite simple entire leaves with colleters (thick glandular hairs); flowers often showy, radially symmetric, with corolla convolute in bud; mostly herbs or vines in our area (a few woody)

Apocynaceae (incl. Asclepiadaceae; milkweed, dogbane, or periwinkle): Milky sap (sometimes clear), corona often present, 2 separate ovaries but fused style (stylar head); fruits often paired; colleters (no stipules) mostly at base of petiole but in digitate cluster at base of lamina in Asclepiad subfamily (which also has pollinia, staminal appendages, & highly modified flowers with hoods, horns)

Gentianaceae (gentian): Leaves usually more or less sessile; stems often winged; stamens open by pores; superior ovary with parietal placentation; usually capsule with many seeds

Rubiaceae (coffee, bedstraw, or buttonbush): Interpetiolar stipules; ovary inferior

Solanales: Alternate, simple leaves, no stipules; flowers radially symmetric, plicate; mostly herbs in our area (few woody)

Boraginaceae (borage, comfrey, forget-me-not, or bluebells): [actually isolated and not Solanales, although flower looks similar; treated as Boraginales now] Leaves scabrous (rough to the touch) above in most of our species (not in bluebells, *Mertensia*); inflorescence a helicoid or scorpioid cyme; sepals free or fused; 2 carpels, but each one with a false partition (appearing to have 4 locules), with 1 seed per partition (4 total); the ovary 4-lobed in most of our species, so fruit usually 4 nutlets (sometimes schizocarpic or drupe)

Convolvulaceae (incl. Cuscutaceae; morning-glory, bindweed, or dodder): Vines (*Cuscuta* are parasites, orange “strings” on other plants); often with milky sap; flowers fairly large, showy; sepals usually free (sometimes only slightly fused at base), overlapping; capsule with 4 large seeds

Solanaceae (potato, tomato, eggplant, jimsonweed, nightshade, petunia, or tobacco): A few genera (*Physalis* & *Solanum*, the commonest two) with sub-opposite big leaf & little leaf clustered at same node, crushed leaves often with a faint “tomatoey” smell; sepals fused & never overlapping; fruit a berry or capsule with many seeds (often flattened)

Lamiales: Mostly with opposite, simple leaves, no stipules, square(ish) stem common; flowers bilabiate (more or less 2-lipped with 2 upper petals & 3 lower petals), with 4 stamens (2 long, 2 short, often curving together; sometimes reduced to just 2 total)

Oleaceae (olive, jasmine, privet, lilac, or ash): Trees, shrubs (lianas cultivated/naturalized); (*Fraxinus* & *Jasminum* with pinnately compound leaves), often with green (or blackish) dots (small pits in cuticle) on abaxial leaf surface; sepals and petals 4 (sometimes strap-shaped); stamens 2; drupe, samara, capsule

Acanthaceae (acanthus or wild petunia): Herbs (ours), stem often flexuous from node to node (comparable to many amaranths); cystoliths often present in leaves (with the right magnification & lighting - lines/dashes in epidermis); flower usually associated with conspicuous bracts; fiddle-shape capsule (each ovule borne on a hook shaped projection, retinaculum or jaculator)

Bigoniaceae (trumpet creeper or catalpa): Generally, woody plants with opposite compound leaves; in our area trees with opposite & whorled large cordate leaves (*Catalpa*) or lianas (*Campsis* with pinnately compound leaves; *Bignonia* with 2 leaflets & a tendril in position of terminal leaflet); fruit an elongated capsule with winged seeds

Verbenaceae (vervain, lantana, or beauty-berry): Herbs or shrubs (cultivated trees); crushed leaves sometimes aromatic (usually unpleasant), stem often square in cross section; indeterminate inflorescences (racemes or condensed into heads); gynoterminal style, expanded stigma; drupe (with 2 or 4-pits) or schizocarpic nutlets

Lamiaceae (mint, basil, catnip, sage, thyme, or oregano): Herbs or shrubs; crushed leaves often aromatic (fragrant, minty), stem usually square in cross section; subunits of inflorescence determinate (in cymes), but often densely pseudoverticillate (clustered in whorls along an elongate axis); gynoterminal to gynobasic style, stigma linear; mostly 4 schizocarpic nutlets or drupelets

Scrophulariaceae (figwort or mullein): As traditionally circumscribed, this family included some or all of the next 6 families (as well as others not mentioned here); it was a “wastebasket” group with no clear defining features, other than being distinguished from most other Lamiales by being herbs (mostly) with alternate & opposite leaves, often with round stems, often with capsules (with many seeds); in its modern sense only *Scrophularia*, *Verbascum* (large rosettes, biennials, with alternate leaves on flowering stem), & the cultivated *Sutera* in our area; characterized as herbs with the anther sacs confluent and opening by a single distal slit (oriented at right angle to the filament) & anther base not sagittate, except now also including the shrubby Buddlejaceae (butterfly bush) & Myoporaceae. the exact delimitation of these groups is not resolved, and many of the apparently useful characters are rather cryptic; published floras recognize many of the following families in their traditional usage, while modern usages are generally more expanded

Plantaginaceae (incl. Veronicaceae; snapdragon, foxglove, or speedwell): Most of the traditional Scrophulariaceae are now included here; there has been some disagreement in the literature about which family name to use -- traditionally, this name was restricted to the genus *Plantago* (rosulate herbs with reduced flowers in a spike on a scape, modified for wind-pollination); differs from Orobanchaceae in being autotrophic (no haustorial connections to other plants) and mostly not turning black on drying; differs from Scrophulariaceae s.str. in anther sacs separate and opening by two slits (or if apically fused, then opening by a U or V shaped slit) & anther base sagittate [characters of being mostly herbs, stems often round, alternate or opposite leaves, fruit a capsule, are still diagnostic, but they also apply to most of the other families here]; incl. Callitrichaceae (water starwort): *Callitriche* only (a lineage of tiny, highly reduced, mostly aquatic herbs)

Orobanchaceae (broomrape): Herbs, hemiparasites or holoparasites, stems often round, leaves turn black upon drying in most, fruit a capsule; this group was traditionally restricted to just the holoparasites (*Conopholis*, *Epifagus*, *Orobanche*), but modern studies have shown that other hemiparasites are also in this group (*Agalinis*, *Aureolaria*, *Castilleja*, *Melampyrum*, *Pedicularis*, *Seymeria*)

Phrymaceae (lopseed or monkey flower): *Mimulus* & *Phryma* are the 2 KY genera now placed together by phylogenetic molecular data; morphological features not clear yet, so learn genera; traditionally restricted to *Phryma*, with the other genera part of the traditional Scrophulariaceae

Mazaceae (mazu): *Mazus* was originally segregated as part of Phrymaceae, but DNA says separate

Asterales (or Campanulids): a lot of cryptic features support this group, but plunger pollination is the only one that is readily visible (stamens held together, release pollen onto modified style with secondary pollen presentation by the style); in our area all are herbs with no stipules

Campanulaceae (bellflower or lobelia): Herbs with milky sap; leaves simple, alternate, toothed; filaments usually attached to disk at apex of ovary; capsule with numerous seeds (in ours)

Asteraceae (aster, daisy, sunflower, artichoke, dandelion, lettuce, goldenrod, marigold, thistle, chamomile, chicory, ragweed, or coneflower): Herbs; leaves alternate, opposite, simple, compound (i.e., vegetatively variable); flowers in involucrate heads (bracteate phyllaries); achene usually with a pappus; the lettuce group (Lactuceae) has milky sap; some groups have a distinctive resinous smell; this family is common in many habitats, including shaded woodlands & as an important part of summer & fall displays in open areas; experience-based imprinting is the only way to positively identify this family in the absence of reproductive material; most herbs in our area with opposite compound leaves are this family