Klondike Access

January 8, 2024

	BOTANICAL NAME (with etymology & genus pronunciation)	**FAMILY** [CC] = Coefficient of Conservatism	**COMMON NAME** (with tips we learned)
☐	*Acer negundo* (Acer = maple) (AY-sr)	Sapindaceae [CC1]	Boxelder (unlike most other maples, the Boxelder is fully dioecious, so only the female trees will display samaras / the samaras often persist throughout the winter, a good identifier / unlike most other maples, the Boxelder has pinnately compound leaves with 3 to 7 leaflets which can resemble Poison Ivy /)
☐	*Acer saccharinum* (mnemonic: "Who wants sugar?" [no answer] "Who wants silver?" ["I!" "I!" "I want silver!"]) (AY-sr / sack-er-RYE-num)	Sapindaceae [CC2]	Silver Maple (leaf lobes spikey, frazzled, with deep angular sinuses, like a Sugar Maple after 20 cups of coffee, / scratched twigs have a perceptible odor / leaf underside silvery / bark develops a shaggy, flaky appearance)
☐	*Acer saccharum* (= sugary, also the genus name for sugar cane: *Saccharum officinarum*) (AY-sr)	Sapindaceae [CC5]	Sugar Maple (leaf: 5 lobes, the basal pair are small, but the upper 3 lobes are large with notches / compared to the Silver Maple's narrow, angular sinuses, the Sugar Maple has more open, shallow, and rounded ones / buds: John demonstrated the hardness and sharpness of its dark buds)
☐	*Agastache nepetoides* (= very much + spike + like catnip) (uh-GAH-stuh-kee / nep-uh-TOY-deez)	Lamiaceae (Nepetoideae subfamily) [CC4]	Yellow Giant Hyssop Easy to identify with its candelabra inflorescences
☐	*Ageratina altissima* (not growing old + highest) (ADD-jr-uh-TY-nuh)	Asteraceae (Eupatorieae tribe) [CC2]	White Snakeroot
☐	*Alliaria petiolata* (garlic-like + having a leaf stalk) (al-lee-AYR-ee-uh)	Brassicaceae [intro]	Garlic Mustard (hard to get rid of with its self-compatible flowers and its seeds that remain viable in the soil for years)
☐	*Ambrosia artemisiifolia* (= food of the gods + leaves like *Artemisia*) (am-BRO-see-uh)	Asteraceae (Heliantheae tribe) [CC0]	Ragweed
☐	*Ambrosia trifida* (= food of the gods + divided into 3) (am-BRO-see-uh)	Asteraceae (Heliantheae tribe) [CC0]	Giant Ragweed
☐	*Ampelopsis cordata* (resembling a vine + heart-shaped) (am-pel-OP-sis)	Vitaceae [CC3]	Raccoon Grape / Heartleaf Peppervine (fruit cluster more spherical than the typical distended cone or columnar shape of *Vitis* species / bark deeply furrowed / stem less dense than *Vitis* species)
☐	*Andropogon gerardi* (man + beard + somebody's name) (an-dro-PO-gon)	Poaceae (Panicoideae subfamily) [CC5]	Big Bluestem (famous for its "turkeyfoot" inflorescence / one of the 4 dominant grasses of the tallgrass prairie – along with Little Bluestem, Indian Grass, and Switchgrass)
☐	*Asclepias syriaca* (Greek god of medicine + Syrian) (uh-SKLEE-pee-us / seer-ee-AY-kuh)	Apocynaceae [CC0]	Common Milkweed (follicles only have 1 slot for the seeds to escape. It would be folly to look for another one / milkweed flowers are in umbels, but for some reason only 1 flower produces a fruit. Still, a knob of flower scars can be found.)
☐	*Asimina triloba* (native American name of tree + 3 lobes) (uh-SIM-in-uh)	Annonaceae (a Basal Angiosperm family) [CC5]	Pawpaw (the only member of the family not confined to the tropics, hence the naked "paintbrush" buds in winter)
☐	*Asplenium platyneuron* (without spleen [medicinal for aiding spleen] + flat veins) (uh-SPLEE-nee-um)	Aspleniaceae [CC4]	Ebony Spleenwort (cheerful little fern; fertile fronds stand upright but die off during winter; sterile fronds are evergreen and lie on ground during winter)
☐	*Betula nigra* (birch + black) (BET-choo-luh)	Betulaceae [CC4]	River Birch (no terminal buds / lateral buds have hook at tip / bark on mature tree peels into thin sheets / leaves somewhat triangular with both small teeth and shallow lobing at the same time / long, pendulous male catkins form in fall, but the inconspicuous green female catkins appear on spur shoots in the spring with the leaves)

☐	*Campsis radicans* (bent [stamens] + rooting stems) (KAMP-sis)	Bignoniaceae [CC3]	Trumpet Vine (opposite leaves / aerial rootlets attach to tree from nodes / vine has lighter color than most other vines)
☐	*Carya cordiformis* (nut tree + heart-shaped) (KAYR-ee-uh)	Juglandaceae [CC5]	Bitternut Hickory (has naked buds, like the pecan / St. Louis has 7 different hickory species / the hickories can be divided into 2 sections: the Bitternut and Pecan belong to one section [Apocarya] while all the others, i.e. Pignut, Shellbark, Shagbark, Black, and Mockernut belong to the other section [Carya] which has scales on its buds)
☐	*Carya illinoinensis* (nut tree + Illinois) (KAYR-ee-uh)	Juglandaceae [CC7]	Pecan Hickory (falcate leaflet shape / has naked buds, like the Bitternut Hickory / belongs to the Apocarya section of the Hickory family, along with the Bitternut Hickory)
☐	*Celastrus orbiculatus* (evergreen tree + circular) (sell-ASS-trus)	Celastraceae [intro]	Oriental Bittersweet (aggressive; differs from native by having rounder leaves, fruit in axillary [rather than terminal] clusters, and yellow [rather than orange] fruit valves)
☐	*Celastrus scandens* (evergreen tree + climbing) (sell-ASS-trus)	Celastraceae [CC3]	American Bittersweet (although crossbreeding is common, the native has narrower leaves, fruit in terminal [rather than axillary] clusters, and orange [rather than yellow] fruit valves)
☐	*Celtis occidentalis* (tree name + western) (SELL-tiss)	Cannabaceae [CC3]	Hackberry (easy to identify from its laminated bark)
☐	*Cercis canadensis* (= weaver's shuttle [shape of seedpod]) (SIR-siss)	Fabaceae (Caesalpinioideae subfam) [CC3]	Redbud (seedpods grow from trunk and main branches [cauliflory] as does chocolate [from the mallow family] / each leaf has 2 pulvini for movement, one on each end of the petiole)
☐	*Chamaecrista fasciculata* (kam-ee-KRISS-tuh)	Fabaceae (Caesalpinioideae subfam) [CC2]	Partridge Pea
☐	*Conium maculatum* (cone + spotted) (KOH-nee-um)	Apiaceae [intro]	Poison Hemlock (its smooth hollow stems are reportedly still toxic 3 years after the plant has died / Queen Anne's lace has hairy stems and does not have the purple blotches of Poison Hemlock)
☐	*Cornus drummondii* (horn + someone's name) (KOR-nuss)	Cornaceae [CC2]	Roughleaf Dogwood (though not as famous as the Flowering Dogwood, this is our most common species / has white fruits)
☐	*Cornus florida* (also *Benthamidia florida*) (horn + flowering) (KOR-nuss)	Cornaceae [CC5]	Flowering Dogwood / twig tips bend upward / vegetative buds have 2 scales, like praying hands / has red fruits)
☐	*Dactylis glomerata* (finger + clustered in a head) (DACK-till-iss)	Poaceae (Pooideae subfamily) [intro]	Orchardgrass (even in winter, this grass looks more flower-like than others)
☐	*Daucus carota* (carrot + carrot) (DOW-kuss)	Apiaceae [intro]	Wild Carrot / Queen Anne's Lace / (In biennials like this, winter allows us to see both the dried remnants from last summer's flowers as well as the new green rosettes waiting for spring.)
☐	*Desmanthus illinoensis* (bundle + flower) (dez-MAN-thus)	Fabaceae (Caesalpinioideae subfam) [CC3]	Illinois Bundleflower
☐	*Diospyros virginiana* (= divine + pear) (dee-OSS-pr-us) [but a more etymologically meaningful pronunciation would be "dee-os-PY-rus"]	Ebenaceae [CC3]	Persimmon Tree (dioecious / leaves entire / bark blocky / hard wood for golf club heads and pool cues)
☐	*Elymus riparius* (= porcupine + river bank) (ELL-uh-muss)	Poaceae (Pooideae subfamily) [CC7]	Riverbank Wild Rye
☐	*Elymus virginicus* (= porcupine) (ELL-uh-muss)	Poaceae (Pooideae subfamily) [CC5]	Virginia Wild Rye
☐	*Enemion biternatum* (= Anemone + two clusters of 3) (eh-NEE-mee-un)	Ranunculaceae [CC5]	Lowland Rue Anemone (John's note: "This plant was in flower! And it was being visited by a winter stonefly. These insects are active in healthy creek systems year-round and actually produce their own anti-freeze – glycerol, sugars, and proteins – to allow them to thrive

			in colder temperatures. For more information click here and here.")
☐	*Eryngium yuccifolium* (= bristly plant + leaves like a yucca) (er-RIN-jee-um)	Apiaceae (Apioideae subfamily) [CC8]	Rattlesnake Master (hard to believe this plant is in the carrot family!)
☐	*Euonymus alatus* (= good name + winged) (yoo-ONN-i-mus)	Celastraceae [intro]	Burning Bush or Winged Euonymus (at least some stems likely have corky ridges / flowers are pale / leaf undersides are glabrous / leaf petioles shorter than our native tree)
☐	*Euonymus atropurpureus* (good name + dark purple) (yoo-ONN-i-mus)	Celastraceae [CC5]	Wahoo (small tree with attractive pink fruits / no corky ridges on stems / flowers brown / leaf undersides with short erect hairs / leaf petioles longer than the non-native species /)
☐	*Fraxinus smallii* (ash tree + somebody's name) (FRACK-sin-us)	Oleaceae [CC3]	Sullivan's Ash [yes! our own Father Sullivan!] (a type of White Ash which has, among other differences, brown buds instead of the typical black ones)
☐	*Hamamelis vernalis* (= together with fruit [new flowers and fruit from preceding year at the same time] + spring) (ham-a-MEE-liss)	Hamamelidaceae [CC7]	Spring Witch-Hazel / Ozark Witch-Hazel ["witch" is from an Old English word meaning "bendable"] (has 4 shoestring-like petals in yellow, orange, or red / very fragrant / more common here than the Fall species *H. virginiana*)
☐	*Helianthus mollis* (sun + flower + soft) (hee-lee-ANN-thus)	Asteraceae (Heliantheae tribe) [CC6]	Ashy Sunflower (dried-up and ash-colored, as advertised)
☐	*Hydrangea arborescens* (= water + vessel + tree) (hy-DRANN-jee-uh)	Hydrangeaceae [CC7]	Wild Hydrangea (winter capsules resemble summer inflorescences)
☐	*Hypericum punctatum* (above + picture + marked with dots) (hy-PAYR-i-kum)	Hypericaceae [CC3]	Spotted St. John's Wort ("spotted" because of the many black dots on the leaves and flower petals / distinguished from the non-native *H.perforatum* by its heavily dotted petals, distinct corymb, and black spots instead of clear spots on leaves / found to have more hypericin than *H.perforatum* [mnemonic: our native *punctatum* gives more of a "punch"] / both species used the same way medicinally for depression)
☐	*Ilex decidua* (= holly + deciduous) (EYE-lex)	Aquifoliaceae [CC5]	Possumhaw / Deciduous Holly (dioecious / spur branches useful for identification)
☐	*Liatris pycnostachya* (pycnostachya = crowded spikes) (LY-a-triss)	Asteraceae (Eupatorieae tribe) [CC6]	Prairie Blazing Star (numerous linear leaves and densely flowered spikes)
☐	*Ligustrum obtusifolium* (privet + leaves blunt at apex) (ligg-GUSS-strum)	Oleaceae [intro]	Border Privet (twigs pubescent with minute, spreading hairs / winter bud scales are tawny and short-hairy)
☐	*Lindera benzoin* (person's name + aromatic resin) (lin-DEER-uh)	Lauraceae [CC5]	Spicebush (male plants have conspicuously larger winter flower buds)
☐	*Lonicera japonica* (= somebody's name + Japanese) (lo-NISS-r-uh)	Caprifoliaceae [intro]	Japanese Honeysuckle Vine (berries black)
☐	*Lonicera maackii* (= somebody's name + somebody's name) (lo-NISS-r-uh)	Caprifoliaceae [intro]	Bush Honeysuckle (berries red)
☐	*Micranthes pensylvanica* (= small flowers) (my-KRANN-theez)	Saxifragaceae [CC10]	Forbes' Saxifrage / Swamp Saxifrage / (habitat moist sandstone / pilose stems / large basal leaves)
☐	*Monarda fistulosa* (= somebody's name + hollow) (mo-NARR-duh)	Lamiaceae [CC4]	Wild Bergamot (dense rounded heads of dried calyx tubes, still with a wonderful smell)
☐	*Ostrya virginiana* (= Gk name of tree) (o-STRY-yuh)	Betulaceae [CC4]	Hop Hornbeam (hop-like fruit, shredded bark on older trees, leaves often marcescent [retained throughout winter], with venation that is forked at margin [in contrast to *Carpinus*])
☐	*Panicum virgatum* (millet + twiggy) (PANN-i-kum)	Poaceae (Panicoideae subfamily) [CC4]	Switchgrass (perennial, warm-season, deep-rooted, bunchgrass / one of the 4 dominant grass species of the tallgrass prairie /)
☐	*Physocarpus opulifolius* (= bladder fruit + maple-leaved) (fy-so-KARR-pus)	Rosaceae [CC5]	Ninebark (peeling bark on older branches)

☐	*Platanus occidentalis* (= plane tree + western) (PLATT-tuh-nuss)	Platanaceae [CC3]	Sycamore (brown bark famously exfoliates in irregular pieces to reveal a white inner bark / can be used to locate where streams are from a distance)
☐	*Polystichum acrosticoides* (many rows + resembling *Acrostichium*, the Elk-Horn Fern, which also has its sori densely packed on pinna underside) (po-LISS-tick-um)	Dryopteridaceae [CC5]	Christmas Fern (evergreen – which is how it gets its common name because it's still green at Christmas, except for the fertile tips of fronds which are dried up and brown)
☐	*Populus deltoides* (poplar + triangle-shaped) (POP-yoo-lus)	Salicaceae [CC2]	Eastern Cottonwood (dioecious / male catkins reddish-purple, female catkins green / winter buds long, slender, brown, pointed, resinous / strings of beadlike capsules split open to release numerous seeds with cottony strands / one tree may release 40 million seeds per season)
☐	*Pycnanthemum tenuifolium* (dense flowers + narrow leaves) (pik-NANN-thuh-mum)	Lamiaceae (Nepetoideae subfamily) [CC4]	Narrowleaf Mountainmint (narrow leaves = narrow flavor)
☐	*Quercus imbricaria* (oak + roofing tile [wood use]) (KWERK-us)	Fagaceae (red group) [CC3]	Shingle Oak (leaf: of our 3 lobeless native oaks (water, shingle, willow), this has the "middle-size" leaf / leaves marcescent (stay on tree throughout winter) /
☐	*Quercus rubra* (oak + red) (KWERK-us)	Fagaceae (red group) [CC5]	Northern Red Oak (leaf: pointed lobes are not divided again at their tips [in contrast to Shumard], with shallow sinuses for shade leaves and more deeply cut sinuses for sun leaves / petiole sometimes red / ski tracks down trunk / acorns: as wide as long, with very shallow cap / buds: long, pointy, sometimes with hair on upper half /
☐	*Ratibida pinnata* (pinnata = feather) (ruh-TIBB-i-duh)	Asteraceae (Heliantheae tribe) [CC4]	Gray-Headed Coneflower
☐	*Robinia pseudoacacia* (somebody's name + false acacia) (ro-BIN-ee-uh)	Fabaceae (Faboideae subfamily) [CC6 or intro]	Black Locust (legumes flat, brown, 2-4 inches, with 3-10 seeds / paired spines on younger branches / odd-pinnate leaves with 7-19 leaflets /)
☐	*Rosa multiflora* (many + flower) (RO-zuh)	Rosaceae [intro]	Multiflora Rose (has frilly stipules)
☐	*Sassafras albidum* (sassafras + white) (SASS-uh-frass)	Lauraceae (Laurel Family) [CC2]	Sassafras (has green twigs, even in winter / scratch to enjoy Juicyfruit Gum or Fruit Loops fragrance / terminal buds green and plump / plant is dioecious / leaves: some mitten-shaped / no longer sold as food because of safrole's cancer link)
☐	*Sceptridium dissectum* (scepter + deeply divided) (skep-TRIDD-ee-um)	Ophioglossaceae (Adder's Tongue Family) – a Eusporangiate Fern; [CC5]	Grape Fern (so-called because the sporangia on the fertile stalk resemble grapes) / sterile frond turns bronze during the winter, but still photosynthesizes / although people speak of fertile and sterile fronds, they're actually connected as one)
☐	*Scrophularia marilandica* (= swelling [treating of neck lymph glands]) (skro-foo-LAYR-ee-uh)	Scrophulariaceae [CC3]	Figwort (grooved, square stems, opposite branching, small 2-parted fruits)
☐	*Silphium perfoliatum* (= extinct Greek, resinous, medicinal plant + through the leaf) (SILL-fee-um)	Asteraceae (Heliantheae tribe) [CC3]	Cup Plant (opposite, perfoliate leaves form cups / one of St. Louis' 4 silphiums, the others being Rosinweed, Compass Plant, and Prairie Dock)
☐	*Smilax tamnoides* (*S.hispida*) (= resembling *Tamus*, a yam plant) (SMY-lax)	Smilacaceae [CC3]	Bristly Greenbrier (lower stem prickles crowded and black)
☐	*Solidago altissima* (to make whole + highest) (so-lid-DAY-go)	Asteraceae (Astereae tribe) [CC1]	Tall Goldenrod
☐	*Sorghastrum nutans* (false sorghum + nodding) (sor-GAS-strum)	Poaceae (Panicoideae subfamily) [CC4]	Indian Grass (blue-green foliage, "rabbit ears" upright auricles at base of blade, hairy nodes / warm-season perennial bunchgrass, intolerant of shade / one of the 4 dominant grasses of the tallgrass prairie /)
☐	*Symphoricarpos orbiculatus* (= gather together + fruit + round [leaf]) (SIMM-for-ee-KARR-pos)	Caprifoliaceae [CC1]	Coralberry (leaves opposite, sessile / fruit in leaf axils: purple-red drupes with 2 stones, persistent through winter / monoecious)
☐	*Tilia americana* (= linden tree) (TILL-ee-uh)	Malvaceae [CC5]	Basswood ("has red buds, but it's not a Redbud" – Fr. Sullivan's joke / zigzag twigs / look for telltale bracts with attached peduncles /

			asymmetric leaf base, hyaline tissue along leaf margins, upper surface glabrous)
☐	*Toxicodendron radicans* (poison tree + rooting) (TOCK-see-ko-DEN-dron)	Anacardiaceae (cashew, mango, pistachio family) [CC1]	Poison Ivy (urushiol / when vine is climbing up tree, the aerial rootlets point in all directions "as if they didn't know where the tree was" - John's joke.)
☐	*Ulmus rubra* (elm + red) (UL-muss)	Ulmaceae [CC5]	Slippery Elm / Red Elm (from color of heartwood) / (In comparison with American Elm, the Slippery Elm buds are darker in color and usually have some rusty-brown pubescence on scales / Slippery Elm leaves tend to be rougher on upper surface, have a more exaggerated acuminate tip, and at least some leaves are strongly folded upward along the midvein / Slippery Elm's fruit (samara) lacks the marginal cilia of American Elm's / both have double-serrated leaves with asymmetrical bases /)

Analysis

We identified over 70 species – and not on some warm summer day but in the dead of winter! This has to be a record of some kind!

Let's sort these many species into the 4 boxes (divisions) which land plants (embryophytes) are typically placed:

- **Box 1: BRYOPHYTES**: We didn't find any bryophytes (liverworts, mosses, or hornworts).

- **Box 2: LYCOPHYTES and FERNS**: We didn't find any lycophytes (clubmosses, spikemosses, or quillworts). But we did find 3 ferns (*Asplenium platyneuron*, *Polystichum acrosticoides*, and *Sceptridium dissectum*). The first two ferns are more modern. But the last fern – the *Sceptridium* (Grape Fern) – is a primitive fern not closely related to the other two.
  Explanation: Ferns can be divided into 2 groups. The first group is the EUSPORANGIATE FERNS. "Eu" can mean "true", but don't think of them that way! These primitive ferns are definitely not the "true" ferns that we picture in our minds. The second group is the LEPTOSPORANGIATE FERNS ("lepto" means thin and delicate). It is these LEPTOSPORANGIATE FERNS that are the "true" ferns that we picture in our minds. Such awkward names! They refer to the type of sporangia that the ferns have on their fertile fronds. ["Sporangia" (spore + container) are the spore-producing vessels where meiosis occurs.]

  The "Grape Fern" (*Sceptridium*) that we found is a EUSPORANGIATE fern. This is the uncommon, more primitive group. It's in the Whisk Fern class (Psilotopsida). In St. Louis we only have a few EUSPORANGIATE ferns. Besides the "Grape Fern", we have the "Rattlesnake Fern" (*Botrypus* or *Botrychium*) and the "Adders' Tongue Fern" (*Ophioglossum*). The sporangia from these EUSPORANGIATE ferns are big and thick-walled – big enough to look like grapes or rattlesnake rattles. When the big sporangia mature, their thick walls rip open to release hundreds or even thousands of spores. Any spore that germinates will produce a brown, subterranean gametophyte the size of a little slug. That's why it took centuries for people to figure-out its life cycle. By the way, these 3 St. Louis fern genera all belong to the same Adders' Tongue family (Ophioglossaceae). Not only are they all EUSPORANGIATE with brown, non-photosynthesizing, underground gametophytes, they also have dimorphic fronds. Their single sterile frond is wide to capture energy, while their narrow fertile frond looks as though it has lost all its lamina, with only the sporangia left behind.

  In contrast, the "Ebony Spleenwort" (*Asplenium*) and the "Christmas Fern" (*Polystichum*) that we found are LEPTOSPORANGIATE ferns. This is the more common, more refined group. Their sporangia are very small and stalked. The sporangia appear in clusters called "sori". Often the sori are covered with a protective indusium. When a sporangium matures, instead of crudely ripping open, it has a special dehiscence mechanism to release its spores efficiently. Instead of releasing hundreds or thousands of spores, each sporangium releases only 64. Any spore that germinates will produce a green, above-ground gametophyte (instead of a brown, underground one). All of our St. Louis ferns belong to this refined LEPTOSPORANGIATE group (except for the Grape, Rattlesnake, and Adders' Tongue ferns listed above).

Two more bits of confusion: St. Louis has ferns in the Osmundaceae (Interrupted Fern, Royal Fern, Cinnamon Fern). This family diverged early in the evolution of the Leptosporangiate ferns. They might be considered halfway between the 2 groups – a stepping-stone between the EUSPORANGIATE and the LEPTOSPORANGIATE ferns. St. Louis also has horsetails, which might be considered EUSPORANGIATE ferns (though in a different order from our other eusporangiate ferns.)

One final note about fern classification: "Lycophyte" and "Monilophyte" are the new words to learn. The ferns and the fern allies used to be called "Pteridophytes". That word is not used anymore (at least not formally, although sometimes for convenience like the word "Bryophytes"). The reason is that the fern allies (lycopods) and the ferns together *do not make a monophyletic group*. The ferns and horsetails have been found to be more closely related to the seed plants than to the lycopods. The old term "pteridophyte" is therefore paraphyletic and is no longer accepted. (The phrase "fern allies" has lost its usefulness too). The lycopods now have their own division "Lycopodiophyta" or "Lycophyta" for short. The new term for ferns and horsetails is "Monilophyte". Their division is "**Monilophyta**". "Monilo" means "necklace". The ferns get that name because when a fern stem is cut, the transverse section (stele) shows a vascular system that looks like a string of beads.

- **Box 3: GYMNOSPERMS**: We didn't find a single gymnosperm – not one *Juniperus* or planted pine or planted baldcypress or planted Ginkgo.

- **Box 4: ANGIOSPERMS**: We hit the jackpot in this department, identifying about 70 flowering plants in 35 different families! Most species were from the Asteraceae (8), with the Poaceae (6) close behind. For no particular reason, let's sort the 35 families (and their orders) into 5 arbitrary groups from the phylogenetic tree:

  Group 1: BASAL ANGIOSPERMS:
  Annonaceae (Magnoliales) / Lauraceae (Laurales) /

  Group 2: MONOCOTS
  Smilacaceae (Liliales) / Poaceae (Poales) /

  Group 3: EARLY EUDICOTS
  Hamamelidaceae (Saxifragales) / Platanaceae (Proteales) / Ranunculaceae (Ranunculales) /
  Saxifragaceae (Saxifragales) /

  Group 4: ROSIDS
  Anacardiaceae (Sapindales) / Brassicaceae (Brassicales) / Cannabaceae (Rosales) / Hypericaceae (Malpighiales)
  Malvaceae (Malvales) / Salicaceae (Malpighiales) / Ulmaceae (Rosales) / Vitaceae (Vitales) /
  Betulaceae (Fagales) / Fagaceae (Fagales) / Juglandaceae (Fagales) / Rosaceae (Rosales) /
  Sapindaceae (Sapindales) / Celastraceae (Celastrales) / Fabaceae (Fabales) /

  Group 5: ASTERIDS
  Apocynaceae (Gentianales) / Aquifoliaceae (Aquifoliales) / Bignoniaceae (Lamiales) / Ebenaceae (Ericales) /
  Hydrangeaceae (Cornales) / Scroophulariaceae (Lamiales) / Cornaceae (Cornales) / Oleaceae (Lamiales) /
  Apiaceae (Apiales) / Caprifoliaceae (Dipsacales) / Lamiaceae (Lamiales) / Asteraceae (Asterales) /

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