

Willner ., Hülber K. & Fischer M. A. (2014): Return of the grades: towards objectivity in evolutionary classification. – Preslia 86: 233–243.

Electronic Appendix 1. – Apomorphies of all clades in the Angiosperm Tree above the level of APG III families. Data from Stevens, Angiosperm Phylogeny Website, Version 12 (accessed September 2013); with some modifications. Structure of the list: Node name – number of apomorphies – apomorphies (separated by semicolons). Sister groups are listed back-to-back. APG III families have been given the value 1 except for APG III orders with only one family.

ORDERS

- AMBORELLALES: 3 (hypanthium +; embryo sac 9-nucleate, with three synergids; endosperm triploid).
- [NYMPHAEALES [AUSTROBAILEYALES [[CHLORANTHALES + MAGNOLIIDS] [MONOCOTS [CERATOPHYLLALES + EUDICOTS]]]]]: 1 (vessels +).
- NYMPHAEALES: 11 (4-celled uniseriate secretory trichomes with a large terminal cell [hydropoten]; trichoblasts in vertical files, proximal cell smaller; diaphragms in root aerenchyma; primary stem with ± scattered vascular bundles; protoxylem lacunae +; vascular cambium 0; stomata anomocytic; pollen boat-shaped, tectum continuous; first division of endosperm transverse, chalazal cell undivided, ± enlarged and elongated, haustorial; operculum +, endotegmic; embryo broad, cotyledons connate, suspensor 0).
- [AUSTROBAILEYALES [[CHLORANTHALES + MAGNOLIIDS] [MONOCOTS [CERATOPHYLLALES + EUDICOTS]]]]: 2 (essential oils in specialized cells; tectum reticulate).
- AUSTROBAILEYALES: 3 (Tiglic acid +; outer integument 5-7 cells thick; endosperm starchy).
- [[CHLORANTHALES + MAGNOLIIDS] [MONOCOTS [CERATOPHYLLALES + EUDICOTS]]] / **MESANGIOSPERMAE**: 3 (benzylisoquinoline alkaloids +; embryo sac bipolar, 8 nucleate; endosperm triploid).
- CHLORANTHALES: 4 (flowers very small, monosymmetric by reduction; G 1; ovule 1/carpel, straight; endotesta palisade, lignified, crystalliferous).
- [[MAGNOLIALES + LAURALES] [CANELLALES + PIPERALES]] / **MAGNOLIIDS**: 3 (lamina margins entire; A many, extrorse; antipodal cells soon die).
- CERATOPHYLLALES: 10 (Herbaceous, aquatic, roots 0; vascular cambium 0; vessels 0; stomata 0; flowers extra-axillary, alternating with leaves; tapetum amoeboid; pollen inaperturate, pollen tubes branched; G 1; ovule 1/carpel, straight, apical, unitegmic; endosperm 0, embryo large, suspensor 0).
- MONOCOTS: 18 (Plant herbaceous, rhizomatous, growth sympodial; benzylisoquinoline alkaloids 0; primary thickening meristem +; vascular bundles in stem scattered, closed, vascular cambium 0; tracheids only in stems and leaves; sieve tube plastids with cuneate protein crystals alone; prophyll single, adaxial; leaf base sheathing, sheath open, petiole 0, blade linear, main venation parallel, margins entire, Vorläuferspitze +; flowers 3-merous, pentacyclic; median member of outer whorl abaxial, aestivation open; stamens = and opposite each T member; endothecium from outer secondary parietal cell layer; G [3]; endosperm with distinct nuclear and chalazal chambers; embryo long, cotyledon 1, plumule apparently lateral; primary root unbranched, not very well developed, "adventitious" roots numerous; cotyledon with a closed sheath, unifacial [hyperphyllar], both assimilating and haustorial; duplication producing monocot *LOFSEP* and *FUL3* genes).
- EUDICOTS: 3 (stomata anomocytic; microsporogenesis simultaneous; pollen tricolpate, apertures in pairs at six points of the young tetrad [Fischer's rule]).

MAGNOLIIDS:

- [MAGNOLIALES + LAURALES]: 1 (cuticle waxes as annularly-ridged rodlets, palmitol the main wax).
- [CANELLALES + PIPERALES]: 2 (aporphine alkaloids +; G whorled).
- MAGNOLIALES: 2 (testa vascularized, multiplicative; endosperm irregularly ruminate).
- LAURALES: 5 (sieve tube plastids with polygonal protein crystalloids and starch; leaves opposite; hypanthium +; receptacle ± concave; seed endotestal, endotesta tracheidal).
- CANELLALES: 5 (drimane-type sesquiterpenes +; indumentum 0; sieve tube plastids with starch and protein crystalloids and/or fibres; foliar sclereids +, branched; K and C distinct).

- PIPERALES: 4 (growth sympodial; primary stem with distinct bundles; wood with broad rays, interfascicular cambium lacking fusiform initials; leaves two-ranked, lamina heart-shaped, secondary veins palmate).

MONOCOTS:

- ACORALES: 2 (inflorescence scapose, densely spicate [spadix], with large associated bract [spathe]; perisperm +).
- [ALISMATALES [PETROSAVIALES [[DIOSCOREALES + PANDANALES] [LILIALES [ASPARAGALES + COMMELINIDS]]]]]: 4 (ethereal oils 0; raphides +; endothecium develops directly from undivided outer secondary parietal cells; septal nectaries +).
- ALISMATALES: 2 (anthers extrorse; cotyledon large).
- [PETROSAVIALES [[DIOSCOREALES + PANDANALES] [LILIALES [ASPARAGALES + COMMELINIDS]]]]]: 1 (leaf blade developing basipetally from hyperphyll/hypophyll junction).
- PETROSAVIALES: 1 (septal nectaries +, position of the septal nectaries in both the ascidiate and plicate zone of the gynoecium unique).
- [[DIOSCOREALES + PANDANALES] [LILIALES [ASPARAGALES + COMMELINIDS]]]: 0.
- [DIOSCOREALES + PANDANALES]: 0.
- [LILIALES [ASPARAGALES + COMMELINIDS]]: 0.
- DIOSCOREALES: 1 (vascular bundles in rings).
- PANDANALES: 0.
- LILIALES: 2 (tepals nectaries +; anthers extrorse).
- [ASPARAGALES + COMMELINIDS]: 0.
- ASPARAGALES: 0.
- COMMELINIDS: 4 (Unlignified cell walls with UV-fluorescent ferulic and coumaric acids; SiO₂ bodies +, in leaf bundle sheaths; T = calyx + corolla; embryo short, broad).
- ARECALES: 5 (Growth monopodial, plant unbranched, stem well-developed, woody; leaves spiral, massive, vernation reduplicate-plicate, pinnately pseudocompound, petiolate, with closed sheath; flowers ± sessile; ovule 1/carpel, sessile; seeds large [>1 cm long]).
- [POALES [COMMELINALES + ZINGIBERALES]]: 1 (endosperm reserves starchy).
- POALES: 3 (SiO₂ epidermal; raphides 0; inflorescence indeterminate).
- [COMMELINALES + ZINGIBERALES]: 1 (inflorescences with many-flowered cincinnal branches [helicoid cymes]).
- ZINGIBERALES: 8 (sieve tube plastids also with starch grains; leaves with distinct petiole, midrib, S-shaped lateral veins and fine cross venation; flowers large, monosymmetric; A 5, adaxial member of inner whorl 0/staminodial; pollen inaperturate; outer intine thick, channeled; G inferior, stigma large, wet; epidermal cells of nucellus apex radially elongated; seeds arillate, operculate).
- COMMELINALES: 0.

EUDICOTS:

- RANUNCULALES: 0.
- [PROTEALES [TROCHODENDRALES [BUXALES + CORE EUDICOTS]]]: 1 (axial/receptacular nectary +).
- PROTEALES: 0.
- [TROCHODENDRALES [BUXALES + CORE EUDICOTS]]: 0.
- TROCHODENDRALES: 4 (G laterally connate; nectariferous abaxially; 5 vascular bundles/carpel; fruit an aggregate of follicles, styles becoming ± basal on the outer surface).
- [BUXALES + CORE EUDICOTS]: 0.
- BUXALES: 2 (Steroidal pregnan pseudoalkaloids +; P members with a single trace).
- CORE EUDICOTS: 2 (ellagic and gallic acids +; palaeohexaploidy [gamma triplication]).

- GUNNERALES: 2 (sieve tube plastids with protein crystalloids and starch; pits with sclerenchymatous diagrams).
- [ROSIDS ET AL. + ASTERIDS ET AL.] / **PENTAPETALAE**: 8 (flowers 5-merous, parts whorled; P = calyx + corolla, the calyx enclosing the flower in bud; stamens = 2x K/C, in two whorls developing internally/adaxially to the corolla whorl and successively alternating; pollen tricolporate; compitum +; style +; endosperm nuclear; floral nectaries with *CRABSCLAW* expression).
- DILLENIALES: 1 (endotesta ± palisade, massively lignified).
- [SAXIFRAGALES [VITALES + ROSIDS]] / SUPERROSIDS: 0.
- [SANTALALES [BERBERIDOPSIDALES [CARYOPHYLLALES + ASTERIDS]]] / SUPERASTERIDS: 0.
- SAXIFRAGALES: 0.
- [VITALES + ROSIDS]: 0.
- VITALES: 6 (sieve tube plastids with protein crystalloids and starch; raphide bundles +; pearl glands + [food bodies]; stamens = and opposite petals; seeds perichalazal, vascular bundle ± surrounding seed, ± ruminant and with Y-shaped dorsal infold; testa multiplicative, endotesta 2-5-layered, lignified, crystalliferous).
- ROSIDS: 0.
- [ZYGOPHYLLALES [the COM clade + the nitrogen-fixing clade]]: 0.
- [[GERANIALES + MYRTALES] [CROSSOSOMATALES [PICRAMNIALES [SAPINDALES [HUERTEALES [MALVALES + BRASSICALES]]]]]]: 0.
- ZYGOPHYLLALES: 0.
- [the COM clade + the nitrogen-fixing clade]: 0.
- [FABALES [ROSALES [CUCURBITALES + FAGALES]]] / the nitrogen-fixing clade: 2 (N-fixing by associated root-dwelling bacteria; seed exotestal).
- [CELASTRALES [OXALIDALES + MALPIGHIALES]] / the COM clade: 0.
- FABALES: 1 (carpels free).
- [ROSALES [CUCURBITALES + FAGALES]]: 1 (ovules 1-2/carpel).
- ROSALES: 2 (hypanthium + ; K valvate).
- [CUCURBITALES + FAGALES]: 3 (ovary inferior; ovules 2/carpel; fruit 1-seeded, indehiscent).
- CUCURBITALES: 1 (styluli +).
- FAGALES: 5 (flowers very small, ± monosymmetric by reduction; nectary 0; inflorescence a spike or catkin; pollen oblate; ovules unitegmic, poorly developed at pollination, fertilisation delayed; testa vascularized).
- CELASTRALES: 1 (distinctive postgenital carpel closure by conspicuously elongated cells).
- [OXALIDALES + MALPIGHIALES]: 0.
- OXALIDALES: 0.
- MALPIGHIALES: 0.
- [GERANIALES + MYRTALES]: 0.
- [CROSSOSOMATALES [PICRAMNIALES [SAPINDALES [HUERTEALES [MALVALES + BRASSICALES]]]]]: 0.
- GERANIALES: 0.
- MYRTALES: 8 (Bark flaky, cork cambium deep seated; pits vestured; secondary phloem stratified, internal phloem + [= intraxylary phloem]; K valvate; A incurved in bud; pollen with pseudocolpi; G inferior; endotesta crystalliferous).

- CROSSOSOMATALES: 3 (hypanthium +; styluli +, postgenital connation +; seed walls of outer layers much thickened).
- [PICRAMNIALES [SAPINDALES [HUERTEALES [MALVALES + BRASSICALES]]]]: 0.
- PICRAMNIALES: 4 (C₁₈ acetylenic tariric acid; petroselenic acid; anthracenone moieties linked to C₅-sugar derivatives; stamens = and opposite petals).
- [SAPINDALES [HUERTEALES [MALVALES + BRASSICALES]]]: 0.
- SAPINDALES: 2 (special secondary compounds; stigmatic head from postgenitally united free carpel tips).
- [HUERTEALES [MALVALES + BRASSICALES]]: 0.
- HUERTEALES: 0.
- [MALVALES + BRASSICALES]: 0.
- MALVALES: 0.
- BRASSICALES: 2 (Glucosinolates +; idioblastic and stomatal myrosin cells +).
- SANTALALES: 5 (polyacetylenes; pericyclic fibres 0; petiole/mesophyll with (astro)sclereids; fruit a drupe, 1-seeded; chalazal endosperm haustoria +).
- [BERBERIDOPSIDALES [CARYOPHYLLALES + ASTERIDS]]: 0.
- BERBERIDOPSIDALES: 1 (stomata cyclocytic).
- [CARYOPHYLLALES + ASTERIDS]: 1 (seed exotestal).
- CARYOPHYLLALES: 4 (Odd ecology and/or physiology; lamina margins entire; anther wall with outer secondary parietal cell layer developing directly into the endothecium; pollen colpate, tectum spinulose).
- **ASTERIDS** / ASTERANAE: 5 (iridoids +; C enclosing A and G in bud; ovules unitegmic; endothelium +; endosperm cellular).
- CORNALES: 4 (C apparently free; G inferior; ventral carpellary bundles in the carpel wall [transseptal bundles]; fruit drupaceous, with apical germination valves in the stone).
- [ERICALES [ASTERID I + ASTERID II]]: 1 (ovules tenuinucellate).
- ERICALES: 0.
- [ASTERID I + ASTERID II] / CORE ASTERIDS: 2 (ellagic acid 0; A = and opposite sepals or P).
- ASTERID I / LAMIIDAE: 0.
- ASTERID II / CAMPANULIDAE: 0.
- ICACINACEAE: 1 (unplaced family).
- GARRYALES: 2 (gutta +; C valvate).
- [BORAGINACEAE + GENTIANALES + LAMIALES + SOLANALES]: 2 (C forming a distinct tube; A epipetalous).
- BORAGINACEAE: 1 (unplaced family).
- GENTIANALES: 4 (pits vestured; leaves opposite, joined by a line across the stem; endothelium 0; endosperm nuclear).
- SOLANALES: 0.
- LAMIALES: 0.
- AQUIFOLIALES: 3 (C valvate, free; ovules 1-2/carpel, apical; fruit drupaceous).
- [ASTERALES [ESCALLONIALES [BRUNIALES [APIALES [PARACRYPHIALES + DIPSACALES]]]]] / APIIDAE: 3 (C forming a distinct tube, tube initiation early; A epipetalous; G inferior).
- ASTERALES: 1 (apotracheal parenchyma 0).
- [ESCALLONIALES [BRUNIALES [APIALES [PARACRYPHIALES + DIPSACALES]]]]: 0.

- ESCALLONIALES: 1 (only one family; apomorphies?).
- [BRUNIALES [APIALES [PARACRYPHIALES + DIPSACALES]]]: 0.
- BRUNIALES: 0.
- [APIALES [PARACRYPHIALES + DIPSACALES]] / DIPSAPIIDAE: 0.
- APIALES: 3 (flowers small, C apparently free; fruit a drupe, single-seeded; endosperm nuclear).
- [PARACRYPHIALES + DIPSACALES] / DIPSIDAE: 0.
- PARACRYPHIALES: 1 (capsule septicidal).
- DIPSACALES: 3 (leaves opposite, bases $\pm$ confluent; pollen grains trinucleate; testa vascularized).

FAMILIES

NYMPHAEALES:

- Hydatellaceae:1 (family)
- [Cabombaceae + Nymphaeaceae]: 4 (hydrozable [ellagi]tannins +; minute rhombic crystals on stellate cells [astrosclereids, stellate parenchyma cells]; placentation $\pm$ laminar; exotesta with sinuous anticlinal cell walls).
- Cabombaceae:1 (family)
- Nymphaeaceae:1 (family)

AUSTROBAILEYALES:

- Austrobaileyaceae:1 (family)
- [Schisandraceae + Trimeniaceae]: 2 (megaspore mother cells 2-many; exotesta $\pm$ palisade).
- Schisandraceae:1 (family)
- Trimeniaceae:1 (family)

MAGNOLIALES:

- Myristicaceae:1 (family)
- [Magnoliaceae [[Degeneriaceae + Himantandraceae] [Eupomatiaceae + Annonaceae]]]: 6 (wood with broad rays; flowers solitary, large; A many, spiral; filaments with three veins, anther thecae separate, embedded in the broad connective, connective prolonged; tectum imperforate; 10-aa deletion in PI-derived motif in AP3 gene).
- Magnoliaceae:1 (family)
- [[Degeneriaceae + Himantandraceae] [Eupomatiaceae + Annonaceae]]: 4 (flower haplomorphic; anthers valvate, inner staminodes +, secretory; exine thin, infrathecium granular; mesotesta fibrous).
- [Degeneriaceae + Himantandraceae]: 1 (nexine foliations absent).
- [Eupomatiaceae + Annonaceae]: 4 (sieve tube plastids also with polygonal protein crystalloids; prophyll single, adaxial; inflorescence +; fruit $\pm$ berry-like).
- Degeneriaceae:1 (family)
- Himantandraceae:1 (family)
- Eupomatiaceae:1 (family)
- Annonaceae:1 (family)

LAURALES:

- Calycanthaceae:1 (family)
- [[Siparunaceae [Gomortegaceae + Atherospermataceae]] [Monimiaceae [Hernandiaceae + Lauraceae]]]: 5 (hippocrepiform sclereids in pericycle; stamens with paired nectaries/glands at base; anthers bisporangiate, monothecal, valvate, valves apically hinged; pollen inaperturate, exine thin, $\pm$ spinulose, intine thick, outer part with radial channels; fruit fleshy).

- [Siparunaceae [Gomortegaceae + Atherospermataceae]]: 3 (acicular crystals +; hypanthium closed by roof; embryo very small).
- [Monimiaceae [Hernandiaceae + Lauraceae]]: 2 (aporphine alkaloids and variants +; ovule apical).
- Siparunaceae:1 (family)
- [Gomortegaceae + Atherospermataceae]: 1 (sieve tube plastids also with peripheral protein fibrils).
- Gomortegaceae:1 (family)
- Atherospermataceae:1 (family)
- Monimiaceae:1 (family)
- [Hernandiaceae + Lauraceae]: 5 (tapetum amoeboid; G 1; ovule pachychalazal; testa thick, multiplicative; endosperm 0).
- Hernandiaceae:1 (family)
- Lauraceae:1 (family)

CANELLALES:

- Canellaceae:1 (family)
- Winteraceae:1 (family)

PIPERALES:

- [Hydnoraceae + Aristolochiaceae]: 4 (P uniseriate, 3, connate, valvate; anthers extrorse, filaments $\pm$ 0; ovary inferior; embryo undifferentiated).
- [Piperaceae + Saururaceae]: 6 (stomata tetracytic; lamina vernation supervolute, leaf base $\pm$ sheathing stem; flowers small, P 0; microsporogenesis simultaneous; ovules straight; perisperm +, starchy).
- Hydnoraceae:1 (family)
- Aristolochiaceae:1 (family)
- Piperaceae:1 (family)
- Saururaceae:1 (family)

ALISMATALES:

- Araceae:1 (family)
- [Tofieldiaceae [[Alismataceae [Butomaceae + Hydrocharitaceae]] [Aponogetonaceae [Scheuchzeriaceae [Juncaginaceae [Maundiaceae [[Posidoniaceae [Ruppiaceae + Cymodoceaceae]] [Zosteraceae + Potamogetonaceae]]]]]]]]]: 1 (carpels free).
- Tofieldiaceae:1 (family)
- [[[Alismataceae [Butomaceae + Hydrocharitaceae]] [Aponogetonaceae [Scheuchzeriaceae [Juncaginaceae [Maundiaceae [[Posidoniaceae [Ruppiaceae + Cymodoceaceae]] [Zosteraceae + Potamogetonaceae]]]]]]]]]: 5 (plant rooted aquatic; stem with lacunae; raphides and druses 0; pollen grains trinucleate; endosperm 0).
- [Alismataceae [Butomaceae + Hydrocharitaceae]] : 2 (P = K + C; placentation laminar).
- [Aponogetonaceae [Scheuchzeriaceae [Juncaginaceae [Maundiaceae [[Posidoniaceae [Ruppiaceae + Cymodoceaceae]] [Zosteraceae + Potamogetonaceae]]]]]]]: 1 (suspensor unicellular, cell large).
- Alismataceae:1 (family)
- [Butomaceae + Hydrocharitaceae]: 0.
- Butomaceae:1 (family)
- Hydrocharitaceae:1 (family)
- Aponogetonaceae:1 (family)
- [Scheuchzeriaceae [Juncaginaceae [Maundiaceae [[Posidoniaceae [Ruppiaceae + Cymodoceaceae]] [Zosteraceae + Potamogetonaceae]]]]]: 1 (pollen inaperturate).
- Scheuchzeriaceae:1 (family)

- [Juncaginaceae [Maundiaceae [[Posidoniaceae [Ruppiaceae + Cymodoceaceae]] [Zosteraceae + Potamogetonaceae]]]]: 2 (carpels the dispersal unit; endosperm nuclear).
- Juncaginaceae:1 (family)
- [Maundiaceae [[Posidoniaceae [Ruppiaceae + Cymodoceaceae]] [Zosteraceae + Potamogetonaceae]]]: 1 (ovule 1/carpel, straight).
- Maundiaceae:1 (family)
- [[Posidoniaceae [Ruppiaceae + Cymodoceaceae]] [Zosteraceae + Potamogetonaceae]]: 6 (vessels 0; epidermis chlorophyllous, stomata 0; hydrophily + [water pollination]; flowers imperfect; anthers sessile; embryo with massive elongated hypocotyl).
- [Posidoniaceae [Ruppiaceae + Cymodoceaceae]]: 3 (P 0; anthers with apical development of the connective; pollen filiform).
- [Zosteraceae + Potamogetonaceae]: 2 (roots unbranched; leaf with apical pore).
- Posidoniaceae:1 (family)
- [Ruppiaceae + Cymodoceaceae]: 1 (A 2).
- Ruppiaceae:1 (family)
- Cymodoceaceae:1 (family)
- Zosteraceae:1 (family)
- Potamogetonaceae:1 (family)

DIOSCOREALES:

- Nartheciaceae:1 (family)
- [[Taccaceae + Thismiaceae] [Burmanniaceae + Dioscoreaceae]]: 2 (T tube broad; ovary inferior, style short).
- [Taccaceae + Thismiaceae]: 4 (T whorls differentiated, but both well developed and petal-like; A incurved; septal nectaries 0; placentation parietal).
- [Burmanniaceae + Dioscoreaceae]: 1 (fruit winged).
- Taccaceae:1 (family)
- Thismiaceae:1 (family)
- Burmanniaceae:1 (family)
- Dioscoreaceae:1 (family)

PANDANALES:

- Velloziaceae:1 (family)
- [Triuridaceae [Stemonaceae [Pandanceae + Cyclanthaceae]]]: 1 (septal nectaries 0).
- Triuridaceae:1 (family)
- [Stemonaceae [Pandanceae + Cyclanthaceae]]: 2 (placentation parietal; style 0).
- Stemonaceae:1 (family)
- [Pandanceae + Cyclanthaceae]: 6 (stem vascular bundles compound; inflorescence bracts conspicuous, inflorescence a dense spike or head [a spadix]; flowers sessile; pollen porate; ovules apotropous, with radiating subepidermal nucellar/chalazal cells; fruit an indehiscent syncarp [baccate or drupaceous]).
- Pandanceae:1 (family)
- Cyclanthaceae:1 (family)

LILIALES:

- Corsiaceae:1 (family)
- Campynemataceae:1 (family)
- Melanthiaceae:1 (family)
- [Petermanniaceae [Colchicaceae + Alstroemeriaceae]]: 0.

- [[Philesiaceae + Rhipogonaceae] [Smilacaceae + Liliaceae]]: 2 (leaf with broad lamina, with midrib, venation reticulate, petiolate; fruit a berry).
- Petermanniaceae:1 (family)
- [Colchicaceae + Alstroemeriaceae]: 0.
- Colchicaceae:1 (family)
- Alstroemeriaceae:1 (family)
- [Philesiaceae + Rhipogonaceae]: 2 (testa disintegrates; chromosomes heteromorphic).
- [Smilacaceae + Liliaceae]: 0.
- Philesiaceae:1 (family)
- Rhipogonaceae:1 (family)
- Smilacaceae:1 (family)
- Liliaceae:1 (family)

ASPARAGALES:

- Orchidaceae:1 (family)
- [[Boryaceae et al.] [[Ixoliriaceae + Tecophilaeaceae] [Doryanthaceae [Iridaceae [Xeronemaceae [Xanthorrhoeaceae [Amaryllidaceae + Asparagaceae]]]]]]]: 0.
- [Boryaceae [Blandfordiaceae [Lanariaceae [Asteliaceae + Hypoxidaceae]]]]]: 0.
- [[Ixoliriaceae + Tecophilaeaceae] [Doryanthaceae [Iridaceae [Xeronemataceae [Xanthorrhoeaceae [Amaryllidaceae + Asparagaceae]]]]]]]: 0.
- Boryaceae:1 (family)
- Blandfordiaceae:1 (family)
- Lanariaceae:1 (family)
- Asteliaceae:1 (family)
- Hypoxidaceae:1 (family)
- Ixoliriaceae:1 (family)
- Tecophilaeaceae:1 (family)
- Doryanthaceae:1 (family)
- Iridaceae:1 (family)
- Xeronemataceae:1 (family)
- [Xanthorrhoeaceae [Amaryllidaceae + Asparagaceae]]: 1 (sepal nectaries infralocular).
- Xanthorrhoeaceae:1 (family)
- Amaryllidaceae:1 (family)
- Asparagaceae:1 (family)

POALES:

- [Typhaceae + Bromeliaceae]: 1 (leaf without distinct sheath).
- [Rapateaceae [[[Eriocaulaceae + Xyridaceae] [Mayacaceae [Thurniaceae [Juncaceae + Cyperaceae]]]] [[Anarthriaceae [Restionaceae + Centrolepidaceae]] [Flagellariaceae [[Joinvilleaceae + Ecdeiocoleaceae] Poaceae]]]]]: 0.
- Typhaceae:1 (family)
- Bromeliaceae:1 (family)
- Rapateaceae:1 (family)
- [[[Eriocaulaceae + Xyridaceae] [Mayacaceae [Thurniaceae [Juncaceae + Cyperaceae]]]] [[Anarthriaceae [Restionaceae + Centrolepidaceae]] [Flagellariaceae [[Joinvilleaceae + Ecdeiocoleaceae] Poaceae]]]]]: 2 (pollen trinucleate; sepal nectary 0).

- [[Eriocaulaceae + Xyridaceae] [Mayacaceae [Thurniaceae [Juncaceae + Cyperaceae]]]]: 2 (A basifixed; deletions in ORF 2280 region).
- [[Anarthriaceae [Restionaceae + Centrolepidaceae]] [Flagellariaceae [Joinvilleaceae + Ecdeiocolaceae] Poaceae]]: 5 (bracteoles 0; P = T, membranous; pollen monoporate; pollen wall scrobiculate [minute pores penetrating tectum and foot layer]; ovule 1/carpel, straight).
- [Eriocaulaceae + Xyridaceae]: 5 (inflorescence capitate, with involucre bracts, scapose; carinal stylar appendages +; styles/stigmas commissural; ovules straight, operculum +).
- [Mayacaceae [Thurniaceae [Juncaceae + Cyperaceae]]]: 0.
- Eriocaulaceae:1 (family)
- Xyridaceae:1 (family)
- Mayacaceae:1 (family)
- [Thurniaceae [Juncaceae + Cyperaceae]]: 3 (flowers small, P = T, scarious; pollen in tetrads, porate; chromosomes with diffuse centromeres).
- Thurniaceae:1 (family)
- [Juncaceae + Cyperaceae]: 0.
- Juncaceae:1 (family)
- Cyperaceae:1 (family)
- [Anarthriaceae [Centrolepidaceae + Restionaceae]]: 2 (flowers imperfect; A 3, opposite inner P).
- [Flagellariaceae [[Joinvilleaceae + Ecdeiocolaceae] Poaceae]]: 0.
- Anarthriaceae:1 (family)
- [Centrolepidaceae + Restionaceae]: 2 (anthers bisporangiate, monothecal; pollen pore not annulate, margin irregular).
- Centrolepidaceae:1 (family)
- Restionaceae:1 (family)
- Flagellariaceae:1 (family)
- [Joinvilleaceae [Ecdeiocolaceae + Poaceae]]: 2 (stigmatic receptive cells on multicellular branches; 28 and 6.4 kb chloroplast genome inversion).
- Joinvilleaceae:1 (family)
- [Ecdeiocolaceae + Poaceae]: 3 (flowers monosymmetric by reduction, imperfect; pollen with operculum, wall without scrobiculi, with intraaxinous channels; fruit 1-seeded).
- Ecdeiocolaceae:1 (family)
- Poaceae:1 (family)

ZINGIBERALES:

- Musaceae:1 (family)
- Heliconiaceae:1 (family)
- [Strelitziaceae + Lowiaceae]: 3 (T whorls differentiated, 2 abaxial members of inner whorl enclosing stamens, adaxial A of inner whorl staminodial; apex of ovary sterile; aril hairy).
- [Cannaceae + Marantaceae]: 4 (oblique cells in petiole; flowers in pairs, asymmetric; A bisporangiate, monothecal; cells of chalazal intrusion into nucellus degenerate forming chalazal channel).
- Zingiberaceae:1 (family)
- Costaceae:1 (family)
- Strelitziaceae:1 (family)
- Lowiaceae:1 (family)
- Cannaceae:1 (family)
- Marantaceae:1 (family)

COMMELINALES:

- Hanguanaceae:1 (family)
- Commelinaceae:1 (family)
- Philydraceae:1 (family)
- [Haemodoraceae + Pontederiaceae]: 1 (phenylphenalenones +).
- Haemodoraceae:1 (family)
- Pontederiaceae:1 (family)

RANUNCULALES:

- Eupteleaceae:1 (family)
- [Papaveraceae [[Circaeasteraceae + Lardizabalaceae] [Menispermaceae [Berberidaceae + Ranunculaceae]]]]: 2 (secondary venation palmate; P differentiated into "K" and "C", C $\pm$ petal-like).
- Papaveraceae:1 (family)
- [[Circaeasteraceae + Lardizabalaceae] [Menispermaceae [Berberidaceae + Ranunculaceae]]]: 2 (K with three or more vascular traces, $\pm$ petal-like; C nectariferous).
- [Circaeasteraceae + Lardizabalaceae]: 0.
- [Menispermaceae [Berberidaceae + Ranunculaceae]]: 1 (berberine).
- Circaeasteraceae:1 (family)
- Lardizabalaceae:1 (family)
- Menispermaceae:1 (family)
- [Berberidaceae + Ranunculaceae]: 1 (*AP3-III gene expressed in P whorl alone*).
- Berberidaceae:1 (family)
- Ranunculaceae:1 (family)

PROTEALES:

- Sabiaceae:1 (family)
- [Nelumbonaceae [Platanaceae + Proteaceae]]: 1 (connective extended beyond anther loculi).
- Nelumbonaceae:1 (family)
- [Platanaceae + Proteaceae]: 4 (stomata laterocytic; stamens = perianth, opposite them; carpels with 5 vascular bundles; ovules straight).
- Platanaceae:1 (family)
- Proteaceae:1 (family)

BUXALES:

- Buxaceae:1 (family)
- Didymelaceae:1 (family)

GUNNERALES:

- Gunneraceae:1 (family)
- Myrothamnaceae:1 (family)

SAXIFRAGALES:

- Peridiscaceae:1 (family)
- [[Paeoniaceae [Altingiaceae [Hamamelidaceae [Cercidiphyllaceae + Daphniphyllaceae]]]] [[Crassulaceae [Aphanopetalaceae [Tetracarpaeaceae [Haloragaceae + Penthoraceae]]]] [[Iteaceae [Grossulariaceae + Saxifragaceae]]]]: 0.
- [Paeoniaceae [Altingiaceae [Hamamelidaceae [Cercidiphyllaceae + Daphniphyllaceae]]]]: 2 (buds with scales; stigma $\pm$ decurrent).
- [[Crassulaceae [Aphanopetalaceae [Tetracarpaeaceae [Penthoraceae + Haloragaceae]]]] [Iteaceae [Grossulariaceae + Saxifragaceae]]]: 2 (petiole bundles arcuate; venation $\pm$ pinnate).

- Paeoniaceae:1 (family)
- [Altingiaceae [Hamamelidaceae [Cercidiphyllaceae + Daphniphyllaceae]]]: 2 (flowers sessile; seeds winged).
- Altingiaceae:1 (family)
- [Hamamelidaceae [Cercidiphyllaceae + Daphniphyllaceae]]: 0.
- Hamamelidaceae:1 (family)
- [Cercidiphyllaceae + Daphniphyllaceae]: 2 (flowers small, C 0; endosperm cellular).
- Cercidiphyllaceae:1 (family)
- Daphniphyllaceae:1 (family)
- [Crassulaceae [Aphanopetalaceae [Tetracarpaeaceae [Haloragaceae + Penthoraceae]]]]: 2 (stipules 0; flowers 4-merous).
- [Iteaceae [Grossulariaceae + Saxifragaceae]]: 3 (hypanthium +; stamens = and opposite K; fruit a septicidal capsule).
- Crassulaceae:1 (family)
- [Aphanopetalaceae [Tetracarpaeaceae [Penthoraceae + Haloragaceae]]]: 0.
- Aphanopetalaceae:1 (family)
- [Tetracarpaeaceae [Penthoraceae + Haloragaceae]]: 0.
- Tetracarpaeaceae:1 (family)
- [Penthoraceae + Haloragaceae]: 0.
- Penthoraceae:1 (family)
- Haloragaceae:1 (family)
- Iteaceae:1 (family)
- [Grossulariaceae + Saxifragaceae]: 2 (secondary veins palmate; endosperm ± cellular).
- Grossulariaceae:1 (family)
- Saxifragaceae:1 (family)

ZYGOPHYLLALES:

- Krameriaceae:1 (family)
- Zygophyllaceae:1 (family)

FABALES:

- Quillajaceae:1 (family)
- [Fabaceae [Surianaceae + Polygalaceae]]: 0.
- Fabaceae:1 (family)
- [Surianaceae + Polygalaceae]: 0.
- Surianaceae:1 (family)
- Polygalaceae:1 (family)

ROSALES:

- Rosaceae:1 (family)
- [[Rhamnaceae [Elaeagnaceae [Barbeyaceae + Dirachmaceae]]] [Ulmaceae [Cannabaceae [Moraceae + Urticaceae]]]]: 0.
- [Rhamnaceae [Elaeagnaceae [Barbeyaceae + Dirachmaceae]]]: 3 (stamens = and opposite C/alternate with P; capsule septicidal; coat multiplicative, exotesta palisade, thick-walled).
- [Ulmaceae [Cannabaceae [Moraceae + Urticaceae]]]: 9 (phloem stratified; at least one prominent prophyllar bud; flowers small, P +; stamens equal and opposite P; pollen porate; nectary 0; G [2], abaxial only fertile; ovule single; endosperm scanty).

- Rhamnaceae:1 (family)
- [Elaeagnaceae [Barbeyaceae + Dirachmaceae]]: 0.
- Elaeagnaceae:1 (family)
- [Barbeyaceae + Dirachmaceae]: 1 (connective produced).
- Barbeyaceae:1 (family)
- Dirachmaceae:1 (family)
- Ulmaceae:1 (family)
- [Cannabaceae [Moraceae + Urticaceae]]: 0.
- Cannabaceae:1 (family)
- [Moraceae + Urticaceae]: 2 (latex system +; stamens incurved in bud).
- Moraceae:1 (family)
- Urticaceae:1 (family)

CUCURBITALES:

- Anisophylleaceae:1 (family)
- [[Corynocarpaceae + Coriariaceae] [Cucurbitaceae [Tetramelaceae [Datiscaceae + Begoniaceae]]]]: 2 (filaments shorter than anthers in bud; nectaries 0).
- [Corynocarpaceae + Coriariaceae]: 3 (sieve tube plastids lacking both starch and protein inclusions; ovule 1/carpel; vascular bundle extending into the outer integument).
- [Cucurbitaceae [Tetramelaceae [Datiscaceae + Begoniaceae]]]: 4 (placentation parietal; stigmas large, elongated, bilobed; ovules many/carpel; seeds many/fruit).
- Corynocarpaceae:1 (family)
- Coriariaceae:1 (family)
- Cucurbitaceae:1 (family)
- [Tetramelaceae [Datiscaceae + Begoniaceae]]: 1 (seeds with lid [operculate]).
- Tetramelaceae:1 (family)
- [Datiscaceae + Begoniaceae]: 0.
- Datiscaceae:1 (family)
- Begoniaceae:1 (family)

FAGALES:

- Nothofagaceae:1 (family)
- [Fagaceae [Myricaceae [Juglandaceae + Rhoipteleaceae]] [Casuarinaceae [Ticodendraceae + Betulaceae]]]: 0.
- Fagaceae:1 (family)
- [[Myricaceae [Juglandaceae + Rhoipteleaceae]] [Casuarinaceae [Ticodendraceae + Betulaceae]]] / the *Normapolles* group: 2 (pollen pororate, exine of two layers separated by an alveolar zone and obviously expanded around the apertures; fertilization chalazogamous).
- [Myricaceae [Juglandaceae + Rhoipteleaceae]]: 3 (peltate glandular hairs +; 1 flower/bract; ovule single, straight).
- Casuarinaceae [Ticodendraceae + Betulaceae]: 0.
- Myricaceae:1 (family)
- [Juglandaceae + Rhoipteleaceae]: 0.
- Juglandaceae:1 (family)
- Rhoipteleaceae:1 (family)

- Casuarinaceae:1 (family)
- [Ticodendraceae + Betulaceae]: 0.

- Ticodendraceae:1 (family)
- Betulaceae:1 (family)

CELASTRALES:

- Celastraceae:1 (family)
- Lepidobotryaceae:1 (family)

OXALIDALES:

- Huaceae:1 (family)
- [[Connaraceae + Oxalidaceae] [Cunoniaceae [Elaeocarpaceae [Brunelliaceae + Cephalotaceae]]]]: 2 (nectary extrastaminal; testa multiplicative).
- [Connaraceae + Oxalidaceae]: 5 (sieve tube plastids with protein crystalloids; calcium oxalate druses 0; leaflets articulated, pulvinate, margins entire, stipules 0; flowers di- and tristylous; exotesta ± fleshy).
- [Cunoniaceae [Elaeocarpaceae [Brunelliaceae + Cephalotaceae]]]: 0.
- Connaraceae:1 (family)
- Oxalidaceae:1 (family)
- Cunoniaceae:1 (family)
- [Elaeocarpaceae [Brunelliaceae + Cephalotaceae]]: 1 (K/P valvate).
- Elaeocarpaceae:1 (family)
- [Brunelliaceae + Cephalotaceae]: 3 (P uniseriate; G free, styles recurved, stigma decurrent; fruit a follicle).
- Brunelliaceae:1 (family)
- Cephalotaceae:1 (family)

MALPIGHIALES:

- [[Ctenolophonaceae [Erythroxylaceae + Rhizophoraceae]], [Irvingiaceae + Pandaceae], [Ochnaceae [[Bonnetiaceae + Clusiaceae] [Calophyllaceae [Hypericaceae + Podostemaceae]]]]]: 0.
- [[Lophopyxidaceae + Putranjivaceae], Caryocaraceae, [Centroplacaceae [Elatinaceae + Malpighiaceae]], [Balanopaceae [[Trigonaceae + Dichapetalaceae] [Euphroniaceae + Chrysobalanaceae]]]]]: 0.
- [[Humiriaceae [Achariaceae [[Goupiaceae + Violaceae] [Passifloraceae [Lacistemataceae + Salicaceae]]]]] [[Peraceae [Rafflesiaceae + Euphorbiaceae]] [[Phyllanthaceae + Picrodendraceae] [Ixonanthaceae + Linaceae]]]]]: 0.

Clade 1 :

- [Ctenolophonaceae [Erythroxylaceae + Rhizophoraceae]] / rhizophoroids: 3 (leaves opposite, stipules enclosing the terminal bud, interpetiolar; nectary to outside of A; seeds arillate, exotestal).
- [Irvingiaceae + Pandaceae]: 3 (lamina vernation involute; ovule 1/carpel; fruit indehiscent).
- [Ochnaceae [[Bonnetiaceae + Clusiaceae] [Calophyllaceae [Hypericaceae + Podostemaceae]]]]: 5 (C contorted; A many, basifixed; nectary 0; ovules lacking parietal tissue, endothelium +; fruit a septicidal or -fragal capsule).
- Ctenolophonaceae:1 (family)
- [Erythroxylaceae + Rhizophoraceae]: 7 (tropane [hygroline] and pyrrolidine alkaloids; sieve tube plastids with protein crystalloids; stomata paracytic; K valvate; petals enclosing a stamen/stamens; fruit a septicidal capsule; endosperm starchy).
- Erythroxylaceae:1 (family)
- Rhizophoraceae:1 (family)
- Irvingiaceae:1 (family)
- Pandaceae:1 (family)

- Ochnaceae:1 (family)
- [[Bonnetiaceae + Clusiaceae] [Calophyllaceae [Hypericaceae + Podostemaceae]]] / clusioids: 7 (xanthones and dimeric xanthones; polyisoprenylated benzophenones; schizogenous canals or cavities + [plant with exudate]; leaves opposite; lamina margins entire, stipules 0; A fasciculate, fascicles opposite C; exotegmen with low, lignified, sinuous anticlinal cell walls).
- [Bonnetiaceae + Clusiaceae]: 2 (root cork superficial; hypocotyl/radicle long).
- [Calophyllaceae [Hypericaceae + Podostemaceae]]: 0.
- Bonnetiaceae:1 (family)
- Clusiaceae:1 (family)
- Calophyllaceae:1 (family)
- [Hypericaceae + Podostemaceae]: 0.
- Hypericaceae:1 (family)
- Podostemaceae:1 (family)

Clade 2:

- [Lophopyxidaceae + Putranjivaceae] / putranjivoids: 4 (flowers imperfect; sepals not enclosing gynoecium in bud; style 0; fruit 1-seeded).
- Caryocaraceae:1 (family)
- [Centroplacaceae [Elatinaceae + Malpighiaceae]] / malpighioids: 0.
- [Balanopaceae [[Trigoniaceae + Dichapetalaceae] [Euphroniaceae + Chrysobalanaceae]]] / chrysobalanoids: 0.
- Lophopyxidaceae:1 (family)
- Putranjivaceae:1 (family)
- Centroplacaceae:1 (family)
- [Elatinaceae + Malpighiaceae]: 5 (sieve tube plastids lacking starch and protein inclusions; leaves opposite; flowers with inverted orientation; nectary 0; fruit septifragal).
- Elatinaceae:1 (family)
- Malpighiaceae:1 (family)
- Balanopaceae:1 (family)
- [[Trigoniaceae + Dichapetalaceae] [Euphroniaceae + Chrysobalanaceae]]: 4 (vestured pits +; flowers obliquely monosymmetric; fertile stamens abaxial; stigmas commissural).
- [Trigoniaceae + Dichapetalaceae]: 1 (testa multiplicative).
- [Euphroniaceae + Chrysobalanaceae]: 2 (hypanthium +; C clawed, with lignified hairs).
- Trigoniaceae:1 (family)
- Dichapetalaceae:1 (family)
- Euphroniaceae:1 (family)
- Chrysobalanaceae:1 (family)

Clade 3:

- [Humiriaceae [Achariaceae [[Goupiaceae + Violaceae] [Passifloraceae [Lacistemataceae + Salicaceae]]]]]: 1 (nectary outside the stamens).
- [Peraceae [Rafflesiaceae + Euphorbiaceae]]: 2 (ovule 1/carpel; fruit with persistent central column).
- [[Phyllanthaceae + Picrodendraceae] [Ixonanthaceae + Linaceae]]: 0.
- Humiriaceae:1 (family)
- [Achariaceae [[Goupiaceae + Violaceae] [Passifloraceae [Lacistemataceae + Salicaceae]]]]: 3 (nectary outside A; placentation intrusive parietal; seeds arillate).
- Achariaceae:1 (family)

- [[Goupiaceae + Violaceae] [Passifloraceae [Lacistemataceae + Salicaceae]]]: 1 (stamens = and opposite sepals).
- [Goupiaceae + Violaceae]: 2 (connective ± developed apically; stigma proper ± punctate, receptive area small, appearing recessed/hollow).
- [Passifloraceae [Lacistemataceae + Salicaceae]] / the salicoids: 0.
- Goupiaceae:1 (family)
- Violaceae:1 (family)
- Passifloraceae:1 (family)
- [Lacistemataceae + Salicaceae]: 0.
- Lacistemataceae:1 (family)
- Salicaceae:1 (family)
- Peraceae:1 (family)
- [Rafflesiaceae + Euphorbiaceae]: 0.
- Rafflesiaceae:1 (family)
- Euphorbiaceae:1 (family)
- [Phyllanthaceae + Picrodendraceae]: 2 (nucellar beak + [parietal tissue protruding through micropyle]; fruit with persistent central column).
- [Ixonanthaceae + Linaceae]: 0.
- Phyllanthaceae:1 (family)
- Picrodendraceae:1 (family)
- Ixonanthaceae:1 (family)
- Linaceae:1 (family)

GERANIALES:

- Geraniaceae:1 (family)
- [Melianthaceae [Vivianaceae [Greyiaceae + Francoaceae]]]: 0.
- Melianthaceae:1 (family)
- [Vivianaceae [Greyiaceae + Francoaceae]]: 0.
- Vivianaceae:1 (family)
- [Greyiaceae + Francoaceae]: 0.
- Greyiaceae:1 (family)
- Francoaceae:1 (family)

MYRTALES:

- Combretaceae:1 (family)
- [Onagraceae + Lythraceae]: 1 (exotegmen fibrous).
- [[Vochysiaceae + Myrtaceae] [Melastomataceae [Crypteroniaceae [Alzataeaceae + Penaeaceae]]]]: 0.
- Onagraceae:1 (family)
- Lythraceae:1 (family)
- [Vochysiaceae + Myrtaceae]: 1 (K and C imbricate).
- [Melastomataceae [Crypteroniaceae [Alzataeaceae + Penaeaceae]]]: 3 (connective abaxially much expanded; endothelial thickening absent/atypical; nectary 0).
- Vochysiaceae:1 (family)
- Myrtaceae:1 (family)

- Melastomataceae:1 (family)
- [Crypteroniaceae [Alzateaceae + Penaeaceae]]: 2 (stamens = and opposite petals; endothecium ephemeral).
- Crypteroniaceae:1 (family)
- [Alzateaceae + Penaeaceae]: 0.
- Alzateaceae:1 (family)
- Penaeaceae:1 (family)

CROSSOSOMATALES:

- [Staphyleaceae [Guamatelaceae [Stachyuraceae + Crossosomataceae]]]: 0.
- [Aphloiaceae [Geissolomataceae + Strasburgeriaceae]]: 1 (conspicuous protrusions from pollen apertures ["pollen buds"]).
- Staphyleaceae:1 (family)
- [Guamatelaceae [Stachyuraceae + Crossosomataceae]]: 0.
- Guamatelaceae:1 (family)
- [Stachyuraceae + Crossosomataceae]: 0.
- Stachyuraceae:1 (family)
- Crossosomataceae:1 (family)
- Aphloiaceae:1 (family)
- [Geissolomataceae + Strasburgeriaceae]: 4 (hairs single-celled, lignified and T-shaped; G synascidiate, with dorsal ribs, style long, towards tips twisted, postgenitally united; ovules two/carpel; hilum on seed large).
- Geissolomataceae:1 (family)
- Strasburgeriaceae:1 (family)

SAPINDALES:

- Biebersteiniaceae:1 (family)
- Nitrariaceae:1 (family)
- [Kirkiaceae [Anacardiaceae + Burseraceae]]: 2 (G adnate to central receptacular apex; fruit a schizocarp, with 1 seed/carpel).
- Sapindaceae:1 (family)
- [Simaroubaceae [Rutaceae + Meliaceae]]: 1 (limonoids/protolimonoids +).
- Kirkiaceae:1 (family)
- [Anacardiaceae + Burseraceae]: 5 (biflavonoids; phloem with vertical intercellular secretory canals; phloem surrounded by a light-coloured, sinuous, sclerenchymatous band; ovule pachychalazal; fruit a drupe, operculate).
- Anacardiaceae:1 (family)
- Burseraceae:1 (family)
- Simaroubaceae:1 (family)
- Rutaceae:1 (family)
- Meliaceae:1 (family)

HUERTEALES:

- Dipentodontaceae:1 (family)
- Gerrardinaceae:1 (family)
- Petenaeaceae:1 (family)
- Tapisciaceae:1 (family)

MALVALES:

- Neuradaceae:1 (family)

- [Thymelaeaceae [Sphaerosepalaceae, Bixaceae, [Cistaceae + Sarcolaenaceae + Dipterocarpaceae], [Muntingiaceae + Cytinaceae], Malvaceae]]: 3 (pits vestured; phloem stratified, phloem rays wedge-shaped; exotegmen much thickened and lignified, palisade).
- Thymelaeaceae:1 (family)
- Sphaerosepalaceae:1 (family)
- Bixaceae:1 (family)
- [Cistaceae + Sarcolaenaceae + Dipterocarpaceae]: 2 (plant with secretory canals; K with the two outer members often different from the rest).
- [Cytinaceae + Muntingiaceae]: 1 (seeds mucilaginous, mucilage derived from funicle).
- Malvaceae:1 (family)
- Cistaceae:1 (family)
- Sarcolaenaceae:1 (family)
- Dipterocarpaceae:1 (family)
- Cytinaceae:1 (family)
- Muntingiaceae:1 (family)

BRASSICALES:

- [Akaniaceae + Tropaeolaceae]: 6 (bracteoles 0; flowers obliquely monosymmetric; K/C tube +; A 8; ovules 1-2/carpel; testa vascularized, multiplicative).
- [[Moringaceae + Caricaceae] [Limnanthaceae [Setchellanthaceae [[Koeberliniaceae [Bataceae + Salvadoraceae]] [Emblingiaceae [[Pentadiplandraceae [Gyrostemonaceae [Borthwickia + Stixis & co. + Resedaceae]]], Tovariaceae, [Capparaceae [Cleomaceae + Brassicaceae]]]]]]]: 0.
- Akaniaceae:1 (family)
- Tropaeolaceae:1 (family)
- [Moringaceae + Caricaceae]: 5 (ovary longitudinally sulcate; placentation parietal; style hollow; micropyle bistomal; testa multiplicative, mesotesta ± lignified).
- [Setchellanthaceae [Limnanthaceae [[Koeberliniaceae [Bataceae + Salvadoraceae]] [Emblingiaceae [[Pentadiplandraceae [Gyrostemonaceae [Borthwickia + Stixis & co. + Resedaceae]]], Tovariaceae, [Capparaceae [Cleomaceae + Brassicaceae]]]]]]]: 1 (extended 3' terminus of *rbcL* gene).
- Moringaceae:1 (family)
- Caricaceae:1 (family)
- Setchellanthaceae:1 (family)
- Limnanthaceae:1 (family)
- [[Koeberliniaceae [Bataceae + Salvadoraceae]] [Emblingiaceae [[Pentadiplandraceae [Gyrostemonaceae [Borthwickia + Stixis & co. + Resedaceae]]], Tovariaceae, [Cleomaceae [Capparaceae + Brassicaceae]]]]]: 5 (glucosinolates from chain-elongated branched-chain amino acids; style short to absent; ovules campylotropous; seeds exotegmic, exotegmen fibrous; embryo strongly curved).
- [Koeberliniaceae [Bataceae + Salvadoraceae]]: 4 (idioblastic myrosin cells 0; pits vestured; flowers 4-merous; fruit indehiscent).
- [Emblingiaceae [[Pentadiplandraceae [Gyrostemonaceae [Borthwickia + Stixis & co. + Resedaceae]]], Tovariaceae, [Capparaceae [Cleomaceae + Brassicaceae]]] / **core Brassicales**: 4 (cisternae of endoplasmic reticulum dilated and vacuole-like; bracteoles 0; nectary outside A; endotesta crystalliferous).
- Koeberliniaceae:1 (family)
- [Bataceae + Salvadoraceae]: 5 (stomata paracytic; leaves opposite, lamina with secondary veins ± palmate; bracts with colleters on their tips; ovules 2/carpel; exotegmen not fibrous).
- Bataceae:1 (family)
- Salvadoraceae:1 (family)
- Emblingiaceae:1 (family)
- Pentadiplandraceae:1 (family)

- [Gyrostemonaceae [*Borthwickia* + *Stixis* & co. + Resedaceae]]: 3 (idioblastic myrosin cells 0; styluli +; seeds arillate).
- Tovariaceae:1 (family)
- [Capparaceae [Cleomaceae + Brassicaceae]]: 6 (stomatal myrosin cells 0; pits vestured; flowers 4-merous; placentation parietal; tegmen multiplicative; radicle in pocket formed by testa).
- Gyrostemonaceae:1 (family)
- Resedaceae:1 (family)
- Capparaceae:1 (family)
- [[Cleomaceae + Brassicaceae]: 2 (A 6; fruit septicidal, persistent placental strands + [replum]).
- Cleomaceae:1 (family)
- Brassicaceae:1 (family)

SANTALALES:

- Erythralaceae:1 (family)
- Strombosiaceae:1 (family)
- Coulaceae:1 (family)
- [Ximeniaceae [Aptandraceae, Olacaceae [Octoknemaceae [[Loranthaceae [Misodendraceae + Schoepfiaceae]] [Opiliaceae + Santalaceae]]]]: 3 (root hemiparasites; silicification of some foliar mesophyll/epidermal cells; embryo sac curved, with chalazal caecum and ± developed micropylar prolongation).
- Ximeniaceae:1 (family)
- Aptandraceae:1 (family)
- Olacaceae:1 (family)
- Octoknemaceae:1 (family)
- [[Loranthaceae [Misodendraceae + Schoepfiaceae]] [Opiliaceae + Santalaceae]]: 3 (G not septate; ovules undifferentiated, ategmic; testa 0).
- Balanophoraceae [incertae sedis]:1 (family)
- [Loranthaceae [Misodendraceae + Schoepfiaceae]]: 0.
- [Opiliaceae + Santalaceae]: 0.
- Loranthaceae:1 (family)
- [Misodendraceae + Schoepfiaceae]: 0.
- Misodendraceae:1 (family)
- Schoepfiaceae:1 (family)
- Opiliaceae:1 (family)
- Santalaceae:1 (family)

BERBERIDOPSIDALES:

- Aextoxicaceae:1 (family)
- Berberidopsidaceae:1 (family)

CARYOPHYLLALES:

- [[Droseraceae [Nepenthaceae [Drosophyllaceae [Ancistrocladaceae + Dioncophyllaceae]]]] [[Frankeniaceae + Tamaricaceae] [Plumbaginaceae + Polygonaceae]]: 3 (acetogenic naphthoquinones +; pit glands +; endosperm starchy).
- [Rhabdodendraceae [Simmondsiaceae [[Asteropeiaceae + Physenaceae] [Caryophyllaceae, Nyctaginaceae, Cactaceae, etc.]]]]: 1 (fruit 1-seeded).
- [Droseraceae [Nepenthaceae [Drosophyllaceae [Ancistrocladaceae + Dioncophyllaceae]]]]: 4 (plants carnivorous; vascularized multicellular stalked or sessile glands +; anthers extrorse; ovary unilocular).
- [[Frankeniaceae + Tamaricaceae] [Plumbaginaceae + Polygonaceae]]: 2 (sulphated flavonols; ovary 1-locular).

- Droseraceae:1 (family)
- [Nepenthaceae [Drosophyllaceae [Ancistrocladaceae + Dioncophyllaceae]]]: 3 (petiole bundles surrounded by massive sclerenchymatous ring with embedded vascular bundles; leaves abaxially circinate; anthers basifixed).
- Nepenthaceae:1 (family)
- [Drosophyllaceae [Ancistrocladaceae + Dioncophyllaceae]]: 0.
- Drosophyllaceae:1 (family)
- [Ancistrocladaceae + Dioncophyllaceae]: 4 (acetogenic naphthyl isoquinoline alkaloids +; cork deep seated; petiole with inverted bundles in sclerenchyma ring; stomata actinocyclic).
- Ancistrocladaceae:1 (family)
- Dioncophyllaceae:1 (family)
- [Frankeniaceae + Tamaricaceae]: 3 (leaves small, with salt-excreting glands; C with basal adaxial appendages; pollen not spinulose).
- [Plumbaginaceae + Polygonaceae]: 6 (O-methylated flavonols; quinones +; cortical and/or medullary vascular bundles +; leaf base broad; ovule single; fruit surrounded by accrescent calyx).
- Frankeniaceae:1 (family)
- Tamaricaceae:1 (family)
- Plumbaginaceae:1 (family)
- Polygonaceae:1 (family)
- Rhabdodendraceae:1 (family)
- [Simmondsiaceae [[Asteropeiaceae + Physenaceae] [Caryophyllaceae, Nyctaginaceae, Cactaceae, etc.]]]: 1 (petals lost).
- Simmondsiaceae:1 (family)
- [Asteropeiaceae + Physenaceae]: 0.
- [Caryophyllaceae, Nyctaginaceae, Cactaceae, etc.] / **Core Caryophyllales**: 10 (plant herbaceous; betalains; ferulic acid ester-linked to primary unlignified cell walls; sieve tube plastids with a ring of proteinaceous filaments and a central angular crystalloid; pollen trinucleate; nectaries on adaxial bases of stamens [or hypanthium]; ovules campylotropous; endosperm 0, perisperm +, starch; embryo curved, not central; no dark reversal $P_{fr} \rightarrow P_r$).
- Asteropeiaceae:1 (family)
- Physenaceae:1 (family)

Core Caryophyllales:

- Microteaceae:1 (family)
- [[Caryophyllaceae [Achatocarpaceae + Amaranthaceae]] [Stegnospermataceae [Limeaceae [[Lophiocarpaceae [Hypertelis [Barbeuiaceae [Aizoaceae [Gisekiaceae [Sarcobataceae, Phytolaccaceae, Nyctaginaceae]]]]]] [Molluginaceae [Montiaceae [[Halophytaceae [Didiereaceae + Basellaceae]] [Talinaceae [Anacampserotaceae [Portulacaceae + Cactaceae]]]]]]]]]: 0.
- [Caryophyllaceae [Achatocarpaceae + Amaranthaceae]]: 2 (stamens = and opposite P; ovule single).
- [Stegnospermataceae [Limeaceae [[Lophiocarpaceae [Hypertelis [Barbeuiaceae [Aizoaceae [Gisekiaceae [Sarcobataceae, Phytolaccaceae, Nyctaginaceae]]]]]] [Molluginaceae [Montiaceae [[Halophytaceae [Didiereaceae + Basellaceae]] [Talinaceae [Anacampserotaceae [Portulacaceae + Cactaceae]]]]]]]]]: 0.
- Caryophyllaceae:1 (family)
- [Achatocarpaceae + Amaranthaceae]: 1 (pollen porate).
- Achatocarpaceae:1 (family)
- Amaranthaceae:1 (family)
- Stegnospermataceae:1 (family)

- [Limeaceae [[Lophiocarpaceae [*Hypertelis* [Barbeuiaceae [Aizoaceae [Gisekiaceae [Sarcobataceae, Phytolaccaceae, Nyctaginaceae]]]]]] [Molluginaceae [Montiaceae [[Halophytaceae [Didiereaceae + Basellaceae]] [Talinaceae [Anacampserotaceae [Portulacaceae + Cactaceae]]]]]]]: 0.
- Limeaceae:1 (family)
- [[[Lophiocarpaceae [*Hypertelis* [Barbeuiaceae [Aizoaceae [Gisekiaceae [Sarcobataceae, Phytolaccaceae, Nyctaginaceae]]]]]] [Molluginaceae [Montiaceae [[Halophytaceae [Didiereaceae + Basellaceae]] [Talinaceae [Anacampserotaceae [Portulacaceae + Cactaceae]]]]]]]: 1 (sieve tube plastids with globular crystalloids).
- [Lophiocarpaceae [*Hypertelis* [Barbeuiaceae [Aizoaceae [Gisekiaceae [Sarcobataceae, Phytolaccaceae, Nyctaginaceae]]]]]]: 0.
- [Molluginaceae [Montiaceae [[Halophytaceae [Didiereaceae + Basellaceae]] [Talinaceae [Anacampserotaceae [Portulacaceae + Cactaceae]]]]]]: 0.
- Lophiocarpaceae:1 (family)
- Barbeuiaceae:1 (family)
- Aizoaceae:1 (family)
- Gisekiaceae:1 (family)
- Sarcobataceae:1 (family)
- Phytolaccaceae:1 (family)
- Nyctaginaceae:1 (family)
- Molluginaceae:1 (family)
- [Montiaceae [[Halophytaceae [Didiereaceae + Basellaceae]] [Talinaceae [Anacampserotaceae [Portulacaceae + Cactaceae]]]] / Portulacinae / Cactinae: 4 (phloem parenchyma cells with phytoferritin; two pairs of bracteoles, inner pair in the median plane; pollen pantocolpate; 6-bp deletion in *ndhf* gene).
- Montiaceae:1 (family)
- [[[Halophytaceae [Didiereaceae + Basellaceae]] [Talinaceae [Anacampserotaceae [Portulacaceae + Cactaceae]]]]]: 0.
- [Halophytaceae [Didiereaceae + Basellaceae]]: 2 (ovary with single basal ovule; fruit indehiscent).
- [Talinaceae [Anacampserotaceae [Portulacaceae + Cactaceae]]]: 2 (pericyclic fibres 0; pericarp 2-layered, exocarp ± caducous).
- Halophytaceae:1 (family)
- Didiereaceae:1 (family)
- Basellaceae:1 (family)
- Talinaceae:1 (family)
- Anacampserotaceae:1 (family)
- [Portulacaceae + Cactaceae]: 2 (G half inferior; pericarp not 2-layered).
- Portulacaceae:1 (family)
- Cactaceae:1 (family)

CORNALES:

- Cornaceae:1 (family)
- [Grubbiaceae + Curtisiaceae]: 0.
- Nyssaceae:1 (family)
- [Hydrostachyaceae [Hydrangeaceae + Loasaceae]]: 2 (ovary with intrusive parietal placentation; micropylar endosperm haustorium +).
- Grubbiaceae:1 (family)
- Curtisiaceae:1 (family)
- Hydrostachyaceae:1 (family)
- [Hydrangeaceae + Loasaceae]: 1 (similar route I secoiridoids and route II decarboxylated iridoids).

- Hydrangeaceae:1 (family)
- Loasaceae:1 (family)

ERICALES:

- [Marcgraviaceae [Balsaminaceae + Tetrameristaceae]] / **Balsaminoid clade**: 8 (raphide sacs +; druses 0; vessels in radial multiples; ± branched sclereids +; lamina supervolute, elongating in bud, with obscure abaxial lines; nectary outside A; gynoeical nectary 0; style short, stigma little expanded).
- [[Polemoniaceae + Fouquieriaceae], Lecythidaceae, [[Sladeniaceae + Pentaphylacaceae], [Sapotaceae [Ebenaceae + Primulaceae]], [Mitrastemonaceae, Theaceae, [Symplocaceae [Styracaceae + Diapensiaceae]], [[Sarraceniaceae [Roridulaceae + Actinidiaceae] [Clethraceae [Cyrillaceae + Ericaceae]]]]]]: 1 (corolla connate, tube well developed).
- Marcgraviaceae:1 (family)
- [Balsaminaceae + Tetrameristaceae]: 3 (K petal-like, nectariferous; filaments postgenitally united; stylar canal +, 5-radiate).
- Balsaminaceae:1 (family)
- Tetrameristaceae:1 (family)
- [Polemoniaceae + Fouquieriaceae]: 4 (K with scarious margins; A adnate to the corolla; G [3], style hollow, style/stigma branched; seeds winged).
- Lecythidaceae:1 (family)
- [[Sladeniaceae + Pentaphylacaceae], [Sapotaceae [Ebenaceae + Primulaceae]], [Mitrastemonaceae, Theaceae, [Symplocaceae [Styracaceae + Diapensiaceae]], [[Sarraceniaceae [Roridulaceae + Actinidiaceae] [Clethraceae [Cyrillaceae + Ericaceae]]]]]]: 0.
- Polemoniaceae:1 (family)
- Fouquieriaceae:1 (family)
- [Sladeniaceae + Pentaphylacaceae]: 1 (ovules bitegmic).
- [Sapotaceae [Ebenaceae + Primulaceae]]: 0.
- [Mitrastemonaceae, Theaceae, [Symplocaceae [Styracaceae + Diapensiaceae]], [[Sarraceniaceae [Roridulaceae + Actinidiaceae] [Clethraceae [Cyrillaceae + Ericaceae]]]]: 0.
- Sladeniaceae:1 (family)
- Pentaphylacaceae:1 (family)
- Sapotaceae:1 (family)
- [Ebenaceae + Primulaceae]: 1 (ovules bitegmic).
- Ebenaceae:1 (family)
- Primulaceae:1 (family)
- Mitrastemonaceae:1 (family)
- Theaceae:1 (family)
- [Symplocaceae [Styracaceae + Diapensiaceae]]: 0.
- [[Sarraceniaceae [Actinidiaceae + Roridulaceae]] [Clethraceae [Cyrillaceae + Ericaceae]]]: 1 (anthers extrorse, inverting during development).
- Symplocaceae:1 (family)
- [Styracaceae + Diapensiaceae]: 1 (nectary 0).
- Styracaceae:1 (family)
- Diapensiaceae:1 (family)
- [Sarraceniaceae [Actinidiaceae + Roridulaceae]]: 0.
- [Clethraceae [Cyrillaceae + Ericaceae]]: 0.
- Sarraceniaceae:1 (family)
- [Actinidiaceae + Roridulaceae]: 0.

- Actinidiaceae:1 (family)
- Roridulaceae:1 (family)
- Clethraceae:1 (family)
- [Cyrillaceae + Ericaceae]: 0.
- Cyrillaceae:1 (family)
- Ericaceae:1 (family)

GARRYALES:

- Eucommiaceae:1 (family)
- Garryaceae:1 (family)

GENTIANALES:

- Rubiaceae:1 (family)
- [Gentianaceae [Loganiaceae + Gelsemiaceae + Apocynaceae]]: 3 (route I secoiridoids +; internal phloem + [bicollateral vascular bundles]; syncarpy postgenital).
- Gentianaceae:1 (family)
- [Loganiaceae + Gelsemiaceae + Apocynaceae]: 0.
- Loganiaceae:1 (family)
- Gelsemiaceae:1 (family)
- Apocynaceae:1 (family)

SOLANALES:

- [Montiniaceae [Sphenocleaceae + Hydroleaceae]]: 0.
- [Convolvulaceae + Solanaceae]: 6 (tropane [polyhydroxynortropenes]; pyrrolidine; acylated anthocyanins +; internal phloem +; flowers with oblique symmetry; C contorted-plicate or induplicate-valvate).
- Montiniaceae:1 (family)
- [Sphenocleaceae + Hydroleaceae]: 0.
- Sphenocleaceae:1 (family)
- Hydroleaceae:1 (family)
- Convolvulaceae:1 (family)
- Solanaceae:1 (family)

LAMIALES:

- Plocospermataceae:1 (family)
- [[[Carlemanniaceae + Oleaceae] [Tetrachondraceae [[Calceolariaceae + Gesneriaceae s.l.] [Plantaginaceae [Scrophulariaceae [Byblidaceae, Linderniaceae, [Stilbaceae [[Lamiaceae [Mazaceae [Phrymaceae [Paulowniaceae + Orobanchaceae]]]] [Thomandersiaceae, Verbenaceae, Pedaliaceae, [Schlegeliaceae + Martyniaceae], Bignoniaceae, Acanthaceae, Lentibulariaceae]]]]]]]]]: 1 (cells in heads of glandular hairs with vertical walls only).
- [Carlemanniaceae + Oleaceae]: 2 (A 2; pollen tricolpate).
- [Tetrachondraceae [[Calceolariaceae + Gesneriaceae s.l.] [Plantaginaceae [Scrophulariaceae [Byblidaceae, Linderniaceae, [Stilbaceae [[Lamiaceae [Mazaceae [Phrymaceae [Paulowniaceae + Orobanchaceae]]]] [Thomandersiaceae, Verbenaceae, Pedaliaceae, [Schlegeliaceae + Martyniaceae], Bignoniaceae, Acanthaceae, Lentibulariaceae]]]]]]]]]: 0.
- Carlemanniaceae:1 (family)
- Oleaceae:1 (family)
- Tetrachondraceae:1 (family)
- [[[Calceolariaceae + Gesneriaceae s.l.] [Plantaginaceae [Scrophulariaceae [Byblidaceae, Linderniaceae, [Stilbaceae [[Lamiaceae [Mazaceae [Phrymaceae [Paulowniaceae + Orobanchaceae]]]] [Thomandersiaceae,

Verbenaceae, Pedaliaceae, [Schlegeliaceae + Martyniaceae], Bignoniaceae, Acanthaceae, Lentibulariaceae]]]]]] / **Core Lamiales**: 4 (shikimic-acid derived anthraquinones; flowers vertically monosymmetric, C bilabiate, 2-lobed upper lip, 3-lobed lower lip; A 4, didynamous, anthers connivent; ovules many/carpel).

- Calceolariaceae:1 (family)
- Gesneriaceae:1 (family)
- [Plantaginaceae [Scrophulariaceae [Byblidaceae, Linderniaceae, [Stilbaceae [[Lamiaceae [Mazaceae [Phrymaceae [Paulowniaceae + Orobanchaceae]]]] [Thomandersiaceae, Verbenaceae, Pedaliaceae, [Schlegeliaceae + Martyniaceae], Bignoniaceae, Acanthaceae, Lentibulariaceae]]]]]: 2 (route II decarboxylated iridoids; cornosides 0).
- Plantaginaceae:1 (family)
- [Scrophulariaceae [Byblidaceae, Linderniaceae, [Stilbaceae [[Lamiaceae [Mazaceae [Phrymaceae [Paulowniaceae + Orobanchaceae]]]] [Thomandersiaceae, Verbenaceae, Pedaliaceae, [Schlegeliaceae + Martyniaceae], Bignoniaceae, Acanthaceae, Lentibulariaceae]]]]]: 0.
- Scrophulariaceae:1 (family)
- [Byblidaceae, Linderniaceae, [Stilbaceae [[Lamiaceae [Mazaceae [Phrymaceae [Paulowniaceae + Orobanchaceae]]]] [Thomandersiaceae, Verbenaceae, Pedaliaceae, [Schlegeliaceae + Martyniaceae], Bignoniaceae, Acanthaceae, Lentibulariaceae]]]]]: 0.
- Byblidaceae:1 (family)
- Linderniaceae:1 (family)
- Stilbaceae:1 (family)
- [[Lamiaceae [Paulowniaceae, Phrymaceae, Orobanchaceae]] [Thomandersiaceae, Verbenaceae, Pedaliaceae, [Schlegeliaceae + Martyniaceae], Bignoniaceae, Acanthaceae, Lentibulariaceae]]]: 0.
- Lamiaceae:1 (family)
- Paulowniaceae:1 (family)
- Phrymaceae:1 (family)
- Orobanchaceae:1 (family)
- Thomandersiaceae:1 (family)
- Verbenaceae:1 (family)
- Pedaliaceae:1 (family)
- Schlegeliaceae:1 (family)
- Martyniaceae:1 (family)
- Bignoniaceae:1 (family)
- Acanthaceae:1 (family)
- Lentibulariaceae:1 (family)

AQUIFOLIALES:

- [Cardiopteridaceae + Stemonuraceae]: 4 (pollen (1-)3(-6)-porate; G [2], adaxial carpel alone fertile; integument vascularized; fruit 1-seeded).
- [Aquifoliaceae [Phyllonomaceae + Helwingiaceae]]: 1 (style 0).
- Cardiopteridaceae:1 (family)
- Stemonuraceae:1 (family)
- Aquifoliaceae:1 (family)
- [Phyllonomaceae + Helwingiaceae]: 3 (stipules fimbriate; inflorescence epiphyllous; ovary inferior).
- Phyllonomaceae:1 (family)
- Helwingiaceae:1 (family)

ASTERALES:

- [Rousseaceae + Campanulaceae]: 0.
- [Pentaphragmataceae [[Alseuosmiaceae [Phellinaceae + Argophyllaceae]] [Stylidiaceae [Menyanthaceae [Goodeniaceae [Calyceraceae + Asteraceae]]]]]]]: 0.

- Rousseeaceae:1 (family)
- Campanulaceae:1 (family)
- Pentaphragmataceae:1 (family)
- [[Alseuosmiaceae [Phellinaceae + Argophyllaceae]] [Stylidiaceae [Menyanthaceae [Goodeniaceae [Calyceraceae + Asteraceae]]]]]: 0.
- [Alseuosmiaceae [Phellinaceae + Argophyllaceae]]: 0.
- [Stylidiaceae [Menyanthaceae [Goodeniaceae [Calyceraceae + Asteraceae]]]]: 0.
- Alseuosmiaceae:1 (family)
- Phellinaceae:1 (family)
- Argophyllaceae:1 (family)
- Stylidiaceae:1 (family)
- [Menyanthaceae [Goodeniaceae [Calyceraceae + Asteraceae]]]: 1 (antiraphal vascular bundle proceeding to the micropyle).
- Menyanthaceae:1 (family)
- [Goodeniaceae [Calyceraceae + Asteraceae]]: 2 (acetylenes +; secondary pollen presentation +).
- Goodeniaceae:1 (family)
- [Calyceraceae + Asteraceae]: 5 (inflorescence capitate, involucrate; flowers small, sessile; ovule single; fruit a cypsel; K persistent, modified, involved in dispersal).
- Calyceraceae:1 (family)
- Asteraceae:1 (family)

BRUNIALES:

- Bruniaceae:1 (family)
- Columelliaceae:1 (family)

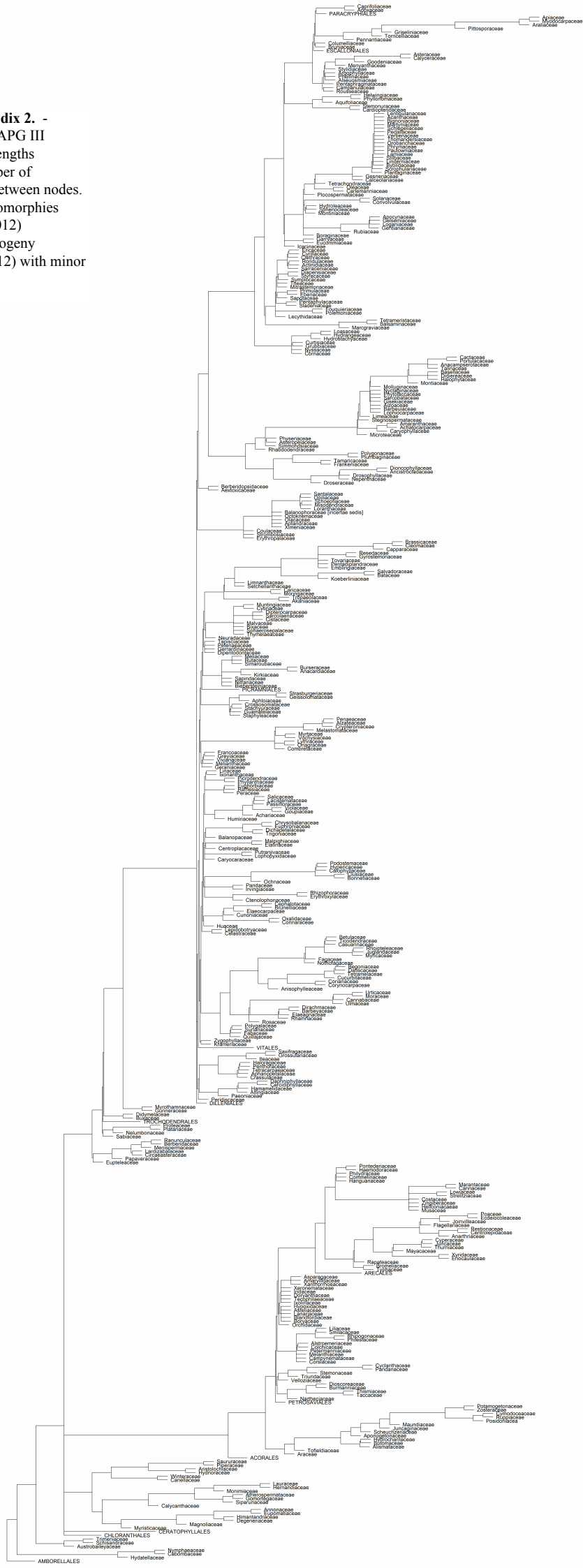
APIALES:

- Pennantiaceae:1 (family)
- [Torricelliaceae [Griselinaceae [Pittosporaceae [Araliaceae [Myodocarpaceae + Apiaceae]]]]]: 3 (C apparently free; ovary inferior; style branches/stigmas recurved).
- Torricelliaceae:1 (family)
- [Griselinaceae [Pittosporaceae [Araliaceae [Myodocarpaceae + Apiaceae]]]: 1 (petroselenic acid +).
- Griselinaceae:1 (family)
- [Pittosporaceae [Araliaceae [Myodocarpaceae + Apiaceae]]]: 8 (ethereal oils; acetate-derived anthroquinones; coumarins +; C₁₇ aliphatic acetylene falcarinone; lateral roots originating from either side of the xylem poles; schizogenous secretory canals +; pollen trinucleate; G [2]).
- Pittosporaceae:1 (family)
- [Araliaceae [Myodocarpaceae + Apiaceae]]: 7 (polyacetylenes + [mainly aliphatic, C₁₈ tariric fatty acid in seed]; inflorescences terminal, ultimate units umbels; K open; C valvate; nectary continuous with style [stylopodium]; ventral carpel bundles are fused bundles of adjacent placentae; fruits ± laterally flattened).
- Araliaceae:1 (family)
- [Myodocarpaceae + Apiaceae]: 1 (A inflexed in bud).
- Myodocarpaceae:1 (family)
- Apiaceae:1 (family)

DIPSACALES:

- Adoxaceae:1 (family)
- Caprifoliaceae: 1 (family)

Phylogram of the APG III families. Branch lengths represent the number of synapomorphies between nodes. Phylogeny and apomorphies follow Stevens (2012) (Angiosperm Phylogeny Website, Version 12) with minor modifications.



Electronic Appendix 3. -
Dendrogram of a cluster analysis
(average linkage) of the
angiosperms based on the
patrocladistic distance among
APG III families.

